Workshop Manual
Audi A3 2013 ➤
Audi A3 Sportback China 2014 ➤

4-cylinder direct injection engine (1.2, 1.4 ltr. 4-valve TFSI EA 211)									
Engine ID	CMBA	CPTA	CJZA	CXSA	CXSB	CSSA	CYVB	CZCA	CZEA
	CUKB	CXUA	DBWA	CWLA	CZCC	DJSA	DGEA		

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List of Workshop Manual Repair Groups

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

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00 – Technical data

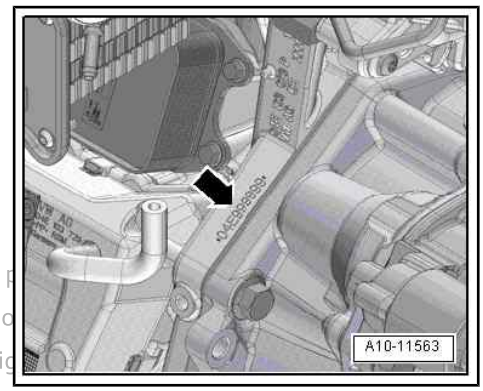
1 Identification

(ARL006502; Edition 08.2019)

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

1.1 Engine 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.
- The four-letter engine code is found on the type plate (certain countries only), vehicle data sticker and engine control unit.
- Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 821 ; General information; Vehicle data sticker .

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Engine data

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

2 Safety precautions

⇒ “2.1 Safety precautions when working on vehicles with high-voltage system”, page 2

⇒ “2.2 Safety precautions when working in the vicinity of high-voltage components”, page 3

⇒ “2.3 Safety precautions when working on the fuel supply system”, page 3

⇒ “2.4 Safety precautions when working on vehicles with start/stop system”, page 4

⇒ “2.5 Safety precautions when using testers and measuring instruments during a road test”, page 4

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

⇒ “2.7 Safety precautions when working on the cooling system”, page 4

⇒ “2.8 Safety precautions when working on the exhaust system”, page 5

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2.1 Safety precautions when working on vehicles with high-voltage system

Electric and magnetic fields can cause fatal injury.

The high-voltage system generates electric and magnetic fields. Danger of severe or fatal injuries caused by malfunctioning of active implants (e.g. pacemakers, insulin pumps).

– Persons with active implants must not perform work on the high-voltage system.

Risk of injury - engine may start unexpectedly

It is difficult to determine whether the drive system of an electric vehicle or hybrid vehicle is active. Moving parts can trap or draw in parts of the body.

– Switch off ignition.

– Deposit the ignition key outside of the vehicle.

Risk of damage to high-voltage wiring

Incorrect handling may result in damage to the insulation of high-voltage wires or high-voltage connectors.

– Never use high-voltage wiring or high-voltage connectors as a support.

– Never support tools or equipment on high-voltage wires and high-voltage connectors.

– High-voltage cables must not be excessively bent or kinked.

– Pay attention to coding when connecting high-voltage connections.

Risk of injury if auxiliary air conditioner is activated

On electric and hybrid vehicles, the auxiliary air conditioner can switch itself on if it has been activated. The radiator fans can start up automatically and trap or draw in parts of the body.

– Deactivate auxiliary air conditioner.

2.2 Safety precautions when working in the vicinity of high-voltage components

High voltage can cause fatal injury.

The voltage levels in the high-voltage system constitute a safety hazard. Danger of severe or fatal injuries from electric shock or electric arcs if high-voltage components or high-voltage wiring are damaged.

– Carry out a visual check of high-voltage components and high-voltage wiring.
– Never use cutting/forming tools or other sharp-edged implements in the vicinity of high-voltage components and high-voltage wires.
– Never perform work using welding, brazing, thermal bonding or hot air in the vicinity of high-voltage components or high-voltage wires.

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2.3 Safety precautions when working on the fuel supply system

Risk of injury - fuel system operates under high pressure

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

Before opening the fuel system:

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

Risk of fire due to escaping fuel

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

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

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

Risk of injury - engine may start unexpectedly

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

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

2.5 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.

2.6 Safety precautions when working on the ignition system

Risk of injury due to electric shock

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

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

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Risk of damage to components

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

– Switch off ignition before connecting/disconnecting electrical wiring.

– Switch off ignition before cleaning engine.

2.7 Safety precautions when working on the cooling system

Risk of scalding as hot coolant can escape

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

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

DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

– **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
– **If the warning lamps for “low coolant” and “fault in high-voltage battery” light up, move the vehicle into the dedicated separate storage area outside.**
– **Inform a high-voltage expert at the importer.**

2.8 Safety precautions when working on the exhaust system

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.

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Risk of injury caused by components of the exhaust system

Danger of injury to hands and other parts of the body due to hot or sharp parts of the exhaust system.

– Allow exhaust system to cool down.
– Put on protective gloves.

Risk to health due to chemical substances in components of exhaust system

Risk to health if components of system for after-treatment of exhaust gases are dismantled.

– Do NOT cut, saw or open components of system for after-treatment of exhaust gases.

3 Assessing high-voltage system risk level

⇒ “3.1 Necessary qualifications”, page 6

⇒ “3.2 Work that requires high-voltage system to be de-energised”, page 6

3.1 Necessary qualifications

The different types of work near or directly on high-voltage components require different qualifications ⇒ Basic information on high-voltage vehicles; Rep. gr. 00 ; Qualification of internal/external personnel .

3.2 Work that requires high-voltage system to be de-energised

– The high-voltage system must be de-energised to perform the following work.

The high-voltage system must be de-energised according to the “Guided Fault Finding” routine in
⇒ “10 De-energising high-voltage system”, page 689 , and ONLY by this method.

Component	Operation	Qualification
Welding, grinding or cutting work near high-voltage components	⇒ Body Repairs; Rep. gr. 00 ; Notes for vehicles with hybrid drive	System de-energised by HVT, work after system has been de-energised by EIP
Body repairs (with straightening jig)	⇒ Body Repairs; Rep. gr. 00 ; Straightening jig	System de-energised by HVT, work after system has been de-energised by EIP
Power and control electronics for electric drive - JX1-	Removing and installing power and control electronics for electric drive ⇒ “5.3 Removing and installing power and control electronics for electric drive”, page 638	HVT
Hybrid battery unit - AX1-	Removing and installing hybrid battery unit ⇒ “3.3 Removing and installing hybrid battery unit AX1 ”, page 568	HVT
Control unit for high-voltage battery charging unit - J1050-	Removing and installing control unit for high-voltage battery charging unit ⇒ “6.2 Removing and installing charging unit 1 for high-voltage battery AX4 ”, page 658	HVT
High-voltage battery charging socket 1 - UX4-	Removing and installing high-voltage battery charging socket 1 ⇒ “9.4 Removing and installing high-voltage battery charging socket 1 UX4 ”, page 685	HVT
Mounting for high-voltage battery charging socket 1 - UX4-	Removing and installing mounting for charging socket ⇒ “9.4.2 Removing and installing mounting for charging socket”, page 687	HVT
Three-phase current drive - VX54-	Removing and installing electric drive motor ⇒ “7.1 Removing and installing three-phase current drive VX54 ”, page 662	HVT
High-voltage system fuse 3 - S353-	Removing and installing high-voltage system fuse 3 - S353- ⇒ “5.5 Removing and installing high-voltage system fuse 3 S353 ”, page 651	HVT

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Component	Operation	Qualification
Electrical air conditioner compressor - V470-	Removing and installing electrical air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor	HVT
High-voltage heater (PTC) - Z115-	Removing and installing high-voltage heater (PTC) ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit	HVT
High-voltage wiring harness for high-voltage battery - PX1-	Removing and installing high-voltage wiring harness for high-voltage battery ⇒ "8.2 Removing and installing high-voltage wiring harness for high-voltage battery", page 666	HVT
High-voltage wiring harness for drive motor - PX2-	Removing and installing high-voltage wiring harness for drive motor ⇒ "8.3 Removing and installing high-voltage wiring harness for drive motor", page 673	HVT
High-voltage wire for electrical air conditioner compressor - P3-	Removing and installing high-voltage wire for electrical air conditioner compressor ⇒ "8.6 Removing and installing high-voltage wire for electrical air conditioner compressor", page 681	HVT
High-voltage wire for high-voltage battery charging unit - P25-	Removing and installing high-voltage wire for high-voltage battery charging unit ⇒ "8.4 Removing and installing high-voltage wire for power and control electronics for electric drive", page 677	HVT
High-voltage wire for high-voltage heater (PTC) - P11-	Removing and installing high-voltage wire for high-voltage heater (PTC) ⇒ "8.5 Removing and installing high-voltage wire for high-voltage heater (PTC)", page 679	HVT
Final drive	Removing and installing gearbox ⇒ Rep. gr. 34 ; Removing and installing gearbox	System de-energised by HVT, work after system has been de-energised by EIP
Oil seal for selector shaft	Removing and installing oil seal for selector shaft ⇒ Rep. gr. 34 ; Selector mechanism; Renewing oil seal for selector shaft	System de-energised by HVT, work after system has been de-energised by EIP
Mechatronic unit for dual clutch gearbox - J743-	Removing and installing mechatronic unit for dual clutch gearbox ⇒ Rep. gr. 38 ; Mechatronic unit; Removing and installing mechatronic unit	System de-energised by HVT, work after system has been de-energised by EIP
Gearbox mounting	Removing and installing gearbox mounting ⇒ "2.4.2 Removing and installing gearbox mounting - e-tron", page 69	System de-energised by HVT, work after system has been de-energised by EIP
Gear oil filter	Removing and installing gear oil filter ⇒ Rep. gr. 34 ; Gear oil circuit; Removing and installing gear oil filter	System de-energised by HVT, work after system has been de-energised by EIP
Gear oil cooler	Removing and installing gear oil cooler ⇒ Rep. gr. 34 ; Gear oil circuit; Removing and installing gear oil cooler	System de-energised by HVT, work after system has been de-energised by EIP
Coolant valve for gearbox - N488-	Removing and installing coolant valve for gearbox ⇒ "4.13.1 Removing and installing coolant valve for gearbox N488 ", page 382	System de-energised by HVT, work after system has been de-energised by EIP

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Component	Operation	Qualification
Engine removal (including gearbox)	Removing and installing engine with gearbox ⇒ “1.1.2 Removing engine - e-tron”, page 27 , ⇒ “1.4.2 Installing engine - e-tron”, page 51	System de-energised by HVT, work after system has been de-energised by EIP
Coolant pipes (left-side)	Removing and installing coolant pipes (left-side) ⇒ “5.2.3 Removing and installing coolant pipes (left-side) - e-tron”, page 393	System de-energised by HVT, work after system has been de-energised by EIP
Coolant pump	Removing and installing coolant pump ⇒ “4.5.2 Removing and installing coolant pump - e-tron”, page 355	System de-energised by HVT, work after system has been de-energised by EIP
Catalytic converter	Removing and installing catalytic converter ⇒ “2.3.2 Removing and installing catalytic converter - e-tron without particulate filter”, page 530 , ⇒ “2.3.3 Removing and installing catalytic converter - e-tron with particulate filter”, page 533	System de-energised by HVT, work after system has been de-energised by EIP
Brake servo - NX6- with brake pedal position sender - G100- and brake pedal position sender 2 - G836-	Removing and installing brake servo ⇒ Brake system; Rep. gr. 47 ; Brake servo/brake master cylinder; Removing and installing brake servo	System de-energised by HVT, work after system has been de-energised by EIP
Brake system pressure accumulator - VX70-	Removing and installing brake system pressure accumulator ⇒ Brake system; Rep. gr. 47 ; Brake servo/brake master cylinder; Exploded view - brake servo/brake master cylinder	System de-energised by HVT, work after system has been de-energised by EIP
Brake master cylinder	Removing and installing brake master cylinder ⇒ Brake system; Rep. gr. 47 ; Brake servo/brake master cylinder; Removing and installing brake master cylinder	System de-energised by HVT, work after system has been de-energised by EIP
Subframe	Lowering/removing and installing subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .	System de-energised by HVT, work after system has been de-energised by EIP

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4 Repair instructions

⇒ “4.1 Work on high-voltage components or potential equalisation lines”, page 9

⇒ “4.2 Rules for cleanliness”, page 9

⇒ “4.3 Foreign particles in engine”, page 10

⇒ “4.4 Contact corrosion”, page 10

⇒ “4.5 Routing and attachment of pipes, hoses and wiring”, page 10

⇒ “4.6 Nuts, bolts”, page 10

⇒ “4.7 Identification plates”, page 11

⇒ “4.8 Use of impact wrenches”, page 11

⇒ “4.9 Installing radiators and condensers”, page 12

⇒ “4.10 Checking vacuum system”, page 12

⇒ “4.11 General notes”, page 12

⇒ “4.12 Painting work on vehicles with high-voltage system”, page 12

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4.1 Work on high-voltage components or potential equalisation lines

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

♦ `High-voltage`

♦ `Potential equalisation measurement on high-voltage components`

♦ `8C - Potential equalisation measurement hybrid battery unit AX1`

4.2 Rules for cleanliness

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

♦ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.

♦ Seal off open pipes and connections immediately with clean plugs, e.g. 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.

4.3 Foreign particles in engine

- When performing assembly work on the engine, all open passages in the intake and exhaust systems must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.
- If the turbocharger has suffered mechanical damage
⇒ "1.2 Removing and installing turbocharger", page 422

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4.4 Contact corrosion

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

For this reason, only fasteners with a special surface coating are 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 using Audi Genuine Accessories.
- Damage caused by contact corrosion is not covered by warranty.

4.5 Routing and attachment of pipes, hoses and wiring

Risk of damage to pipes/hoses/wiring

Moving or hot components may cause damage to pipes/hoses/wiring.

– Restore original routing when installing pipes/hoses/wiring.
– Ensure sufficient clearance from all moving or hot components.

- 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.

4.6 Nuts, bolts

- Loosen bolts in reverse sequence to specified tightening sequence.

- Bolts and nuts used to secure covers and housings must be tightened in steps according to the specified tightening sequence and method.
- Bolts and nuts which secure covers and housings should be loosened and tightened in diagonal sequence and in stages if no tightening sequence is specified.
- Always renew self-locking bolts and nuts.
- Unless otherwise specified, use a wire brush to clean the threads of bolts which are secured with locking fluid. Then install bolts with locking fluid; for locking fluid refer to ⇒ Electronic parts catalogue .
- Threaded holes which take self-locking bolts or bolts coated with locking fluid must be cleaned using a thread tap or similar. Otherwise there is a danger of the bolts shearing off the next time they are removed.
- The tightening torques stated apply to non-oiled nuts and bolts.

4.7 Identification plates

When renewing vehicle components, the identification plates on the old parts that have a replacement part number (see ⇒ Electronic parts catalogue) must be attached to the new parts due to approval regulations.

4.8 Use of impact wrenches

In general, it is permitted to use an impact wrench to unscrew bolts and nuts. An exception to this is when work is performed inside an open high-voltage battery. For this work, it is not permitted to use an impact wrench.

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An impact wrench may be used to screw in bolts and nuts when performing repair work if the following requirements are observed. In general, electric and compressed-air impact wrenches should be used.

Requirements:

- Only screw in bolts with locking fluid or self-locking nuts at low speed.
- Use a suitable impact wrench with variable speed and adjustable torque range.
- Use suitable bits when working in the vicinity of sensitive surfaces, e.g. plastic-coated bits for aluminium rims.
- When working in the vicinity of natural gas systems, observe the information in the Workshop Manual “Natural gas engines - General information”.

Use:

- Fit bolts/nuts by hand.
- Only use an impact wrench to screw in bolts/nuts until the head of the bolt/nut makes contact and then continue tightening with a torque wrench.
- Clean threaded pins before unscrewing the bolt/nut.

4.9 Installing radiators and condensers

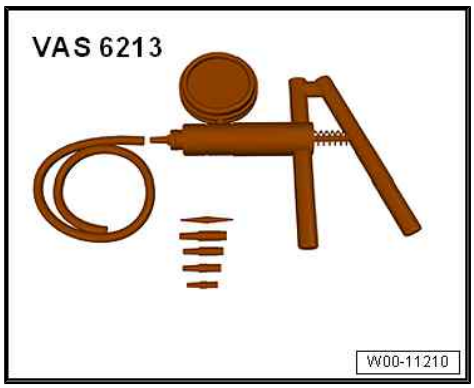
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Even when the radiator, condenser and charge air cooler are correctly installed, slight impressions may be visible on the fins of these components. This does not mean that the components are damaged. If the fins are only very slightly distorted, this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

4.10 Checking vacuum system

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-



Procedure

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

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

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

– If 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.

4.11 General notes

- For the applicable current flow diagrams, refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

4.12 Painting work on vehicles with high-voltage system

When performing paintwork repairs, object temperatures of 55 ° C are not to be exceeded in drying ovens or their pre-heating areas ⇒ Audi Paintwork Guide; Repairing paintwork on hybrid/ high-voltage vehicles .

10 – Removing and installing engine

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1 Removing and installing engine

⇒ “1.1 Removing engine”, page 13

⇒ “1.2 Separating engine and gearbox”, page 37

⇒ “1.3 Securing engine to engine and gearbox support”, page 46

⇒ “1.4 Installing engine”, page 48

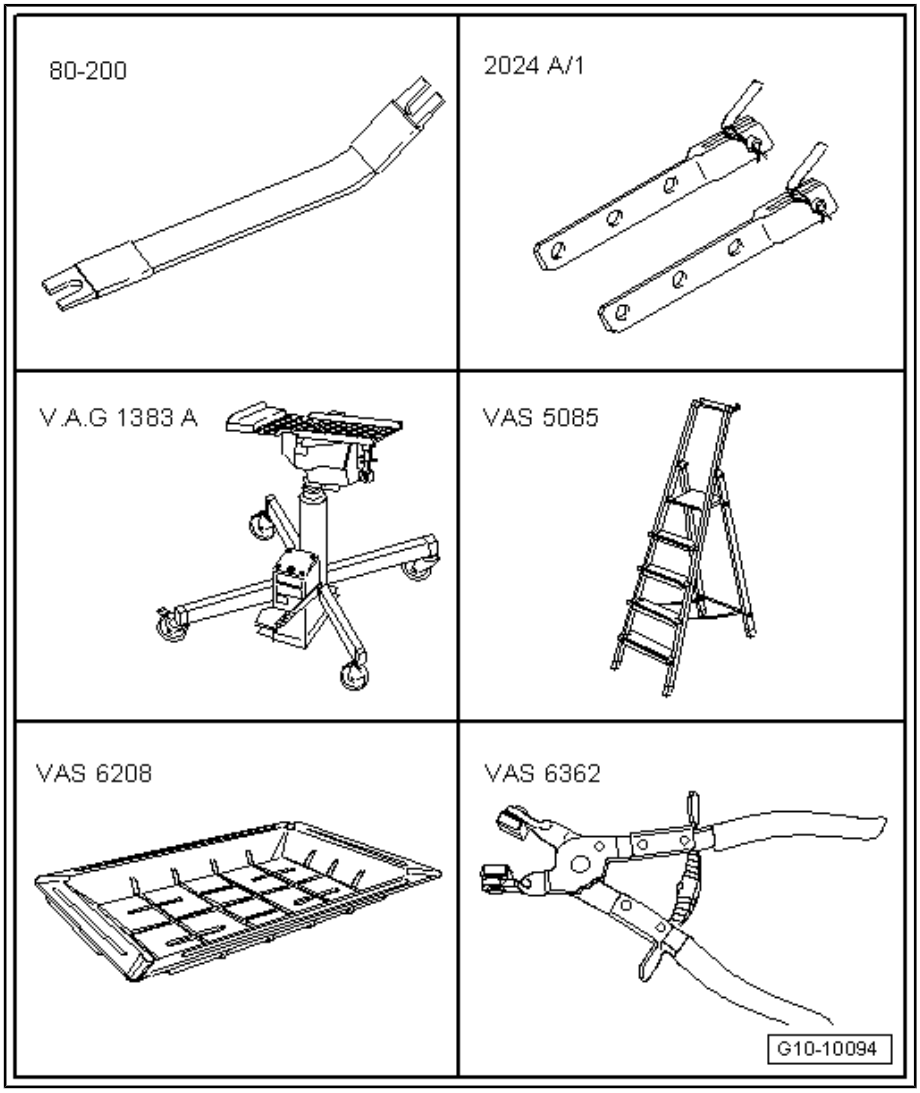
1.1 Removing engine

⇒ “1.1.1 Removing engine - all vehicles except e-tron”, page 13

⇒ “1.1.2 Removing engine - e-tron”, page 27

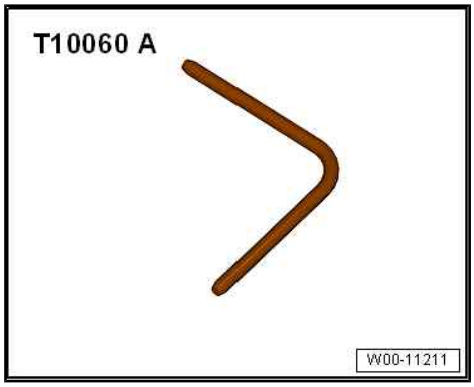
1.1.1 Removing engine - all vehicles except e-tron

Special tools and workshop equipment required

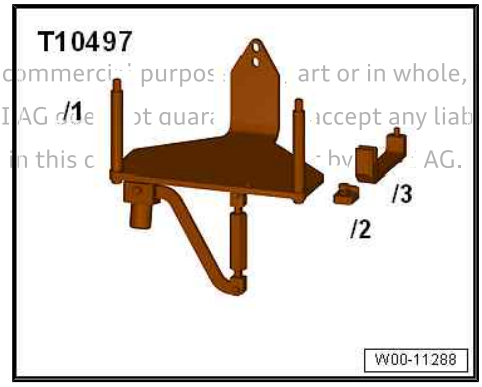


- Removal lever - 80-200-
- Extension -2024A/1- for lifting tackle - 2024A-

- Engine and gearbox jack - VAS 6931- or -V.A.G 1383 A-
- Stepladder (commercially available) or -VAS 5085-
- Drip tray for workshop hoist - VAS 6208-
- Hose clip pliers - VAS 6362-
- Locking pin - T10060A-



- Engine bracket - T10497-



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- Safety goggles
- Protective gloves

Procedure

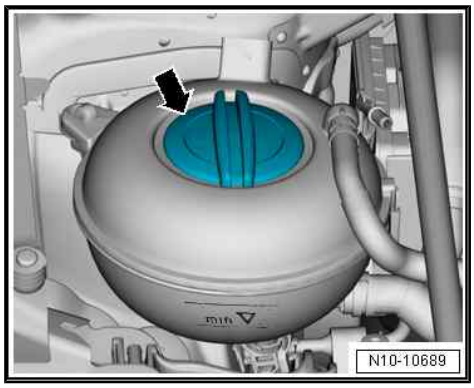
- The engine is removed from underneath together with the gearbox.
- Re-install all cable ties in original positions.

CAUTION

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

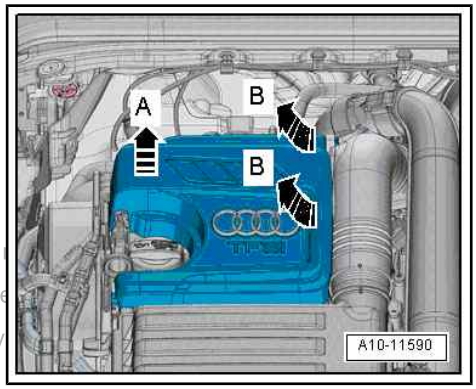
Danger of scalding skin and other parts of the body.

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



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

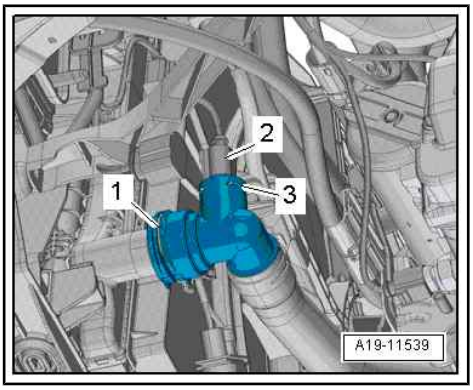
– First pull engine cover panel off ball studs on right side -arrow A-, then detach towards right side -arrows B-.



– Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

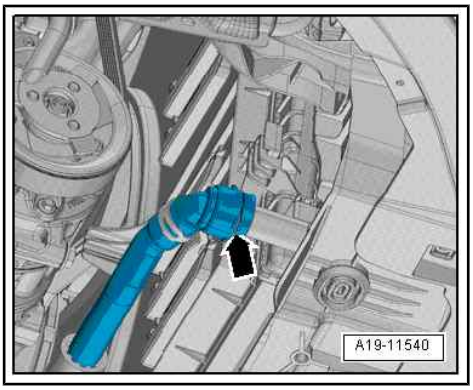
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– Unplug electrical connector -2- at radiator outlet coolant temperature sender - G83- .
– Place drip tray for workshop hoist - VAS 6208- underneath.
– Lift retaining clip -1-, disconnect coolant hose from radiator (bottom left) and drain off coolant.



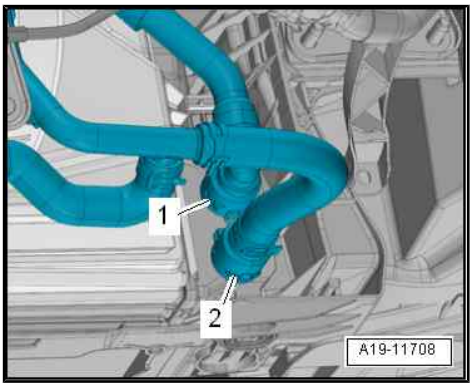
Vehicles with water radiator for charge air cooling circuit (version 1):

– Lift retaining clip -arrow-, disconnect coolant hose (bottom right) from water radiator for charge air cooling circuit and drain off coolant.



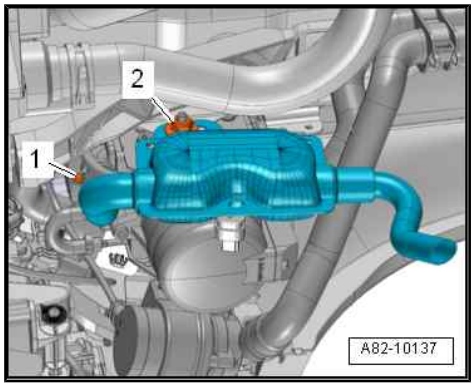
Vehicles with water radiator for charge air cooling circuit (version 2):

– Lift retaining clips -1, 2-, disconnect coolant hoses from water radiator for charge air cooling circuit and drain off coolant.



Vehicles with auxiliary heater:

– Open clip -1-, unscrew bolt -2- and detach silencer for auxiliary heater.



Vehicles with air conditioner compressor:

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NOTICE

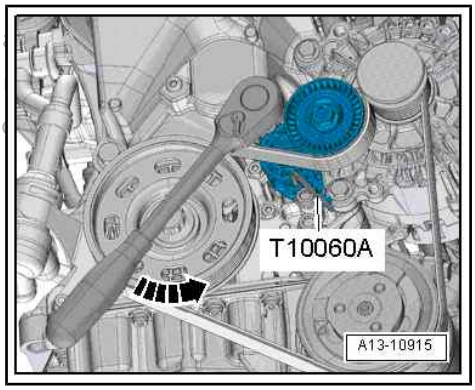
Risk of irreparable damage due to running a used belt in the opposite direction when it is refitted.

- **Mark running direction before removing.**
- **Pay attention to running direction when reinstalling.**

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

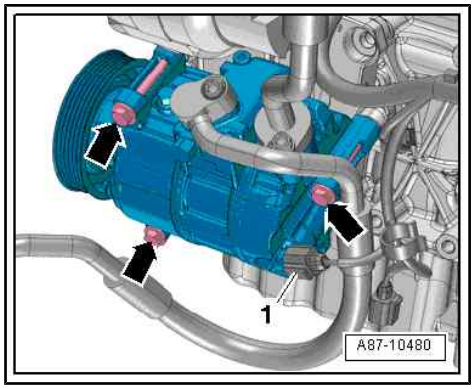
– Lock tensioner with locking pin - T10060A- .

– Take off poly V-belt.



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

– Remove bolts -arrows- for air conditioner compressor.



NOTICE

Risk of damage to refrigerant lines and hoses when detaching and pivoting air conditioner compressor.

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

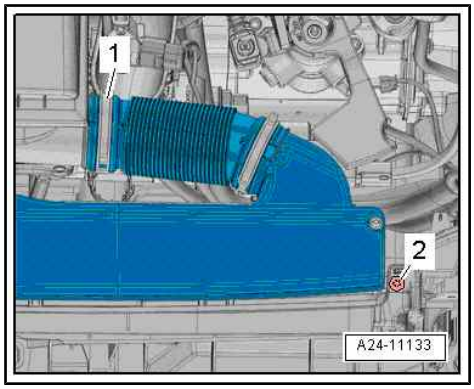
– Detach air conditioner compressor with refrigerant lines still connected and tie up to right side.

All vehicles (continued):

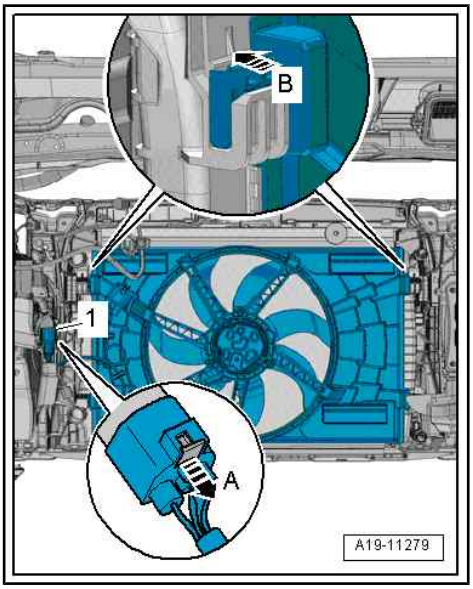
– Release hose clip -1- and detach air hose.

– Remove bolt -2- on both sides.

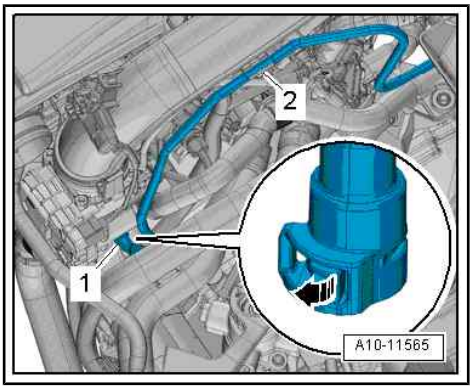
– Unclip air duct at lock carrier and detach.



– Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow A- and press down release catch).
– Press locking tabs on left and right sides of radiator cowl -arrow B- and at the same time lift radiator cowl off radiator.
– Remove battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .



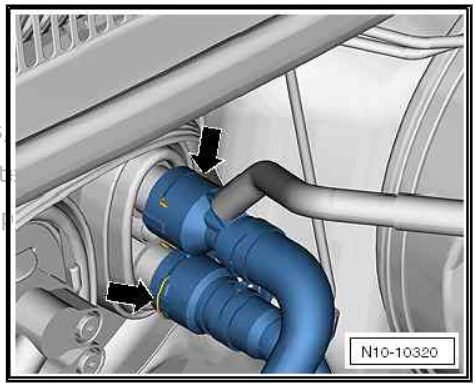
– Release catch -arrow- and disconnect vacuum hose -1-.
– Move vacuum hose clear at air pipe -2-.



Vehicles without auxiliary heater:

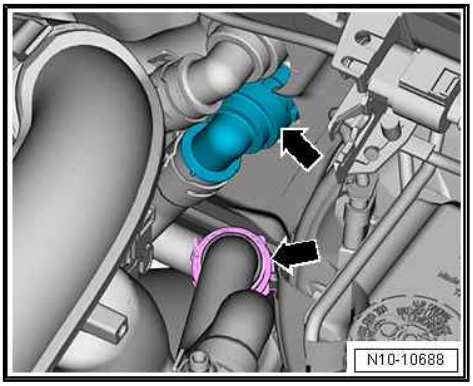
– Lift retaining clips -arrows- and disconnect coolant hoses from heat exchanger for heater.

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Vehicles with auxiliary heater:

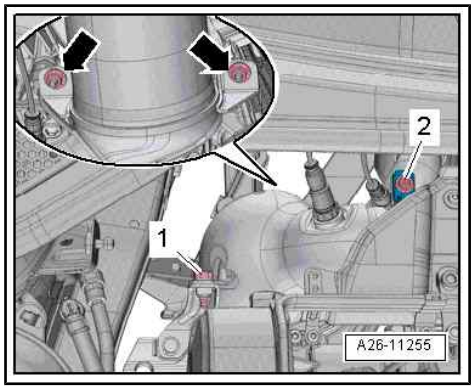
– Release retaining clip and hose clip and detach both coolant hoses -arrows-.



All vehicles (continued)

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

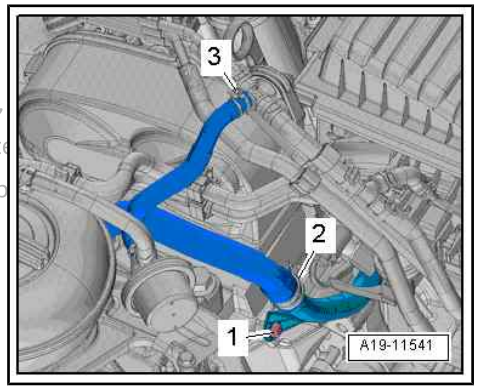
– Remove bolt -1- and nuts -arrows- and tie up catalytic converter.



Version I:

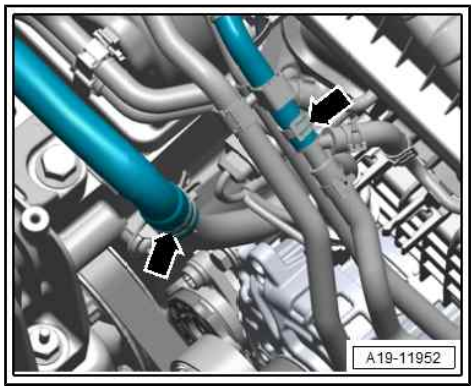
– Release hose clips -2, 3- and disconnect coolant hoses.

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Version II:

– Release hose clips -arrows- and disconnect coolant hoses.



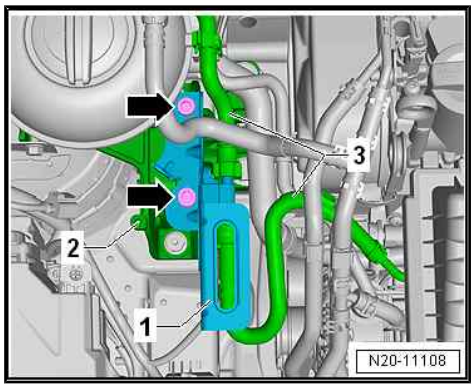
Version with fuel quality sender - G446-

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

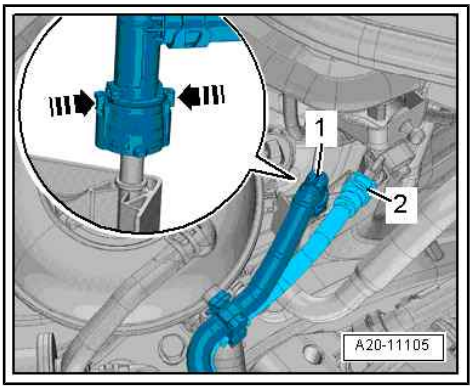
– Place bracket -1- with fuel quality sender - G446- to one side (pipes/hoses -3- remain connected).

All versions (continued):

- Observe rules for cleanliness
⇒ “4.2 Rules for cleanliness”, page 9 .

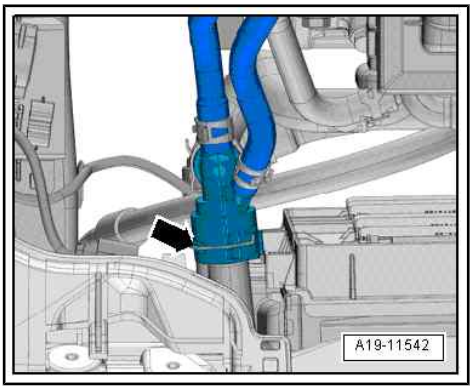


– Disconnect hose connector -1- ⇒ Fuel supply system; Rep. gr. 20 ; Plug-in connectors; Disconnecting plug-in connectors .
– Press release tab on hose -2- connected to activated charcoal filter.
– Disconnect hose and move it clear.



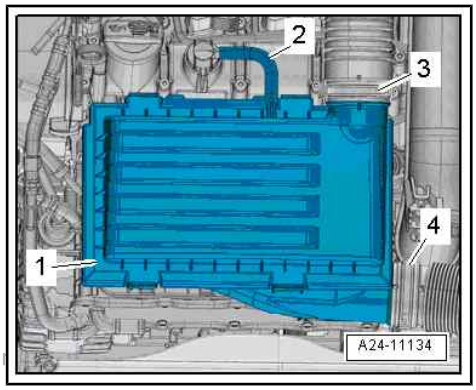
Vehicles with water radiator for charge air cooling circuit (version 1):

– Lift retaining clip -arrow- and disconnect coolant hose (top right) from water radiator for charge air cooling circuit.



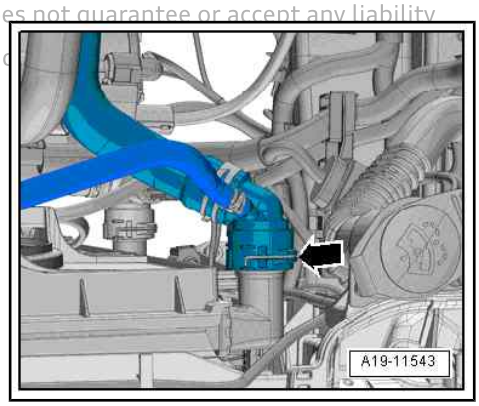
All vehicles (continued):

– Detach air hose -2-.
– Lift air cleaner housing -1- off ball studs.
– Release hose clip -3- and detach air pipe.

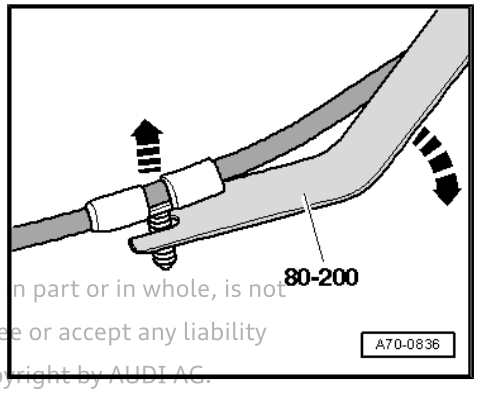


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– Lift retaining clip -arrow- and disconnect coolant hose (top left) from radiator.

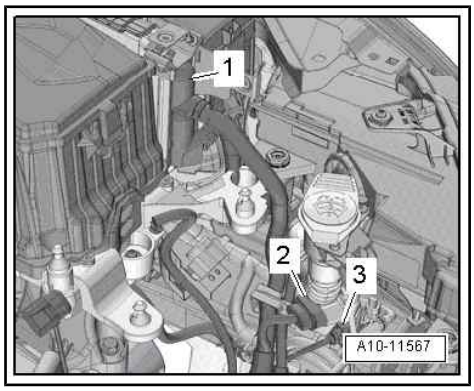


- Use removal lever - 80-200- to lever out the wiring clips when performing the next work steps.



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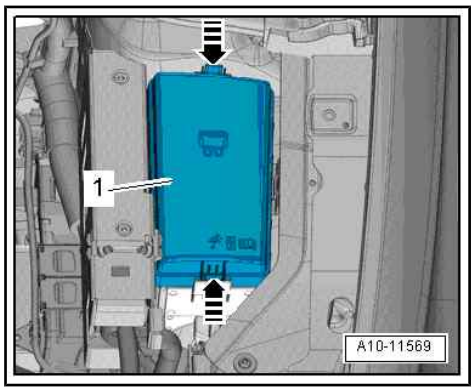
– Unplug electrical connector -1- at engine control unit - J623- ⇒ “8.1 Removing and installing engine/motor control unit J623 ”, page 509 .



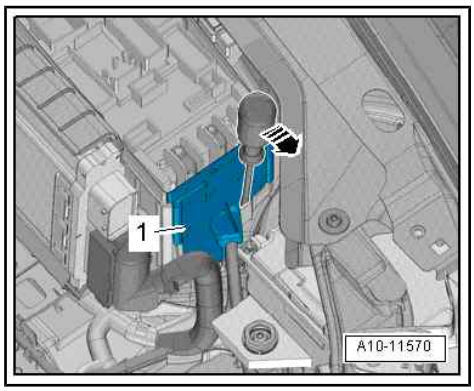
– Detach electrical connectors -2, 3- from bracket and unplug.

– Move electrical wiring clear.

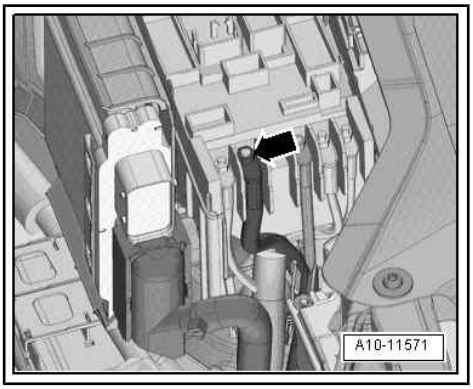
– Release catches -arrows- and detach cover -1- for electronics box in engine compartment.



– Release catch using a screwdriver -arrow- and detach cover -1- for electronics box in engine compartment upwards.



– Remove nut -arrow-, detach electrical wiring and move clear.

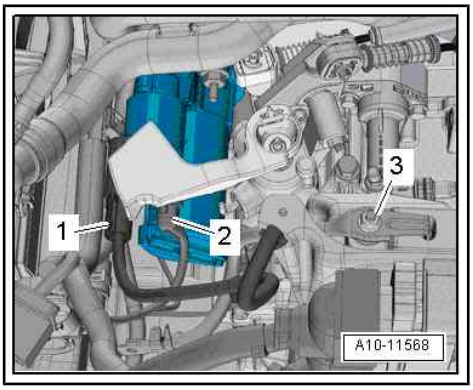


Vehicles with manual gearbox:

– 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.



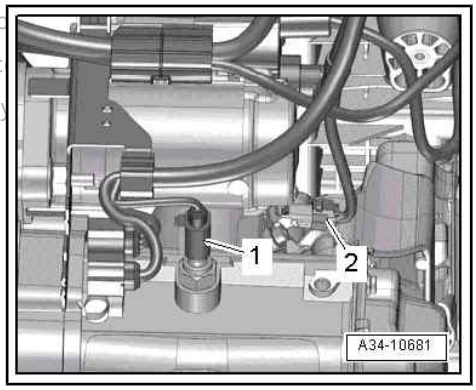
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Vehicles with manual gearbox 0AJ:

– Unplug electrical connectors on gearbox (front):

1 - For reversing light switch - F4-

2 - For gearbox neutral position sender - G701-



– Detach gear selector cable and gate selector cable from gearbox, remove cable support bracket and move to one side with selector cables attached ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector cables .

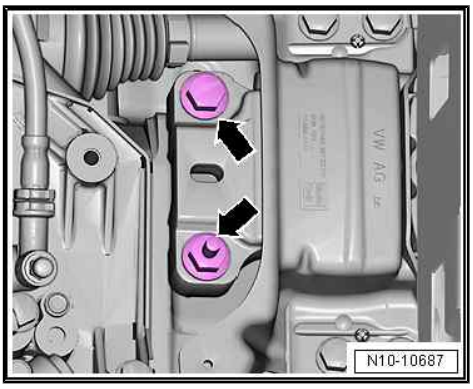
– Remove clutch slave cylinder and move to one side with pipe/hose assembly attached ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch slave cylinder .

NOTICE

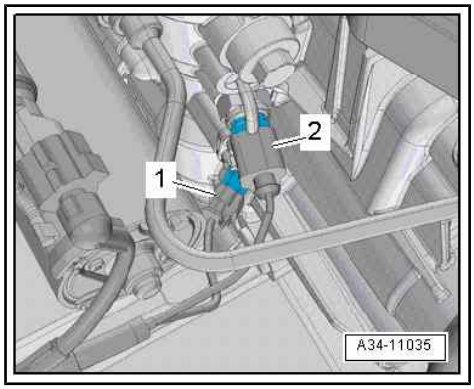
Risk of damage to removed clutch slave cylinder if clutch pedal is applied.

– Do not apply clutch pedal.

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



Vehicles with manual gearbox 02S:



– Unplug electrical connectors on gearbox (front):

1 - Gearbox neutral position sender - G701-

2 - Reversing light switch - F4-

– Detach gear selector cable and gate selector cable from gearbox, remove cable support bracket and move to one side with selector cables attached ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector cables .

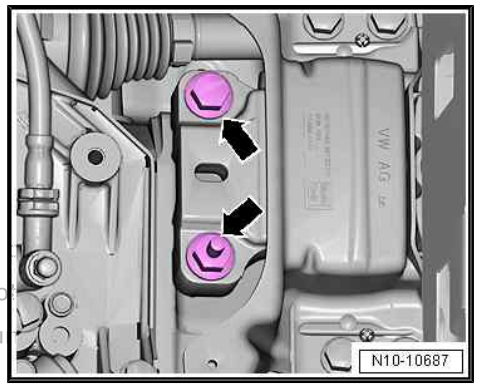
– Remove clutch slave cylinder and move to one side with pipe/hose assembly attached ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch slave cylinder .

NOTICE

Risk of damage to removed clutch slave cylinder if clutch pedal is applied.

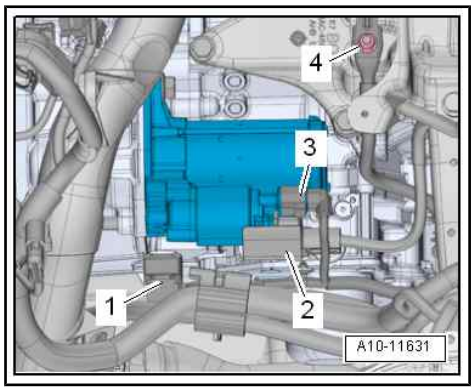
– Do not apply clutch pedal.

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



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Vehicles with dual clutch gearbox 0CW:



– Unplug electrical connector -3-.

– Push back cover -2- for positive battery terminal and unscrew positive wire from starter solenoid switch.

– Remove nut -4- and detach earth wire. (On some versions the earth wire is attached to the starter bolt.)

NOTICE

Risk of irreparable damage due to electrostatic discharge.

– Do not touch connector contacts with your hands.

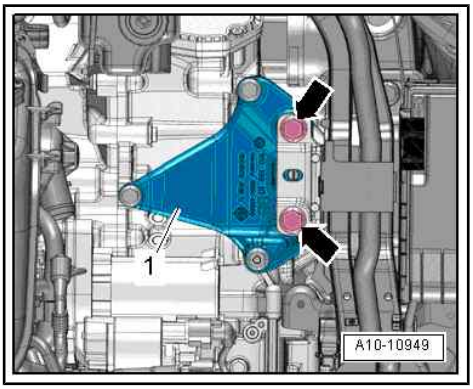
– Touch the lifting platform or other earthed object to discharge static electricity.

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

– Unplug electrical connector -1- for mechatronic unit for dual clutch gearbox - J743- .

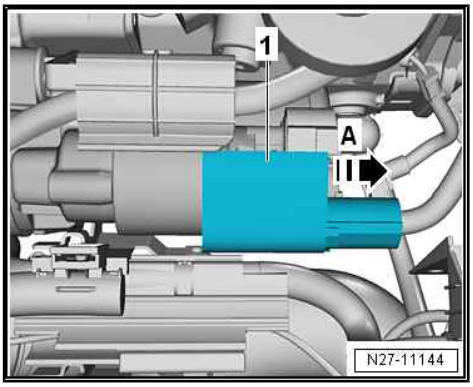
– Detach selector lever cable from gearbox, remove cable support bracket and tie up with selector lever cable attached ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector mechanism .

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



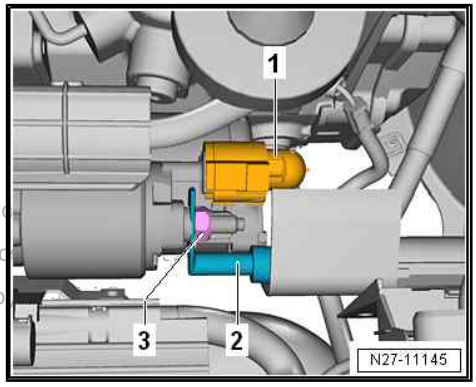
Vehicles with automatic gearbox:

– Slide cover cap -1- off in direction of -arrow A-.



– Release and unplug connector -1-.

– Remove nut -3- and detach terminal 30/B+ -2-.



NOTICE

Risk of irreparable damage due to electrostatic discharge.

– Do not touch connector contacts with your hands.

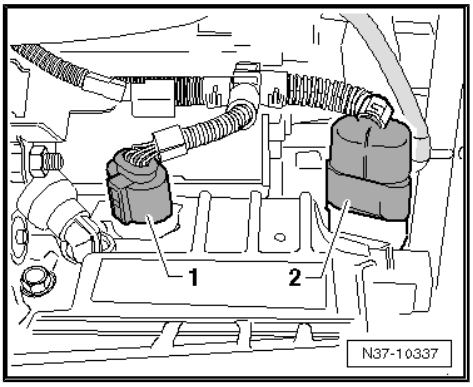
– Touch the lifting platform or other earthed object to discharge static electricity.

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

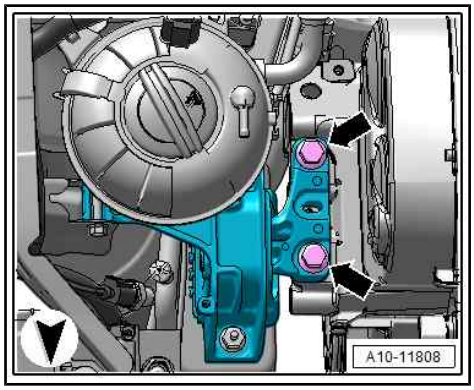
– Disconnect electrical connectors -1- and -2- from gearbox at front.

– Detach selector lever cable from gearbox, remove cable support bracket and tie up with selector lever cable attached ⇒ 6-speed automatic gearbox 09G; Rep. gr. 37 ; Selector mechanism; Exploded view - selector mechanism .



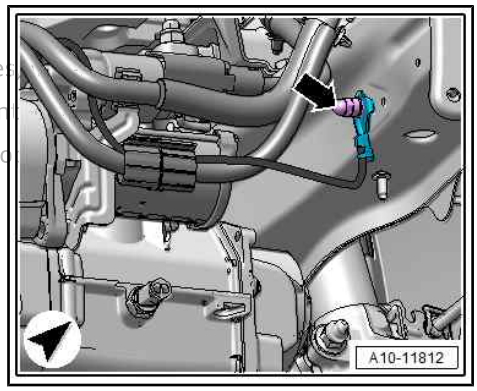
All vehicles (continued):

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

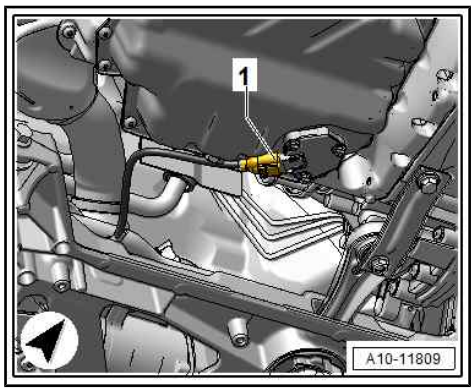


– If fitted, remove nut -arrow- and detach earth wire.

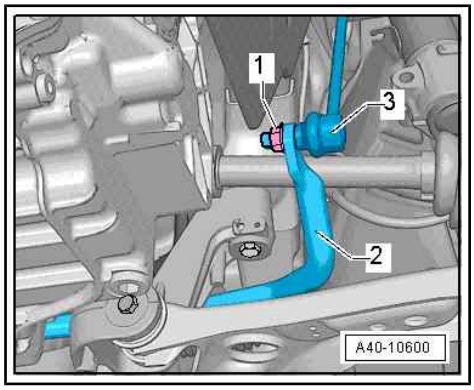
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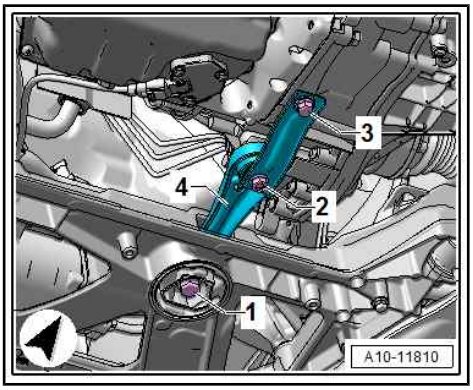
– Unplug electrical connector -1- at oil level and oil temperature sender - G266- .



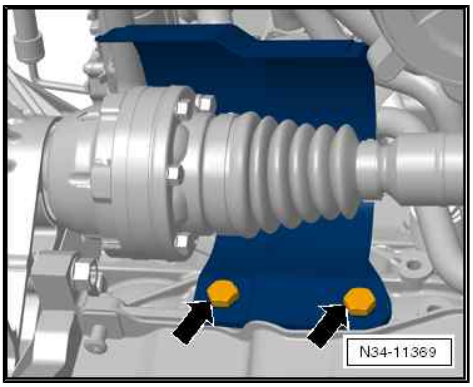
– Remove nut -1- for coupling rod -3- on anti-roll bar -2- on both sides.



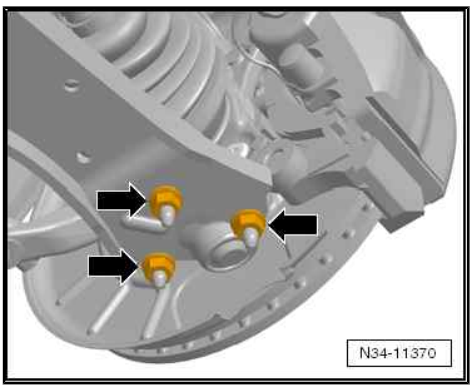
– Remove bolts -1, 2, and 3- and detach pendulum support -4-.



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



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

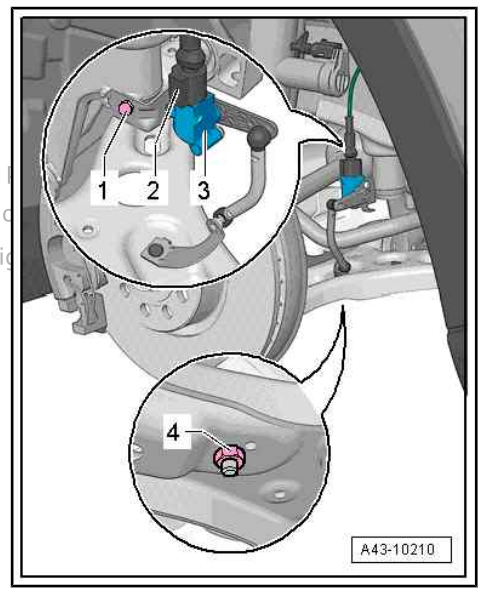


– If fitted, remove nut -4- and bolt -1- and move front left vehicle level sender - G78- -item 3- aside.

– Detach swivel joint from wishbone (both sides).

– Unbolt drive shaft (both sides) from gearbox and tie up ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .

• Take care not to damage surface coating of drive shaft.



Vehicles with sports running gear:

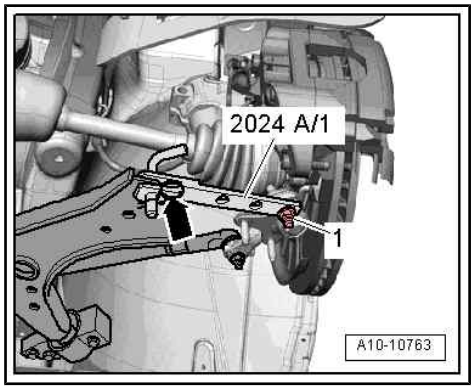
– Lower suspension strut (left and right) ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links .

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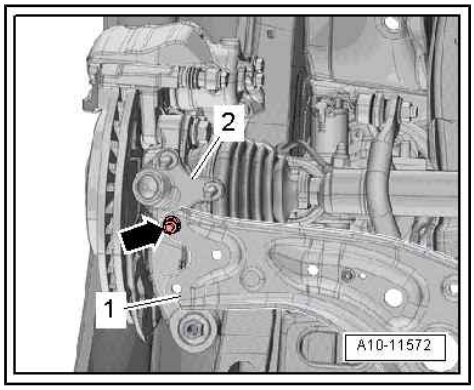
All vehicles (continued):

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

– Secure retaining pin and swivel joint with locking pin -arrow- and nut -1-.



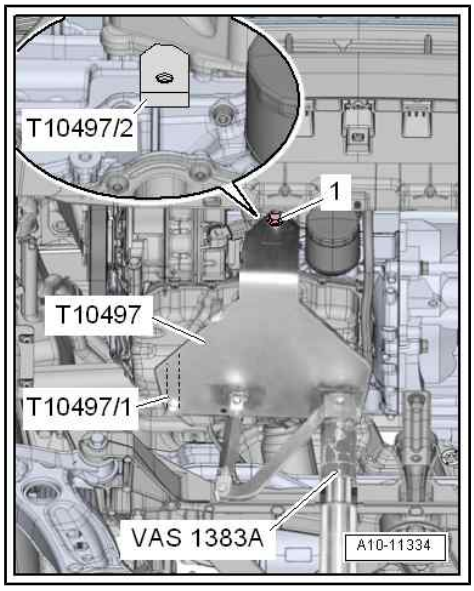
– Secure swivel joint -2- (right-side) to wishbone -1- with nut -arrow-, as shown in illustration.



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

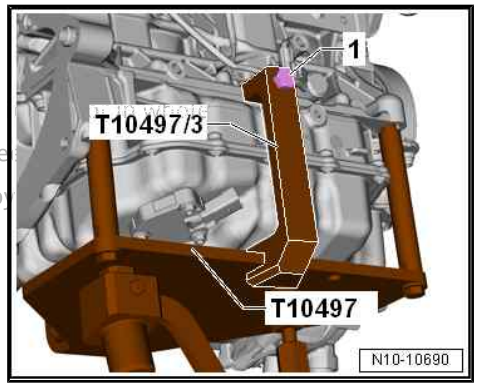
– Position engine bracket - T10497- on cylinder block using pin T10497/1 .

– 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.

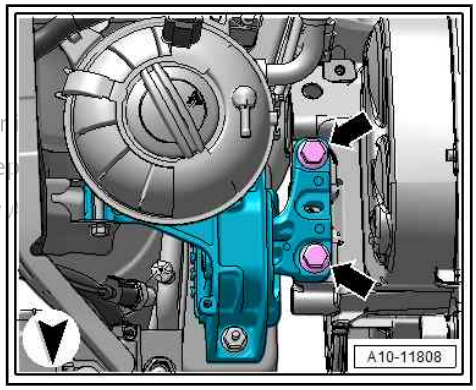
– Insert engine and gearbox jack - VAS 6931- in engine bracket T10497 and raise engine/gearbox assembly slightly.



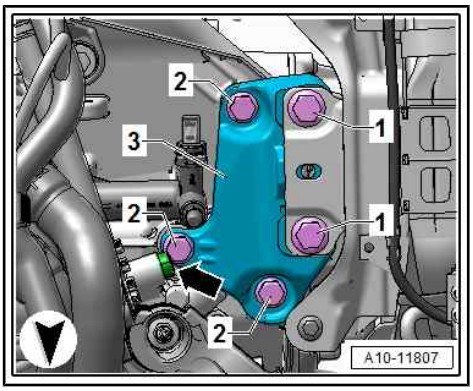
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– Unscrew bolts -arrows- for engine mounting fully (use step-ladder when doing so).



– Remove bolts -1- securing gearbox mounting. Illustrated on manual gearbox 0AJ.



NOTICE

Risk of damage to lines/pipes, hoses and engine compartment when lowering engine/gearbox assembly.

- **Check that all connections between engine, gearbox, sub-frame and body have been detached.**
- **Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering.**

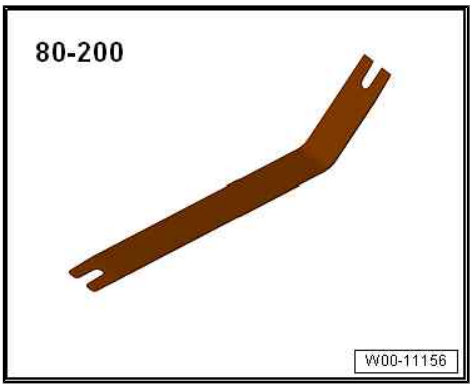
– First lower engine/gearbox assembly only slightly.

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

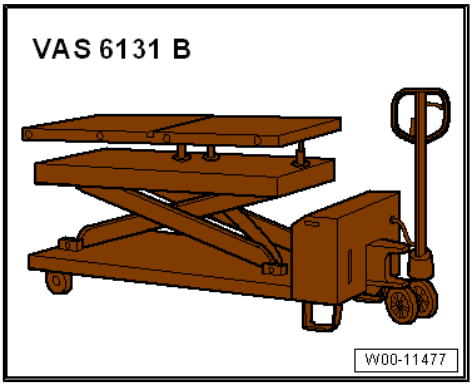
1.1.2 Removing engine - e-tron

Special tools and workshop equipment required

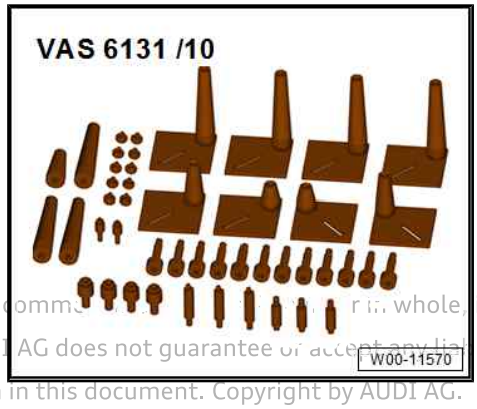
♦ Removal lever - 80-200-



♦ Scissor-type assembly platform - VAS 6131 B-



- Support set for Audi - VAS 6131/10-



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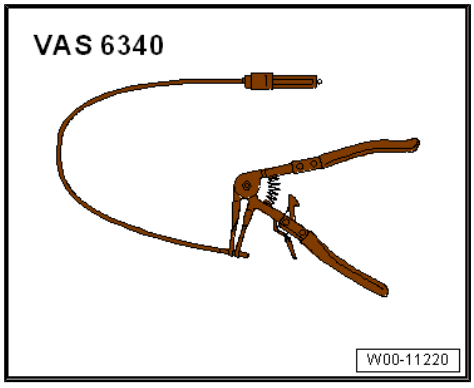
- Support set, Audi A6 >2005 - VAS 6131/12- (not illustrated)
- -VAS 6131/13-2- from supplementary set, Audi Q7 >2005 - VAS 6131/13-



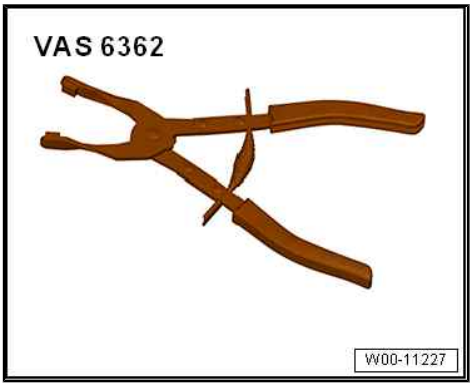
- Lifting-table support - VAS 6131/16-4- (not illustrated)
- Drip tray for workshop hoist - VAS 6208-



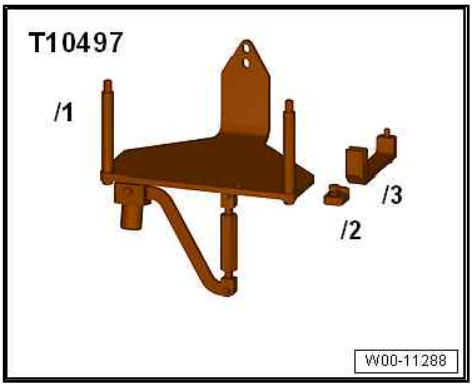
- Hose clip pliers - VAS 6340-



- Hose clip pliers - VAS 6362-



- Engine bracket - T10497-



- Stepladder
- Safety goggles
- Protective gloves

Procedure

- The engine is removed from underneath together with the gearbox.
- Re-install all cable ties in original positions.

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

Vehicles up to model year 2016

– Remove power and control electronics for electric drive - JX1-
⇒ “5.3 Removing and installing power and control electronics for electric drive”, page 638 .

Vehicles from model year 2017 onwards

– Remove bracket for power and control electronics for electric drive - JX1-
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1”, page 650

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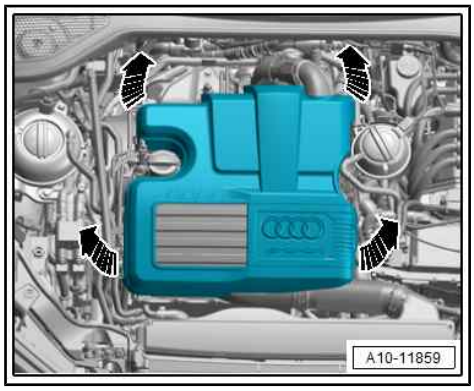
All vehicles (continued):

– Remove high-voltage heater (PTC) - Z115- ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit .

– Remove subframe with steering rack ⇒ Rep. gr. 40 ; Subframe; Removing and installing subframe with steering rack .

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

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

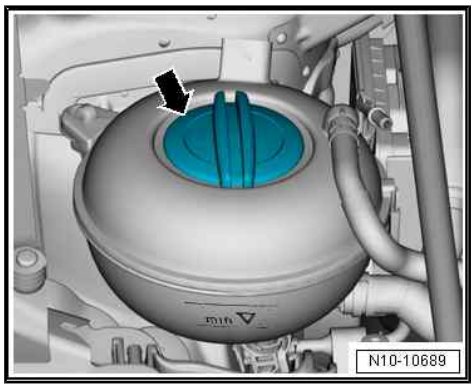


CAUTION

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

Danger of scalding skin and other parts of the body.

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

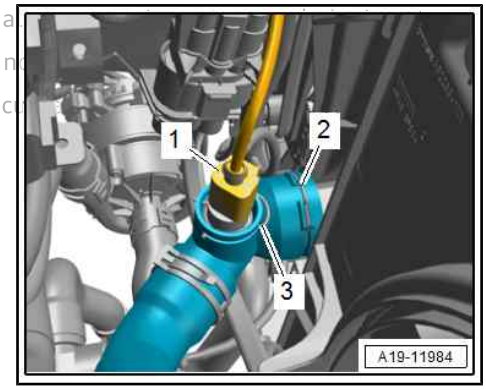


– Open filler cap -arrow- on coolant expansion tank.

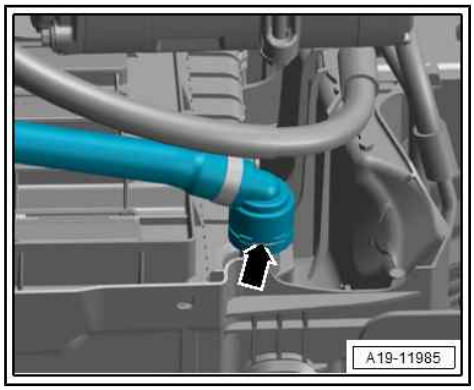
– Unplug electrical connector -1- at radiator outlet coolant temperature sender - G83- .

– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Lift retaining clip -2-, disconnect coolant hose from radiator (bottom left) and drain off coolant.

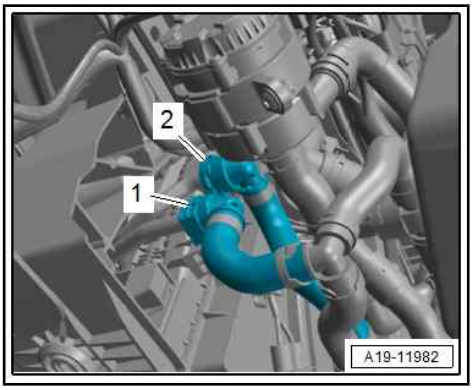


– Lift retaining clip -arrow-, disconnect coolant hose (bottom right) from water radiator for charge air cooling circuit and drain off coolant.



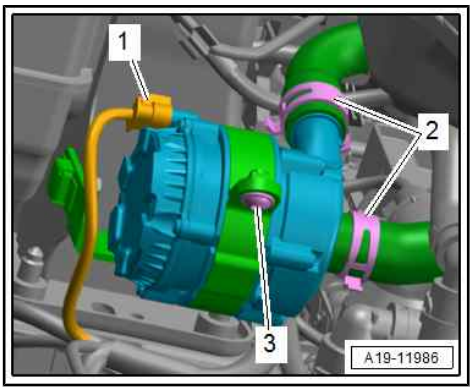
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– Lift retaining clips -1, 2-, disconnect coolant hose from radiator for high-voltage cooling circuit and drain off coolant.



– Release hose clips -2- and disconnect coolant hoses from coolant circulation pump before power and control electronics for electric drive - V508- (illustration shows version 1 of -V508-).

– Remove bolts -arrows- for air conditioner compressor.



NOTICE

Risk of damage to refrigerant lines and hoses when detaching and pivoting air conditioner compressor.

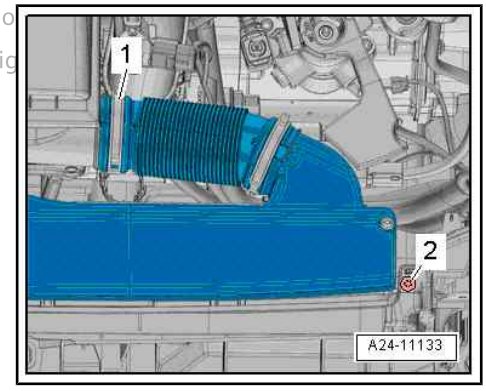
– Do NOT stretch, kink or bend refrigerant lines and hoses.

– Remove electrical air conditioner compressor -V470- from bracket and tie up to right side ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

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

– Remove bolt -2- on both sides.



– Unclip air duct at lock carrier and detach.

Vehicles without particulate filter:

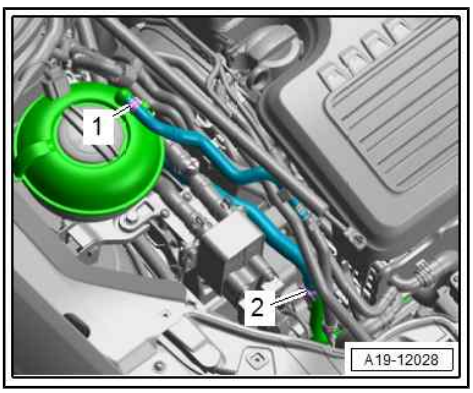
– Remove catalytic converter ⇒ “2.3.2 Removing and installing catalytic converter - e-tron without particulate filter”, page 530 .

Vehicles with particulate filter:

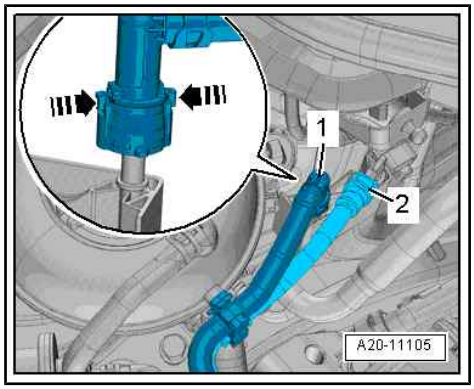
– Remove catalytic converter ⇒ “2.3.3 Removing and installing catalytic converter - e-tron with particulate filter”, page 533 .

All vehicles (continued):

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

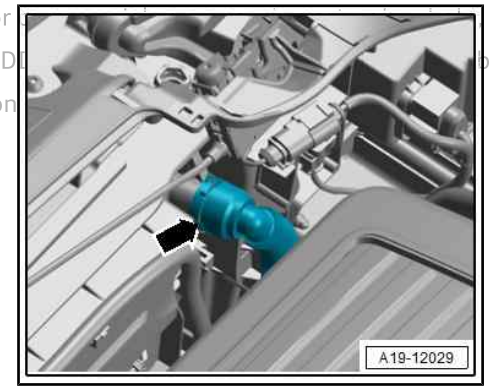


– Disconnect hose connector -1- ⇒ Fuel supply system; Rep. gr. 20 ; Plug-in connectors; Disconnecting plug-in connectors .
– Press release tab on hose -2- connected to activated charcoal filter.
– Disconnect hose and move it clear.

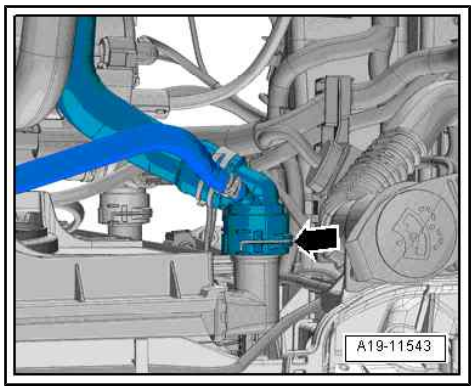


– Lift retaining clip -arrow- and disconnect coolant hose (top right) from radiator.

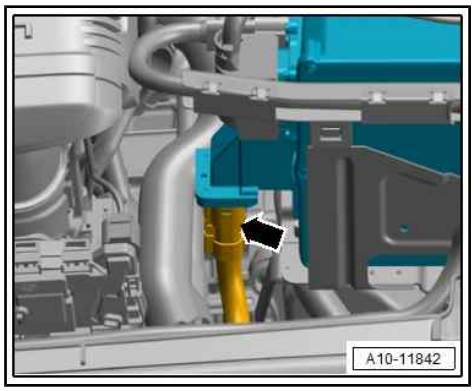
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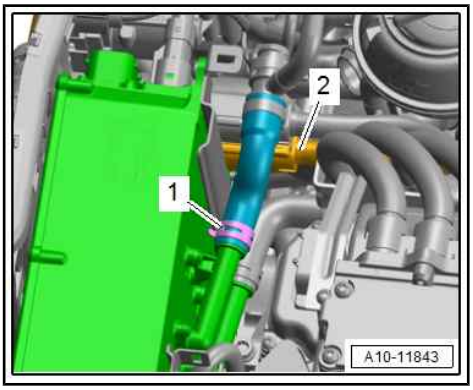
– Lift retaining clip -arrow- and disconnect coolant hose (top left) from water radiator for charge air cooling circuit.



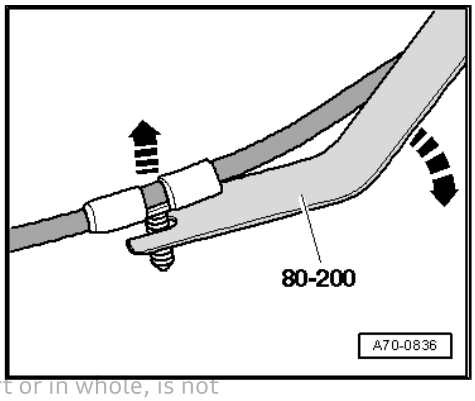
– Unplug electrical connector -arrow- from control unit for high-voltage battery charging unit - J1050- .



– Unplug electrical connector -2- from control unit for high-voltage battery charging unit - J1050- .
– Release hose clip -1- and disconnect coolant hose.

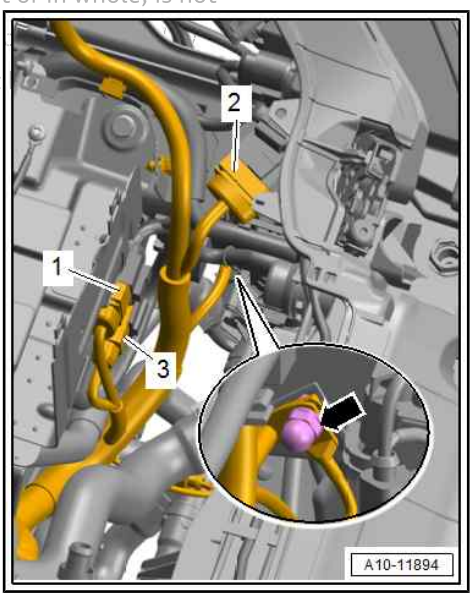


• Use removal lever - 80-200- to lever out the wiring clips when performing the next work steps.

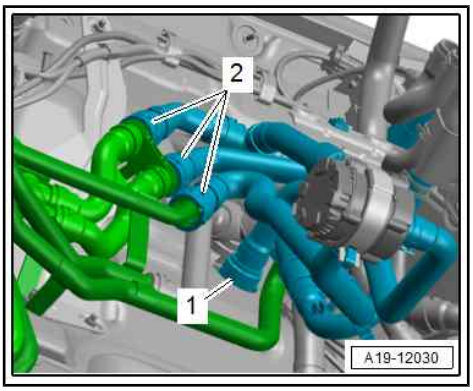


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– Version with secondary air system: Take electrical connector -3- out of bracket, unplug it and move electrical wiring clear.
– Take electrical connectors -1, 2- out of bracket, unplug connectors and move electrical wiring clear.
– Remove nut -arrow- and move earth wire clear.
– Unplug electrical connector from engine control unit - J623- ⇒ “8.1 Removing and installing engine/motor control unit J623 ”, page 509 .

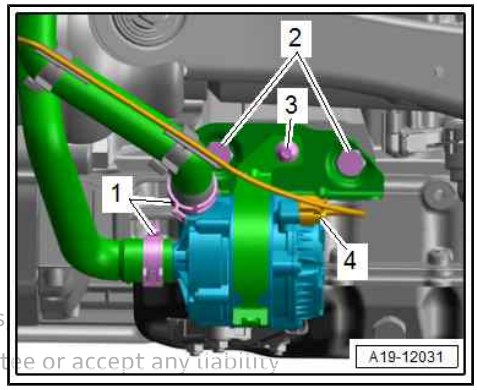


– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Lift retaining clips -1, 2- and disconnect coolant hoses.
– Detach selector lever cable from gearbox and pull out of support bracket (for description of procedure refer to ⇒ Rep. gr. 34 ; Selector mechanism; Removing and installing selector mechanism).



– Unplug electrical connector -4- and move wiring clear.

– Remove nuts -2- and tie up coolant pump for high-voltage battery - V590- to engine.

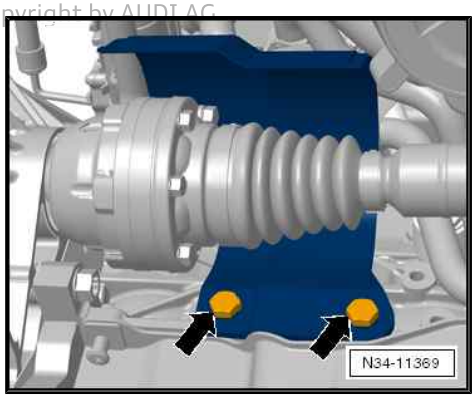


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– Remove centre hex studs -arrows- and detach heat shield for drive shaft (right-side).

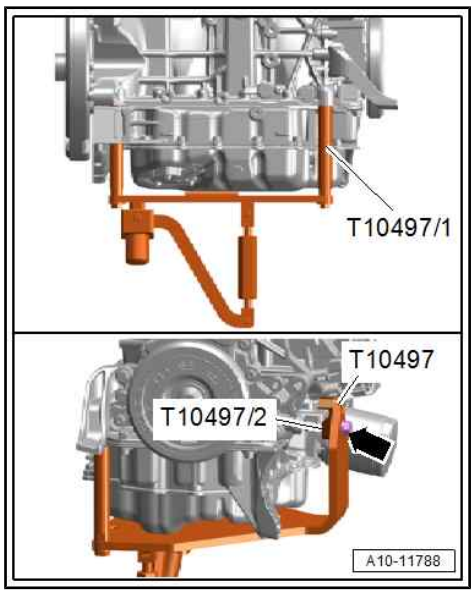
– Press drive shafts (left and right) off gearbox and tie up to rear ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .

• Take care not to damage surface coating of drive shaft.

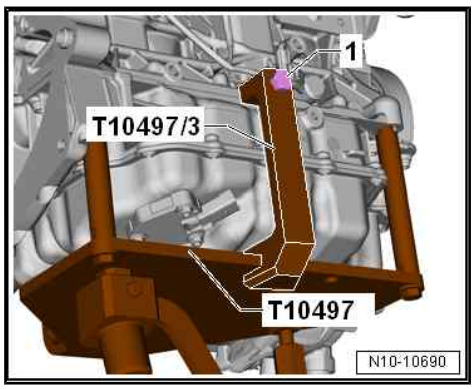


– Apply clamping piece T10497/2 at housing rib on cylinder block, as shown in illustration.

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



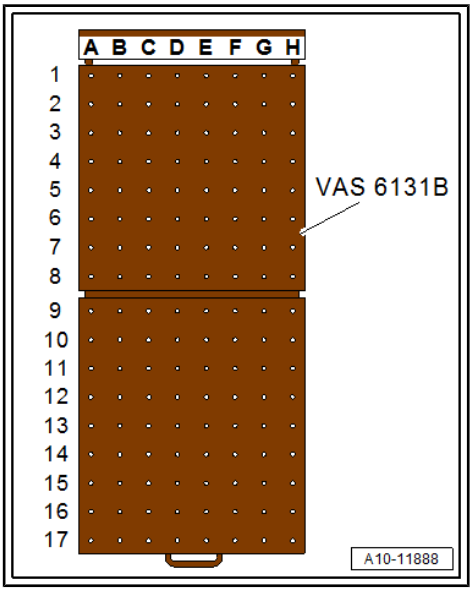
– Fit adapter - T10497/3- onto engine bracket - T10497- and tighten bolt -1- to 20 Nm.



Setting up scissor-type assembly platform:

– Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/12- , -VAS 6131/13- and assembly platform support - VAS 6131/16-4- as follows:

Platform coordinates	Parts of support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/12- , -VAS 6131/13- and assembly platform support - VAS 6131/16-4-			
D7+E7	/16-4			
D8+E8				
C10	/10-1	/10-3	/10-5	/12-1
F10	/10-1	/10-4	/10-5	/10-13
C12	/10-1	/10-3	/10-5	/13-2
F12	/10-1	/12-2	/10-5	/12-1



– Initially hand-tighten the support elements on the scissor-type assembly platform.

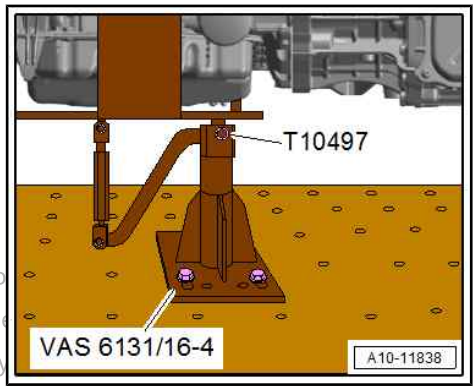
– Position scissor-type assembly platform - VAS 6131 B- horizontally.

• Take note of spirit level (bubble gauge).

– Position scissor-type assembly platform - VAS 6131 B- below engine/gearbox assembly and raise it.

– Insert engine bracket - T10497- in assembly platform support - VAS 6131/16-4- and raise engine/gearbox assembly slightly.

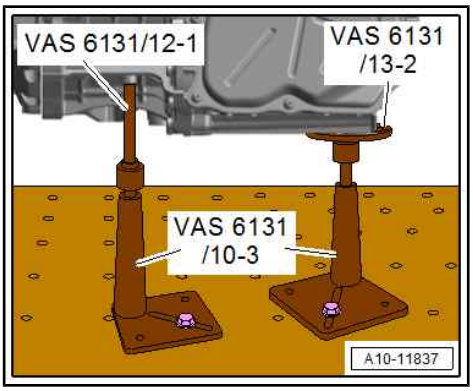
– If necessary, align engine bracket - T10497- with assembly platform support - VAS 6131/16-4- at adjuster nut.



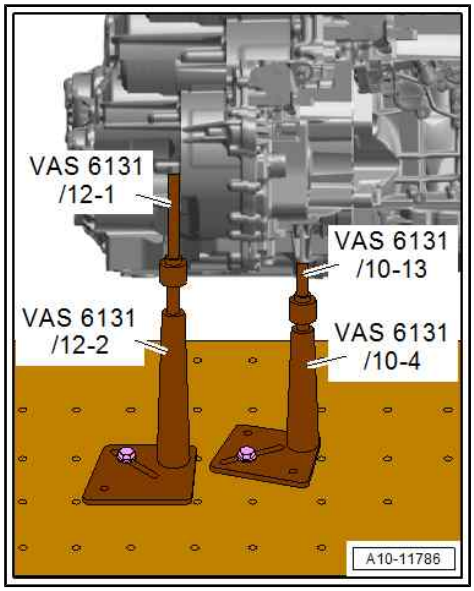
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– Position support elements from -VAS 6131/10- and -VAS 6131/12- at front of gearbox, as shown in illustration.

– Make sure that threaded spindles are screwed in completely.

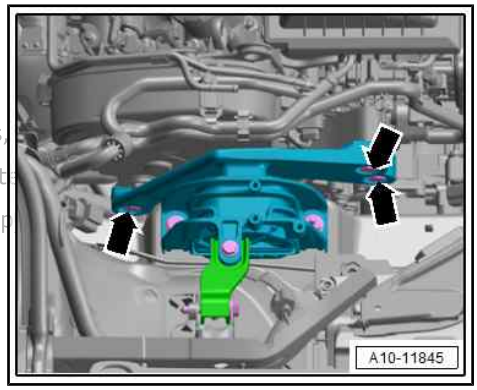


– Position support elements from -VAS 6131/10- and -VAS 6131/12- at rear of gearbox, as shown in illustration.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.

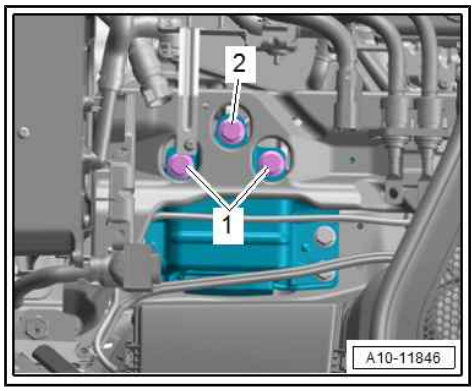


– Tighten base plates for support elements and assembly platform support - VAS 6131/16-4- to 20 Nm on scissor-type assembly platform - VAS 6131 B- .
– Unscrew bolt -left arrow- at rear of cylinder block from wheel housing side.
– Remove bolts -arrows-.

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– Mark installation position of bolts -1, 2- for support arm of gearbox mounting with felt-tip pen.
– Remove bolts.

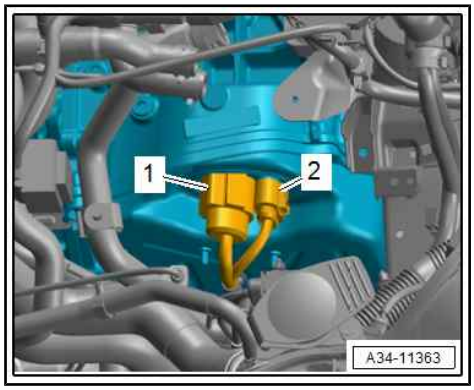


NOTICE

Risk of damage to lines/pipes, hoses and engine compartment when lowering engine/gearbox assembly.

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

– Lower engine/gearbox assembly until electrical connectors -1, 2- are accessible and unplug connectors.
– Lower engine/gearbox assembly further.
– Pull out scissor-type assembly platform - VAS 6131 B- with engine/gearbox assembly from underneath vehicle.



1.2 Separating engine and gearbox

⇒ “1.2.1 Separating engine and gearbox - vehicles with manual gearbox 0AJ”, page 37

⇒ “1.2.2 Separating engine and gearbox - vehicles with manual gearbox 02S”, page 38

⇒ “1.2.3 Separating engine and gearbox - vehicles with dual clutch gearbox 0CW”, page 40

⇒ “1.2.4 Separating engine and gearbox - vehicles with dual clutch gearbox 0DD”, page 41

⇒ “1.2.5 Separating engine and gearbox - vehicles with automatic gearbox 09G”, page 43

1.2.1 Separating engine and gearbox - vehicles with manual gearbox 0AJ

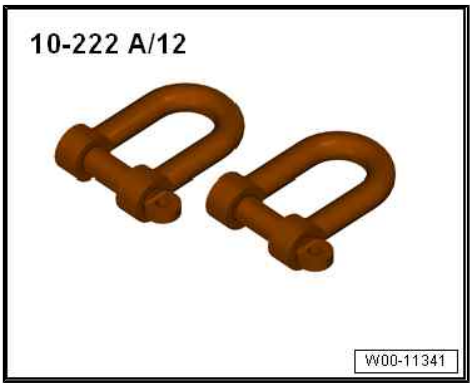
Special tools and workshop equipment required

- Hooks - 10-222A/2-



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- Shackle - 10-222A/12-



- Workshop hoist - VAS 6100-



Procedure

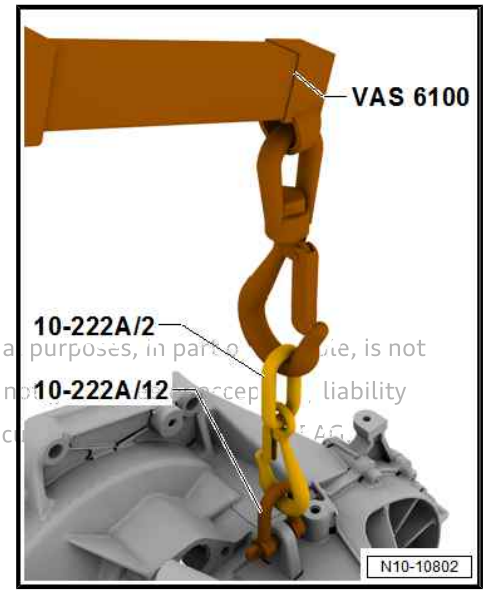
- Engine/gearbox assembly removed and attached to engine bracket - T10497- .

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

– Detach gearbox support from gearbox ⇒ Item 17 (page 57) .

– Attach shackle - 10-222A/12- to gearbox and screw in pin as far as it will go.

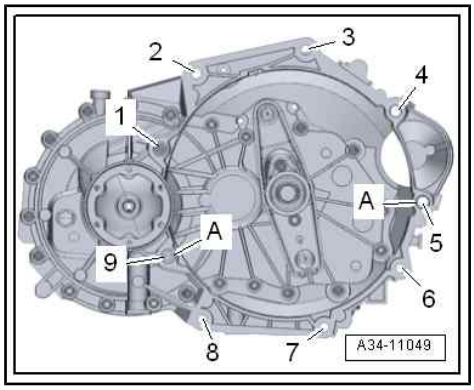
– Secure gearbox to workshop hoist - 10-222A/2- using hook - VAS 6100- .



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– Remove bolts -1, 2, 3, 6, 7, 8, 9- securing gearbox to engine.

– Detach gearbox from engine.



1.2.2 Separating engine and gearbox - vehicles with manual gearbox 02S

Special tools and workshop equipment required

♦ Lifting tackle - 2024A-



♦ Workshop hoist - VAS 6100-



Procedure

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

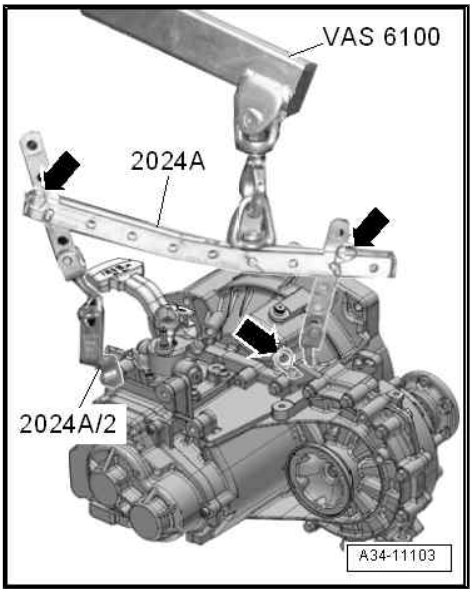
– Remove starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .

– Detach gearbox support from gearbox ⇒ Item 17 (page 57) .

– Attach gearbox to workshop hoist - 2024A- using lifting tackle - VAS 6100- , as shown in illustration.

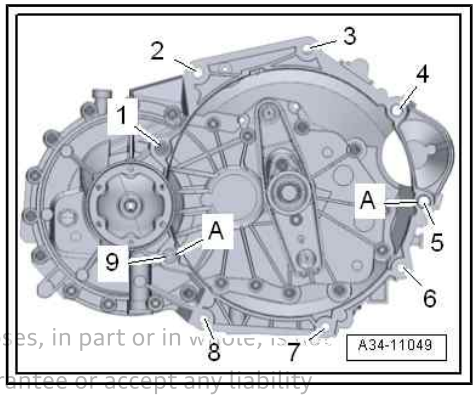
– To adjust to the centre of gravity of the assembly, the perforated rails of the support hooks must be positioned as shown.

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



– Remove bolts -1, 2, 3, 6, 7, 8, 9- securing gearbox to engine.

– Detach gearbox from engine.

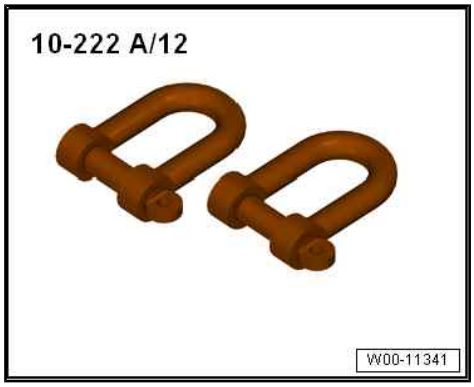


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1.2.3 Separating engine and gearbox - vehicles with dual clutch gearbox 0CW

Special tools and workshop equipment required

- Shackle - 10-222A/12-



- Workshop hoist - VAS 6100-

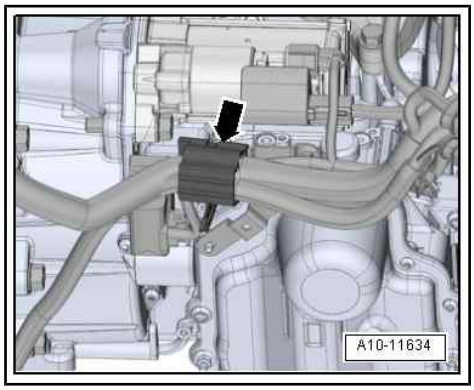


Procedure

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

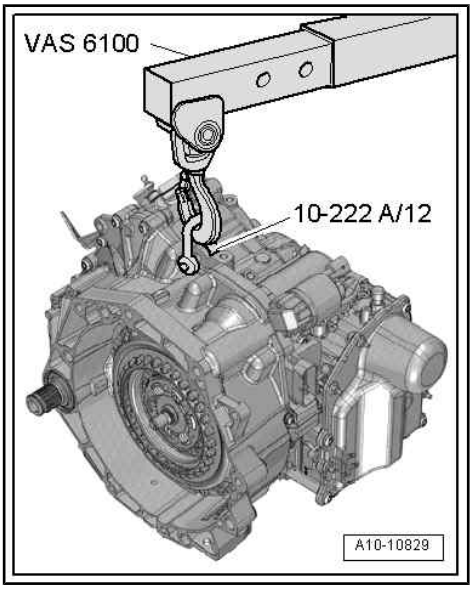
– Remove starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .

– Move electrical wiring clear at bracket -arrow-.

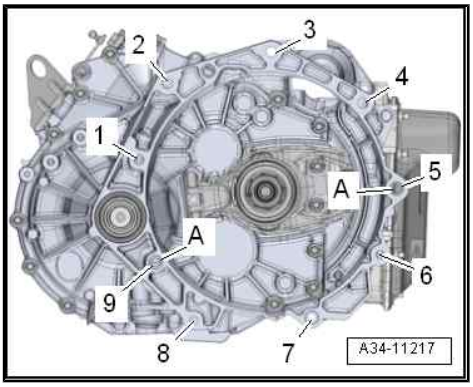


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– Secure gearbox to workshop hoist - 10-222A/12- using shackle - VAS 6100- .



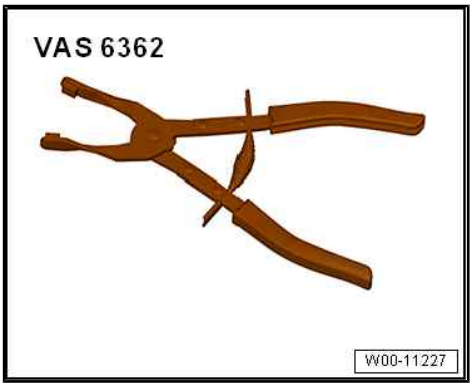
– Remove bolts -1, 2, 4, 5, 6, 7, 8, 9- securing gearbox to engine.
– Detach gearbox from engine.



1.2.4 Separating engine and gearbox - vehicles with dual clutch gearbox 0DD

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-



Procedure

• Engine/gearbox assembly removed and secured to scissor-type assembly platform - VAS 6131 B-

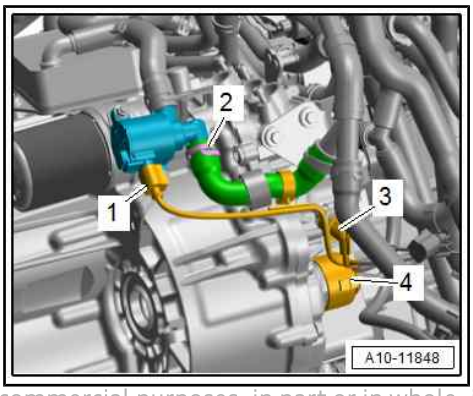
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NOTICE

Risk of irreparable damage due to electrostatic discharge.

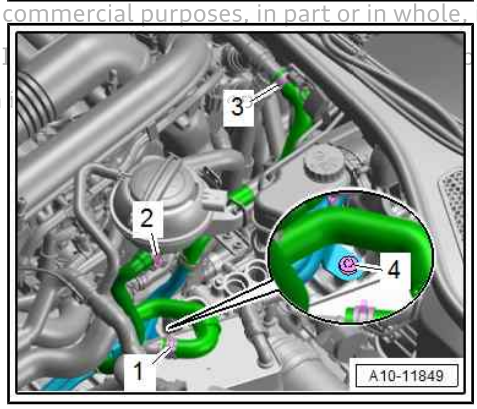
- **Do not touch connector contacts with your hands.**
- **Touch the lifting platform or other earthed object to discharge static electricity.**

- Unplug electrical connectors -1, 3, 4- and move electrical wiring clear.
- Release hose clip -2- and detach coolant hose.

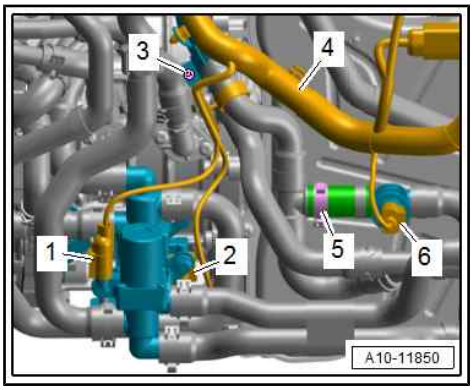


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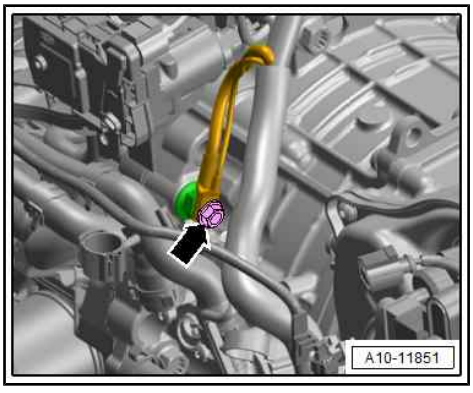
- Release hose clips -1, 2, 3- and disconnect coolant hoses.
- Remove bolt -4-.



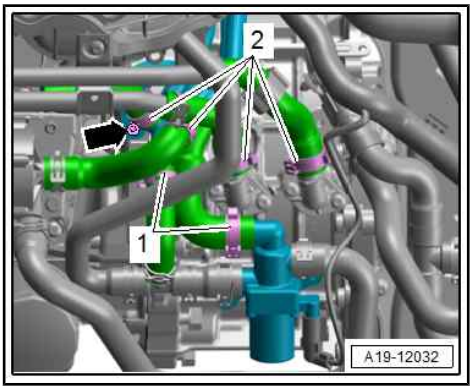
- Unplug electrical connectors -1, 2, 6- and move wiring harness clear.
- Release hose clip -5- and disconnect coolant hose.
- Remove bolt -3- and detach coolant pipes (left-side) for high-voltage cooling system.



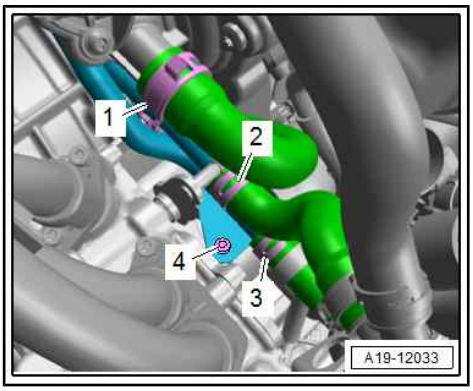
- Remove nut -arrow- and move earth wire clear.



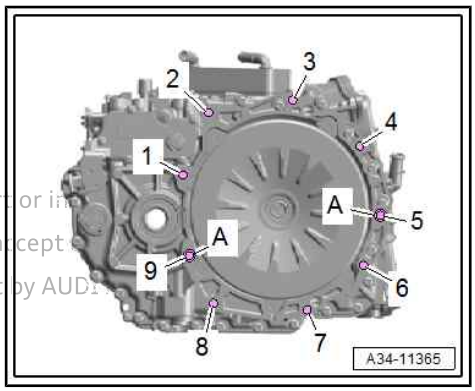
– Remove bolt -arrow- for coolant pipes (left-side).
– Release hose clips -1, 2- and disconnect coolant hoses.



– Release hose clips -1, 2, 3- and disconnect coolant hoses.
– Remove bolt -4- and detach coolant pipes (left-side).

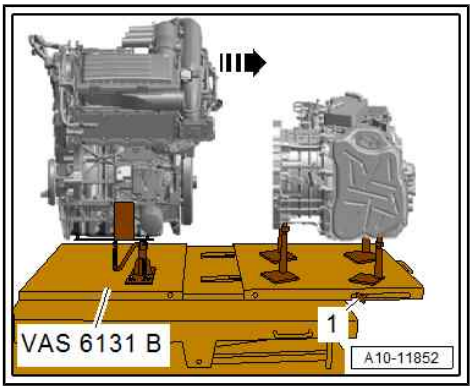


– Remove bolts -1 ... 9-.
– Tie up coolant valves (front) to engine.



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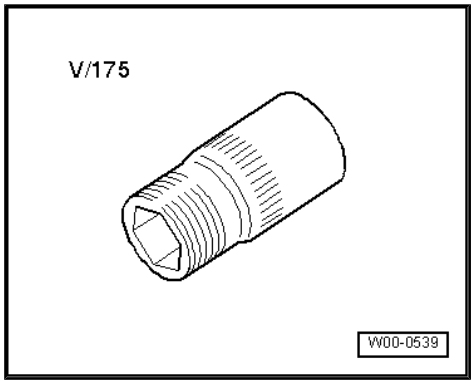
– Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 B- and pull rear section of platform together with gearbox slightly towards rear -arrow-.
– If necessary, align engine using adjuster nut on engine bracket -T10497- .



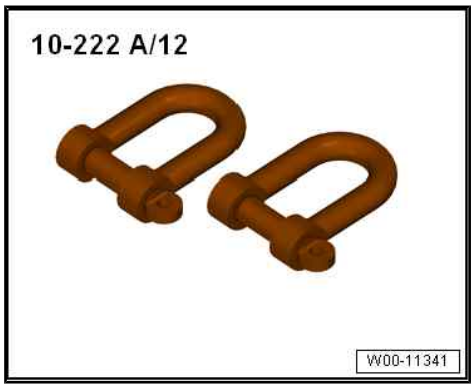
1.2.5 Separating engine and gearbox - vehicles with automatic gearbox 09G

Special tools and workshop equipment required

- Tool insert - V/175-



- Shackle - 10-222A/12-



- Workshop hoist - VAS 6100-



- Hose clip pliers - VAS 6362-



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Procedure

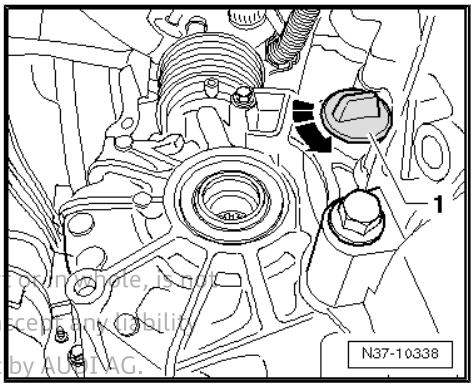
- Engine/gearbox assembly removed and attached to engine bracket - T10497- .

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

– Detach gearbox support from gearbox
⇒ Item 17 (page 57) .
– Clamp off coolant hoses with hose clamps up to 25 mm - 3094- and disconnect hoses from ATF cooler.
– Seal off coolant hoses and connections with suitable sealing plugs from engine bung set - VAS 6122- .

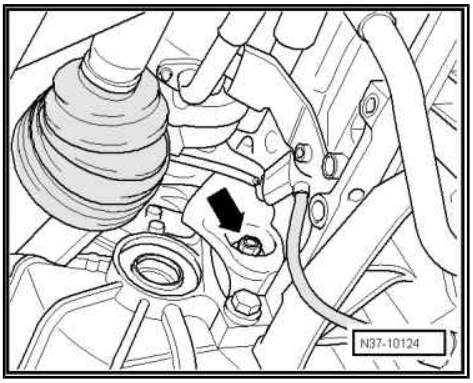


– Turn cover cap -1- in direction of -arrow- and remove.



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– Unscrew 6 torque converter nuts -arrow- using insert tool - V/ 175- .

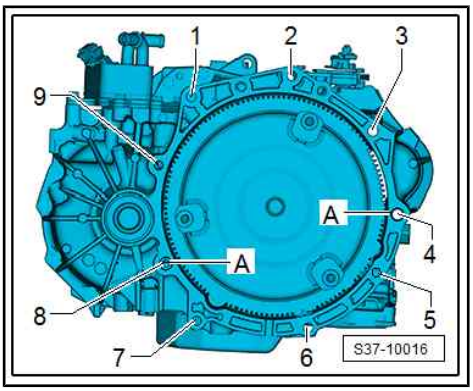


Note

- *Proceed carefully when rotating engine.*
- *If any torque converter nuts have not been removed, the torque converter will be pulled out when the gearbox is detached from the engine.*

– Secure gearbox to workshop hoist - 10-222A/12- using shackle - VAS 6100- .

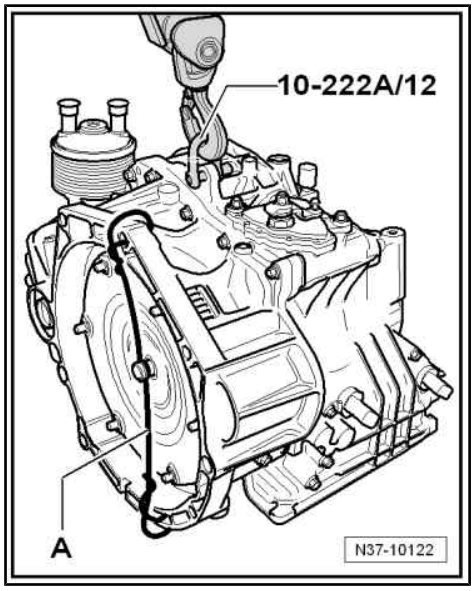
– Remove bolts -1 - 9- securing gearbox to engine.
– Separate gearbox from engine and at the same time detach torque converter from drive plate (on engine).



Note

- *Pay special attention to the torque converter; it must be removed together with the gearbox. Secure torque converter with a wire -A- (or similar) to prevent it falling out.*
- *The gearbox may differ from the one illustrated.*

– Detach gearbox from engine.



1.3 Securing engine to engine and gearbox support

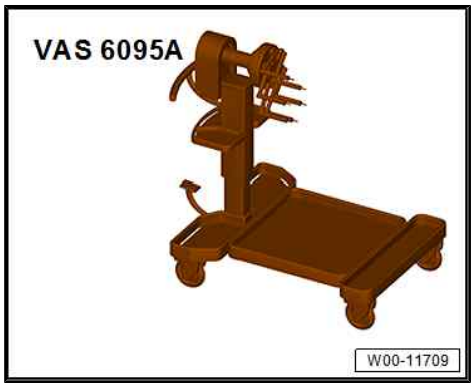
Special tools and workshop equipment required

- Lifting tackle - 2024A-



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- Engine and gearbox support - VAS 6095A-



♦ Workshop hoist - VAS 6100-



Procedure

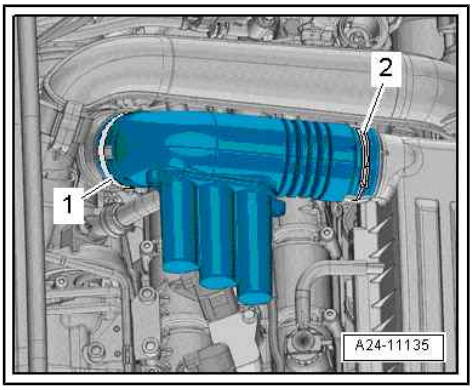
- Gearbox detached from engine
  ⇒ “1.2 Separating engine and gearbox”, page 37 .

e-tron:

– Remove air cleaner housing
  ⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

All engine versions (continued):

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



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

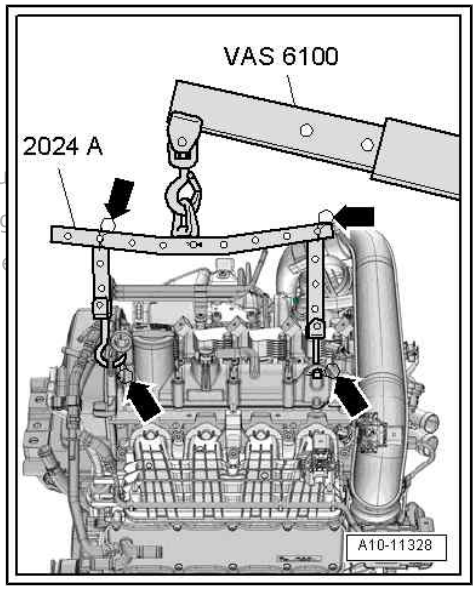
– To adjust to the centre of gravity of the assembly, the perforated rails must be positioned as shown.

CAUTION

Risk of injury if power unit drops when it is lifted.

Danger of trapping or crushing parts of the body.

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



– Secure support hooks and retaining pins with locking pins -arrows-.

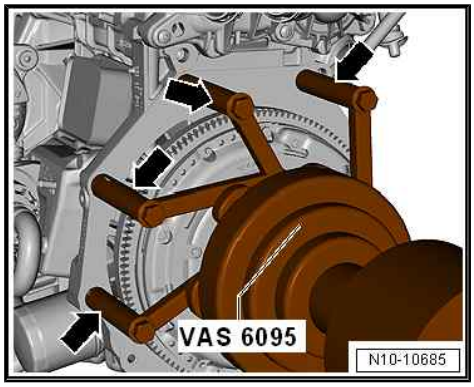
– Lift engine off T10497 using workshop hoist - VAS 6100- .

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mation in this docume

– Secure engine to engine and gearbox support - VAS 6095A- using pins -arrows-, as shown in illustration.

– Fit spacers so that mounting pin (bottom right in illustration) of -VAS 6095A- makes contact with crankcase free of tension.

• Thickness of spacers: approx. 10 mm



Tightening torque

Component		Nm
Bolts/nuts	M6	10
	M8	20
	M10	45
	M12	65

1.4 Installing engine

⇒ “1.4.1 Installing engine - all vehicles except e-tron”, page 48

⇒ “1.4.2 Installing engine - e-tron”, page 51

1.4.1 Installing engine - all vehicles except e-tron

Tightening torques

♦ 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

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♦ Assembly mountings
⇒ “2.1 Exploded view - assembly mountings”, page 55

♦ Securing gearbox to engine ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox / ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure

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

• Renew bolts tightened with specified tightening angle.

• Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.

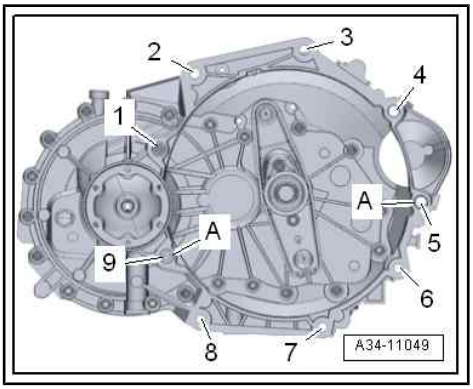
• Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

• Re-install all cable ties in original positions.

• Do not reuse coolant.

– Install intermediate plate
⇒ Fig. ““Installing intermediate plate”“ , page 100 .

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



Vehicles with manual gearbox:

– Remove needle bearing in crankshaft if fitted
⇒ “3.3 Renewing needle bearing in crankshaft”, page 111 .

– Renew clutch release bearing if worn ⇒ Rep. gr. 30 ; Clutch mechanism; Servicing clutch release mechanism .

– Lubricate splines of gearbox input shaft lightly with grease for clutch plate splines ⇒ Electronic parts catalogue .

– Make sure that clutch plate is properly centred.

Vehicles with dual clutch gearbox:

– If engine and gearbox have been separated, renew needle bearing
⇒ “3.3 Renewing needle bearing in crankshaft”, page 111 .

All vehicles (continued):

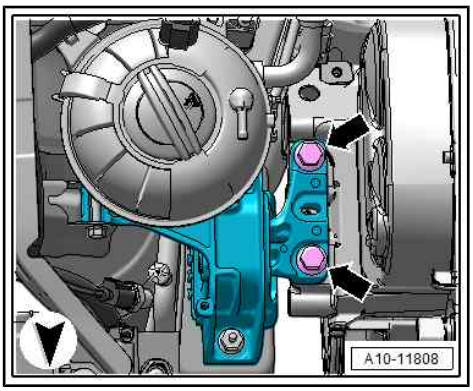
– Secure gearbox to engine ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Installing gearbox / ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Installing gearbox .

– Install gearbox support.

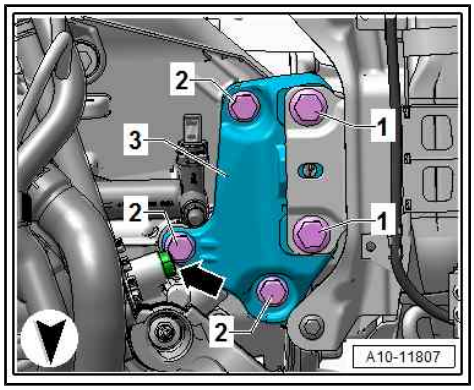
– Take up engine/gearbox assembly with engine bracket -T10497- .

– Guide engine/gearbox assembly into body.

– Initially screw in bolts -arrows- for engine mounting by hand until they make contact. Illustrated on manual gearbox 0AJ.



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- Initially screw in bolts -1- for gearbox mounting by hand until they make contact.
- The bolts are tightened to final torque only after adjusting the assembly mountings
  ⇒ “2.7 Adjusting assembly mountings”, page 75 .
- Remove engine bracket - T10497- from engine.
- Install starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Exploded view - starter .
- Install continued coolant circulation pump - V51-
  ⇒ “4.8.1 Removing and installing continued coolant circulation pump V51 ”, page 369 .
- Install air pipe
  ⇒ “2.1 Exploded view - charge air system”, page 441 .
- Install air ducts
  ⇒ “2.2 Exploded view - hose connections for charge air system”, page 444 .
- Install clutch slave cylinder ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch slave cylinder .
- Install cables with cable support bracket ⇒ Gearbox; Rep. gr. 34 ; Selector mechanism; Exploded view - selector cables .
- Install catalytic converter
  ⇒ “2.3 Removing and installing catalytic converter”, page 528 .
- Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
- Install heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for 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 .
- Install poly V-belt
  ⇒ “1.4.1 Removing and installing poly V-belt - all vehicles except e-tron (without air conditioner compressor)”, page 85 .
- 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 - GX3-
  ⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475 .
- Install engine control unit - J623-
  ⇒ “8.1 Removing and installing engine/motor control unit J623 ”, page 509 .
- Connect coolant hoses with plug-in connector
  ⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .
- Install pendulum support
  ⇒ Fig. ““Installing pendulum support”“ , page 57 .

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– Install front wheel housing liners ⇒ 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 75 .

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

– Install air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

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

– Fill up with coolant ⇒ page 318 .

– Check oil level ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .

– Connect vehicle diagnostic tester :

– Erase entries in event memory ⇒ Vehicle diagnostic tester, `Guided Functions`, `Interrogate event memory`.

– After renewing engine:

♦ Resetting misfire adaptions ⇒ Vehicle diagnostic tester, `Guided Functions`, `01 - Reset adaptions misfires`

♦ Deleting adaption values for injectors ⇒ Vehicle diagnostic tester, `Guided Functions`, `01 - Delete adaption values for injectors`

1.4.2 Installing engine - e-tron

Tightening torques

♦ 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

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♦ Assembly mountings
⇒ “2.1 Exploded view - assembly mountings”, page 55

♦ Securing gearbox to engine ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure

• Engine/gearbox assembly placed on scissor-type assembly platform - VAS 6131 B- .

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .
- Re-install all cable ties in original positions.
- Do not reuse coolant.

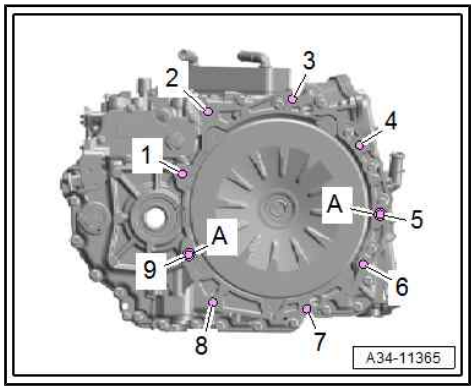
– Install intermediate plate
⇒ Fig. ““Installing intermediate plate”“ , page 100 .

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

– If engine and gearbox have been separated, renew needle bearing
⇒ “3.3 Renewing needle bearing in crankshaft”, page 111 .

– Secure gearbox to engine ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Installing gearbox .

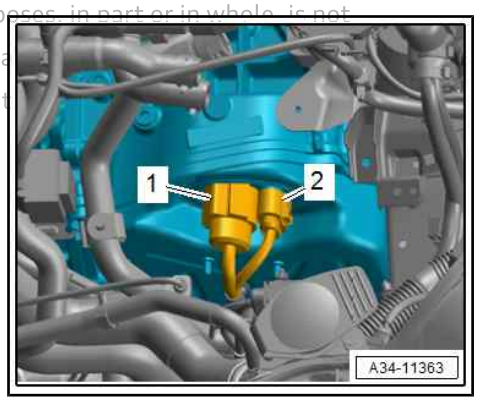
– Guide engine/gearbox assembly into body using scissor-type assembly platform - VAS 6131 B- .



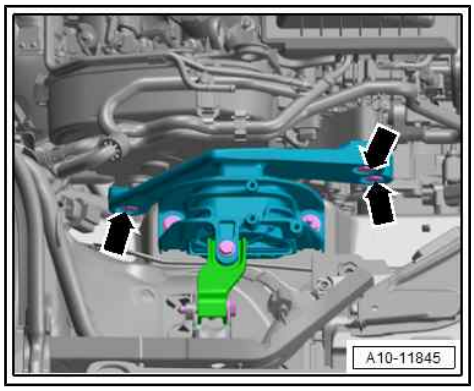
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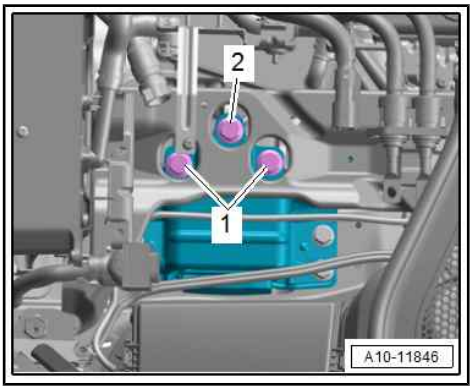
– Raise engine/gearbox assembly until electrical connectors -1, 2- can be plugged in at gearbox.

– Raise engine/gearbox assembly further into installation position.



– Tighten bolts -arrows- for engine mounting.





- Initially screw in bolts -1, 2- for gearbox mounting by hand until they make contact.
- The bolts are tightened to final torque only after adjusting the assembly mountings
  ⇒ “2.7 Adjusting assembly mountings”, page 75 .
- Remove engine bracket - T10497- from engine.
- Lower scissor-type assembly platform - VAS 6131 B- and move to one side.
- Install air pipe
  ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441 .
- Install air ducts
  ⇒ “2.2 Exploded view - hose connections for charge air system”, page 444 .
- Install coolant pump for high-voltage battery - V590-
  ⇒ “4.8.5 Removing and installing coolant pump for high-voltage battery V590 ”, page 374 .
- Install selector lever cable ⇒ Gearbox; Rep. gr. 34 ; Selector mechanism; Removing and installing selector mechanism .
- Install catalytic converter
  ⇒ “2.3 Removing and installing catalytic converter”, page 528 .
- Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
- Install heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft .
- Install electrical air conditioner compressor -V470- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor .
- 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 engine control unit - J623-
  ⇒ “8.1 Removing and installing engine/motor control unit J623 ”, page 509 .
- Connect coolant hoses with plug-in connector
  ⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .
- Install subframe with steering rack ⇒ Rep. gr. 40 ; Subframe; Removing and installing subframe with steering rack .
- If removed previously, install bracket for power and control electronics for electric drive - JX1-
  ⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .
- If removed previously, install mounting bracket for charging unit 1 for high-voltage battery - AX4-
  ⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661 .
- Install power and control electronics for electric drive - JX1-
  ⇒ “5.3 Removing and installing power and control electronics for electric drive”, page 638 .

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– If removed previously, install charging unit 1 for high-voltage battery - AX4-
⇒ “6.2 Removing and installing charging unit 1 for high-voltage battery AX4 ”, page 658 .

– Install front wheel housing liners ⇒ 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 .

– Install underbody trim ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .

– Adjust assembly mountings
⇒ “2.7 Adjusting assembly mountings”, page 75 .

– Install high-voltage heater (PTC) - Z115- ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Install air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

– Fill up with coolant ⇒ page 318 .

– Check oil level ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

– Erase entries in event memory ⇒ Vehicle diagnostic tester, `Guided Functions`, `Interrogate event memory`.

– After renewing engine:

♦ Resetting misfire adaptions ⇒ Vehicle diagnostic tester, `Guided Functions`, `01 - Reset adaptions misfires`

♦ Deleting adaption values for injectors ⇒ Vehicle diagnostic tester, `Guided Functions`, `01 - Delete adaption values for injectors`

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2 Assembly mountings

⇒ “2.1 Exploded view - assembly mountings”, page 55

⇒ “2.2 Supporting engine in installation position”, page 61

⇒ “2.3 Removing and installing engine mountings”, page 65

⇒ “2.4 Removing and installing gearbox mounting”, page 68

⇒ “2.5 Removing and installing pendulum support”, page 72

⇒ “2.6 Checking adjustment of assembly mountings (engine/ gearbox mountings)”, page 73

⇒ “2.7 Adjusting assembly mountings”, page 75

2.1 Exploded view - assembly mountings

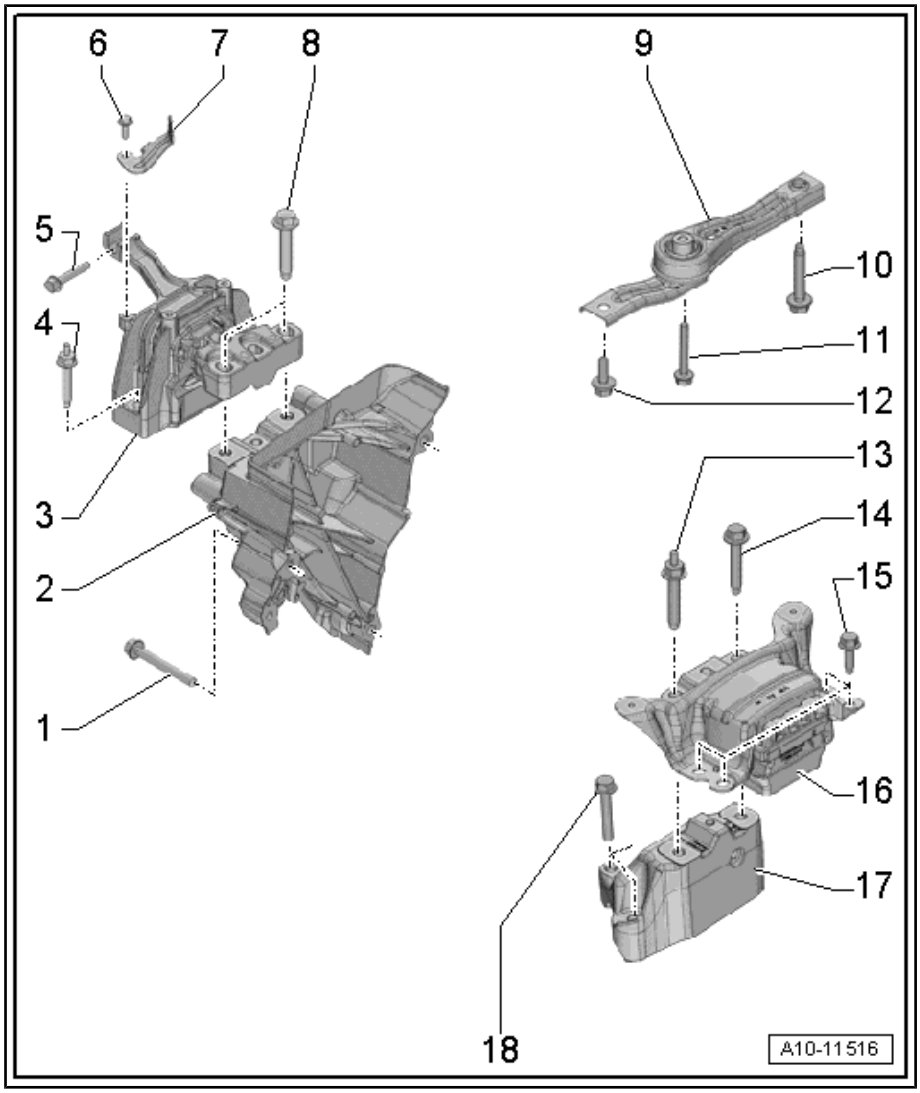
⇒ “2.1.1 Exploded view - assembly mountings, vehicles with manual gearbox 0AJ, automatic gearbox 09G or dual clutch gearbox 0CW”, page 55

⇒ “2.1.2 Exploded view - assembly mountings, vehicles with manual gearbox 02S”, page 58

⇒ “2.1.3 Exploded view - assembly mountings, vehicles with dual clutch gearbox 0DD”, page 60

2.1.1 Exploded view - assembly mountings, vehicles with manual gearbox 0AJ, automatic gearbox 09G or dual clutch gearbox 0CW

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1 - Bolt
- ❑ Renew after removing
- ❑ Tightening sequence ⇒ Fig. ""Engine support - tightening torque and sequence"" , page 57

2 - Engine support
- ❑ Tightening torque and sequence ⇒ Fig. ""Engine support - tightening torque and sequence"" , page 57

3 - Engine mounting
- ❑ With support arm
- ❑ Removing and installing ⇒ "2.3 Removing and installing engine mountings", page 65

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

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

6 - Bolt
- ❑ 8 Nm

7 - Bracket
- ❑ Depending on version

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

9 - Pendulum support
- ❑ Removing and installing ⇒ "2.5 Removing and installing pendulum support", page 72

10 - Bolt
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing pendulum support"" , page 57

11 - Bolt
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing pendulum support"" , page 57

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12 - Bolts
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing pendulum support"" , page 57

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

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

15 - Bolt
- ❑ Renew after removing

❑ 50 Nm +90°

16 - Gearbox mounting

❑ With support arm

❑ Removing and installing ⇒ “2.4 Removing and installing gearbox mounting”, page 68

17 - Gearbox support

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

18 - Bolt

❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings / ⇒ Gearbox; Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

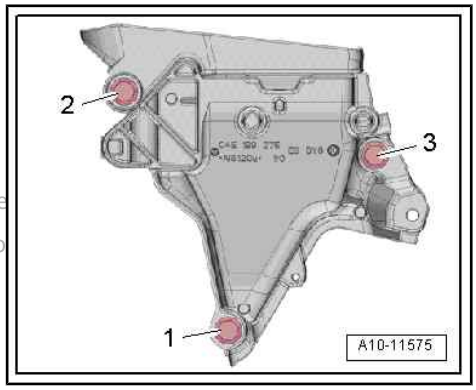
Engine support - tightening torque and sequence

- 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

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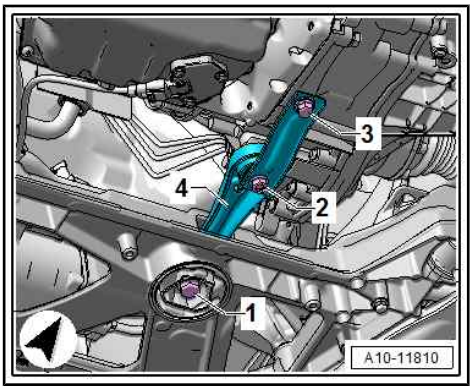


Installing pendulum support

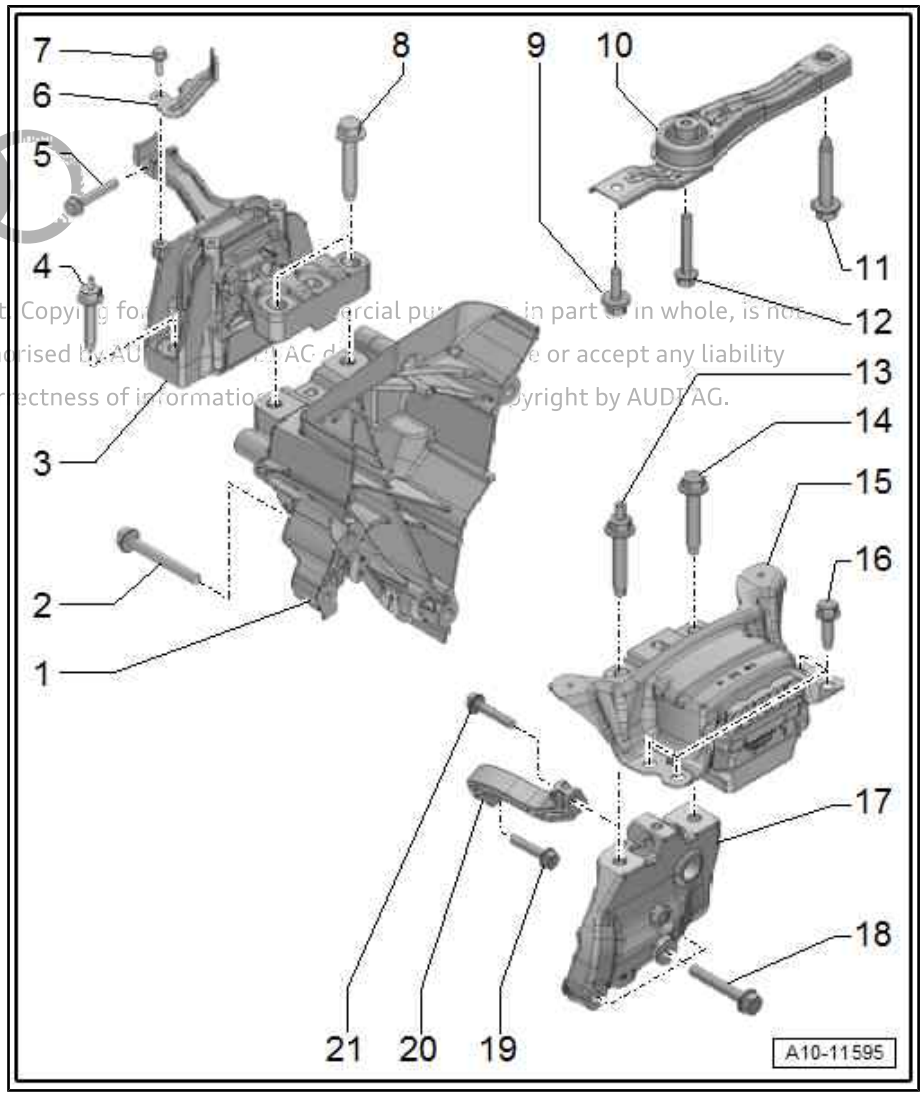
- Renew bolts tightened with specified tightening angle.

– 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



2.1.2 Exploded view - assembly mountings, vehicles with manual gearbox 02S



1 - Engine support
- ❑ Removing and installing ⇒ “1.6 Removing and installing engine support”, page 89

2 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ““Engine support - tightening torque and sequence“ , page 57

3 - Engine mounting
- ❑ With support arm
- ❑ Removing and installing ⇒ “2.3 Removing and installing engine mountings”, page 65

4 - Bolt
- ❑ Renew
- ❑ 40 Nm +90°

5 - Bolt
- ❑ Renew
- ❑ 20 Nm +90°

6 - Bracket
- ❑ Depending on version

7 - Bolt
- ❑ 8 Nm

8 - Bolt
- ❑ Renew
- ❑ 60 Nm +90°

9 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 57

10 - Pendulum support
- ❑ Removing and installing ⇒ “2.5 Removing and installing pendulum support”, page 72

11 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 57

12 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 57

13 - Bolt
- ❑ Renew
- ❑ 60 Nm +90°

14 - Bolt
- ❑ Renew

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- ❑ 60 Nm +90°

15 - Gearbox mounting

- ❑ With support arm
- ❑ Removing and installing ⇒ “2.4 Removing and installing gearbox mounting”, page 68

16 - Bolt

- ❑ Renew
- ❑ 50 Nm +90°

17 - Gearbox support

18 - Bolt

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

19 - Bolt

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

20 - Support

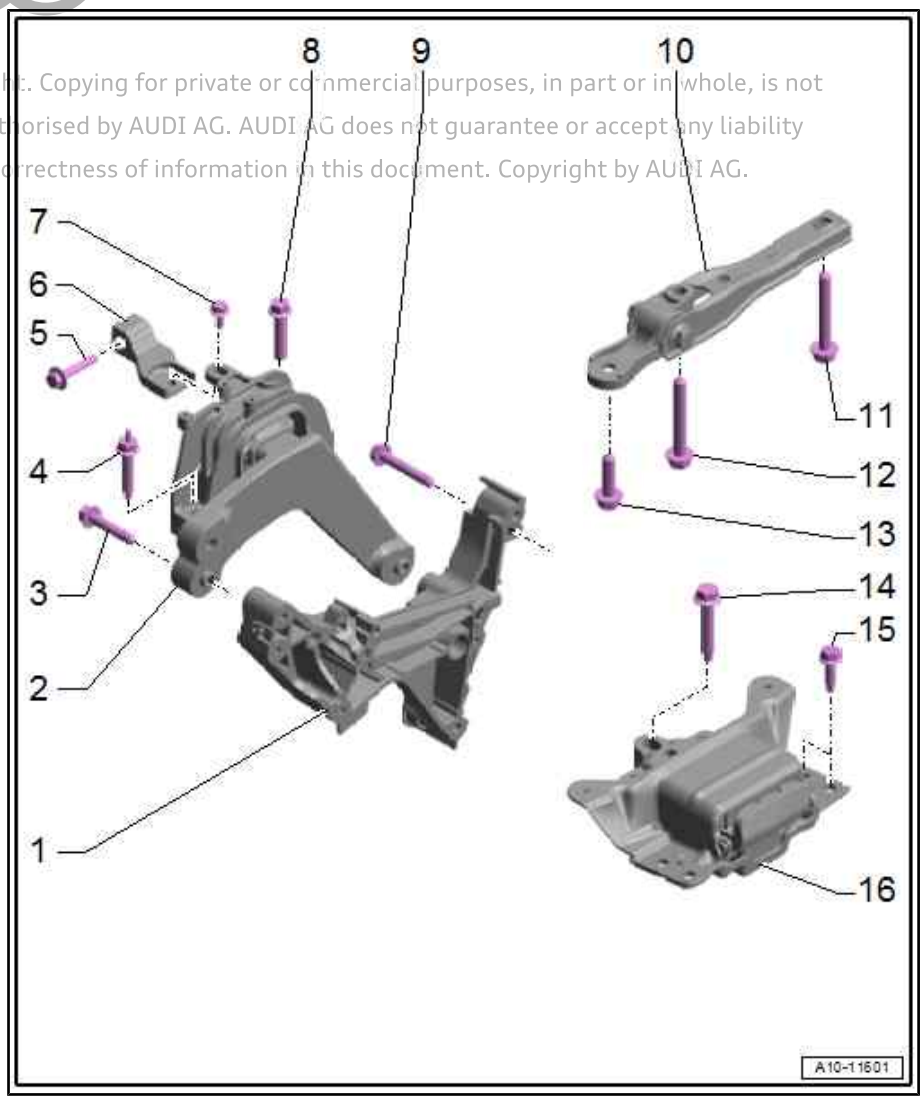
21 - Bolt

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

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2.1.3 Exploded view - assembly mountings, vehicles with dual clutch gearbox 0DD

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1 - Engine support
- ❑ Removing and installing ⇒ “1.6.2 Removing and installing engine support - e-tron”, page 91

2 - Engine mounting
- ❑ With support arm
- ❑ Removing and installing ⇒ “2.3 Removing and installing engine mountings”, page 65

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

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

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

6 - Bracket
- ❑ Depending on version

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

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

9 - Bolt
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Engine support - tightening torque and sequence”“ , page 61

10 - Pendulum support
- ❑ Removing and installing ⇒ “2.5 Removing and installing pendulum support”, page 72

11 - Bolt
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 57

12 - Bolt
- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 57

13 - Bolts
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ Fig. ““Installing pendulum support”“ , page 57

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

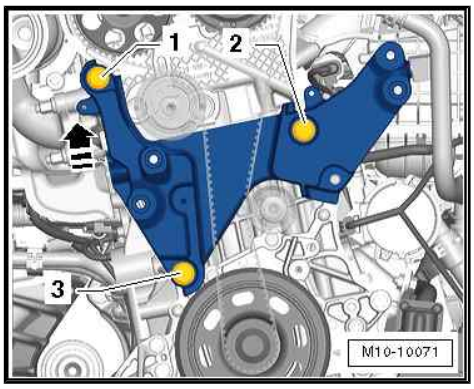
15 - Bolt

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

16 - Gearbox mounting

- ❑ With support arm
- ❑ Removing and installing ⇒ “2.4 Removing and installing gearbox mounting”, page 68

Engine support - tightening torque and sequence



- Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 3-	Screw in loosely
2.		Slide engine support upwards as far as it will go -arrow- and tighten by hand so that it cannot slip out of position
3.	-1 … 3-	40 Nm
4.	-1 … 3-	Turn 90° further

2.2 Supporting engine in installation position

⇒ “2.2.1 Supporting engine in installation position - all vehicles except e-tron”, page 61

⇒ “2.2.2 Supporting engine in installation position - e-tron”, page 63

2.2.1 Supporting engine in installation position - all vehicles except e-tron

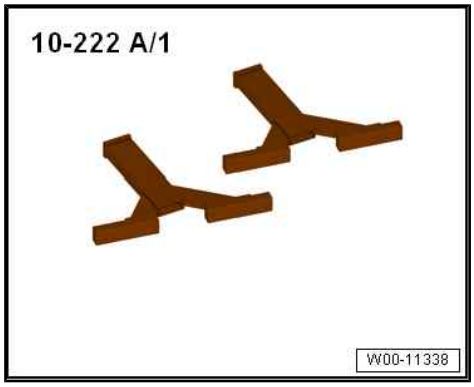
Special tools and workshop equipment required

- ♦ Support bracket - 10-222A-

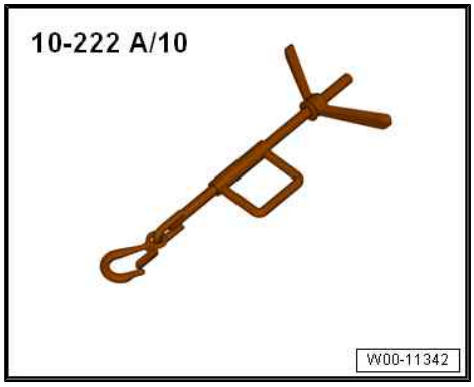


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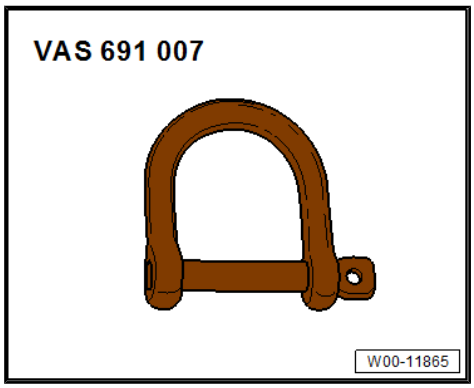
- Rack - 10-222A/1A-



- Hook - 10-222A/10-



- Shackle - VAS 691 007-

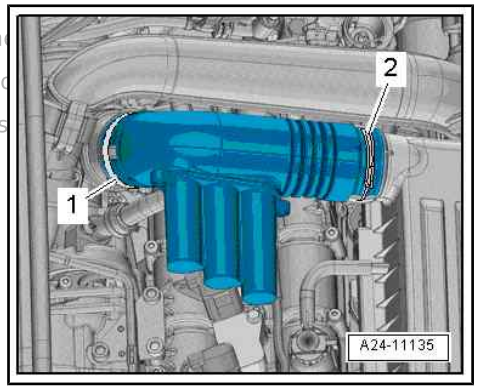


Procedure

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– Remove air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

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

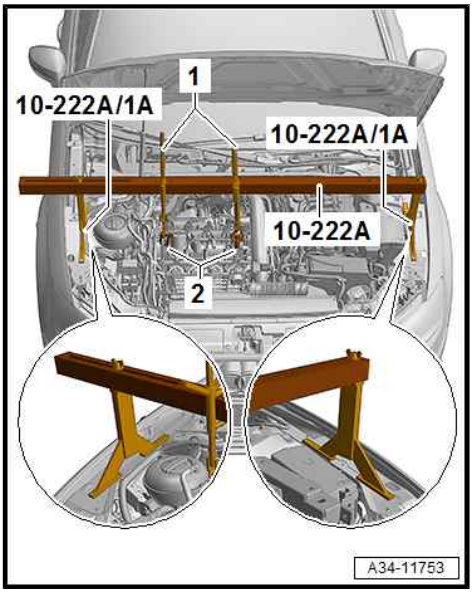


– Remove engine cover panel
⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

– Set up support bracket - 10-222A- on wing mounting flanges (left and right) with hooks - 10-222A/10- -item 1- and support - 10-222A/1A- , as shown.

– Attach shackles - VAS 691 007- -item 2- to engine lifting eyes and engage in hooks - 10-222A/10- -item 1-.

– Tighten spindle slightly to take up weight of engine/gearbox assembly; do not lift.



Assembly is performed in reverse sequence; note the following:

– Install engine cover panel
⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

– Install air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

2.2.2 Supporting engine in installation position - e-tron

Special tools and workshop equipment required

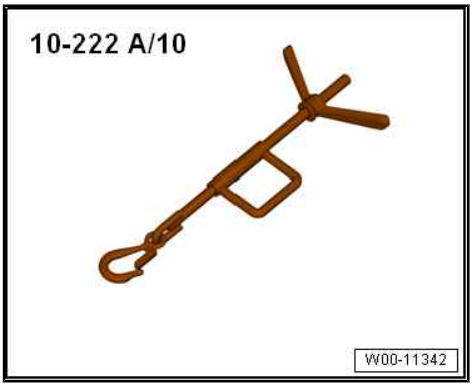
♦ Support bracket - 10-222A-



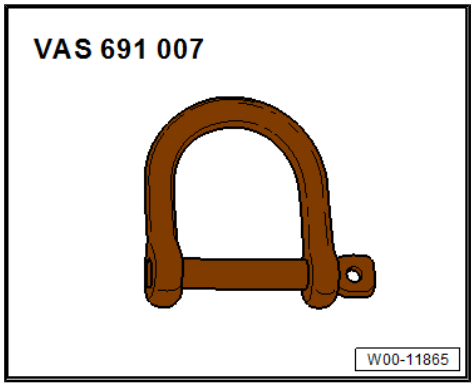
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♦ Rack - 10-222A/1A-

♦ Hook - 10-222A/10-



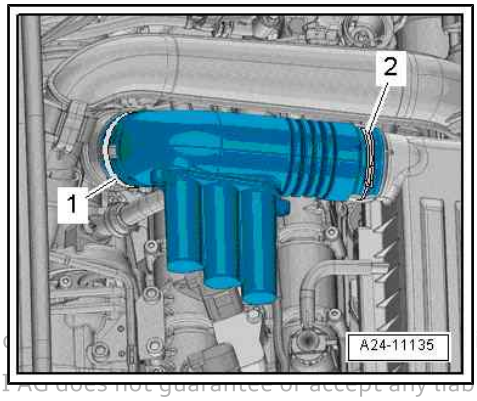
♦ Shackle - VAS 691 007-



Procedure

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

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



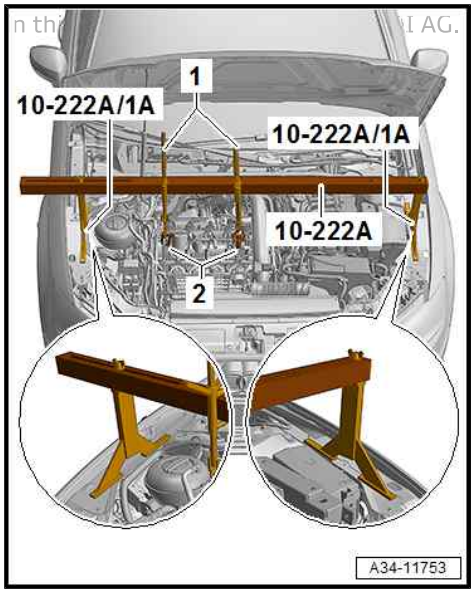
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– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Set up support bracket - 10-222A- on wing mounting flanges (left and right) with hooks - 10-222A/10- -item 1- and support - 10-222A/1A- , as shown.

– Attach shackles - VAS 691 007- -item 2- to engine lifting eyes and engage in hooks - 10-222A/10- -item 1-.

– Tighten spindle slightly to take up weight of engine/gearbox assembly; do not lift.



Assembly is performed in reverse sequence; note the following:

– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Install air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

2.3 Removing and installing engine mountings

⇒ “2.3.1 Removing and installing engine mountings - all vehicles except e-tron”, page 65

⇒ “2.3.2 Removing and installing engine mountings - e-tron”, page 66

2.3.1 Removing and installing engine mountings - all vehicles except e-tron

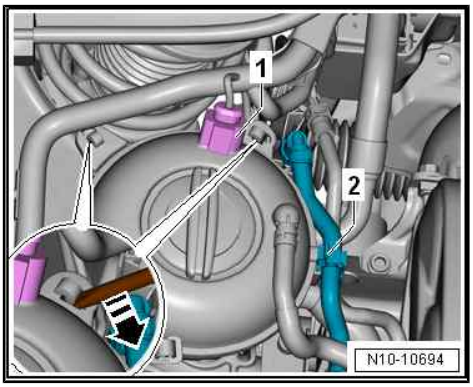
Removing

– Support engine in installation position
⇒ “2.2.1 Supporting engine in installation position - all vehicles except e-tron”, page 61 .

– Unplug electrical connector -1-.

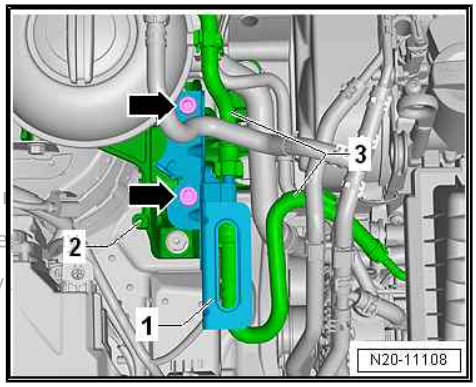
– Move clear hose -2- from activated charcoal filter.

– Using a screwdriver, release fasteners -arrow- and move coolant expansion tank to one side.



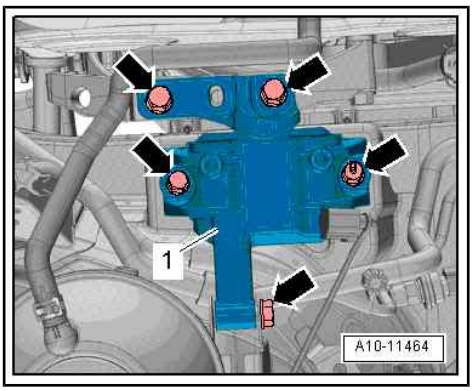
– If fitted, unscrew bolts -arrows- securing bracket for fuel quality sender - G446- .

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



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



Installing

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

– Check adjustment of assembly mountings (engine/gearbox mountings)
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 73 .

– Install engine cover panel
⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

Tightening torques

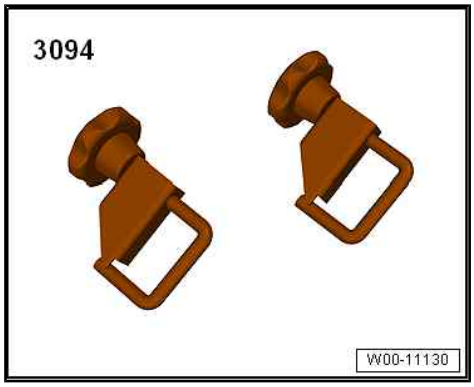
♦ ⇒ “2.1 Exploded view - assembly mountings”, page 55

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

2.3.2 Removing and installing engine mountings - e-tron

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6362-



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Removing

– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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

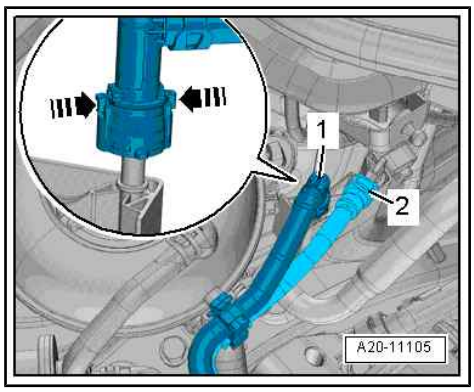
– Support engine in installation position ⇒ “2.2.2 Supporting engine in installation position - e-tron”, page 63 .

– Tighten spindle slightly to take up weight of engine/gearbox assembly; do not lift.

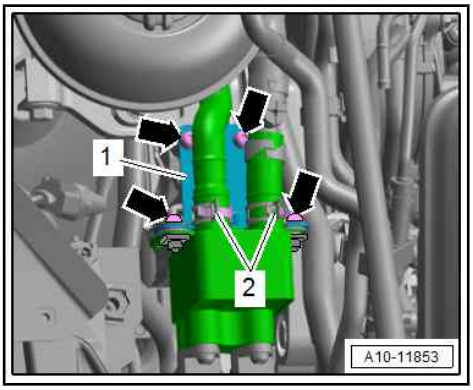
– Disconnect hose connector -1- ⇒ Fuel supply system; Rep. gr. 20 ; Plug-in connectors; Disconnecting plug-in connectors .

– Press release tab on hose -2- connected to activated charcoal filter.

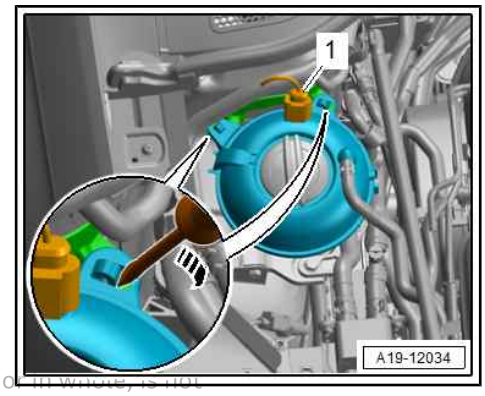
– Disconnect hose and move it clear.



– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -2- and disconnect hoses.
– Unscrew bolts -arrows- and detach bracket -1- for heat exchanger for hybrid battery unit.

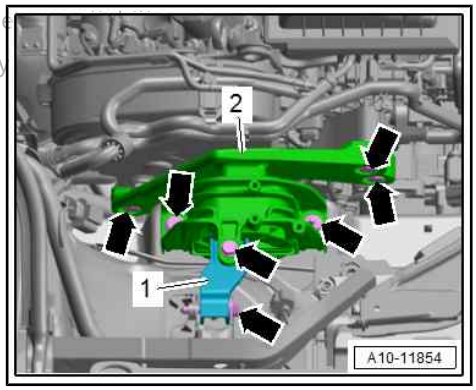


– Unplug electrical connector -1-.
– Using a screwdriver, release fasteners -arrow- and move coolant expansion tank to one side.
• Mark installation position of engine mounting if it is going to be reinstalled.
– Unscrew bolt -left arrow- at rear of cylinder block from wheel housing side.



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– Unscrew bolts -arrows- and detach bracket -1- and engine mounting -2-.



Installing

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

– When reinstalling engine mounting, position it according to marking made previously and secure.
– Check adjustment of assembly mountings (engine/gearbox mountings)
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 73 .
– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

♦ ⇒ “2.1 Exploded view - assembly mountings”, page 55
♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

2.4 Removing and installing gearbox mounting

⇒ “2.4.1 Removing and installing gearbox mounting - all vehicles except e-tron”, page 68
⇒ “2.4.2 Removing and installing gearbox mounting - e-tron”, page 69

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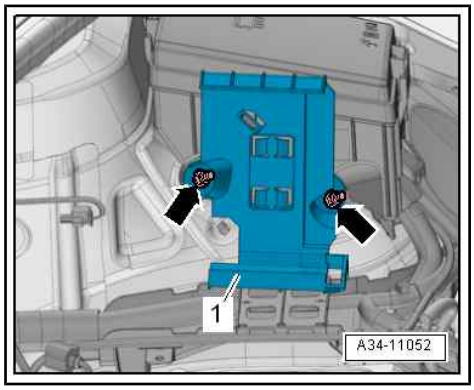
2.4.1 Removing and installing gearbox mounting - all vehicles except e-tron

Removing

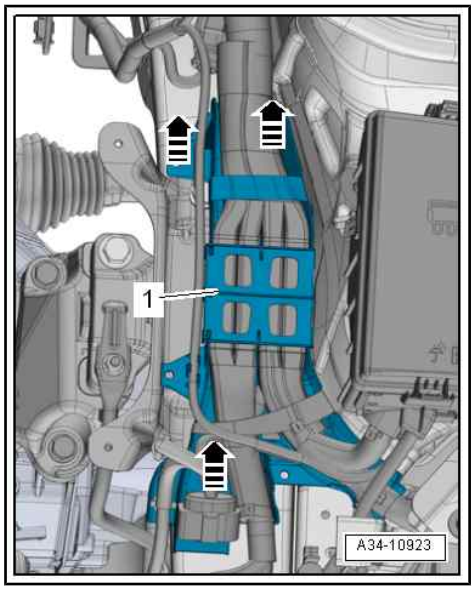
– Remove battery tray ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery tray .

– Detach engine control unit - J623- from bracket and move aside
⇒ “8.1 Removing and installing engine/motor control unit J623”, page 509 .

– Remove nuts -arrows- and detach bracket -1-. Different types of brackets are fitted depending on version.

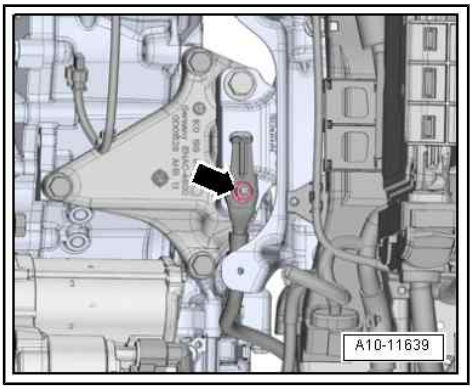


– Unclip wire guide -1- upwards -arrows- and push slightly to one side.

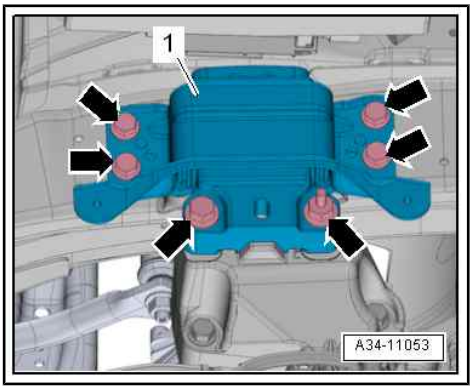


– If fitted, remove nut -arrow- and move earth wire clear.

– Support engine in installation position
⇒ “2.2.1 Supporting engine in installation position - all vehicles except e-tron”, page 61 .



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



Installing

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

• Renew bolts tightened with specified tightening angle.

– Secure gearbox mounting on longitudinal member. Illustrated on manual gearbox 0AJ.

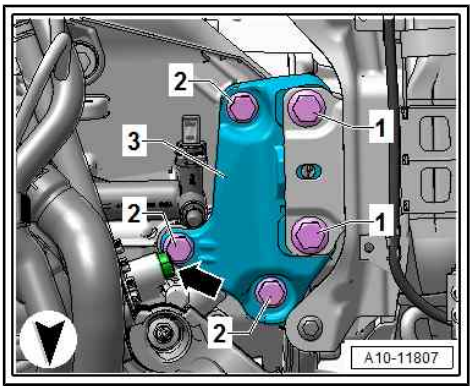
– Lift gearbox with spindle of support bracket until gearbox support makes contact with support arm of gearbox mounting.

– Align gearbox support and support arm of gearbox mounting so that they are parallel to each other before screwing in bolts.

– Screw in bolts -1-.

– Check adjustment of assembly mountings (engine/gearbox mountings)
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 73 .

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



Tightening torques

♦ ⇒ “2.1 Exploded view - assembly mountings”, page 55

♦ ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

♦ ⇒ Gearbox; Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

♦ ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery

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2.4.2 Removing and installing gearbox mounting - e-tron

Removing

• Engine mounting installed

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

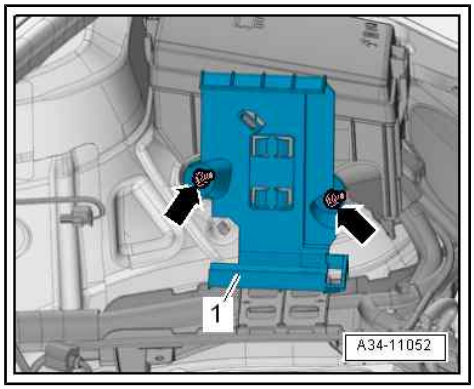
– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

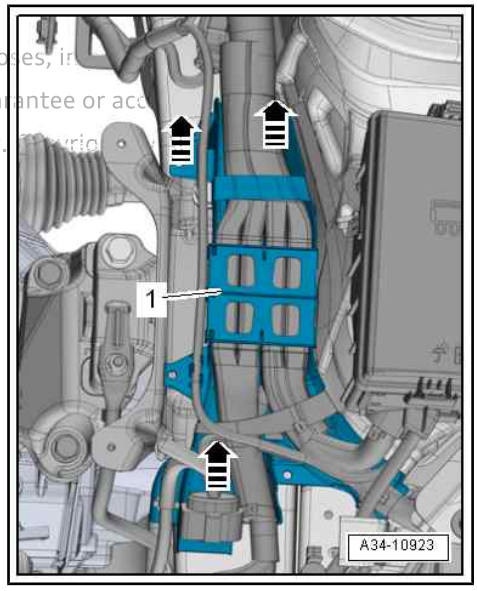
– Remove bracket for power and control electronics for electric drive - JX1-
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .

– Detach engine control unit - J623- from bracket and move aside
⇒ “8.1 Removing and installing engine/motor control unit J623 ”, page 509 .

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

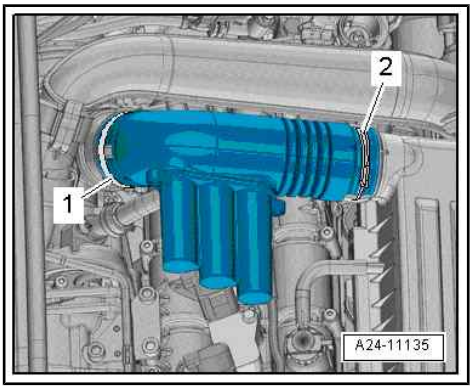


– Unclip wire guide -1- upwards -arrows- and push slightly to one side.

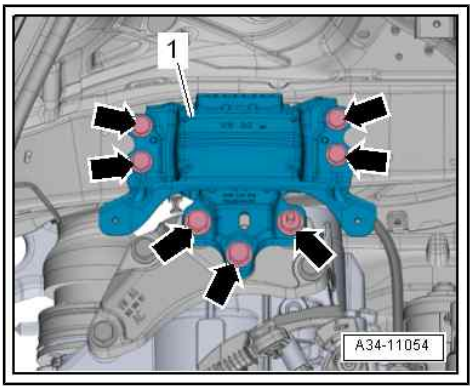


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– Release hose clip -1- and detach air pipe.
– Support engine in installation position
⇒ “2.2.2 Supporting engine in installation position - e-tron”, page 63 .
– Tighten spindle slightly to take up weight of engine/gearbox assembly; do not lift.



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



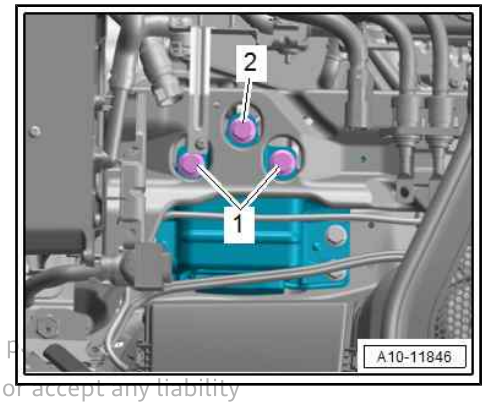
Installing

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

- Renew bolts tightened with specified tightening angle.

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– Secure gearbox mounting on longitudinal member.



NOTICE

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

- **Align gearbox support and support arm of gearbox mounting so that they are parallel to each other before screwing in bolts.**
- **If necessary, lift gearbox at rear using trolley jack.**
- **Only remove support bracket when bolts on assembly mounting have been tightened to specified torque.**

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

– Align gearbox support and support arm of gearbox mounting so that they are parallel to each other before screwing in bolts.

– Screw in bolts -1, 2-.

– Check adjustment of assembly mountings (engine/gearbox mountings)
⇒ “2.6 Checking adjustment of assembly mountings (engine/gearbox mountings)”, page 73 .

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

– Install bracket for power and control electronics for electric drive - JX1-
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

- **Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.**

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

– Install air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

Tightening torques

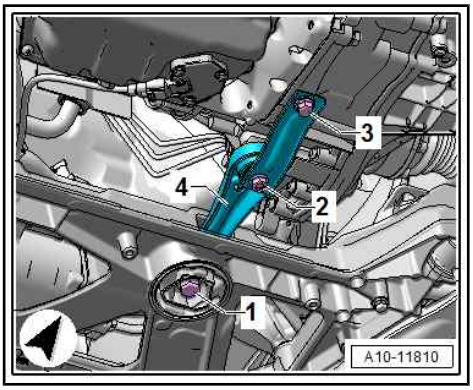
- ⇒ “2.1 Exploded view - assembly mountings”, page 55
- ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings
- ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery

2.5 Removing and installing pendulum support

Removing

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

– Remove bolts -1, 2, 3- and remove pendulum support -4-.



Installing

Installation is carried out in reverse sequence.

Tightening torques

- ⇒ Fig. ""Installing pendulum support"" , page 57
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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

⇒ "2.6.1 Checking adjustment of assembly mountings (engine/gearbox mountings) - all vehicles except e-tron", page 73

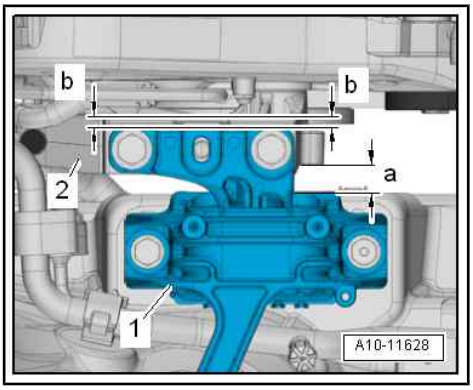
⇒ "2.6.2 Check adjustment of assembly mountings (engine/gearbox mountings) - e-tron", page 73

2.6.1 Checking adjustment of assembly mountings (engine/gearbox mountings) - all vehicles except e-tron

Procedure

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- can be checked using a ∅ 10 mm drill bit or similar.

– If the distance measured is too large or small, the assembly mountings must be adjusted
⇒ "2.7.1 Adjusting assembly mountings - all vehicles except e-tron", page 75 .

2.6.2 Check adjustment of assembly mountings (engine/gearbox mountings) - e-tron

Procedure

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DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– **Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.**

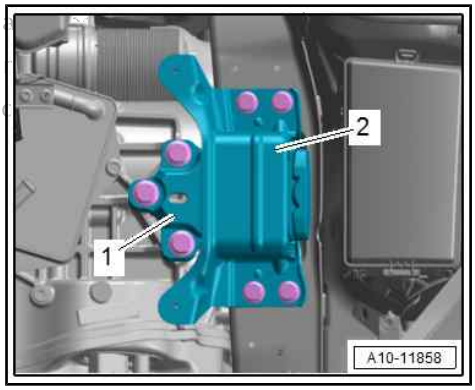
– De-energise high-voltage system
⇒ "10 De-energising high-voltage system", page 689 .

– Remove bracket for power and control electronics for electric drive - JX1-

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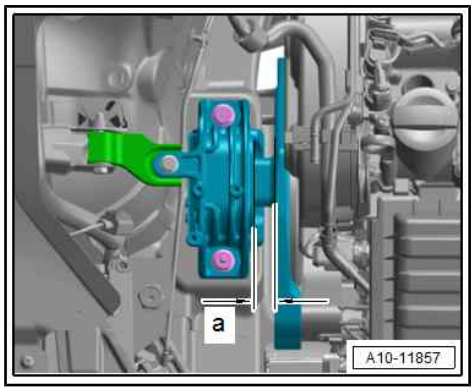
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .

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



– Check installation position at engine mounting:

• The distance -a- between support arm and engine mounting must be at least 9 mm.



Note:

Distance -a- can be checked using a ∅ 9 mm drill bit or similar.

– If the distance measured is too small, the assembly mounting must be adjusted
⇒ “2.7.2 Adjusting assembly mountings - e-tron”, page 76 .

Assembling

– Install bracket for power and control electronics for electric drive - JX1-
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

2.7 Adjusting assembly mountings

⇒ “2.7.1 Adjusting assembly mountings - all vehicles except e-tron”, page 75

⇒ “2.7.2 Adjusting assembly mountings - e-tron”, page 76

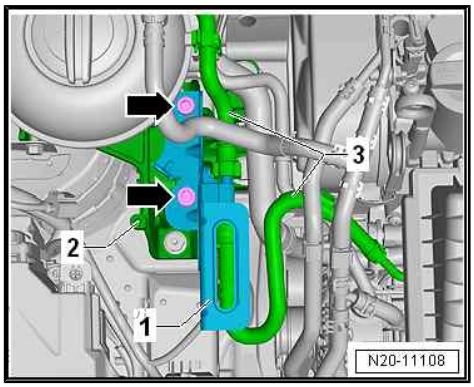
2.7.1 Adjusting assembly mountings - all vehicles except e-tron

Procedure

– 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).

– Support engine in installation position
⇒ “2.2 Supporting engine in installation position”, page 61 .

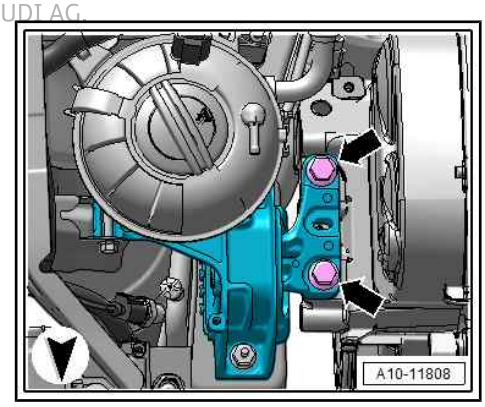


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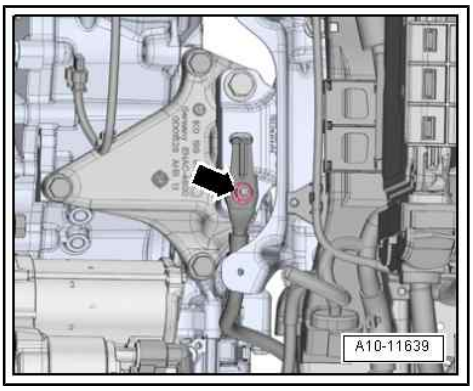
– Remove bolts -arrows- for engine mounting one by one and renew (if they were not renewed when installing engine).

– Initially fit bolts hand-tight.

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

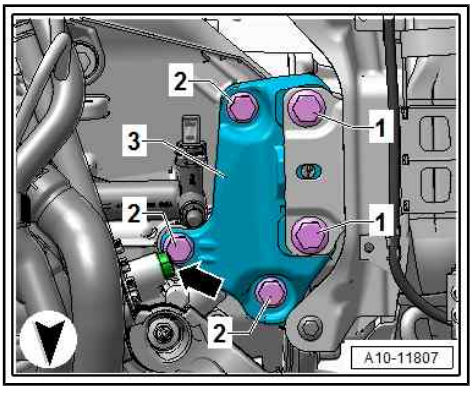


– If fitted, remove nut -arrow- and move earth wire clear.



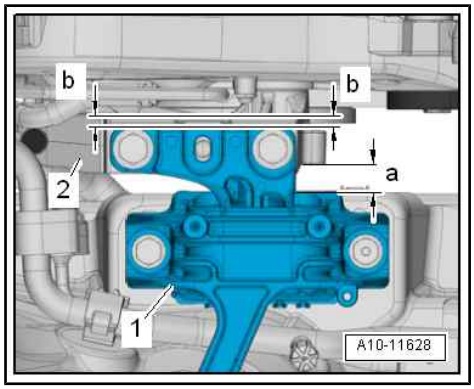
– Remove bolts -1- for gearbox mounting one by one and renew (if they were not renewed when installing engine). Illustrated on manual gearbox 0AJ.

– Initially fit bolts hand-tight.



– Using assembly lever, adjust engine/gearbox assembly so that 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:

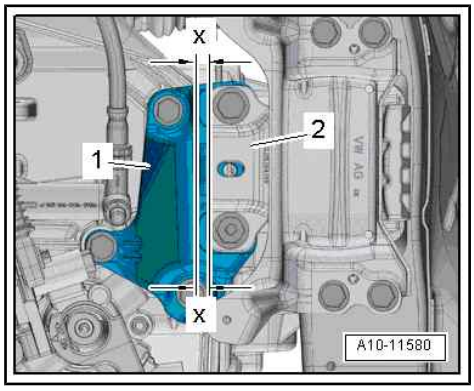
Distance -a- can be checked using a ∅ 10 mm drill bit or similar.

– Tighten bolts for engine mounting.

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

- Dimension -x- = dimension -x-.

– Tighten bolts for gearbox mounting.



Installation is carried out in reverse sequence.

Tightening torques

- ⇒ “2.1 Exploded view - assembly mountings”, page 55
- ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings
- ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery
- If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .

2.7.2 Adjusting assembly mountings - e-tron

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Procedure

DANGER

High voltage can cause fatal injury.

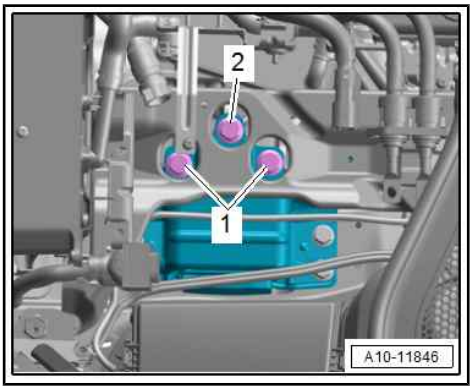
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

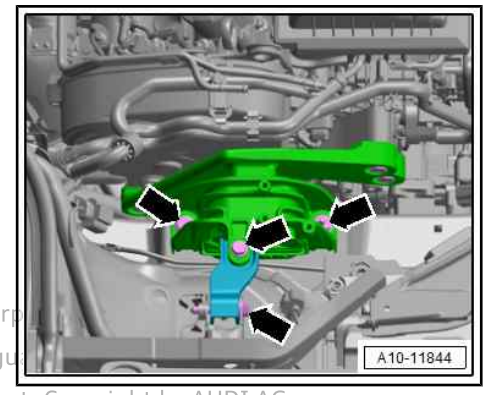
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Perform preparatory work
⇒ “2.3.2 Removing and installing engine mountings - e-tron”, page 66 and
⇒ “2.4.2 Removing and installing gearbox mounting - e-tron”, page 69 .

– Remove bolts -1- securing gearbox mounting.
– Renew bolts and screw in by hand until they make contact.

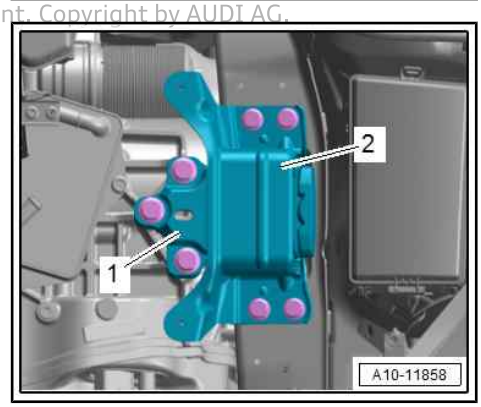


– Remove bolts for engine mounting -arrows-.
– Renew bolts and screw in by hand until they make contact.



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



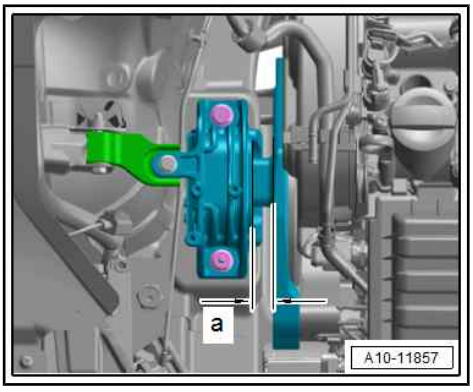
– Check installation position at engine mounting:

• The distance -a- between support arm and engine mounting must be at least 9 mm.

Note:

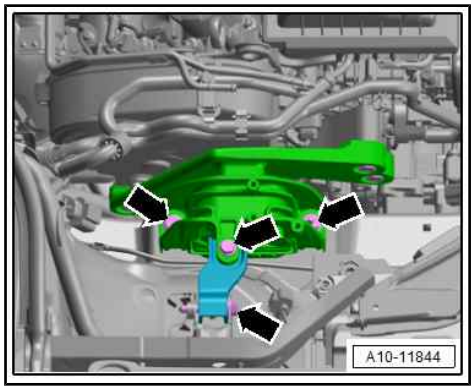
Distance -a- can be checked using a ∅ 9 mm drill bit or similar.

– Move engine/gearbox assembly sideways if necessary.
– Tighten bolts for engine mounting.
– Remove support bracket - 10-222A- .



– Fit and tighten new bolt -2-.

– Install bracket for power and control electronics for electric drive - JX1-
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .



WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

- ⇒ “2.1.3 Exploded view - assembly mountings, vehicles with dual clutch gearbox 0DD”, page 60
- ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

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3 Engine cover panel

⇒ “3.1 Removing and installing engine cover panel”, page 79

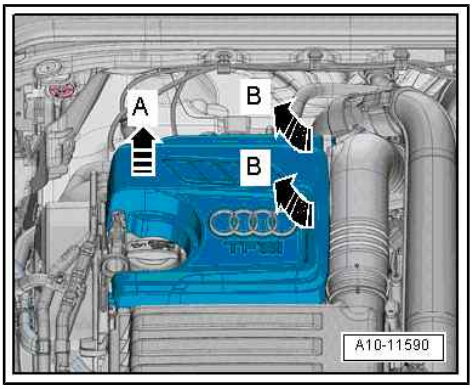
3.1 Removing and installing engine cover panel

⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79

⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79

3.1.1 Removing and installing engine cover panel - all vehicles except e-tron

Removing



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

Installing

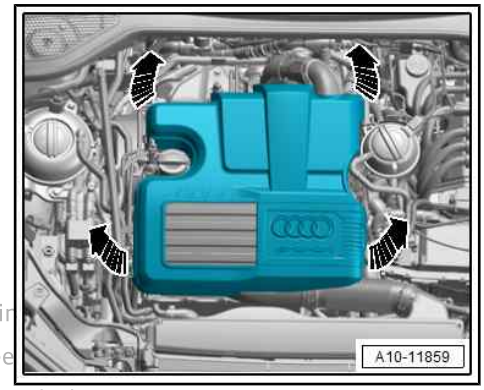
– To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.

– 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.

3.1.2 Removing and installing engine cover panel - e-tron

Removing



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

Installing

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

– When fitting engine cover panel, take care not to damage oil filler neck.

– First press engine cover panel onto rear retaining pins and then onto front retaining pins with both hands.

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13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ “1.1 Exploded view - poly V-belt drive”, page 80

⇒ “1.2 Exploded view - sealing flange (pulley end)”, page 84

⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85

⇒ “1.4 Removing and installing poly V-belt”, page 85

⇒ “1.5 Removing and installing tensioner for poly V-belt”, page 88

⇒ “1.6 Removing and installing engine support”, page 89

⇒ “1.7 Removing and installing pulley”, page 92

⇒ “1.8 Renewing crankshaft oil seal (pulley end)”, page 93

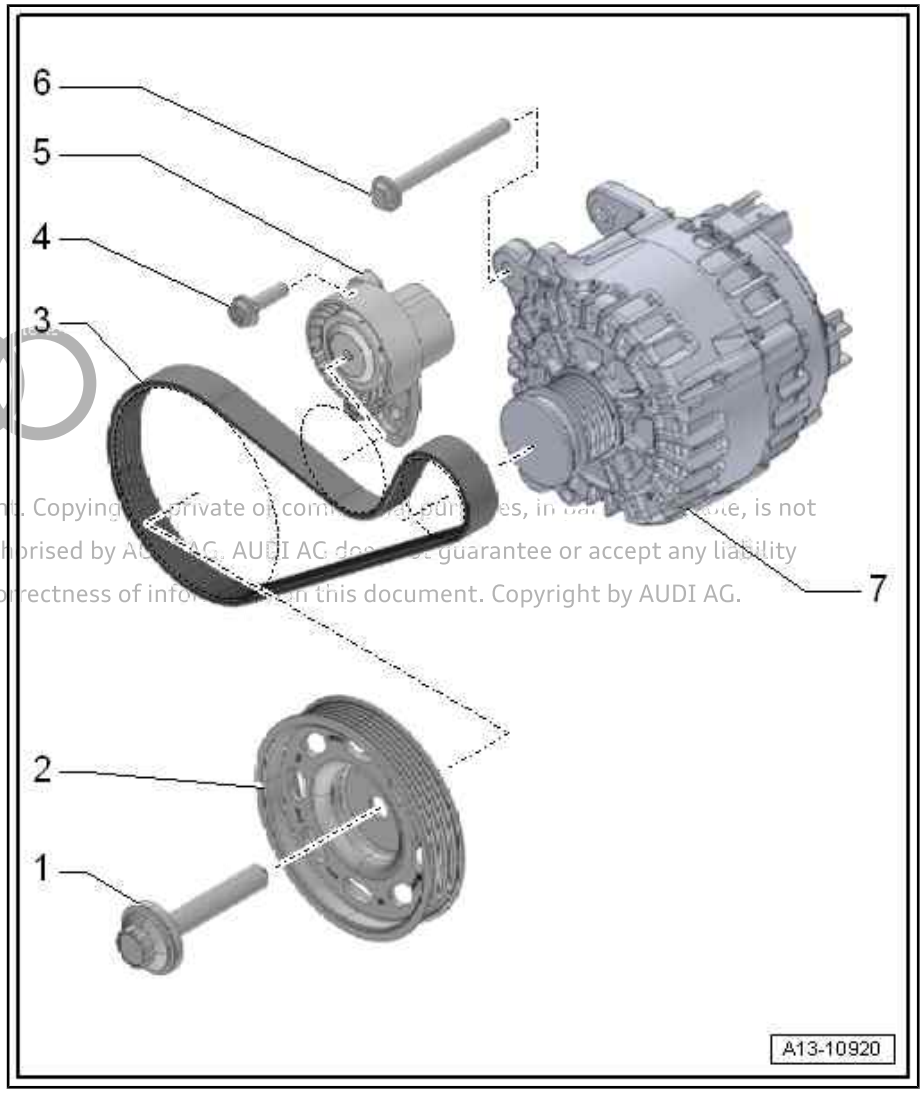
1.1 Exploded view - poly V-belt drive

⇒ “1.1.1 Exploded view - poly V-belt drive, all vehicles except e-tron (without air conditioner compressor)”, page 80

⇒ “1.1.2 Exploded view - poly V-belt drive, all vehicles except e-tron (with air conditioner compressor)”, page 82

1.1.1 Exploded view - poly V-belt drive, all vehicles except e-tron (without air conditioner compressor)

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1 - Bolt

- ❑ Tightening torque ⇒ Item 1 (page 84)
- ❑ Use counterhold tool - T10475- when loosening and tightening

2 - Poly V-belt pulley

- ❑ Removing and installing ⇒ “1.7 Removing and installing pulley”, page 92

3 - 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 86
- ❑ Removing and installing ⇒ “1.4 Removing and installing poly V-belt”, page 85
- ❑ Assigning to decoupler pulley ⇒ Fig. ““Different versions of decoupler pulley”“ , page 82
- ❑ When installing, make sure it is properly seated on pulleys.

4 - Bolt

- ❑ 23 Nm

5 - Tensioner for poly V-belt

- ❑ Pivot with socket to slacken poly V-belt
- ❑ Lock in position with locking pin - T10060A- .
- ❑ Removing and installing ⇒ “1.5 Removing and installing tensioner for poly V-belt”, page 88

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
- ❑ Different types of decoupler pulley ⇒ Fig. ““Different versions of decoupler pulley”“ , page 82

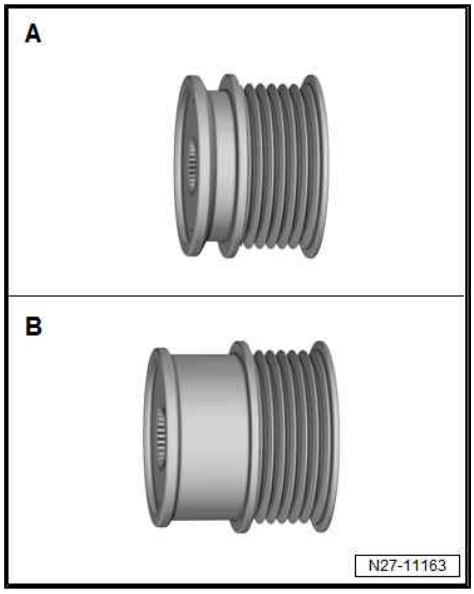
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Different versions of decoupler pulley

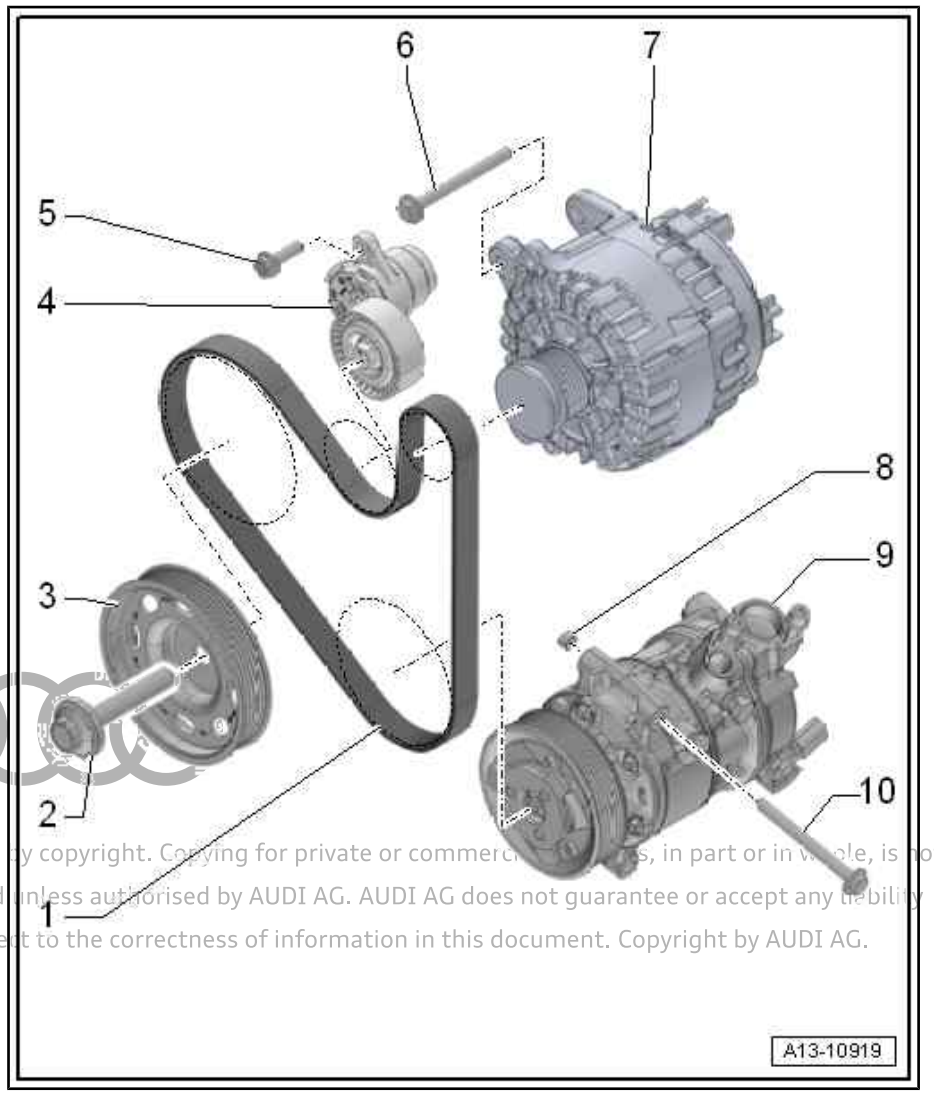
Note:

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

– Allocate poly V-belt ⇒ Electronic parts catalogue .



1.1.2 Exploded view - poly V-belt drive, all vehicles except e-tron (with air conditioner compressor)



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 87
- ❑ Removing and installing ⇒ “1.4.1 Removing and installing poly V-belt - all vehicles except e-tron (without air conditioner compressor)”, page 85
- ❑ Assigning to decoupler pulley ⇒ Fig. ““Different versions of decoupler pulley”“ , page 82
- ❑ When installing, make sure it is properly seated on pulleys.

2 - Bolt

- ❑ Tightening torque ⇒ Item 1 (page 84)

3 - Poly V-belt pulley

- ❑ Removing and installing ⇒ “1.7 Removing and installing pulley”, page 92

4 - Tensioner for poly V-belt

- ❑ Pivot with socket to slacken poly V-belt

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- Lock in position with locking pin - T10060A- .
- Removing and installing ⇒ “1.5 Removing and installing tensioner for poly V-belt”, page 88

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
- Different types of decoupler pulley ⇒ Fig. ““Different versions of decoupler pulley”“ , page 82

8 - Dowel sleeve

- For air conditioner compressor

9 - Air conditioner compressor

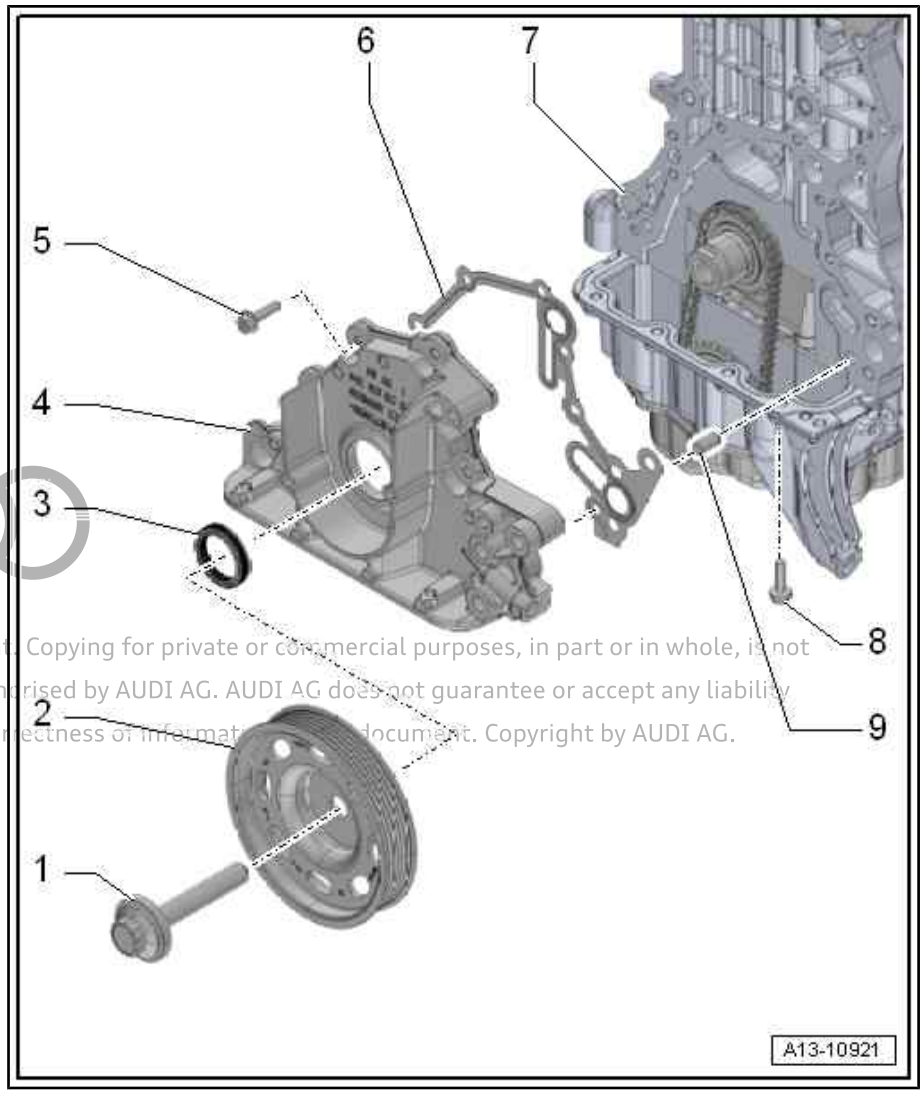
- Do not unscrew or disconnect refrigerant hoses or pipes
- Exploded view ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor

10 - Bolt

- Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor

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1.2 Exploded view - sealing flange (pulley end)



1 - Bolt

- ❑ Renew after removing
- ❑ Use counterhold tool - T10475- when loosening and tightening
- ❑ 150 Nm +180°

2 - Belt pulley/vibration damper

- ❑ All vehicles except e-tron: poly V-belt pulley
- ❑ e-tron: vibration damper
- ❑ Removing and installing ⇒ “1.7 Removing and installing pulley”, page 92

3 - Oil seal

- ❑ For crankshaft (pulley end)
- ❑ Renewing ⇒ “1.8 Renewing crankshaft oil seal (pulley end)”, page 93
- ❑ Do not lubricate with oil

4 - Sealing flange (pulley end)

- ❑ On 1.2 ltr. engine, sealing flange (pulley end) is integrated in oil pump housing ⇒ “1.1.1 Exploded view - sump/oil pump, 1.2 ltr. TFSI”, page 273
- ❑ Should be positioned on dowel pins
- ❑ Removing and installing ⇒ “1.9 Removing and installing sealing flange (pulley end)”, page 96

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 85

6 - Gasket

- ❑ 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 85

9 - Dowel pin

- ❑ 2x

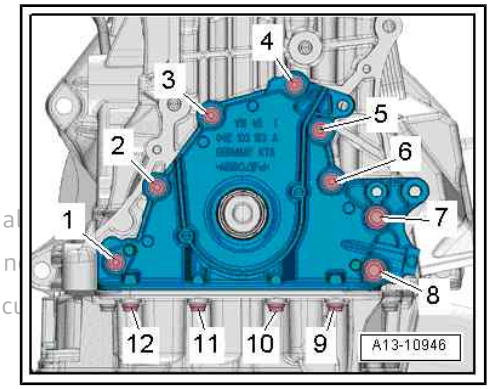
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Sealing flange (pulley end) - tightening torque and sequence

- 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

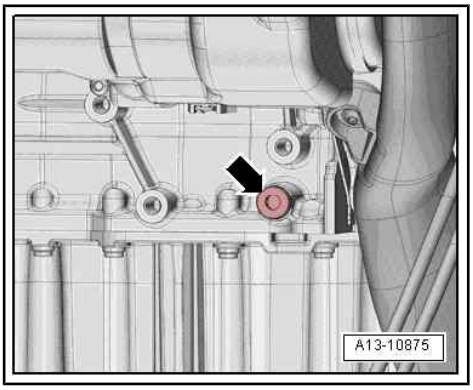


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1.3 Plug for “TDC” drilling in cylinder block - tightening torque

- Renew O-ring if damaged.

– Tighten bolt -arrow- to 30 Nm.



1.4 Removing and installing poly V-belt

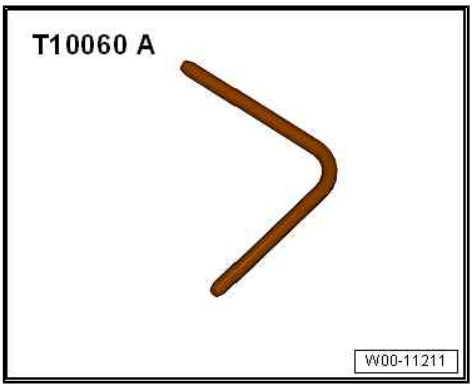
⇒ “1.4.1 Removing and installing poly V-belt - all vehicles except e-tron (without air conditioner compressor)”, page 85

⇒ “1.4.2 Removing and installing poly V-belt - all vehicles except e-tron (with air conditioner compressor)”, page 86

1.4.1 Removing and installing poly V-belt - all vehicles except e-tron (without air conditioner compressor)

Special tools and workshop equipment required

♦ Locking pin - T10060A-

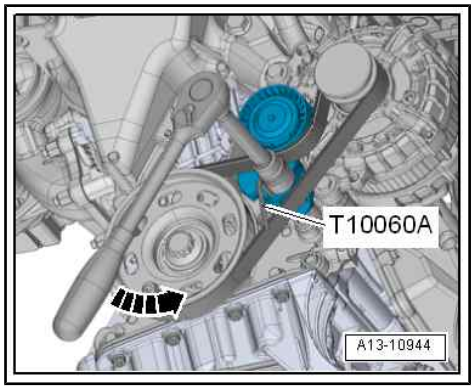


Removing

NOTICE

Risk of irreparable damage due to running a used belt in the opposite direction when it is refitted.

- **Mark running direction before removing.**
- **Pay attention to running direction when reinstalling.**

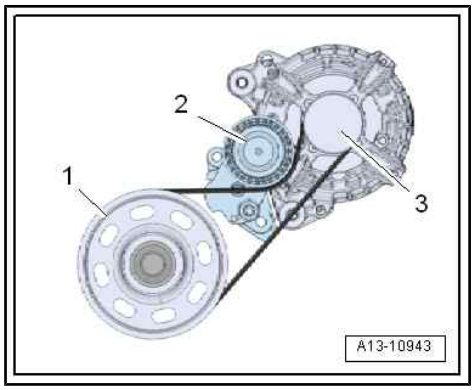


- To slacken poly V-belt, turn tensioner in anti-clockwise direction -arrow-.
- Lock tensioner with locking pin - T10060A- .
- Take off poly V-belt.

Installing

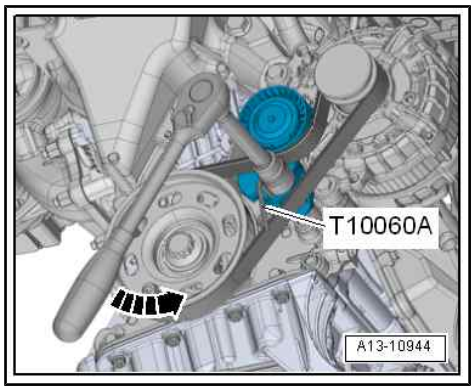
Installation is carried out in reverse order; note the following:

- Assigning new poly V-belt to decoupler pulley
⇒ Fig. ""Different versions of decoupler pulley"" , page 82
- Fit poly V-belt as shown in illustration.



1 - Pulley
2 - Tensioner for poly V-belt
3 - Alternator

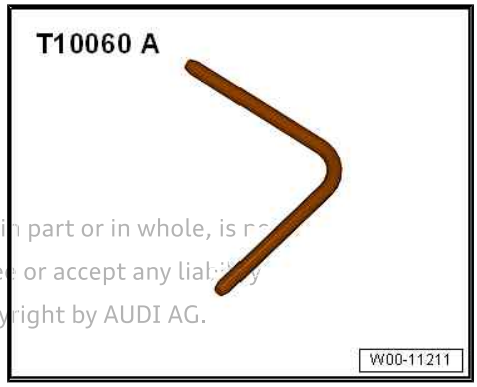
- Turn tensioner anti-clockwise -arrow- and remove locking pin - T10060 A- .
- Release tensioner.
- Check that poly V-belt is properly seated.
- Start engine and check that poly V-belt runs properly.



1.4.2 Removing and installing poly V-belt - all vehicles except e-tron (with air conditioner compressor)

Special tools and workshop equipment required

♦ Locking pin - T10060A-



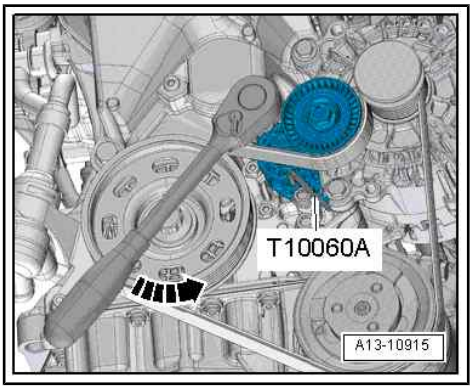
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Removing

NOTICE

Risk of irreparable damage due to running a used belt in the opposite direction when it is refitted.

- **Mark running direction before removing.**
- **Pay attention to running direction when reinstalling.**

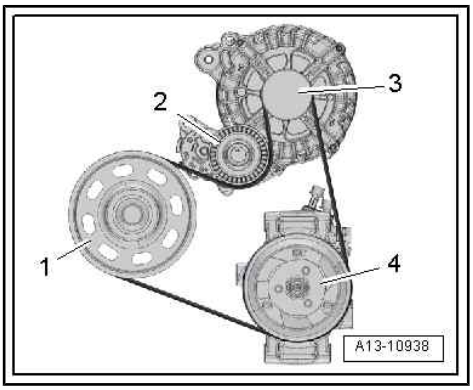


- To slacken poly V-belt, turn tensioner in anti-clockwise direction -arrow-.
- Lock tensioner with locking pin - T10060A- .
- Take off poly V-belt.

Installing

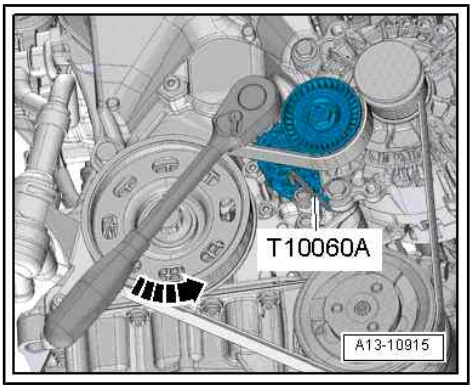
Installation is carried out in reverse order; note the following:

- Assigning new poly V-belt to decoupler pulley
⇒ Fig. ""Different versions of decoupler pulley"" , page 82
- Fit poly V-belt as shown in illustration:



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

- Turn tensioner anti-clockwise -arrow- and remove locking pin - T10060A- .
- Release tensioner.
- Check that poly V-belt is properly seated.
- Start engine and check that poly V-belt runs properly.



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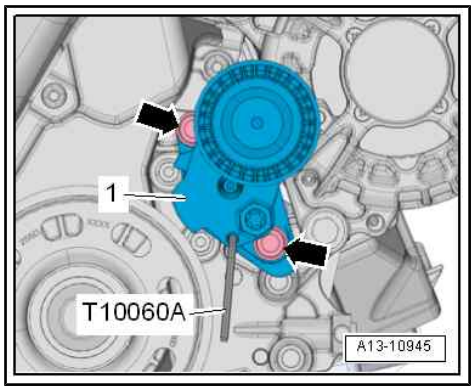
1.5 Removing and installing tensioner for poly V-belt

⇒ “1.5.1 Removing and installing tensioner for poly V-belt - all vehicles except e-tron (without air conditioner compressor)”, page 88

⇒ “1.5.2 Removing and installing tensioner for poly V-belt - all vehicles except e-tron (with air conditioner compressor)”, page 88

1.5.1 Removing and installing tensioner for poly V-belt - all vehicles except e-tron (without air conditioner compressor)

Removing



– Detach poly V-belt from tensioner
⇒ “1.4.1 Removing and installing poly V-belt - all vehicles except e-tron (without air conditioner compressor)”, page 85 .

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

Installing

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

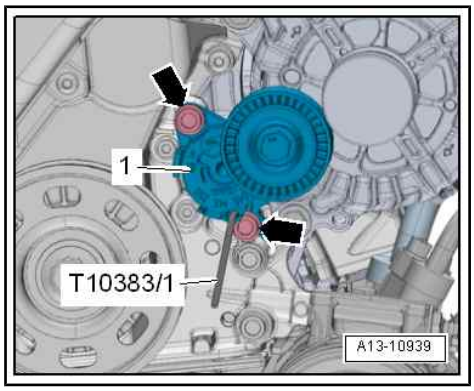
– Install poly V-belt
⇒ “1.4.1 Removing and installing poly V-belt - all vehicles except e-tron (without air conditioner compressor)”, page 85 .

Tightening torques

◆ ⇒ “1.1.1 Exploded view - poly V-belt drive, all vehicles except e-tron (without air conditioner compressor)”, page 80

1.5.2 Removing and installing tensioner for poly V-belt - all vehicles except e-tron (with air conditioner compressor)

Removing



– Detach poly V-belt from tensioner
⇒ “1.4.2 Removing and installing poly V-belt - all vehicles except e-tron (with air conditioner compressor)”, page 86 .

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

Installing

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

– Install poly V-belt
⇒ “1.4.2 Removing and installing poly V-belt - all vehicles except e-tron (with air conditioner compressor)”, page 86 .

Tightening torques

◆ ⇒ “1.1.2 Exploded view - poly V-belt drive, all vehicles except e-tron (with air conditioner compressor)”, page 82

1.6 Removing and installing engine support

⇒ “1.6.1 Removing and installing engine support - all vehicles except e-tron”, page 89

⇒ “1.6.2 Removing and installing engine support - e-tron”, page 91

1.6.1 Removing and installing engine support - all vehicles except e-tron

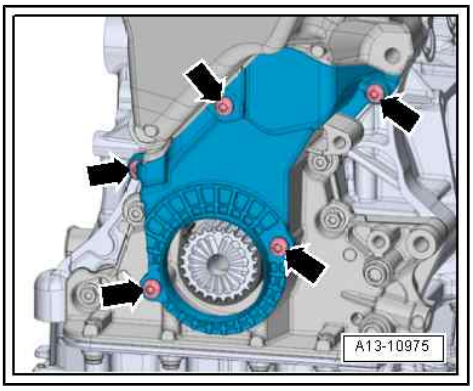
Removing

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

– Remove poly-V-belt pulley
⇒ “1.7 Removing and installing pulley”, page 92 .

– Remove tensioner for poly V-belt
⇒ “1.5 Removing and installing tensioner for poly V-belt”, page 88 .

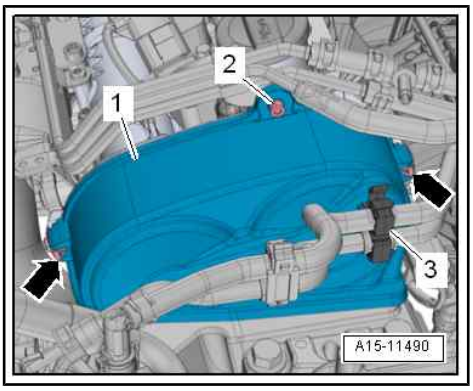
– Remove bolts -arrows- and detach toothed belt cover (bottom).



– Move clear hoses at bracket -3-.

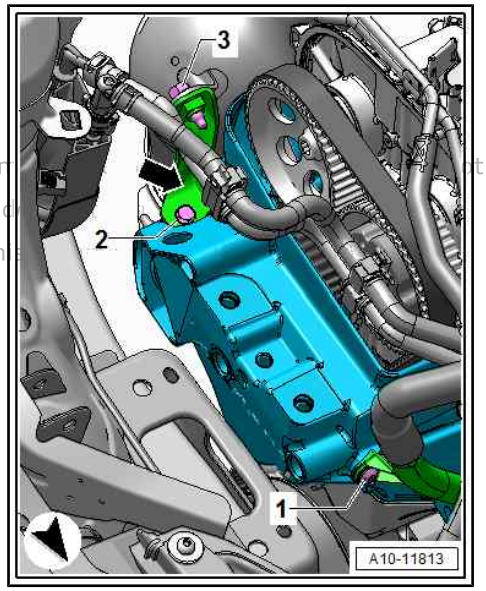
– Remove bolt -2-.

– Release clips -arrows- and detach toothed belt cover (top) -1-.



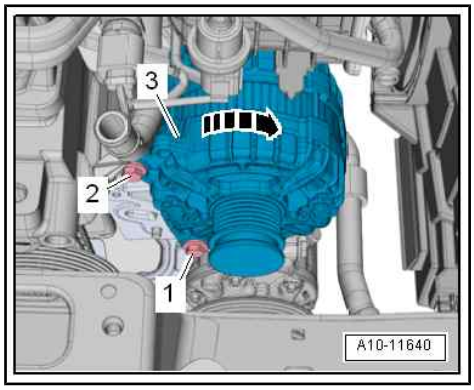
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– Remove bolt -1- for coolant pipe.
– Unscrew bolts -2 and 3- and detach support -arrow-.

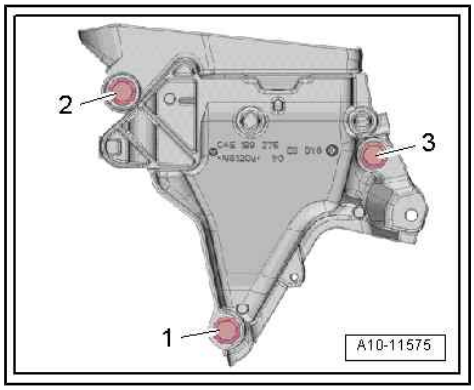


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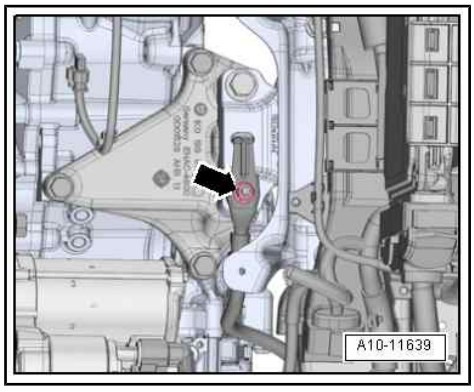
– Loosen bolt -1- but do not remove.
– Remove bolt -2-.
– Swivel alternator -3- towards front.
– Support engine in installation position
⇒ “2.2.1 Supporting engine in installation position - all vehicles except e-tron”, page 61 .
– Remove engine mounting
⇒ “2.3.1 Removing and installing engine mountings - all vehicles except e-tron”, page 65 .



– Remove bolts -1, 2, 3-.

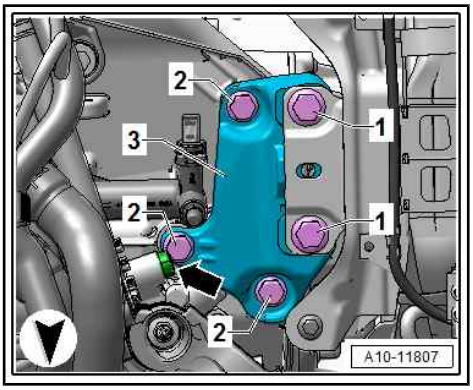


– If fitted, remove nut -arrow- and move earth wire clear.



– Remove bolts -1-. Illustrated on manual gearbox 0AJ.

– Push engine/gearbox assembly slightly towards left and detach engine support downwards.



Installing

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

– Install engine mountings
⇒ “2.3.1 Removing and installing engine mountings - all vehicles except e-tron”, page 65 .

– Check adjustment of assembly mountings
⇒ “2.6.1 Checking adjustment of assembly mountings (engine/gearbox mountings) - all vehicles except e-tron”, page 73 .

Tightening torques

- ⇒ “2.1 Exploded view - assembly mountings”, page 55
- If originally fitted, secure bracket with fuel quality sender - G446- ⇒ Fuel supply system; Rep. gr. 20 ; Senders and sensors .
- ⇒ “1.1 Exploded view - poly V-belt drive”, page 80
- ⇒ “1.1 Exploded view - toothed belt cover”, page 122
- ⇒ “5.1 Exploded view - coolant pipes”, page 389
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery

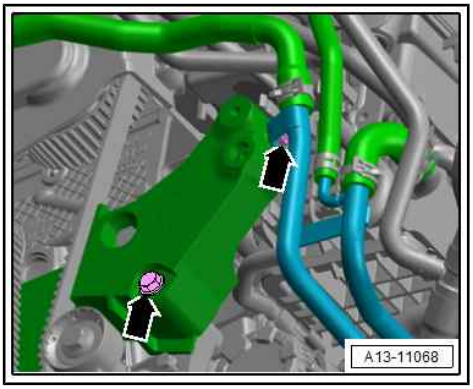
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1.6.2 Removing and installing engine support - e-tron

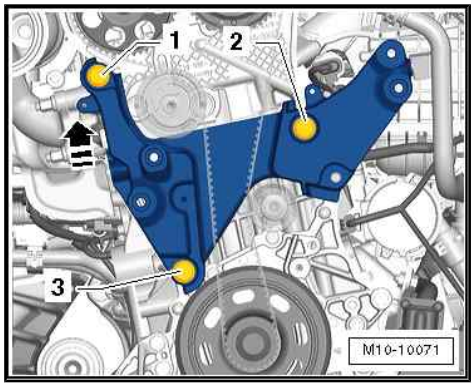
Removing

– Remove toothed belt
⇒ “1.4.3 Removing and installing toothed belt - e-tron”, page 200 .

– Remove bolts -arrows-.



– Unscrew bolts -1, 2 and 3- and detach engine support.



Installing

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

– Install toothed belt
⇒ “1.4.3 Removing and installing toothed belt - e-tron”, page 200 .

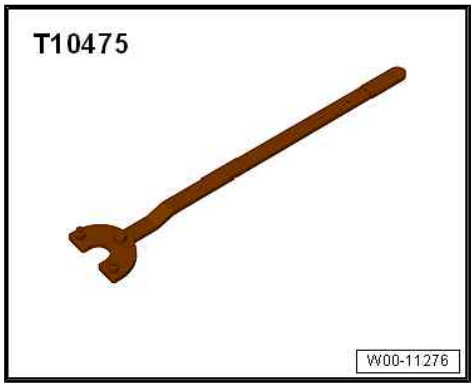
Tightening torques

♦ ⇒ “2.1.3 Exploded view - assembly mountings, vehicles with dual clutch gearbox 0DD”, page 60

1.7 Removing and installing pulley

Special tools and workshop equipment required

♦ Counterhold tool - T10475-



Removing

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

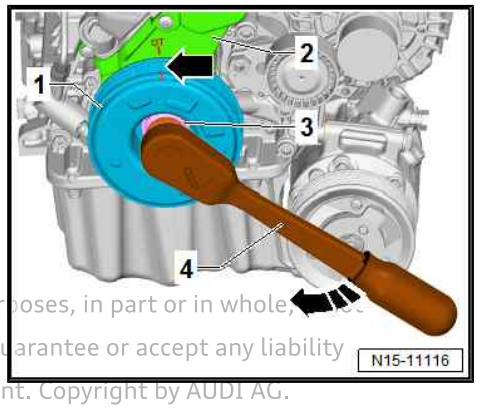
All vehicles except e-tron:

– Remove poly V-belt
⇒ “1.4 Removing and installing poly V-belt”, page 85 .

All engine versions (continued):

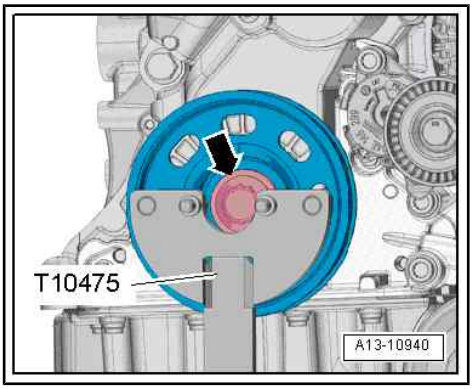
– Turn crankshaft to “TDC” position in normal direction of engine rotation -arrow- by applying a ratchet -4- to central bolt -3-.

• Crankshaft has reached “TDC” position when marking -arrow- on vibration damper -1- aligns with “TDC” marking on toothed belt cover (bottom) -2-.



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– Loosen bolt -arrow- for pulley/vibration damper using counterhold tool - T10475- .
– Remove bolt and take off pulley/vibration damper.



NOTICE

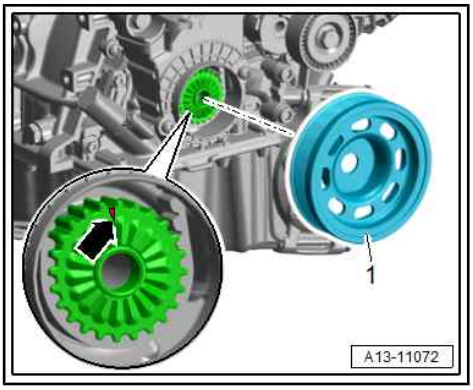
Risk of irreparable damage to engine if valve timing is incorrect

– Do not rotate crankshaft out of TDC position.

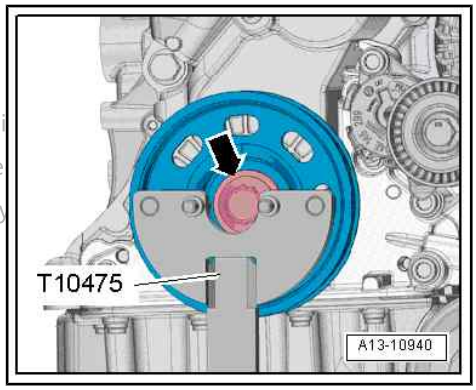
Installing

- 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.

– 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 -arrow- using counterhold tool - T10475- .



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

All vehicles except e-tron:

– Install poly V-belt
⇒ “1.4 Removing and installing poly V-belt”, page 85 .

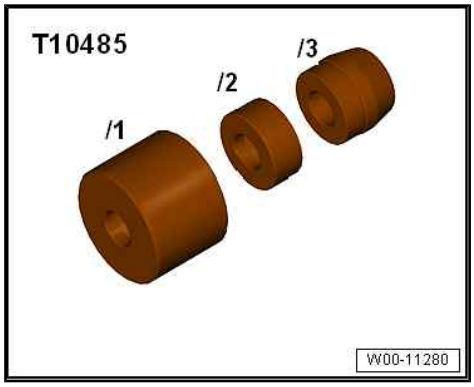
Tightening torques

- ⇒ “1.2 Exploded view - sealing flange (pulley end)”, page 84
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

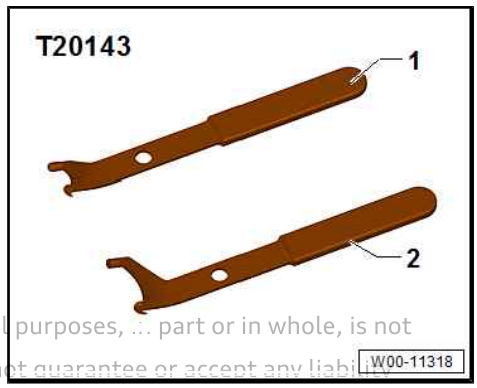
1.8 Renewing crankshaft oil seal (pulley end)

Special tools and workshop equipment required

♦ Assembly tool - T10485-



♦ Extractor tool - T20143-

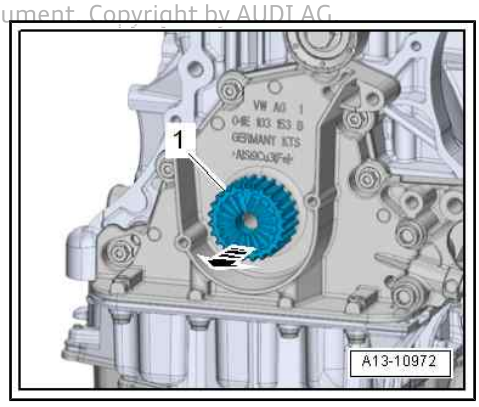


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Procedure

– Remove toothed belt
⇒ “1.4 Removing and installing toothed belt”, page 174 .

– Detach crankshaft sprocket -1- -arrow-.



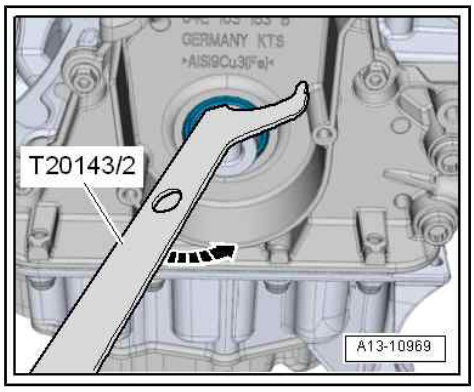
NOTICE

Risk of irreparable damage to engine if valve timing is incorrect

– Do not rotate crankshaft out of TDC position.

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

– Clean contact surface and sealing surface.

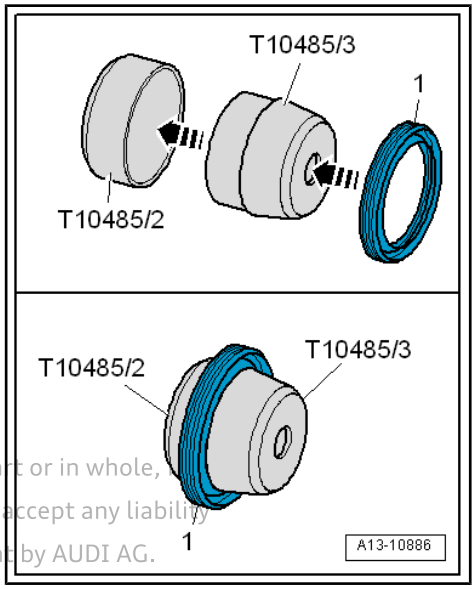


- Do not lubricate new oil seal.

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

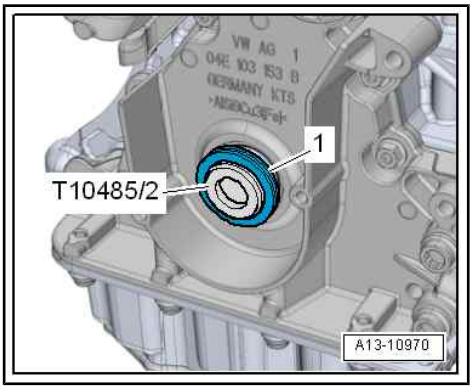
- Fitting position: closed side of oil seal faces guide sleeve.

– Detach fitting sleeve from guide sleeve.

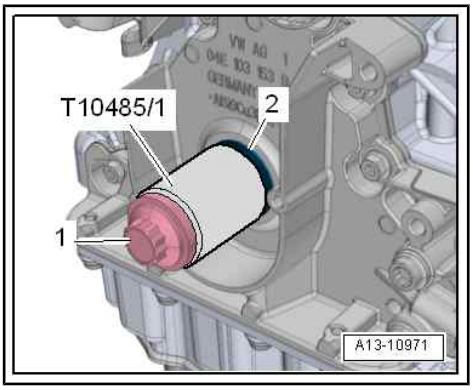


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– Fit guide sleeve -T10485/2- with oil seal -1- onto crankshaft.



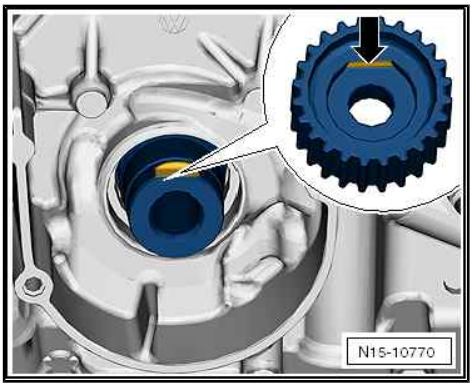
– Use thrust piece -T10485/1- and bolt -1- for poly V-belt pulley to pull in oil seal -2- onto stop.



– 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 174 .



1.9 Removing and installing sealing flange (pulley end)

Special tools and workshop equipment required

- Flat scraper
- 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 .

All vehicles except e-tron:

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

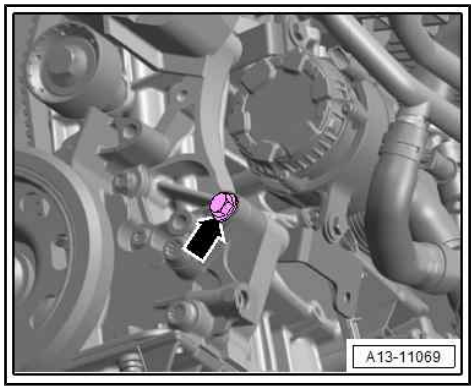
– Remove tensioner for poly V-belt ⇒ “1.5 Removing and installing tensioner for poly V-belt”, page 88 .

All engine versions (continued):

– Remove toothed belt ⇒ “1.4 Removing and installing toothed belt”, page 174 .

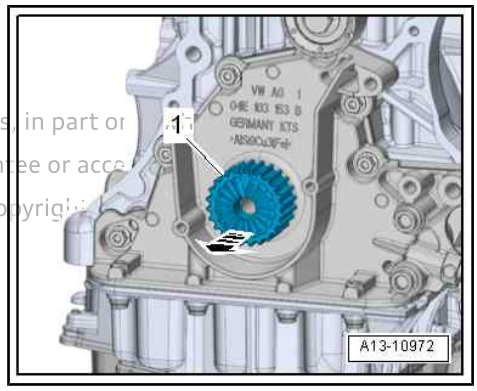
e-tron:

– Remove bolt -arrow- on bracket for coolant pump for low-temperature circuit - V468- .



All vehicles (continued):

– Detach crankshaft sprocket -1- -arrow-.



NOTICE

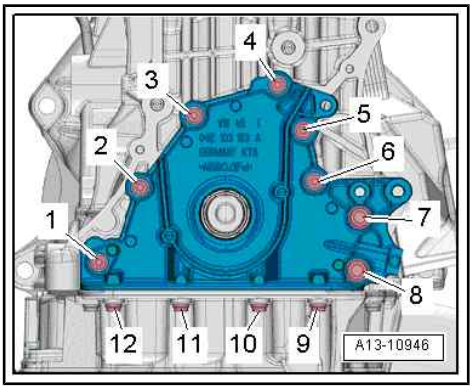
Risk of irreparable damage to engine if valve timing is incorrect

– Do not rotate crankshaft out of TDC position.

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

– Drive out oil seal with sealing flange removed.



Installing

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

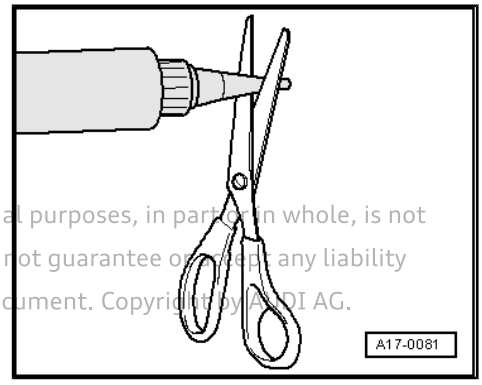
– Cover exposed parts of the engine.

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

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

• Note expiry date of sealant.

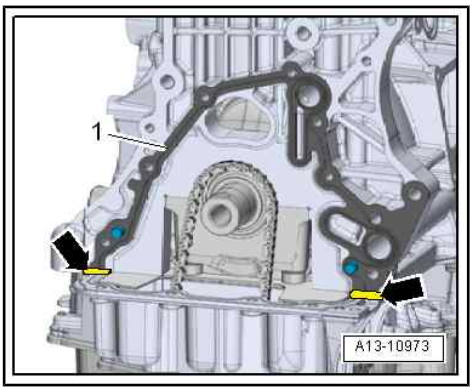
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



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– 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-.



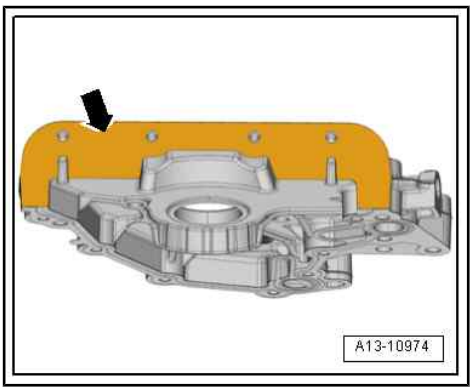
– Apply a thin coat of sealant to bottom sealing surface -arrow- on sealing flange.

• Install sealing flange within 5 minutes of 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 85 .

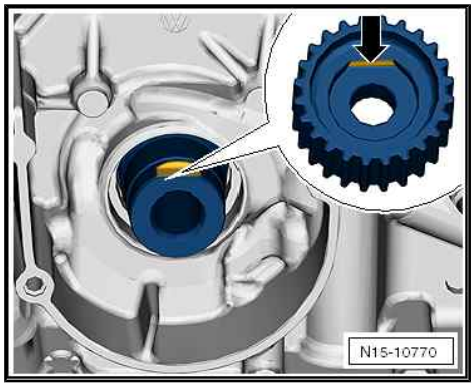
– Install crankshaft oil seal (pulley end)
⇒ “1.8 Renewing crankshaft oil seal (pulley end)”, page 93 .



– 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 174 .



Tightening torques

- ⇒ Fig. ““Sealing flange (pulley end) - tightening torque and sequence”“ , page 85
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

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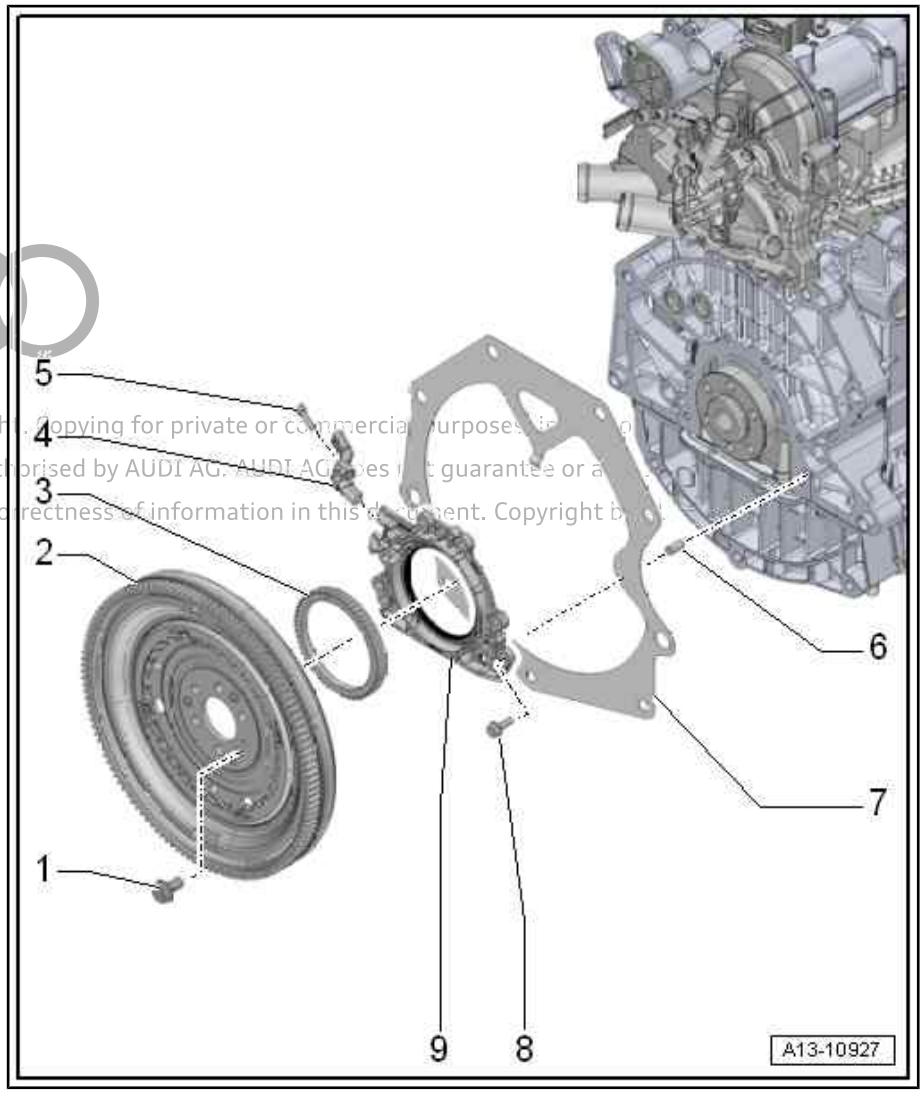
2 Cylinder block (gearbox end)

⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 99

⇒ “2.2 Removing and installing flywheel”, page 100

⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 102

2.1 Exploded view - cylinder block (gearbox end)



1 - Bolt

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

2 - Flywheel

- ❑ Removing and installing ⇒ “2.2 Removing and installing flywheel”, page 100
- ❑ Can only be installed in one position

3 - Sender wheel

- ❑ For engine speed sender - G28-
- ❑ Supplied together with sealing flange -item 9-
- ❑ Must not be separated from sealing flange
- ❑ Renewing ⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 102

4 - Engine speed sender - G28-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

5 - Bolt

- ❑ Tightening torque ⇒ Item 12 (page 549)

6 - Dowel pin

- ❑ 2x

7 - Intermediate plate

- ❑ Do not damage or bend when assembling
- ❑ Installing ⇒ Fig. ““Installing intermediate plate”“ , page 100

8 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Sealing flange (gearbox end) - tightening torque and sequence”“ , page 100

9 - Sealing flange (gearbox end)

- ❑ With oil seal
- ❑ Supplied together with sender wheel -item 3-
- ❑ Must not be separated from sender wheel

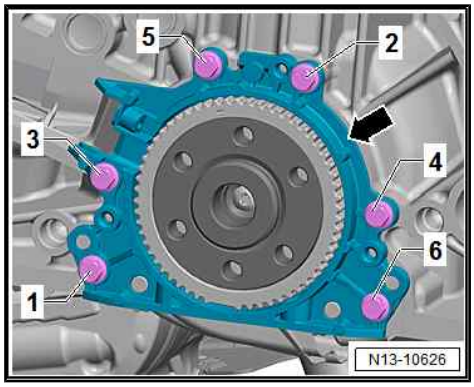
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❑ Renewing ⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 102

Sealing flange (gearbox end) - tightening torque and sequence

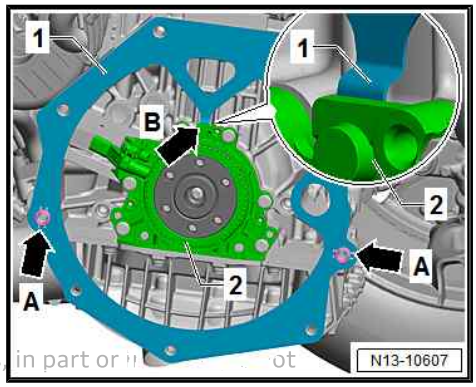
– Tighten bolts in stages as follows:

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 -arrow B- and push onto dowel sleeves -arrows A-.



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2.2 Removing and installing flywheel

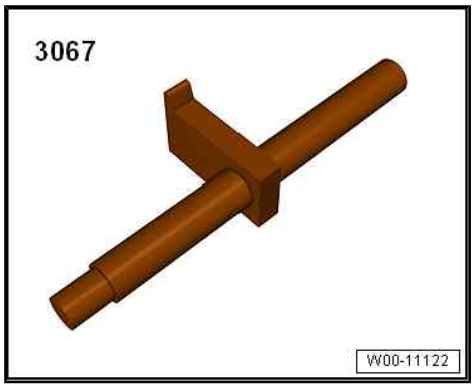
⇒ “2.2.1 Removing and installing flywheel - all vehicles except e-tron”, page 100

⇒ “2.2.2 Removing and installing flywheel - e-tron”, page 101

2.2.1 Removing and installing flywheel - all vehicles except e-tron

Special tools and workshop equipment required

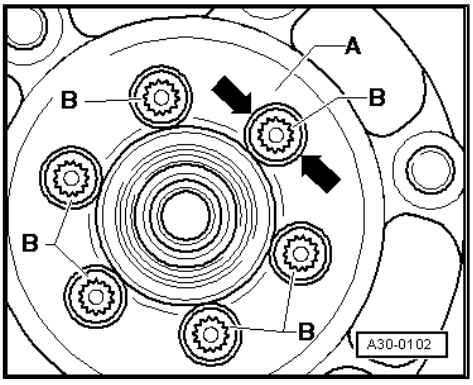
♦ Counterhold tool - 3067-



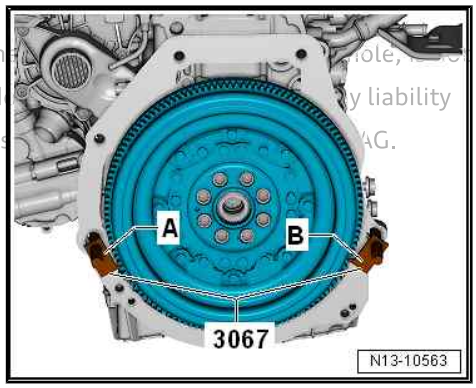
Removing

- Gearbox removed

– Position flywheel -A- so that bolt heads -B- align centrally with holes -arrows-.



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



– Loosen and remove flywheel bolts.

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Installing

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

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

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

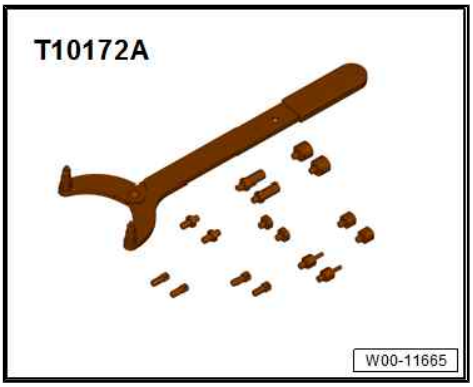
Tightening torques

♦ ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 99

2.2.2 Removing and installing flywheel - e-tron

Special tools and workshop equipment required

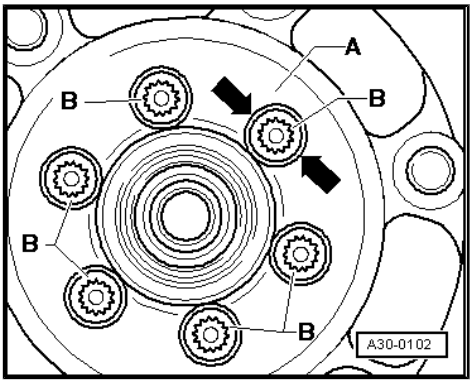
♦ Counterhold tool - T10172- with adapter - T10172/8-



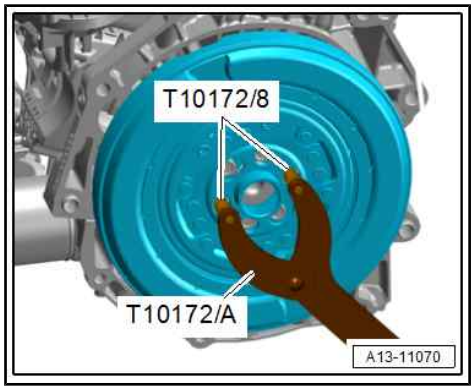
Removing

- Gearbox removed

– Position flywheel -A- so that bolt heads -B- align centrally with holes -arrows-.



– Loosen bolts for flywheel using counterhold tool - T10172- with adapter - T10172/8- .
– Remove bolts and take off flywheel.



Installing

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

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

Tightening torques

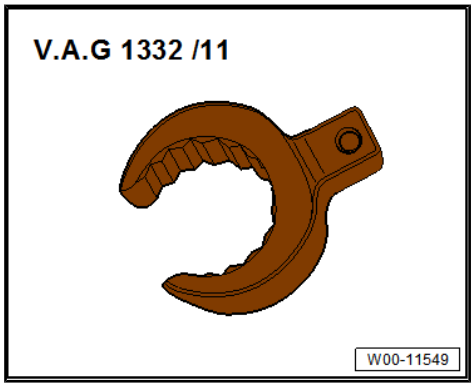
◆ ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 99

2.3 Removing and installing sealing flange (gearbox end)

Illustrations show procedures with engine removed.

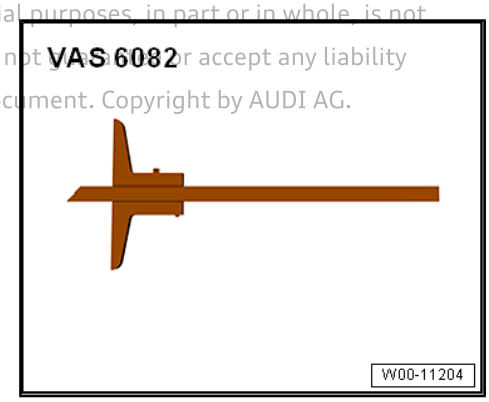
Special tools and workshop equipment required

◆ Open ring spanner - V.A.G 1332/11-

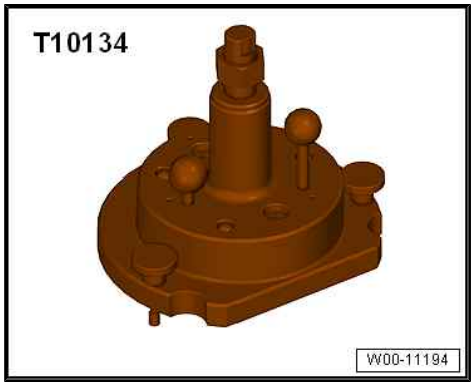


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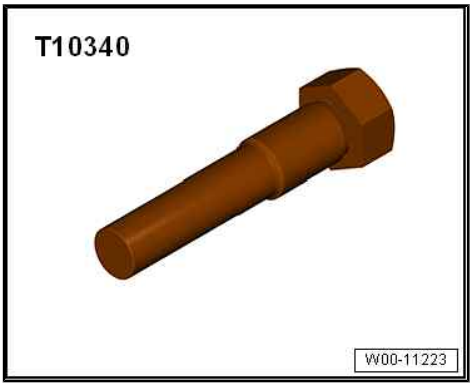
◆ Depth gauge - VAS 6082-



◆ Assembly tool - T10134-



♦ Locking pin - T10340-



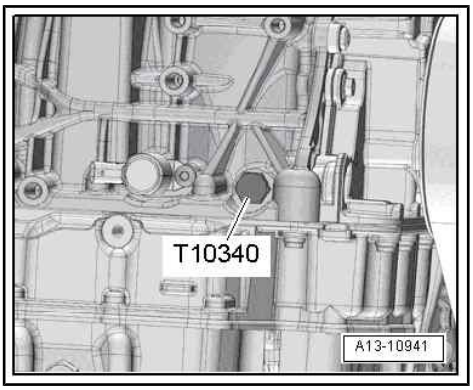
♦ Bolt M6x35 (3x)

Procedure

- Gearbox removed

– Remove flywheel
⇒ “2.2 Removing and installing flywheel”, page 100 .

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.

– If the locking pin - T10340- cannot be screwed in as far as the stop, the crankshaft is not in the correct position. 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.

- The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)

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1.2 ltr. engine:

– Remove sump
⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

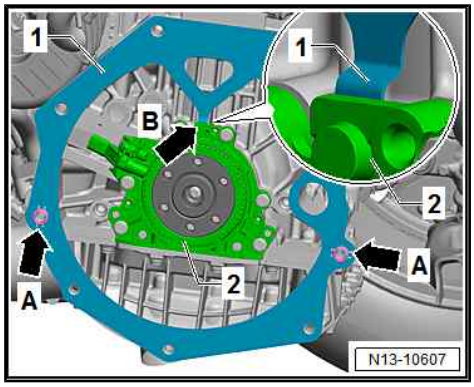
1.4 ltr. engine:

– Remove sump (top section)
⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286 .

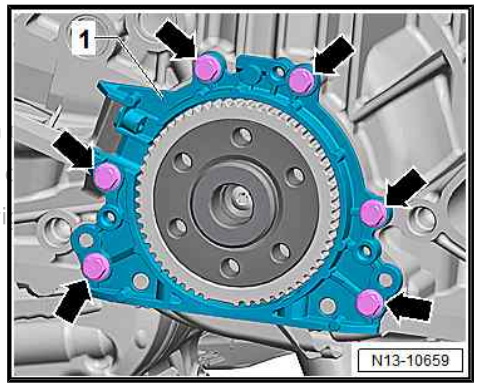
All engine versions (continued):

– Remove engine speed sender - G28-
⇒ “1.6 Removing and installing engine speed sender G28 ”, page 556 .

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

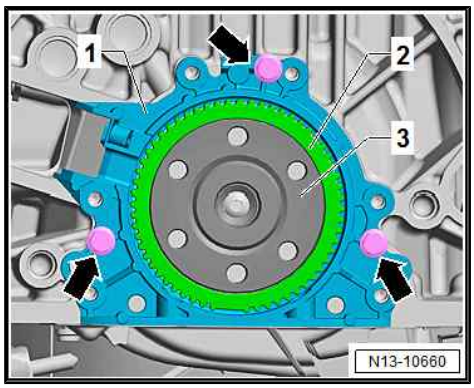


– Remove bolts -arrows- for sealing flange -1-.



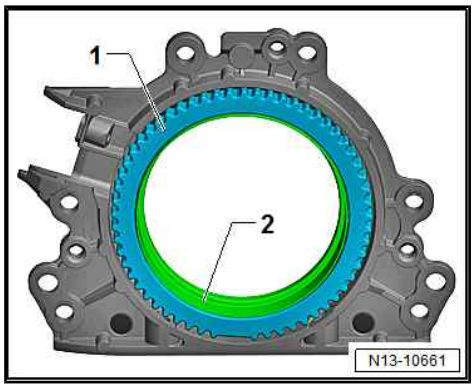
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• The sealing flange -1- is pressed off the crankshaft -3- together with the sender wheel -2-.
– To press off, screw 3 bolts M6x35 -arrows- alternately into sealing flange not more than $^{1}/_{2}$ turn at a time.
– Detach sealing flange together with sender wheel.



Pressing in sealing flange with sender wheel

♦ 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

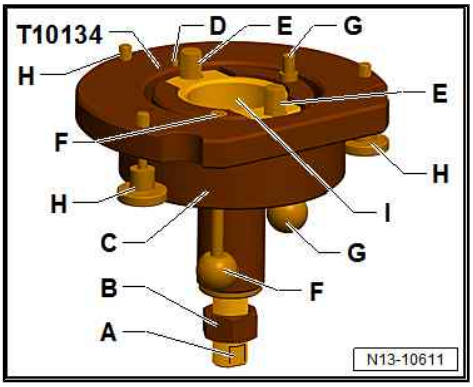
E - Hexagon socket head bolts (2x)

F - Guide pin for diesel engines (black handle)

G - Guide pin for petrol engines (red handle)

H - Knurled screws (3x)

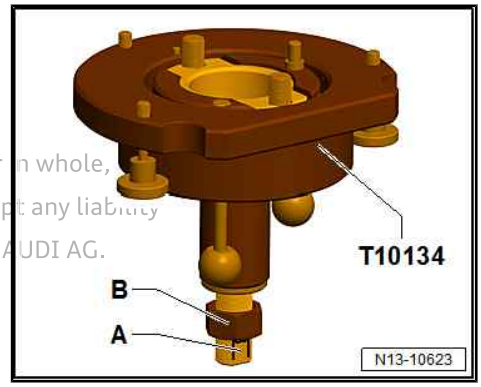
I - Inner section



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.

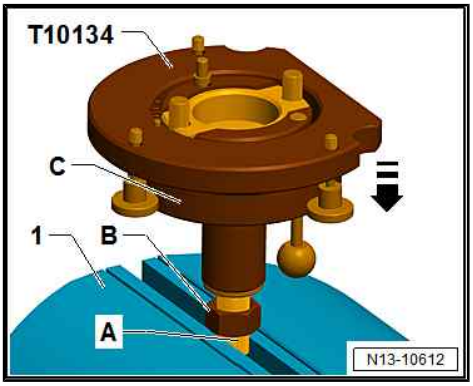
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– Clamp assembly tool - T10134- in a vice -1- on tightening flats -A- of threaded spindle.

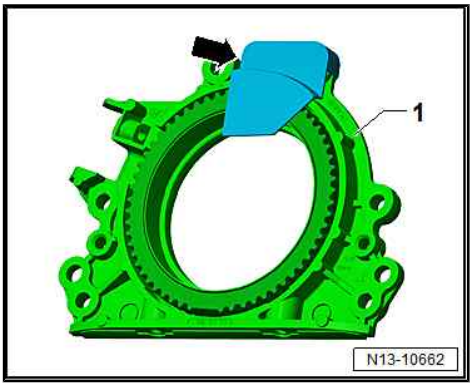
– Press assembly housing -C- downwards -arrow- so that it rests on nut -B-.

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

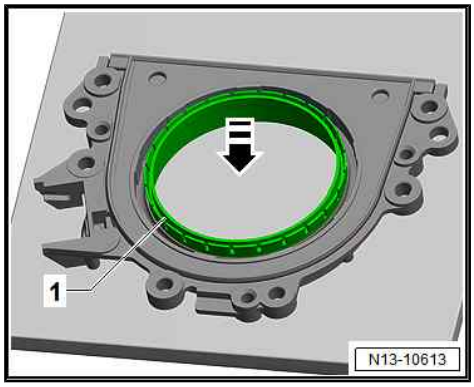


– If fitted, remove securing clip -arrow- from new sealing flange -1-.

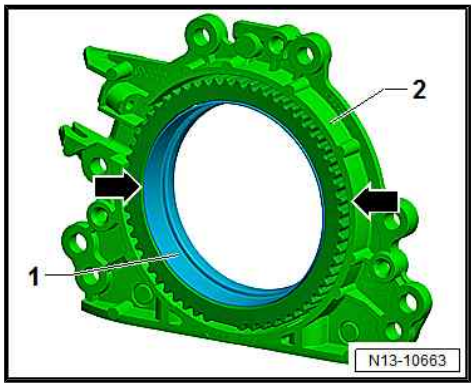
• Do not take the sender wheel out of the sealing flange or rotate it out of position.



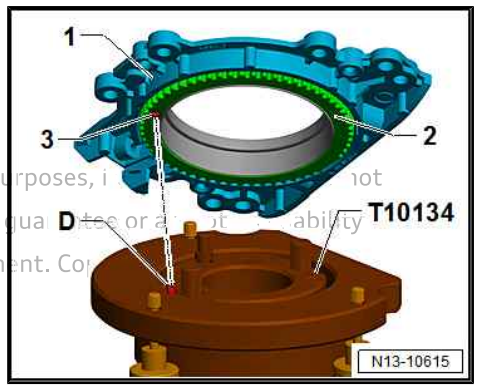
– Place sealing flange (with front side downwards) on a clean flat surface.
– Press sealing lip support ring -1- downwards in direction of -arrow- until it touches flat surface.



• The upper edge of the sealing lip support ring -1- must be flush -arrows- with the front edge of the sealing flange -2-.

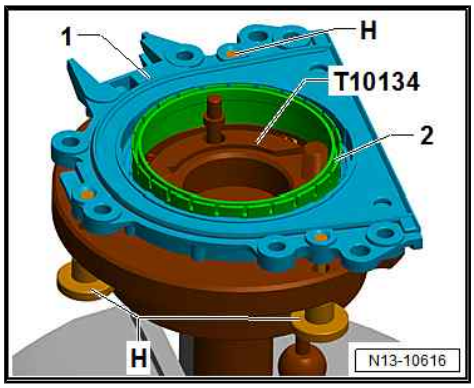


– Place front side of sealing flange -1- on assembly tool - T10134- so that locating pin -D- is seated in hole -3- in sender wheel -2-.
• Ensure that sealing flange lies flat on assembly tool.



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– 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.



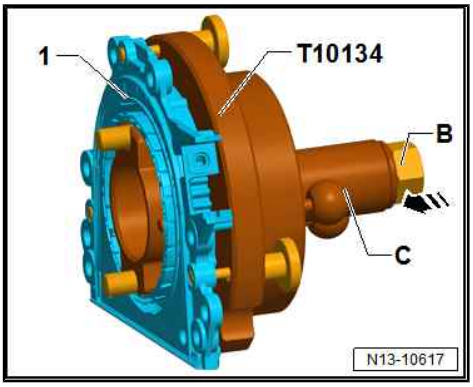
Installing assembly tool - T10134- with sealing flange -1- on crankshaft flange:

- 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.

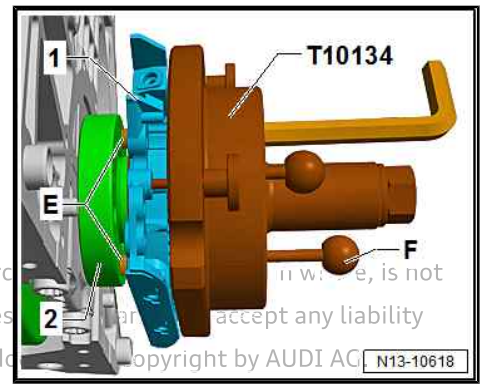


– Secure assembly tool - T10134- with sealing flange -1- to crankshaft flange -2-.

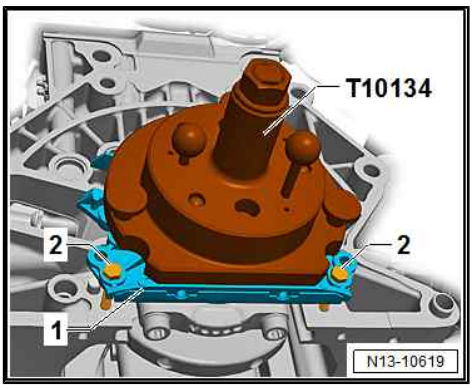
– To do so, screw hexagon socket head bolts -E- approx. 5 turns into crankshaft flange with hexagon key.

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

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



Securing assembly tool - T10134- on crankshaft flange:

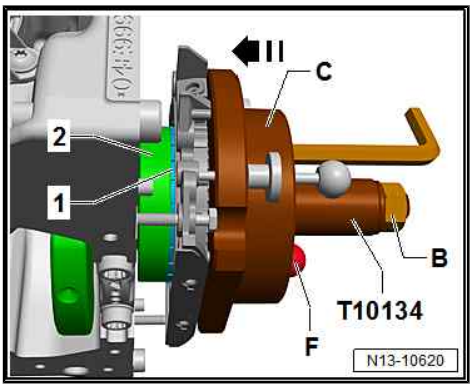
– Press assembly housing -C- by hand in direction of -arrow- until sealing lip support ring -1- touches surface of crankshaft flange -2-.

– 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.

- 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.

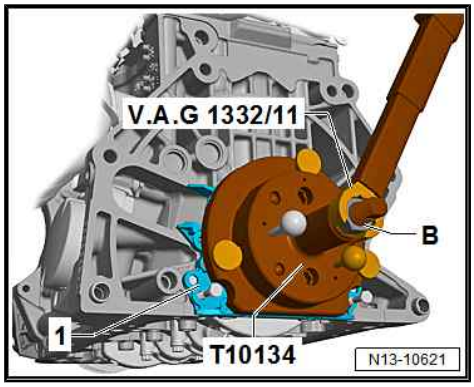
– Screw nut -B- onto threaded spindle by hand until it touches assembly housing -C-.



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.



Checking installation position of sender wheel on crankshaft:

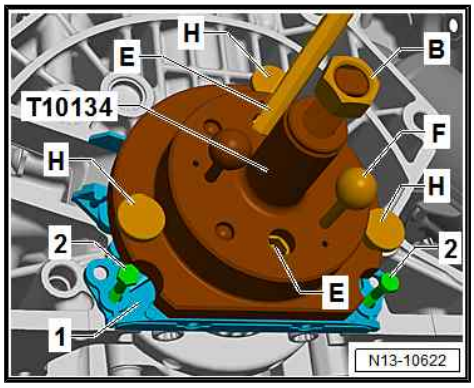
– Screw nut -B- to end of threaded spindle.

– Remove both bolts -2- from cylinder block.

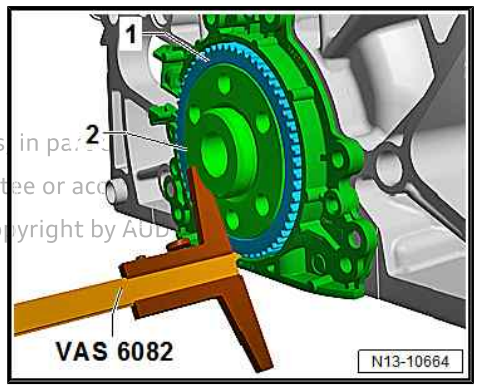
– Unscrew knurled screws -H- from sealing flange -1-.

– 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-.



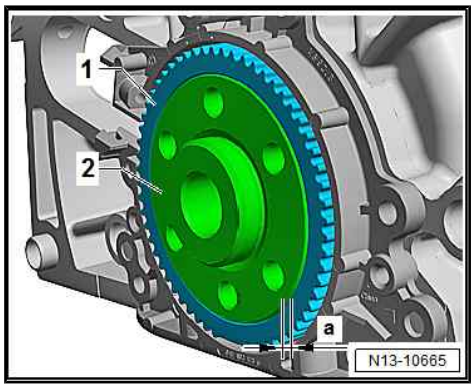
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– Measure distance -a- between crankshaft flange -2- and sender wheel -1-.

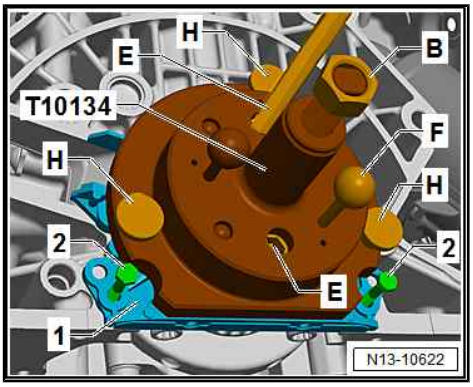
• Specification: Distance -a- = 0.5 mm.

– Press sender wheel in further if measurement is too small ⇒ page 109 .

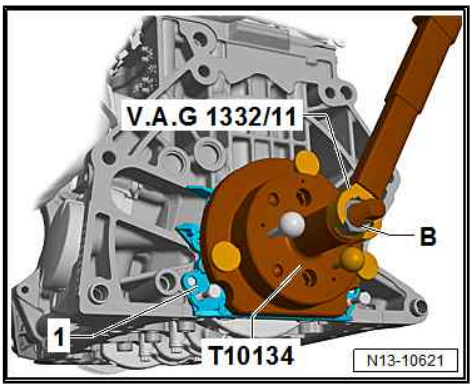
– If reading matches specification, continue with assembly ⇒ page 109 .



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 108 .
- Tighten nut on assembly tool - T10134- to 45 Nm if measurement is too small.
- Check installation position of sender wheel on crankshaft again ⇒ page 108 .

Assembling:

- Tighten bolts for sealing flange in diagonal sequence.

1.2 ltr. engine:

- Install sump
  ⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

1.4 ltr. engine:

- Install sump (upper section)
  ⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286 .

All engine versions (continued):

- Install intermediate plate
  ⇒ Fig. ““Installing intermediate plate”“ , page 100 .
- Install flywheel
  ⇒ “2.2 Removing and installing flywheel”, page 100 .
- 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.

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Tightening torques

- ⇒ Fig. ““Sealing flange (gearbox end) - tightening torque and sequence”“ , page 100
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 99
- Engine speed sender - G28-
  ⇒ “1.1 Exploded view - ignition system”, page 548

3 Crankshaft

⇒ “3.1 Crankshaft dimensions”, page 110

⇒ “3.2 Measuring axial clearance of crankshaft”, page 110

⇒ “3.3 Renewing needle bearing in crankshaft”, page 111

3.1 Crankshaft dimensions

NOTICE

Risk of damage to bearing pedestals if crankshaft is removed.

Loosening the bolts for the crankshaft bearing cap results in deformation of the cylinder block bearing pedestals and in damage to the bearings.

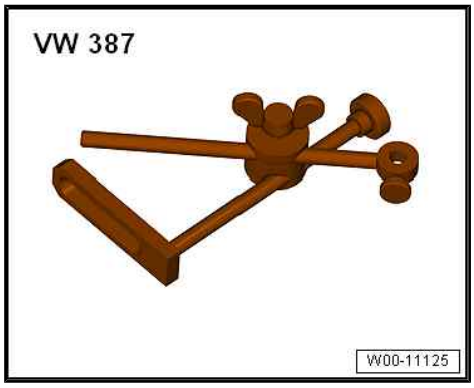
– Never remove the crankshaft.

Honing dimension	Conrod journal ∅ mm	Conrod journal ∅ mm
	1.2 ltr. engine	**1.4 ltr. engine**
Basic dimension	42.00 -0.022 -0.042	48.00 -0.022 -0.042

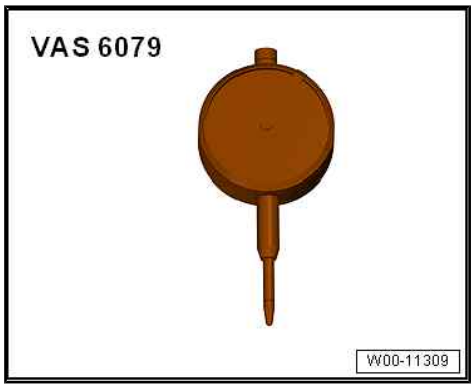
3.2 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-



- Dial gauge - VAS 6079-



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Procedure

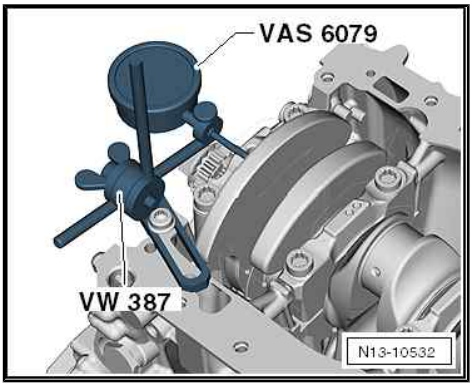
– Secure dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to cylinder block as shown in illustration.

– Apply dial gauge to crank web.

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

– Push crankshaft away from dial gauge and read off value.

• Axial clearance: 0.066 ... 0.233 mm



3.3 Renewing needle bearing in crankshaft

Only fitted on vehicles with dual clutch gearbox

• 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

♦ Pin - VW 207 C-

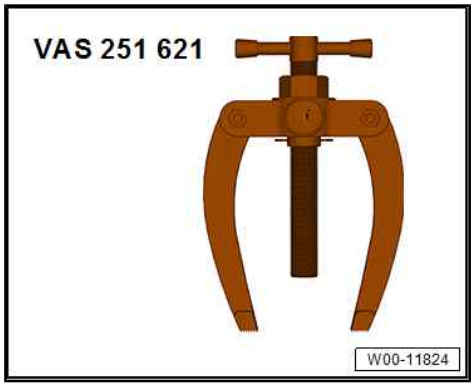


♦ Internal puller - VAS 251 605-



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♦ Counter-support - VAS 251 621-

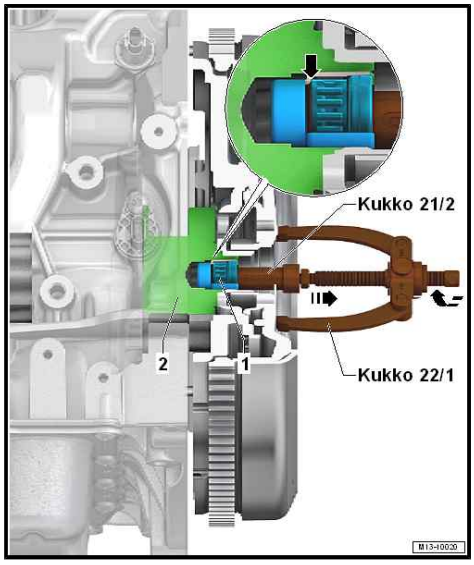


Removing

– Position special tool as shown in illustration.

• Internal puller must be positioned behind needle roller -arrow-.

– Pull out needle bearing.



Installing

– Clean bearing seat in crankshaft and grease lightly.

• The lettering on the needle bearing must be visible when installed.



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– Drive needle bearing into crankshaft with drift - VW 207 C- until it reaches installation depth -a-.

• Installation depth: dimension -a- = 2 mm.

• Renew needle bearing if you have driven it in too far (needle bearing will be damaged when it is pulled out).



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4 Pistons and conrods

⇒ “4.1 Exploded view - pistons and conrods”, page 114

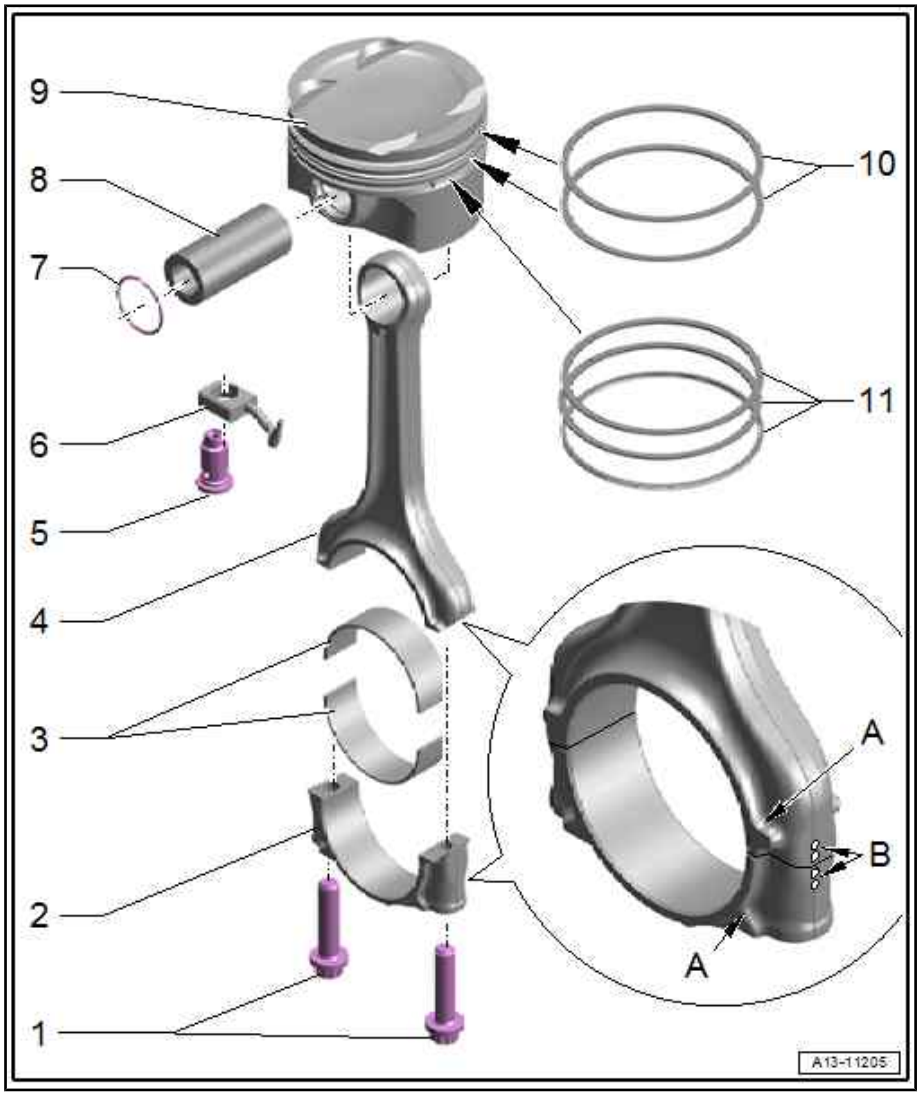
⇒ “4.2 Removing and installing pistons”, page 117

⇒ “4.3 Removing and installing oil spray jets”, page 119

⇒ “4.4 Checking pistons and cylinder bores”, page 120

⇒ “4.5 Checking radial clearance of conrod bearings”, page 121

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 116
- ❑ 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 ⇒ “4.5 Checking radial clearance of conrod bearings”, page 121
- ❑ Separating parts of new conrod ⇒ Fig. ““Separating parts of new conrod”“ , page 117
- ❑ Installation position: Lug -A- on conrod bearing cap faces towards pulley end

5 - Pressure relief valve

- ❑ 27 Nm

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6 - Oil spray jet

- ❑ For piston cooling
- ❑ Removing and installing ⇒ “4.3 Removing and installing oil spray jets”, page 119

7 - Circlip

- ❑ 2x
- ❑ Renew after removing

8 - Piston pin

- ❑ Removing and installing ⇒ “4.2 Removing and installing pistons”, page 117

9 - Piston

- ❑ With combustion chamber
- ❑ Mark installation position and cylinder number ⇒ Fig. ““Installation position of pistons and allocation of piston/cylinder”“ , page 115
- ❑ Removing and installing ⇒ “4.2 Removing and installing pistons”, page 117
- ❑ Checking pistons and cylinder bores ⇒ “4.4 Checking pistons and cylinder bores”, page 120

10 - Compression rings

- ❑ Install using piston ring pliers -VAS 211 003- ⇒ Fig. ““Installing compression rings”“ , page 116
- ❑ Measuring ring gap ⇒ Fig. ““Measuring piston ring gap”“ , page 120
- ❑ Measuring ring-to-groove clearance ⇒ Fig. ““Measuring ring-to-groove clearance”“ , page 121
- ❑ Installation position: marking “TOP” or side with lettering faces towards piston crown
- ❑ Offset gaps by 120°

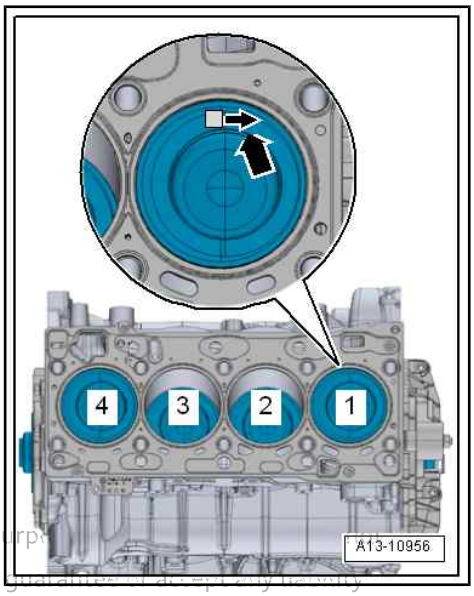
11 - Oil scraper ring

- ❑ Three-part
- ❑ Carefully remove and install by hand
- ❑ Gap cannot be measured
- ❑ Ring-to-groove clearance cannot be checked
- ❑ Installation position ⇒ Fig. ““Installing oil scraper ring”“ , page 116

Installation position of pistons and allocation of piston/cylinder

– If you intend to re-install used pistons, mark the cylinder number on the piston crown using paint.

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



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Installing compression rings

- Installation position: marking “TOP” or side with lettering faces towards piston crown.
- Open up compression ring -2- using piston ring pliers -VAS 211 003- just far enough to be able to slide it over piston -1-.



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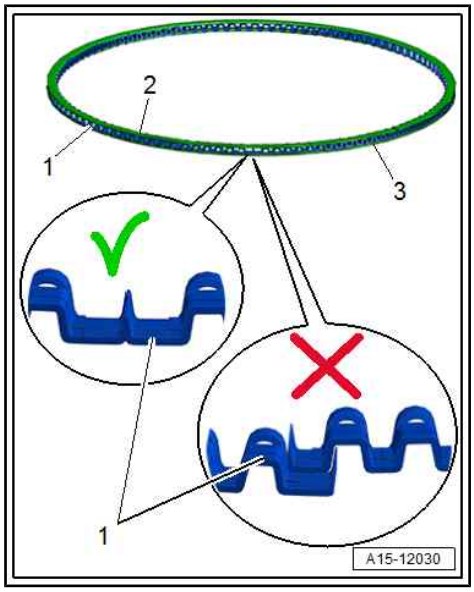
Installing oil scraper ring

– Note installation position of spring:
- Ends of fins -2, 3- and spring -1- must be offset from one another by at least 90°.

– Install by hand.

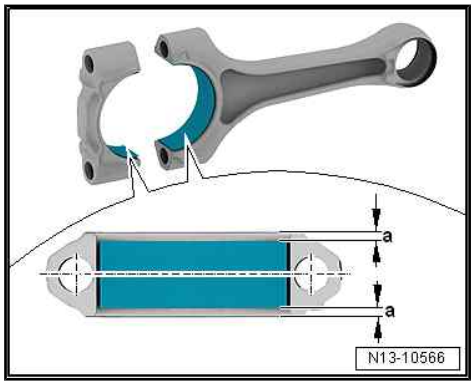
Installation sequence:

1. Insert spring -1- in groove.
2. Insert bottom fin -3- in groove.
3. Insert top fin -2- in groove.



Installation position of bearing shell

– Insert bearing shells centrally in conrod and conrod bearing cap.
- Dimension -a- = 2.5 mm



Separating parts of new conrod

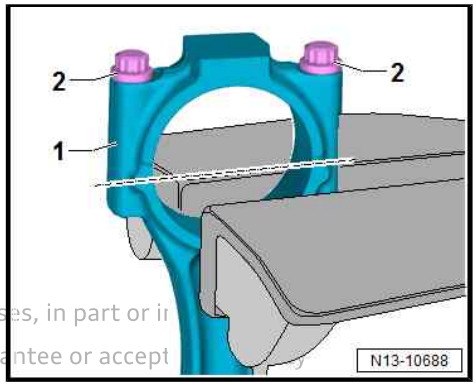
It is possible that the two parts of a new conrod are not completely separated as intended. If it is not possible to detach conrod bearing cap by hand, proceed as follows:

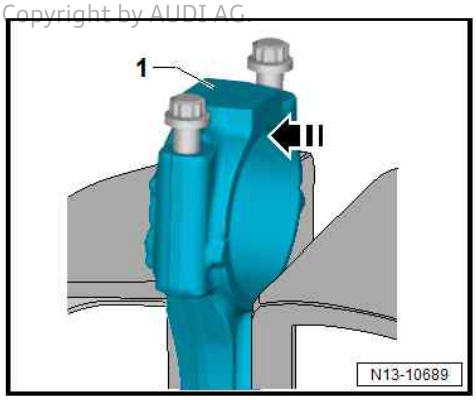
– Clamp conrod -1- lightly in a vice using aluminium jaw covers as shown in illustration.

- To avoid any risk of damage, the conrod should only be clamped lightly.
- The conrod is clamped in a position below the dotted line.

– Loosen the two bolts -2- approx. 5 turns.

– Using a plastic hammer, carefully knock conrod bearing cap -1- loose in direction of -arrow-.





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4.2 Removing and installing pistons

Special tools and workshop equipment required

♦ Pin - VW 222 A-



♦ Piston ring clamp, commercially available

Removing

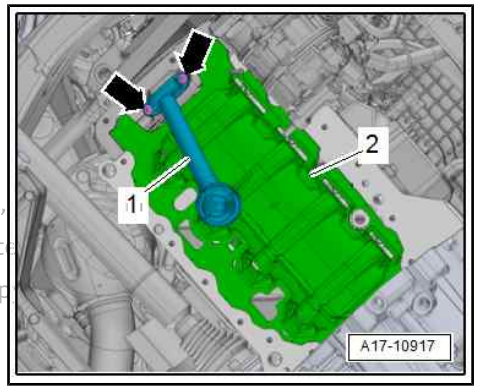
– Remove cylinder head
⇒ “2.2 Removing and installing cylinder head”, page 228 .

1.2 ltr. engine:

– Remove sump ⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

– Unscrew bolts -arrows- and remove suction pipe -1-.

– Detach baffle plate -2-.



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1.4 ltr. engine:

– Remove sump (top section) ⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286 and detach baffle plate.

All engine versions (continued):

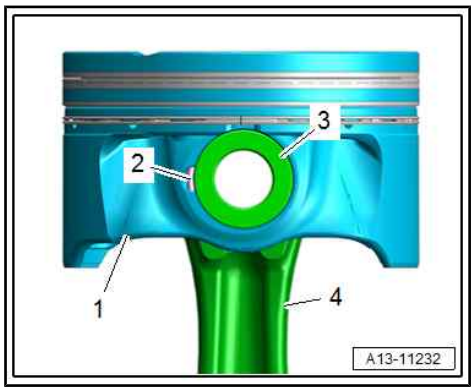
– Mark installation position and cylinder number of piston.

– Mark installation position and matching of cylinder and conrod bearing cap to conrod ⇒ Item 4 (page 114) .

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

– Take circlip -2- out of piston pin boss.

– Use drift - VW 222A- to drive out piston pin -3-.



Note:

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

– Detach piston -1- from conrod -4-.

Installing

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

- When installing, offset top gap of 3-part oil scraper ring by 120° to next compression ring.
- 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 115 .

– Install conrod bearing cap; note installation position ⇒ Item 2 (page 114) .

– Install cylinder head ⇒ “2.2 Removing and installing cylinder head”, page 228 .

1.2 ltr. engine:

– Install sump ⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

1.4 ltr. engine:

– Install sump (upper section) ⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286 .

Tightening torques

- ⇒ “4.3 Removing and installing oil spray jets”, page 119
- ⇒ “4.1 Exploded view - pistons and conrods”, page 114
- ⇒ “1.1 Exploded view - sump/oil pump”, page 273

4.3 Removing and installing oil spray jets

Special tools and workshop equipment required

♦ Socket - T10545-

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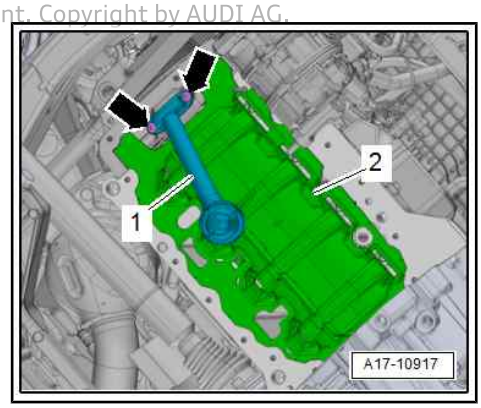
Removing

1.2 ltr. engine:

– Remove sump
⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

– Unscrew bolts -arrows- and remove suction pipe -1-.

– Detach baffle plate -2-.



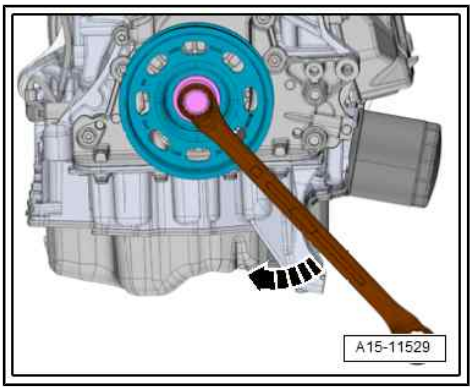
1.4 ltr. engine:

– Remove sump (top section)
⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286 and detach baffle plate.

All engine versions (continued):

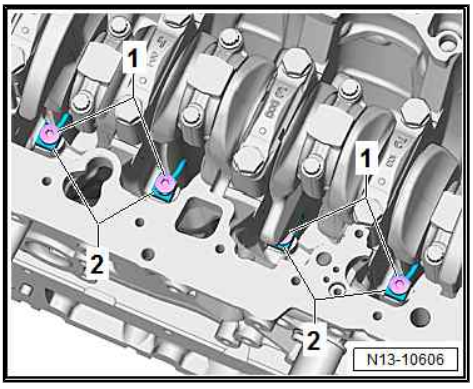
– Turn crankshaft at pulley/vibration damper in direction of engine rotation -arrow- until corresponding bolt is accessible.

– 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-.

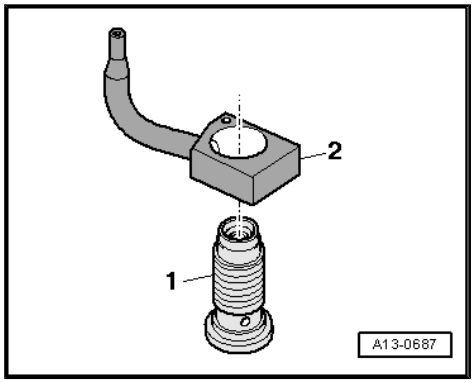


Installing

Installation is carried out in 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



NOTICE

Risk of damage to oil spray jets due to deformation.

– Never bend oil spray jets.

1.2 ltr. engine:

– Install sump
⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

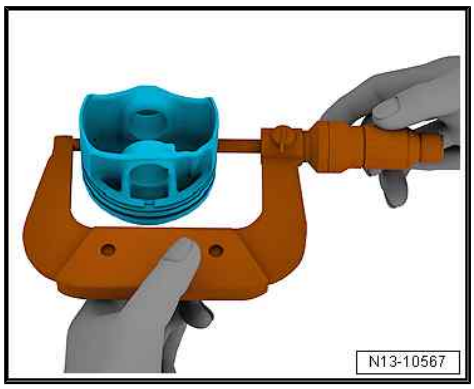
1.4 ltr. engine:

– Install sump (upper section)
⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286 .

Tightening torques

- ⇒ “4.1 Exploded view - pistons and conrods”, page 114
- ⇒ “1.1 Exploded view - sump/oil pump”, page 273

4.4 Checking pistons and cylinder bores



Checking piston

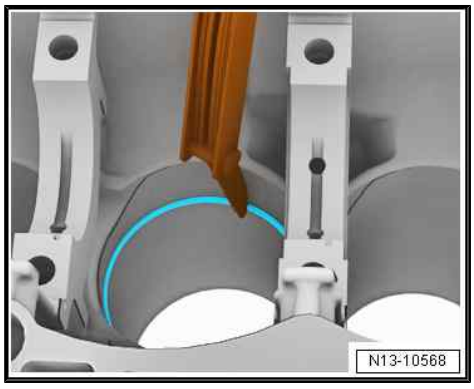
– Using a micrometer, measure approx. 10 mm from the lower edge, perpendicular to the piston pin axis.

- Maximum deviation from nominal dimension: 0.04 mm.

Piston ∅ mm		
	1.2 ltr. engine	**1.4 ltr. engine**
Nominal dimension	70.92[1)]	74.42[2)]

- [1)] Dimensions not including coating (thickness 0.015 mm on each side).
- [1)] Dimensions not including coating (thickness 0.018 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

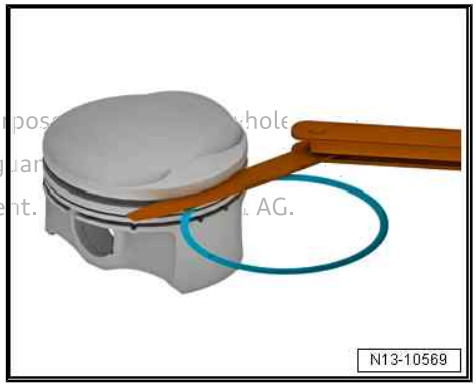
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Measuring ring-to-groove clearance

– Clean groove in piston before checking clearance.

Piston ring	new mm	Wear limit mm
1st compression ring	0.05 … 0.09	0.15
2nd compression ring	0.03 … 0.07	0.15
Oil scraper rings (2 parts)	0.04 … 0.08	0.15
Oil scraper rings (3 parts)	Cannot be measured	



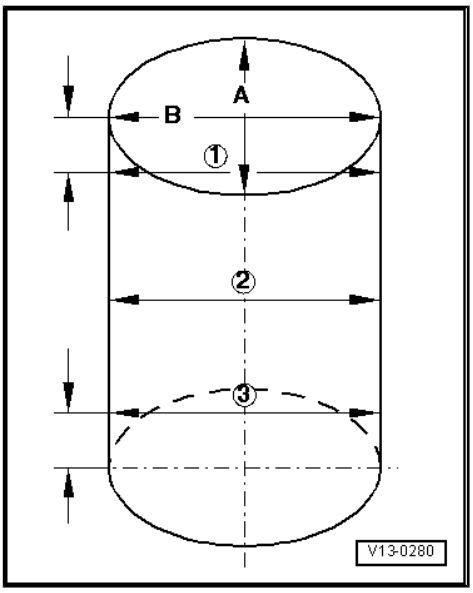
Measuring cylinder bore

– Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.

• Maximum deviation from nominal dimension: 0.08 mm.

Cylinder bore ∅ mm		
	1.2 ltr. engine	1.4 ltr. engine
Nominal dimension	71.0 +0.015 +0.005	74.5 +0.015 +0.005

• Do not measure the cylinder bore when the cylinder block is mounted to the engine and gearbox support - VAS 6095A- , as this may result in incorrect measurements.



4.5 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

♦ Plastigauge

Procedure

– Remove conrod bearing cap.

– Clean bearing cap and bearing journal.

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

– Fit conrod bearing cap and secure with old bolts ⇒ Item 1 (page 114) without rotating crankshaft.

– Remove conrod bearing cap again.

– Compare width of Plastigauge with measurement scale.

• Radial clearance: 0.028 ... 0.065 mm

– Renew conrod bolts.

15 – Cylinder head, valve gear

1 Toothed belt drive

⇒ “1.1 Exploded view - toothed belt cover”, page 122

⇒ “1.2 Exploded view - toothed belt”, page 124

⇒ “1.3 Detaching toothed belt from camshaft”, page 127

⇒ “1.4 Removing and installing toothed belt”, page 174

1.1 Exploded view - toothed belt cover

⇒ “1.1.1 Exploded view - toothed belt cover, all vehicles except e-tron”, page 122

⇒ “1.1.2 Exploded view - toothed belt cover, e-tron”, page 123

1.1.1 Exploded view - toothed belt cover, all vehicles except e-tron

1 - Toothed belt cover (bottom)

2 - Bolt

- ❑ 8 Nm

3 - Engine support

- ❑ Removing and installing ⇒ “1.6.1 Removing and installing engine support - all vehicles except e-tron”, page 89

4 - Bolt

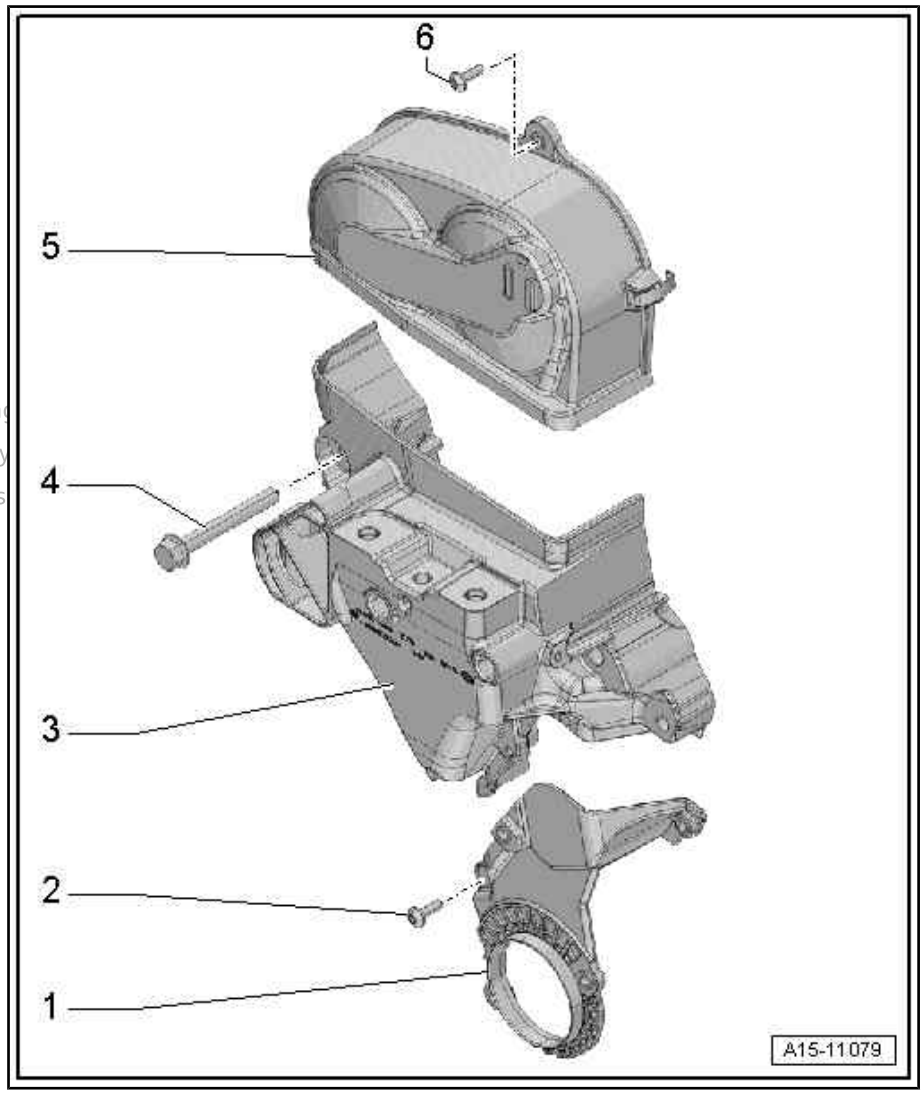
- ❑ Tightening torque and sequence ⇒ Fig. ““Engine support - tightening torque and sequence”“, page 57

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5 - Toothed belt cover (top)

6 - Bolt

- ❑ 8 Nm



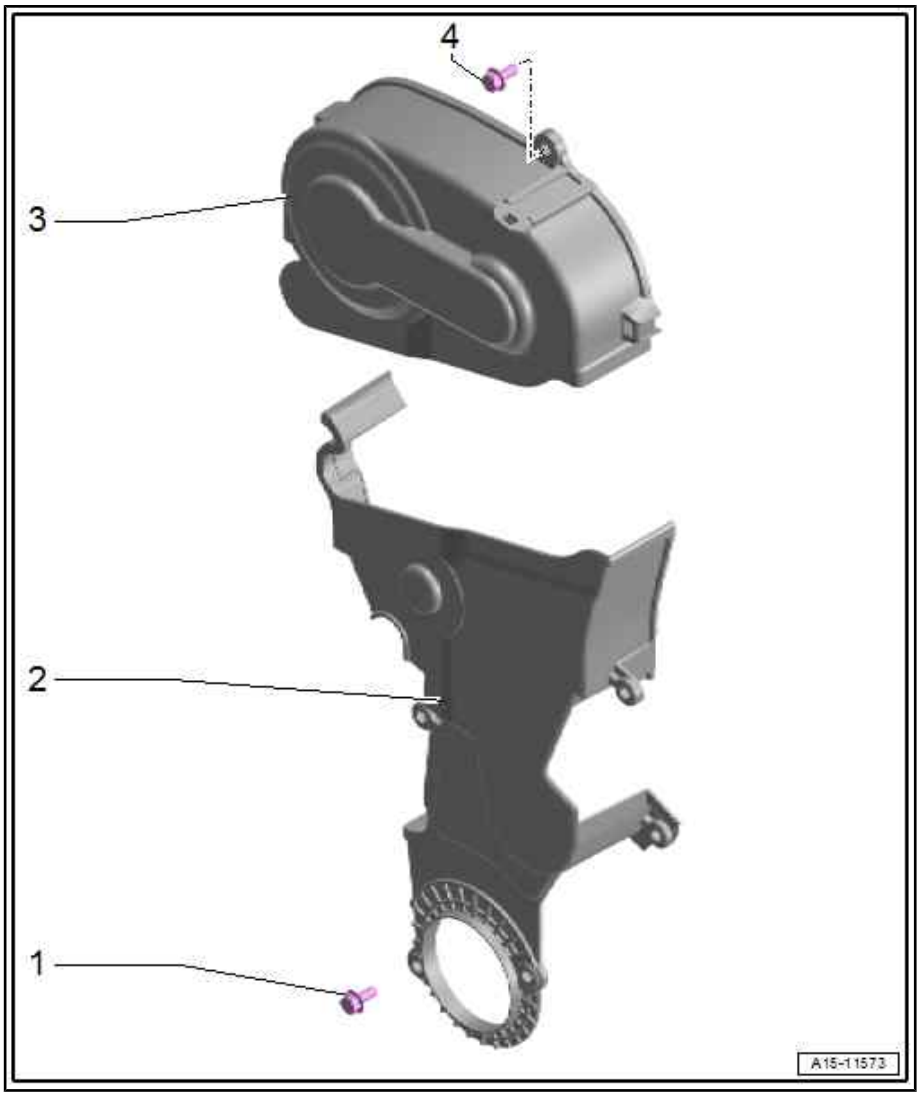
1.1.2 Exploded view - toothed belt cover, e-tron

1 - Bolt
- ❑ 8 Nm

2 - Toothed belt cover (bottom)

3 - Bolt
- ❑ 8 Nm

4 - Toothed belt cover (top)



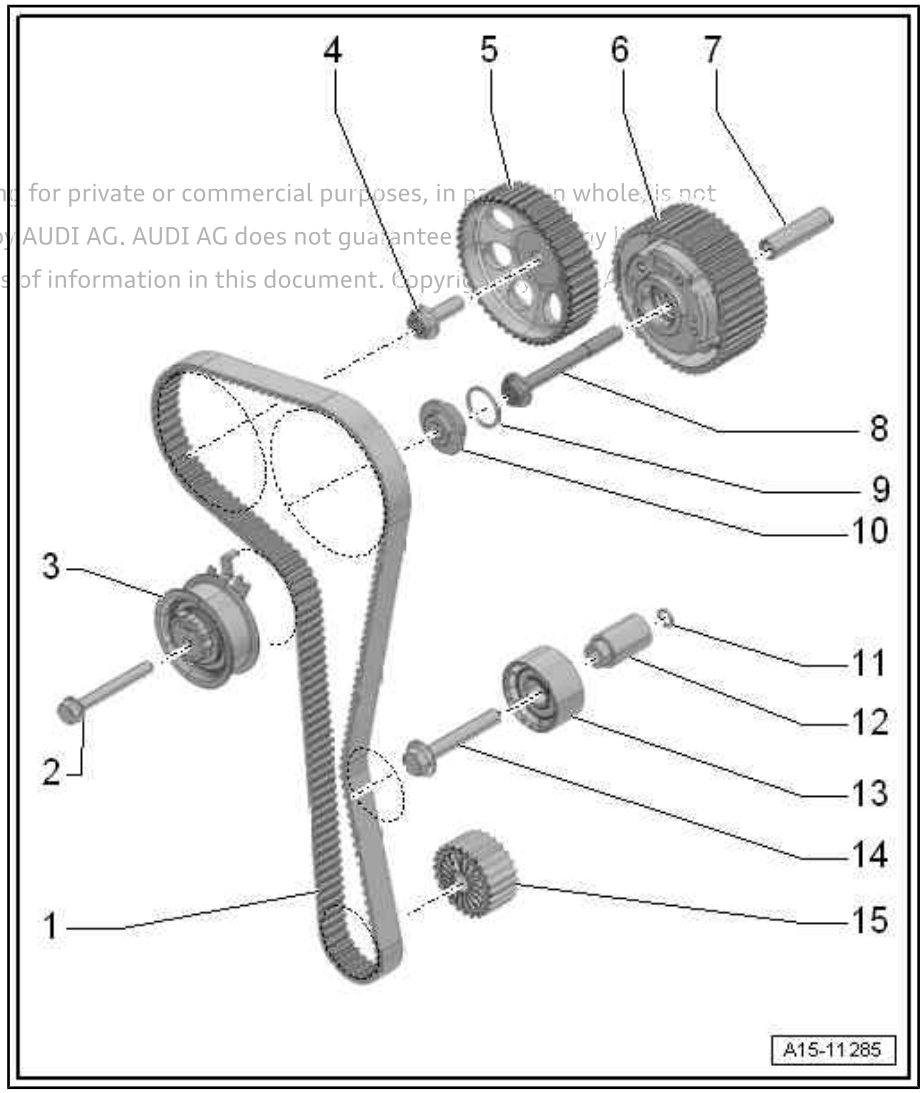
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1.2 Exploded view - toothed belt

⇒ “1.2.1 Exploded view - toothed belt, engine with one camshaft adjuster”, page 124

⇒ “1.2.2 Exploded view - toothed belt, engine with two camshaft adjusters”, page 125

1.2.1 Exploded view - toothed belt, engine with one camshaft adjuster



1 - Toothed belt

- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Check for wear
- ❑ Removing from camshafts
  ⇒ “1.3.1 Detaching toothed belt from camshaft - engines with one camshaft adjuster”, page 127
- ❑ Removing
  ⇒ “1.4.1 Removing and installing toothed belt - engines with one camshaft adjuster”, page 174
- ❑ Installing (adjusting valve timing)
  ⇒ page 133

2 - Bolt

- ❑ 25 Nm

3 - Tensioning roller

- ❑ Removal and installation involve taking out engine support
  ⇒ “1.6 Removing and installing engine support”, page 89

4 - Bolt

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

5 - Toothed belt sprocket (exhaust camshaft)

6 - Toothed belt sprocket (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

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11 - O-ring
- ❑ Retaining element
- ❑ Renew after removing

12 - Spacer sleeve

13 - Idler roller

14 - Bolt
- ❑ 45 Nm

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

1.2.2 Exploded view - toothed belt, engine with two camshaft adjusters

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 127
- ❑ Removing ⇒ “1.4 Removing and installing toothed belt”, page 174
- ❑ Installing (adjusting valve timing) ⇒ “1.4 Removing and installing toothed belt”, page 174

2 - Bolt
- ❑ 25 Nm

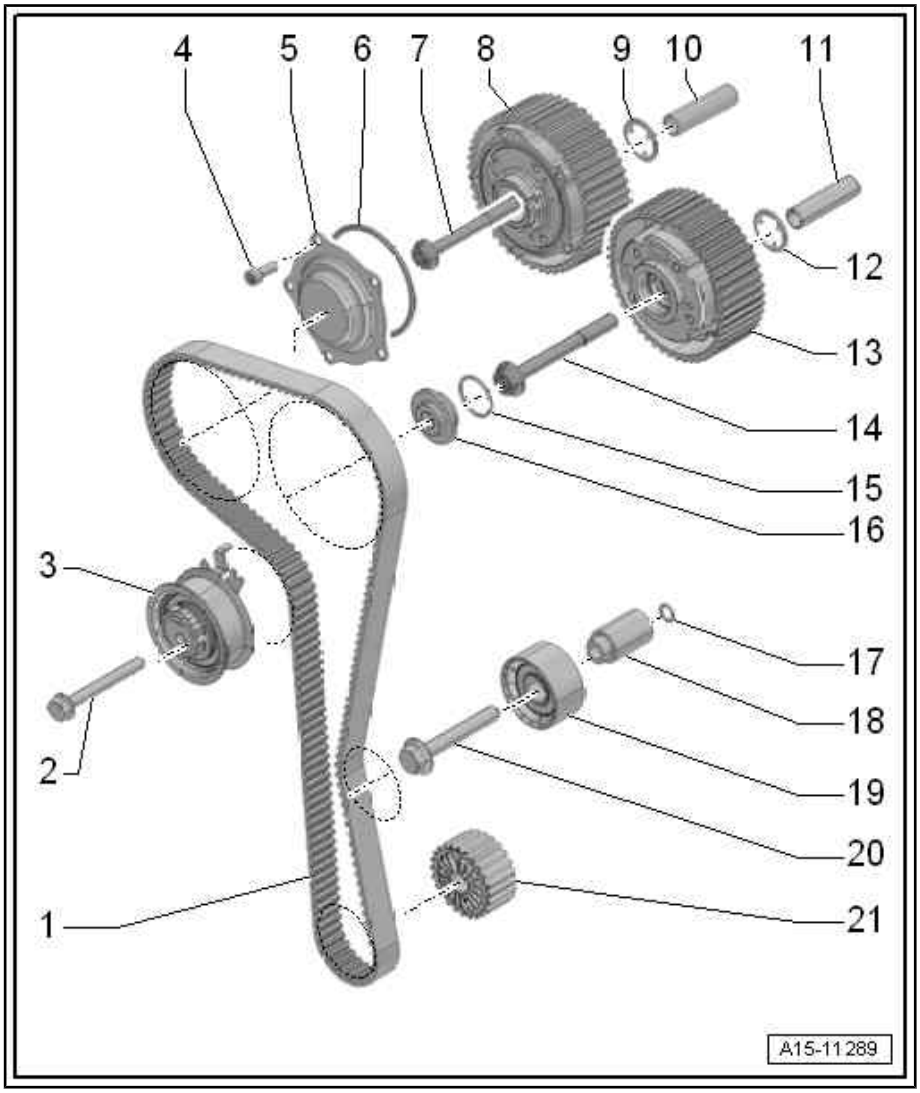
3 - Tensioning roller
- ❑ Removal and installation involve taking out engine support ⇒ “1.6 Removing and installing engine support”, page 89

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 - Toothed belt sprocket (exhaust camshaft)

- ❑ With camshaft adjuster

9 - Diamond-coated washer

- ❑ Not fitted on all versions ⇒ Electronic parts catalogue
- ❑ If fitted, renew after removal

10 - Guide sleeve

11 - Guide sleeve

12 - Diamond-coated washer

- ❑ Not fitted on all versions ⇒ Electronic parts catalogue
- ❑ If fitted, renew after removal

13 - Toothed belt sprocket (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

- ❑ Retaining element
- ❑ Renew after removing

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

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1.3 Detaching toothed belt from camshaft

⇒ “1.3.1 Detaching toothed belt from camshaft - engines with one camshaft adjuster”, page 127

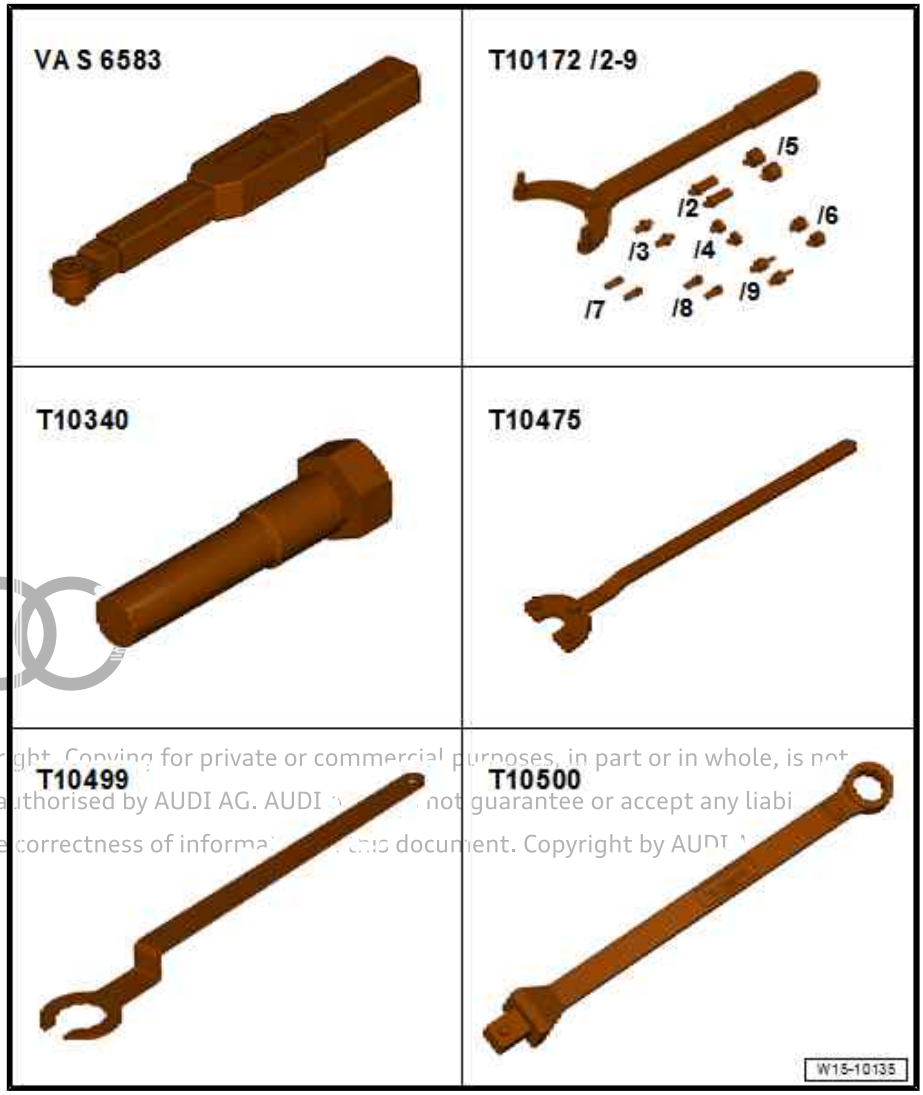
⇒ “1.3.2 Detaching toothed belt from camshaft - engines with two camshaft adjusters”, page 138

⇒ “1.3.3 Detaching toothed belt from camshaft - e-tron”, page 150

⇒ “1.3.4 Detaching toothed belt from camshaft - engines with two camshaft adjusters and cylinder shut-off”, page 162

1.3.1 Detaching toothed belt from camshaft - engines with one camshaft adjuster

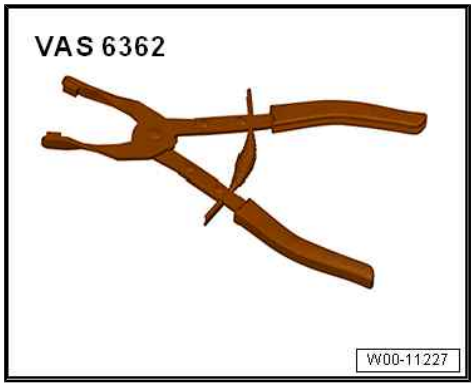
Special tools and workshop equipment required



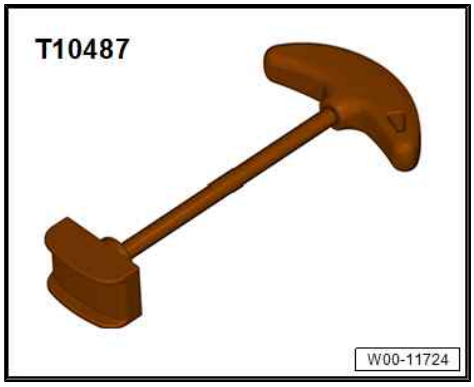
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- Torque wrench - VAS 6583-
- Counterhold tool - T10172- with adapters -T10172/2-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-

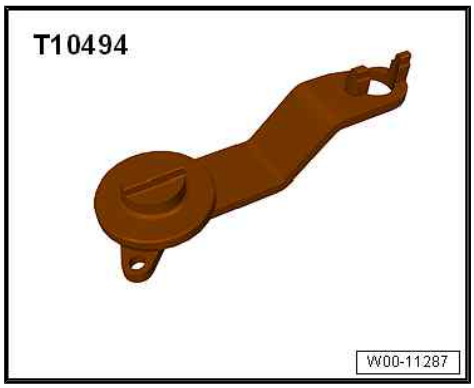
- Hose clip pliers - VAS 6362-



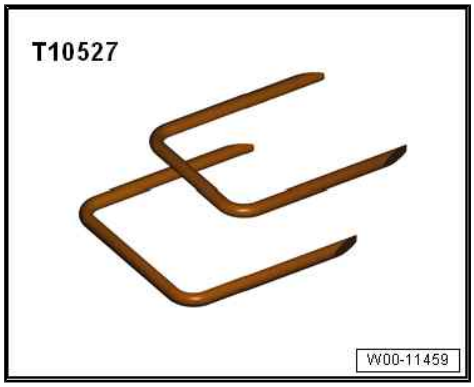
- Assembly tool - T10487-



- Camshaft clamp - T10494-

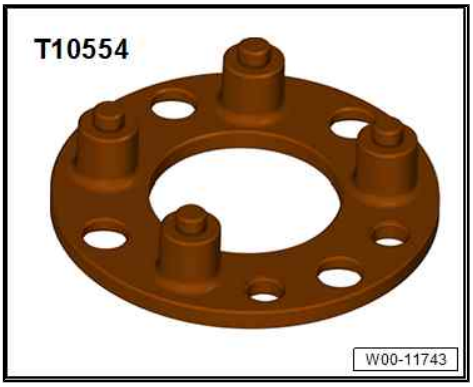


- Release tool - T10527- and -T10527/1-



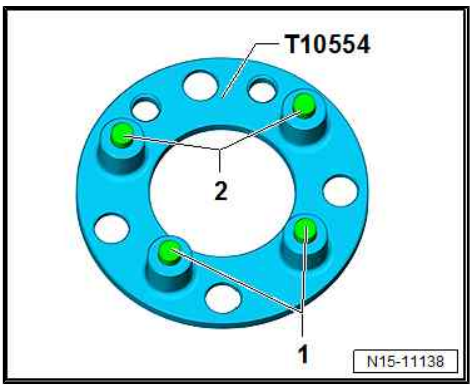
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- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

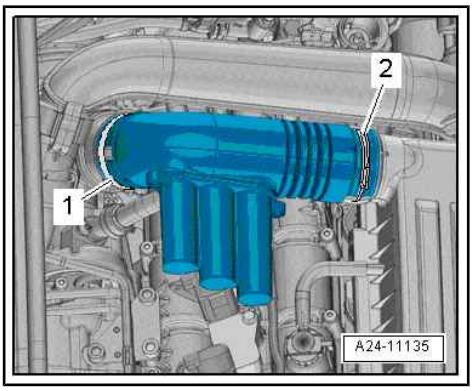
- The lugs -1- and -2- on counterhold tool - T10554/1- are different distances apart.
- Counterhold tool - T10554/1- can only be applied in one position.
- Position counterhold tool - T10554/1- flush against camshaft adjusters.



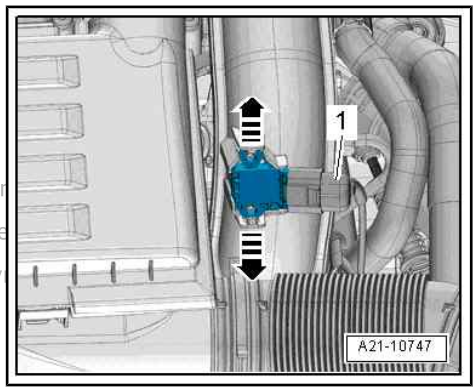
Procedure

– Remove engine cover panel ⇒ page 79 .

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

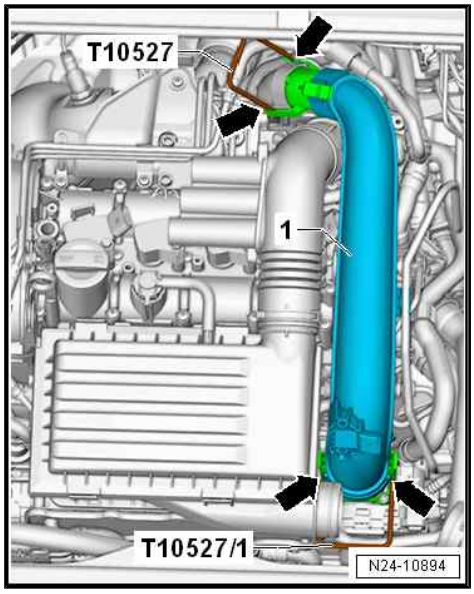


– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



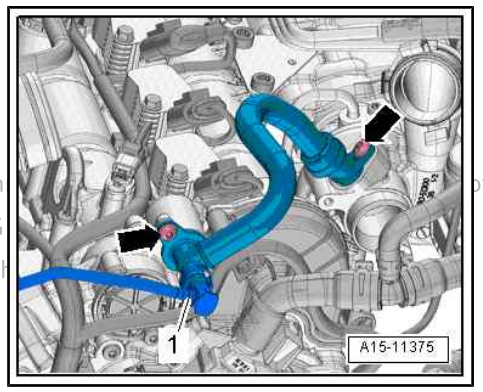
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– Move air hoses clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe -1-.

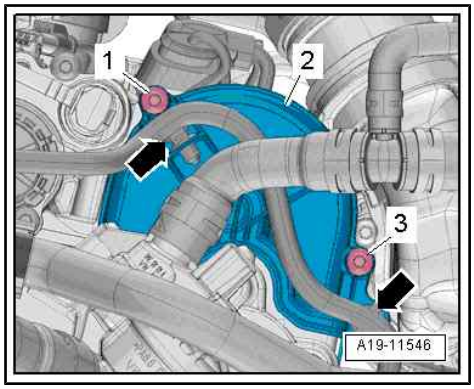


– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).

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

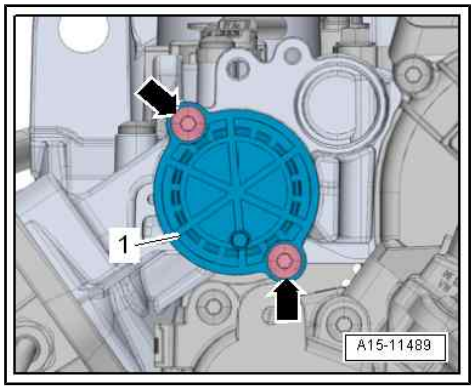


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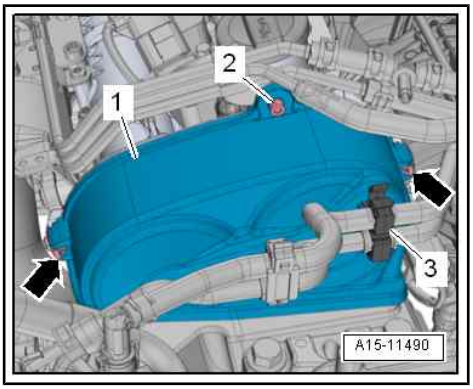
Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

– **Cover coolant pump with a cloth.**
– **Catch escaping engine oil with a cloth.**

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



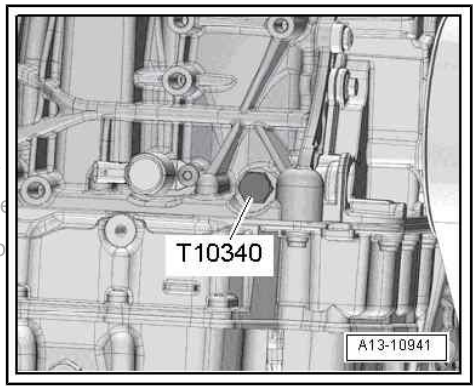
– Move clear hoses at bracket -3-.
– Remove bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



Rotate crankshaft to “TDC” as follows:

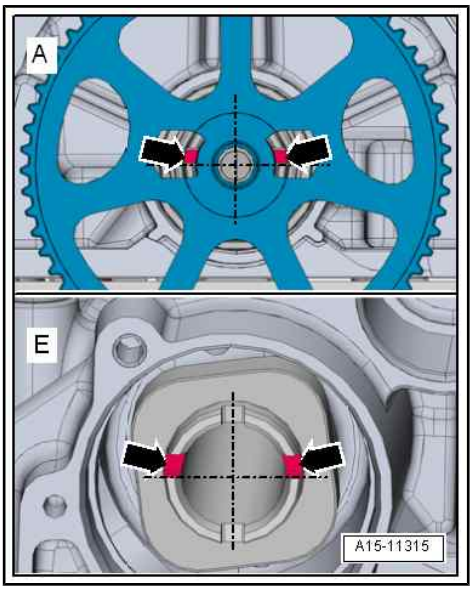
– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block until head of pin makes contact.
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.
– Turn crankshaft by 90° in direction of engine rotation.
– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.

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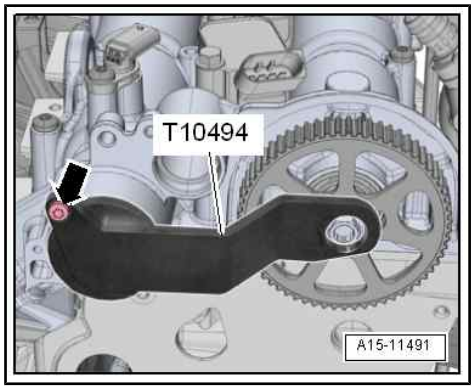


• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)

• 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.
• 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.

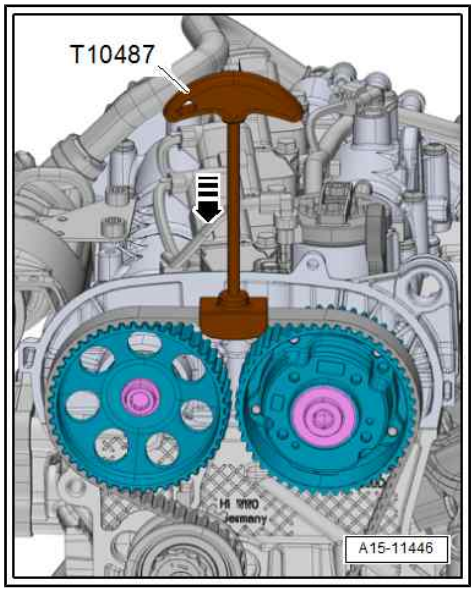


– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.
- It should be possible to insert the camshaft clamp - T10494- easily.
- Do not knock camshaft clamp into place with any kind of tool.
– When camshafts are 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 tighten bolt hand-tight.

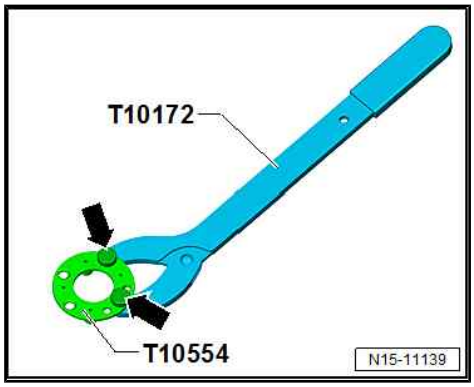


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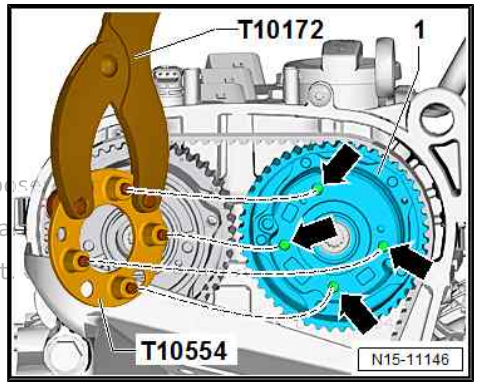
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

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



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



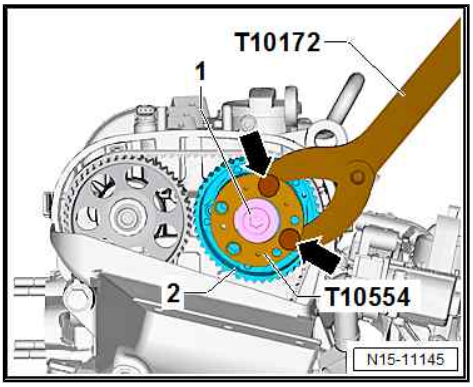
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NOTICE

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

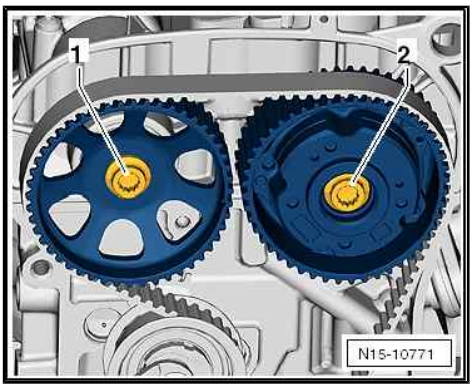
– Catch escaping engine oil with a cloth.
– Clean any spaces/cavities that have filled with engine oil.

– Unscrew plug -1- on camshaft sprocket (inlet side) -2- using counterhold tool - T10172- and counterhold tool - T10554/1- .



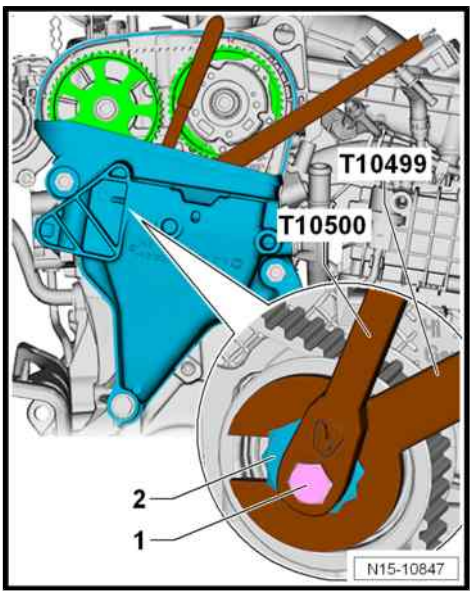
– Loosen bolt -2- approx. one turn using counterhold tool - T10172- and counterhold tool - T10554/1- .

– Loosen bolt -1- approx. one turn using counterhold tool - T10172- 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- .

– Detach toothed belt from camshaft sprockets.

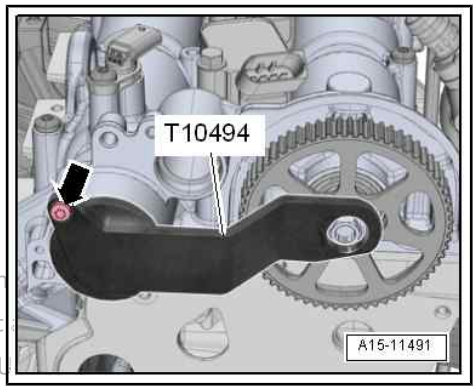


Installing (adjusting valve timing)

- Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

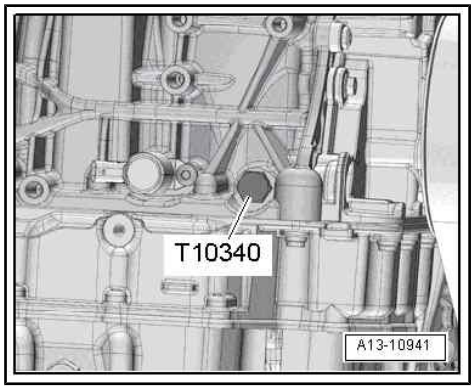
– Check “TDC” position of camshaft and crankshaft:

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



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- 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.



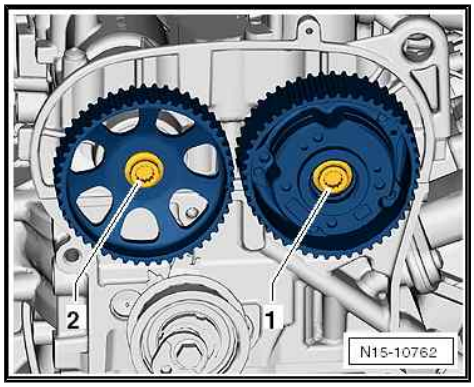
NOTICE

Risk of damage to camshaft if handled incorrectly

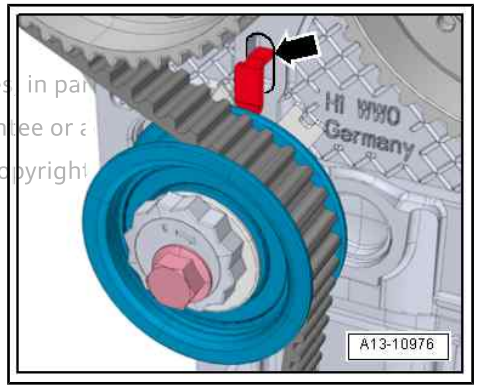
– Never use camshaft clamp as a counterhold tool.

– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

- It should just be possible to turn the adjusters on the camshafts without axial movement.



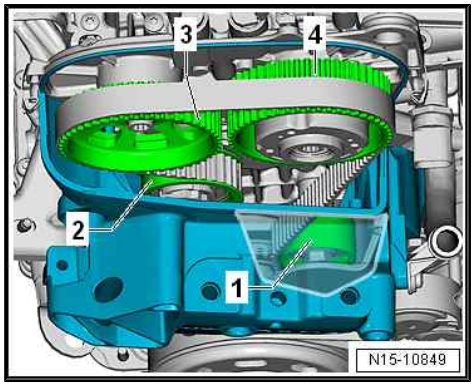
- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



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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-.

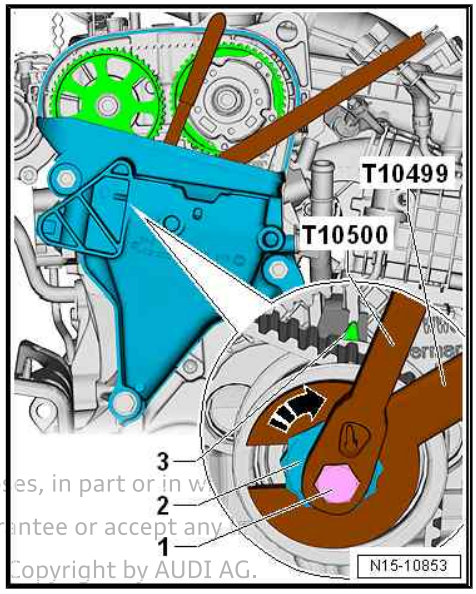


– Using special wrench, 30 mm - T10499- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

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

– 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- .



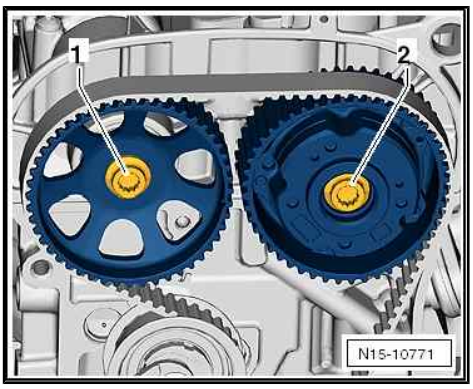
Note:

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.

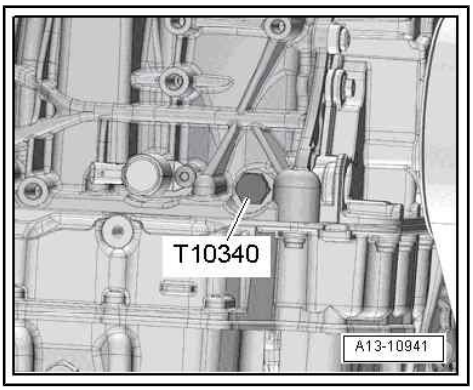
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– Tighten bolt -1- initially to 50 Nm using counterhold tool - T10172- with adapters -T10172/2- .

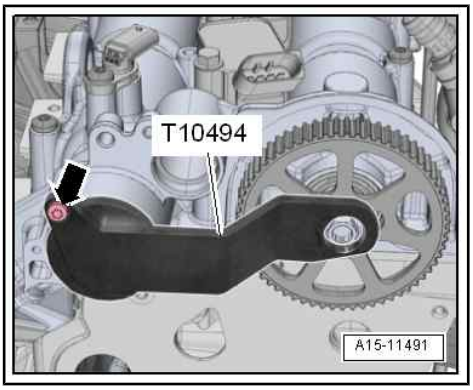
– Tighten bolt -2- initially to 50 Nm using counterhold tool - T10172- and counterhold tool - T10554/1- .



– Remove locking pin - T10340- .

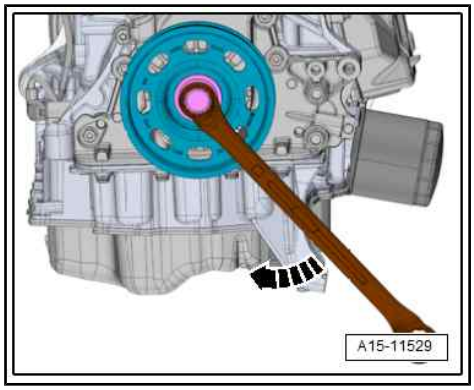


– Remove bolt -arrow- and detach camshaft clamp - T10494- .



Checking valve timing:

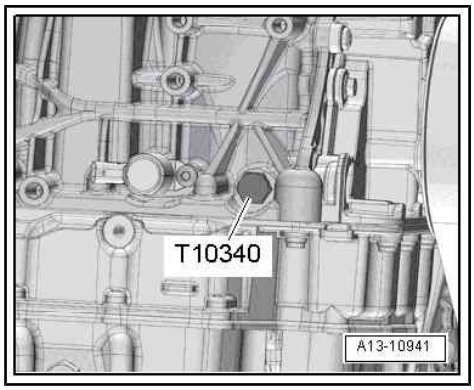
– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.



– 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.

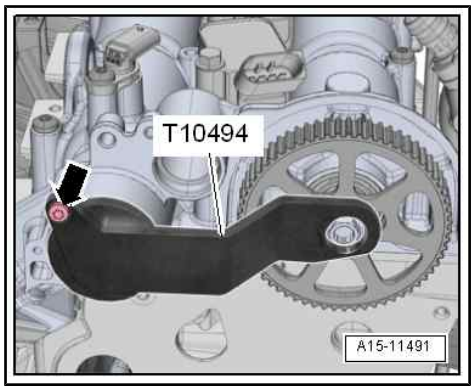
• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



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

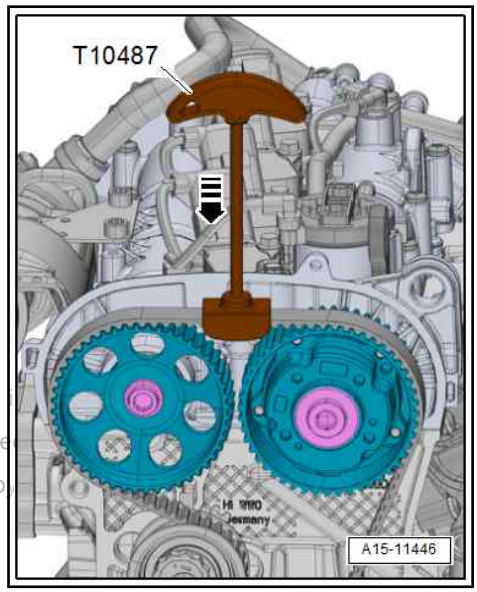
• Do not knock camshaft clamp into place with any kind of tool.

– 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 tighten bolt hand-tight.



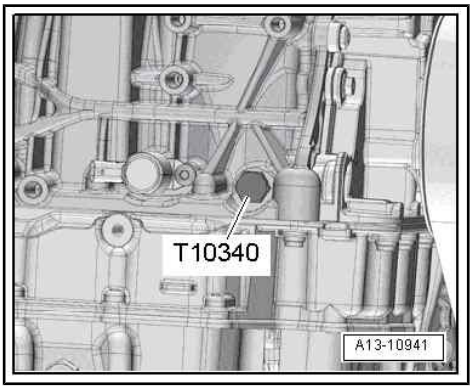
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If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

– Adjust valve timing again ⇒ page 133 .

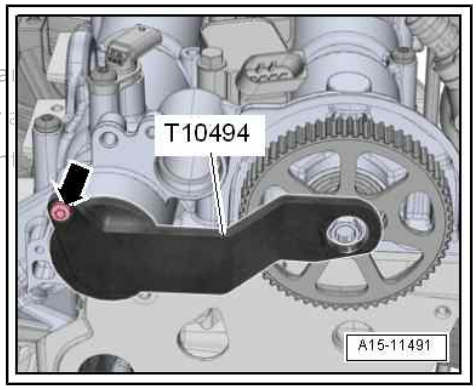
If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

– Remove locking pin - T10340- .

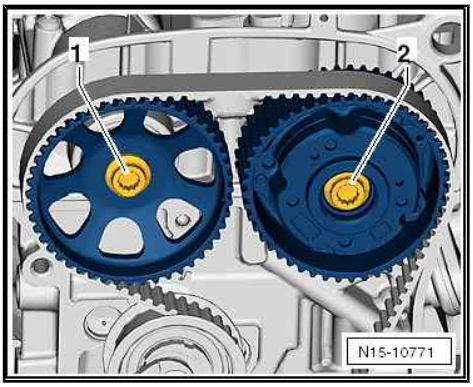


– Remove bolt -arrow- and detach camshaft clamp - T10494- .

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– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- and counterhold tool - T10554/1- , or counterhold tool - T10172- with adapters -T10172/2- .



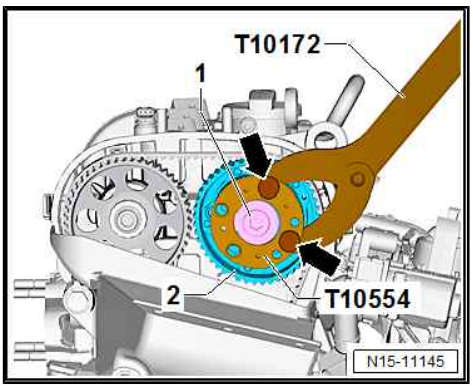
– Tighten plug -1- using counterhold tool - T10172- and counterhold tool - T10554/1- .

• Check that locking pin and camshaft clamp have been removed.

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

Tightening torques

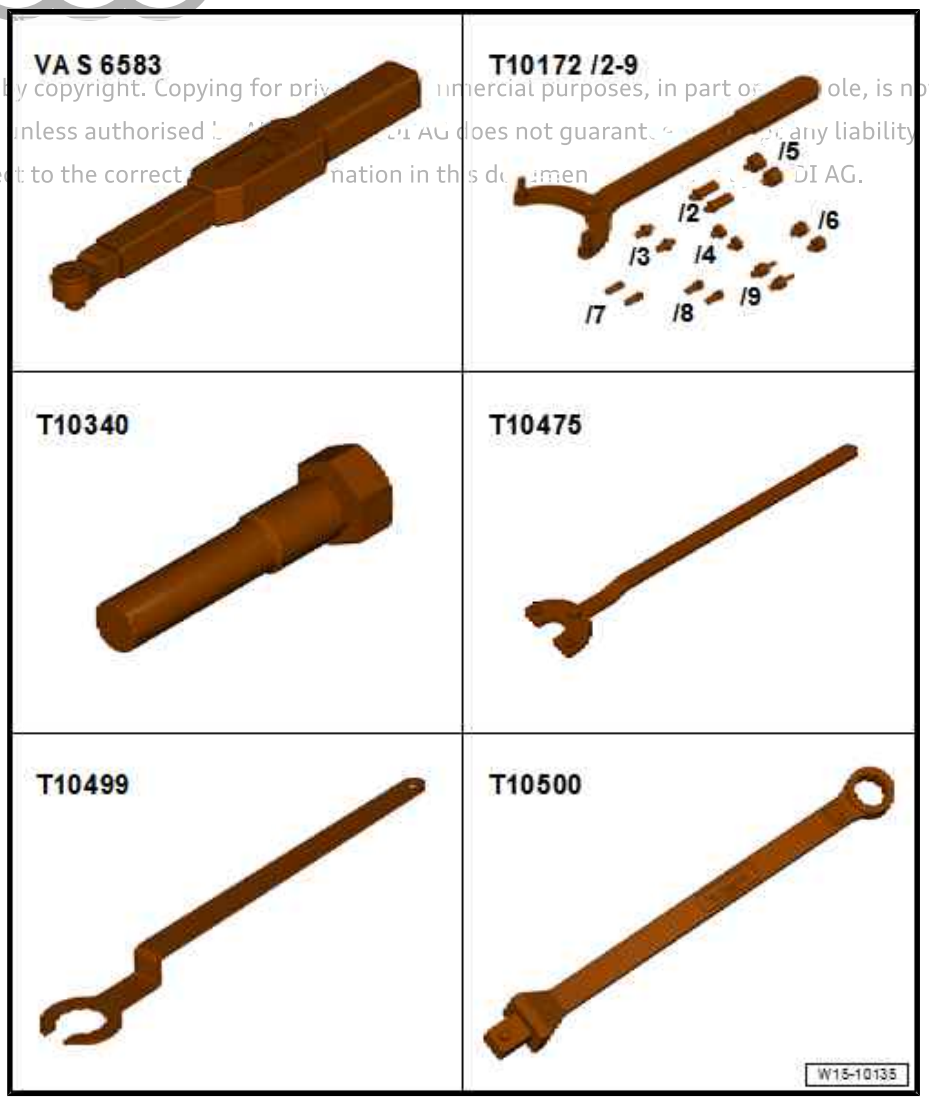
- ⇒ “1.2.1 Exploded view - toothed belt, engine with one camshaft adjuster”, page 124
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294
- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441



1.3.2 Detaching toothed belt from camshaft - engines with two camshaft adjusters

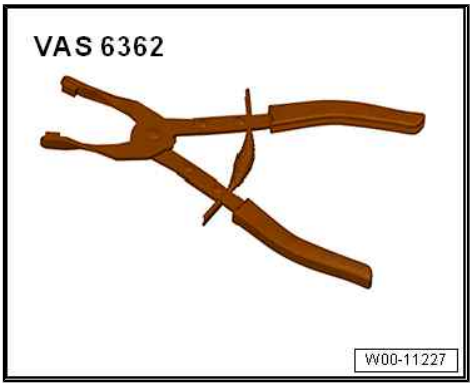
Special tools and workshop equipment required

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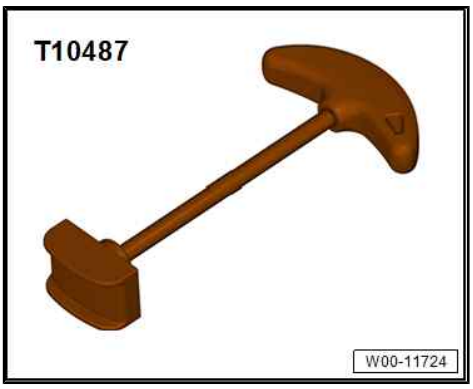


- Torque wrench - VAS 6583-
- Counterhold tool - T10172A-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-

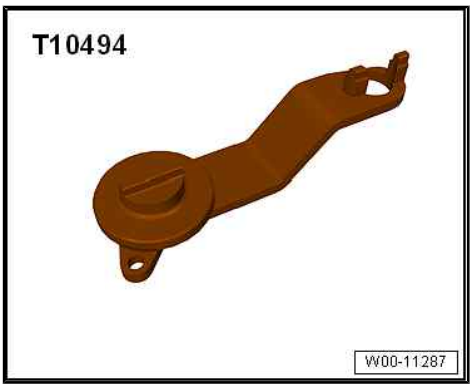
- Hose clip pliers - VAS 6362-



- Assembly tool - T10487-



- Camshaft clamp - T10494-

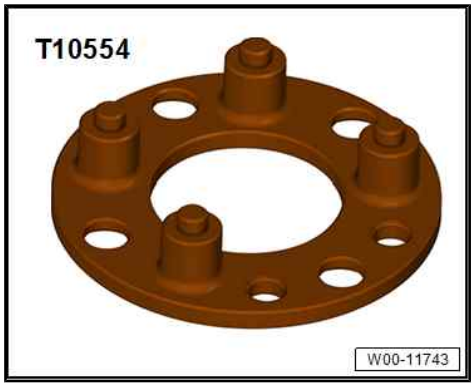


- Release tool - T10527- and -T10527/1-



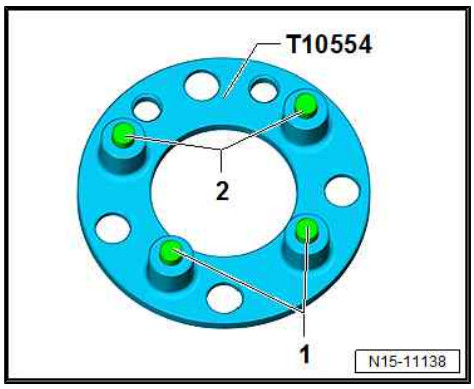
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- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

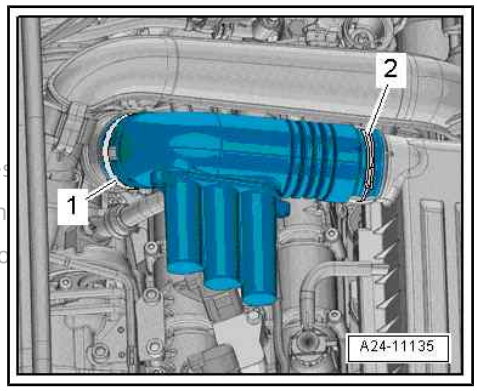
- The lugs -1- and -2- on counterhold tool - T10554/1- are different distances apart.
- Counterhold tool - T10554/1- can only be applied in one position.
- Position counterhold tool - T10554/1- flush against camshaft adjusters.



Procedure

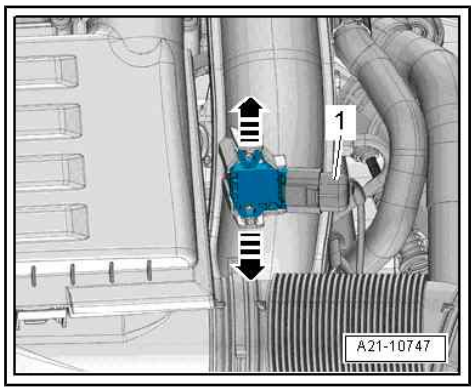
– Remove engine cover panel
⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

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

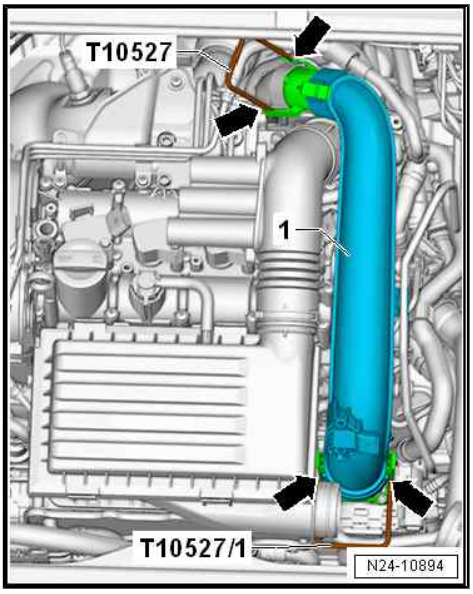


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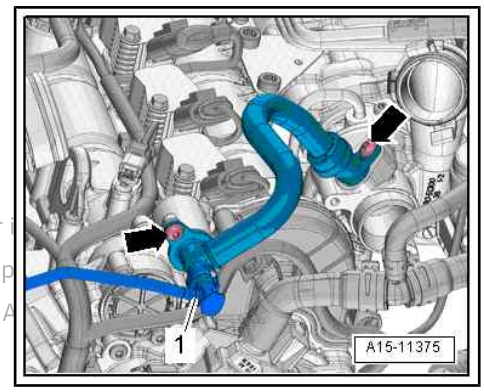
– Unplug electrical connector -1-.



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

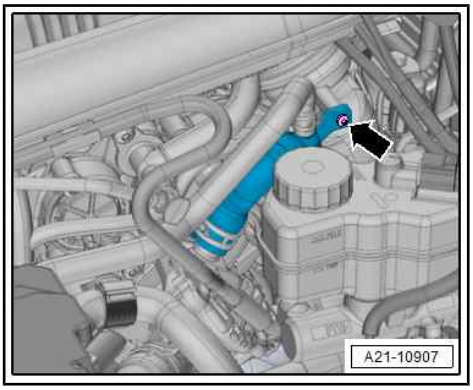


– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).

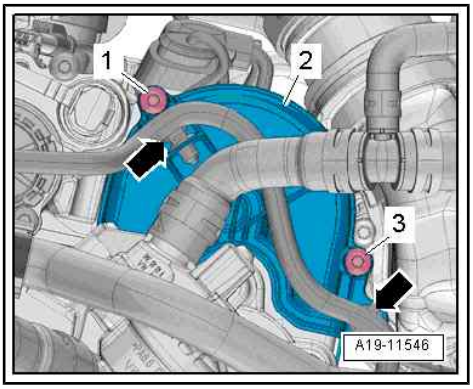


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– If fitted, remove bolt -arrow- from connection and press coolant hose slightly forwards.



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

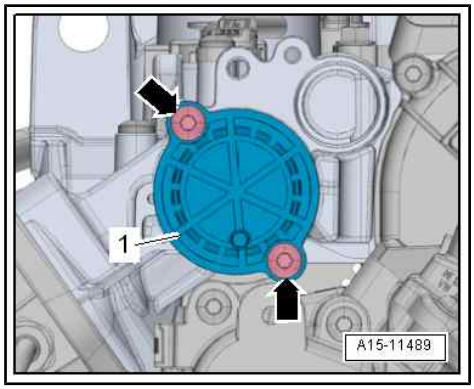


NOTICE

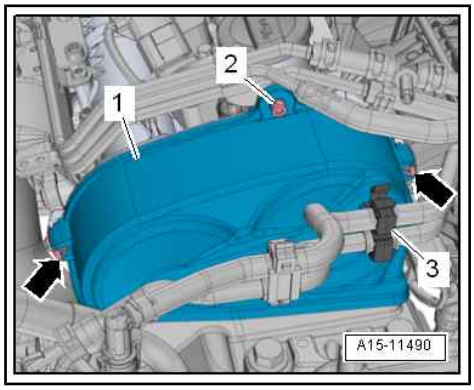
Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

- **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-.
– Remove bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



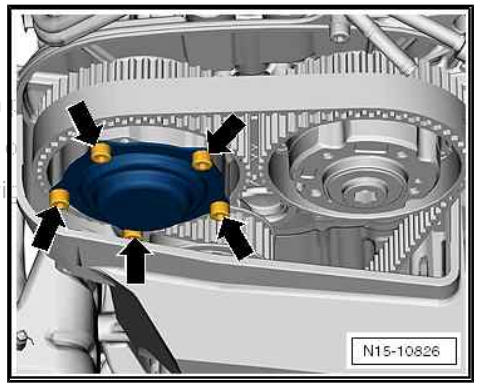
NOTICE

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

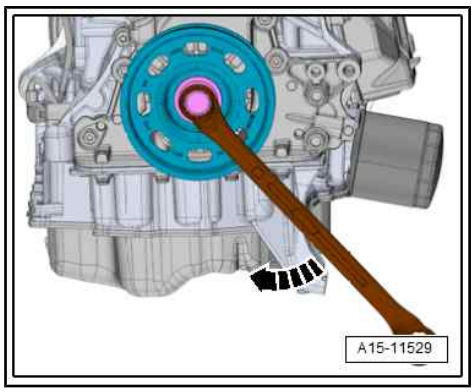
- **Catch escaping engine oil with a cloth.**
- **Clean any spaces/cavities that have filled with engine oil.**

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– Remove bolts -arrows-.



– 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 until head of pin makes contact.

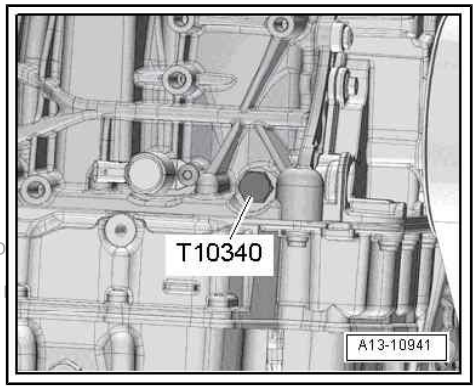
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.

– Turn crankshaft by 90° in direction of engine rotation.

– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.

– Rotate crankshaft in normal direction of rotation until contact is made.

• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



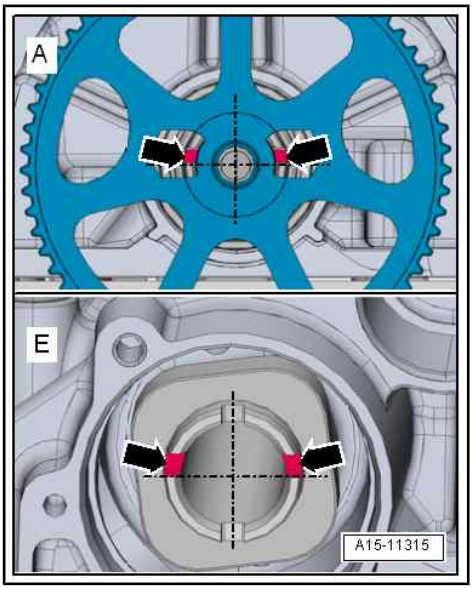
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• On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustrations.

• 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.

• 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.

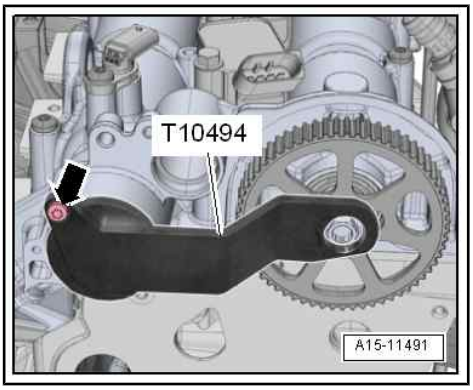


– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.

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

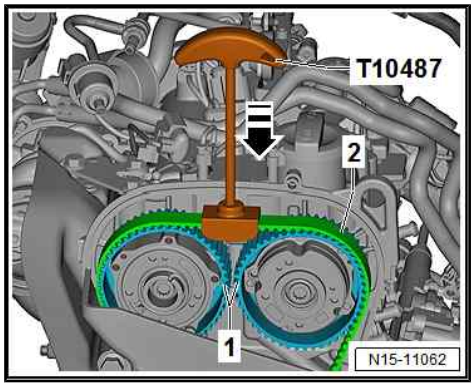
• Do not knock camshaft clamp into place with any kind of tool.

– 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 tighten bolt hand-tight.



NOTICE

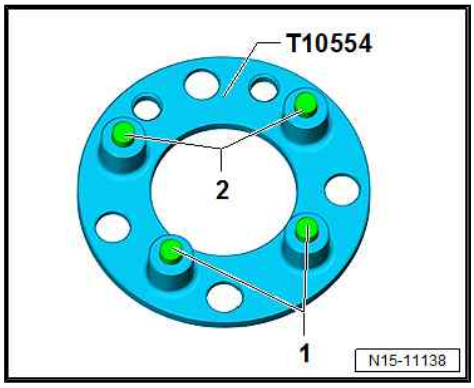
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

Exhaust camshaft:

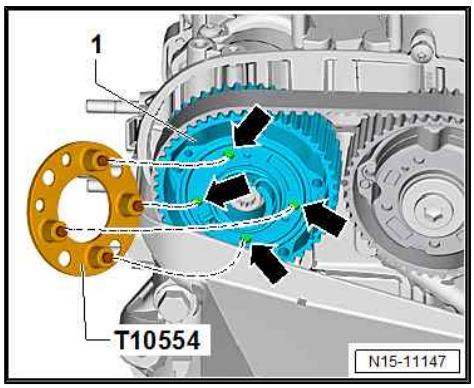
– Guide in counterhold tool - T10554/1- between camshaft adjuster and engine support.

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

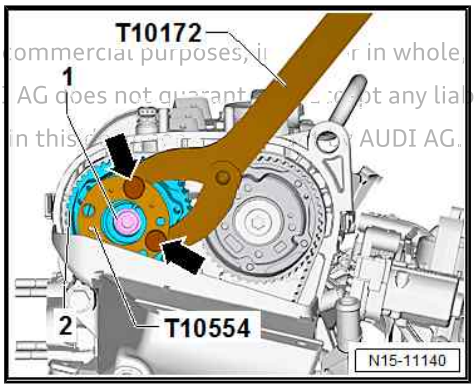


– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.

– 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- .

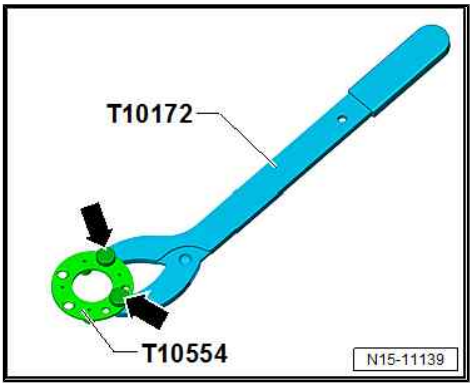


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Inlet camshaft

– Assemble tools as shown.

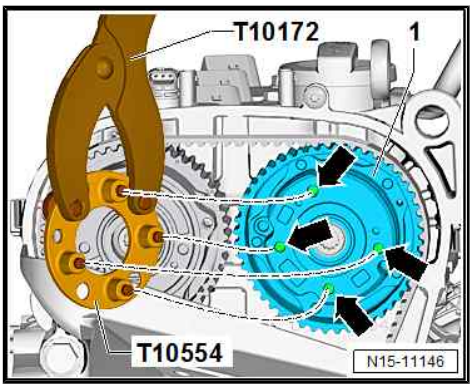
– Attach counterhold tool - T10172- to counterhold tool - T10554/1- using knurled screws -T10554/2- -arrows-.



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

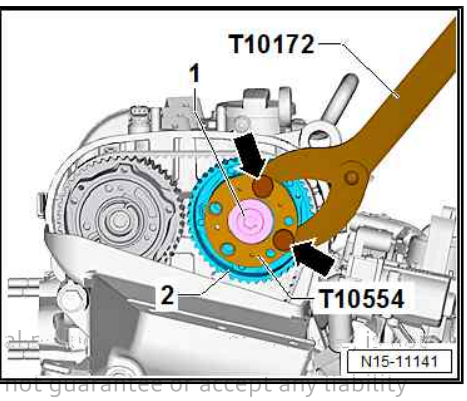
– Pins must be inserted correctly into holes -arrows-.

– 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.



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Both sides (continued):

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

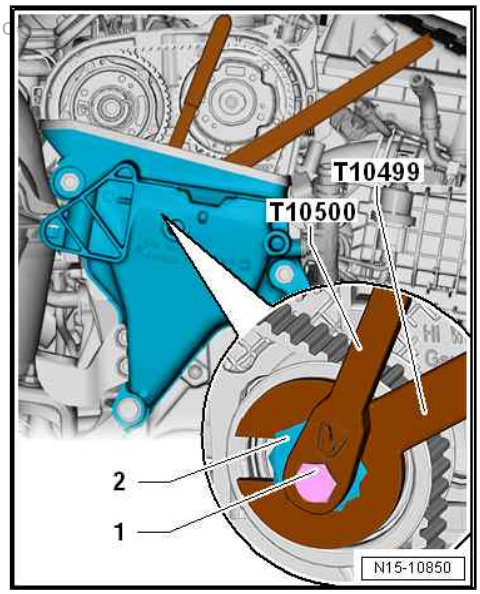
– Loosen bolt -1- using insert tool, 13 mm - T10500- .

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

– Detach toothed belt from camshaft sprockets.

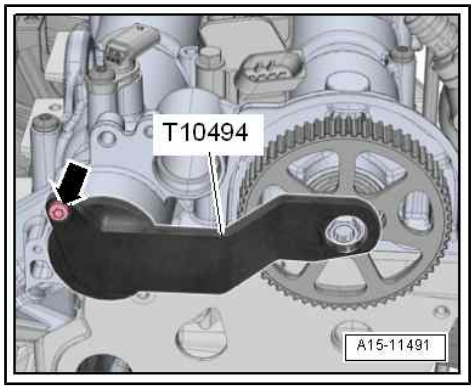
Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .



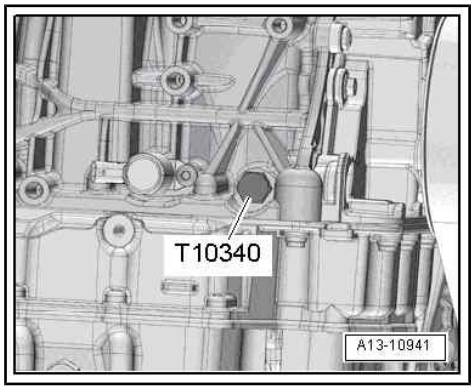
– Check “TDC” position of camshaft and crankshaft:

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



• 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.



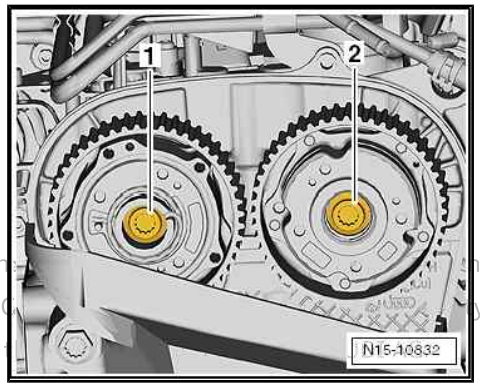
NOTICE

Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

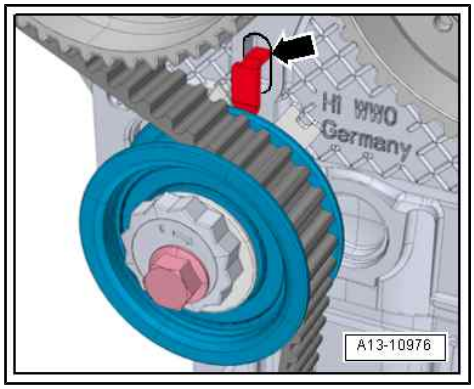
– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

• It should just be possible to turn the adjusters on the camshafts without axial movement.



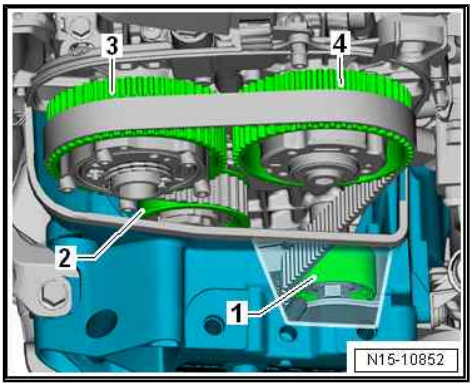
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• Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



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-.



– Using special wrench, 30 mm - T10499- , 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.

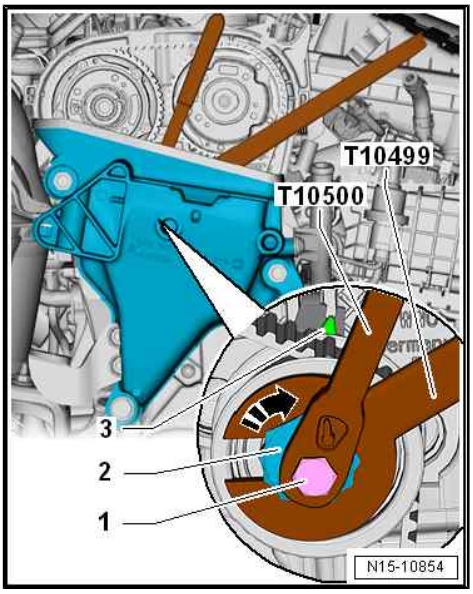
– Turn eccentric adjuster back until adjustment indicator is positioned exactly in adjustment window.

– 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.

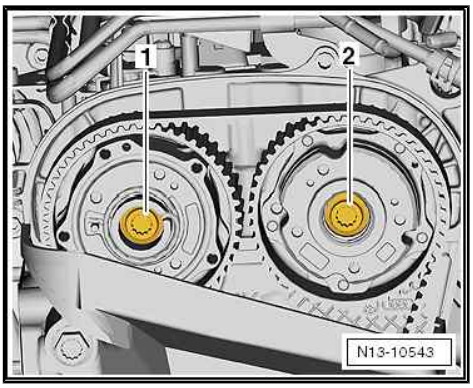


NOTICE

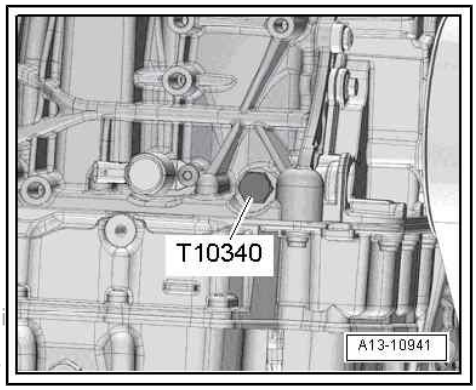
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

– Tighten bolts -1, 2- initially to 50 Nm (use counterhold tool - T10172- with counterhold tool - T10554/1-).

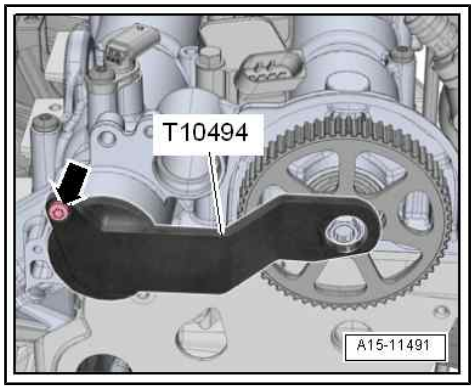


– Remove locking pin - T10340- .



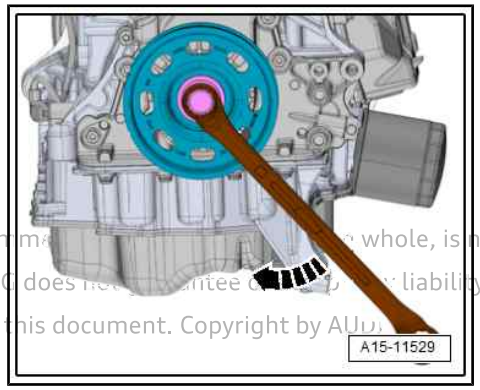
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– Remove bolt -arrow- and detach camshaft clamp - T10494- .



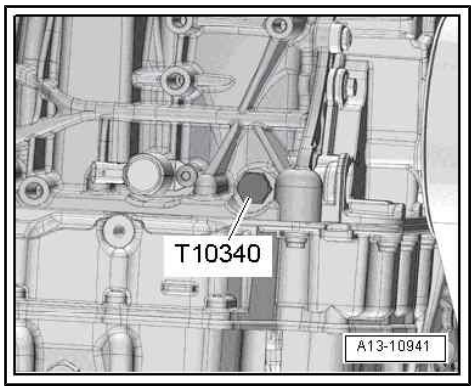
Checking valve timing:

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



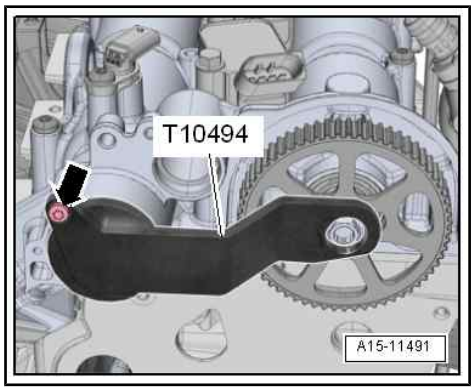
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– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft further in normal direction of rotation as far as stop.
- The crank web is now in contact with the locking pin. (The locking pin - T10340- locks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



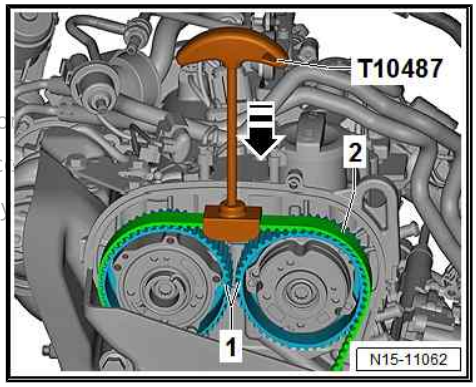
- It should be possible to insert the camshaft clamp - T10494- easily.
- Do not knock camshaft clamp into place with any kind of tool.

– 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 tighten bolt hand-tight.



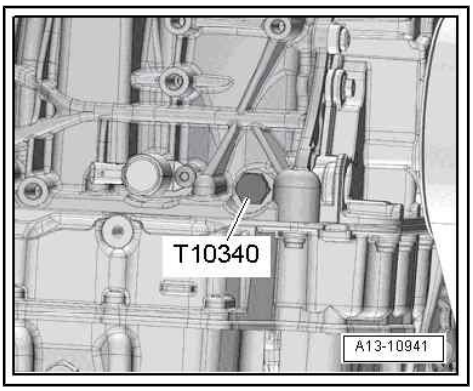
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If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

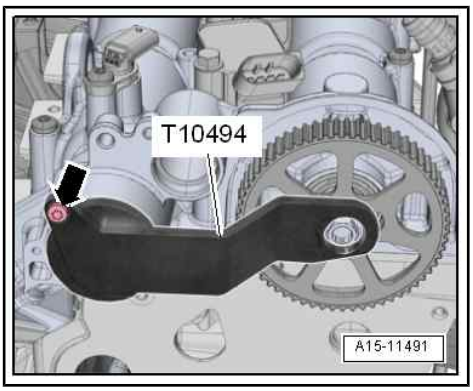
– Adjust valve timing again ⇒ page 145 .

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

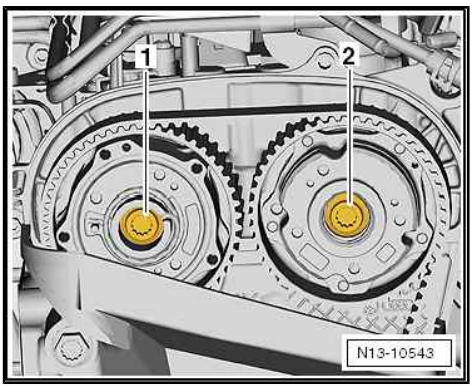
– Remove locking pin - T10340- .



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



– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with counterhold tool - T10554/1- .

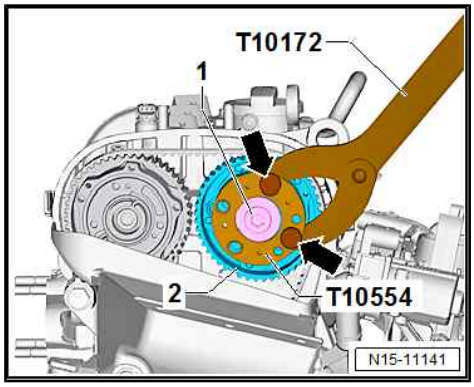


– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554/1- .

• Check that locking pin and camshaft clamp have been removed.

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

– Install engine cover panel ⇒ page 79 .



Tightening torques

- ⇒ “1.1.1 Exploded view - toothed belt cover, all vehicles except e-tron”, page 122
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294
- ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342
- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

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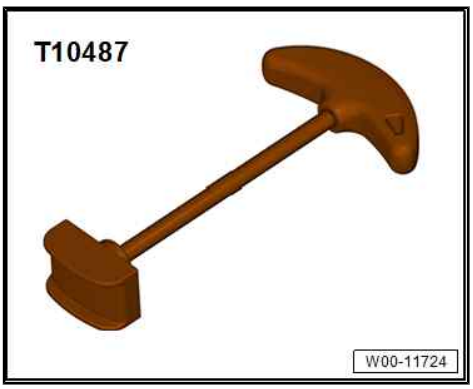
1.3.3 Detaching toothed belt from camshaft - e-tron

Special tools and workshop equipment required

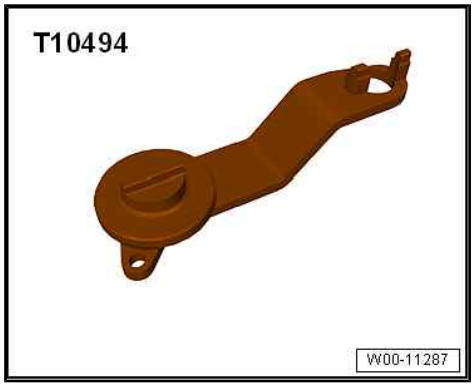


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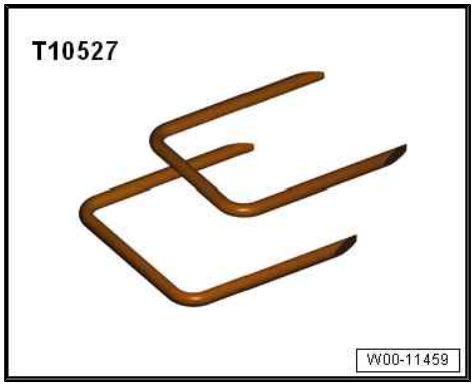
- Torque wrench - VAS 6583-
- Counterhold tool - T10172A-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-
- Assembly tool - T10487-



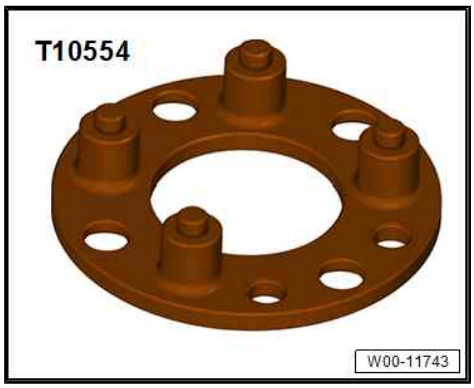
- Camshaft clamp - T10494-



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

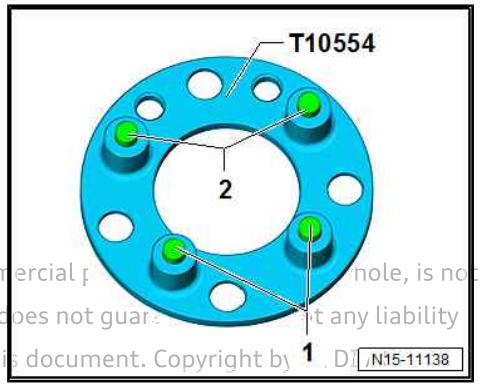


- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

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

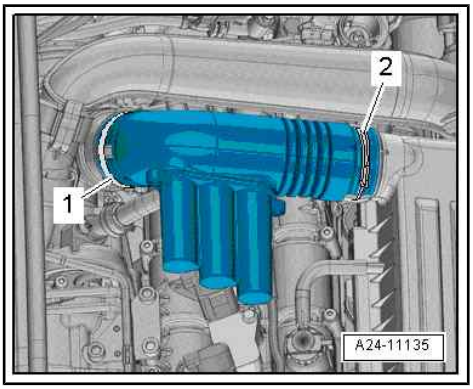


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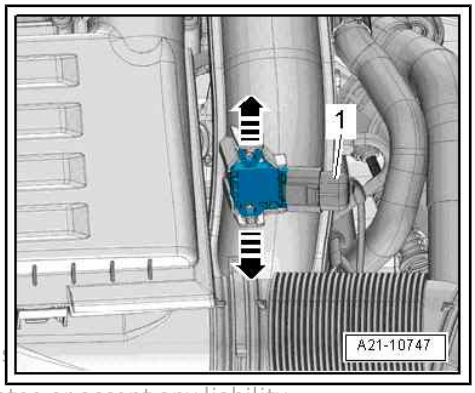
Procedure

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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



– Unplug electrical connector -1-.



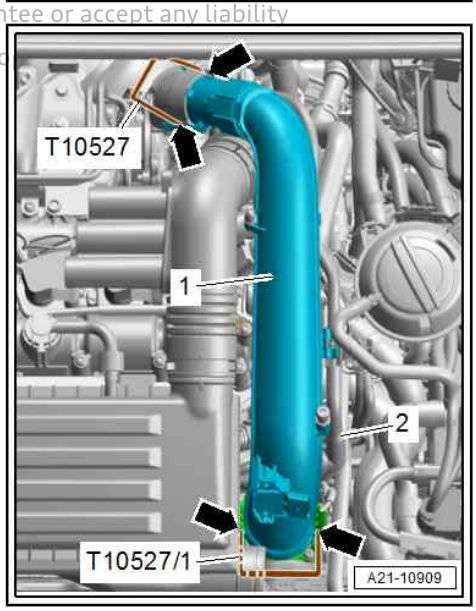
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– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.

– Move line for activated charcoal filter system clear at air pipe.

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

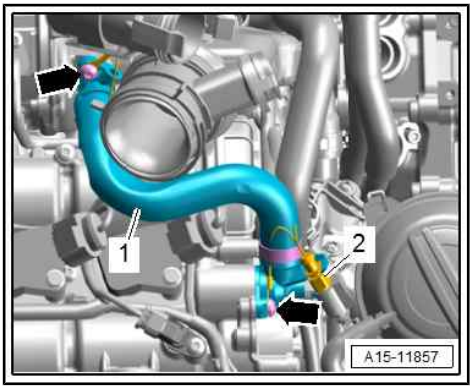
– Detach air pipe -1-.



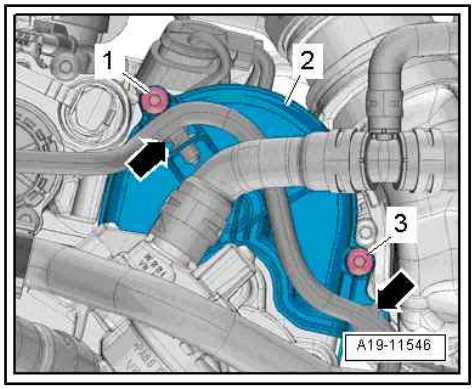
– Version with crankcase breather heating: Unplug electrical connector -2-.

– Remove bolts -arrows- and detach crankcase breather hose -1-.

• Version with crankcase breather heating: The earth wires must be re-secured with bolts -arrows- when installing.



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

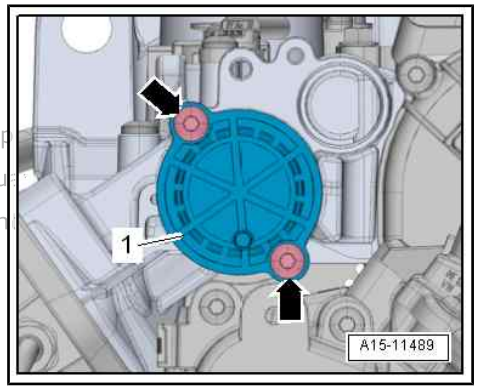


NOTICE

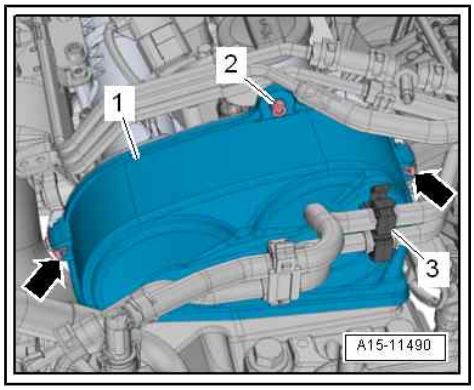
Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.
– **Cover coolant pump with a cloth.**
– **Catch escaping engine oil with a cloth.**

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– Unscrew bolts -arrows- and detach sealing cap -1-.
– Remove engine mounting ⇒ page 66 .



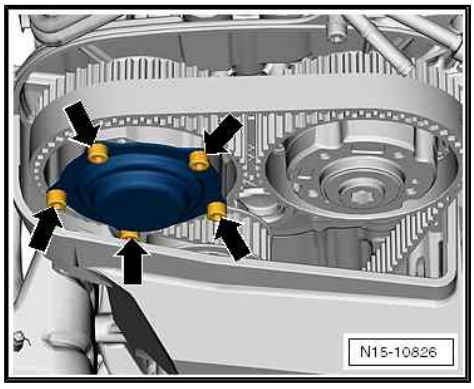
– Remove bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



NOTICE

Risk of irreparable damage to engine due to oil on toothed belt.
– **Catch escaping engine oil with a cloth.**
– **Clean any spaces/cavities that have filled with engine oil.**

– Remove bolts -arrows-.
– 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 until head of pin makes contact.

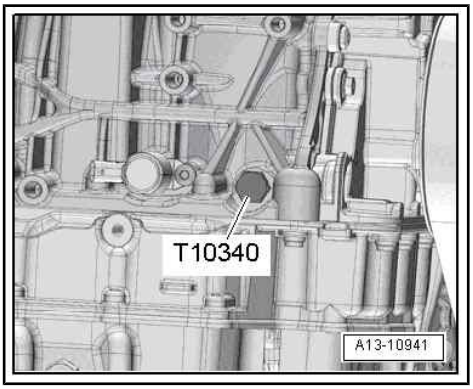
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.

– Turn crankshaft by 90° in direction of engine rotation.

– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.

– Rotate crankshaft in normal direction of rotation until contact is made.

• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)

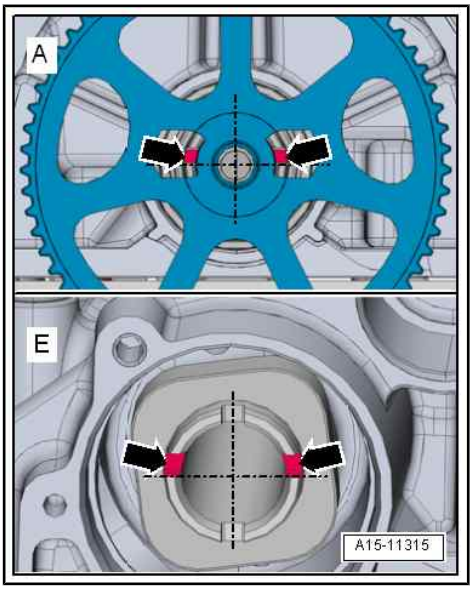


• On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustrations.

• 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.

• 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.

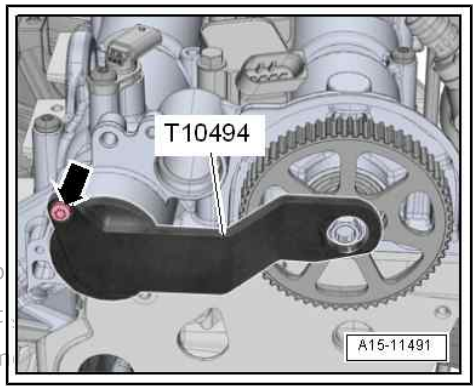


– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.

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

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

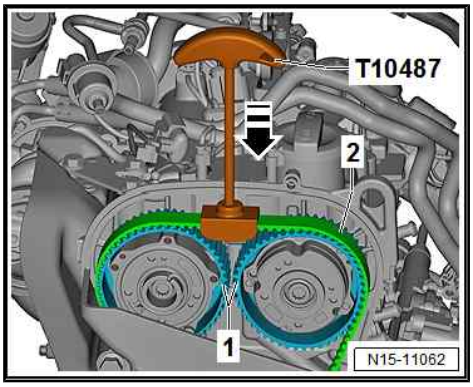
– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.



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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 tighten bolt hand-tight.



NOTICE

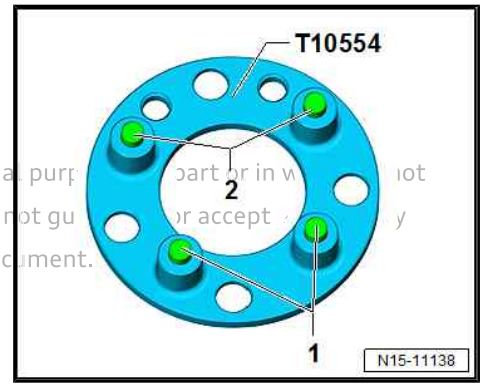
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

Exhaust camshaft:

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

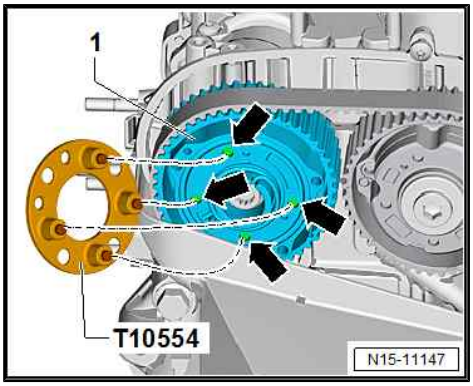
– To do so, first guide area between lugs -2- on counterhold tool - T10554/1- past camshaft adjuster.



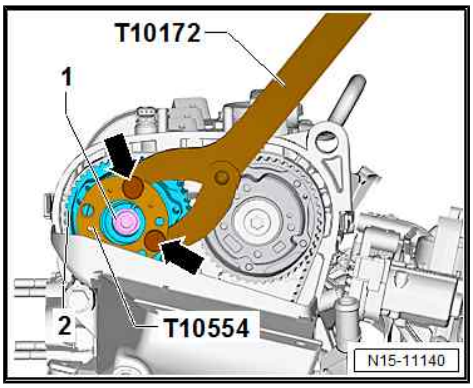
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– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.

– 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- .

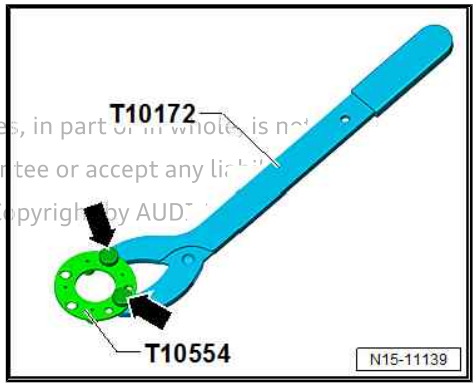


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Inlet camshaft

– Assemble tools as shown.

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

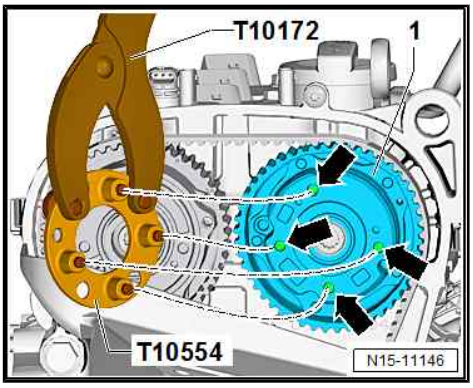


– Apply counterhold tool - T10554/1- with counterhold tool - T10172- to camshaft sprocket -1-, as shown.

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

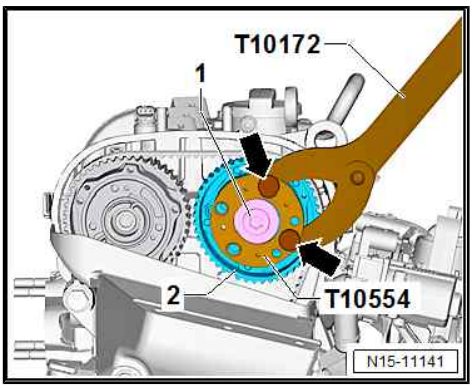
– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.

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



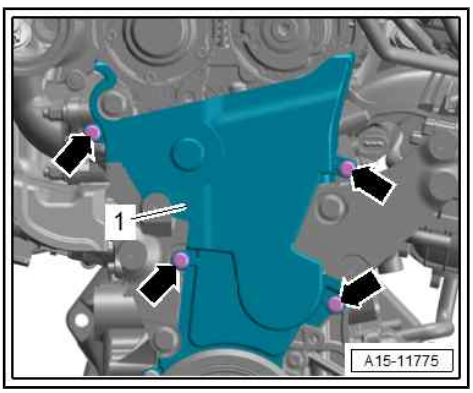
– Unscrew plug -1- and loosen bolt located behind it for camshaft sprocket (inlet side) one turn.

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

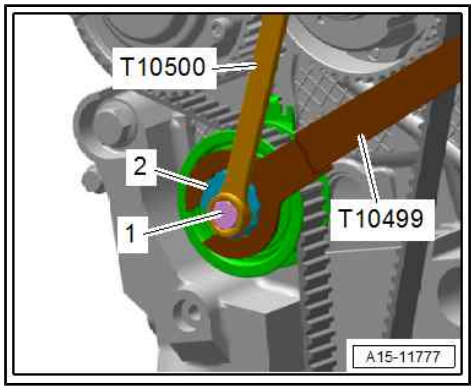


Both sides (continued):

– Remove bolts -arrows- and push toothed belt cover (bottom) -1- slightly to right.



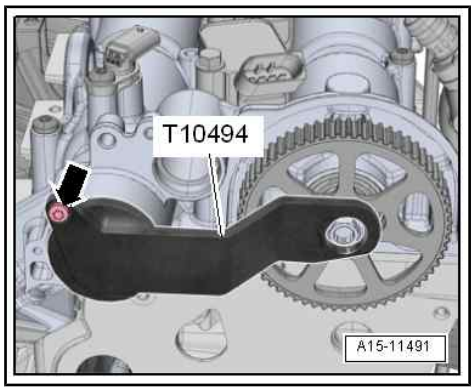
– Fit special wrench, 30 mm - T10499- onto eccentric adjuster -2- of tensioning roller.
– Loosen bolt -1- using insert tool, 13 mm - T10500- .
– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499- .
– Detach toothed belt from camshaft sprockets.



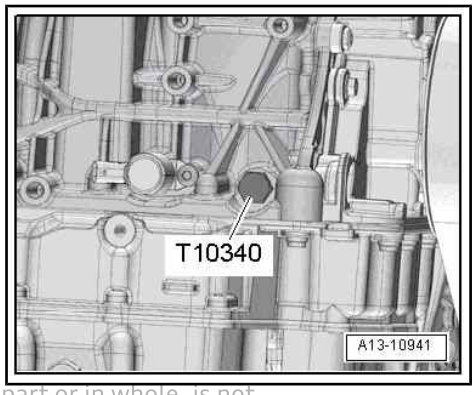
Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

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



- 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.



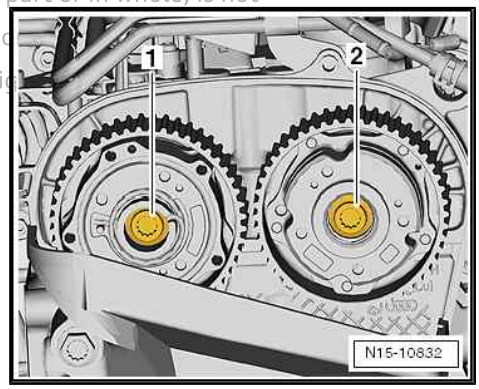
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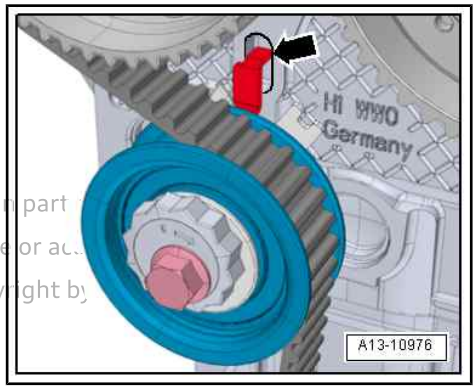
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.
- It should just be possible to turn the adjusters on the camshafts without axial movement.



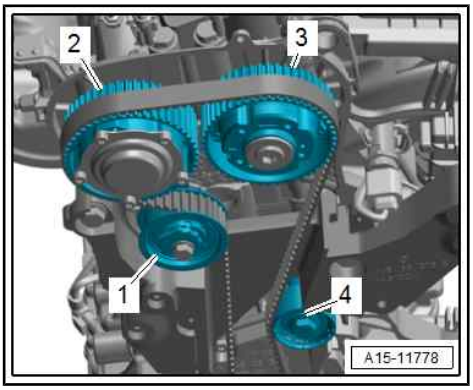
- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



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Note correct sequence for fitting toothed belt:

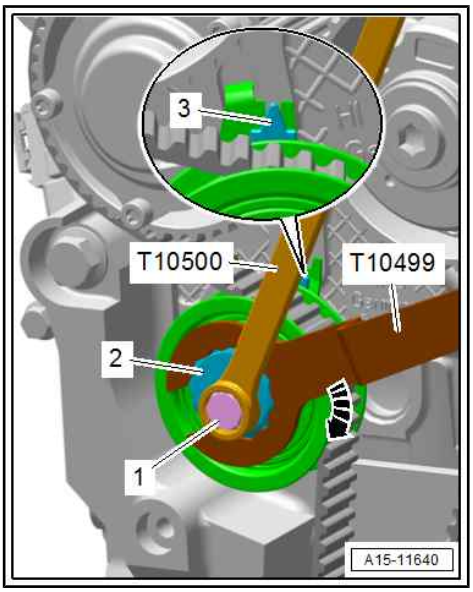
– Pull toothed belt upwards and fit onto idler roller -4-, tensioning roller -1- and camshaft sprockets -2, 3-.



– Using special wrench, 30 mm - T10499- , 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, as shown in illustration.
– 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.

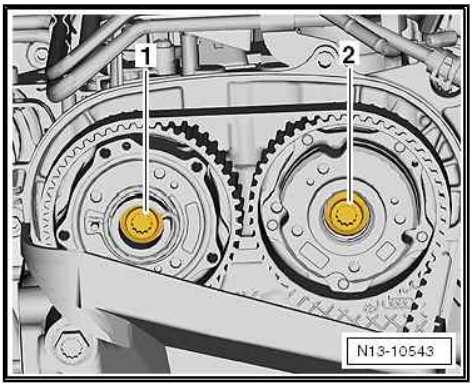


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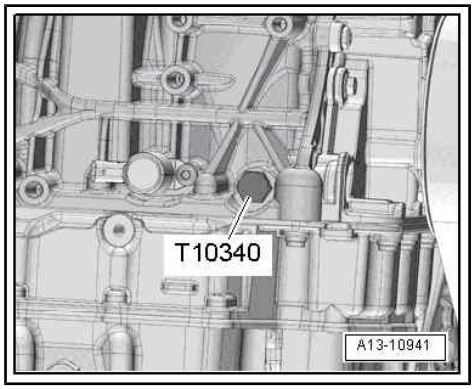
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

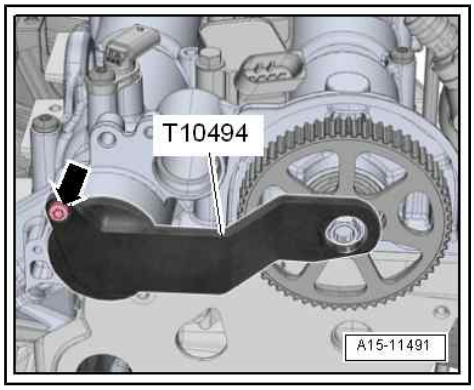
– Tighten bolts -1, 2- initially to 50 Nm (use counterhold tool - T10172- with counterhold tool - T10554/1-).



– Remove locking pin - T10340- .



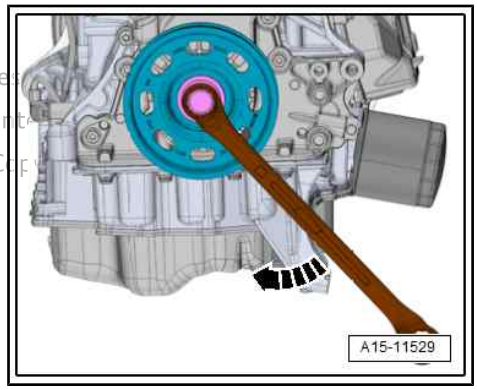
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



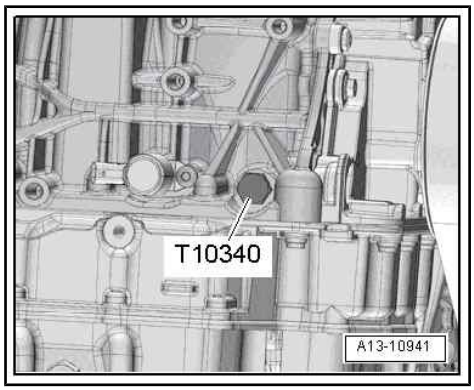
Checking valve timing:

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

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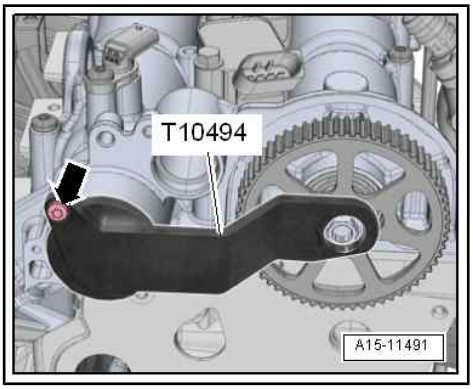


– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft further in normal direction of rotation as far as stop.
• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



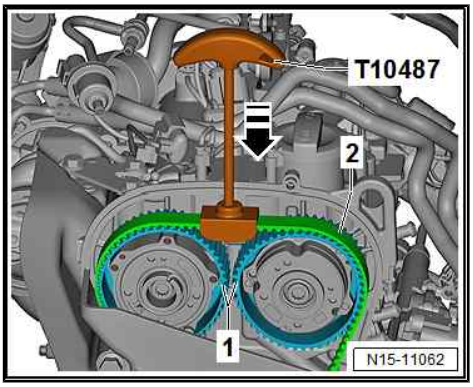
- It should be possible to insert the camshaft clamp - T10494- easily.
- Do not knock camshaft clamp into place with any kind of tool.

– 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 tighten bolt hand-tight.

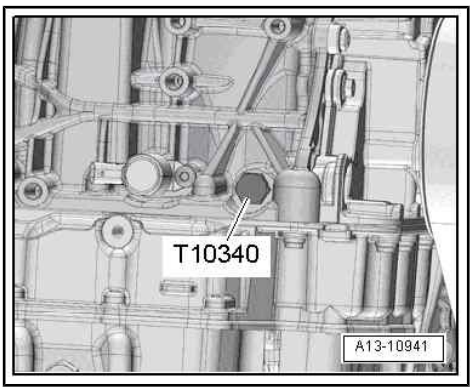


If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

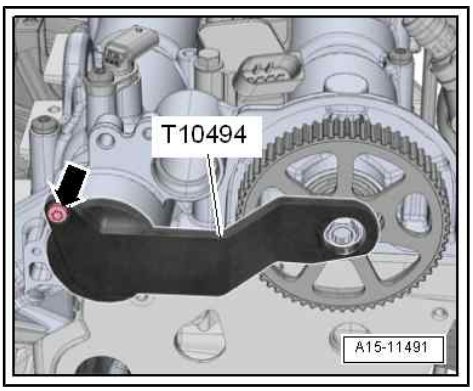
– Adjust valve timing again ⇒ page 158 .

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

– Remove locking pin - T10340- .

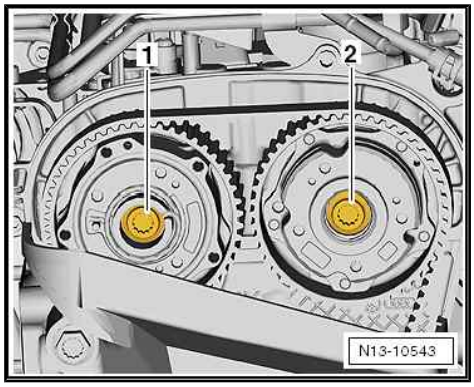


– Remove bolt -arrow- and detach camshaft clamp - T10494- .

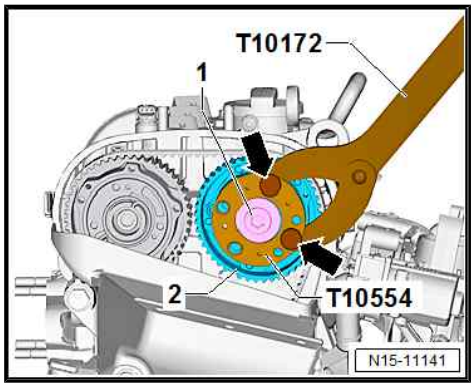


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– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with counterhold tool - T10554/1- .



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



• Check that locking pin and camshaft clamp have been removed.

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

– Install engine mountings ⇒ “2.3.2 Removing and installing engine mountings - e-tron”, page 66 .

– Install engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 79 .

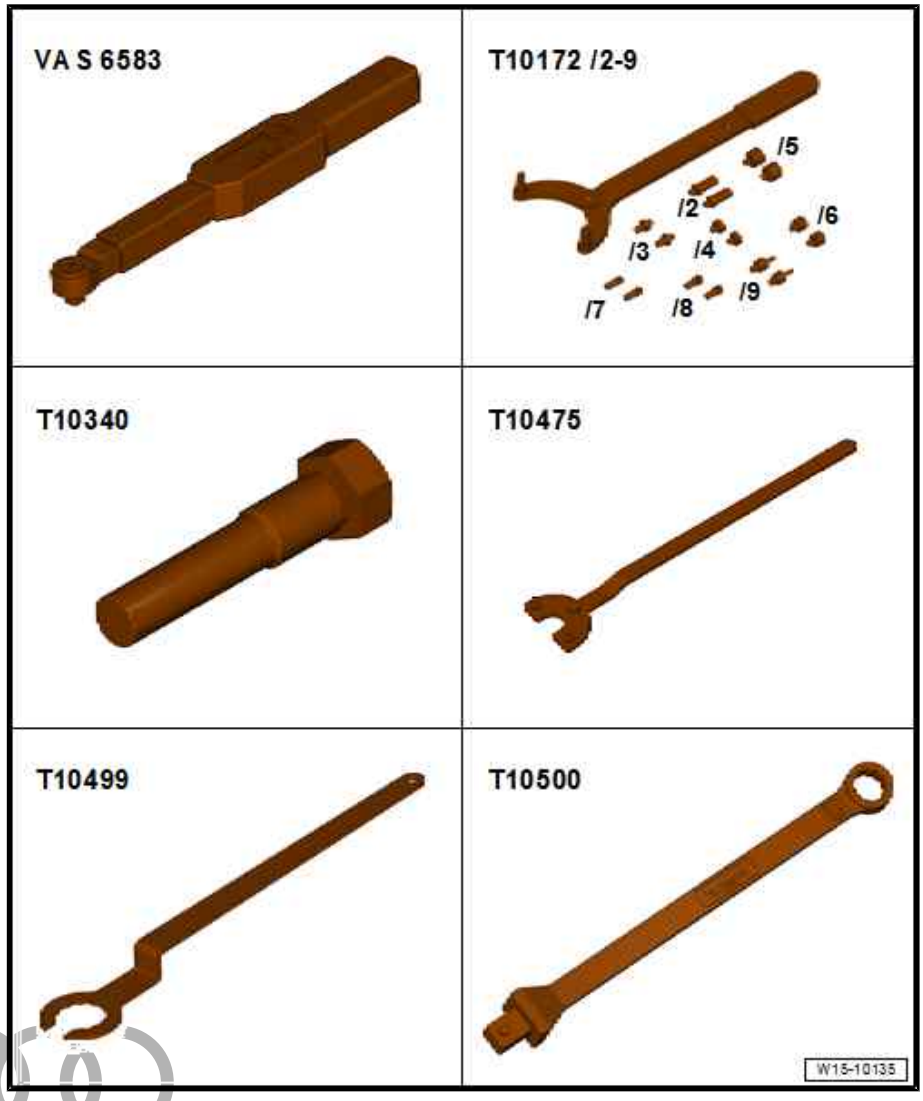
Tightening torques

- ⇒ “1.1.2 Exploded view - toothed belt cover, e-tron”, page 123
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294
- ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342
- ⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418
- ⇒ “2.1.2 Exploded view - charge air system, e-tron”, page 442

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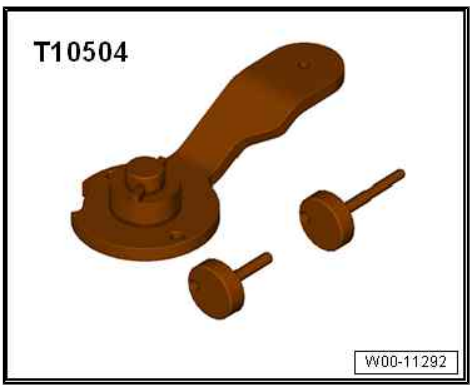
1.3.4 Detaching toothed belt from camshaft - engines with two camshaft adjusters and cylinder shut-off

Special tools and workshop equipment required



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- Torque wrench - VAS 6583-
- Counterhold tool - T10172-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-
- Camshaft clamp - T10504-

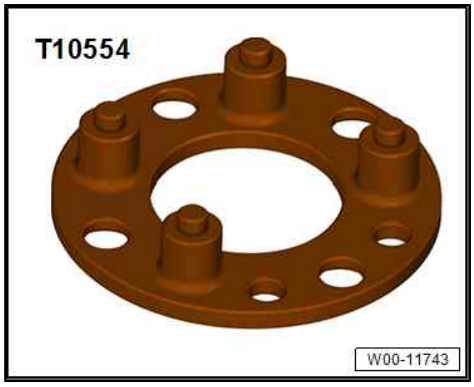


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- Release tool - T10527- and -T10527/1-

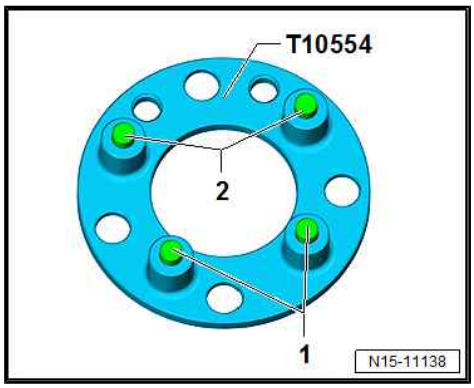


- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

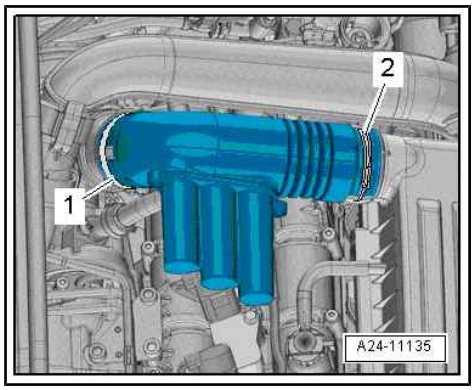
- The lugs -1- and -2- on counterhold tool - T10554/1- are different distances apart.
- Counterhold tool - T10554/1- can only be applied in one position.
- Position counterhold tool - T10554/1- flush against camshaft adjusters.



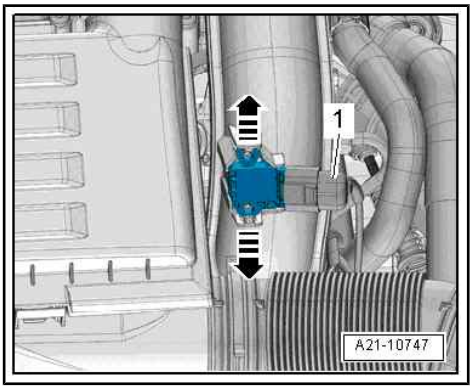
Procedure

– Remove engine cover panel ⇒ page 79 .

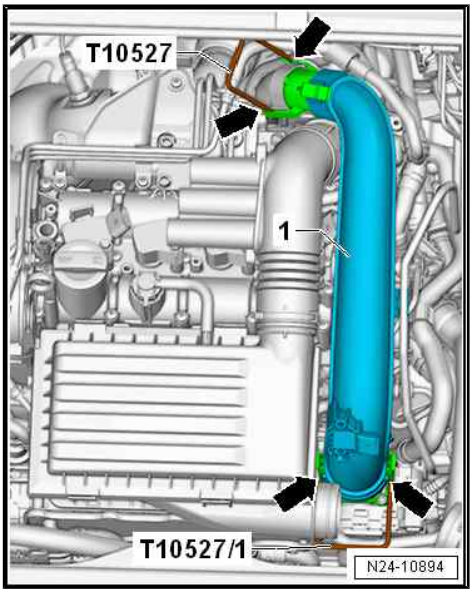
– Loosen hose clips -1, 2- and remove air pipe.



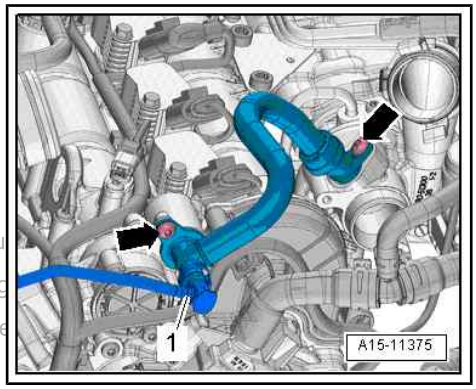
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



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

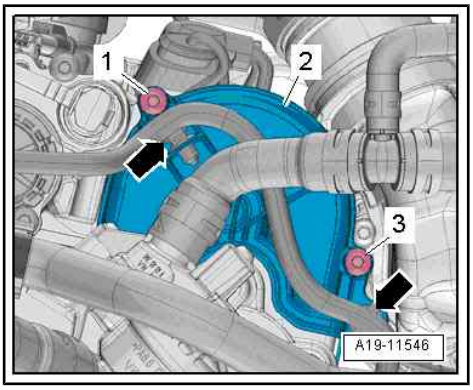


– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).



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

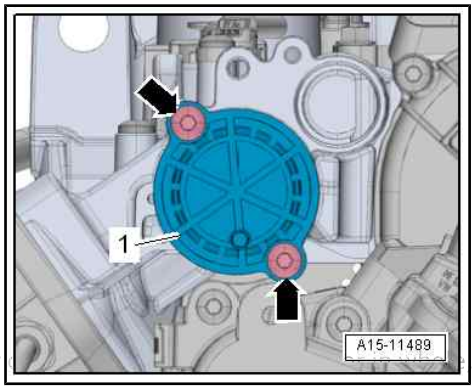


NOTICE

Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

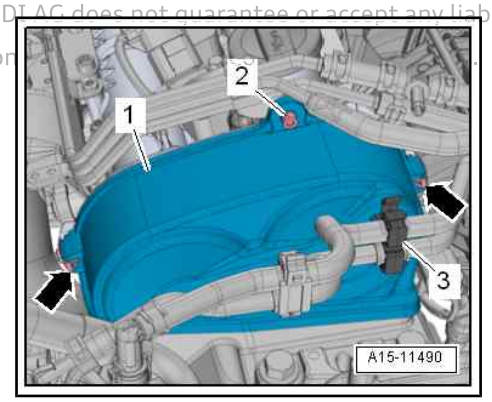
- **Cover coolant pump with a cloth.**
- **Catch escaping engine oil with a cloth.**

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



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

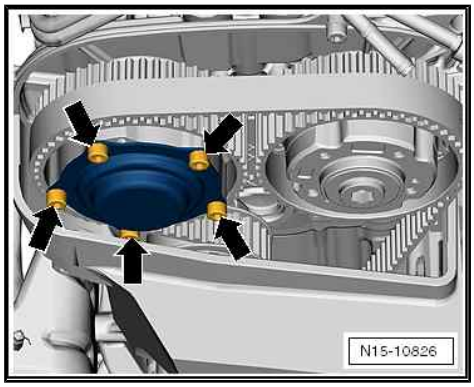


NOTICE

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

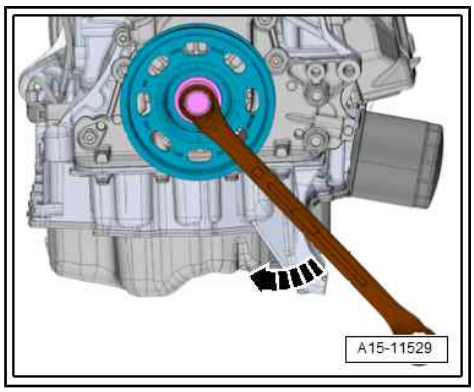
- **Catch escaping engine oil with a cloth.**
- **Clean any spaces/cavities that have filled with engine oil.**

– Remove bolts -arrows-.

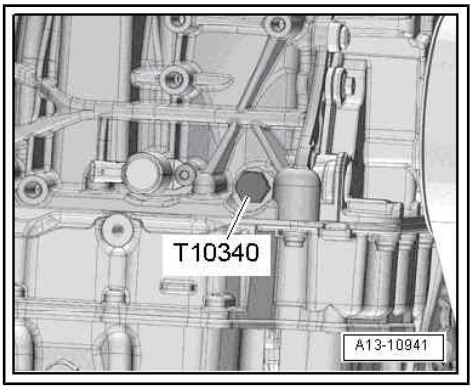


- To remove all bolts, rotate crankshaft in direction of engine rotation by turning bolt for vibration damper pulley in direction of -arrow-.

– Detach cover from camshaft adjuster of exhaust camshaft.



Rotate crankshaft to “TDC” as follows:

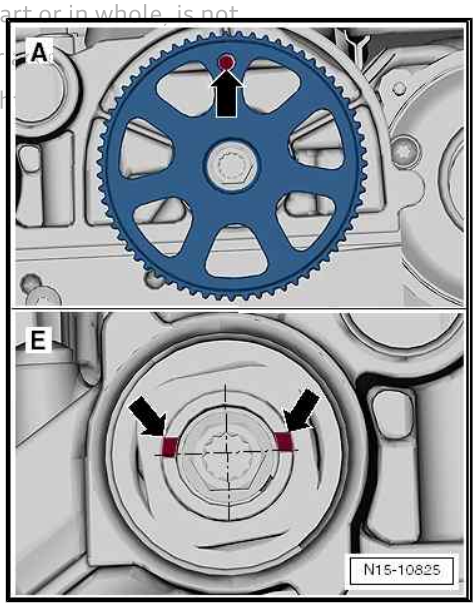


– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop.
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.
– Turn crankshaft by 90° in direction of engine rotation.
– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation until contact is made.

• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)

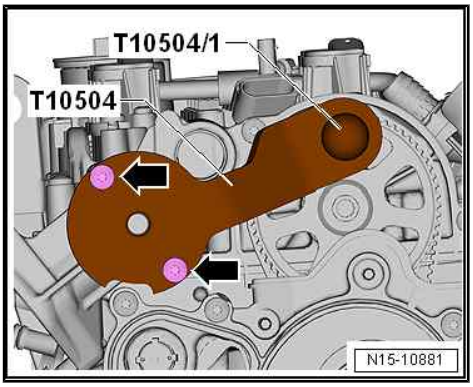
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• On exhaust camshaft -A-, hole -arrow- in coolant pump drive sprocket must be aligned with hole in camshaft housing.
• On inlet camshaft -E-, grooves -arrows- must be positioned above centre of camshaft.



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

• 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.
– Screw in bolts -arrows- hand-tight.

NOTICE

Risk of damage to camshaft if handled incorrectly

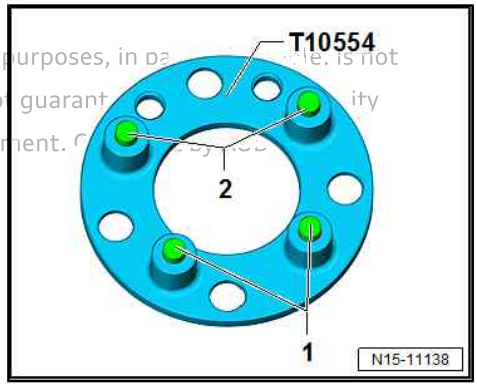
– Never use camshaft clamp as a counterhold tool.

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Exhaust camshaft:

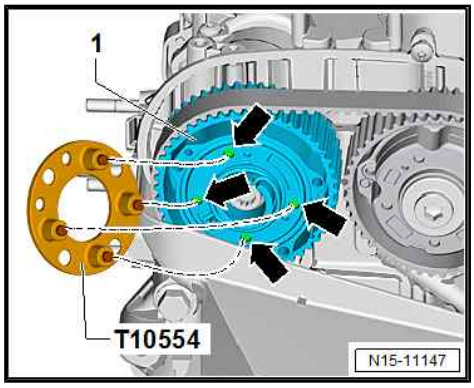
– Guide in counterhold tool - T10554/1- between camshaft adjuster and engine support.

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

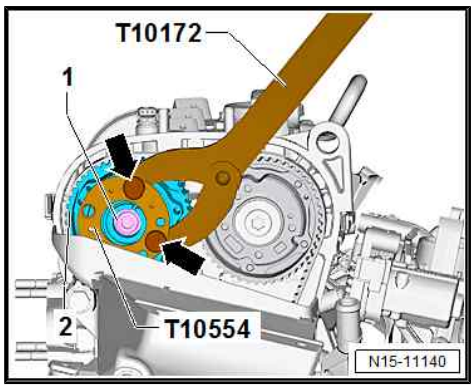


– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.

– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.



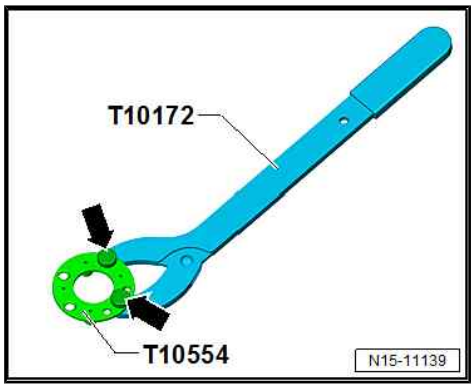
– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10172- and counterhold tool - T10554/1- .



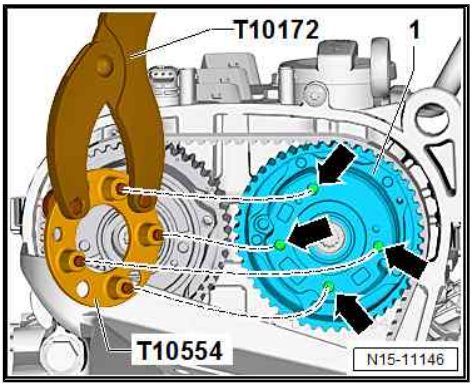
Inlet camshaft

– Assemble tools as shown.

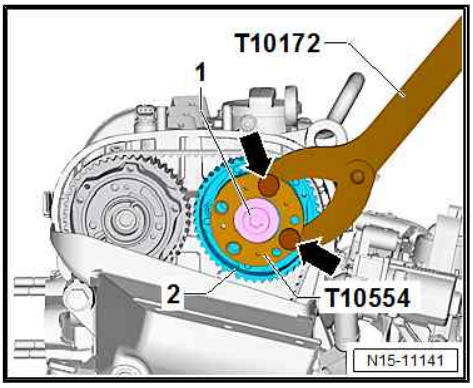
– Attach counterhold tool - T10172- to counterhold tool - T10554/1- using knurled screws -T10554/2- -arrows-.



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

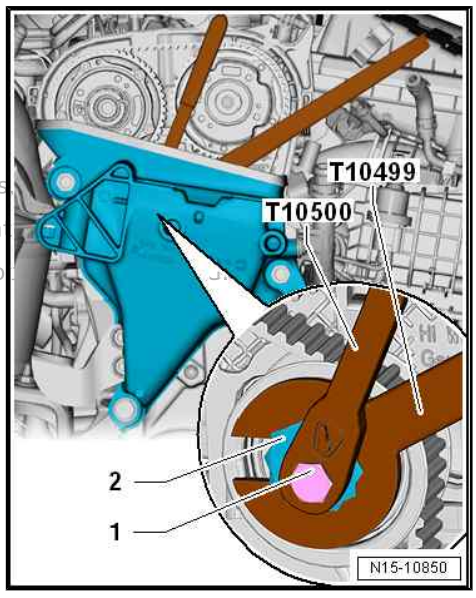


– Unscrew plug -1- and loosen bolt located behind it for camshaft sprocket (inlet side) one turn.
– Use counterhold tool - T10172- and counterhold tool - T10554/1- to do so.



Both sides (continued):

– Fit special wrench, 30 mm - T10499- 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- .
– Detach toothed belt from camshaft sprockets.

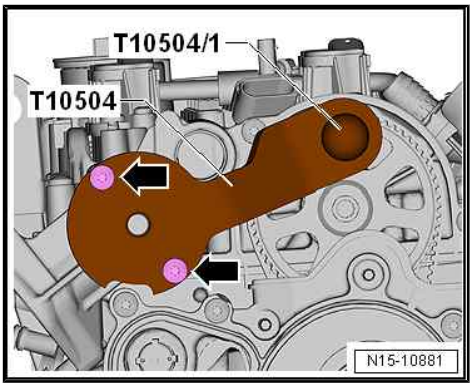


Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

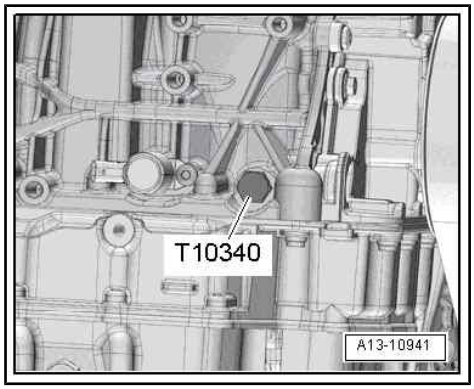
– Check “TDC” position of camshaft and crankshaft:

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



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- 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.



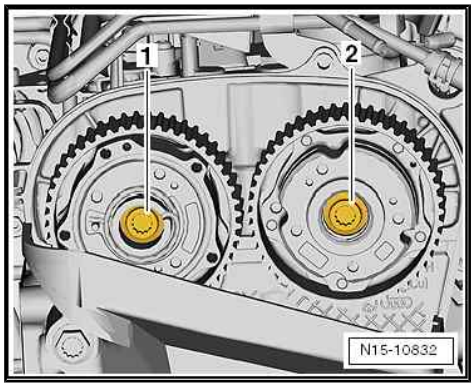
NOTICE

Risk of damage to camshaft if handled incorrectly

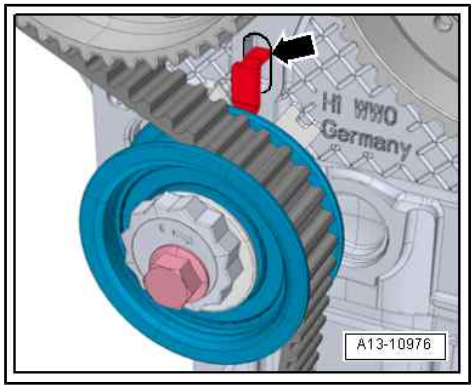
– Never use camshaft clamp as a counterhold tool.

– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

- It should just be possible to turn the adjusters on the camshafts without axial movement.

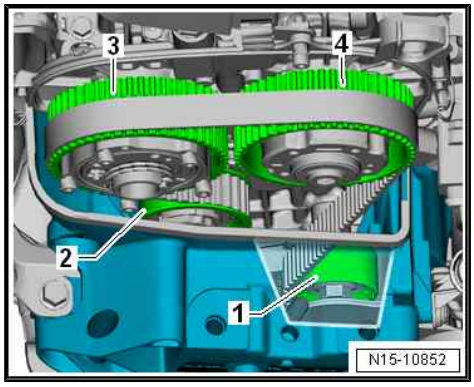


- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



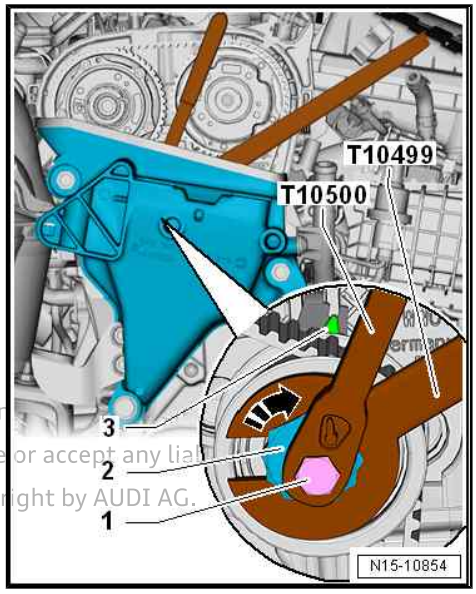
Note correct sequence for fitting toothed belt:

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



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– Using special wrench, 30 mm - T10499- , 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.
– 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- .

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Note:

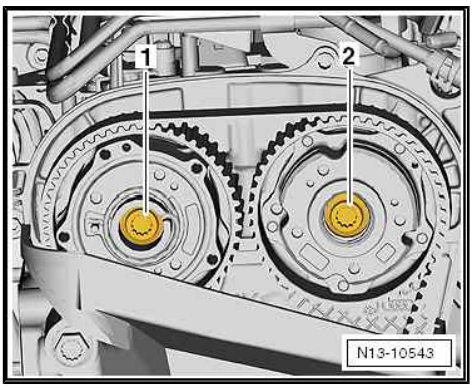
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

NOTICE

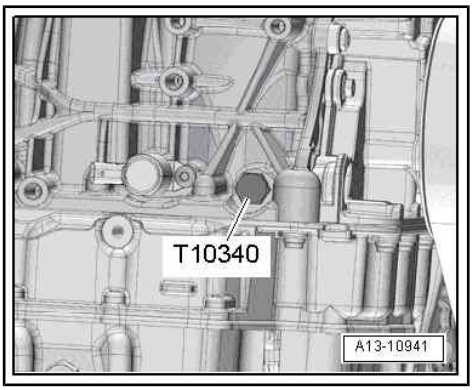
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

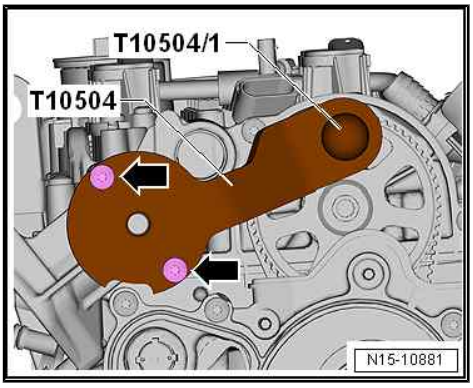
– Tighten bolts -1, 2- initially to 50 Nm (use counterhold tool - T10172- with counterhold tool - T10554/1-).



– Remove locking pin - T10340- .

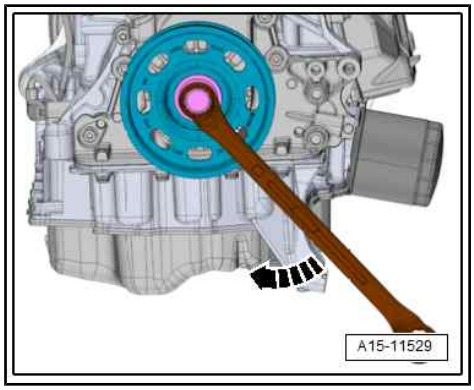


– Remove locating pin -T10504/1- .
– Remove bolts -arrows- and detach camshaft clamp - T10504- .



Checking valve timing:

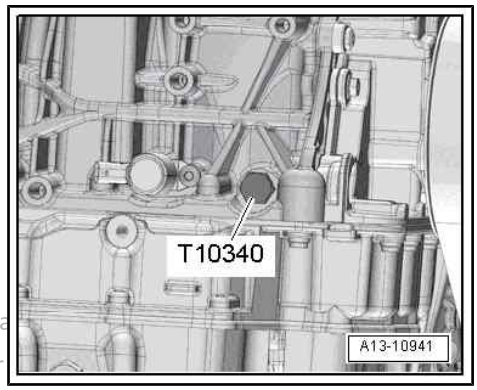
– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.



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



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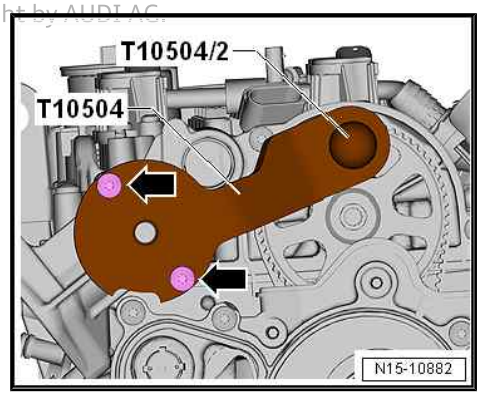
• It should be possible to insert the camshaft clamp - T10504- easily.

• 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.

– Screw in bolts -arrows- hand-tight.

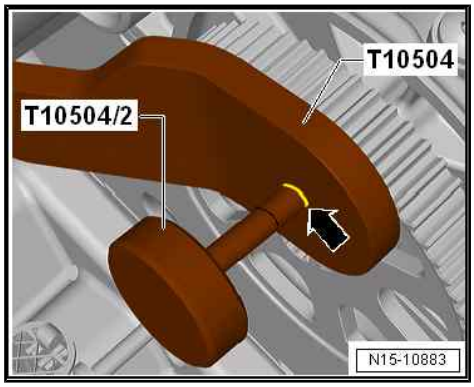


NOTICE

Risk of irreparable damage to engine if valve timing is incorrect

– Insert test pin fully.

– Check whether groove -arrow- on test pin -T10504/2- is flush with camshaft clamp - T10504- .

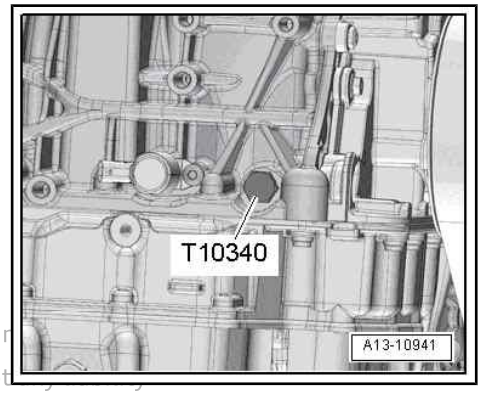


If it is not possible to insert camshaft clamp - T10504- with test pin -T10504/2- , valve timing is not OK:

– Adjust valve timing again ⇒ page 169 .

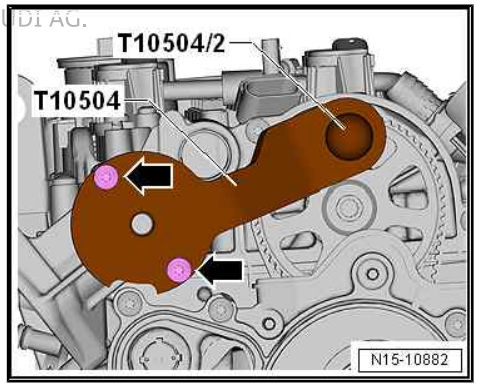
If it is possible to insert camshaft clamp - T10504- with test pin -T10504/2- , valve timing is OK.

– Remove locking pin - T10340- .

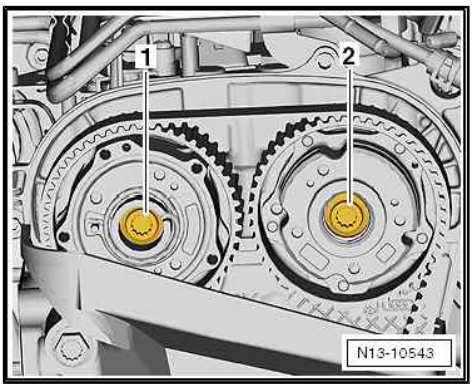


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– Remove bolts -arrows- and detach camshaft clamp - T10504- with test pin -T10504/2- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with counterhold tool - T10554/1- .



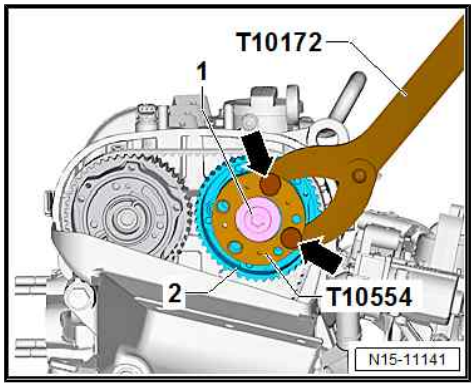
– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554/1- .

• Check that locking pin and camshaft clamp have been removed.

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

• Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .



Tightening torques

- ⇒ “1.2.2 Exploded view - toothed belt, engine with two camshaft adjusters”, page 125
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.2 Exploded view - crankcase breather system (engines with cylinder shut-off)”, page 295
- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

1.4 Removing and installing toothed belt

⇒ “1.4.1 Removing and installing toothed belt - engines with one camshaft adjuster”, page 174

⇒ “1.4.2 Removing and installing toothed belt - engines with two camshaft adjusters”, page 187

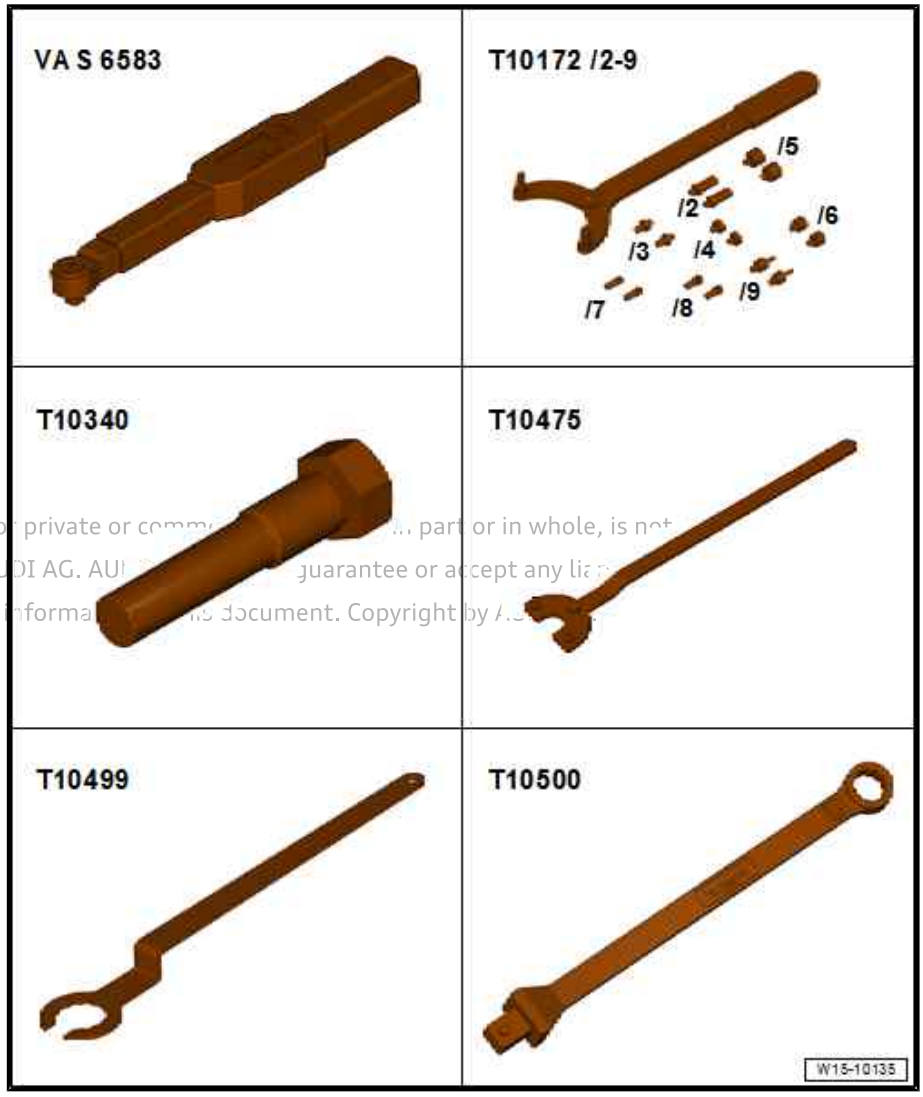
⇒ “1.4.3 Removing and installing toothed belt - e-tron”, page 200

⇒ “1.4.4 Removing and installing toothed belt - engines with two camshaft adjusters and cylinder shut-off”, page 213

1.4.1 Removing and installing toothed belt - engines with one camshaft adjuster

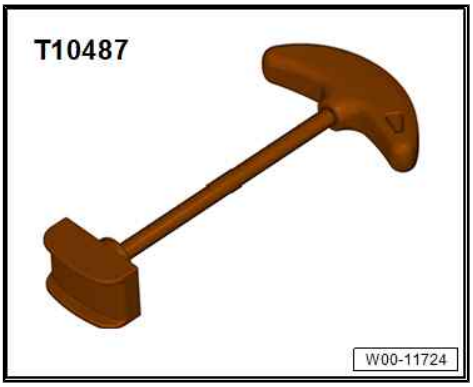
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Special tools and workshop equipment required

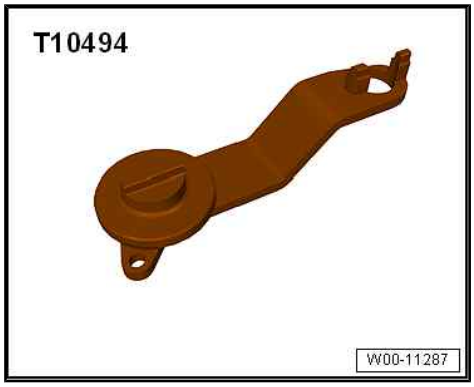


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- Torque wrench - VAS 6583-
- Counterhold tool - T10172- with adapters -T10172/2-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-
- Assembly tool - T10487-



- Camshaft clamp - T10494-

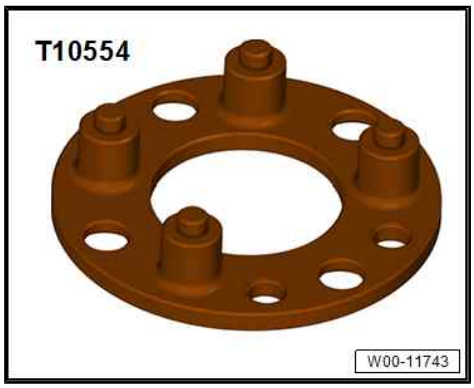


- Release tool - T10527- and -T10527/1-



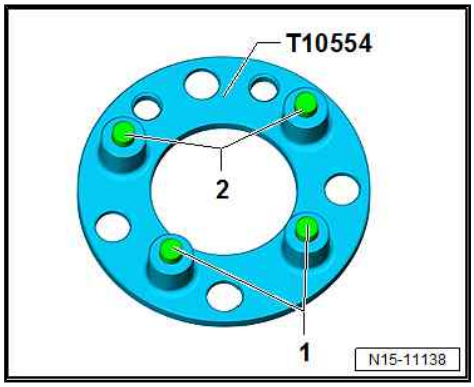
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- Counterhold tool - T10554/1-



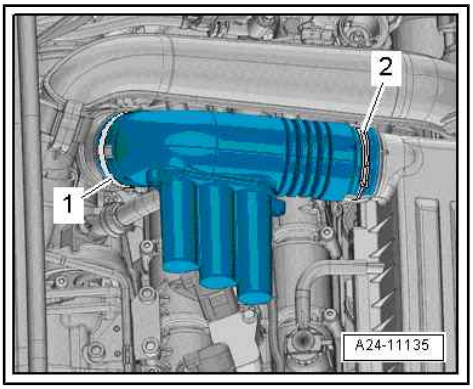
Counterhold tool - T10554/1-

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

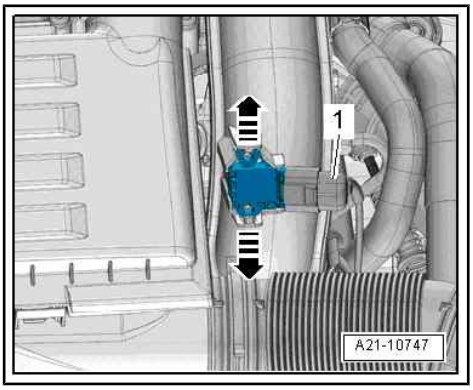


Removing

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



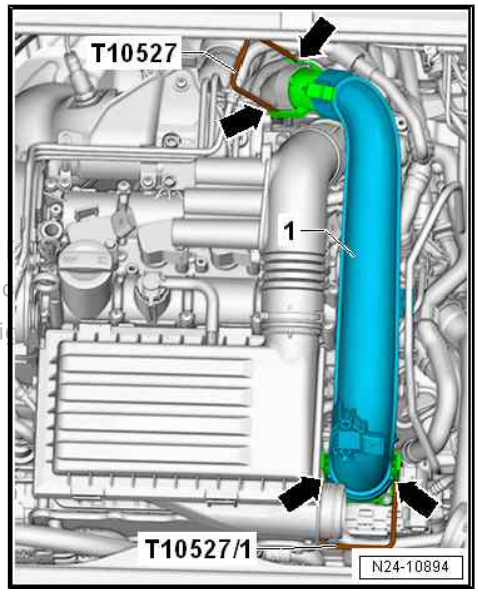
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



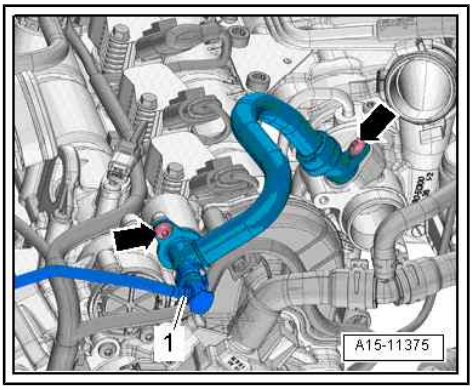
– Move air hoses clear at air pipe.

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

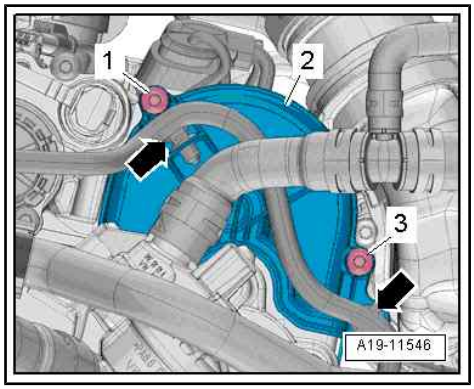
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– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).



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

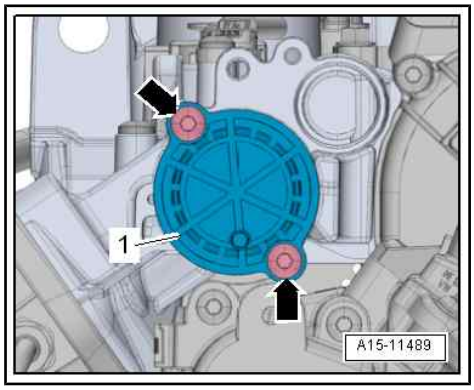


NOTICE

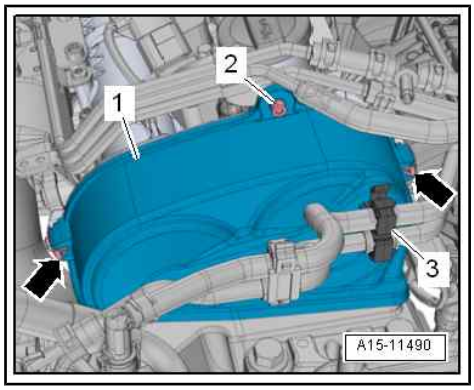
Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

– Cover coolant pump with a cloth.
– Catch escaping engine oil with a cloth.

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

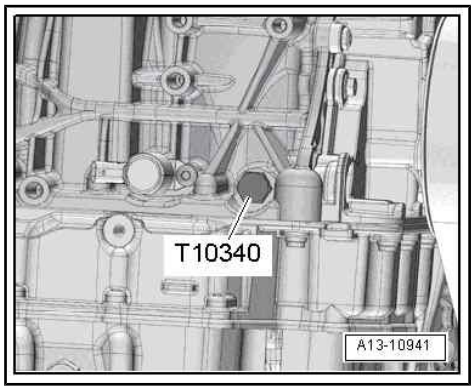


– Move clear hoses at bracket -3-.
– Remove bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



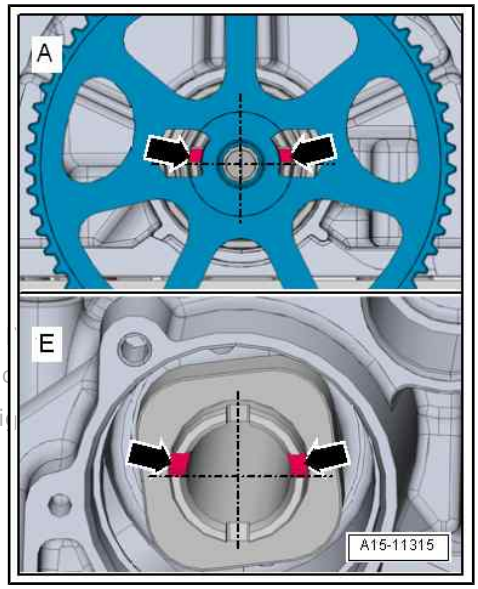
Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block until head of pin makes contact.
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.
– Turn crankshaft by 90° in direction of engine rotation.
– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation as far as stop.
• The crank web is now in contact with the locking pin (the locking pin - T10340- locks the crankshaft only in the normal direction of rotation).



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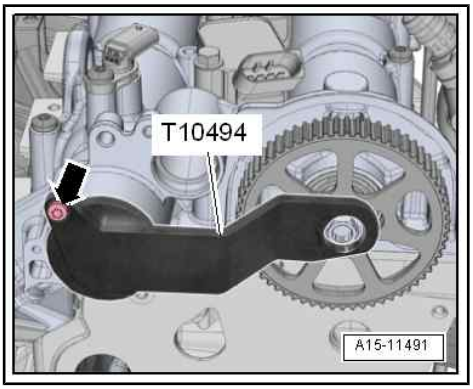
- On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustration.
- On exhaust camshaft -A-, grooves -top arrows- are accessible via openings in coolant pump drive sprocket.
- On inlet camshaft -E-, grooves -bottom arrows- must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

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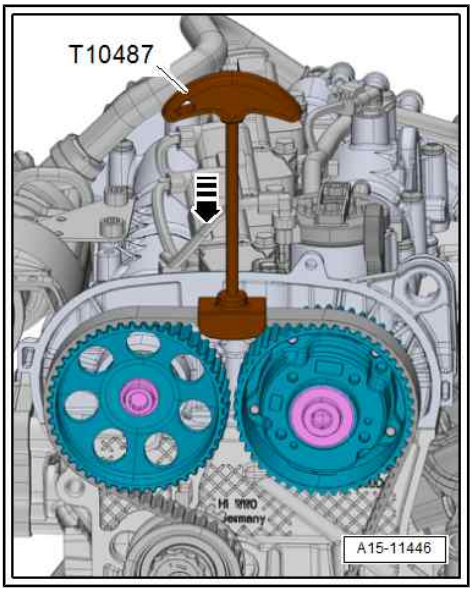
- It should be possible to insert the camshaft clamp - T10494- easily.
- Do not knock camshaft clamp into place with any kind of tool.



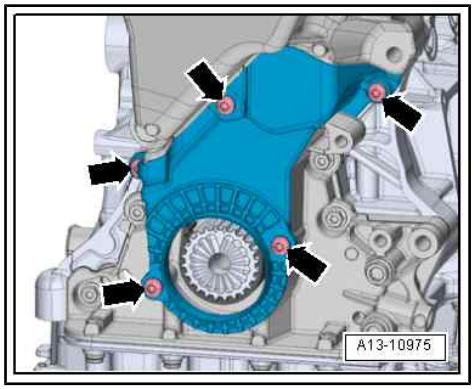
– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.

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 tighten bolt hand-tight.



– Remove bolts -arrows- and detach toothed belt cover (bottom).



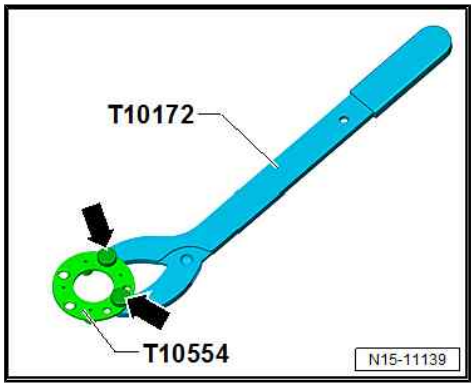
NOTICE

Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

– Assemble tools as shown.

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

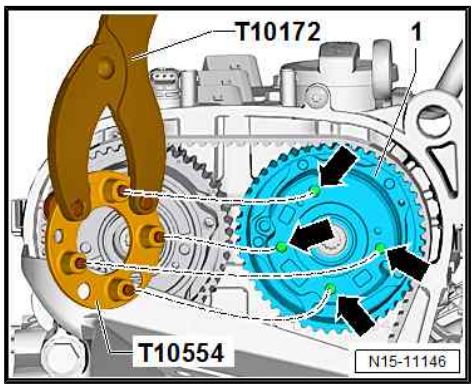


– Apply counterhold tool - T10172- and counterhold tool - T10554/1- to camshaft sprocket -1-, as shown.

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

– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.

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



NOTICE

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

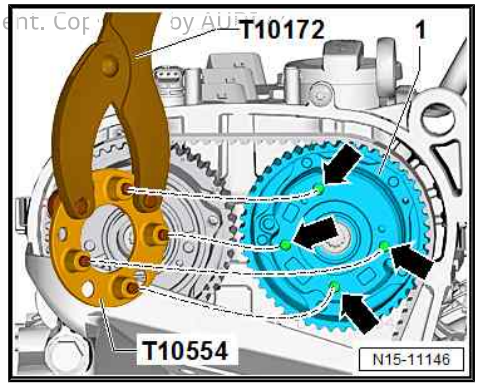
– Catch escaping engine oil with a cloth.

– Clean any spaces/cavities that have filled with engine oil.

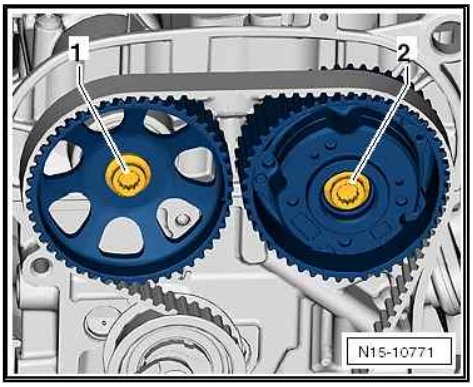
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– Unscrew plug -1- on camshaft sprocket (inlet side).

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



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

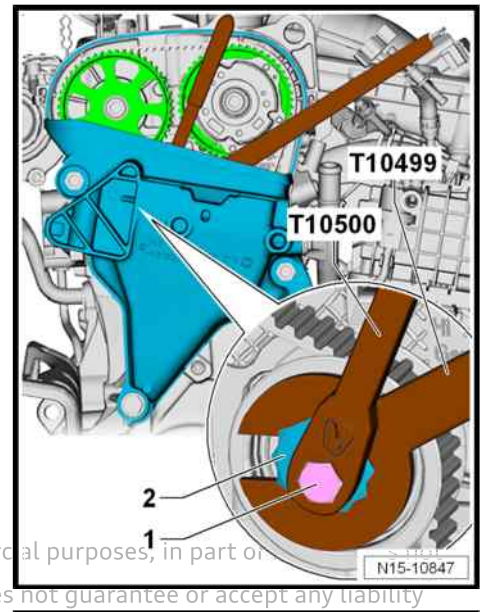


– Loosen bolt -1- using insert tool, 13 mm - T10500- and release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499- .

NOTICE

Risk of irreparable damage due to running a used belt in the opposite direction when it is refitted.

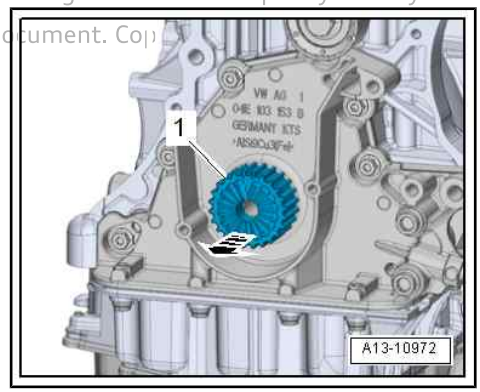
– **Mark running direction before removing.**
– **Pay attention to running direction when reinstalling.**



– Take off toothed belt.

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– Detach crankshaft sprocket -1- -arrow-.

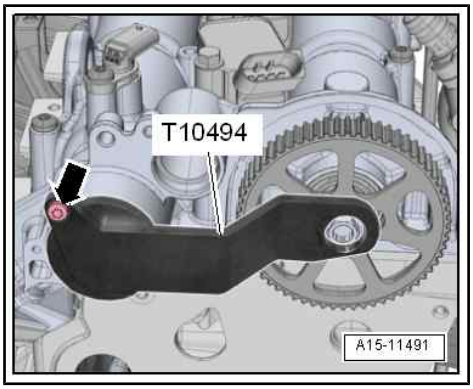


Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check “TDC” position of camshaft and crankshaft:

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

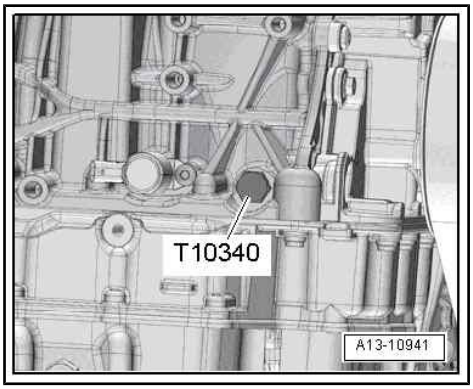


NOTICE

Risk of damage to camshaft if handled incorrectly

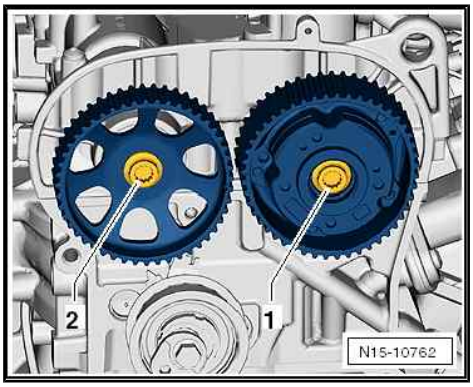
– Never use camshaft clamp as a counterhold tool.

- 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.

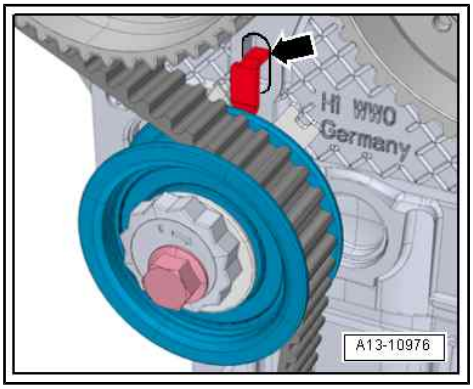


– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

- 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.

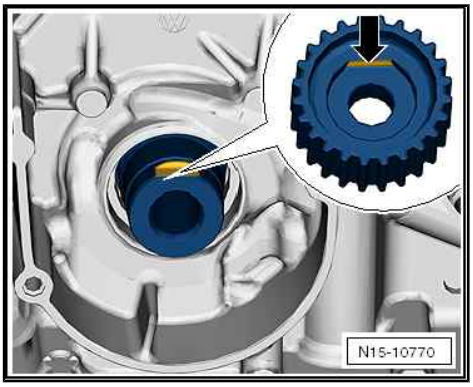


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– Fit crankshaft sprocket onto crankshaft.

• 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.

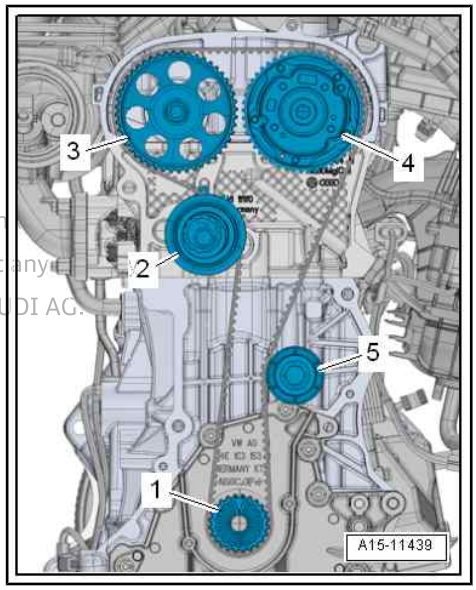
1 - Crankshaft sprocket

5 - Idler roller

2 - Tensioning roller

3 - Camshaft sprocket, exhaust side

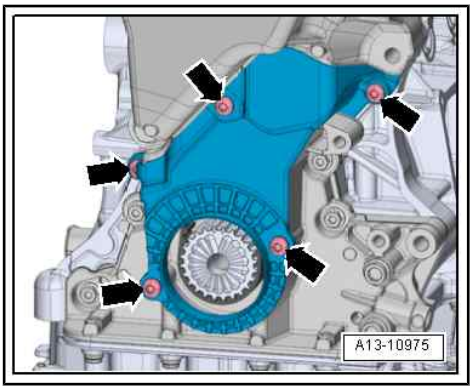
4 - Camshaft sprocket, inlet side



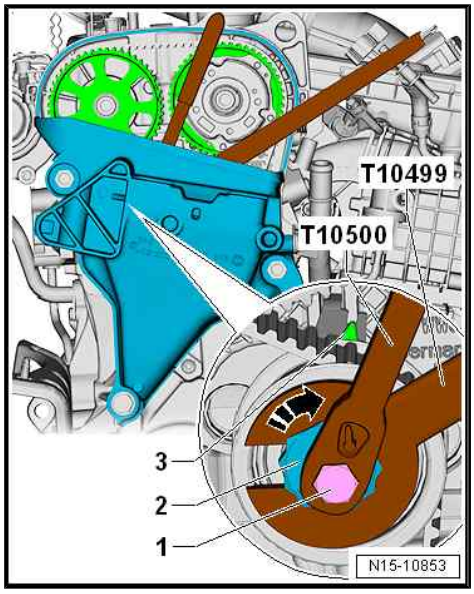
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– Install toothed belt cover (bottom section).

– Install poly-V-belt pulley ⇒ page 92 .



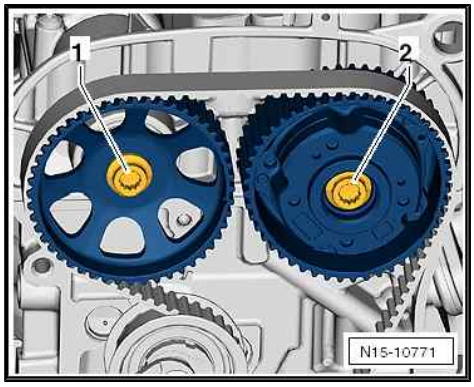
– Using special wrench, 30 mm - T10499- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.
– Turn eccentric adjuster back until adjustment indicator is positioned exactly in adjustment window.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



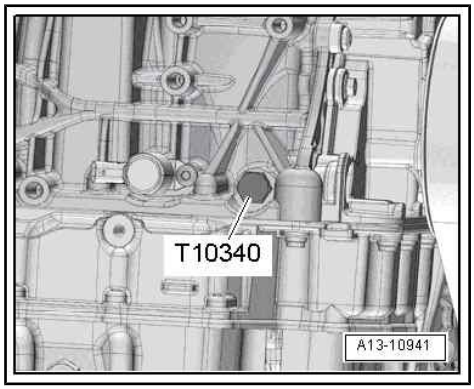
Note:

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.

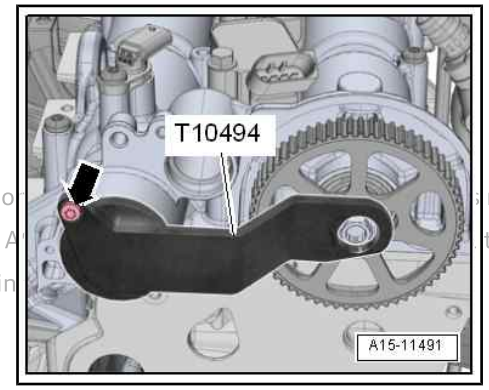
– Tighten bolt -1- initially to 50 Nm using counterhold tool - T10172- with adapters -T10172/2- .
– Tighten bolt -2- initially to 50 Nm using counterhold tool - T10554/1- and counterhold tool - T10172- .



– Remove locking pin - T10340- .



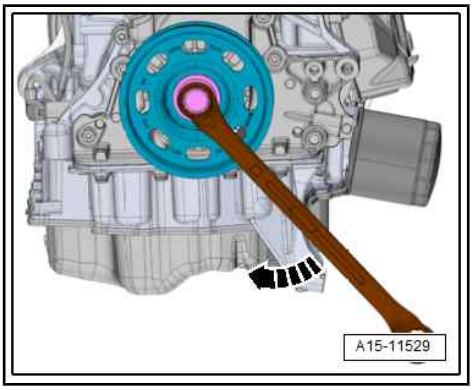
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



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Checking valve timing:

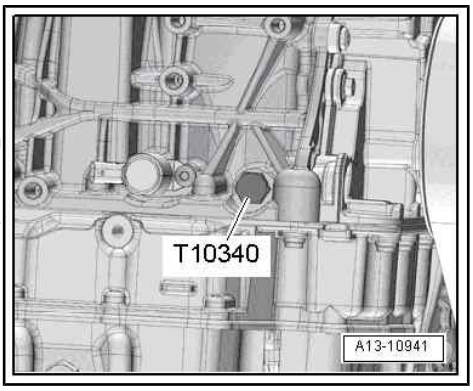
– Turn crankshaft 2 rotations in normal direction of engine rotation -arrow-.



– 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 crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)

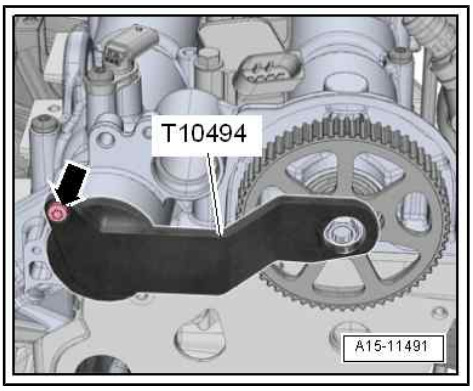


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• It should be possible to insert the camshaft clamp - T10494- easily.

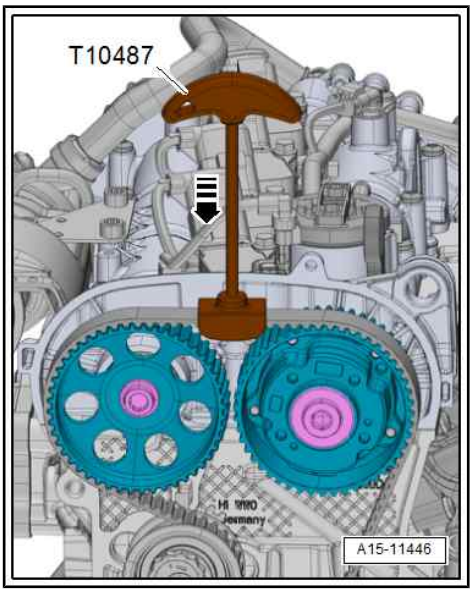
• Do not knock camshaft clamp into place with any kind of tool.

– 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 tighten bolt hand-tight.

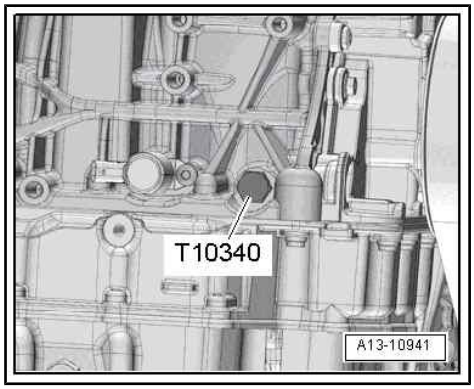


If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

– Adjust valve timing again ⇒ page 133 .

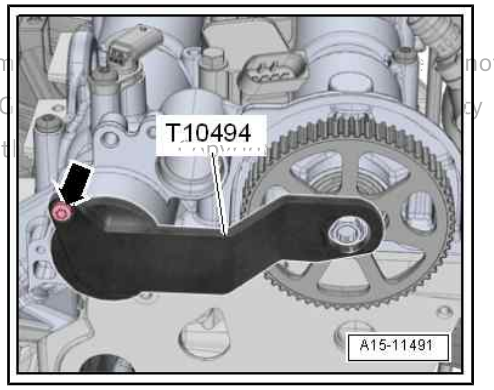
If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

– Remove locking pin - T10340- .

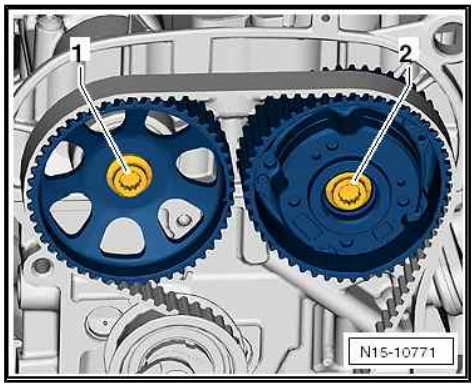


– Remove bolt -arrow- and detach camshaft clamp - T10494- .

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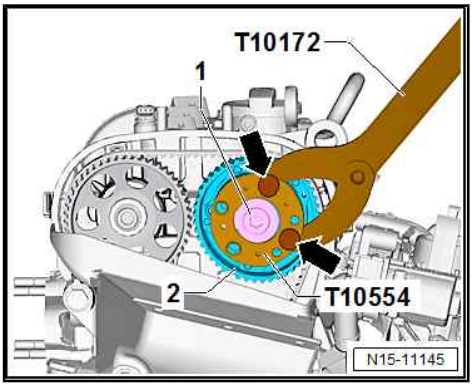
– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with adapters -T10172/2- , or counterhold tool - T10172- and counterhold tool - T10554/1- .



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

• Check that locking pin and camshaft clamp have been removed.

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



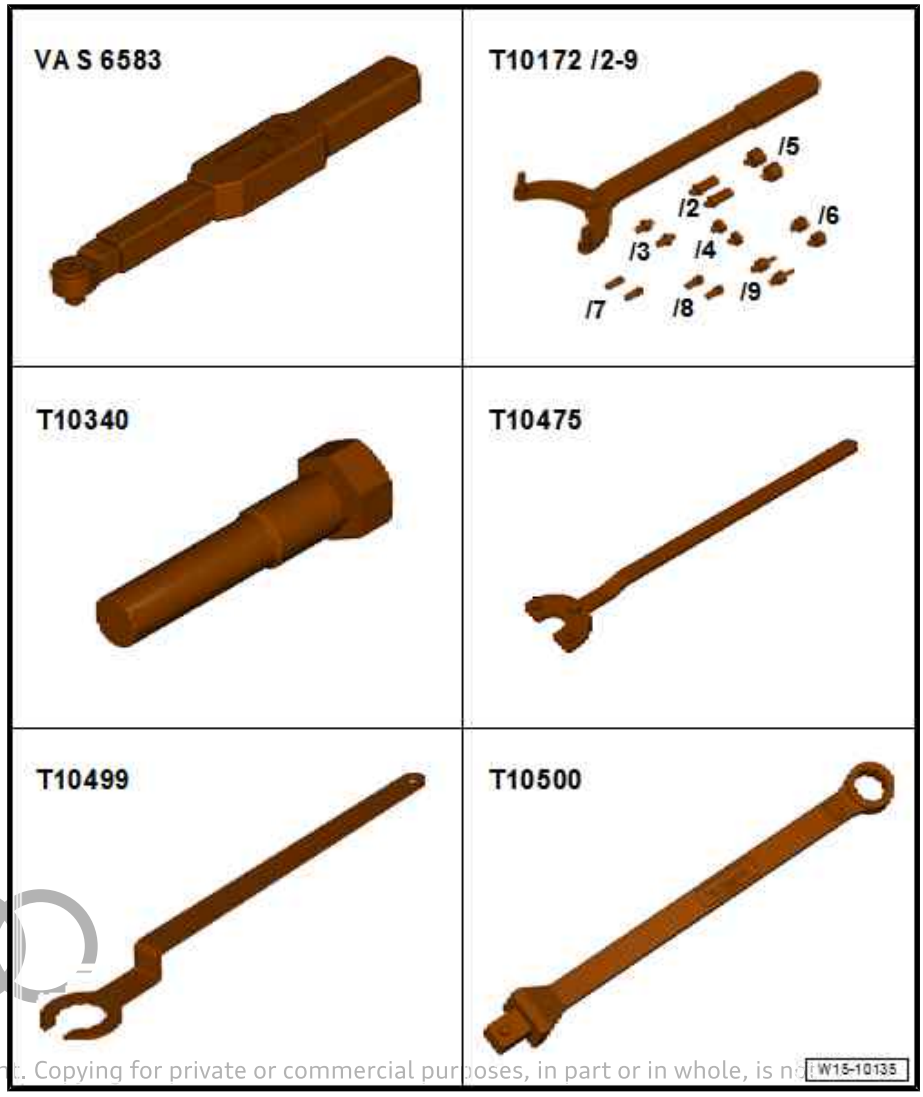
Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 80
- ⇒ “1.2.1 Exploded view - toothed belt, engine with one camshaft adjuster”, page 124
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294
- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

1.4.2 Removing and installing toothed belt - engines with two camshaft adjusters

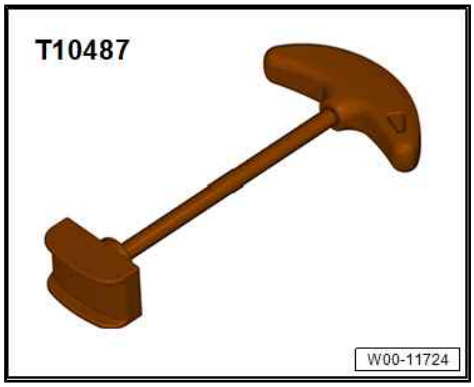
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Special tools and workshop equipment required

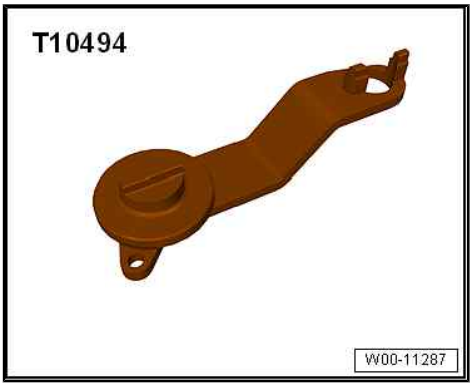


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- Torque wrench - VAS 6583-
- Counterhold tool - T10172-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-
- Assembly tool - T10487-



- Camshaft clamp - T10494-

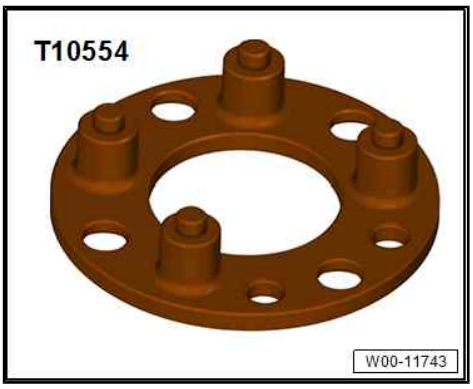


- Release tool - T10527- and -T10527/1-



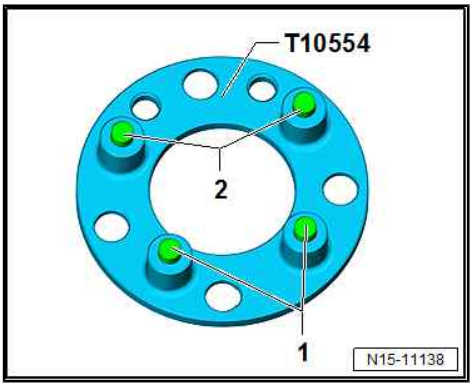
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- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

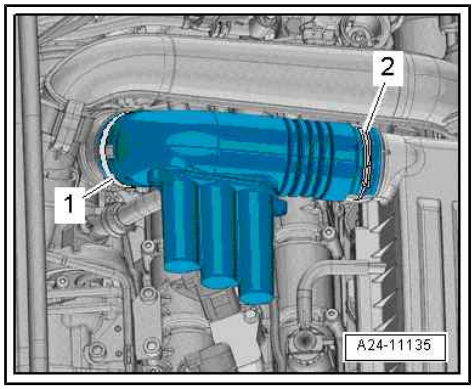
- The lugs -1- and -2- on counterhold tool - T10554/1- are different distances apart.
- Counterhold tool - T10554/1- can only be applied in one position.
- Position counterhold tool - T10554/1- flush against camshaft adjusters.



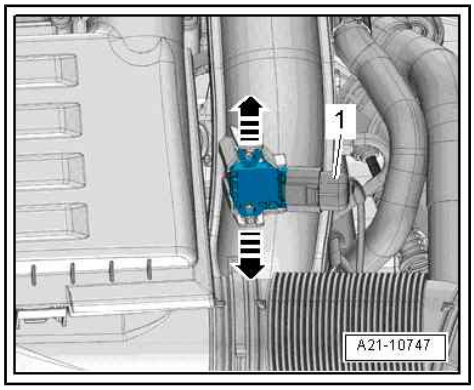
Removing

– Remove engine cover panel ⇒ page 79 .

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

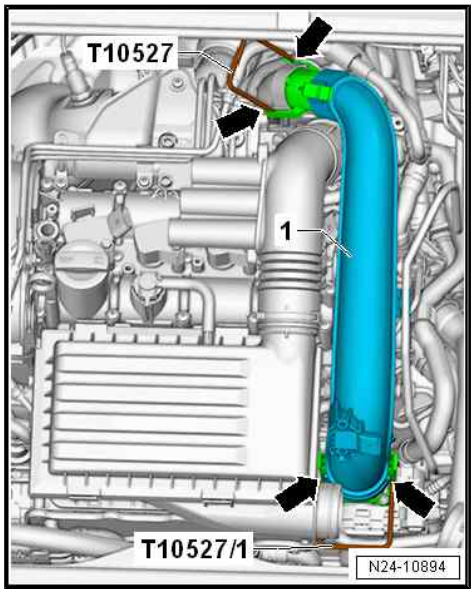


– Unplug electrical connector -1-.

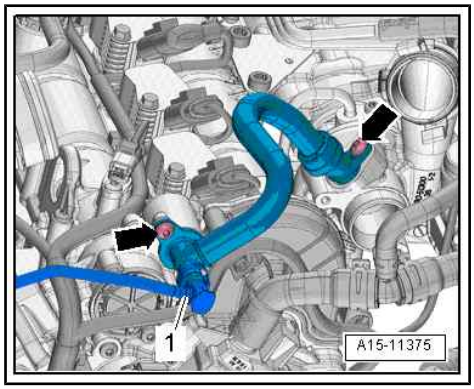


– Move air hoses clear at air pipe.

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

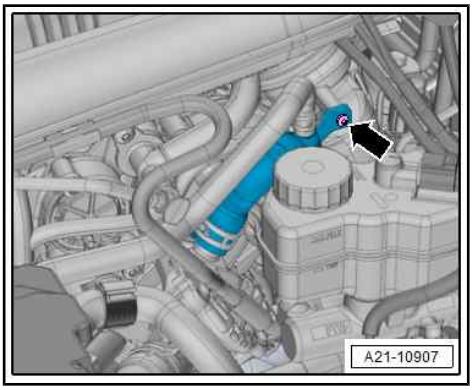


– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).

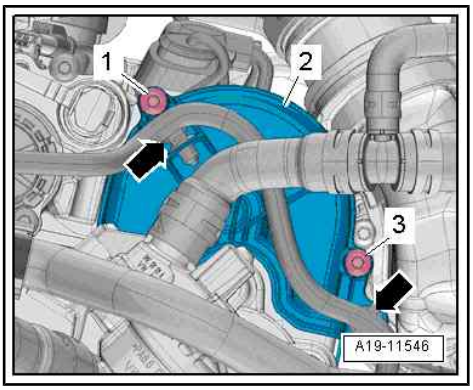


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– If fitted, remove bolt -arrow- from connection and press coolant hose slightly forwards.



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

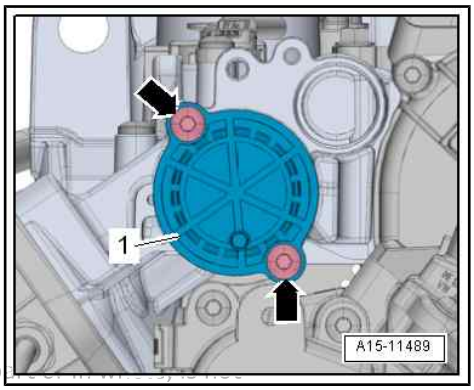


NOTICE

Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

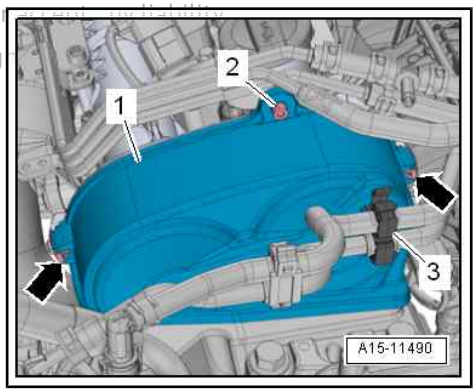
– Cover coolant pump with a cloth.
– Catch escaping engine oil with a cloth.

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



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

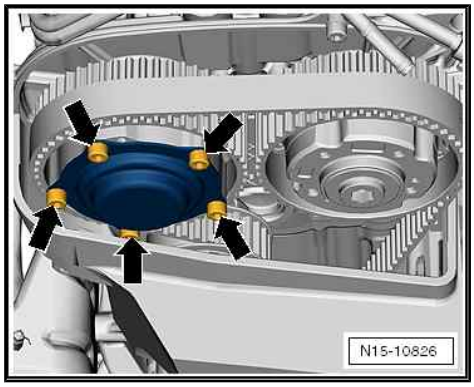


NOTICE

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

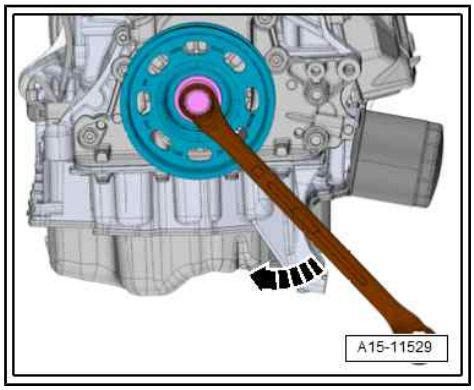
- **Catch escaping engine oil with a cloth.**
- **Clean any spaces/cavities that have filled with engine oil.**

– Remove bolts -arrows-.



- 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:

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– Unscrew plug for “TDC” hole on cylinder block.

– Screw locking pin - T10340- into cylinder block until head of pin makes contact.

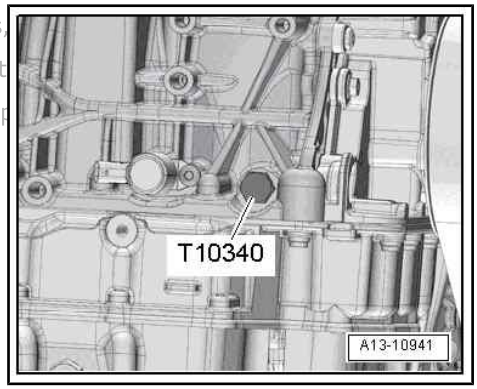
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.

– Turn crankshaft by 90° in direction of engine rotation.

– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.

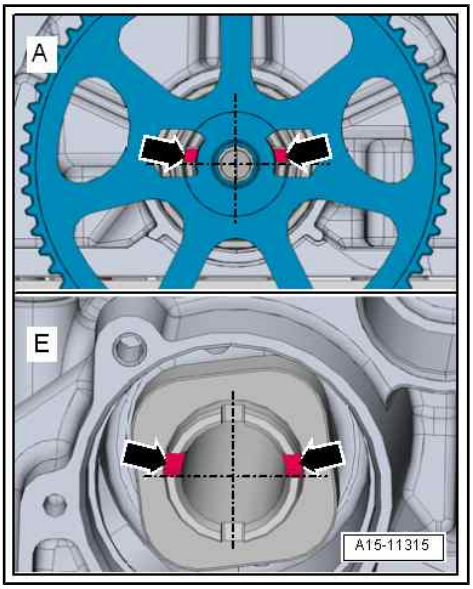
– Rotate crankshaft in normal direction of rotation as far as stop.

- The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



- 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.

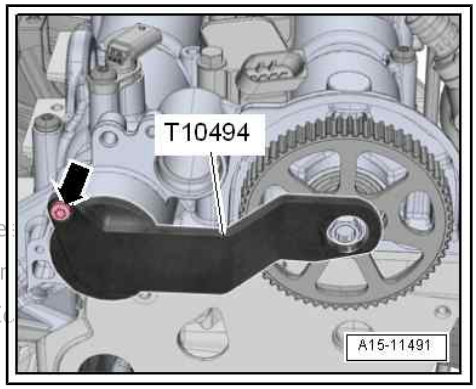
– If camshafts are not positioned as described, unscrew locking pin - T10340- , turn crankshaft one rotation further and return to TDC position.



- 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-.

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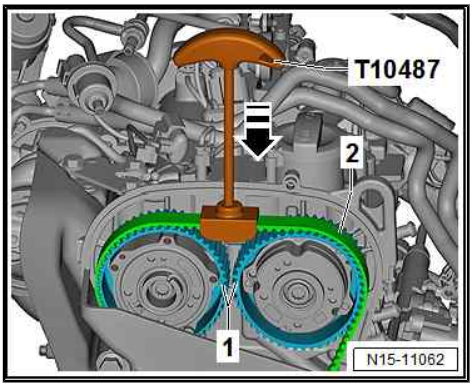
Note:

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 tighten bolt hand-tight.

NOTICE

Risk of damage to camshaft if handled incorrectly

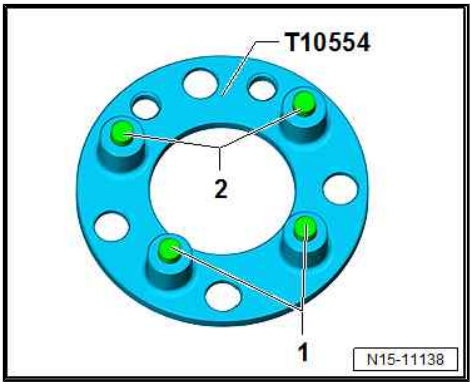
– Never use camshaft clamp as a counterhold tool.



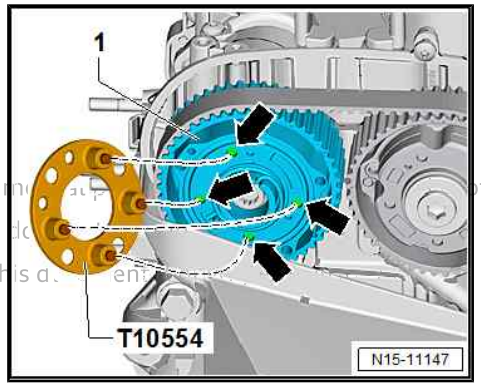
Exhaust camshaft:

– 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.

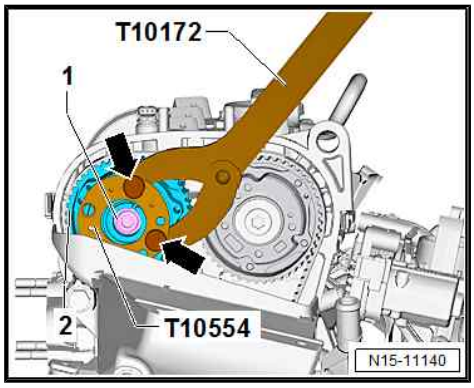


– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.
– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.



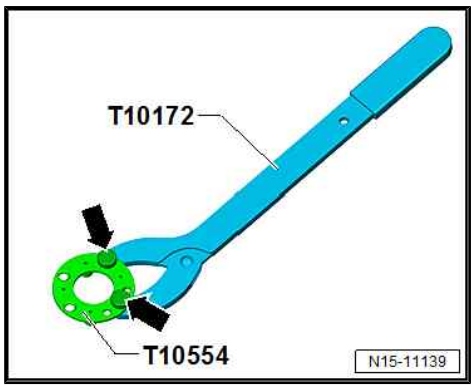
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– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10172- and counterhold tool - T10554/1- .

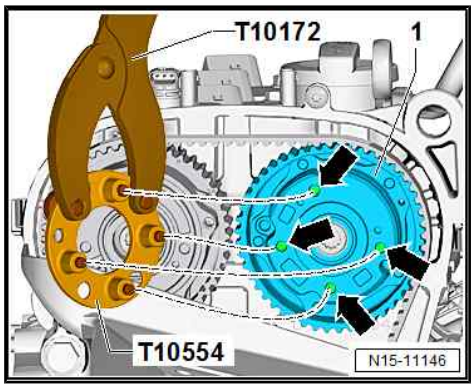


Inlet camshaft

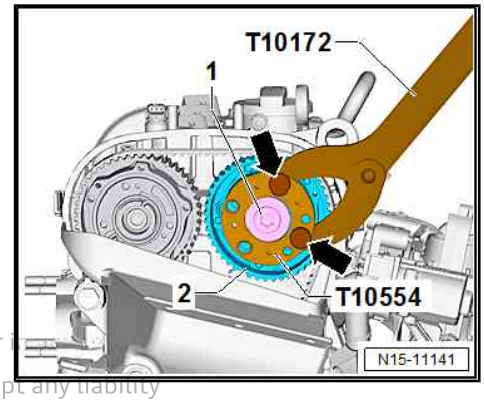
– Assemble tools as shown.
– Attach counterhold tool - T10172- to counterhold tool - T10554/1- using knurled screws -T10554/2- -arrows-.



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



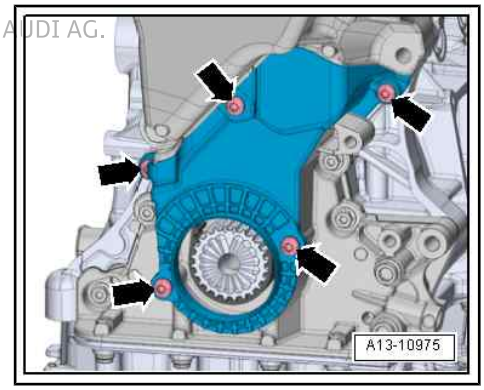
– Unscrew plug -1- and loosen bolt located behind it for camshaft sprocket (inlet side) one turn.
– Use counterhold tool - T10172- and counterhold tool - T10554/1- to do so.



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Both sides (continued):

– Remove pulley
⇒ “1.7 Removing and installing pulley”, page 92 .
– Remove bolts -arrows- and detach toothed belt cover (bottom).



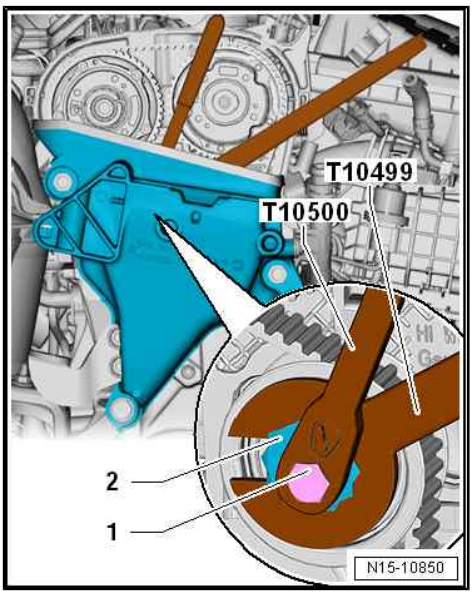
– Fit special wrench, 30 mm - T10499- onto eccentric adjuster -2- of tensioning roller.
– Loosen bolt -1- using insert tool, 13 mm - T10500- .
– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499- .

NOTICE

Risk of irreparable damage due to running a used belt in the opposite direction when it is refitted.

– **Mark running direction before removing.**
– **Pay attention to running direction when reinstalling.**

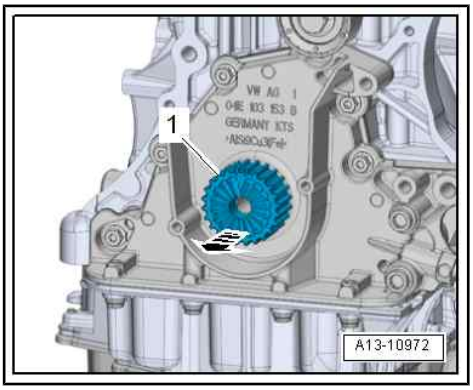
– Take off toothed belt.



– Detach crankshaft sprocket -1- -arrow-.

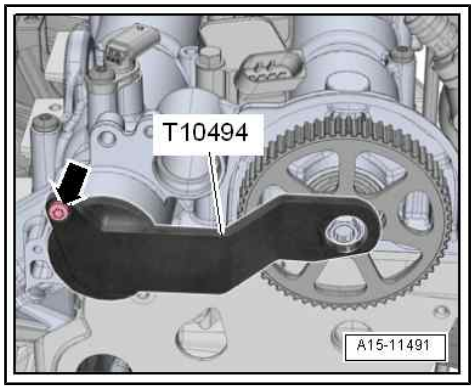
Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .



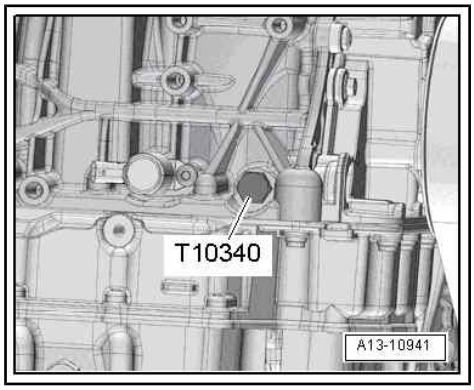
– Check “TDC” position of camshaft and crankshaft:

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



• 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.



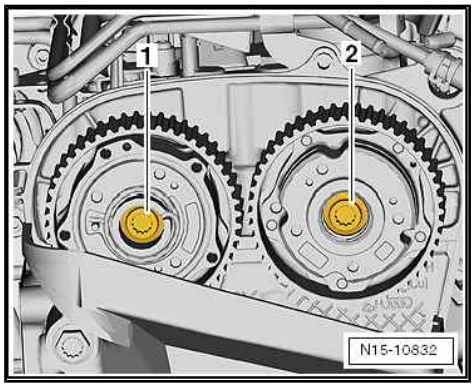
NOTICE

Risk of damage to camshaft if handled incorrectly

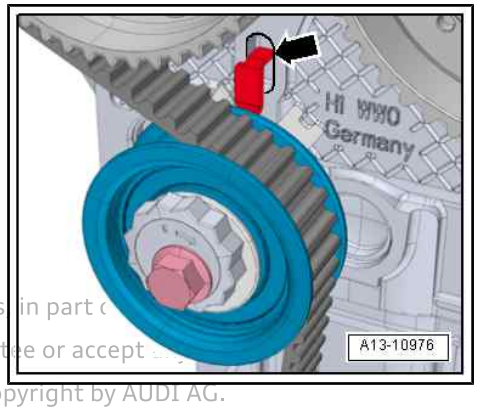
– Never use camshaft clamp as a counterhold tool.

– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

• 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.

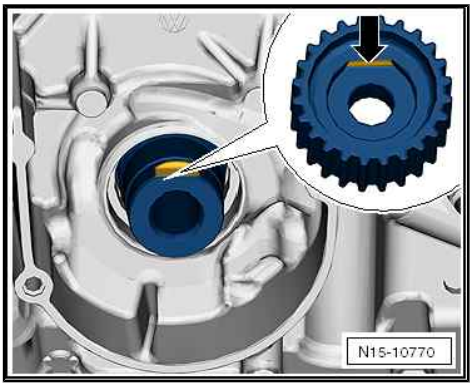


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– Fit crankshaft sprocket onto crankshaft.

• 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.

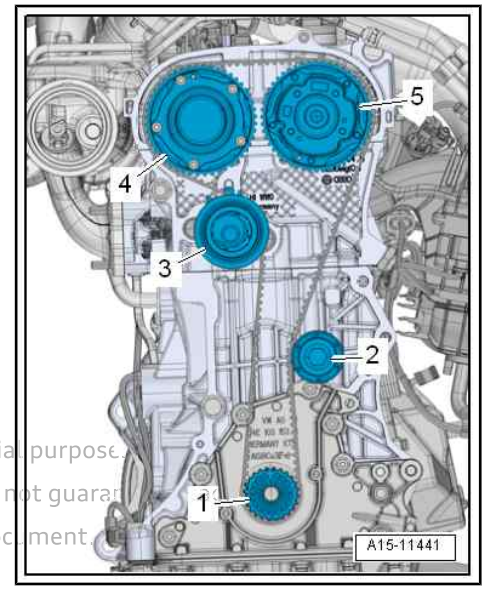
1 - Crankshaft sprocket

2 - Idler roller

3 - Tensioning roller

4 - Camshaft sprocket, exhaust side

5 - Camshaft sprocket, inlet side



– Install toothed belt cover (bottom section).

– Install pulley
⇒ “1.7 Removing and installing pulley”, page 92 .

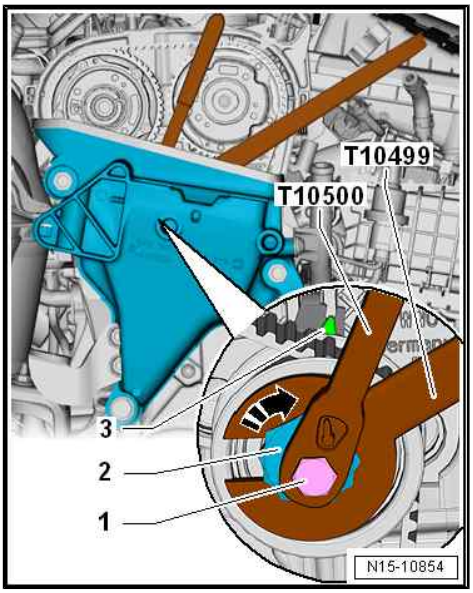
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– Using special wrench, 30 mm - T10499- , turn eccentric adjuster -2- of tensioning roller in direction of -arrow- until adjustment indicator -3- is positioned approx. 10 mm to right of adjustment window.

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

– 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:

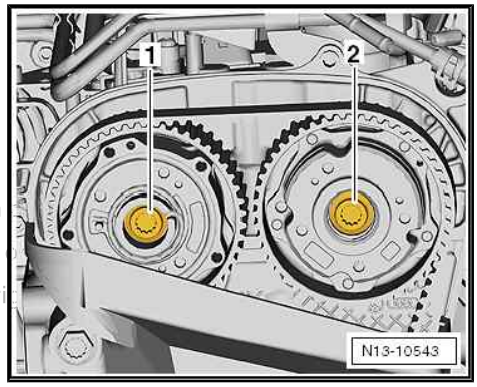
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

NOTICE

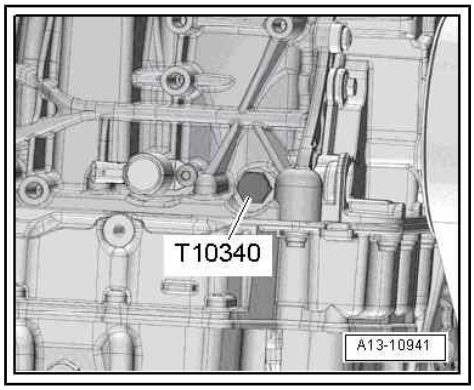
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

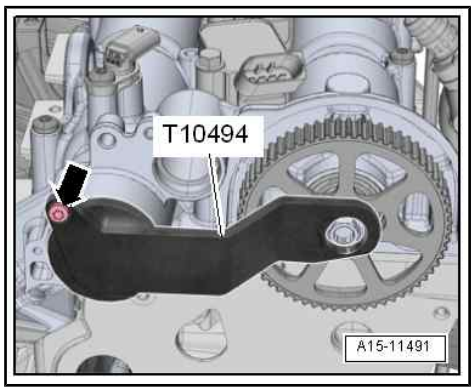
– Tighten bolts -1, 2- initially to 50 Nm (use counterhold tool - T10172- with counterhold tool - T10554/1-).



– Remove locking pin - T10340- .

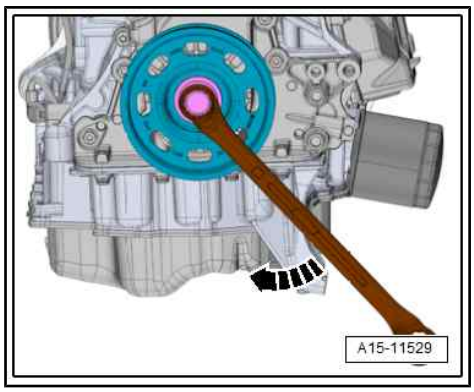


– Remove bolt -arrow- and detach camshaft clamp - T10494- .



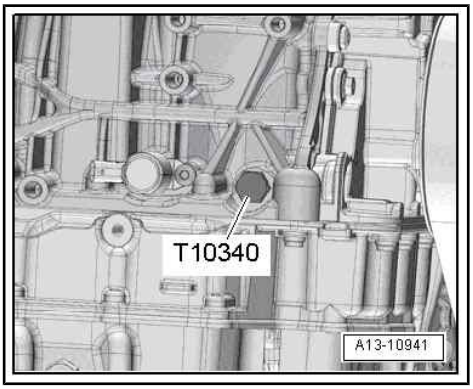
Checking valve timing:

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

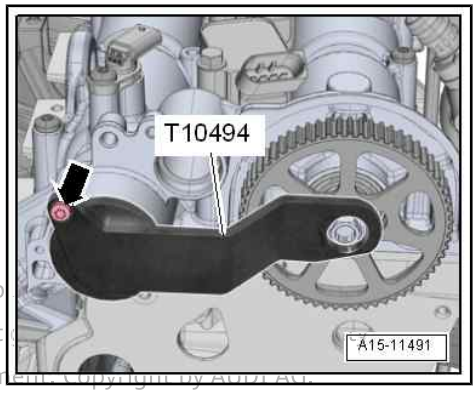


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– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.
– Rotate crankshaft further in normal direction of rotation as far as stop.
• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks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



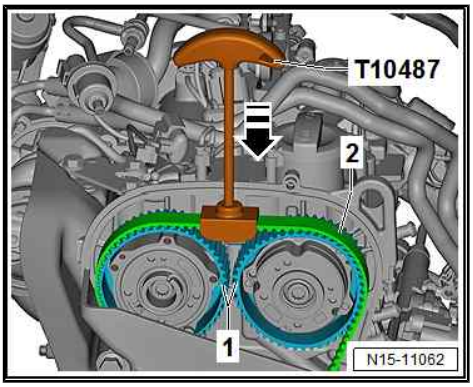
• It should be possible to insert the camshaft clamp - T10494- easily.
• Do not knock camshaft clamp into place with any kind of tool.
– Insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten with bolt -arrow-.



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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 tighten bolt hand-tight.

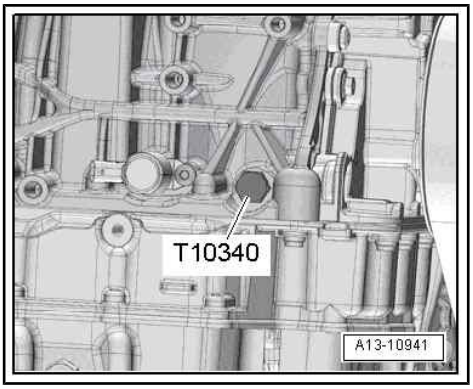


If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

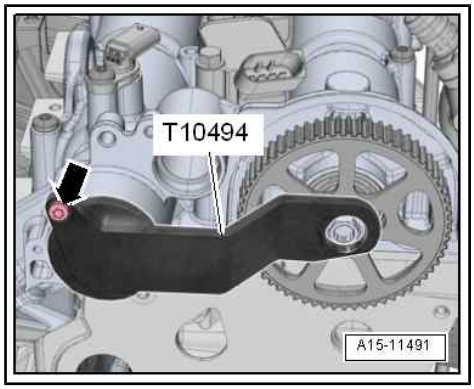
– Adjust valve timing again ⇒ page 195 .

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

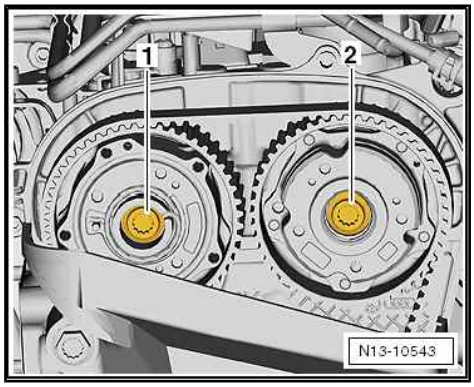
– Remove locking pin - T10340- .



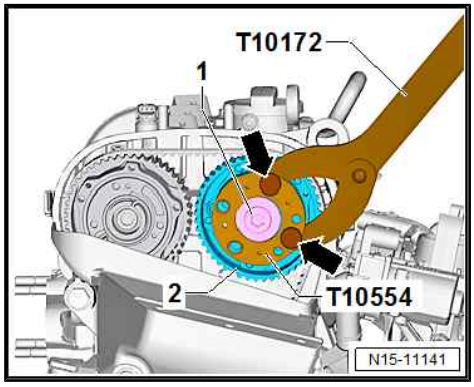
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with counterhold tool - T10554/1- .



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



• Check that locking pin and camshaft clamp have been removed.

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

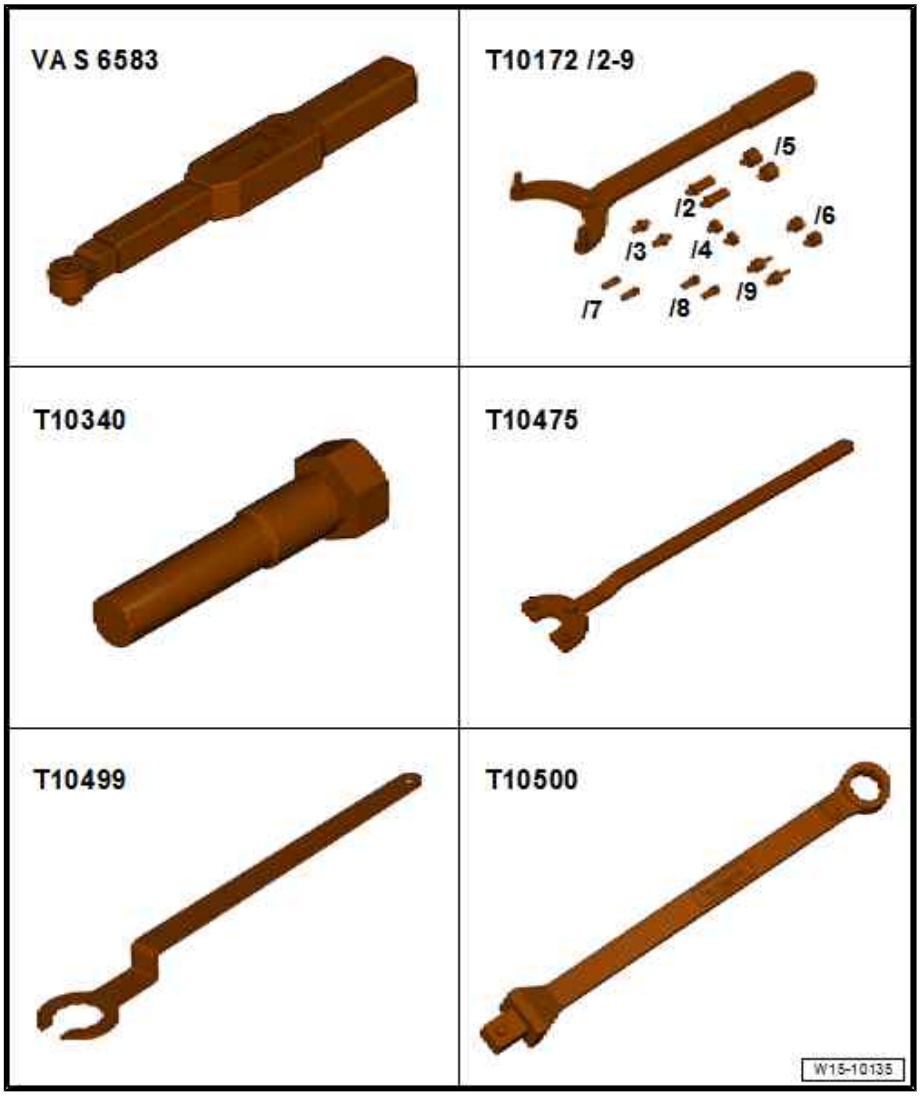
Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 80
- ⇒ “1.1.1 Exploded view - toothed belt cover, all vehicles except e-tron”, page 122
- ⇒ “1.2.2 Exploded view - toothed belt, engine with two camshaft adjusters”, page 125
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294
- ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342
- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

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1.4.3 Removing and installing toothed belt - e-tron

Special tools and workshop equipment required

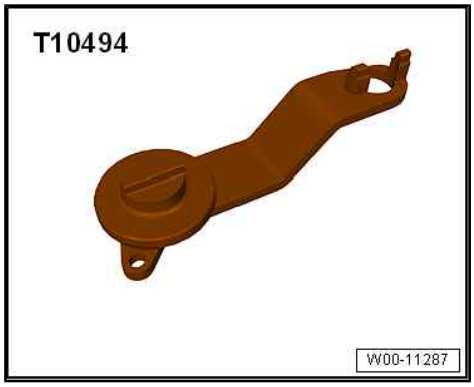


- Torque wrench - VAS 6583-
- Counterhold tool - T10172-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-
- Assembly tool - T10487-

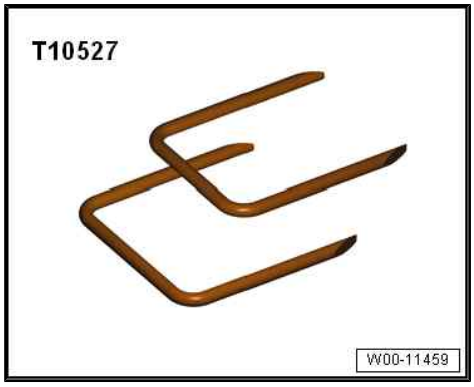


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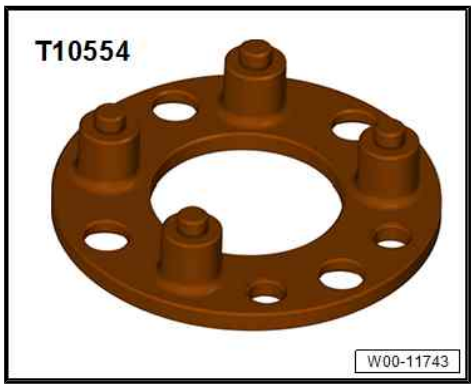
- Camshaft clamp - T10494-



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

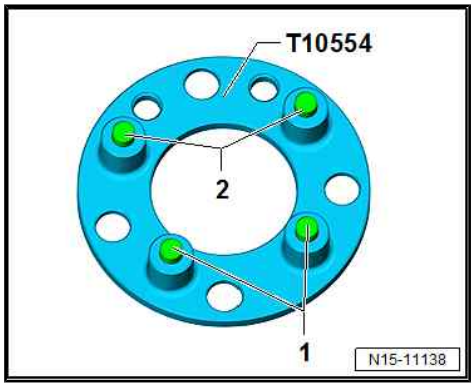


- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

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

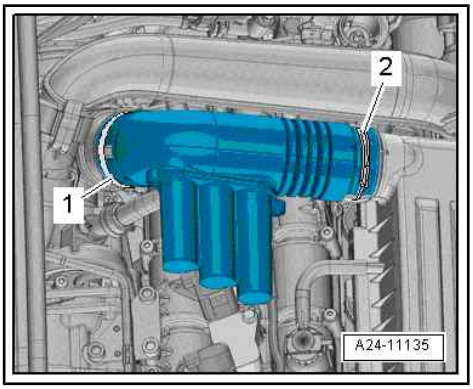


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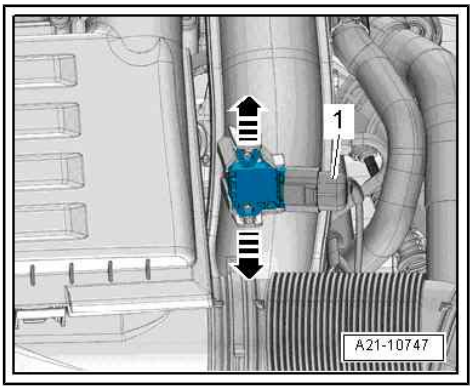
Removing

– Remove engine cover panel ⇒ page 79 .

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



– Unplug electrical connector -1-.

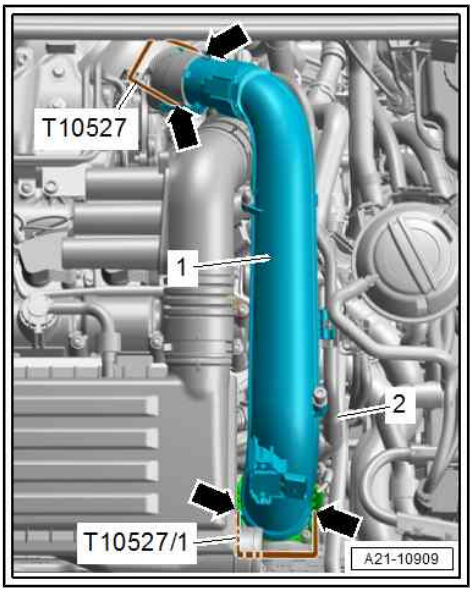


– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.

– Move line for activated charcoal filter system clear at air pipe.

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

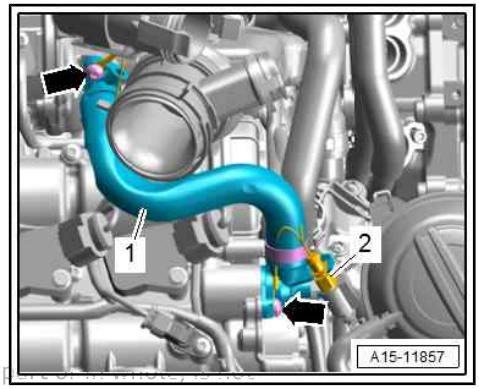
– Detach air pipe -1-.



– Version with crankcase breather heating: Unplug electrical connector -2-.

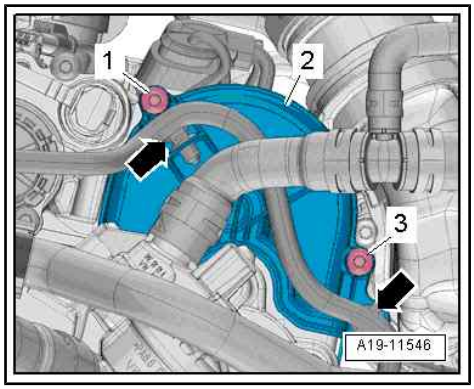
– Remove bolts -arrows- and detach crankcase breather hose -1-.

• Version with crankcase breather heating: The earth wires must be re-secured with bolts -arrows- when installing.



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

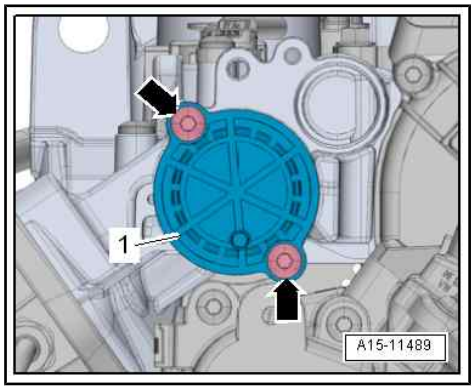


NOTICE

Danger of chemical damage to seal for coolant pump if oil enters between coolant pump and cylinder head.

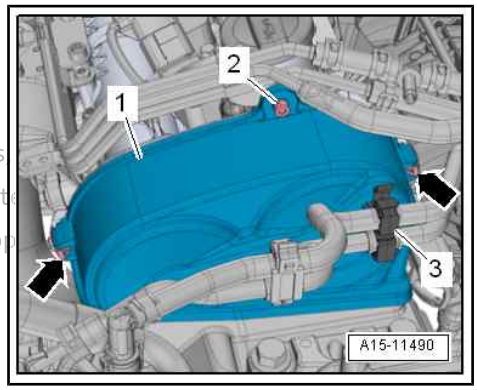
– Cover coolant pump with a cloth.
– Catch escaping engine oil with a cloth.

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



– Remove engine mounting
⇒ “2.3.2 Removing and installing engine mountings - e-tron”, page 66 .

– Remove bolt -2-.
– Release clips -arrows- and detach toothed belt cover (top) -1-.



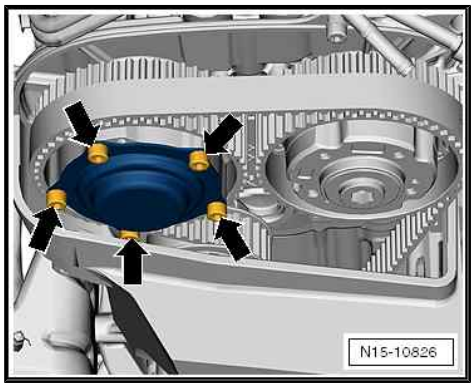
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NOTICE

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

– Catch escaping engine oil with a cloth.
– Clean any spaces/cavities that have filled with engine oil.

– Remove bolts -arrows-.
– 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 until head of pin makes contact.

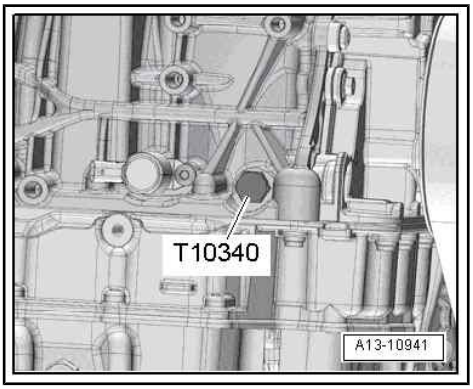
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.

– Turn crankshaft by 90° in direction of engine rotation.

– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.

– Rotate crankshaft in normal direction of rotation until contact is made.

• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



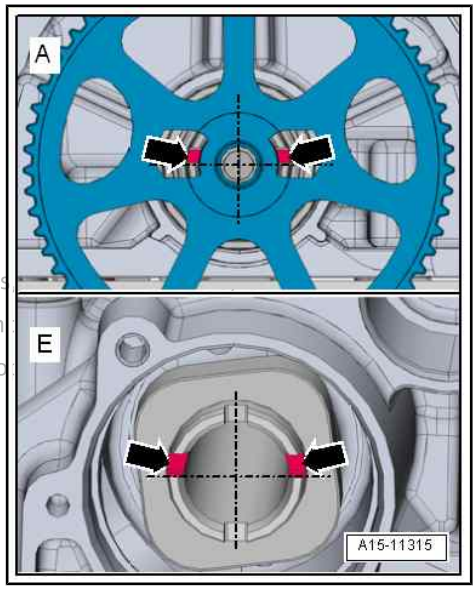
• On both camshafts, asymmetrically positioned grooves -top and bottom arrows- on gearbox end must now face upwards, as shown in illustrations.

• 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.

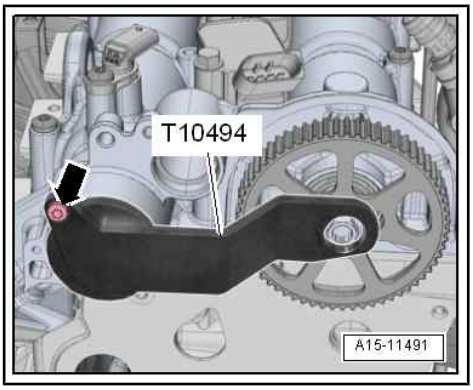
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• It should be possible to insert the camshaft clamp - T10494- easily.

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

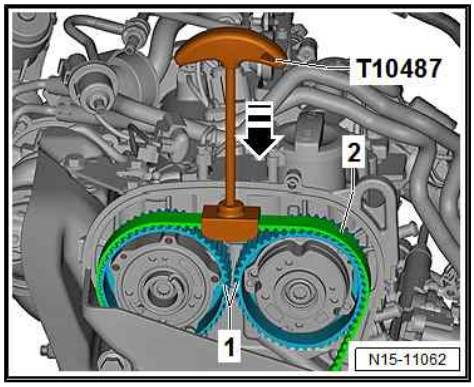
– When camshafts are positioned as described, insert camshaft clamp - T10494- into camshafts as far as stop and hand-tighten bolt -arrow-.



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 tighten bolt hand-tight.

– Remove vibration damper ⇒ page 92 .



NOTICE

Risk of damage to camshaft if handled incorrectly

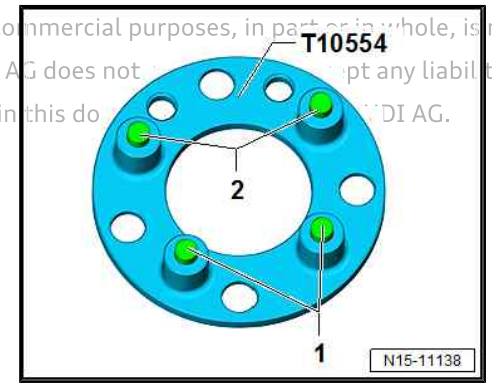
– Never use camshaft clamp as a counterhold tool.

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Exhaust camshaft:

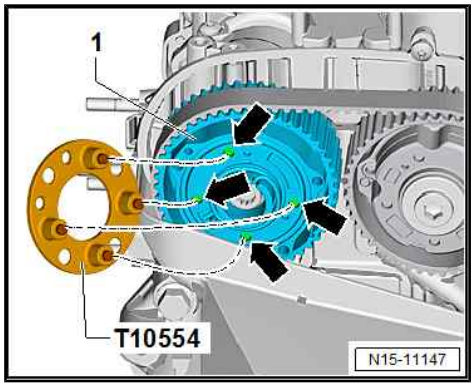
– Guide in counterhold tool - T10554/1- between camshaft adjuster and engine support.

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

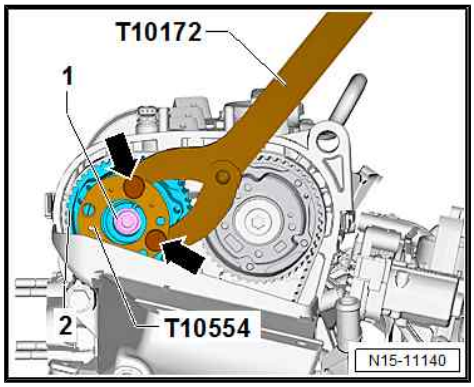


– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.

– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.



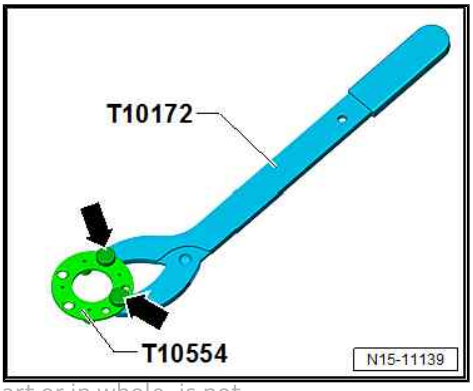
– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10172- and counterhold tool - T10554/1- .



Inlet camshaft

– Assemble tools as shown.

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

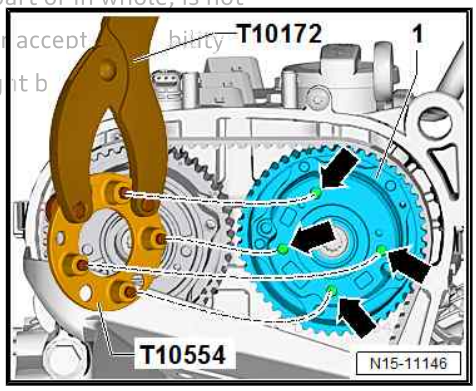


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– Apply counterhold tool - T10172- and counterhold tool - T10554/1- flush against camshaft adjuster -1-, as shown.

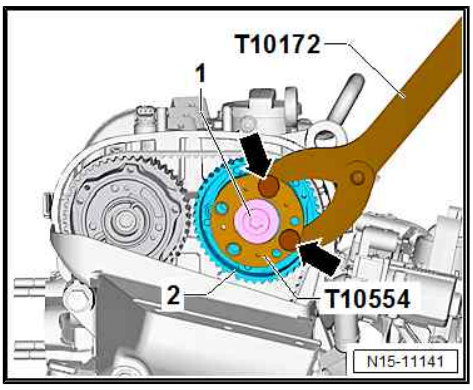
– Pins must be inserted correctly into holes -arrows-.

– 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.

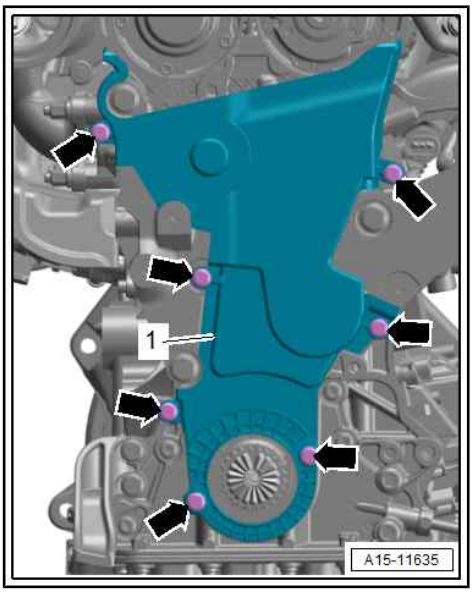
– Use counterhold tool - T10172- and counterhold tool - T10554/1- to do so.



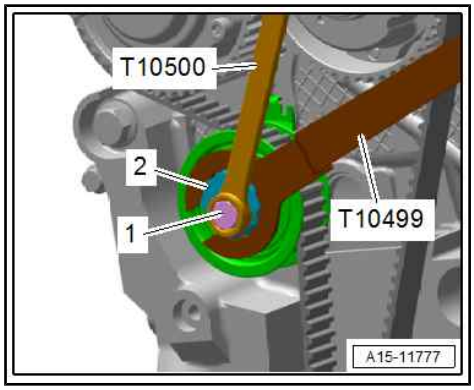
Both sides (continued):

– Remove pulley
⇒ “1.7 Removing and installing pulley”, page 92 .

– Remove bolts -arrows- and push toothed belt cover (bottom) -1- towards longitudinal member.



– Fit special wrench, 30 mm - T10499- 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- .



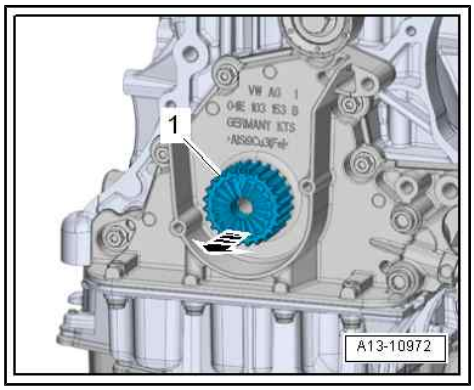
NOTICE

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

– Catch escaping engine oil with a cloth.
– Clean any spaces/cavities that have filled with engine oil.

– Take off toothed belt.

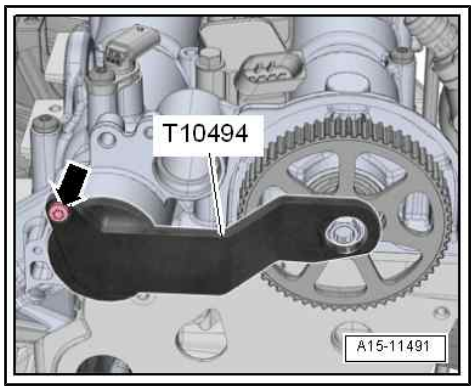
– Detach crankshaft sprocket -1- -arrow-.



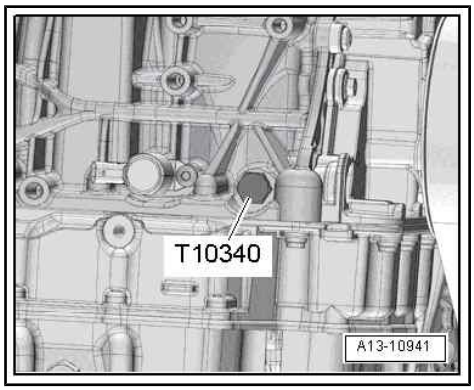
Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

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



- 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.



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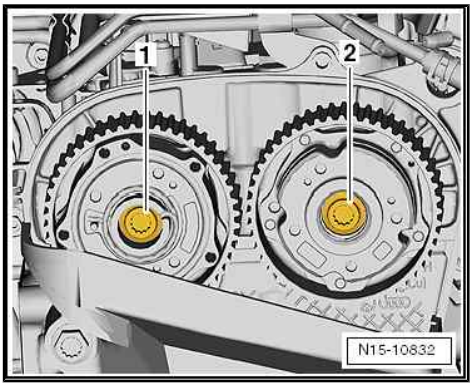
NOTICE

Risk of damage to camshaft if handled incorrectly

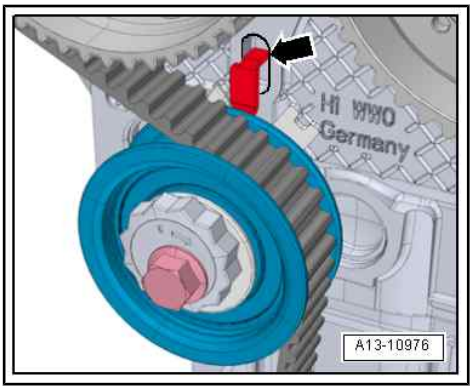
– Never use camshaft clamp as a counterhold tool.

– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

- It should just be possible to turn the adjusters on the camshafts without axial movement.



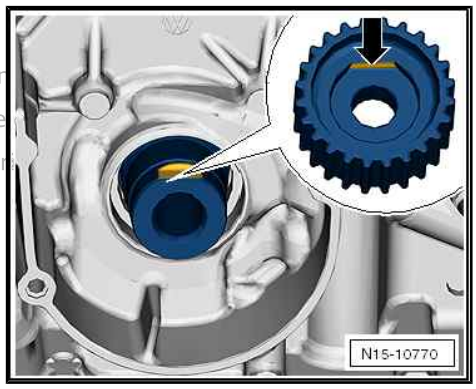
- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



– 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.

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– Fit toothed belt in the specified sequence.

1 - Crankshaft sprocket

2 - Idler roller

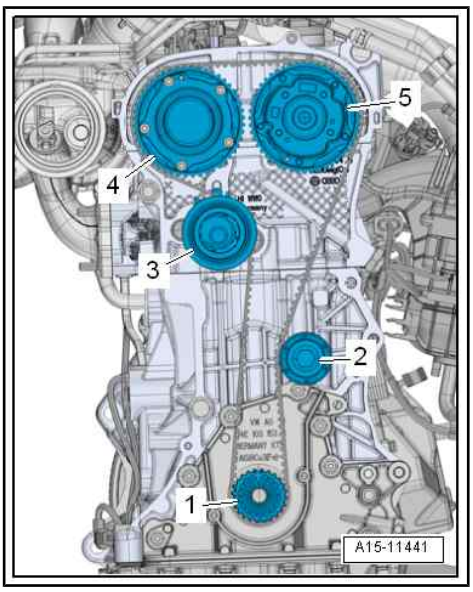
3 - Tensioning roller

4 - Camshaft sprocket, exhaust side

5 - Camshaft sprocket, inlet side

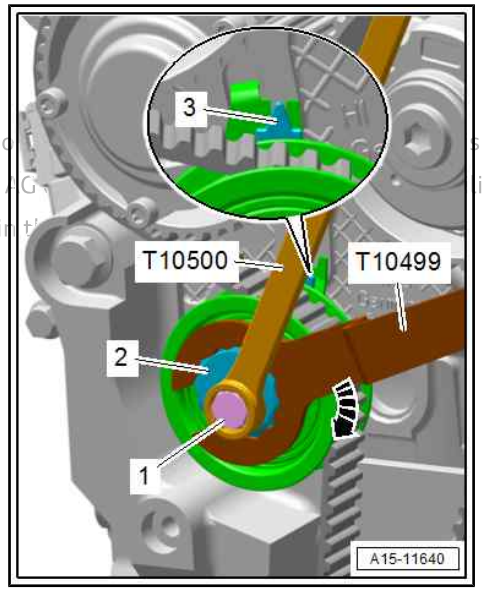
– Install toothed belt cover (bottom section).

– Install pulley
⇒ “1.7 Removing and installing pulley”, page 92 .



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– Using special wrench, 30 mm - T10499- , 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, as shown in illustration.
– 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:

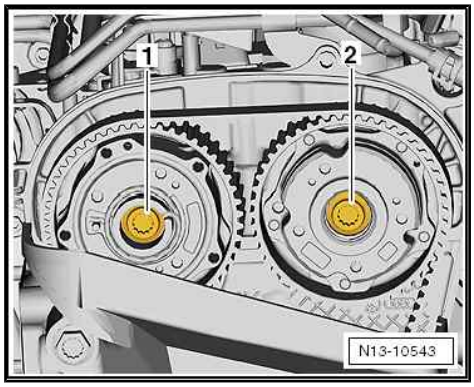
Turning the engine further or running the engine may lead to slight differences in the position of the adjustment indicator -3- in relation to the adjustment window. This does not affect the toothed belt tension.

NOTICE

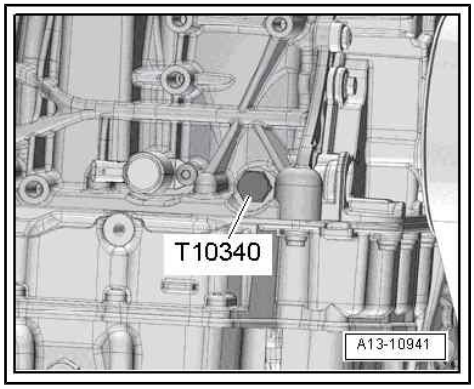
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

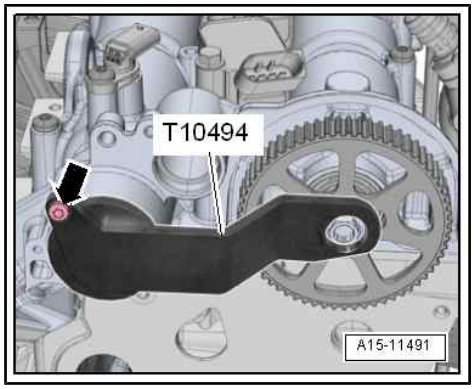
– Tighten bolts -1, 2- initially to 50 Nm (use counterhold tool - T10172- with counterhold tool - T10554/1-).



– Remove locking pin - T10340- .

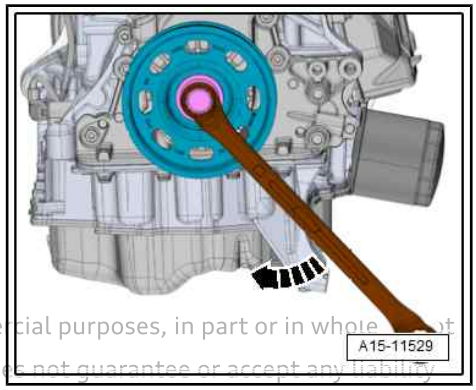


– Remove bolt -arrow- and detach camshaft clamp - T10494- .



Checking valve timing:

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

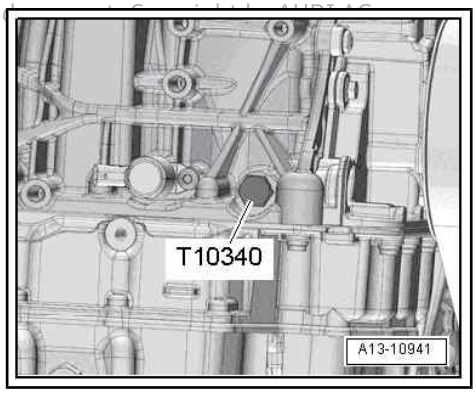


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– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.

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

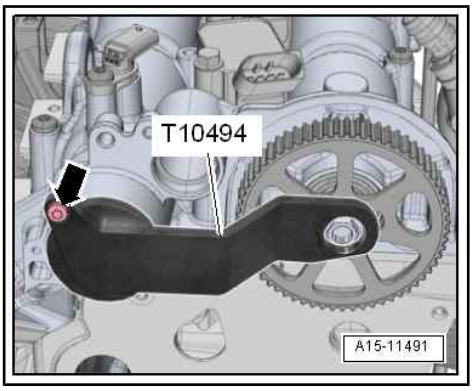
• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



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

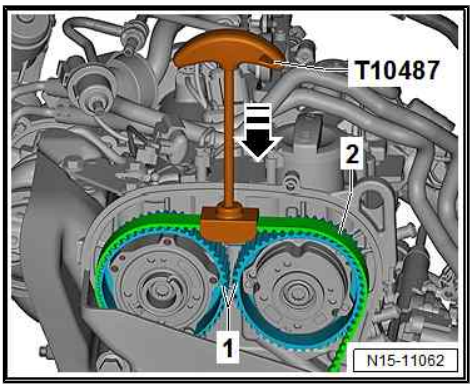
• Do not knock camshaft clamp into place with any kind of tool.

– 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 tighten bolt hand-tight.

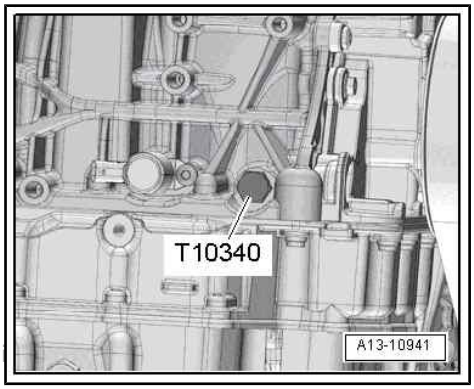


If it is not possible to insert camshaft clamp - T10494- , valve timing is not OK.

– Adjust valve timing again ⇒ page 208 .

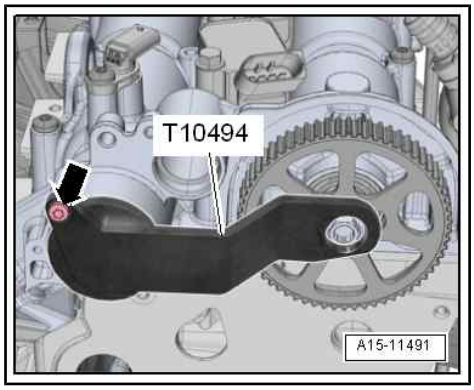
If it is possible to insert camshaft clamp - T10494- , valve timing is OK.

– Remove locking pin - T10340- .

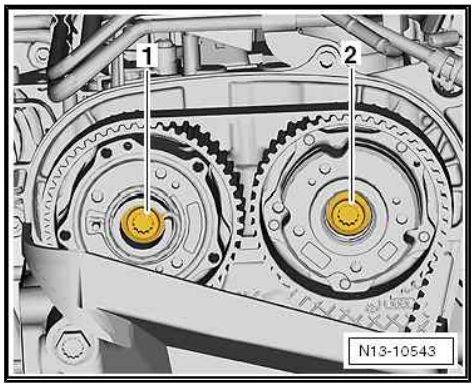


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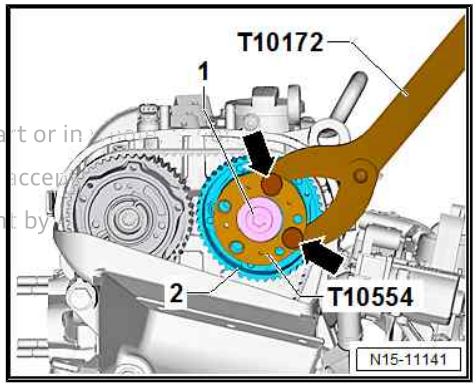
– Remove bolt -arrow- and detach camshaft clamp - T10494- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with counterhold tool - T10554/1- .



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



- Check that locking pin and camshaft clamp have been removed.

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

Tightening torques

- ⇒ “1.1.2 Exploded view - toothed belt cover, e-tron”, page 123
- ⇒ “1.2.2 Exploded view - toothed belt, engine with two camshaft adjusters”, page 125
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294
- ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342
- ⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418
- ⇒ “2.1.2 Exploded view - charge air system, e-tron”, page 442

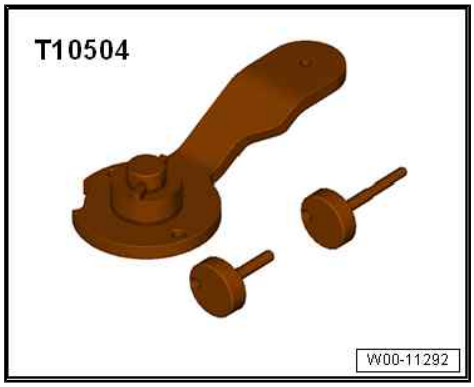
1.4.4 Removing and installing toothed belt - engines with two camshaft adjusters and cylinder shut-off

Special tools and workshop equipment required

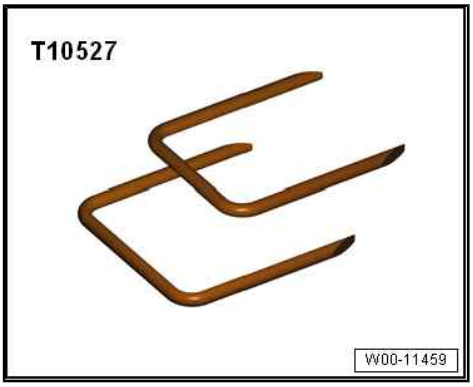


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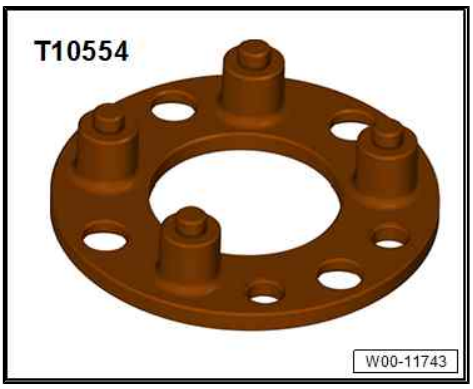
- Torque wrench - VAS 6583-
- Counterhold tool - T10172-
- Locking pin - T10340-
- Counterhold tool - T10475-
- Special wrench, 30 mm - T10499A-
- Open end spanner insert, AF 13 - T10500-
- Camshaft clamp - T10504-



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

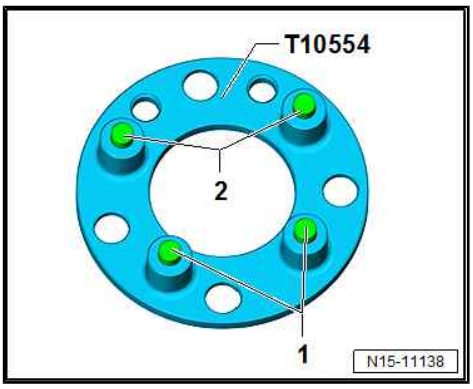


- Counterhold tool - T10554/1-



Counterhold tool - T10554/1-

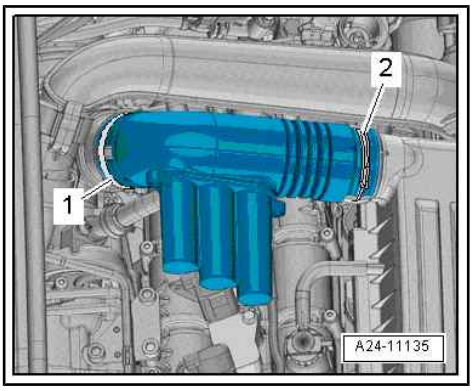
- The lugs -1- and -2- on counterhold tool - T10554/1- are different distances apart.
- Counterhold tool - T10554/1- can only be applied in one position.
- Position counterhold tool - T10554/1- flush against camshaft adjusters.



Removing

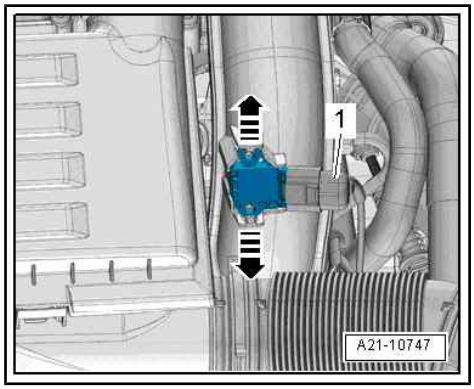
– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 79 .

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

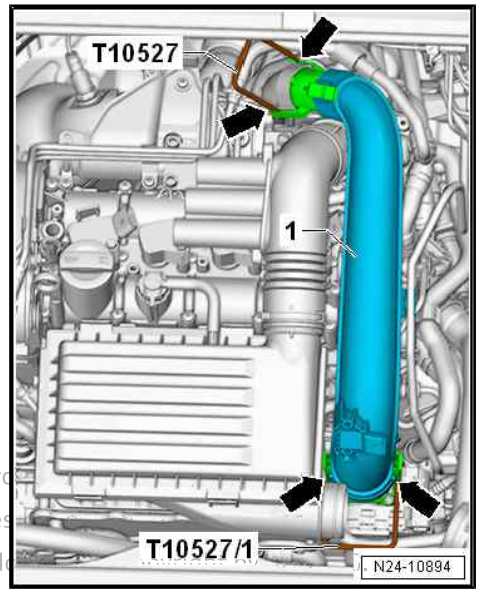


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– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .

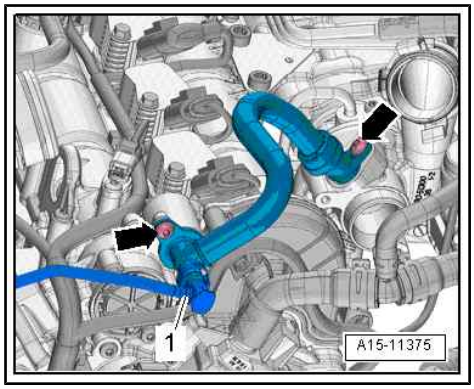


– Move air hoses clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe -1-.

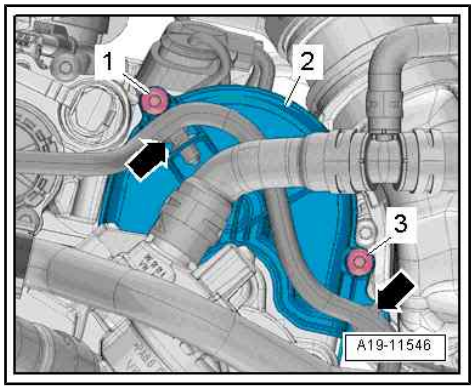


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– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).



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

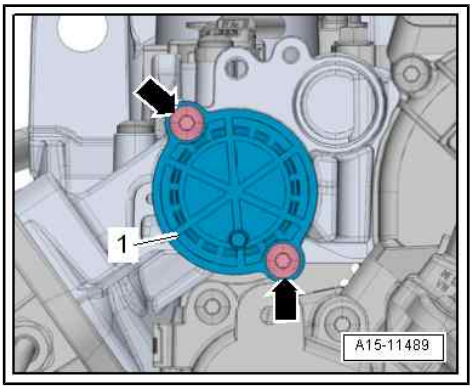


NOTICE

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.**

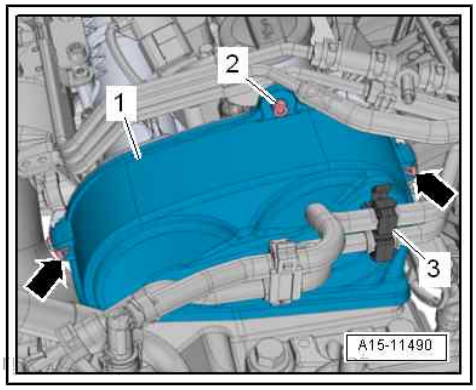
– Unscrew bolts -arrows- and detach sealing cap -1-.



– Move clear hoses at bracket -3-.

– Remove bolt -2-.

– Release clips -arrows- and detach toothed belt cover (top) -1-.



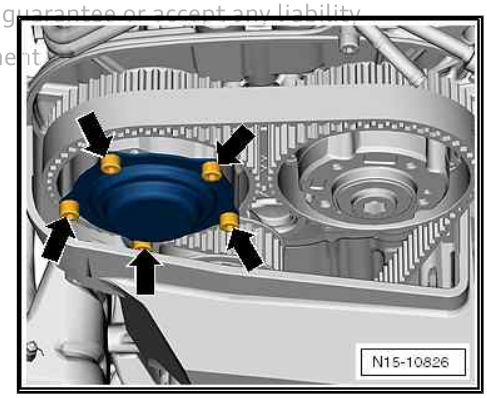
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NOTICE

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

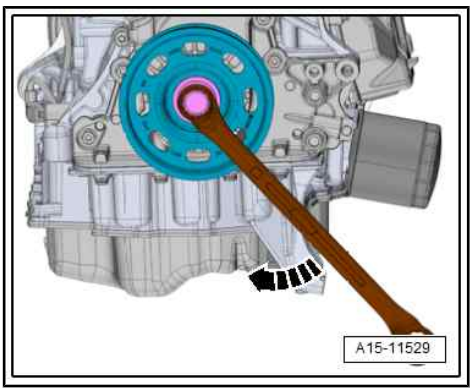
- **Catch escaping engine oil with a cloth.**
- **Clean any spaces/cavities that have filled with engine oil.**

– Remove bolts -arrows-.

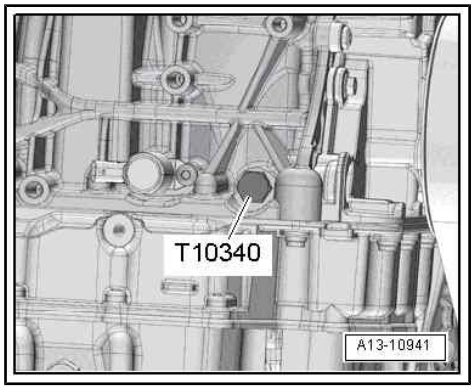


– To remove all bolts, rotate crankshaft in direction of engine rotation by turning bolt for vibration damper pulley in direction of -arrow-.

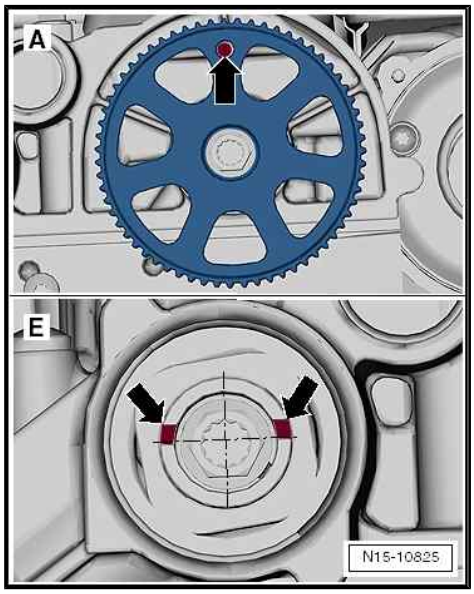
– Detach cover from camshaft adjuster of exhaust camshaft.



Rotate crankshaft to “TDC” as follows:

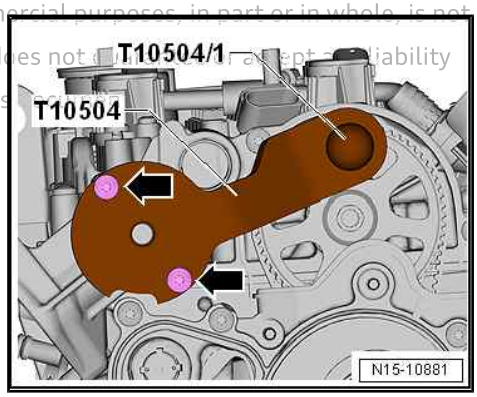


– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block as far as stop.
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.
– Turn crankshaft by 90° in direction of engine rotation.
– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation until contact is made.
• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



• 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.

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– 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.
– Screw in bolts -arrows- hand-tight.

NOTICE

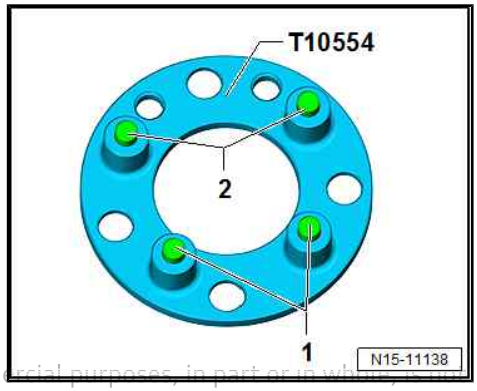
Risk of damage to camshaft if handled incorrectly

– Never use camshaft clamp as a counterhold tool.

Exhaust camshaft:

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

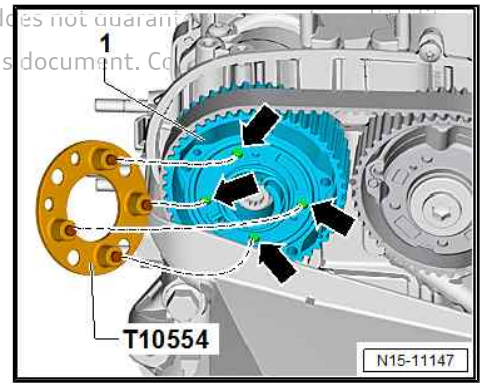
– To do so, first guide area between lugs -2- on counterhold tool - T10554/1- past camshaft adjuster.



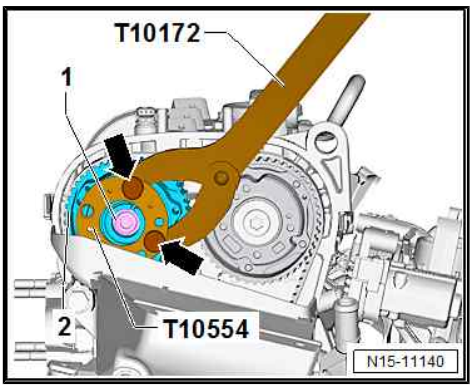
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– Turn counterhold tool - T10554/1- so that it can be inserted in holes -arrows- as shown.

– Position counterhold tool - T10554/1- flush against camshaft adjuster -1-.



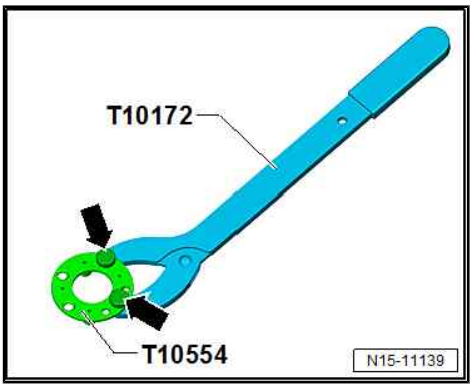
– Loosen bolt -1- one turn. Secure camshaft sprocket in place with counterhold tool - T10172- and counterhold tool - T10554/1- .



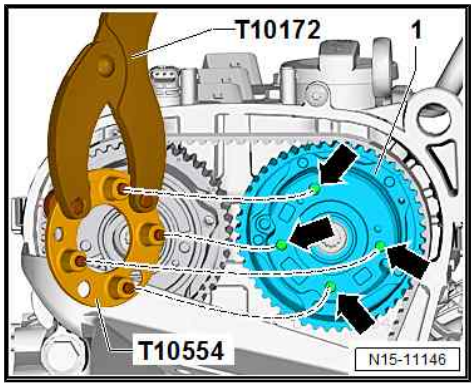
Inlet camshaft

– Assemble tools as shown.

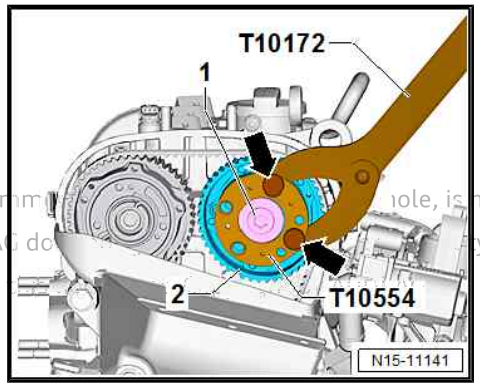
– Attach counterhold tool - T10172- to counterhold tool - T10554/1- using knurled screws -T10554/2- -arrows-.



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



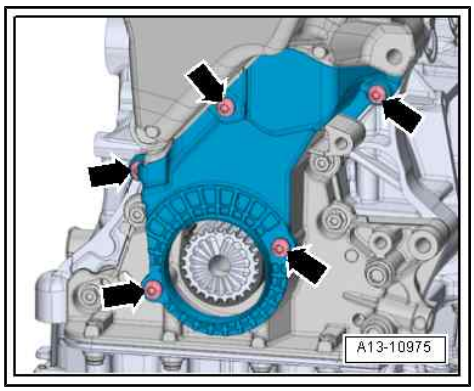
– Unscrew plug -1- and loosen bolt located behind it for camshaft sprocket (inlet side) one turn.
– Use counterhold tool - T10172- and counterhold tool - T10554/1- to do so.



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Both sides (continued):

– Remove pulley ⇒ page 92 .
– Remove bolts -arrows- and detach toothed belt cover (bottom).



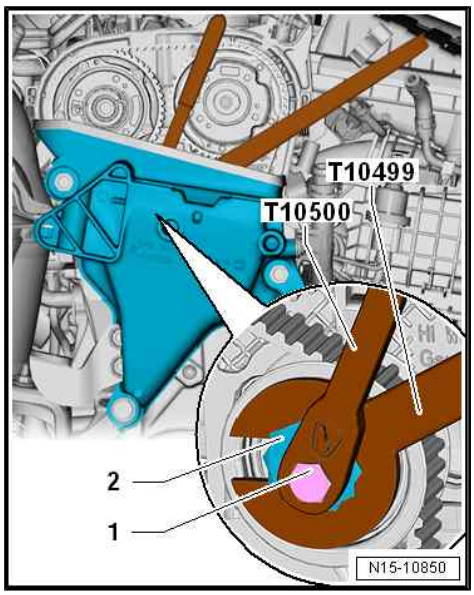
– Fit special wrench, 30 mm - T10499- onto eccentric adjuster -2- of tensioning roller.
– Loosen bolt -1- using insert tool, 13 mm - T10500- .
– Release tensioning roller on eccentric adjuster -2- using special wrench, 30 mm - T10499- .

NOTICE

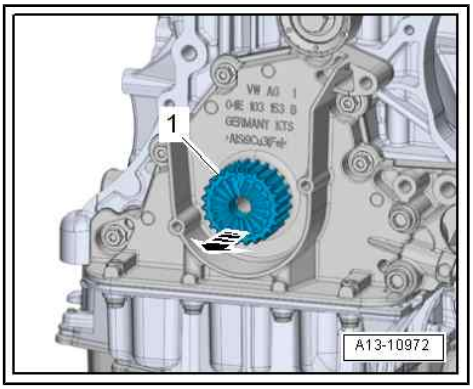
Risk of irreparable damage due to running a used belt in the opposite direction when it is refitted.

– **Mark running direction before removing.**
– **Pay attention to running direction when reinstalling.**

– Take off toothed belt.



– Detach crankshaft sprocket -1- -arrow-.

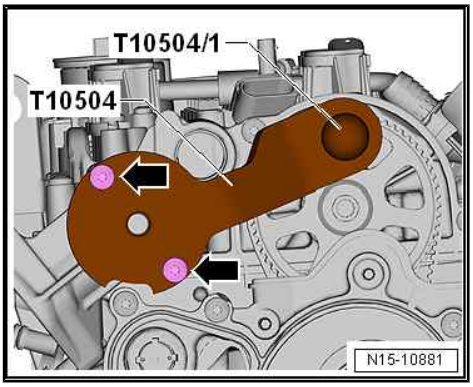


Installing (adjusting valve timing)

- 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 correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

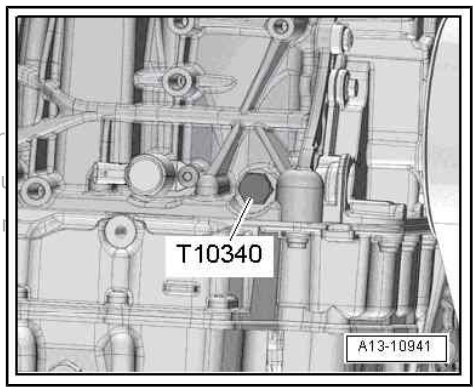
– Check “TDC” position of camshaft and crankshaft:

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



- 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.

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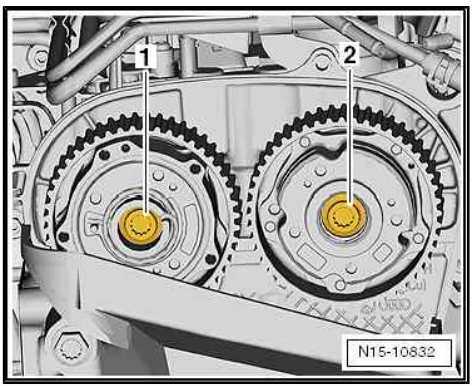
NOTICE

Risk of damage to camshaft if handled incorrectly

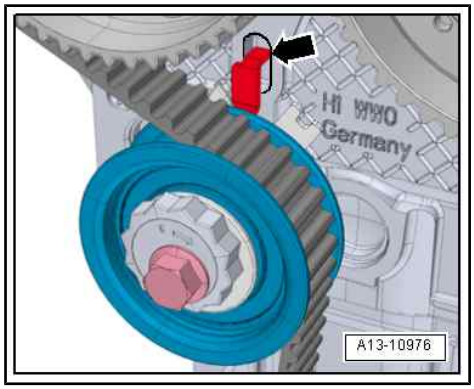
– Never use camshaft clamp as a counterhold tool.

– Fit new bolts -1, 2- for camshaft sprockets and screw them in loosely.

- It should just be possible to turn the adjusters on the camshafts without axial movement.

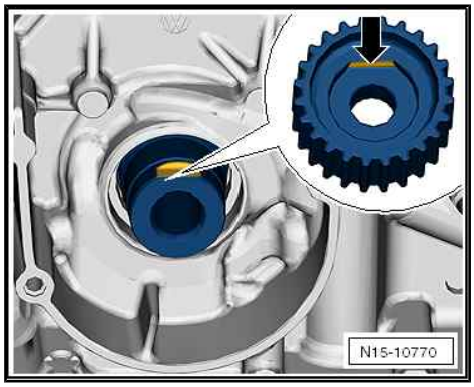


- Metal lug -arrow- of tensioning roller must engage in cast recess on cylinder head.



– 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

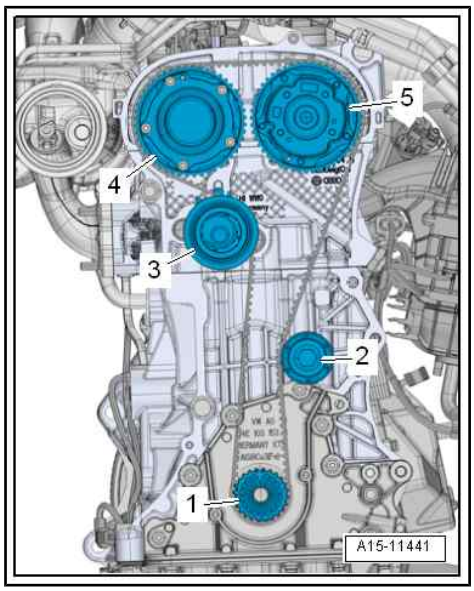
3 - Tensioning roller

4 - Camshaft sprocket, exhaust side

5 - Camshaft sprocket, inlet side

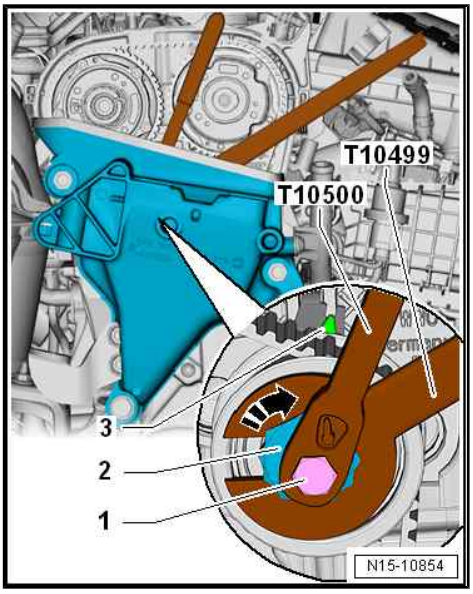
– Install toothed belt cover (bottom section).

– Install pulley
⇒ “1.7 Removing and installing pulley”, page 92 .



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– Using special wrench, 30 mm - T10499- , 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.
– 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.

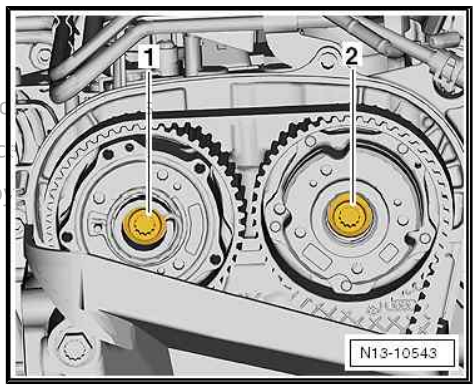
NOTICE

Risk of damage to camshaft if handled incorrectly.

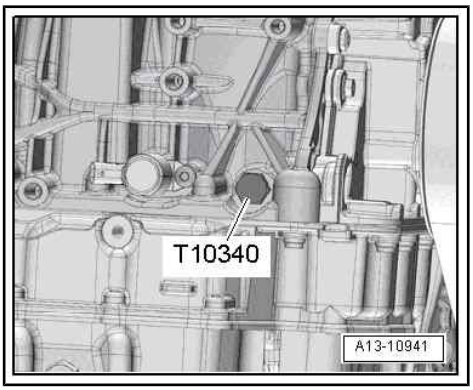
– Never use camshaft clamp as a counterhold tool.

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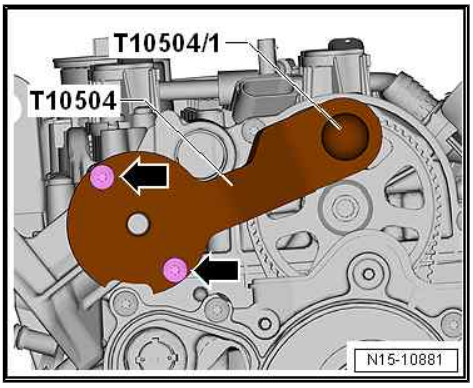
– Tighten bolts -1, 2- initially to 50 Nm (use counterhold tool - T10172- with counterhold tool - T10554/1-).



– Remove locking pin - T10340- .

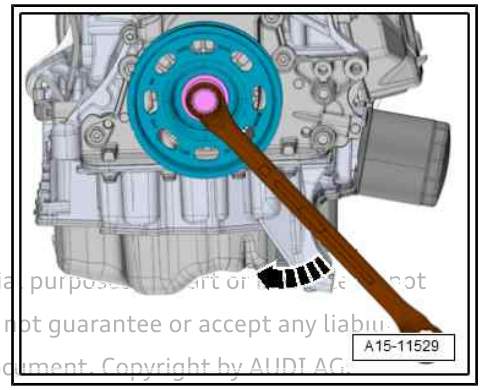


– Remove locating pin -T10504/1- .
– Remove bolts -arrows- and detach camshaft clamp - T10504- .



Checking valve timing:

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

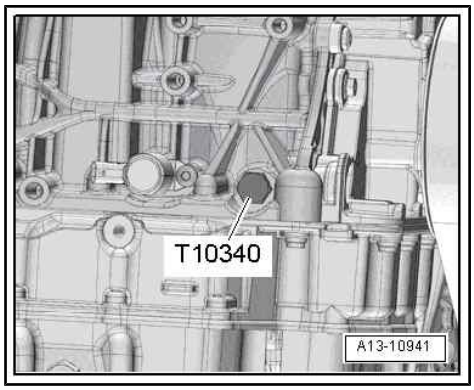


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– Screw locking pin - T10340- into cylinder block as far as stop and tighten to 30 Nm.

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

• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)



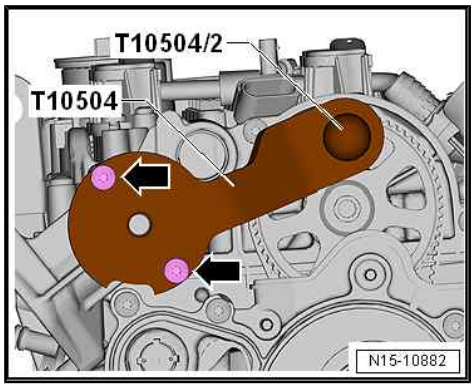
• It should be possible to insert the camshaft clamp - T10504- easily.

• 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.

– Screw in bolts -arrows- hand-tight.



NOTICE

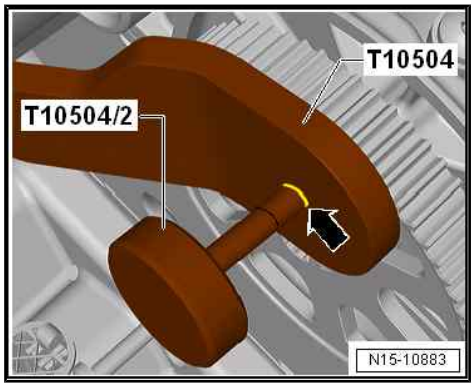
Risk of irreparable damage to engine if valve timing is incorrect

– Do not rotate crankshaft out of TDC position.

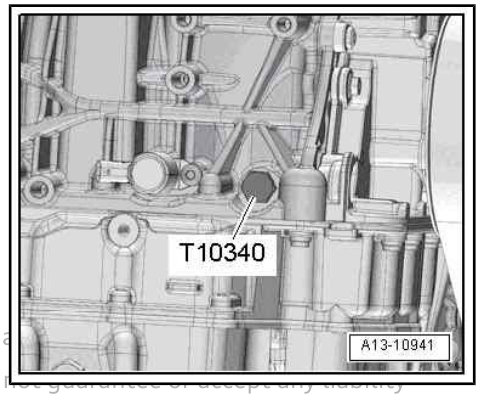
– Check whether groove -arrow- on test pin -T10504/2- is flush with camshaft clamp - T10504- .

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 169 .



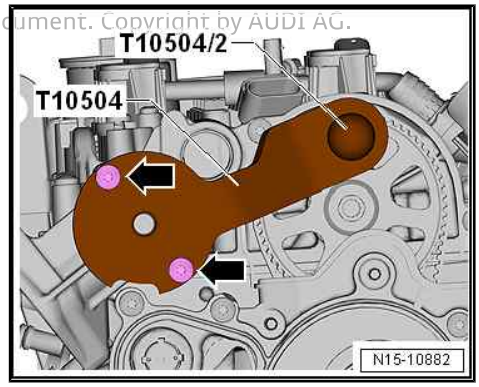
If it is possible to insert camshaft clamp - T10504- with test pin - T10504/2- , valve timing is OK.



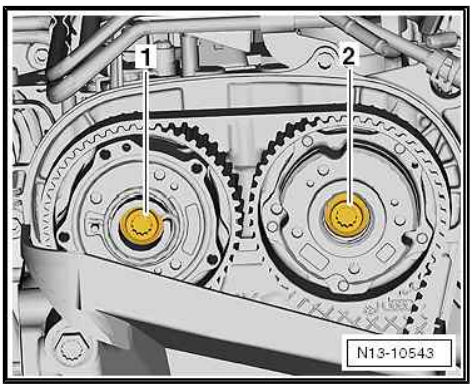
– Remove locking pin - T10340- .

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– Remove bolts -arrows- and detach camshaft clamp - T10504- with test pin -T10504/2- .



– Tighten bolts -1, 2- to final tightening torque ⇒ page 124 using counterhold tool - T10172- with counterhold tool - T10554/1- .



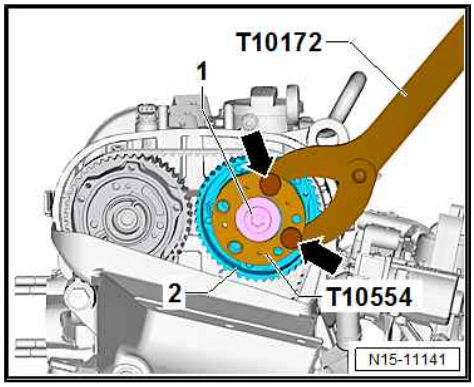
– Tighten plug -1- using counterhold tool - T10172- with counterhold tool - T10554/1- .

• Check that locking pin and camshaft clamp have been removed.

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

• Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .



Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 80
- ⇒ “1.2.2 Exploded view - toothed belt, engine with two camshaft adjusters”, page 125
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85
- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “3.1.2 Exploded view - crankcase breather system (engines with cylinder shut-off)”, page 295
- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

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2 Cylinder head

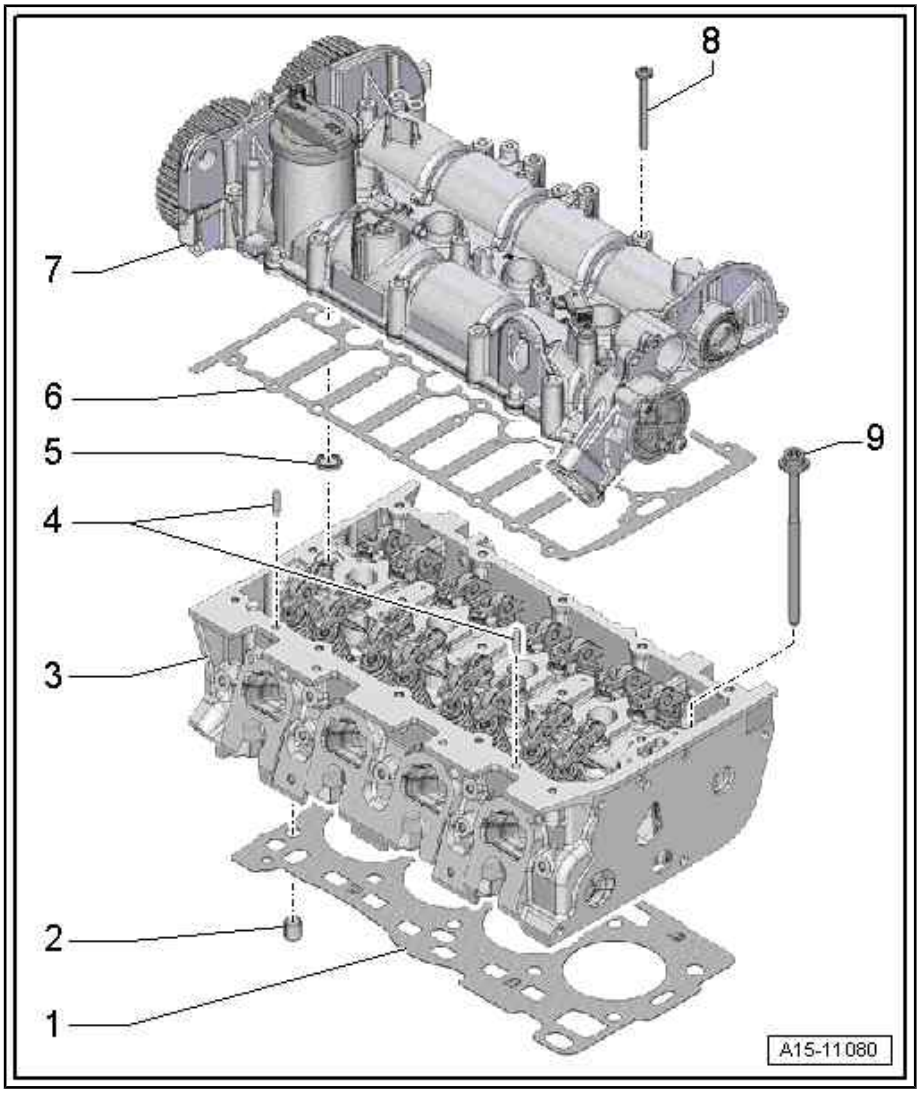
⇒ “2.1 Exploded view - cylinder head”, page 227

⇒ “2.2 Removing and installing cylinder head”, page 228

⇒ “2.3 Removing and installing camshaft housing”, page 238

⇒ “2.4 Checking compression”, page 247

2.1 Exploded view - cylinder head



1 - Cylinder head gasket

- ❑ Renewing ⇒ “2.2 Removing and installing cylinder head”, page 228
- ❑ 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 ⇒ “2.2 Removing and installing cylinder head”, page 228
- ❑ Checking for distortion ⇒ Fig. ““Checking cylinder head for distortion”“ , page 228

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 with cylinder shut-off has cam actuators fitted
- ❑ Removing and installing ⇒ “2.3 Removing and installing camshaft housing”, page 238

8 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Camshaft housing - tightening torque and sequence”“ , page 252

9 - Bolt

- ❑ Renew after removing
- ❑ Correct sequence when slackening ⇒ page 231
- ❑ Tightening torque and sequence ⇒ Fig. ““Cylinder head - tightening torque and sequence”“ , page 228

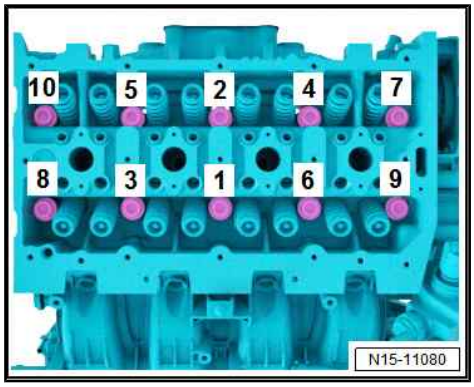
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Cylinder head - tightening torque and sequence

- 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

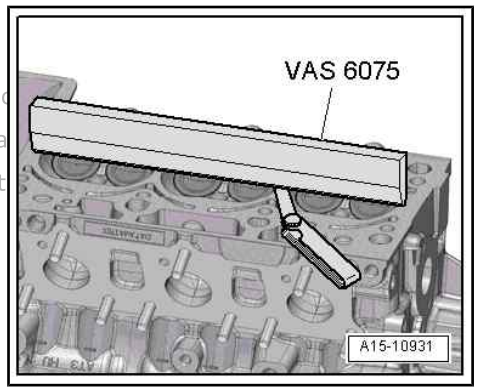


Checking cylinder head for distortion

– 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.

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2.2 Removing and installing cylinder head

⇒ “2.2.1 Removing and installing cylinder head - all vehicles except e-tron”, page 228

⇒ “2.2.2 Removing and installing cylinder head - e-tron”, page 232

2.2.1 Removing and installing cylinder head - all vehicles except e-tron

Removing

- Re-install all heat insulation sleeves in the same locations when installing.

– Remove camshaft housing
⇒ “2.3.1 Removing and installing camshaft housing - all vehicles except e-tron”, page 238 .

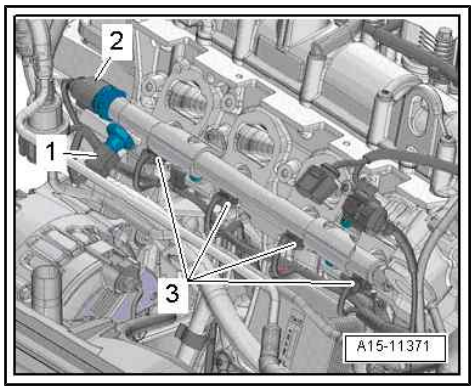
– Remove intake manifold
⇒ “3.2.1 Removing and installing intake manifold - all vehicles except e-tron”, page 468 .

– Unplug electrical connectors:

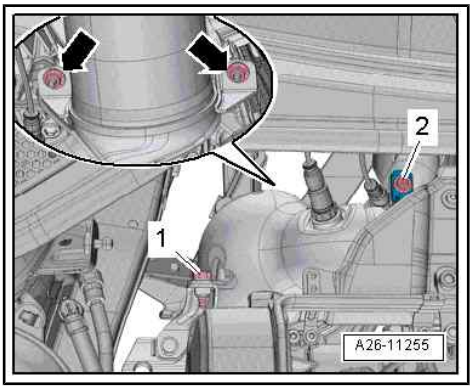
1 - At oil pressure switch for reduced oil pressure - F378-

2 - At fuel pressure sender - G247-

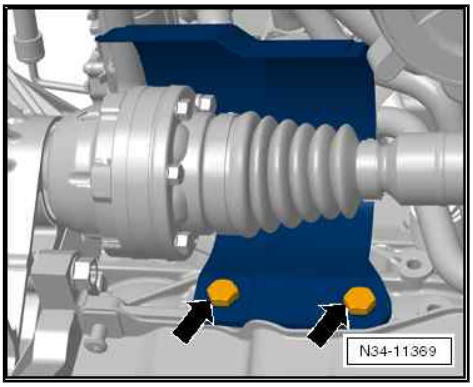
3 - At injectors -N30- ... -N33-



– Unscrew bolt -2- and remove screw-type clip.
– Remove bolt -1- and nuts -arrows- and tie up catalytic converter.

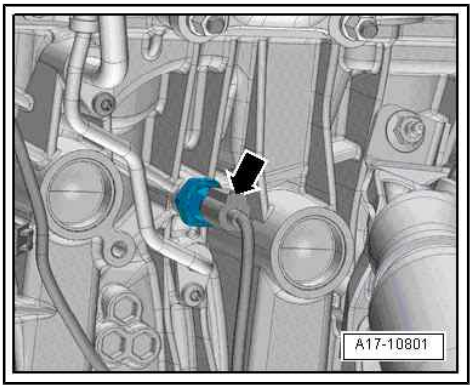


– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



1.2 ltr. engine:

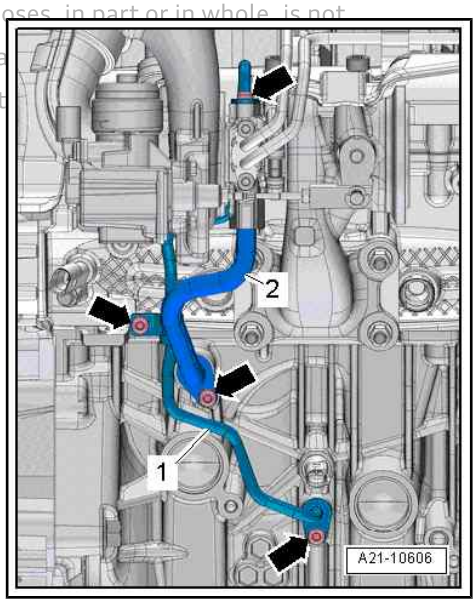
– Detach heat insulation sleeve.
– Unplug electrical connector -arrow- on oil pressure switch - F22- .



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All engine versions (continued):

– Unscrew bolts -arrows- and detach oil supply pipe -1- and oil return pipe -2-.

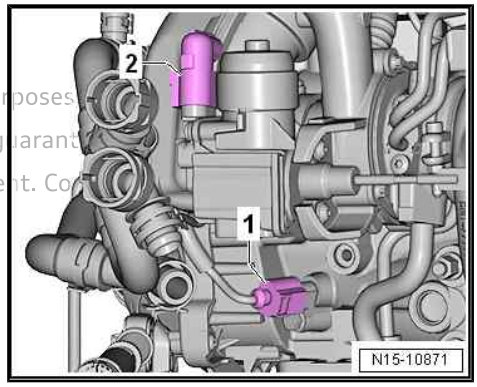


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– Unplug electrical connectors:

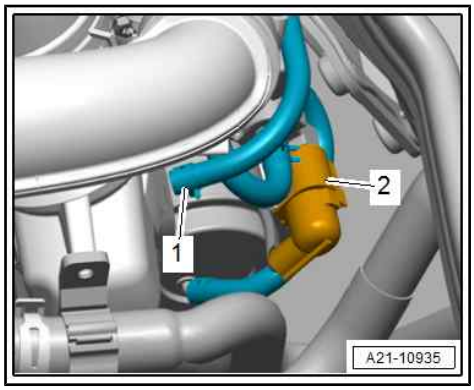
1 - For coolant temperature sender - G62-

2 - For charge pressure positioner - V465- (all versions except version with pneumatic charge pressure control)



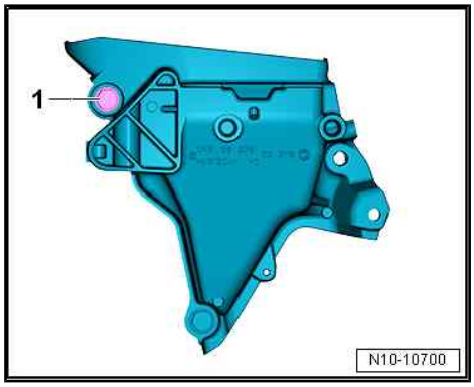
Engine with pneumatic charge pressure control:

– Unplug electrical connector -2- at charge pressure control solenoid valve - N75- .



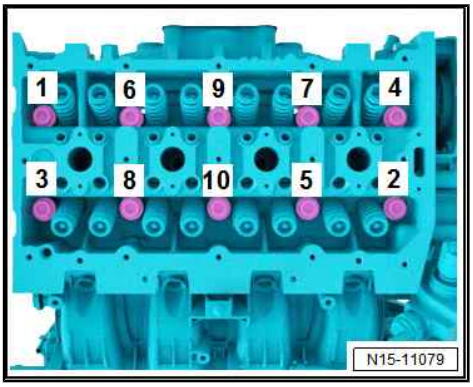
All engine versions (continued):

– 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

NOTICE

Risk of damage to sealing surfaces if handled incorrectly.

– Carefully remove sealant residue from cylinder head and cylinder block.

Note

- *Do NOT use abrasive materials (sandpaper, sanding discs, sanding pads, abrasive web, wire wool, etc.).*
- *When removing sealant residue, make sure none of the residue enters the open channels of the engine.*
- *Ensure that nearby workspaces are kept clean and that the abrasive materials listed above are not being used there.*
- *Use of non-approved abrasive materials can lead to subsequent damage to the turbocharger, conrod bearings, etc.*

CAUTION

Risk of eye injury due to sealant residue.

– Put on safety goggles.

– Sealant residue may only be removed from cylinder head and cylinder block using a commercially available scraper (blade width at least 40 mm).

– Remove loose residue with a lint-free cloth.

- No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.
- Renew bolts tightened with specified tightening angle.
- Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- When installing an exchange cylinder head, oil the contact surfaces between the roller rocker fingers and the running surfaces of the cams.
- Secure all hose connections with correct type of hose clips (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.
- 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.

– Carefully remove sealant residue from cylinder head and cylinder block.

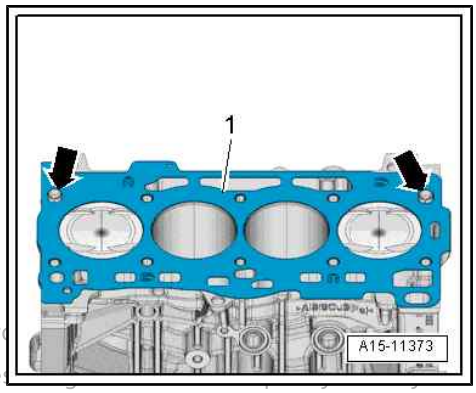
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– Clean blind holes for cylinder head bolts in cylinder block so that they are free of oil and coolant residue.

– 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 piston of cylinder 1 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 228 .

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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:

– Install intake manifold ⇒ "3.2.1 Removing and installing intake manifold - all vehicles except e-tron", page 468 .

– Install camshaft housing ⇒ "2.3.1 Removing and installing camshaft housing - all vehicles except e-tron", page 238 .

– Change engine oil ⇒ Maintenance ; Booklet 821 .

– Fill cooling system with fresh coolant ⇒ "1.3 Draining and filling cooling system", page 315 .

Tightening torques

♦ ⇒ Fig. ""Engine support - tightening torque and sequence"" , page 61

♦ ⇒ "2.1 Exploded view - cylinder head", page 227

♦ ⇒ "1.1 Exploded view - turbocharger", page 412

♦ ⇒ "2.1 Exploded view - air cleaner housing", page 462

♦ ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 525

♦ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft

2.2.2 Removing and installing cylinder head - e-tron

Removing

• Re-install all heat insulation sleeves in the same locations when installing.

– Remove camshaft housing ⇒ "2.3.2 Removing and installing camshaft housing - e-tron", page 242 .

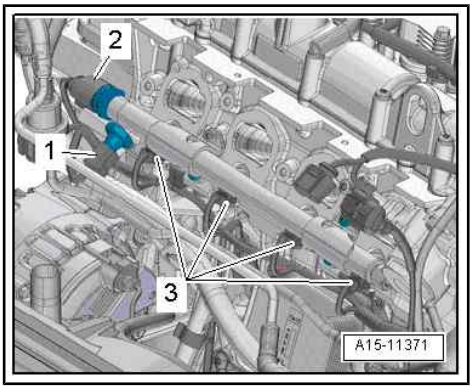
– Remove intake manifold ⇒ "3.2.2 Removing and installing intake manifold - e-tron", page 472 .

– Unplug electrical connectors:

1 - At oil pressure switch for reduced oil pressure - F378-

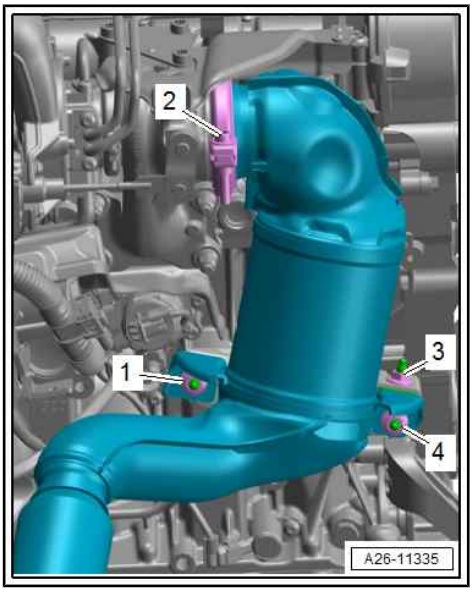
2 - At fuel pressure sender - G247-

3 - At injectors -N30- ... -N33-



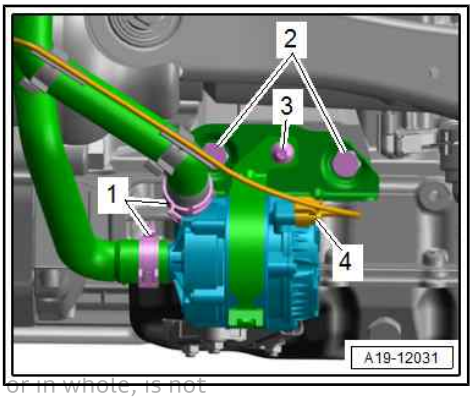
– Open screw-type clip -2- and place it on intake funnel of catalytic converter.

– Unscrew nuts -1, 4- and tie up catalytic converter.



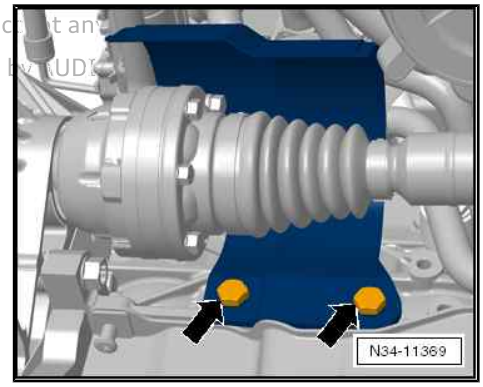
– Unplug electrical connector -4- and move wiring clear.

– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards rear.



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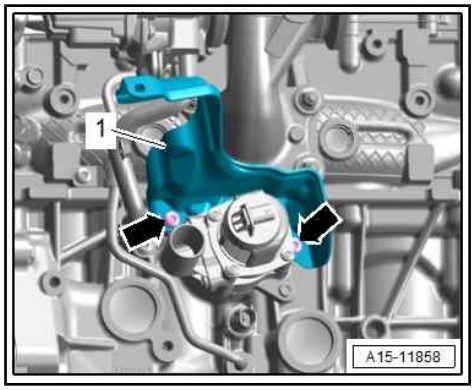
– Remove centre hex studs -arrows- and detach heat shield for drive shaft (right-side).



Version with secondary air system:

– Remove secondary air pump motor - V101-
⇒ “4.2 Removing and installing secondary air pump motor V101 ”, page 543 .

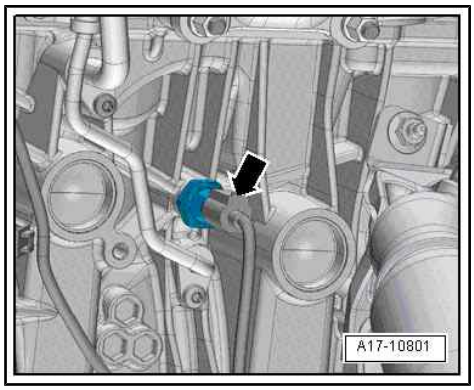
– Remove bolts -arrows- and detach heat shield -1-.



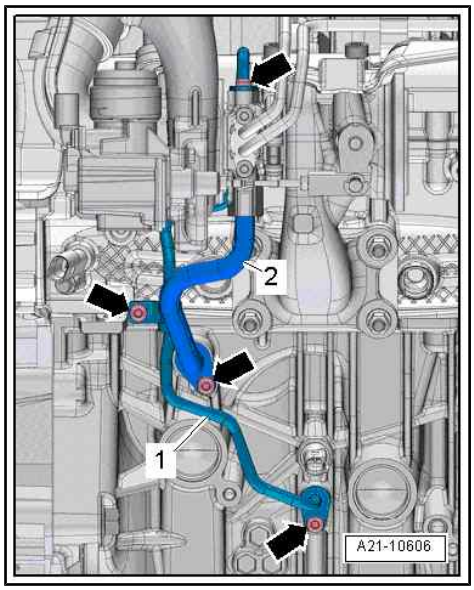
All vehicles (continued):

– Detach heat insulation sleeve.

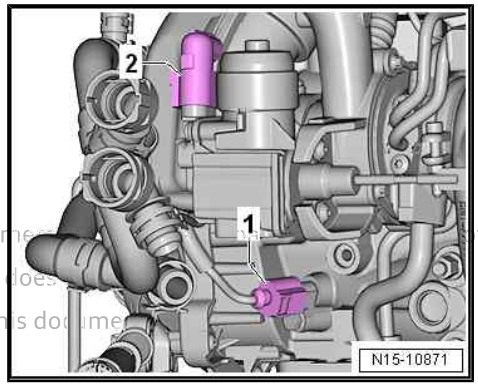
– Unplug electrical connector -arrow- on oil pressure switch - F22- .



– Unscrew bolts -arrows- and detach oil supply pipe -1- and oil return pipe -2-.

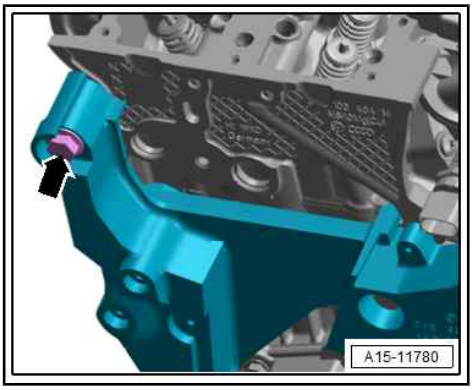


– Unplug electrical connectors for coolant temperature sender - G62- .



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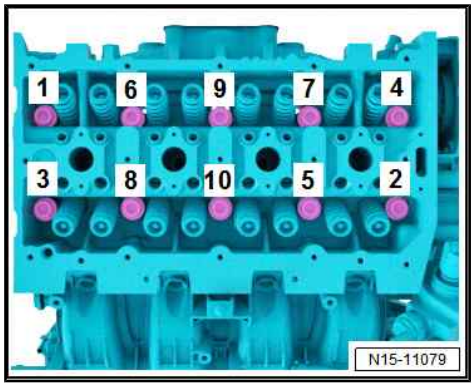
– Remove bolt -arrow- for engine support.



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– 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

NOTICE

Risk of damage to sealing surfaces if handled incorrectly.

– Carefully remove sealant residue from cylinder head and cylinder block.

Note

- *Do NOT use abrasive materials (sandpaper, sanding discs, sanding pads, abrasive web, wire wool, etc.).*
- *When removing sealant residue, make sure none of the residue enters the open channels of the engine.*
- *Ensure that nearby workspaces are kept clean and that the abrasive materials listed above are not being used there.*
- *Use of non-approved abrasive materials can lead to subsequent damage to the turbocharger, conrod bearings, etc.*

CAUTION

Risk of eye injury due to sealant residue.

– Put on safety goggles.

– Sealant residue may only be removed from cylinder head and cylinder block using a commercially available scraper (blade width at least 40 mm).

– Remove loose residue with a lint-free cloth.

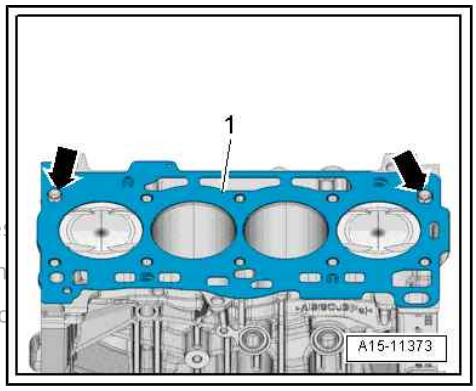
- No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.
- Renew bolts tightened with specified tightening angle.
- Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- When installing an exchange cylinder head, oil the contact surfaces between the roller rocker fingers and the running surfaces of the cams.
- Secure all hose connections with correct type of hose clips (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.
- 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.

– Carefully remove sealant residue from cylinder head and cylinder block.

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– Clean blind holes for cylinder head bolts in cylinder block so that they are free of oil and coolant residue.

– 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 piston of cylinder 1 to top dead centre and then turn crankshaft back slightly.

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– Fit cylinder head.

– Insert and hand-tighten cylinder head bolts.

– Tighten cylinder head bolts
⇒ Fig. ""Cylinder head - tightening torque and sequence"" , page 228 .

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:

– Install intake manifold
⇒ "3.2.2 Removing and installing intake manifold - e-tron", page 472 .

– Install camshaft housing
⇒ "2.3.2 Removing and installing camshaft housing - e-tron", page 242 .

– Change engine oil ⇒ Maintenance ; Booklet 821 .

– Fill cooling system with fresh coolant
⇒ "1.3 Draining and filling cooling system", page 315 .

Tightening torques

♦ ⇒ Fig. ""Engine support - tightening torque and sequence"" , page 61

♦ ⇒ "2.1 Exploded view - cylinder head", page 227

♦ ⇒ "4.2.2 Exploded view - electric coolant pump, e-tron", page 347

♦ ⇒ "1.1.4 Exploded view - turbocharger, e-tron", page 418

♦ ⇒ "2.1 Exploded view - air cleaner housing", page 462

♦ ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 525

♦ ⇒ "4.1 Exploded view - secondary air system", page 542

♦ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft

2.3 Removing and installing camshaft housing

⇒ “2.3.1 Removing and installing camshaft housing - all vehicles except e-tron”, page 238

⇒ “2.3.2 Removing and installing camshaft housing - e-tron”, page 242

2.3.1 Removing and installing camshaft housing - all vehicles except e-tron

Removing

– Remove engine cover panel ⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

– Remove coolant pump ⇒ “4.5.1 Removing and installing coolant pump - all vehicles except e-tron”, page 351 .

– Remove air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

– Remove ignition coils ⇒ “1.3 Removing and installing ignition coils”, page 549 .

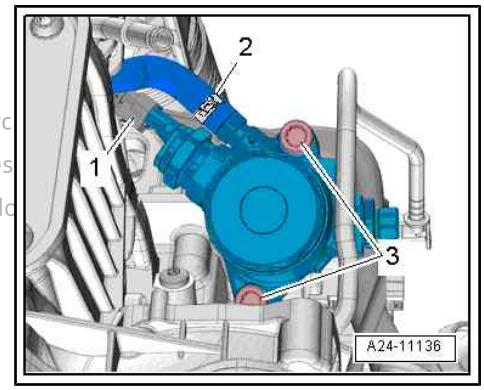
– Detach toothed belt from camshafts ⇒ “1.3 Detaching toothed belt from camshaft”, page 127 .

– Remove high-pressure pipe ⇒ “6.3 Removing and installing high-pressure pipe”, page 498 .

– Unplug electrical connector -1-.

– Release hose clip -2- and disconnect hose.

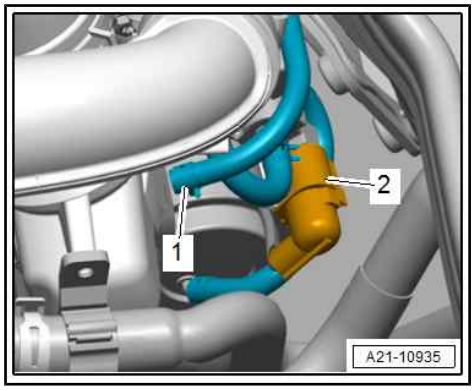
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Engine with pneumatic charge pressure control:

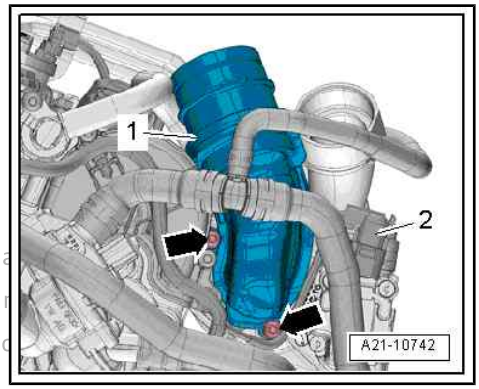
– Unplug electrical connector -2- at charge pressure control solenoid valve - N75- .

– Detach vacuum hose -1-.



All engines except version with pneumatic charge pressure control:

– Unplug electrical connector -2- at charge pressure positioner - V465- .



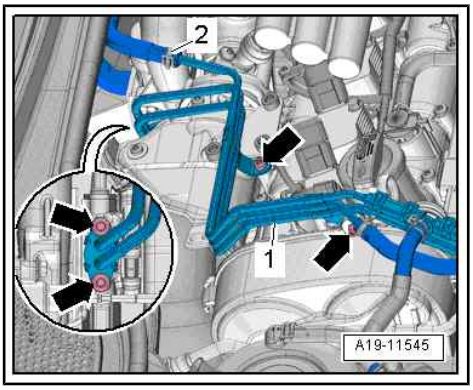
All engine versions (continued):

– Remove bolts -arrows- and detach connection -1-.

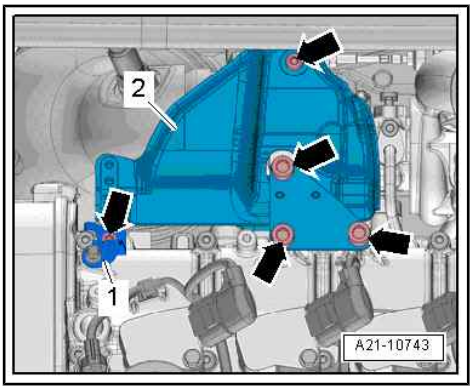
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– If fitted, release hose clip -2- and detach coolant hose.

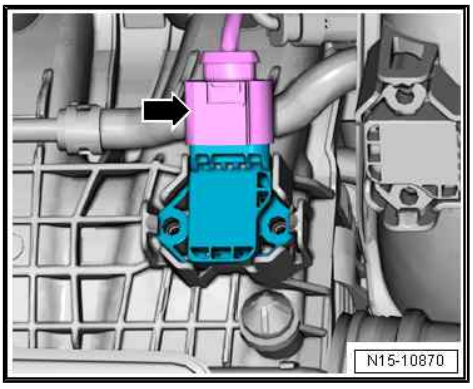
– Remove bolts -arrows- and pivot coolant lines to right side.



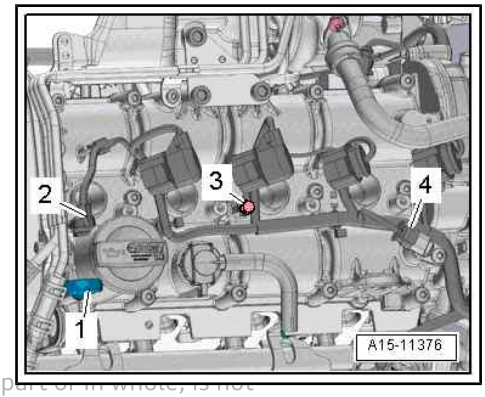
– Remove bolts -arrows- and detach bracket with heat shield -2- and bracket -1- for engine cover panel.



– Unplug electrical connector -arrow- at intake air temperature sender - G42- / intake manifold pressure sender - G71- .



Engine with one camshaft adjuster:



– Unplug electrical connectors:

2 - For camshaft control valve 1 - N205-

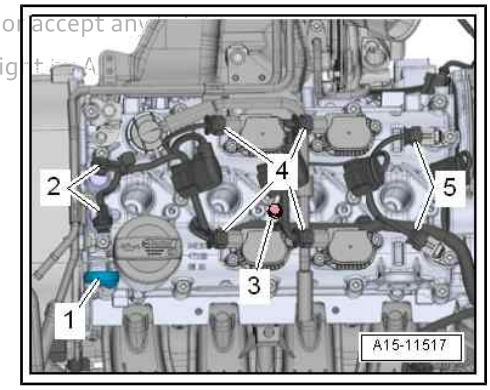
4 - For Hall sender - G40-

– Remove bolt -3-, move wiring harness clear and place to left side.

– Pull out oil dipstick -1-.

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Engine with two camshaft adjusters and cylinder shut-off:



– Unplug electrical connectors:

2 - For camshaft control valve 1 - N205- / exhaust camshaft control valve 1 - N318-

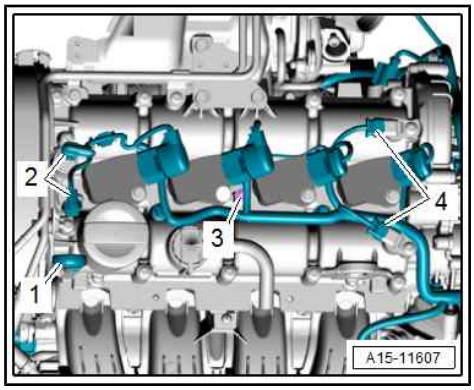
4 - For cam actuators -N583- ... -N597-

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 with two camshaft adjusters:



– Unplug electrical connectors:

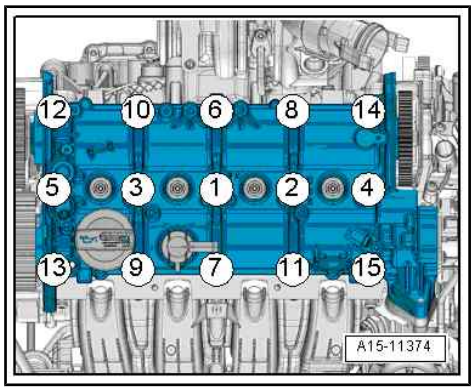
2 - For camshaft control valve 1 - N205- / exhaust camshaft control valve 1 - N318-

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.

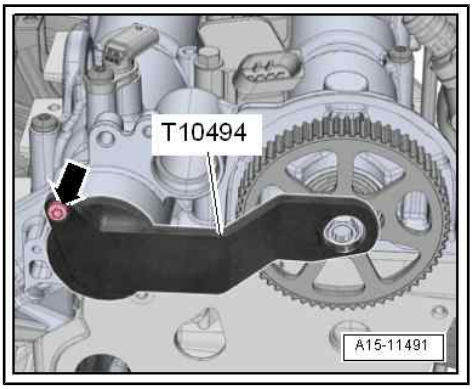
Installing

- Renew bolts tightened with specified tightening angle.
- Renew gaskets and seals.

– Check “TDC” position of camshaft and crankshaft:

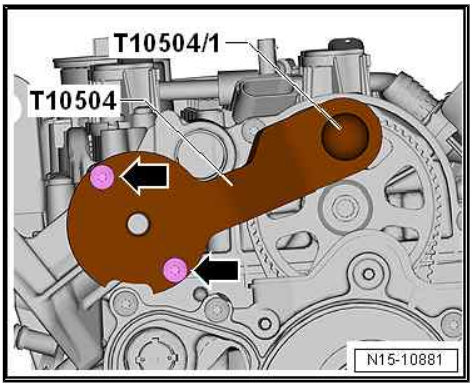
Engines without cylinder shut-off:

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



Engines with cylinder shut-off:

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



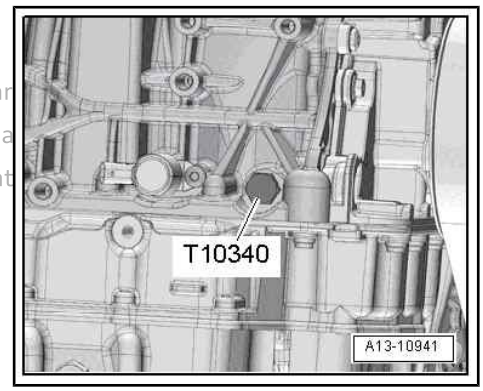
All engine versions (continued):

NOTICE

Risk of damage to valve gear if camshafts are moved axially.

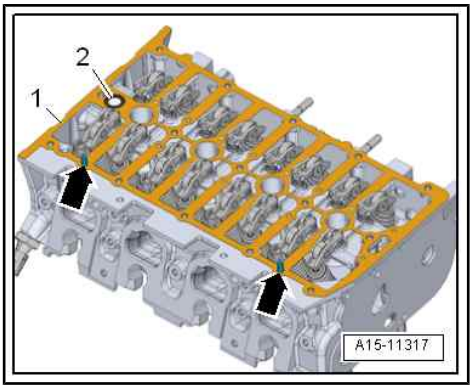
– Never move camshafts axially when turning.

- 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.



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– 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-.



Engines with cylinder shut-off:

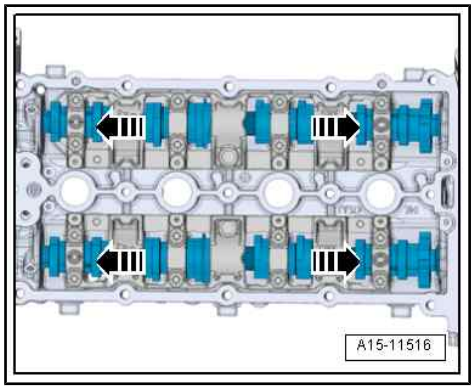
NOTICE

Irreparable engine damage can be caused if sliders are installed in wrong position.

– Move sliders into correct installation position.

– Bring camshaft sliders into installation position -arrows-:

• Sliders must be moved towards both ends of each camshaft.

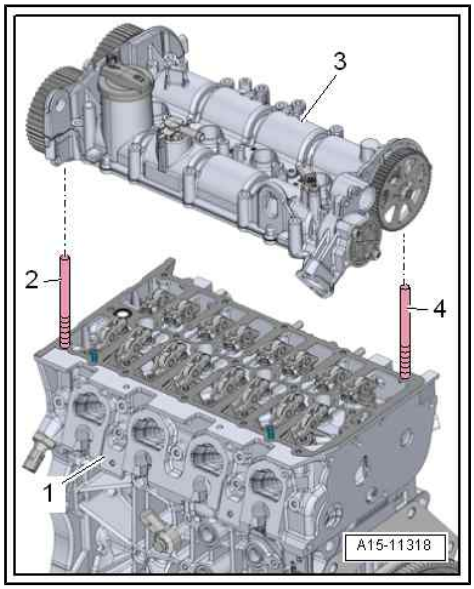


All engine versions (continued):

– Screw 2 studs -items 2, 4- (e.g. -T10288/4-) into cylinder head.

– Carefully lower camshaft housing -3- vertically onto studs in cylinder head, taking care not to tilt it.

– Tighten camshaft housing bolts
⇒ Fig. ""Camshaft housing - tightening torque and sequence"" , page 252 .



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

– Install high-pressure pipe
⇒ "6.2 Removing and installing high-pressure pump", page 496 .

– Install toothed belt (adjust valve timing)
⇒ "1.2 Exploded view - toothed belt", page 124 .

– Install ignition coils
⇒ "1.3 Removing and installing ignition coils", page 549 .

– Install coolant pump
⇒ "4.5.1 Removing and installing coolant pump - all vehicles except e-tron", page 351 .

– 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 79 .

Tightening torques

◆ ⇒ "3.1.1 Exploded view - camshaft housing", page 250

◆ ⇒ "1.1 Exploded view - turbocharger", page 412

◆ ⇒ "2.1 Exploded view - air cleaner housing", page 462

2.3.2 Removing and installing camshaft housing - e-tron

Removing

– Remove engine cover panel
⇒ "3.1 Removing and installing engine cover panel", page 79 .

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– Remove coolant pump
⇒ "4.5.2 Removing and installing coolant pump - e-tron", page 355 .

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

– Remove ignition coils
⇒ “1.3 Removing and installing ignition coils”, page 549 .

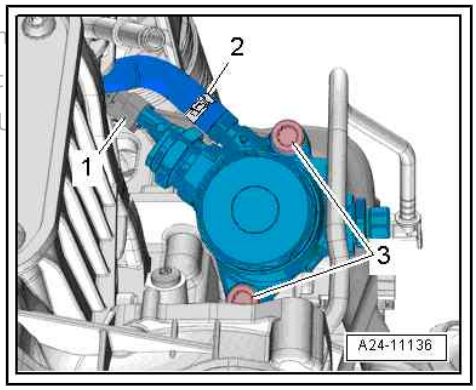
– Detach toothed belt from camshafts
⇒ “1.3 Detaching toothed belt from camshaft”, page 127 .

– Remove high-pressure pipe
⇒ “6.3 Removing and installing high-pressure pipe”, page 498 .

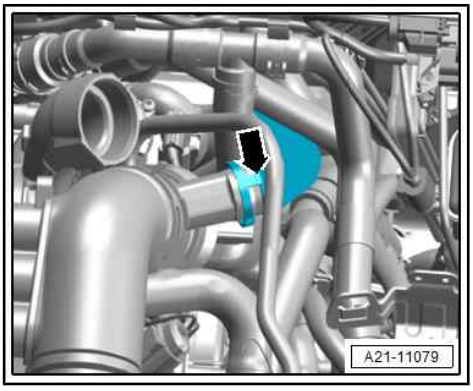
– Unplug electrical connector -1-.

– Release hose clip -2- and disconnect hose.

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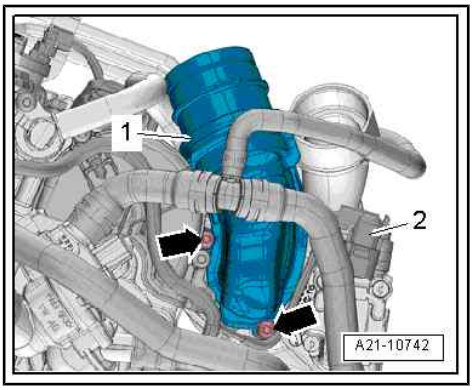


– Version with secondary air system: Press release tabs on both sides and disconnect secondary air hose -arrow-.

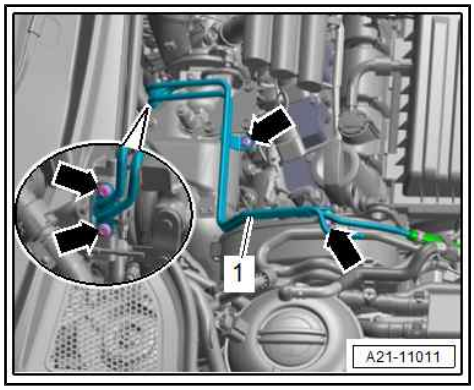


– Unplug electrical connector -2- at charge pressure positioner - V465- .

– Remove bolts -arrow-, detach connection -1- and move to one side.

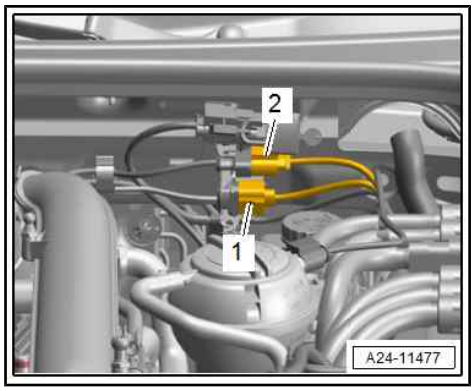


– Remove bolts -arrows- and pivot coolant lines -1- to right side.



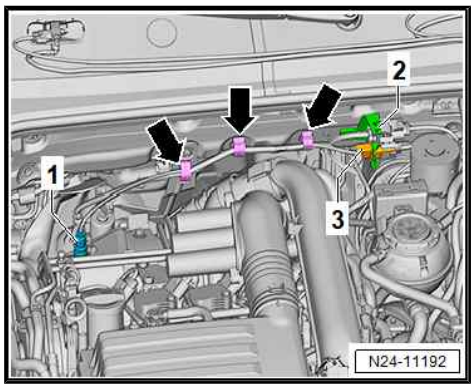
Vehicles without particulate filter:

– Take electrical connector -1- for Lambda probe - G39- out of bracket, unplug and move wiring clear.



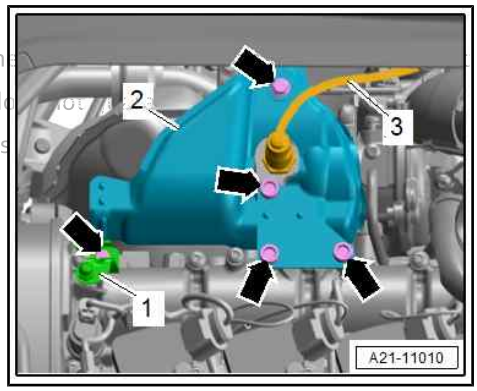
Vehicles with particulate filter:

– Take electrical connector -3- for Lambda probe 1 before catalytic converter - GX10- out of bracket -2-, unplug it and move wiring clear at retainers -arrows-.



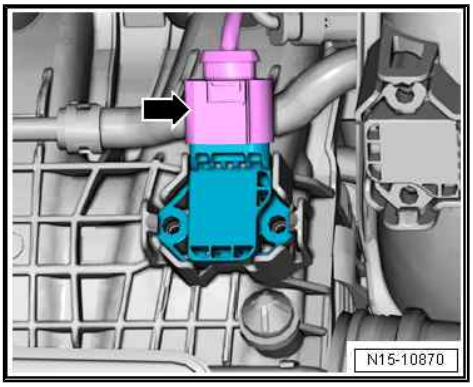
All vehicles (continued):

– Remove bolts -arrows- and detach heat shield -2- and bracket -1- for engine cover panel (guide out wire -3- for Lambda probe while doing so).



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– Unplug electrical connector -arrow- at intake air temperature sender - G42- / intake manifold pressure sender - G71- .



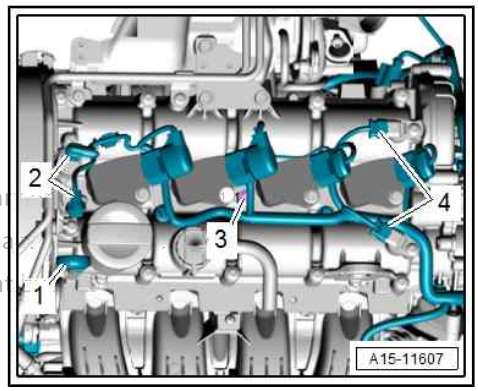
– Unplug electrical connectors:

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.

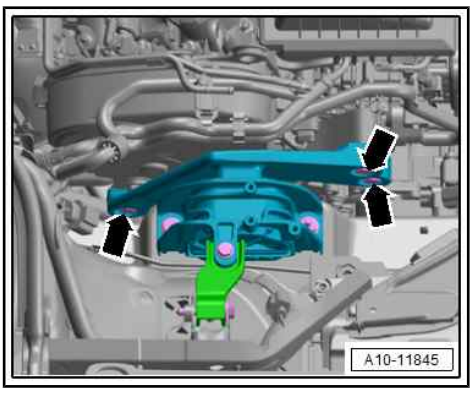
– Pull out oil dipstick -1-.



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– Bring toothed belt cover (bottom) and engine mounting into installation position.

– Secure engine mounting to engine -arrows- (tighten to 20 Nm) and detach spindle - 10-222A/11- from camshaft housing.

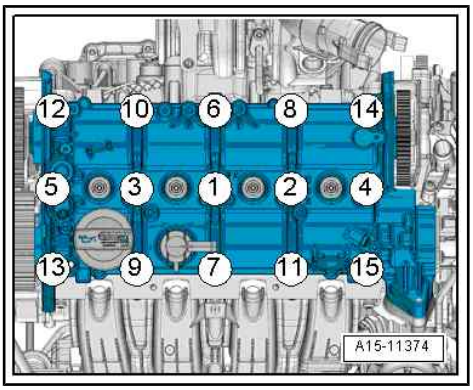


– Loosen and remove bolts for camshaft housing in the sequence -15 ... 1-.

– 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.

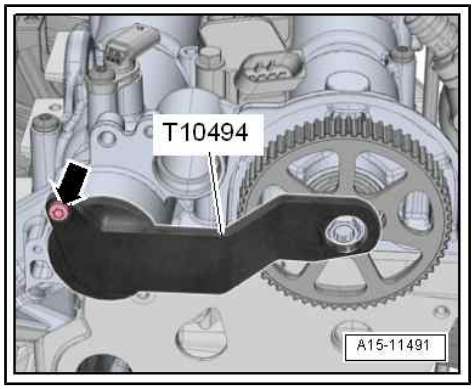


Installing

- Renew bolts tightened with specified tightening angle.
- Renew gaskets and seals.

– Check “TDC” position of camshaft and crankshaft:

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

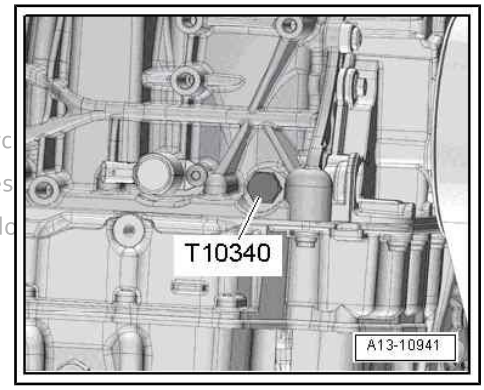


NOTICE

Risk of damage to valve gear if camshafts are moved axially.

– Never move camshafts axially when turning.

- 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.

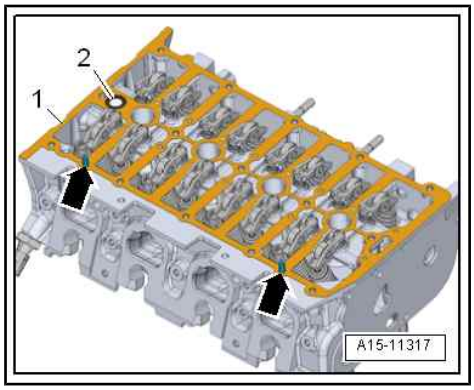


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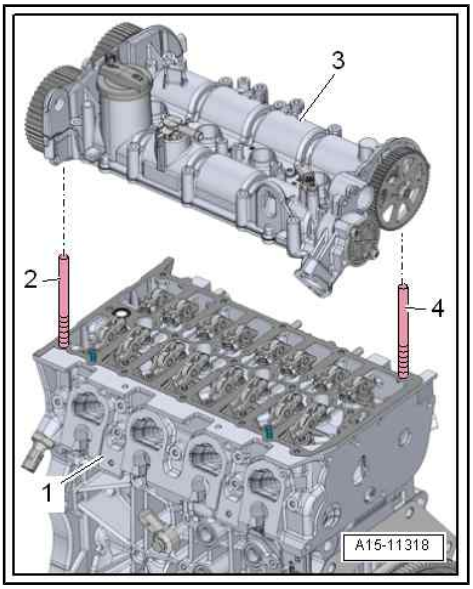
– Make sure that all roller rocker fingers make contact with the valve ends correctly and are clipped into their respective support elements.

– Fit gasket -2- in cylinder head -1-. Gasket -2- is fitted on some vehicle versions only; for allocation refer to ⇒ Electronic parts catalogue .

– Fit gasket onto dowel pins -arrows-.



– Screw 2 studs -items 2, 4- (e.g. -T10288/4-) into cylinder head.
– Carefully lower camshaft housing -3- vertically onto studs in cylinder head, taking care not to tilt it.
– Tighten camshaft housing bolts
⇒ Fig. ""Camshaft housing - tightening torque and sequence"" , page 252 .



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

– Install high-pressure pipe
⇒ “6.2 Removing and installing high-pressure pump”, page 496 .
– Install toothed belt (adjust valve timing)
⇒ “1.2 Exploded view - toothed belt”, page 124 .
– Install ignition coils
⇒ “1.3 Removing and installing ignition coils”, page 549 .
– Install coolant pump
⇒ “4.5.1 Removing and installing coolant pump - all vehicles except e-tron”, page 351 .
– 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 79 .

NOTICE

Risk of damage to valves and piston crowns after working on valve gear if valve timing is incorrect.

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

Tightening torques

- ⇒ “3.1.1 Exploded view - camshaft housing”, page 250
- ⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418
- ⇒ “2.1 Exploded view - air cleaner housing”, page 462

2.4 Checking compression

Special tools and workshop equipment required

- Spark plug spanner - 3122B-

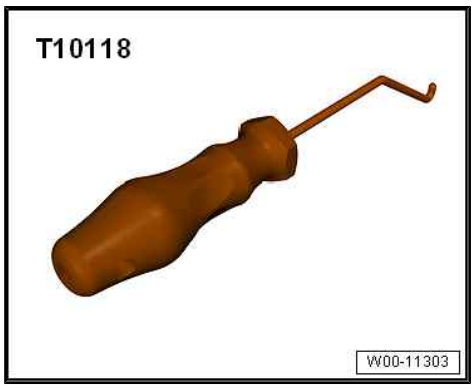


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♦ Compression tester - V.A.G 1763-



♦ Assembly tool - T10118-



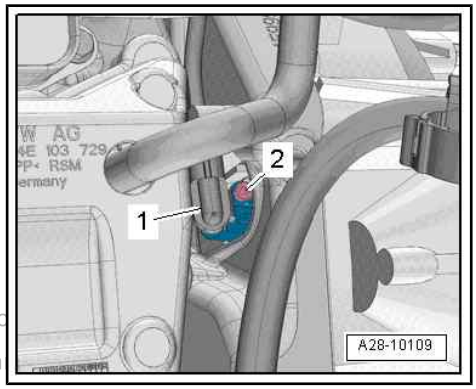
Procedure

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V

– Remove ignition coils
⇒ “1.3 Removing and installing ignition coils”, page 549 .

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

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– Use assembly tool - T10118- to release and unplug electrical connector -1- at engine speed sender - G28- .
– Check compression pressure with compression tester - V.A.G 1763- (see ⇒ operating instructions for details of how to use tester).
– Have a second 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.

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Compression pressure	bar
When new	10.0 … 15.0
Wear limit	7.0
Maximum difference between cylinders	3.0

Assembling

Assembly is performed in reverse sequence; note the following:

– Install spark plugs ⇒ Maintenance ; Booklet 821 ; Maintenance; Spark plugs: renewing .
– Install ignition coils
⇒ “1.3 Removing and installing ignition coils”, page 549 .
– 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 250

⇒ “3.2 Removing and installing cam actuators”, page 253

⇒ “3.3 Removing and installing camshaft control valve 1 N205 ”, page 254

⇒ “3.4 Measuring axial clearance of camshaft”, page 254

⇒ “3.5 Removing and installing camshaft oil seal”, page 255

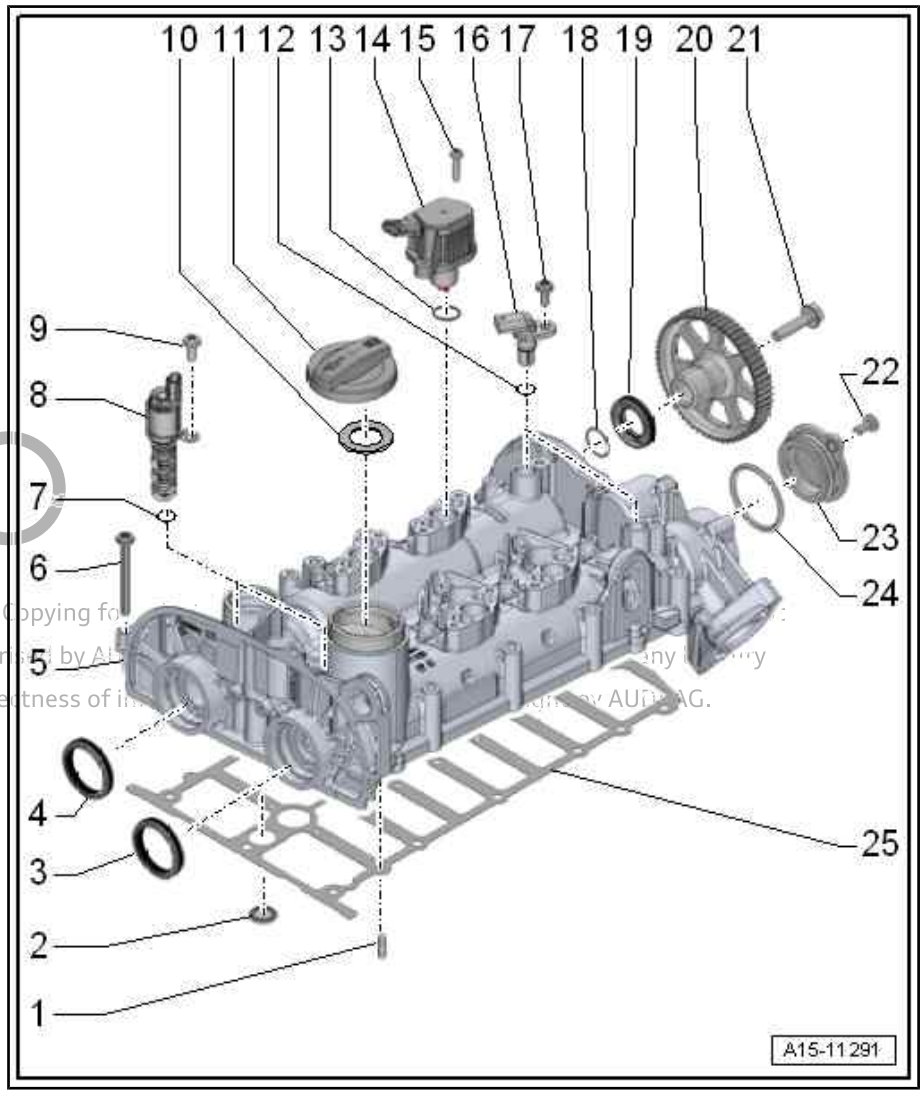
⇒ “3.6 Removing and installing valve stem oil seals”, page 263

3.1 Exploded view - valve gear

⇒ “3.1.1 Exploded view - camshaft housing”, page 250

⇒ “3.1.2 Exploded view - valves”, page 252

3.1.1 Exploded view - camshaft housing



1 - Dowel pin

2 - Seal

- ❑ With oil strainer on some versions
- ❑ Inserted into cylinder head

3 - Oil seal

- ❑ For inlet camshaft
- ❑ Renewing ⇒ “3.5.1 Removing and installing inlet camshaft oil seal (pulley end)”, page 255

4 - Oil seal

- ❑ For exhaust camshaft (pulley end)
- ❑ Renewing ⇒ “3.5.2 Removing and installing exhaust camshaft oil seal (pulley end)”, page 257

5 - Camshaft housing

- ❑ Removing and installing ⇒ “2.3 Removing and installing camshaft housing”, page 238

6 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Camshaft housing - tightening torque and sequence”“ , page 252

7 - O-ring

- ❑ Renew after removing

8 - Camshaft control valve 1 - N205-

- ❑ With oil strainer on more recent versions; allocation ⇒ Electronic parts catalogue

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- ❑ Additionally on engine with two camshaft adjusters: exhaust camshaft control valve 1 - N318-
- ❑ Removing and installing ⇒ “3.3 Removing and installing camshaft control valve 1 N205 ”, page 254

9 - Bolt
- ❑ 8 Nm

10 - Seal
- ❑ For filler cap

11 - Filler cap

12 - O-ring
- ❑ Renew after removing

13 - O-ring
- ❑ Only for engines with cylinder shut-off
- ❑ Renew after removing

14 - Inlet and exhaust cam actuators
- ❑ Only for engines with cylinder shut-off
- ❑ -N583- … -N597-
- ❑ Removing and installing ⇒ “3.2 Removing and installing cam actuators”, page 253

15 - Bolt
- ❑ Only for engines with cylinder shut-off
- ❑ 8 Nm

16 - Hall sender - G40-
- ❑ Additionally on engine with two camshaft adjusters: Hall sender 2 - G163-
- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

17 - Bolt
- ❑ Tightening torque ⇒ Item 6 (page 549)

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18 - O-ring
- ❑ Only for engines with cylinder shut-off
- ❑ Renew after removing

19 - Oil seal
- ❑ For exhaust camshaft (gearbox end)
- ❑ Renewing ⇒ “3.5 Removing and installing camshaft oil seal”, page 255

20 - Toothed belt sprocket
- ❑ For coolant pump
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Removing and installing
  ⇒ “4.6 Removing and installing toothed belt sprocket for coolant pump”, page 359

21 - Bolt
- ❑ Tightening torque ⇒ Item 8 (page 343)

22 - Bolt
- ❑ 8 Nm

23 - Filler cap

24 - O-ring
- ❑ Renew after removing

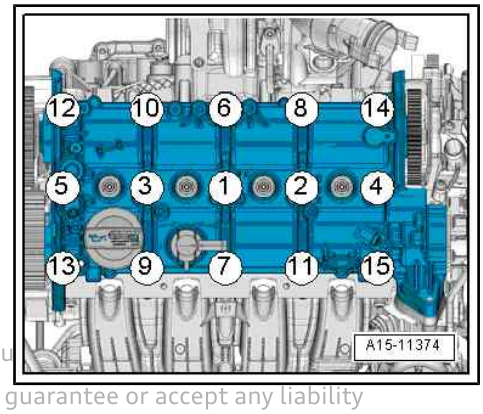
25 - Gasket
- ❑ Renew after removing

Camshaft housing - tightening torque and sequence

– Renew bolts tightened with specified tightening angle.

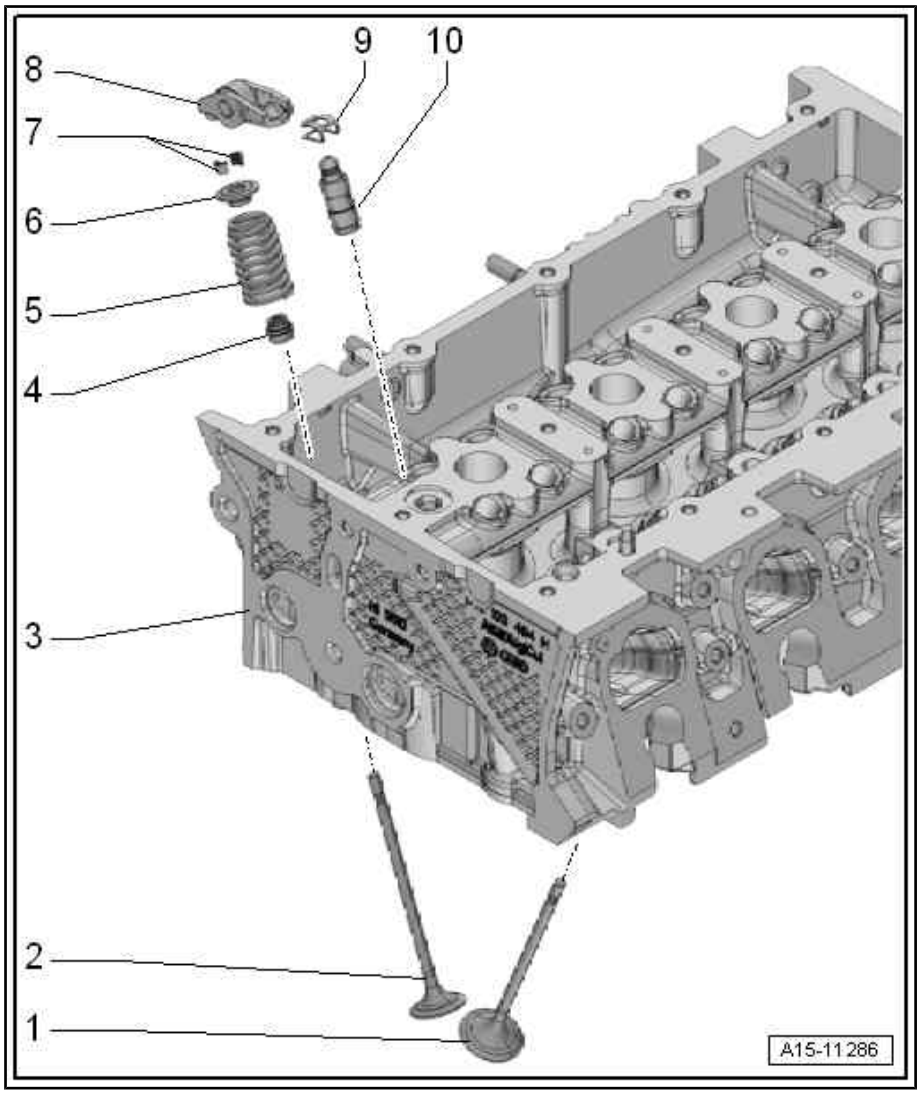
– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 15-	10 Nm
2.	-1 … 15-	Turn 180° further



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3.1.2 Exploded view - valves



1 - Inlet valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Valve dimensions ⇒ “4.3 Valve dimensions”, page 272
- ❑ Checking valve guides ⇒ “4.1 Checking valve guides”, page 271

2 - Exhaust valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Valve dimensions ⇒ “4.3 Valve dimensions”, page 272
- ❑ Checking valve guides ⇒ “4.1 Checking valve guides”, page 271

3 - Cylinder head

4 - Valve stem oil seal

- ❑ Renewing ⇒ “3.6 Removing and installing valve stem oil seals”, page 263

5 - Valve spring

- ❑ Installation position ⇒ Fig. ““Position of valve spring”“ , page 253

6 - Valve spring plate

7 - Valve cotters

8 - Roller rocker finger

- ❑ Removing and installing ⇒ “2.3 Removing and installing camshaft housing”, page 238
- ❑ 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

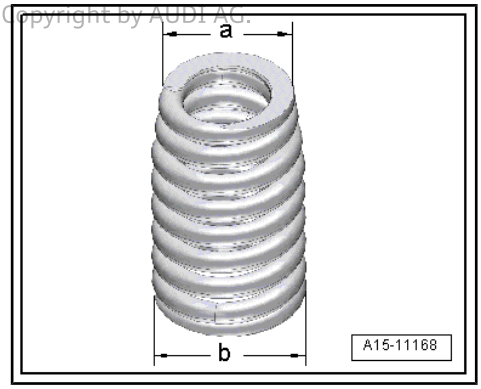
10 - Hydraulic compensation element

- ❑ Do not interchange
- ❑ Lubricate contact surface

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Position of valve spring

- The smaller ∅ -a- faces the valve spring plate.
- The larger ∅ -b- faces the cylinder head.



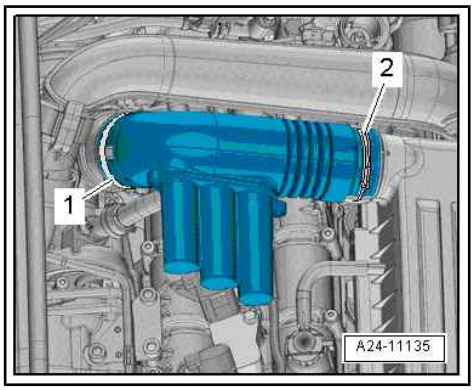
3.2 Removing and installing cam actuators

Only for engines with cylinder shut-off

Removing

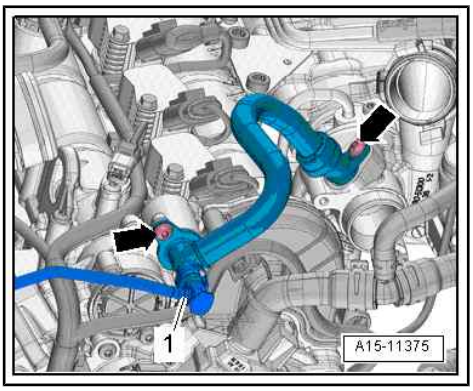
– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 79 .

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



Exhaust cam actuator, cylinder 3:

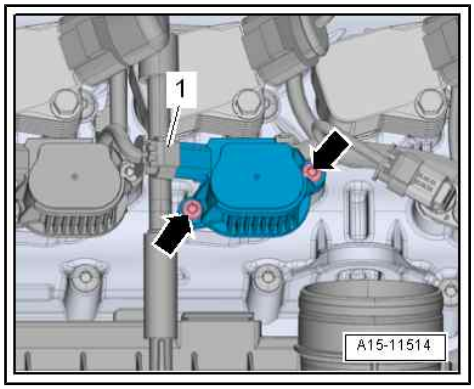
– Remove bolts -arrows- and push crankcase breather hose slightly to one side (with hose -1- going to activated charcoal filter attached).



Continued for all cam actuators:

– Unplug relevant electrical connector -1-.

– Remove bolts -arrows- and detach cam actuator.



Installing

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

- Renew O-ring.

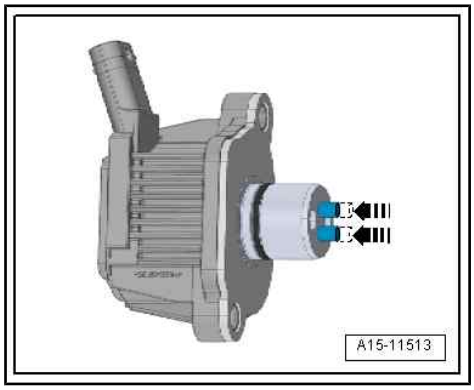
– Bring pins of actuators for camshaft adjustment into installation position.

- Pins of all actuators must be inserted completely -arrows-.

Tightening torques

◆ ⇒ “3.1 Exploded view - valve gear”, page 250

◆ ⇒ “1.1 Exploded view - turbocharger”, page 412



3.3 Removing and installing camshaft control valve 1 - N205-

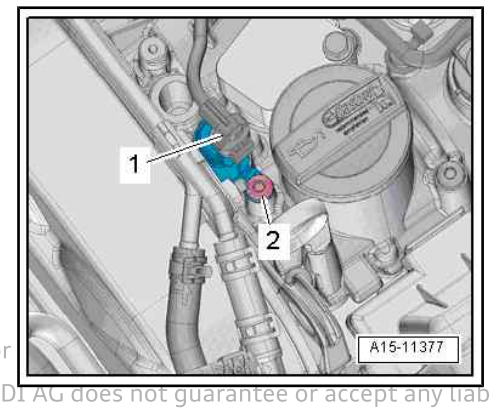
Follow the same procedure to remove exhaust camshaft control valve 1 - N318- .

Removing

– Remove engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 79 .

– Unplug electrical connector -1-.

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



Installing

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

- Renew O-ring.

Tightening torques

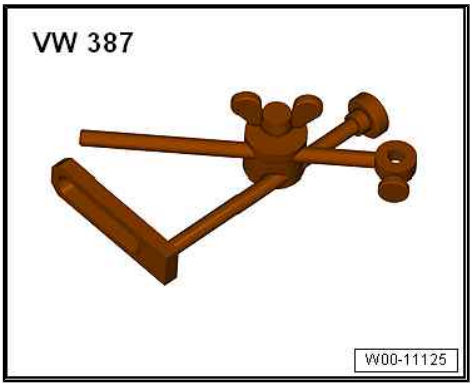
◆ ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

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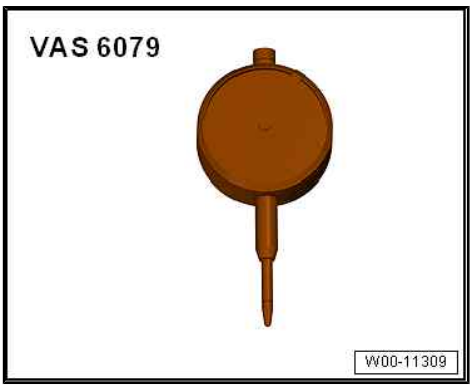
3.4 Measuring axial clearance of camshaft

Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-



- Dial gauge - VAS 6079-



Procedure

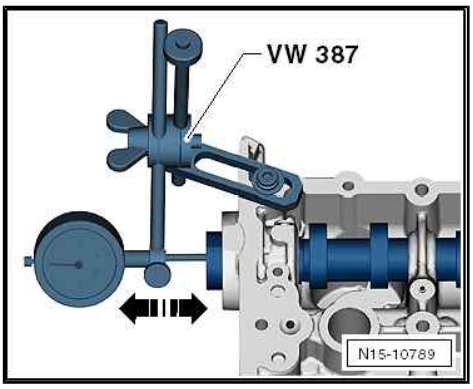
– Remove camshaft housing
⇒ “2.3 Removing and installing camshaft housing”, page 238 .

– 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.

3.5 Removing and installing camshaft oil seal

⇒ “3.5.1 Removing and installing inlet camshaft oil seal (pulley end)”, page 255

⇒ “3.5.2 Removing and installing exhaust camshaft oil seal (pulley end)”, page 257

⇒ “3.5.3 Removing and installing exhaust camshaft oil seal (gearbox end) - engines without cylinder shut-off”, page 259

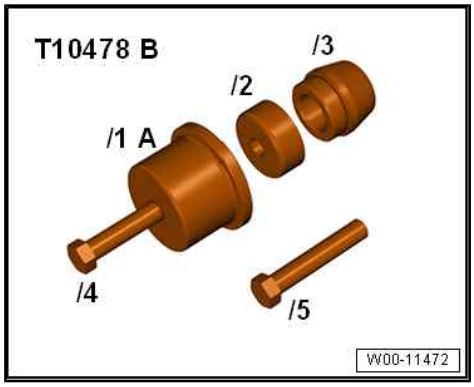
⇒ “3.5.4 Removing and installing exhaust camshaft oil seal (gearbox end) - engines with cylinder shut-off”, page 261

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3.5.1 Removing and installing inlet camshaft oil seal (pulley end)

Special tools and workshop equipment required

♦ Assembly tool - T10478B-

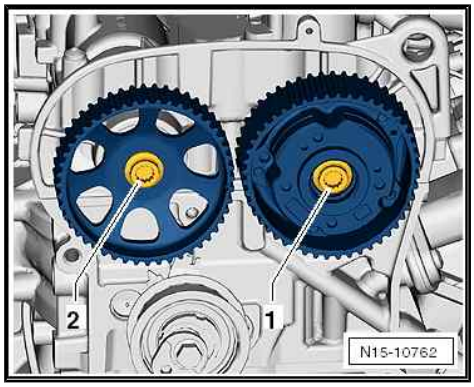


Removing

– Detach toothed belt from camshafts
⇒ “1.3 Detaching toothed belt from camshaft”, page 127 .

Engine with one camshaft adjuster:

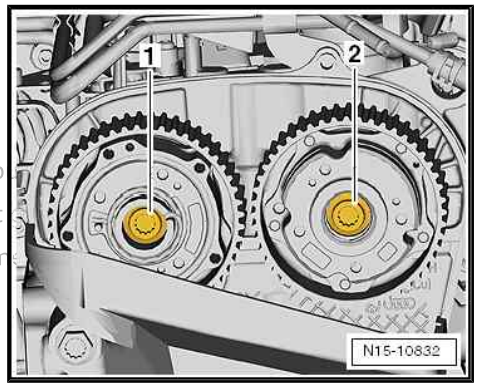
– Unscrew bolt -1- and detach camshaft adjuster.



Engine with two camshaft adjusters:

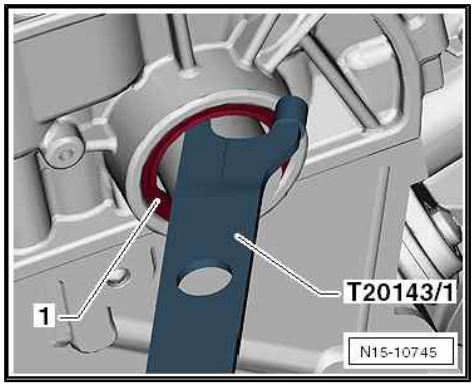
– Unscrew bolt -2- and detach camshaft adjuster.

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All engine versions (continued):

– Pull out oil seal -1- using extractor tool -T20143/1- .



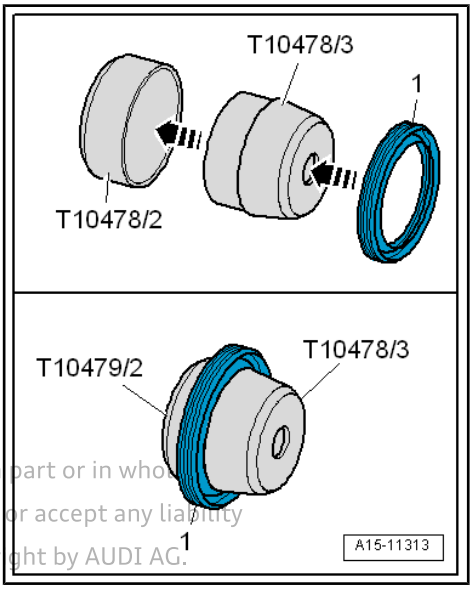
Installing

- Do not lubricate new oil seal.

– Slide oil seal -1- over fitting sleeve -T10478/3- onto guide sleeve -T10478/2- .

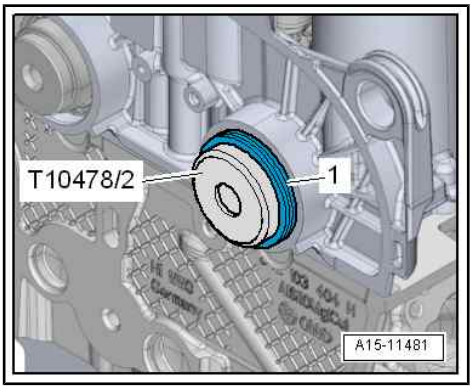
- Fitting position: closed side of oil seal faces guide sleeve.

– Detach fitting sleeve from guide sleeve.



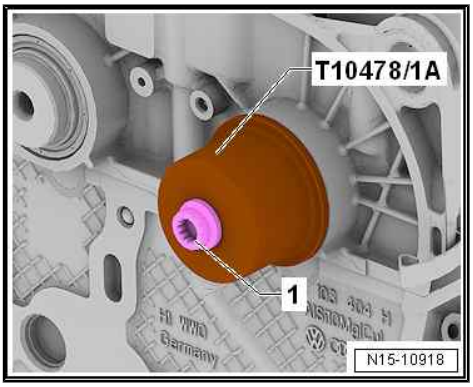
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– Fit guide sleeve -T10478/2- with oil seal -1- onto camshaft.



– Use thrust piece -T10478/1A- and bolt -1- for camshaft sprocket to pull in oil seal onto stop.

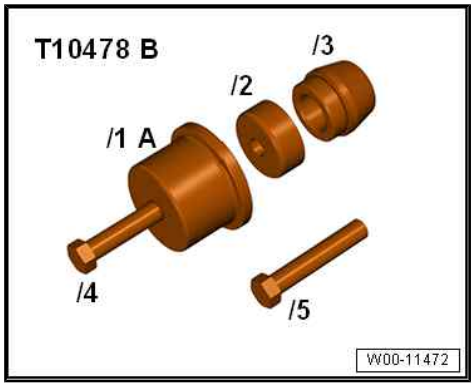
– Install toothed belt (adjust valve timing)
⇒ “1.2 Exploded view - toothed belt”, page 124 .



3.5.2 Removing and installing exhaust camshaft oil seal (pulley end)

Special tools and workshop equipment required

♦ Assembly tool - T10478B-

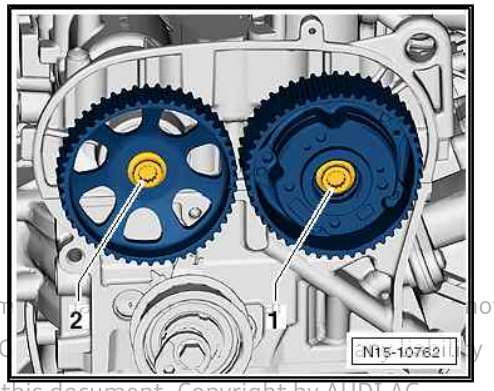


Removing

– Detach toothed belt from camshafts
⇒ “1.3 Detaching toothed belt from camshaft”, page 127 .

Engine with one camshaft adjuster:

– Unscrew bolt -2- and remove camshaft sprocket.

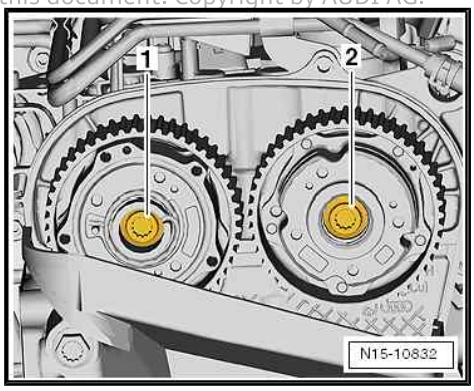


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Engine with two camshaft adjusters:

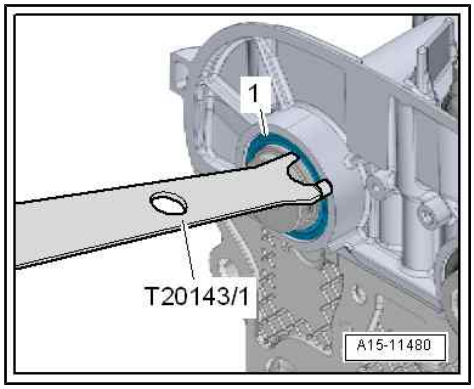
– Remove engine support
⇒ “1.6 Removing and installing engine support”, page 89 .

– Unscrew bolt -1- and detach camshaft adjuster.



All engine versions (continued):

– Pull out oil seal -1- using extractor tool -T20143/1- .



Installing

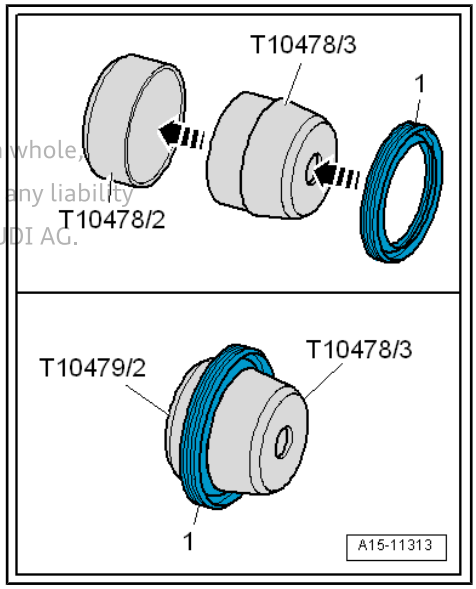
- Do not lubricate new oil seal.

– Slide oil seal -1- over fitting sleeve -T10478/3- onto guide sleeve -T10478/2- .

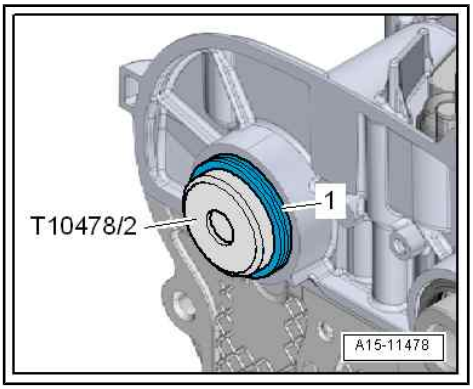
- Fitting position: closed side of oil seal faces guide sleeve.

– Detach fitting sleeve from guide sleeve.

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– Fit guide sleeve -T10478/2- with oil seal -1- onto camshaft.

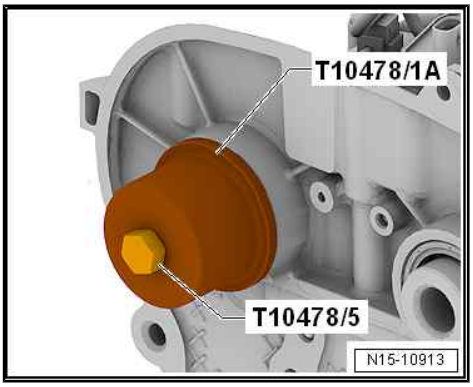


– Pull in thrust piece -T10478/1A- with bolt -T10478/5- as far as stop.

– Install toothed belt (adjust valve timing)
⇒ “1.3 Detaching toothed belt from camshaft”, page 127 .

Engine with two camshaft adjusters:

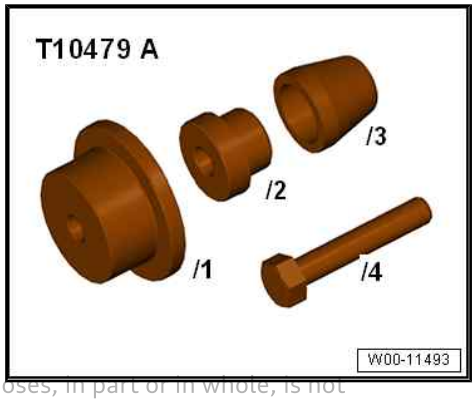
– Install engine support
⇒ “1.6 Removing and installing engine support”, page 89 .



3.5.3 Removing and installing exhaust camshaft oil seal (gearbox end) - engines without cylinder shut-off

Special tools and workshop equipment required

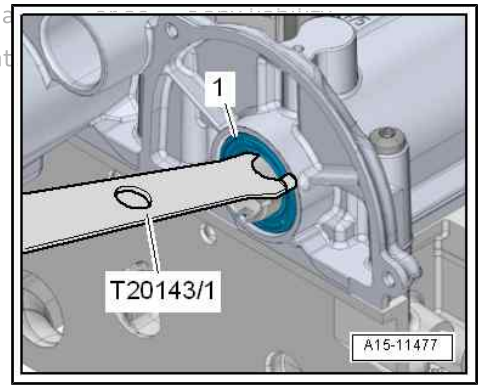
♦ Assembly tool - T10479A-



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Removing

– Remove toothed belt sprocket for coolant pump ⇒ “4.6.1 Removing and installing toothed belt sprocket for coolant pump - engines without cylinder shut-off”, page 359 .



NOTICE

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.

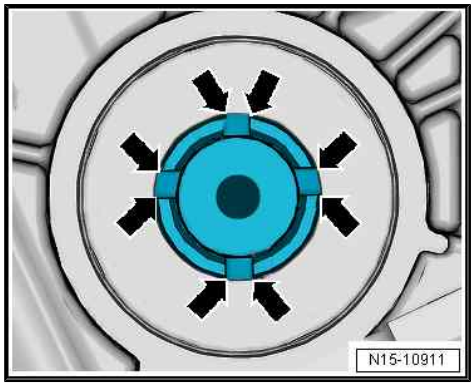
– Carefully slide extractor tool -T20143/1- between camshaft and oil seal -1-.

– Pry out oil seal.

Installing

– 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-.

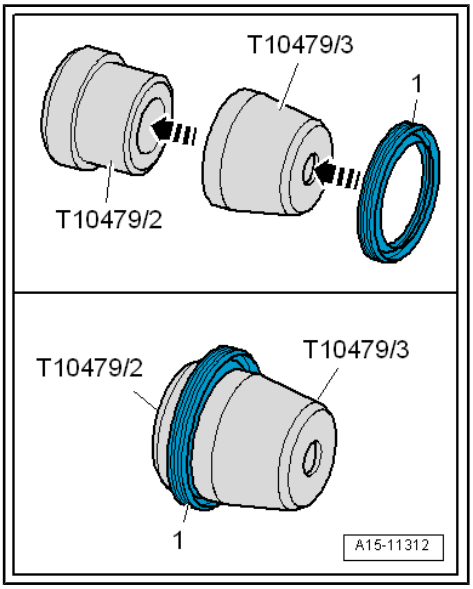
• Do not lubricate new oil seal.



– Slide oil seal -1- over fitting sleeve -T10479/3- onto guide sleeve -T10479/2- .

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

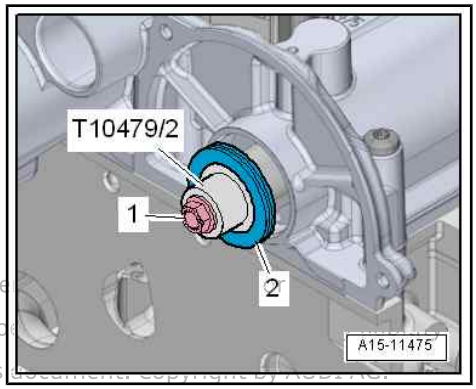
– Detach fitting sleeve from guide sleeve.



– 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.

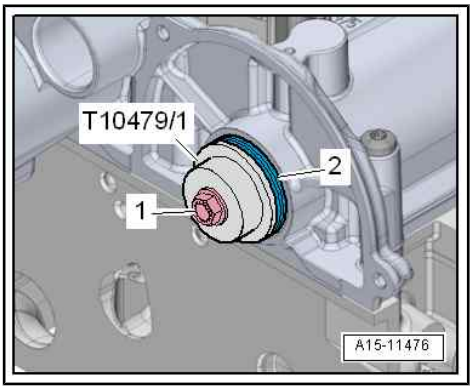
– Slide oil seal onto camshaft and unbolt guide sleeve.



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– 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 ⇒ “4.6.1 Removing and installing toothed belt sprocket for coolant pump - engines without cylinder shut-off”, page 359 .

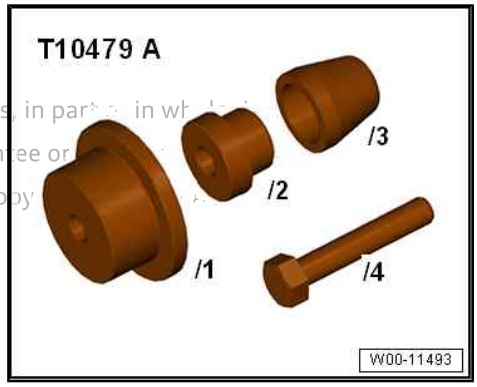


3.5.4 Removing and installing exhaust camshaft oil seal (gearbox end) - engines with cylinder shut-off

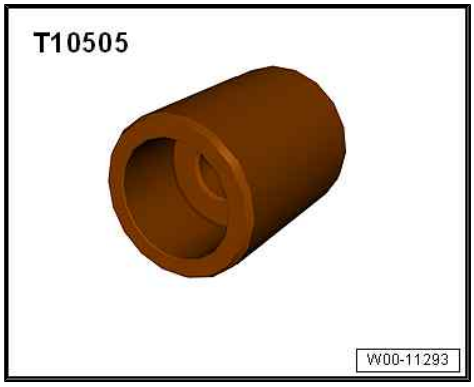
Special tools and workshop equipment required

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♦ Assembly tool - T10479A-



♦ Assembly sleeve - T10505-



Removing

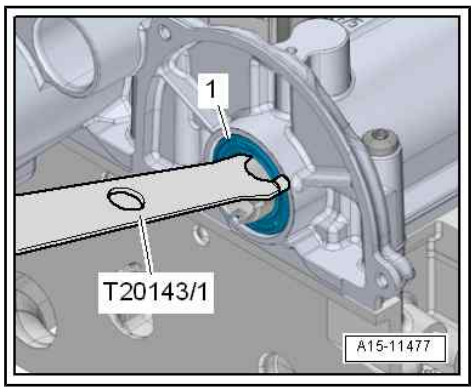
– Remove toothed belt sprocket for coolant pump
⇒ “4.6.2 Removing and installing toothed belt sprocket for coolant pump - engines with cylinder shut-off”, page 360 .

NOTICE

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-.

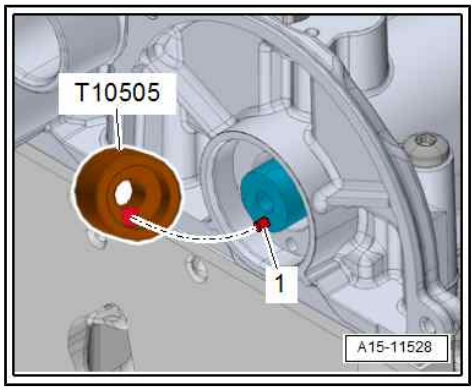
– Pry out oil seal.

Installing

• Do not lubricate new oil seal.

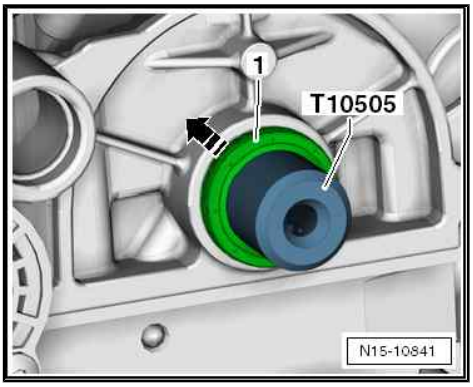
– Fit assembly tool - T10505- onto exhaust camshaft.

• Pin -1- on camshaft must engage in recess on assembly tool.



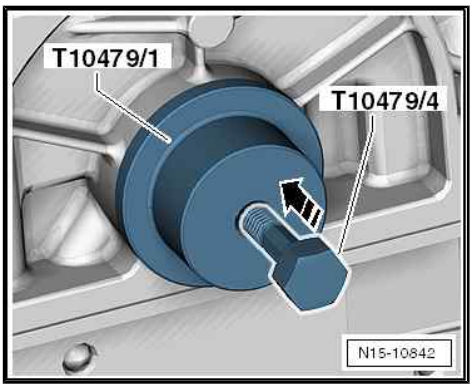
– Fit oil seal -1- onto camshaft housing -arrow-.

• 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
⇒ “4.6.2 Removing and installing toothed belt sprocket for coolant pump - engines with cylinder shut-off”, page 360 .



3.6 Removing and installing valve stem oil seals

⇒ “3.6.1 Removing and installing valve stem oil seals (cylinder head installed)”, page 263

⇒ “3.6.2 Removing and installing valve stem oil seals (cylinder head removed)”, page 267

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

Special tools and workshop equipment required

♦ Spark plug spanner - 3122B-



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- Valve stem oil seal fitting tool - 3365-

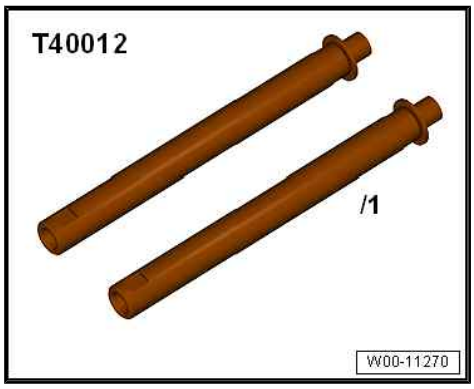


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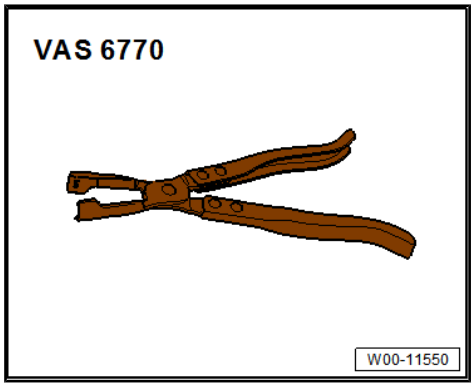
- Removal and installation device for valve cotters - VAS 5161 A- with set -VAS 5161 A/32-



- Adapter - T40012-



- Valve shaft pliers - VAS 6770-

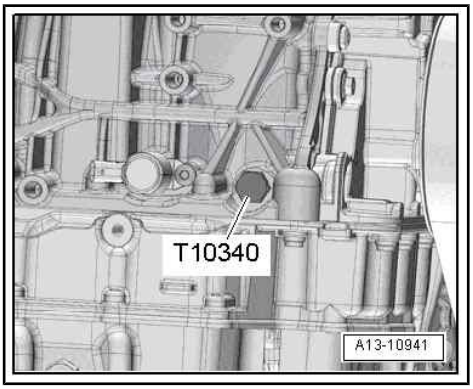


Procedure

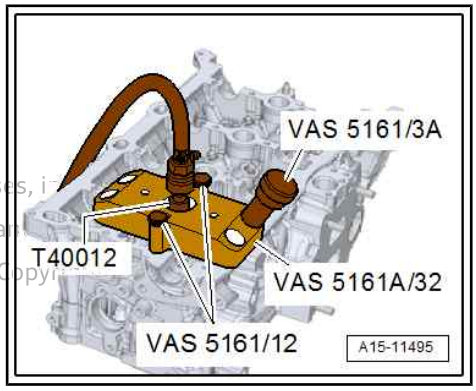
– Remove camshaft housing
⇒ “2.3 Removing and installing camshaft housing”, page 238 .

– Unscrew spark plugs using spark plug socket - 3122B- .

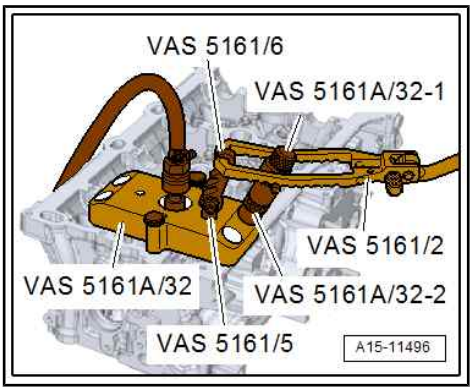
– Remove locking pin - T10340- .
– Set piston of appropriate cylinder to “bottom dead centre”.



– 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.

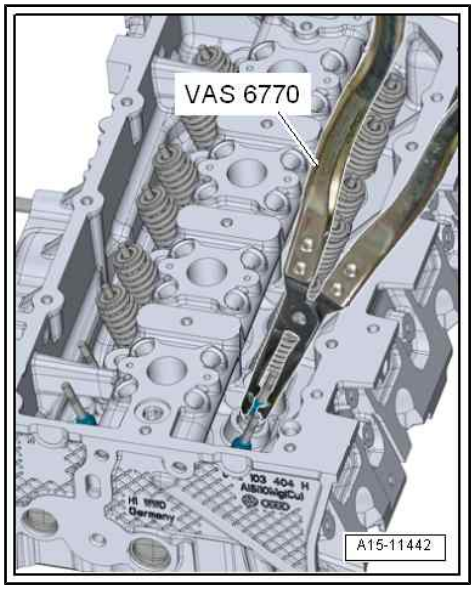


– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161 A/32-1- (slide on sleeve -VAS 5161 A/32-2-) in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled 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.

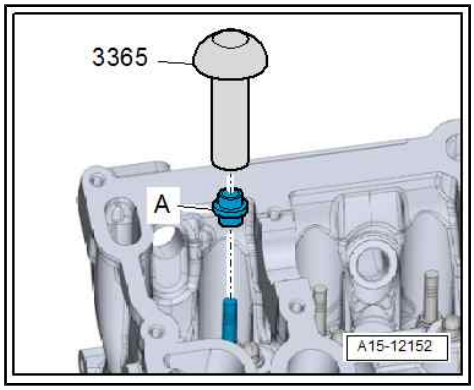


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– Pull off valve stem oil seal with valve shaft pliers - VAS 6770- .



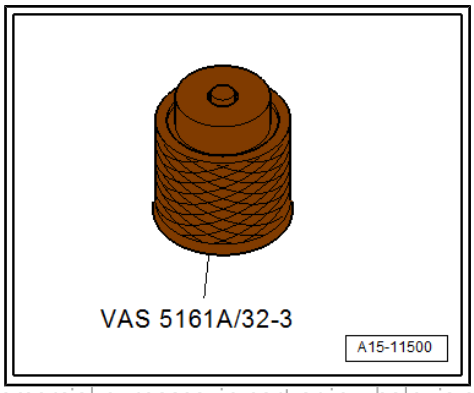
– Lightly oil sealing lip of valve stem oil seal.
– Carefully press valve stem oil seal -A- onto valve guide using valve shaft seal fitting tool - 3365- .



If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161 A/32-3- .

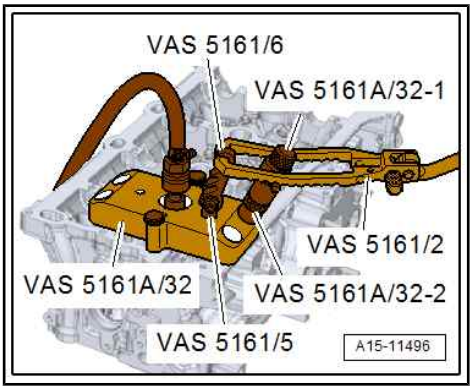
- Larger diameter of valve cotters faces upwards.

– 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 253 .



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– 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 821 ; Maintenance; Spark plugs: renewing .
– Install camshaft housing
⇒ “2.3 Removing and installing camshaft housing”, page 238 .

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

Special tools and workshop equipment required

♦ Valve stem oil seal fitting tool - 3365-

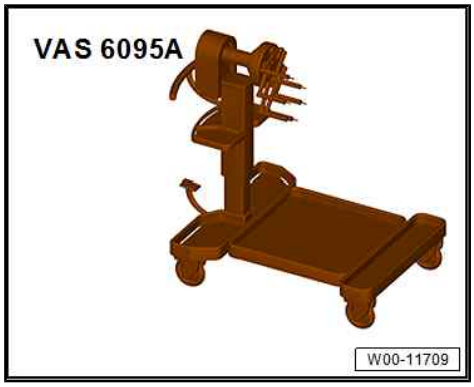


♦ Removal and installation device for valve cotters - VAS 5161 A- with set -VAS 5161 A/32-

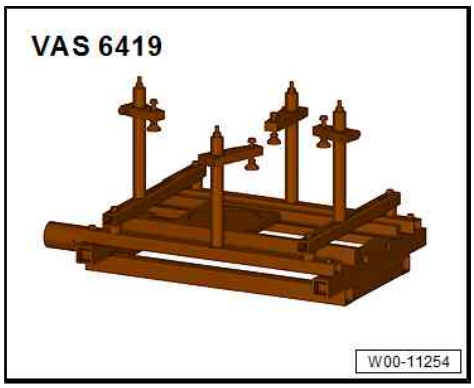


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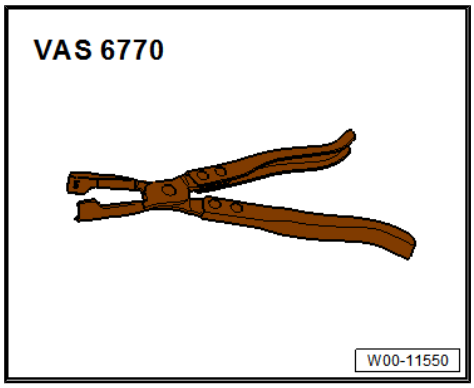
- Engine and gearbox support - VAS 6095A-



- Cylinder head tensioning device - VAS 6419-



- Valve shaft pliers - VAS 6770-



Procedure

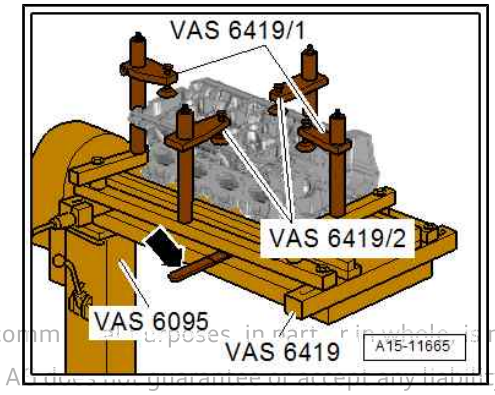
– Insert cylinder head tensioning device - VAS 6419- into engine and gearbox support - VAS 6095A- .

– Secure cylinder head in cylinder head tensioning device, as shown in illustration.

– Connect cylinder head tensioning device to compressed air supply.

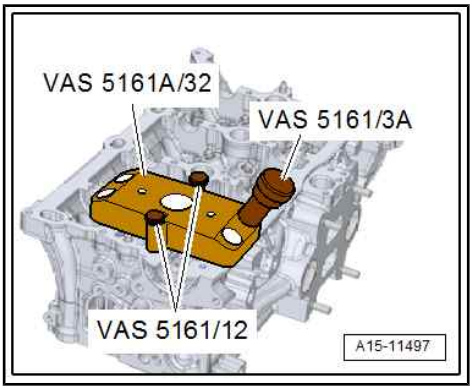
– Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seals are to be removed.

– Apply just enough compressed air to bring air pad into contact with valve heads.

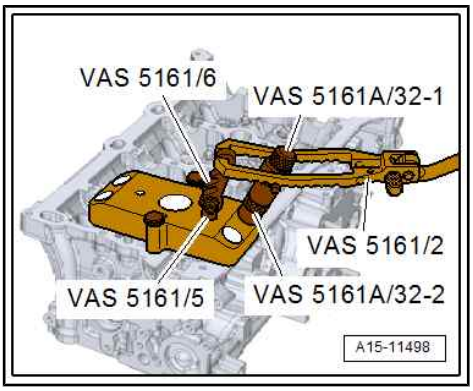


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– Fit guide plate -VAS 5161 A/32- onto cylinder head and secure with knurled screws -VAS 5161/12- .
– Apply drift -VAS 5161/3A- to guide plate and use plastic-headed hammer to release sticking valve cotters.



– 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.

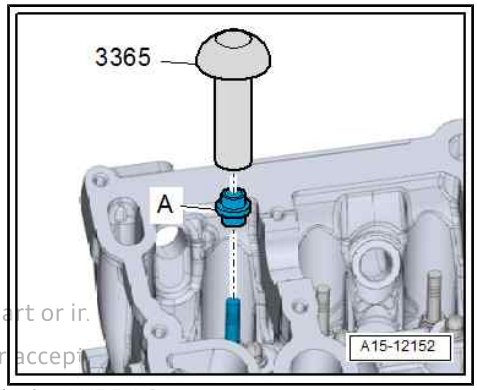


– Pull off valve stem oil seal with valve shaft pliers - VAS 6770- .



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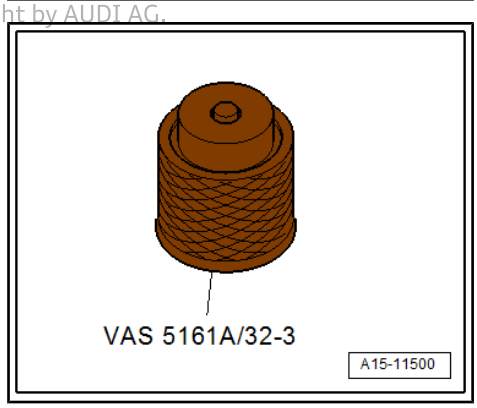
– Lightly oil sealing lip of valve stem oil seal.
– Carefully press valve stem oil seal -A- onto valve guide using valve shaft seal fitting tool - 3365- .



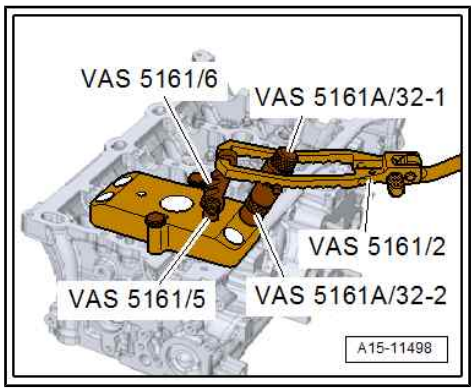
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If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161 A/32-3- .

• 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 253 .



– 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.



4 Inlet and exhaust valves

⇒ “4.1 Checking valve guides”, page 271

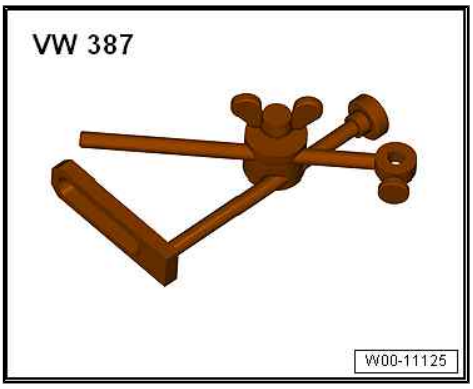
⇒ “4.2 Checking valves”, page 271

⇒ “4.3 Valve dimensions”, page 272

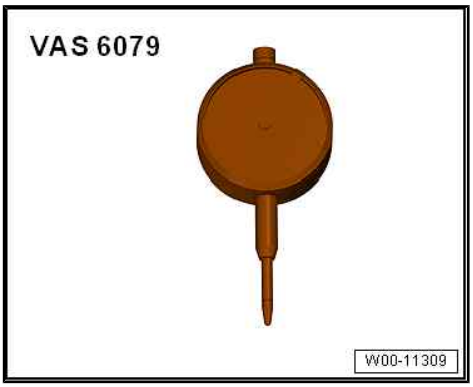
4.1 Checking valve guides

Special tools and workshop equipment required

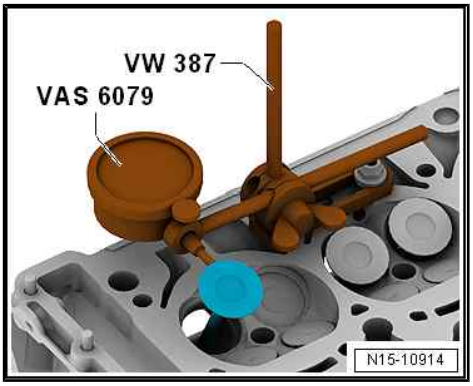
- Universal dial gauge bracket - VW 387-



- 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. Valve guides cannot be renewed.

4.2 Checking valves

– Visually inspect for scoring on valve stems and valve seat surfaces.

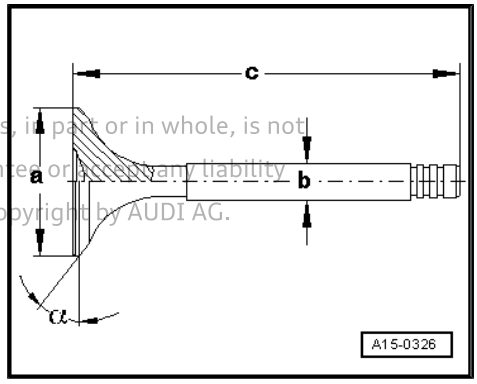
– Renew valve if scoring is clearly visible.

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4.3 Valve dimensions

- Do not machine inlet and exhaust valves. 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



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17 – Lubrication

1 Sump/oil pump

⇒ “1.1 Exploded view - sump/oil pump”, page 273

⇒ “1.2 Removing and installing oil level and oil temperature sender G266 ”, page 278

⇒ “1.3 Removing and installing sump”, page 279

⇒ “1.4 Removing and installing oil pump”, page 289

⇒ “1.5 Engine oil”, page 291

1.1 Exploded view - sump/oil pump

⇒ “1.1.1 Exploded view - sump/oil pump, 1.2 ltr. TFSI”, page 273

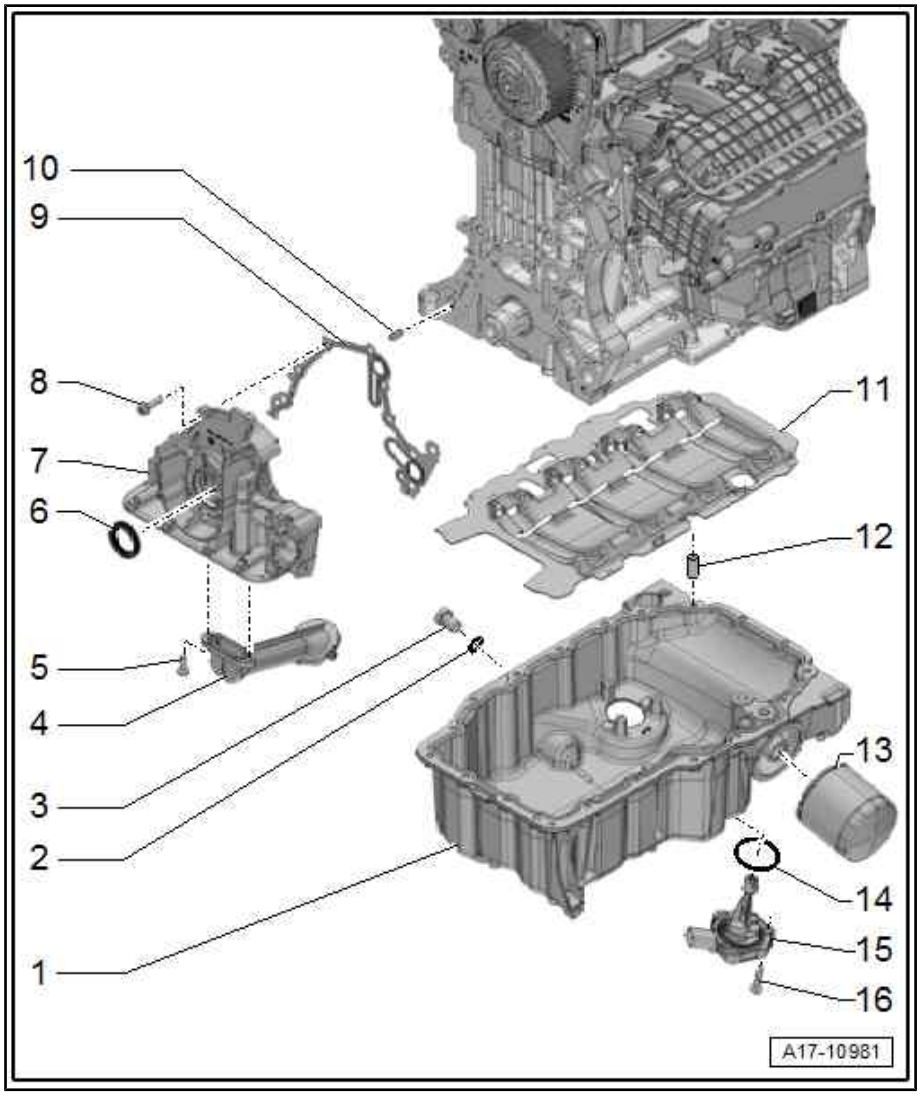
⇒ “1.1.2 Exploded view - sump/oil pump, 1.4 ltr. TFSI”, page 276

1.1.1 Exploded view - sump/oil pump, 1.2 ltr. TFSI

- If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter.

- Oil spray jet and pressure relief valve
  ⇒ “4.1 Exploded view - pistons and conrods”, page 114

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1 - Sump

- ❑ Removing and installing ⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279

2 - Seal

- ❑ For oil drain plug, fitted when first oil change is performed
- ❑ Renew after removing

3 - 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

4 - Oil intake pipe

- ❑ Clean strainer if dirty

5 - Bolt

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

6 - Oil seal

- ❑ For crankshaft (pulley end)
- ❑ Renewing ⇒ “1.8 Renewing crankshaft oil seal (pulley end)”, page 93
- ❑ Do not lubricate with oil

7 - Oil pump

- ❑ Removing and installing ⇒ “1.4.1 Removing and installing oil pump - 1.2 ltr. TFSI”, page 289

8 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Oil pump - tightening torque and sequence”“ , page 275

9 - Gasket

- ❑ Renew after removing

10 - Dowel pin

- ❑ 2x

11 - Baffle plate

12 - Dowel pin

13 - Oil filter

- ❑ See note ⇒ page 273
- ❑ Removing and installing ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: renewing oil filter

14 - Seal

- ❑ Renew after removing

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15 - Oil level and oil temperature sender - G266-

- ❑ Removing and installing
  ⇒ “1.2 Removing and installing oil level and oil temperature sender G266 ”, page 278

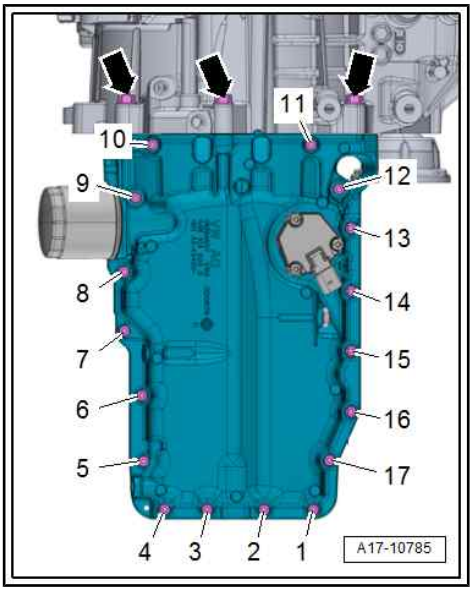
16 - Bolt

- ❑ 9 Nm

Sump - tightening torque and sequence

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 … 17-	Screw in by hand until contact is made
2.	-1 … 17-	Tighten in stages and in diagonal sequence; final torque 12 Nm
3.	-Arrows-	Tightening torque ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox



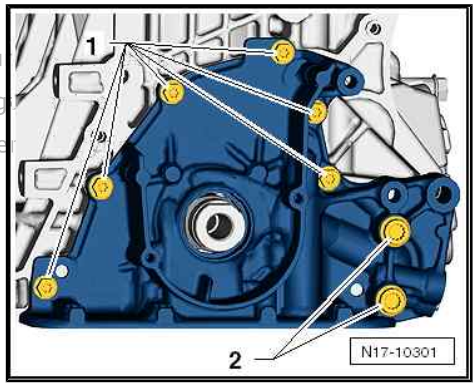
Oil pump - tightening torque and sequence

– Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

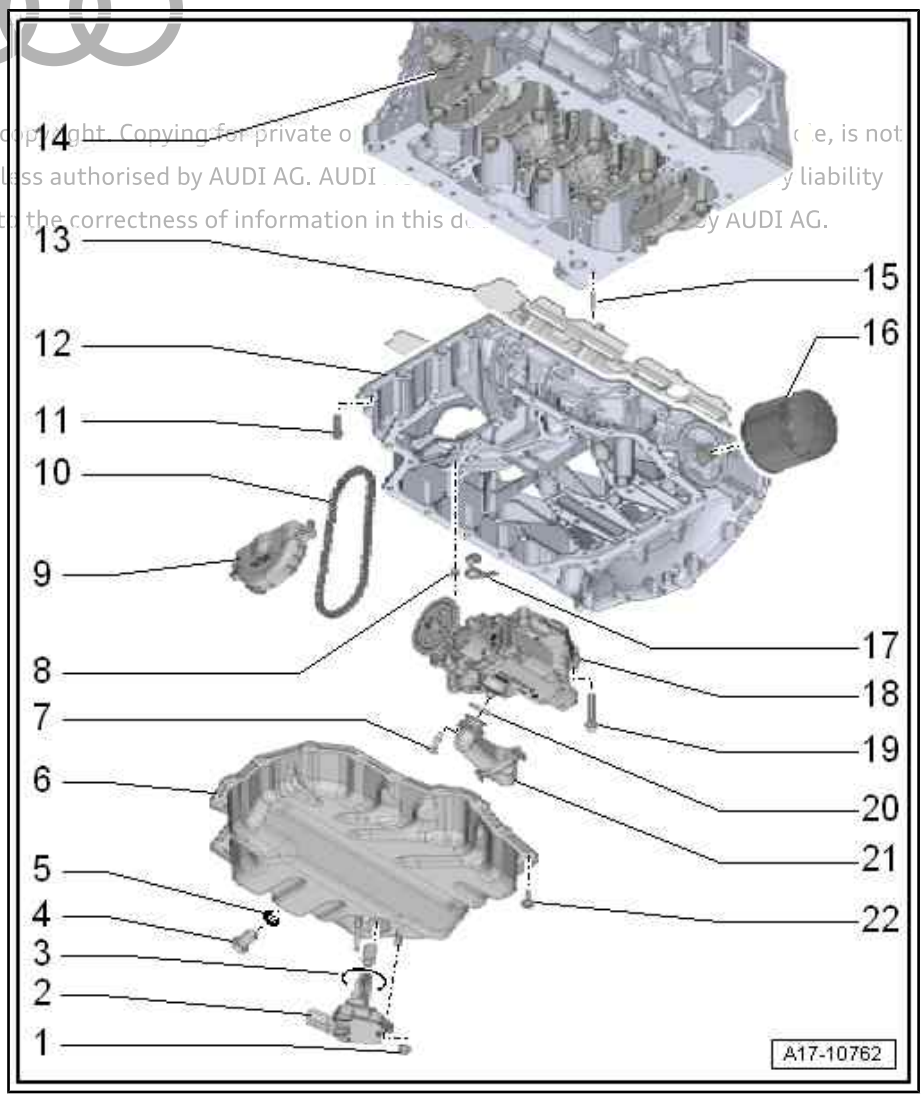
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Stage	Bolts	Tightening torque/angle specification
1.	-1, 2-	8 Nm
2.	-1-	Turn 90° further
3.	-2-	20 Nm



1.1.2 Exploded view - sump/oil pump, 1.4 ltr. TFSI

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1 - Nut
- ❑ 9 Nm

2 - Oil level and oil temperature sender - G266-
- ❑ Removing and installing ⇒ “1.2 Removing and installing oil level and oil temperature sender G266 ”, page 278

3 - Seal
- ❑ Renew after removing

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 ⇒ “1.3.2 Removing and installing sump (bottom section) - 1.4 ltr. TFSI”, page 282

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 278

12 - Sump (top section)
- ❑ Removing and installing ⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286

13 - Baffle plate

14 - Chain sprocket

- For oil pump drive

15 - Dowel pin

16 - Oil filter

- See note ⇒ page 273
- Removing and installing ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: renewing oil filter

17 - Gasket

- With oil strainer

18 - Oil pump

- Removing and installing ⇒ “1.4.2 Removing and installing oil pump - 1.4 ltr. TFSI”, page 290

19 - Bolt

- 10 Nm

20 - O-ring

- Renew after removing

21 - Oil intake pipe

- Clean strainer if dirty

22 - Bolt

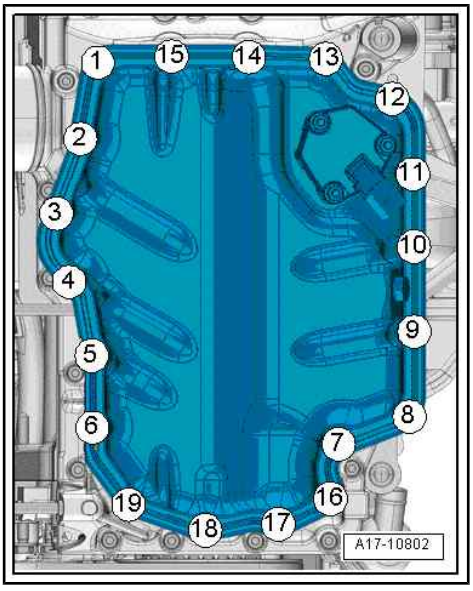
- Renew after removing
- Tightening sequence ⇒ Fig. ““Sump (bottom section) - tightening torque and sequence”“ , page 277

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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

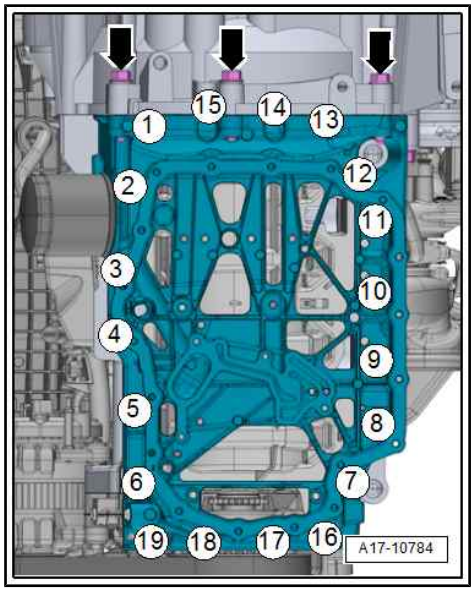


Sump (top section) - tightening torque and sequence

– Renew bolts tightened with specified tightening angle.

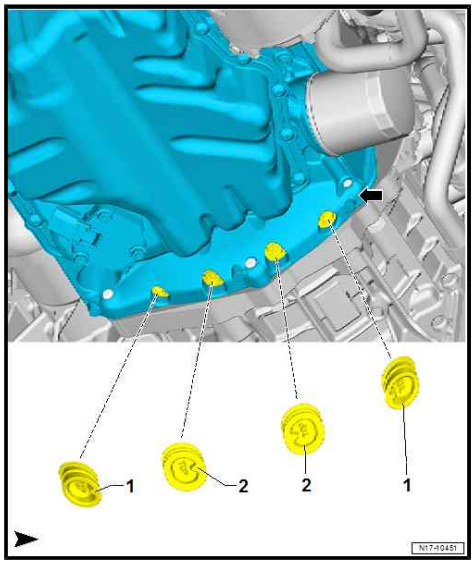
– Tighten bolts in stages in the sequence shown:

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



Sealing plugs for sump (top section) - e-tron

- Plugs -1- and -2- are different.
- Insert plugs -1- and -2- as shown in illustration.
- Note direction of installation (-TOP- marking).



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

Removing

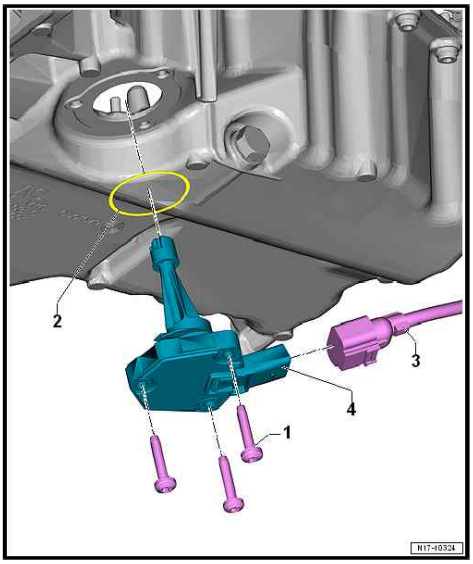
- Engine oil drained ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: draining .

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1.2 ltr. TFSI engine:

– Unplug electrical connector -3-.

– Remove bolts -1- and detach oil level and oil temperature sender - G266- -item 4-.



1.4 ltr. TFSI engine:

– Unplug electrical connector -2-.

– Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 3-.

Installing

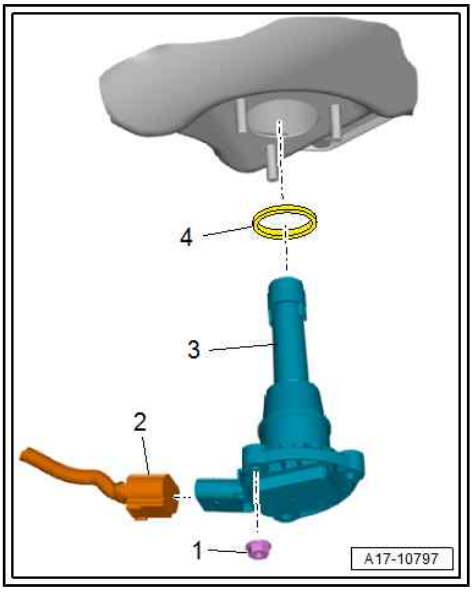
Installation is carried out in reverse order; note the following:

• Renew seal -4-.

– Filling up with engine oil ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: filling up

Tightening torques

♦ ⇒ “1.1 Exploded view - sump/oil pump”, page 273



1.3 Removing and installing sump

⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279

⇒ “1.3.2 Removing and installing sump (bottom section) - 1.4 ltr. TFSI”, page 282

⇒ “1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI”, page 286

1.3.1 Removing and installing sump - 1.2 ltr. TFSI

Special tools and workshop equipment required

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- Socket - T10058-



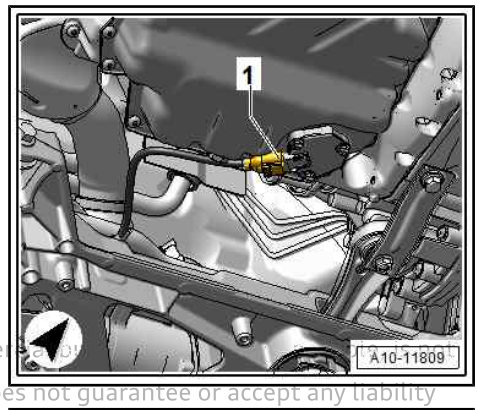
- Sealant remover
- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: draining .

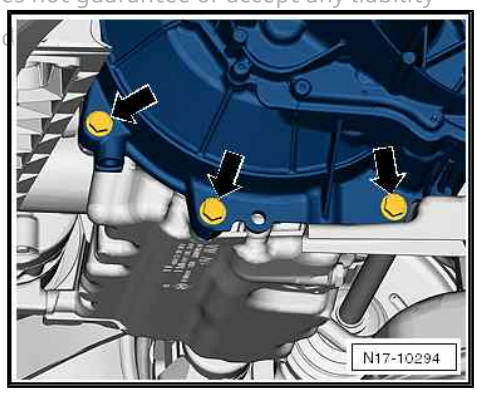
– Detach air conditioner compressor from bracket and tie up ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Unplug electrical connector -1- at oil level and oil temperature sender - G266- .

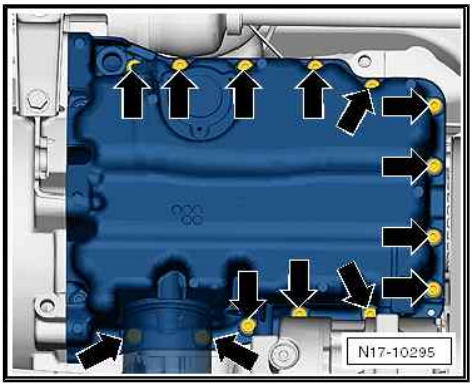


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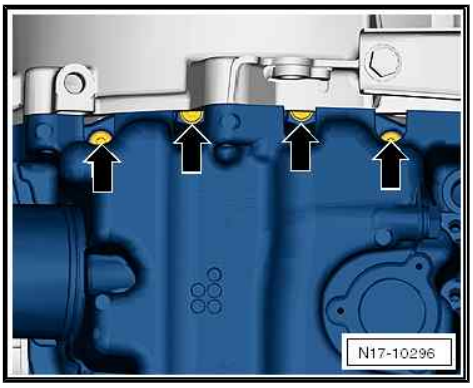
– Remove bolts -arrows- securing gearbox to sump.



– Loosen bolts -arrows- in diagonal sequence and remove.

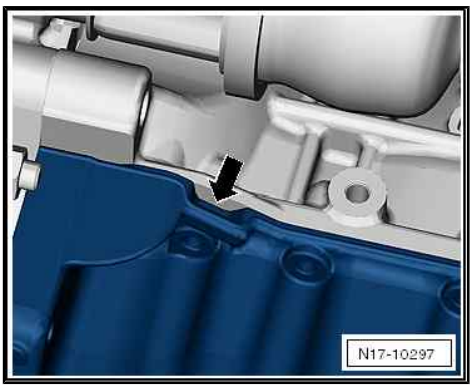


– Unscrew bolts -arrows- at gearbox end using Allen key, long reach - T10058- .



– Use assembly lever to prise sump off cylinder block at recesses -arrow- (front and rear).

– Remove sump. If necessary, release sump by tapping gently with a rubber-headed hammer.



Installing

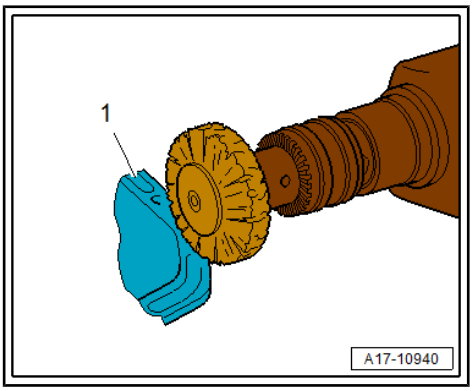
– Cover exposed parts of the engine.

– Spray sealing surface with sealant remover and wait for it to take effect.

⚠ CAUTION

Risk of eye injury due to sealant residue.

– Put on safety goggles.



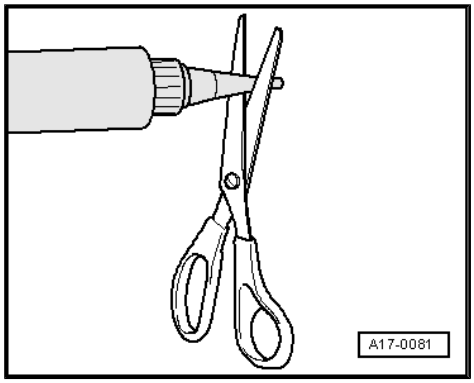
– Remove sealant residue from sump -1- and cylinder block using rotating plastic brush or similar.

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

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- Note expiry date of sealant.

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



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

– Apply sealant bead -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.

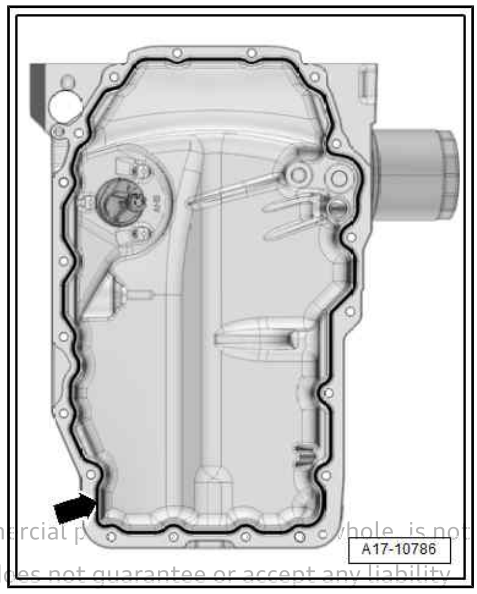
– Take particular care when applying sealant bead in area of sealing flange.

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

– Fit sump and tighten bolts
⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 277 .

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

– Filling up with engine oil ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: filling up



Tightening torques

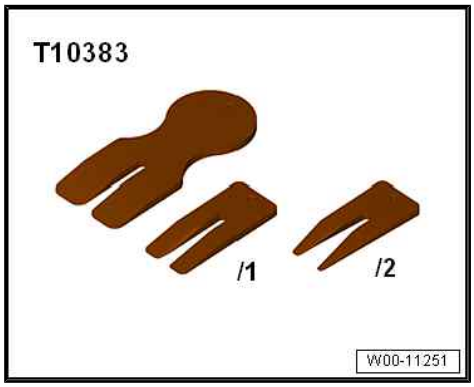
- ⇒ Fig. ""Sump - tightening torque and sequence"" , page 275
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

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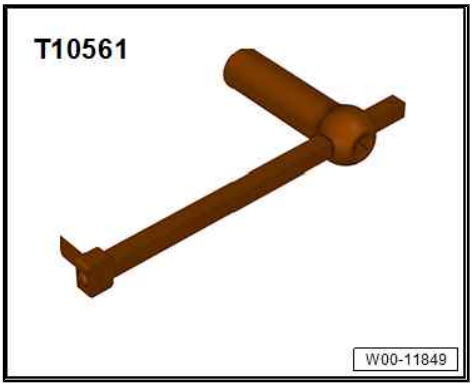
1.3.2 Removing and installing sump (bottom section) - 1.4 ltr. TFSI

Special tools and workshop equipment required

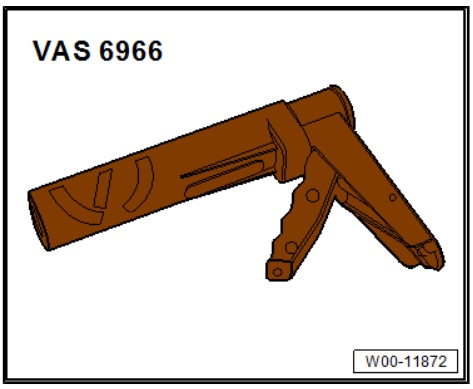
♦ Wedge - T10383/2-



- Separating device - T10561-



- Metering gun - VAS 6966-



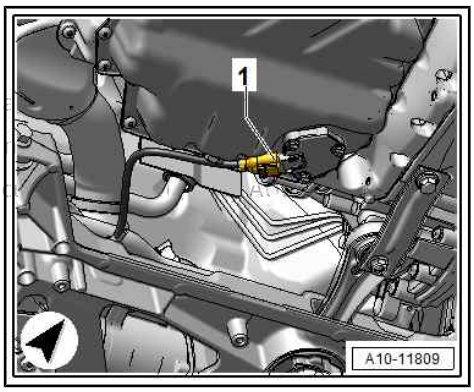
- Flat scraper
- Sealant remover
- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

Removing

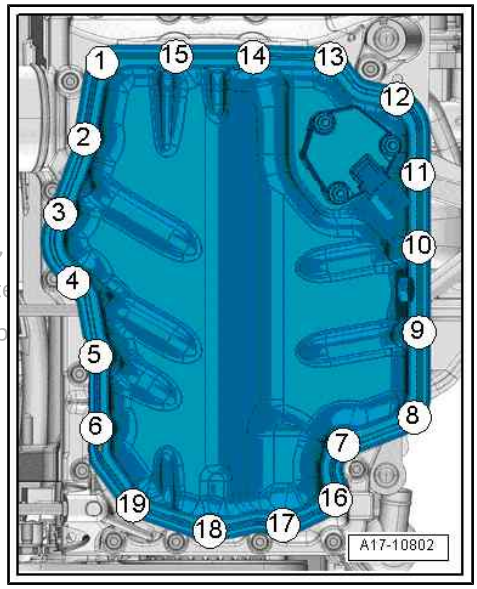
- Engine oil drained ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: draining .

– Unplug electrical connector -1- at oil level and oil temperature sender - G266- .

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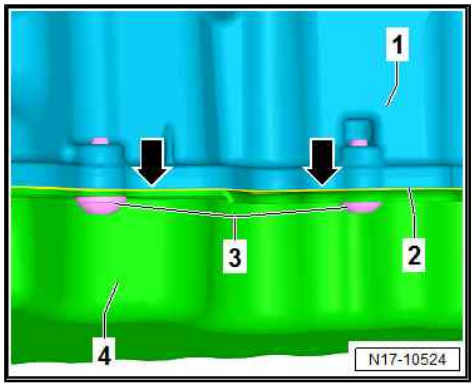


– Slacken and remove bolts in the sequence: -19 ... 1-.
– Only loosen bolts -1- and -7- on sump but do not remove completely.

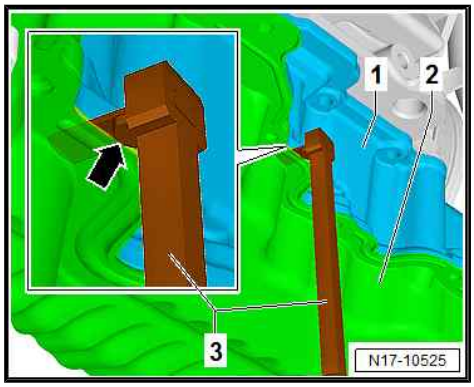


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– Separate adhesive bond between sump -4- and engine -1-.
– To do so, use separating device - T10561- .
• Bond must only be separated centrally between the bolts -3-.



– Apply separating device - T10561- -item 3- at centre of adhesive bond between two bolts.
– Knock separating device in with a hammer as far as stop -arrow-.
– Take care to keep separating device - T10561- straight when doing so.
– Do not move separating device - T10561- sideways.
– Do not lever the separating device - T10561- .
– Repeat the procedure at other points as described until the sump separates.
– Use wedge - T10383/2- to continue separating.
– Where possible, apply wedge - T10383/2- at the separated points.
– To separate further, apply wedge - T10383/2- at the next separated point.
– Carefully drive wedge in with a plastic hammer, but only as far as the sealing surface.
– Apply wedge - T10383/2- at different positions to further release bonded joint.
– Carefully release sump from bonded joint.



– 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).
– Cover exposed parts of the engine.



Installing

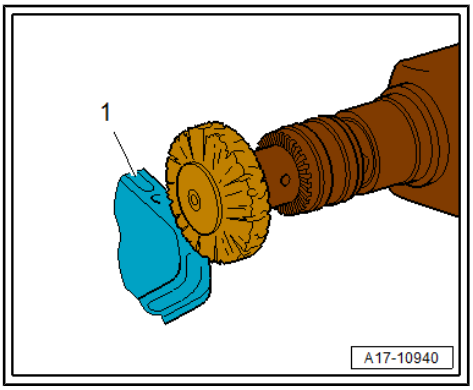
– Spray sealing surface with sealant remover and wait for it to take effect.
– Remove sealant remaining on sump (top section) with flat scraper.

CAUTION

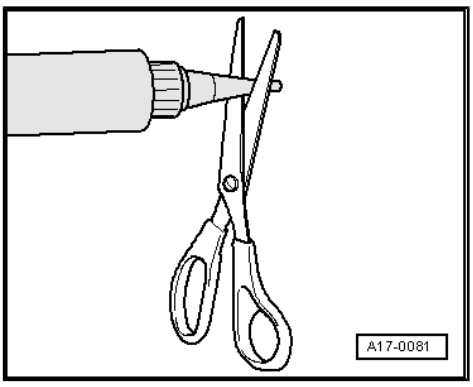
Risk of eye injury due to sealant residue.

– Put on safety goggles.

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



• Note expiry date of sealant.
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



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

– Apply sealant bead -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.

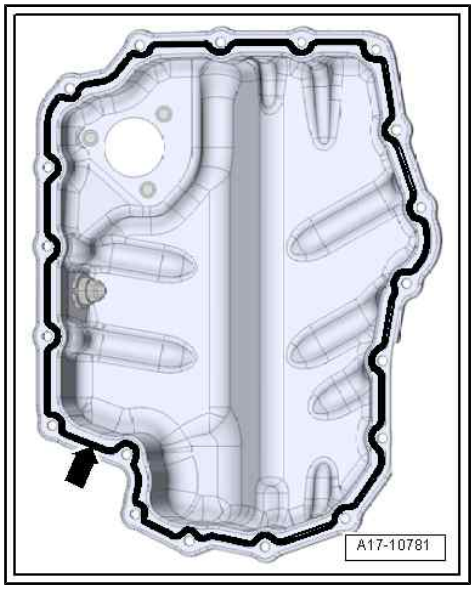
– Take particular care when applying sealant bead in area of sealing flange.

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

– Fit sump (bottom section) and tighten bolts
⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 277 .

- 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.

– Filling up with engine oil ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: filling up



Tightening torques

♦ ⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 277

1.3.3 Removing and installing sump (top section) - 1.4 ltr. TFSI

Special tools and workshop equipment required

♦ Electric drill with plastic brush

♦ Safety goggles

♦ Sealant ⇒ Electronic parts catalogue

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Removing

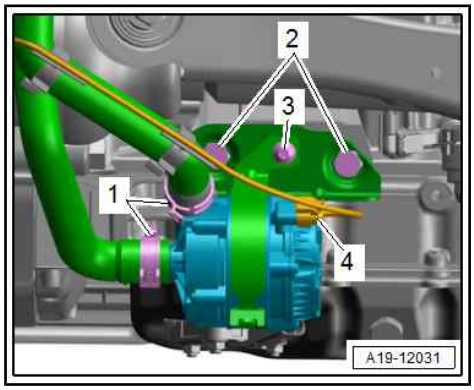
– Detach air conditioner compressor from bracket and tie up ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Remove oil pump
⇒ "1.4.2 Removing and installing oil pump - 1.4 ltr. TFSI", page 290 .

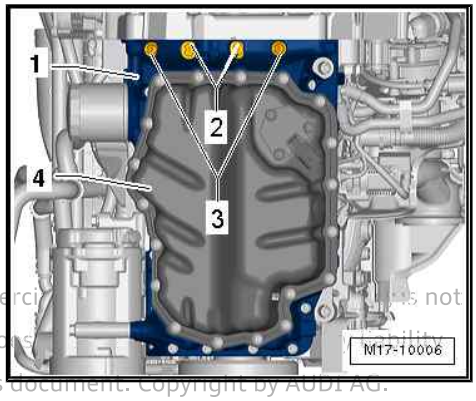
e-tron:

– Unplug electrical connector -4- and move wiring clear.

– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards rear.



– Press in plugs -2- and -3- until bolts are accessible.



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All vehicles (continued):

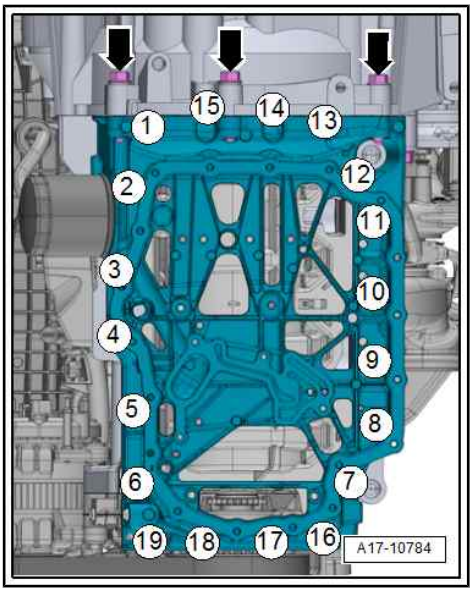
– Remove bolts -arrows- securing gearbox to sump (top section).

– Slacken and remove bolts in the sequence: -19 ... 1-.

– Carefully release sump (top section) from bonded joint.

– Detach baffle plate.

– Remove plugs from inside oil sump (if applicable).



Installing

- Renew bolts tightened with specified tightening angle.
- Renew seals, gaskets and self-locking nuts.

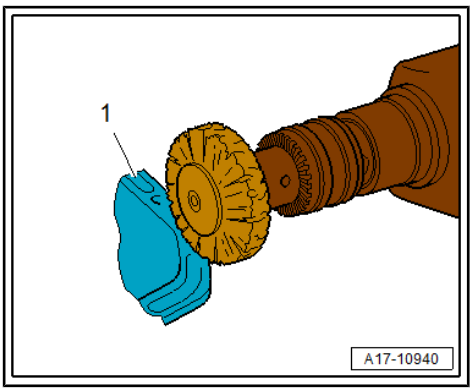
– Cover exposed parts of the engine.

– Remove sealant remaining on cylinder block with flat scraper.

⚠ CAUTION

Risk of eye injury due to sealant residue.

– Put on safety goggles.



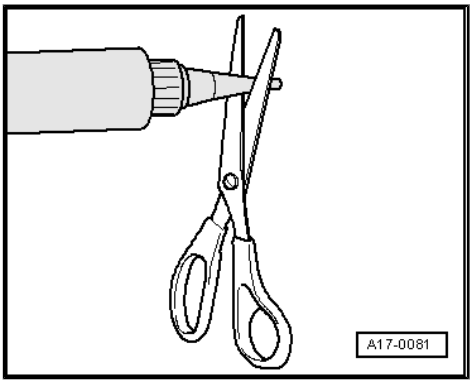
– Use e.g. a rotating plastic brush to remove sealant residue on sump (top section) -1-.

– Check oil passages in sump (top section) and in cylinder block for dirt.

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

- Note expiry date of sealant.

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

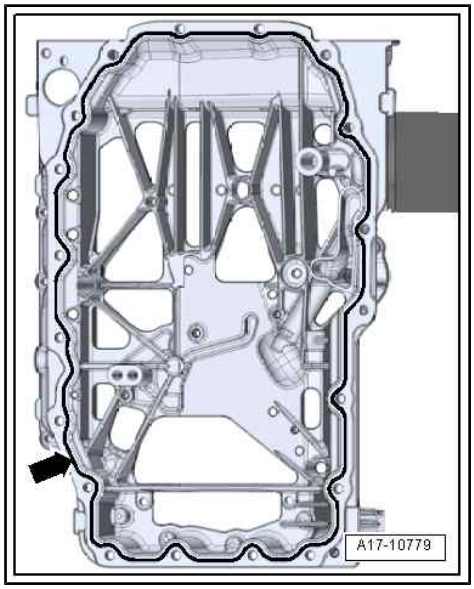


- Thickness of sealant bead: 2 ... 3 mm

– Apply bead of sealant -arrow- onto clean sealing surface of sump (top section) as shown in illustration.

– Take particular care when applying sealant bead in area of sealing flange.

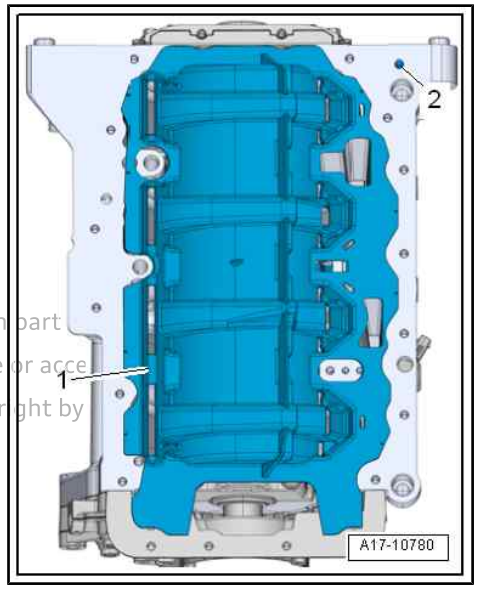
- The sump (bottom section) must be installed within 5 minutes after applying the sealant.
- The sump (top section) must be installed within 5 minutes after applying the sealant.



– 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 278 .

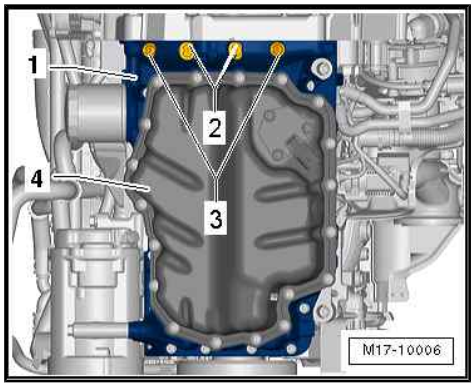


Remaining installation steps are carried out in reverse sequence; note the following:

– Install oil pump
⇒ "1.4.2 Removing and installing oil pump - 1.4 ltr. TFSI", page 290 .

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- Plugs -2, 3- must always be fitted to prevent dust from entering.



Tightening torques

- ⇒ "1.1 Exploded view - sump/oil pump", page 273
- ⇒ "4.2.2 Exploded view - electric coolant pump, e-tron", page 347
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

1.4 Removing and installing oil pump

⇒ “1.4.1 Removing and installing oil pump - 1.2 ltr. TFSI”, page 289

⇒ “1.4.2 Removing and installing oil pump - 1.4 ltr. TFSI”, page 290

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1.4.1 Removing and installing oil pump - 1.2 ltr. TFSI

Removing

– Remove toothed belt
⇒ “1.4.1 Removing and installing toothed belt - engines with one camshaft adjuster”, page 174 .

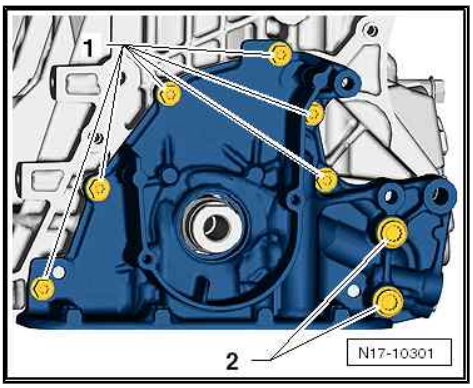
– Remove sump
⇒ “1.3.1 Removing and installing sump - 1.2 ltr. TFSI”, page 279 .

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

– Remove crankshaft oil seal (pulley end)
⇒ “1.8 Renewing crankshaft oil seal (pulley end)”, page 93 .

– Remove bolts -1, 2- and detach oil pump horizontally from dowel pins in cylinder block.

– Detach gasket.



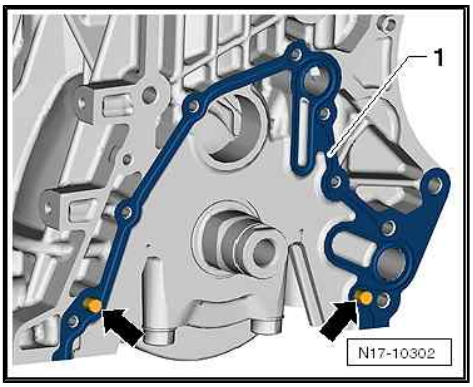
Installing

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

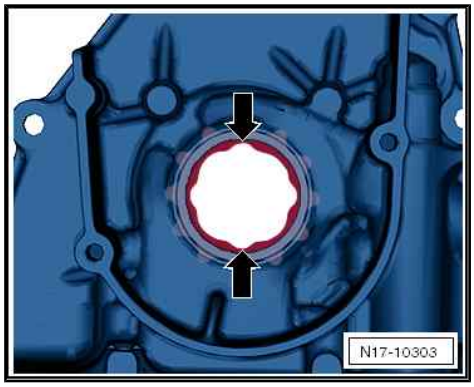
• Renew bolts tightened with specified tightening angle.

– Check whether dowel pins -arrows- for centring oil pump and cylinder block are fitted; insert dowel pins if necessary.

– Fit new gasket -1-.



– Turn oil pump gear so that two opposite recesses are vertically aligned -arrows-.



– Fit oil pump and tighten bolts
⇒ Fig. ""Oil pump - tightening torque and sequence"" , page 275 .
– Install new crankshaft oil seal (pulley end)
⇒ "1.8 Renewing crankshaft oil seal (pulley end)", page 93 .
– Install sump
⇒ "1.3.1 Removing and installing sump - 1.2 ltr. TFSI", page 279 .
– Install toothed belt
⇒ "1.4.1 Removing and installing toothed belt - engines with one camshaft adjuster", page 174 .

Tightening torques

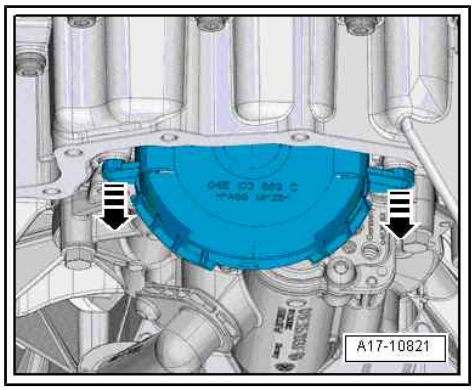
◆ ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator

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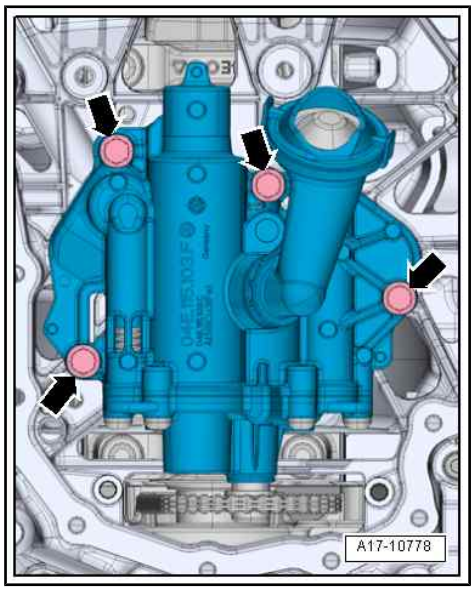
1.4.2 Removing and installing oil pump - 1.4 ltr. TFSI

Removing

– Remove sump (bottom section)
⇒ "1.3.2 Removing and installing sump (bottom section) - 1.4 ltr. TFSI", page 282 .
– 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 reverse order; note the following:

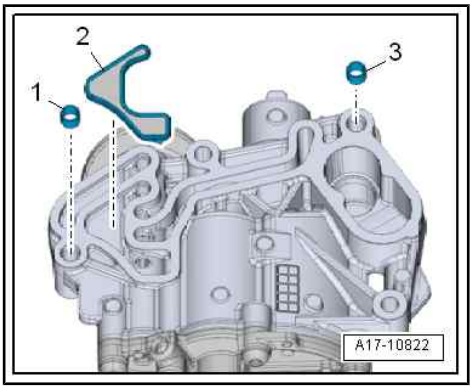
– Check that dowel sleeves -1, 3- are fitted in oil pump.

– Fit seal with strainer -2- in oil pump.

– Turn oil pump drive chain sprocket by hand to check oil pump for ease of movement. Renew oil pump if it does not turn easily.

– Fit oil pump with drive chain sprocket into drive chain and secure.

– Install sump (bottom section)
⇒ “1.3.2 Removing and installing sump (bottom section) - 1.4 ltr. TFSI”, page 282 .



Tightening torques

◆ ⇒ “1.1 Exploded view - sump/oil pump”, page 273

1.5 Engine oil

Oil capacities, oil specifications and viscosity grades ⇒ Maintenance tables .

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2 Engine oil cooler

⇒ “2.1 Exploded view - engine oil cooler”, page 292

⇒ “2.2 Removing and installing engine oil cooler”, page 292

2.1 Exploded view - engine oil cooler

1 - Engine oil cooler

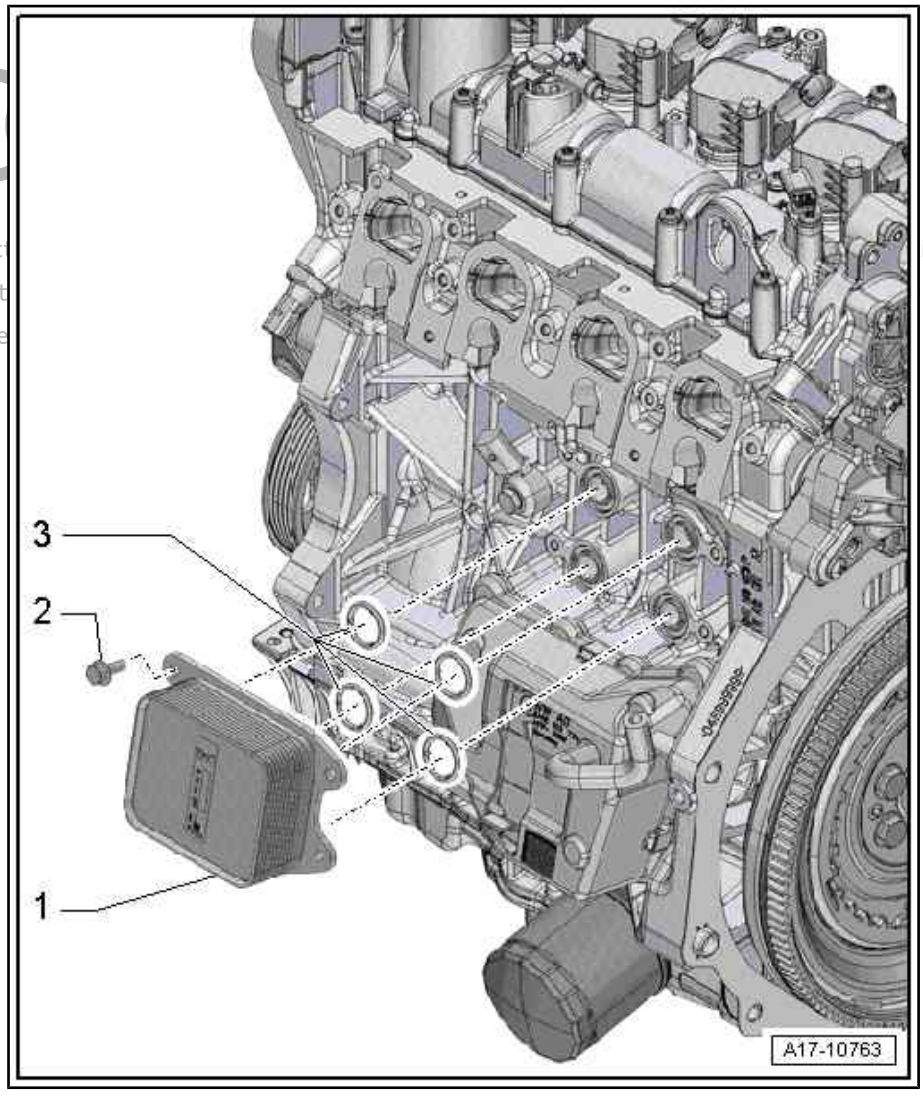
- ❑ See note ⇒ “1 Sump/oil pump”, page 273
- ❑ Removing and installing ⇒ “2.2 Removing and installing engine oil cooler”, page 292
- ❑ If renewed, refill system with fresh coolant

2 - Bolt

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

3 - Seals

- ❑ Renew after removing

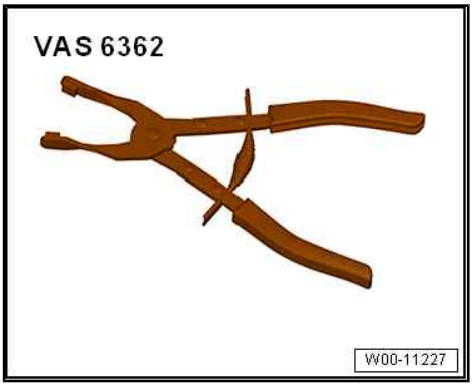


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2.2 Removing and installing engine oil cooler

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-



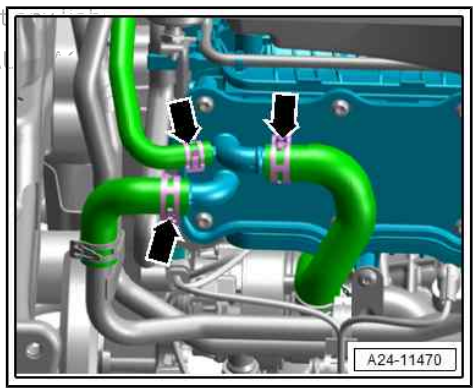
Removing

– Drain coolant
⇒ “1.3 Draining and filling cooling system”, page 315 .

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All vehicles except e-tron:

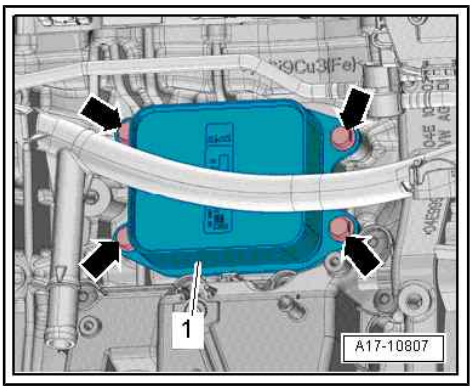
– Release hose clips -arrows- and disconnect coolant hoses. (Installation position varies.)



All vehicles (continued):

– Remove intake manifold
⇒ “3.2 Removing and installing intake manifold”, page 468 .

– Unscrew bolts -arrows- and detach engine oil cooler -1-.



Installing

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

- Renew seals.
- Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .

Tightening torques

♦ ⇒ “2.1 Exploded view - engine oil cooler”, page 292

♦ ⇒ “3.1 Exploded view - intake manifold”, page 465

3 Crankcase breather

⇒ “3.1 Exploded view - crankcase breather system”, page 294

⇒ “3.2 Removing and installing oil separator”, page 295

3.1 Exploded view - crankcase breather system

⇒ “3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)”, page 294

⇒ “3.1.2 Exploded view - crankcase breather system (engines with cylinder shut-off)”, page 295

3.1.1 Exploded view - crankcase breather system (engines without cylinder shut-off)

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1 - Hose
- ❑ For crankcase breather

2 - Cover
- ❑ For oil separator
- ❑ Different versions

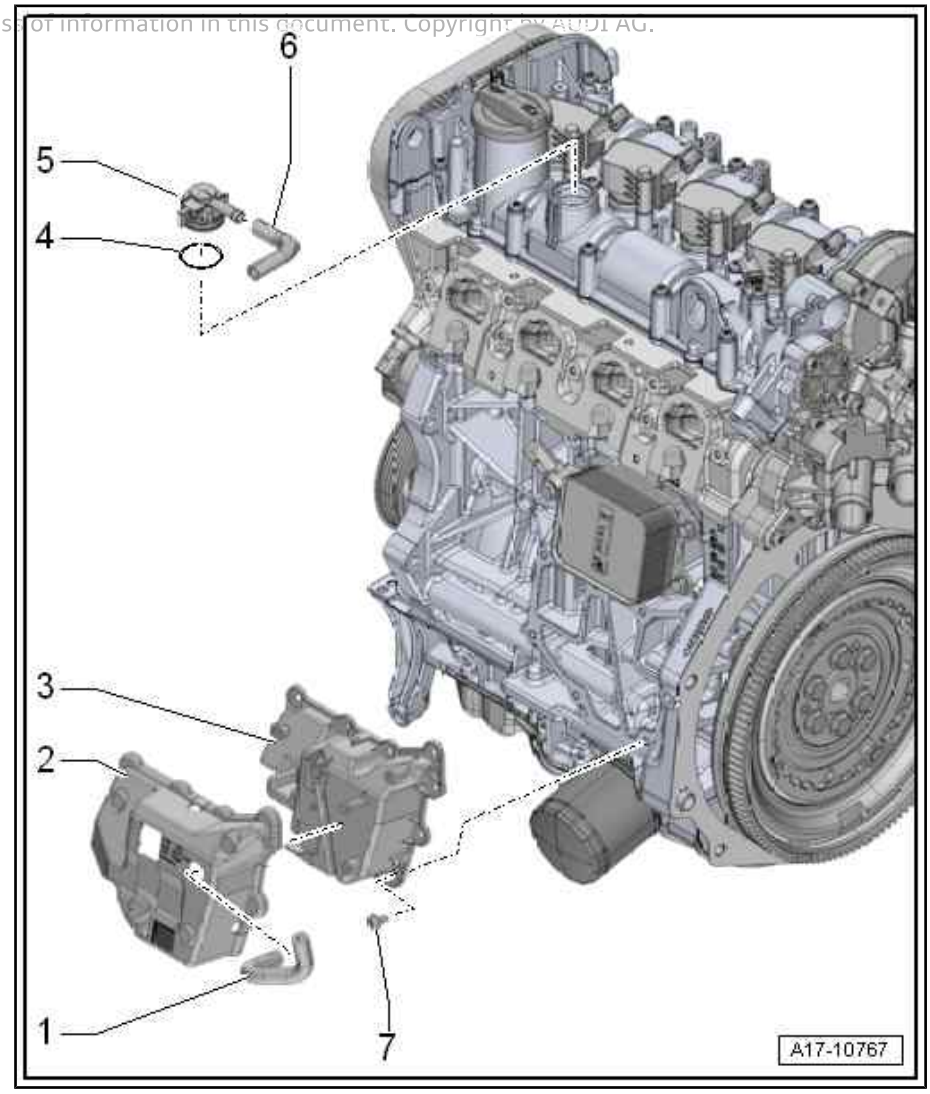
3 - Oil separator
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Removing and installing ⇒ “3.2 Removing and installing oil separator”, page 295
- ❑ Renew if damaged

4 - O-ring
- ❑ Lubricate lightly with engine oil
- ❑ Check for damage and renew if necessary; supplied together with non-return valve

5 - Non-return valve

6 - Hose
- ❑ For crankcase breather

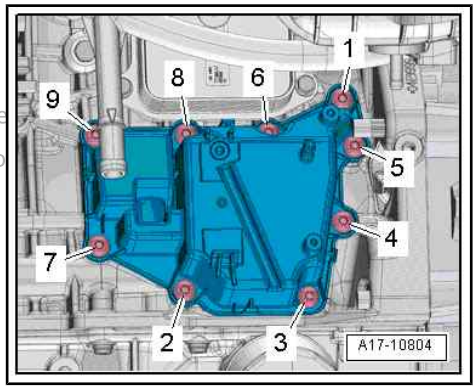
7 - Bolt
- ❑ Self-locking
- ❑ Renew after removing
- ❑ 9 Nm



Oil separator - tightening torque and sequence

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

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3.1.2 Exploded view - crankcase breather system (engines with cylinder shut-off)

1 - Hose
- ❑ For crankcase breather

2 - Cover
- ❑ For oil separator

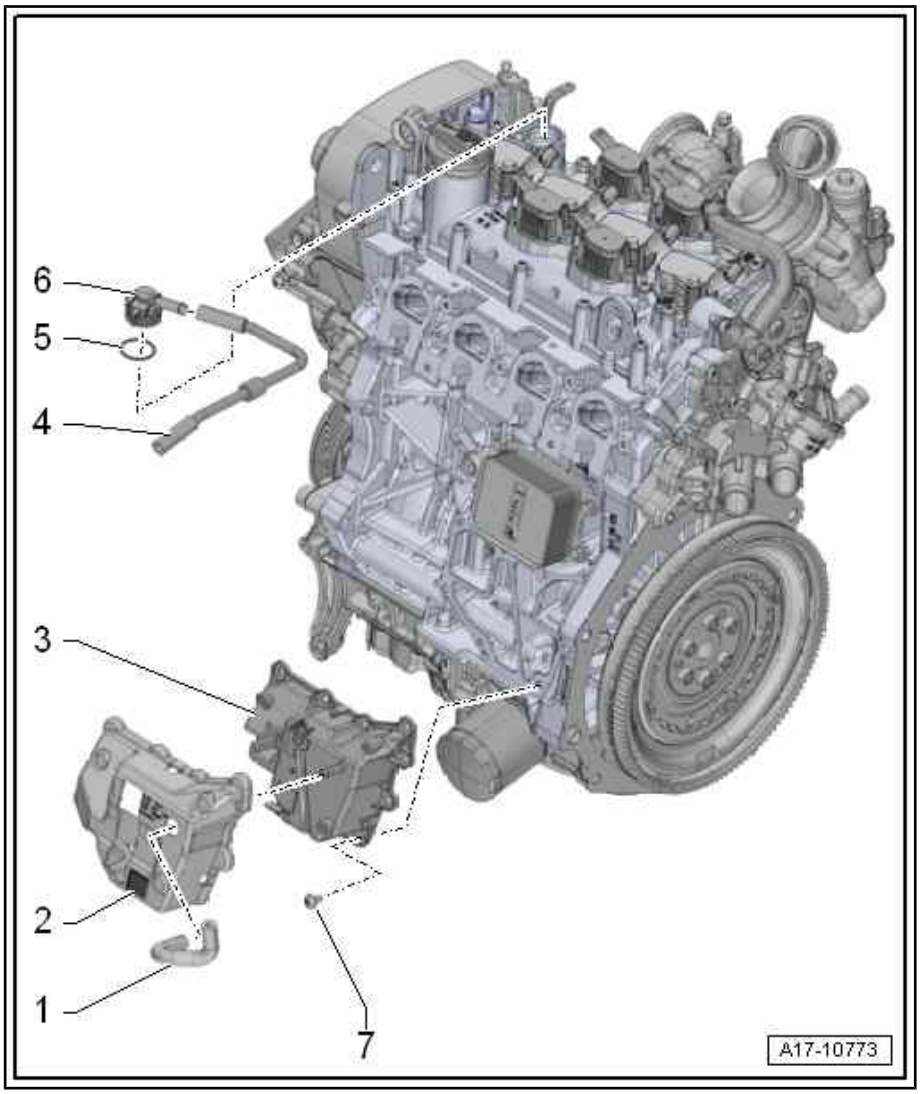
3 - Oil separator
- ❑ Removing and installing ⇒ “3.2 Removing and installing oil separator”, page 295
- ❑ Renew if damaged

4 - Hose
- ❑ For crankcase breather

5 - O-ring
- ❑ Lubricate lightly with engine oil
- ❑ Check for damage and renew if necessary; supplied together with non-return valve

6 - Non-return valve

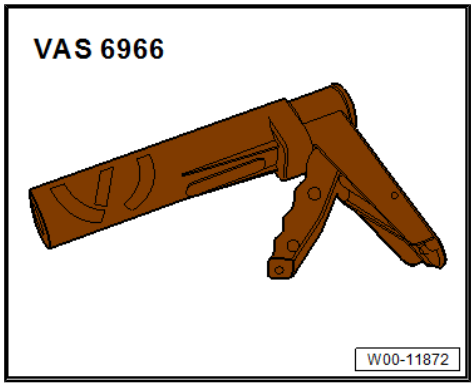
7 - Bolt
- ❑ Self-locking
- ❑ Renew after removing
- ❑ 9 Nm



3.2 Removing and installing oil separator

Special tools and workshop equipment required

- Metering gun - VAS 6966-



- Flat scraper
- Sealant remover
- Sealant ⇒ Electronic parts catalogue

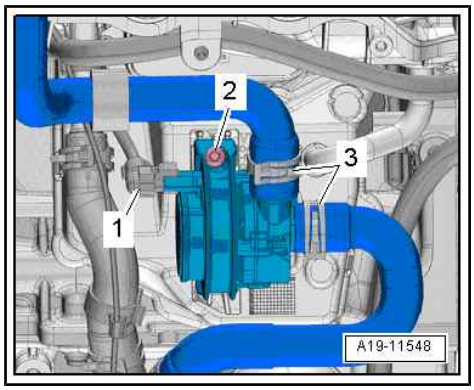
Removing

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

All vehicles except e-tron:

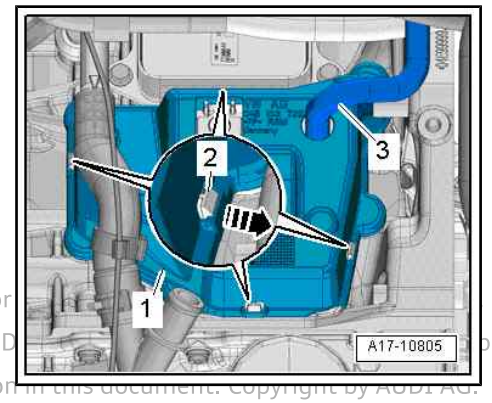
– Unplug electrical connector -1-.

– Remove bolt -2- and press continued coolant circulation pump - V51- to side.



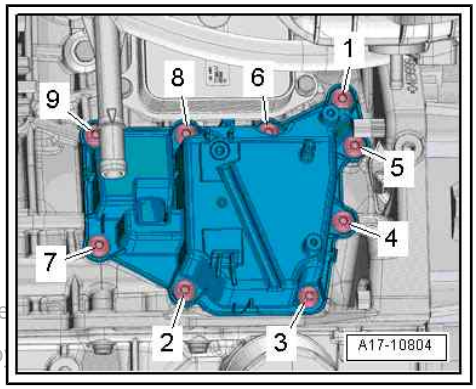
– Disconnect crankcase breather hose -3-.

– Release fasteners -2- -arrow- on cover -1- for oil separator and detach cover.



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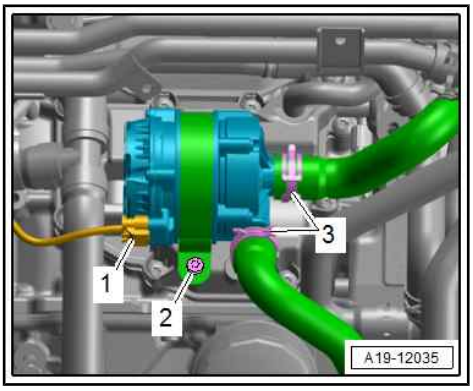
– Slacken and remove bolts in the sequence: -9 ... 1-.
– Carefully release oil separator from bonded joint.



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e-tron:

– Unplug electrical connector -1-.
– Remove bolt -2- and press continued coolant circulation pump - V51- to side.

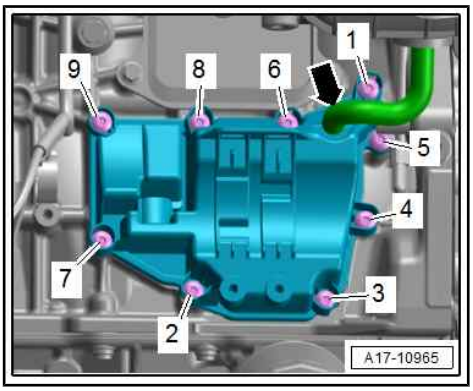


– Disconnect crankcase breather hose -arrow-.
– Slacken and remove bolts in the sequence: -9 ... 1-.
– Carefully release oil separator from bonded joint.

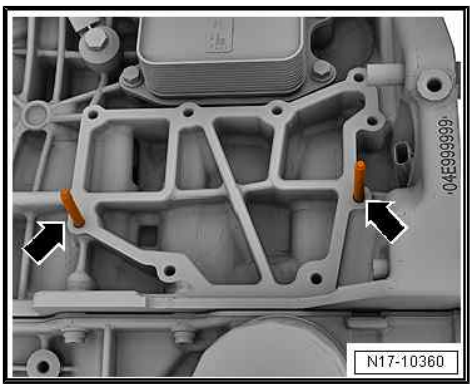
Installing

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

– Cover exposed parts of the engine.
– Remove sealant remaining on cylinder block with flat scraper.
– Clean sealing surfaces; they must be free of oil and grease.

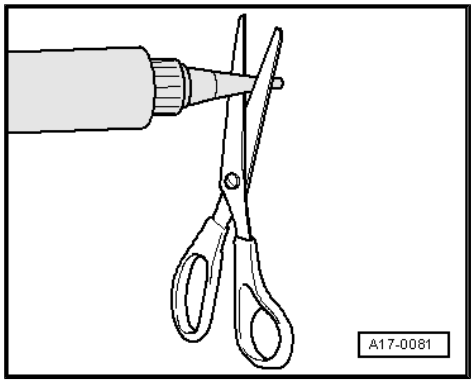


– Screw 2 commercially available studs a few turns into holes -arrows-.



- Note expiry date of sealant.

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

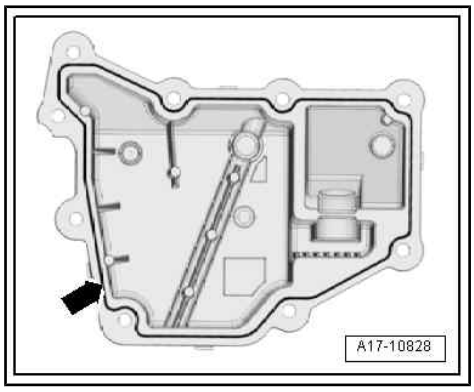


- Thickness of sealant bead: 2 ... 3 mm

– Apply bead of sealant -arrow- onto clean sealing surface of oil separator as shown in illustration.

– Take particular care when applying sealant bead in area of sealing flange.

- Install oil separator within 5 minutes after applying the sealant.

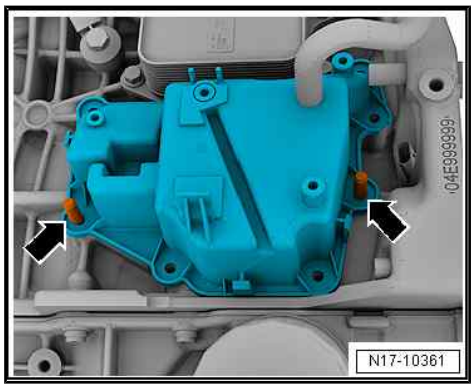


– Place oil separator onto studs -arrows- and position it on cylinder block.

– Remove studs again.

– Tighten bolts for oil separator ⇒ Fig. ""Oil separator - tightening torque and sequence"" , page 295 .

– Check oil level ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .



Tightening torques

- ⇒ Fig. ""Oil separator - tightening torque and sequence"" , page 295
- ⇒ "4.2 Exploded view - electric coolant pump", page 345
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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4 Oil filter/oil pressure switches

⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

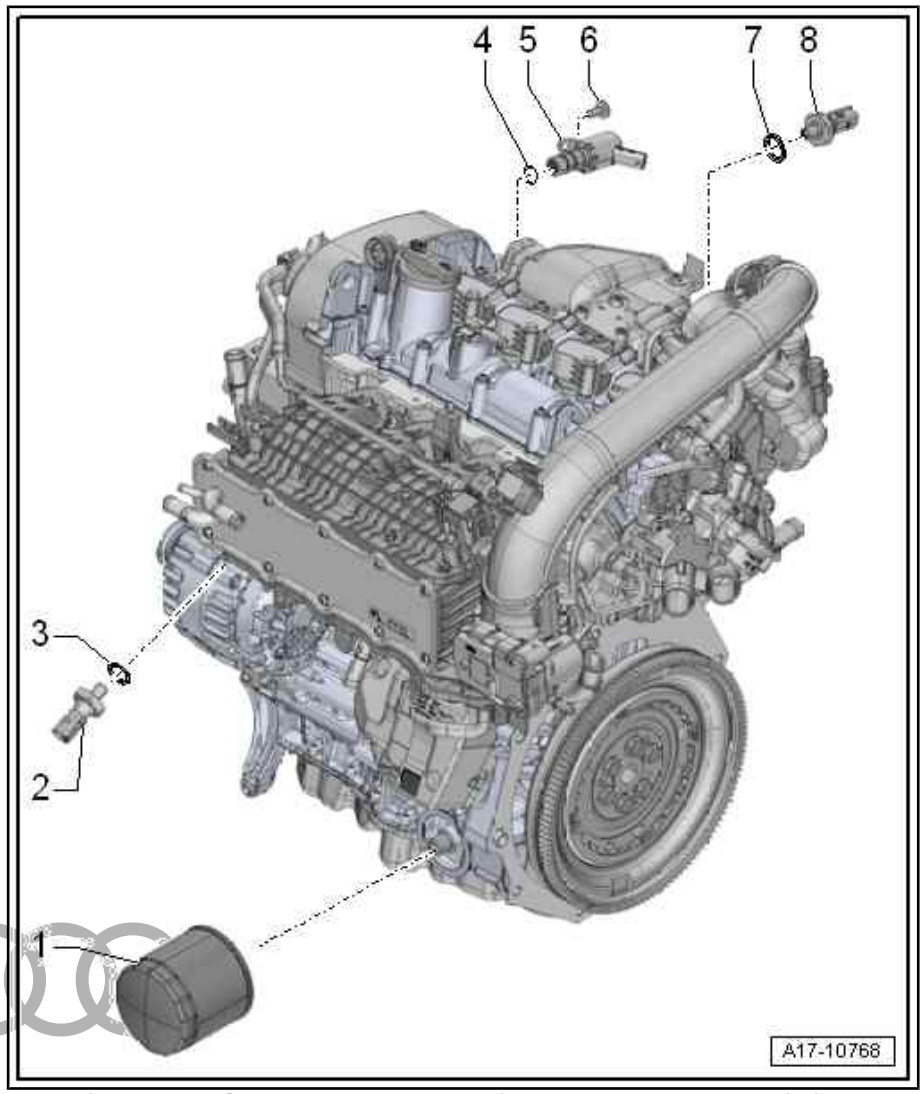
⇒ “4.3 Removing and installing oil pressure switch F1 / F378 ”, page 302

⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 300

⇒ “4.4 Removing and installing valve for oil pressure control N428 ”, page 304

⇒ “4.5 Checking oil pressure”, page 305

4.1 Exploded view - oil filter/oil pressure switches



1 - Oil filter

- ❑ See note ⇒ page 273
- ❑ Removing and installing ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: renewing oil filter
- ❑ Securing threaded connection for oil filter if it has come loose ⇒ Fig. ““Securing threaded connection for oil filter”“ , page 300

2 - Oil pressure switch

- ♦ 1.2 ltr. TFSI (without oil pressure control): oil pressure switch - F1-
- ♦ 1.4 ltr. TFSI (with oil pressure control): 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
  - ❑ Removing and installing ⇒ “4.3 Removing and installing oil pressure switch F1 / F378 ”, page 302
  - ❑ 20 Nm

3 - Seal

- ❑ Renew if removed; check availability in ⇒ Electronic parts catalogue

4 - O-ring

- ❑ Not for 1.2 ltr. TFSI
- ❑ Check for damage and renew if necessary ⇒ Electronic parts catalogue

5 - Valve for oil pressure control - N428-

- ❑ Not for 1.2 ltr. TFSI

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- ❑ Removing and installing
  ⇒ “4.4 Removing and installing valve for oil pressure control N428 ”, page 304

6 - Bolt

- ❑ Not for 1.2 ltr. TFSI
- ❑ 8 Nm

7 - Seal

- ❑ Not for 1.2 ltr. TFSI
- ❑ Renew if removed; check availability in ⇒ Electronic parts catalogue

8 - Oil pressure switch - F22-

- ❑ Not for 1.2 ltr. TFSI
- ❑ Opening/closing pressure 2.15 ... 2.95 bar
- ❑ Blue insulation
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Removing and installing ⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 300
- ❑ 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-.

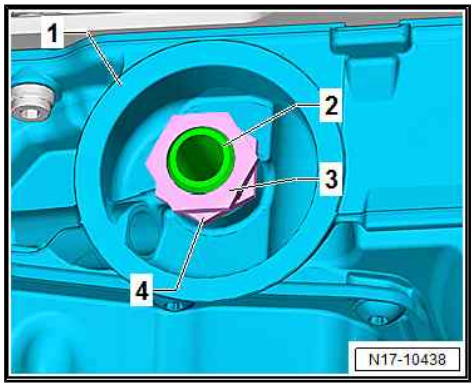
Carry out this procedure using the two nuts -3 and 4- only.

- 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 torque

Threaded connection	Tightening torque
-2-	50 Nm

4.2 Removing and installing oil pressure switch - F22-

Special tools and workshop equipment required

- ♦ Articulated wrench, 24 mm - T40175-



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Removing

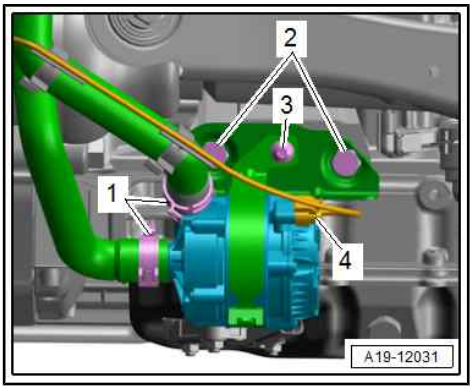
- Re-install all heat insulation sleeves in the same locations when installing.

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

e-tron:

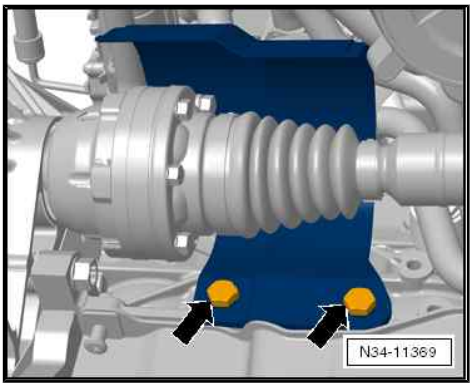
– Unplug electrical connector -4- and move wiring clear.

– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards side.



All vehicles (continued):

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



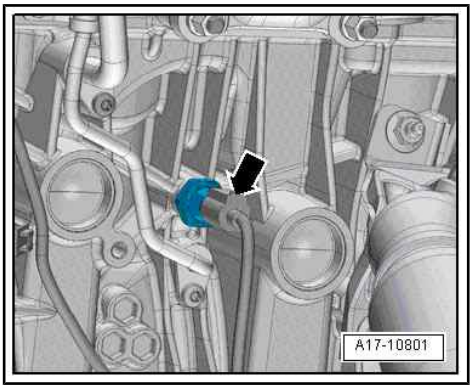
– Detach heat insulation sleeve.

– Unplug electrical connector -arrow-.

– Place a cloth underneath to catch escaping engine oil.

– Unscrew oil pressure switch - F22- .

– Cut open captive seal and renew seal.



Installing

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

- Seal must be renewed after removal.

– Fit the new oil pressure switch - F22- into the connection immediately to avoid loss of oil.

– Check oil level ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .

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Tightening torques

- ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299
- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.3 Removing and installing oil pressure switch -F1- / -F378-

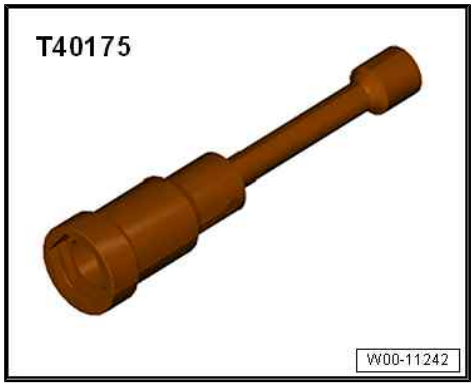
⇒ “4.3.1 Removing and installing oil pressure switch F1 / F378 - all vehicles except e-tron”, page 302

⇒ “4.3.2 Removing and installing oil pressure switch for reduced oil pressure F378 - e-tron”, page 302

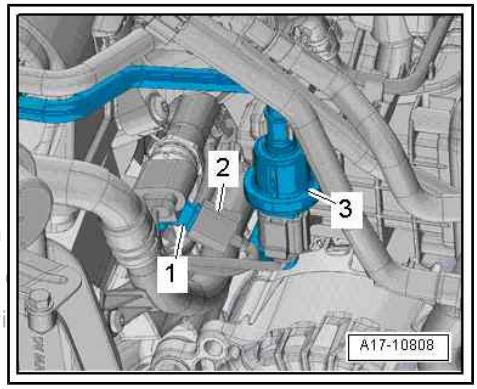
4.3.1 Removing and installing oil pressure switch -F1- / -F378- - all vehicles except e-tron

Special tools and workshop equipment required

- 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-.
– Place a cloth underneath to catch escaping engine oil.
– Remove oil pressure switch -1-.
– Cut open captive seal and renew seal.

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Installing

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

- Seal must be renewed after removal.

– Fit the new oil pressure switch into the connection immediately to avoid loss of oil.
– Check oil level ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .

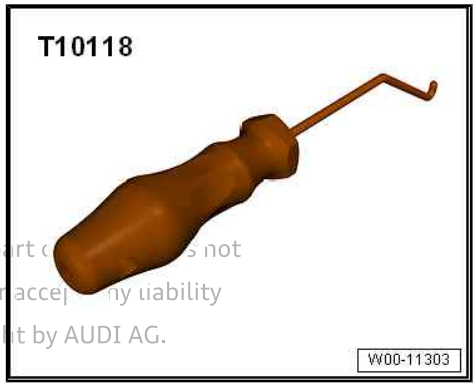
Tightening torques

- ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

4.3.2 Removing and installing oil pressure switch for reduced oil pressure - F378- - e-tron

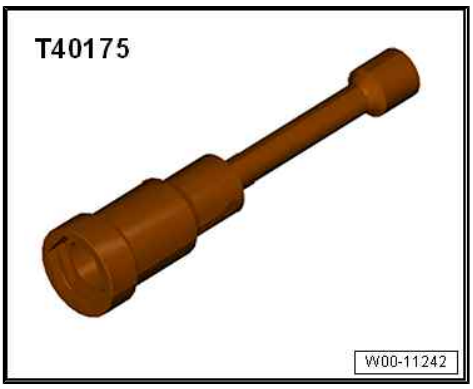
Special tools and workshop equipment required

♦ Assembly tool - T10118-



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♦ Articulated wrench, 24 mm - T40175-



Removing

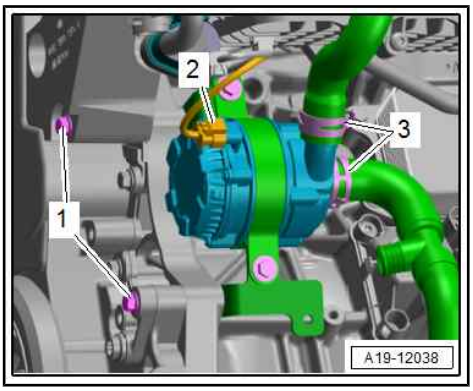
– Remove electrical air conditioner compressor from bracket ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Unplug electrical connector -2- and move wiring clear.

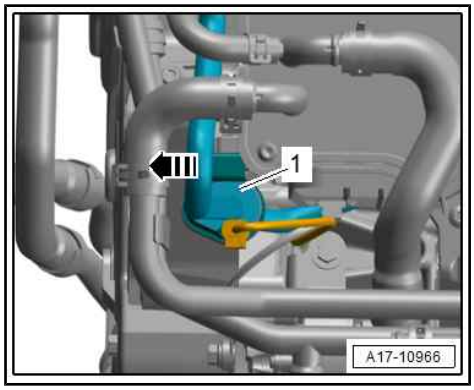
– Remove bolts -1-.

– Move clear coolant pump for low-temperature circuit - V468- with bracket and press it to the side.



– Detach activated charcoal filter solenoid valve 1 - N80- -item 1- from bracket -arrow- and press it to the side.

– If necessary, unclip wiring for activated charcoal filter solenoid valve 1 - N80- at intake manifold.

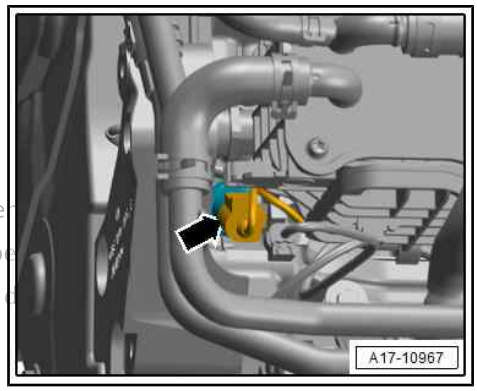


– Unplug electrical connector -arrow- at oil pressure switch for reduced oil pressure - F378- using assembly tool - T10118- .

– Place a cloth underneath to catch escaping engine oil.

– Use articulated wrench, 24 mm - T40175- to remove oil pressure switch for reduced oil pressure - F378- .

– Cut open captive seal and renew seal.



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Installing

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

• Seal must be renewed after removal.

– Fit the new oil pressure switch into the connection immediately to avoid loss of oil.

– Attach electrical air conditioner compressor to bracket ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Check oil level ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

◆ ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

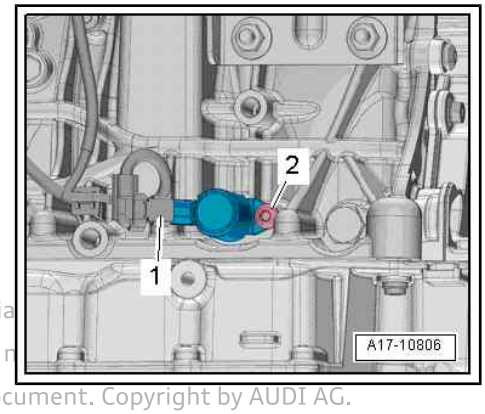
4.4 Removing and installing valve for oil pressure control - N428-

Removing

• Re-install all heat insulation sleeves in the same locations when installing.

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

– Detach heat insulation sleeves.
– Unplug electrical connector -1-.
– 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 reverse order; note the following:

- Check O-ring for damage and renew if necessary.

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Tightening torques

- ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.5 Checking oil pressure

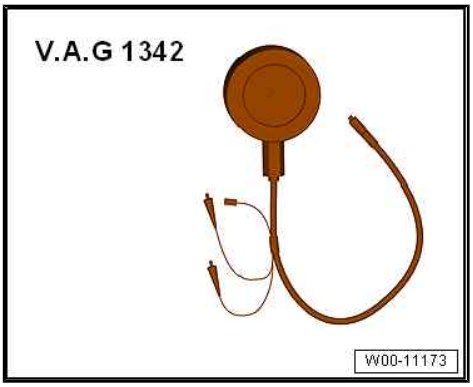
⇒ “4.5.1 Checking oil pressure - all vehicles except e-tron”, page 305

⇒ “4.5.2 Checking oil pressure - e-tron”, page 306

4.5.1 Checking oil pressure - all vehicles except e-tron

Special tools and workshop equipment required

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



Procedure

- Oil level has been checked and is OK ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .
- Engine oil temperature at least 80 °C (radiator fan must have run once).
– Remove oil pressure switch -F1- / -F378- ⇒ “4.3 Removing and installing oil pressure switch F1 / F378”, page 302 .
– 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.

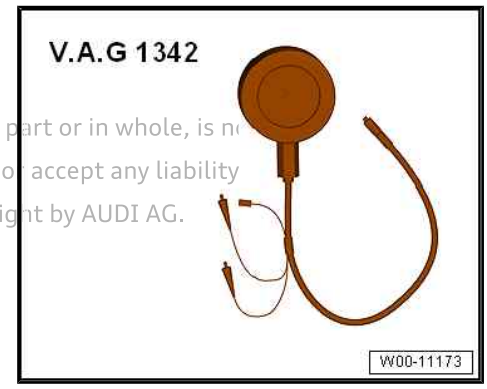
Assembling

– Install oil pressure switch -F1- / -F378-
⇒ “4.3 Removing and installing oil pressure switch F1 / F378 ”, page 302 .

4.5.2 Checking oil pressure - e-tron

Special tools and workshop equipment required

◆ Oil pressure tester - V.A.G 1342- with adapter -V.A.G 1342/3-



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Procedure

- Oil level has been checked and is OK ⇒ Maintenance ; Booklet 821 ; Maintenance; Engine oil: checking oil level and correcting if necessary .
- Engine oil temperature at least 80 °C (radiator fan must have run once).

– Remove oil pressure switch - F22-
⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 300 .

– Screw oil pressure tester - V.A.G 1342- into hole for oil pressure switch.

– Screw oil pressure switch - F22- into hole in oil pressure tester - V.A.G 1342- to seal hole.

– 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.

Assembling

– Install oil pressure switch - F22-
⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 300 .

19 – Cooling

1 Cooling system/coolant

⇒ “1.1 Connection diagram - coolant hoses”, page 307

⇒ “1.2 Checking cooling system for leaks”, page 312

⇒ “1.3 Draining and filling cooling system”, page 315

⇒ “2 Connecting coolant hose with plug-in connector”, page 336

1.1 Connection diagram - coolant hoses

⇒ “1.1.1 Connection diagram - coolant hoses, vehicles up to June 2013”, page 307

⇒ “1.1.2 Connection diagram - coolant hoses, all vehicles from June 2013 onwards, except e-tron”, page 308

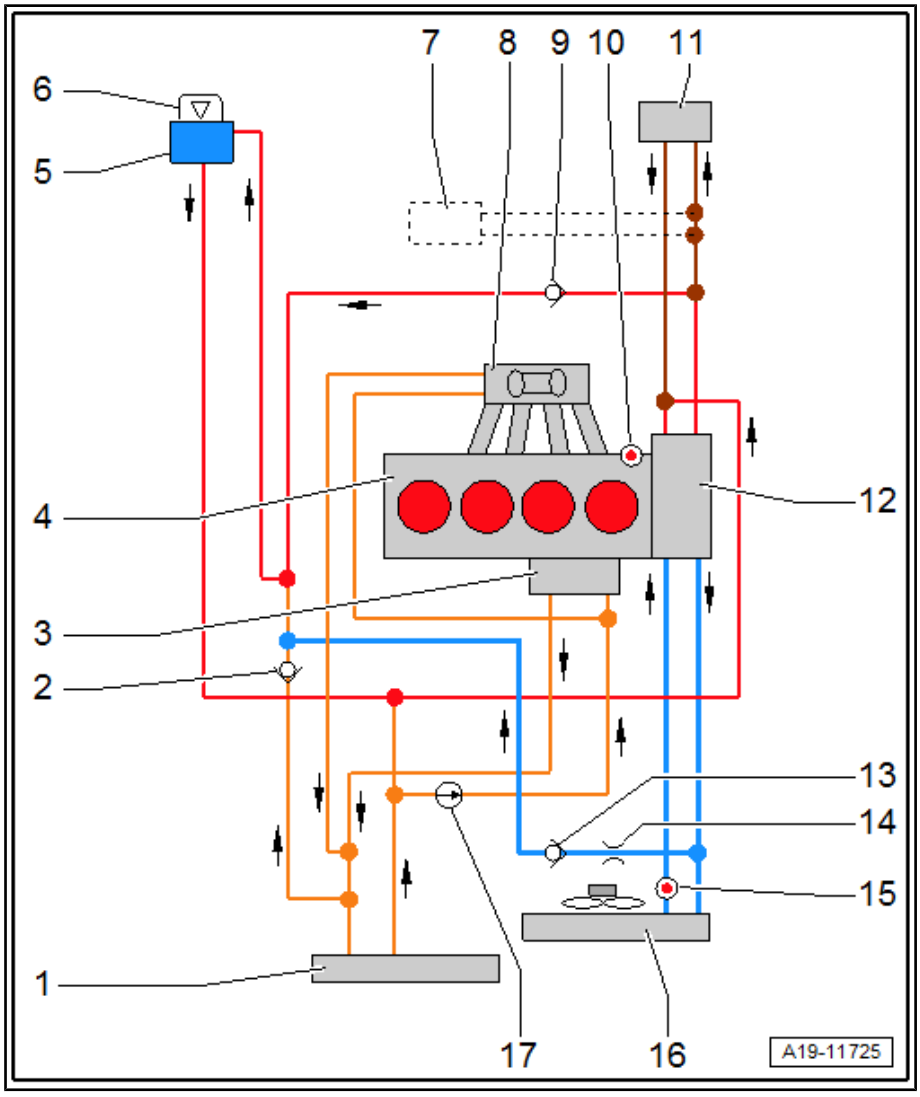
⇒ “1.1.3 Connection diagram - coolant hoses, e-tron”, page 309

⇒ “1.1.4 Connection diagram - coolant hoses, cooling components for high-voltage system”, page 311

1.1.1 Connection diagram - coolant hoses, vehicles up to June 2013

- Blue = Primary coolant circuit (radiator)
- Red = Coolant circuit for cylinder block
- Orange = Charge air cooling circuit
- Brown = Heating circuit
- Arrows show direction of coolant flow.

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1 - Water radiator for charge air cooling circuit

2 - Non-return valve

3 - Charge air cooler

4 - Cylinder head/cylinder block

5 - Coolant expansion tank

- ❑ With coolant shortage indicator switch - F66-
- ❑ With filler cap
- ❑ Removing and installing ⇒ “3.2.1 Removing and installing coolant expansion tank - engine cooling circuit”, page 338

6 - Filler cap

- ❑ For coolant expansion tank
- ❑ Checking pressure relief valve ⇒ “1.2.1 Checking pressure relief valve in filler cap”, page 312

7 - Auxiliary heater

- ❑ Optional equipment

8 - Turbocharger

9 - Non-return valve

10 - Coolant temperature sender - G62-

11 - Heat exchanger for heater

12 - Coolant pump

- ❑ With thermostat housing

13 - Non-return valve

14 - Restrictor

15 - Radiator outlet coolant temperature sender - G83-

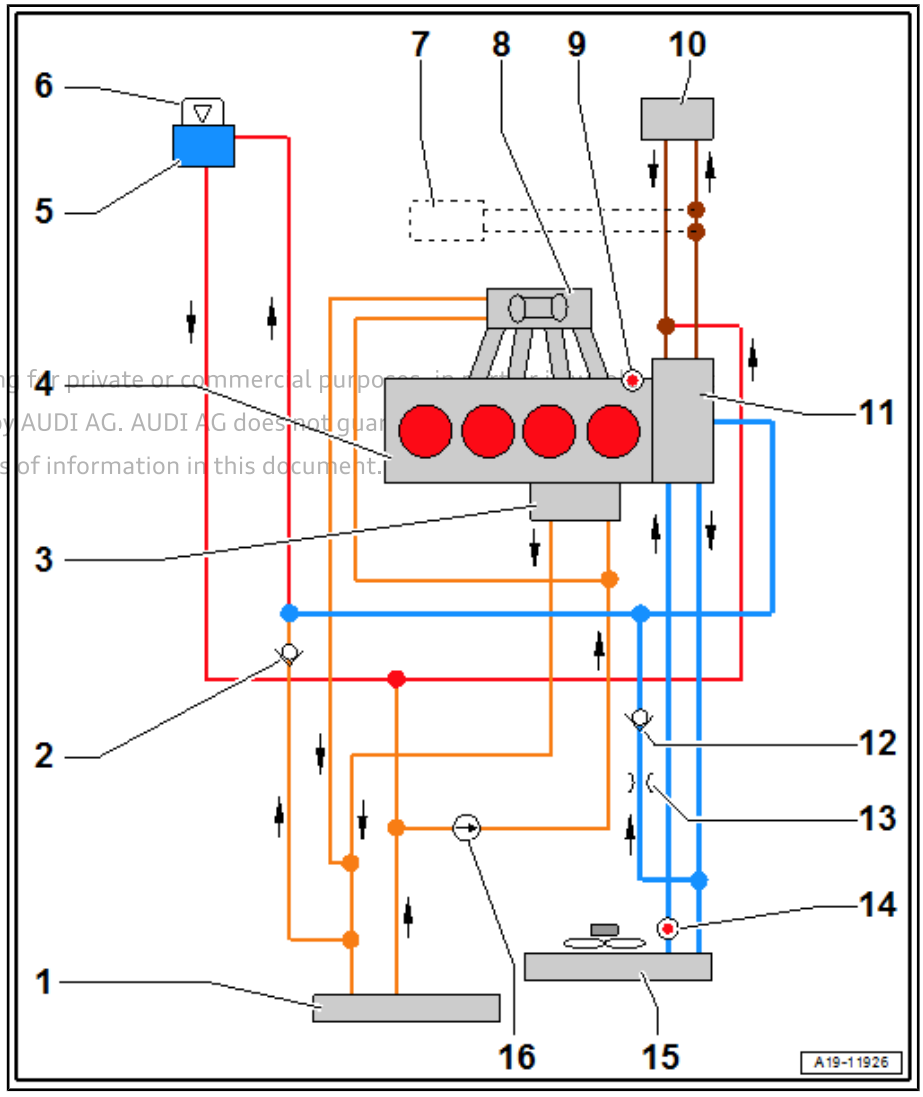
16 - Radiator

17 - Continued coolant circulation pump - V51-

1.1.2 Connection diagram - coolant hoses, all vehicles from June 2013 onwards, except e-tron

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- ♦ Blue = Primary coolant circuit (radiator)
- ♦ Red = Coolant circuit for cylinder block
- ♦ Orange = Charge air cooling circuit
- ♦ Brown = Heating circuit
- ♦ Arrows show direction of coolant flow.



1 - Water radiator for charge air cooling circuit

2 - Non-return valve

3 - Charge air cooler

4 - Cylinder head/cylinder block

5 - Coolant expansion tank

- ❑ With coolant shortage indicator switch - F66-
- ❑ With filler cap
- ❑ Removing and installing

⇒ “3.2.1 Removing and installing coolant expansion tank - engine cooling circuit”, page 338

6 - Filler cap

- ❑ For coolant expansion tank
- ❑ Checking pressure relief valve

⇒ “1.2.1 Checking pressure relief valve in filler cap”, page 312

7 - Auxiliary heater

- ❑ Optional equipment

8 - Turbocharger

9 - Coolant temperature sender - G62-

10 - Heat exchanger for heater

11 - Coolant pump

- ❑ With thermostat housing

12 - Non-return valve

13 - Restrictor

14 - Radiator outlet coolant temperature sender - G83-

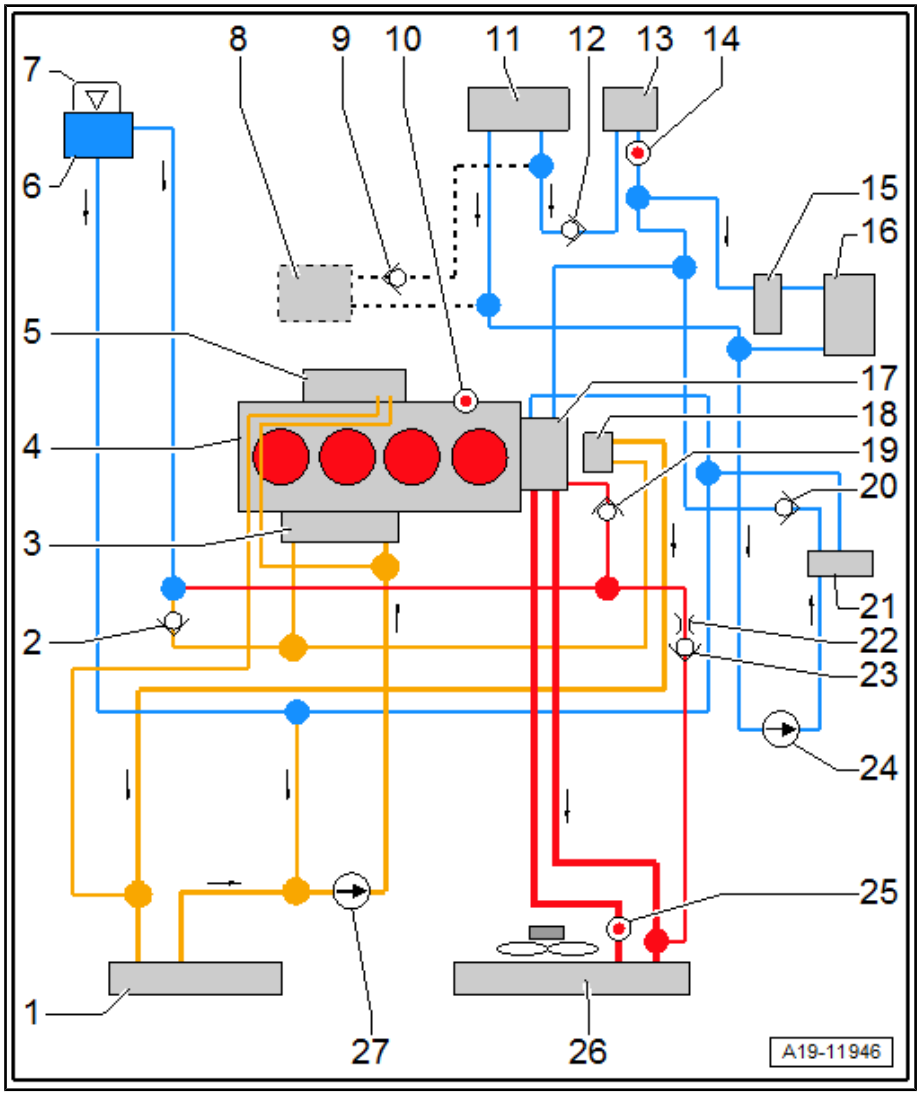
15 - Radiator

16 - Continued coolant circulation pump - V51-

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1.1.3 Connection diagram - coolant hoses, e-tron

- Red = Primary coolant circuit (radiator)
- Blue = Coolant circuit for cylinder block
- Orange = Charge air cooling circuit
- Brown = Heating circuit
- Arrows show direction of coolant flow.



1 - Water radiator for charge air cooling circuit

2 - Non-return valve

3 - Charge air cooler

4 - Cylinder head/cylinder block

5 - Turbocharger

6 - Coolant expansion tank

- ❑ With coolant shortage indicator sender - G32-
- ❑ With filler cap
- ❑ Removing and installing ⇒ “3.2.1 Removing and installing coolant expansion tank - engine cooling circuit”, page 338

7 - Filler cap

- ❑ For coolant expansion tank
- ❑ Checking pressure relief valve ⇒ “1.2.1 Checking pressure relief valve in filler cap”, page 312

8 - Auxiliary heater

- ❑ Optional equipment

9 - Non-return valve

10 - Coolant temperature sender - G62-

11 - Heat exchanger for heater

12 - Non-return valve

13 - High-voltage heater (PTC) control unit - J848- with high-voltage heater (PTC) - Z115-

14 - Coolant temperature sender for heater - G241-

15 - Coolant valve for gearbox - N488-

16 - Gear oil cooler

17 - Coolant pump

- ❑ With thermostat housing

18 - Three-phase current drive - VX54- with electric drive motor - V141-

19 - Non-return valve

20 - Non-return valve

21 - Coolant changeover valve 2 - N633-

22 - Restrictor

23 - Non-return valve

24 - Coolant pump for high-temperature circuit - V467-

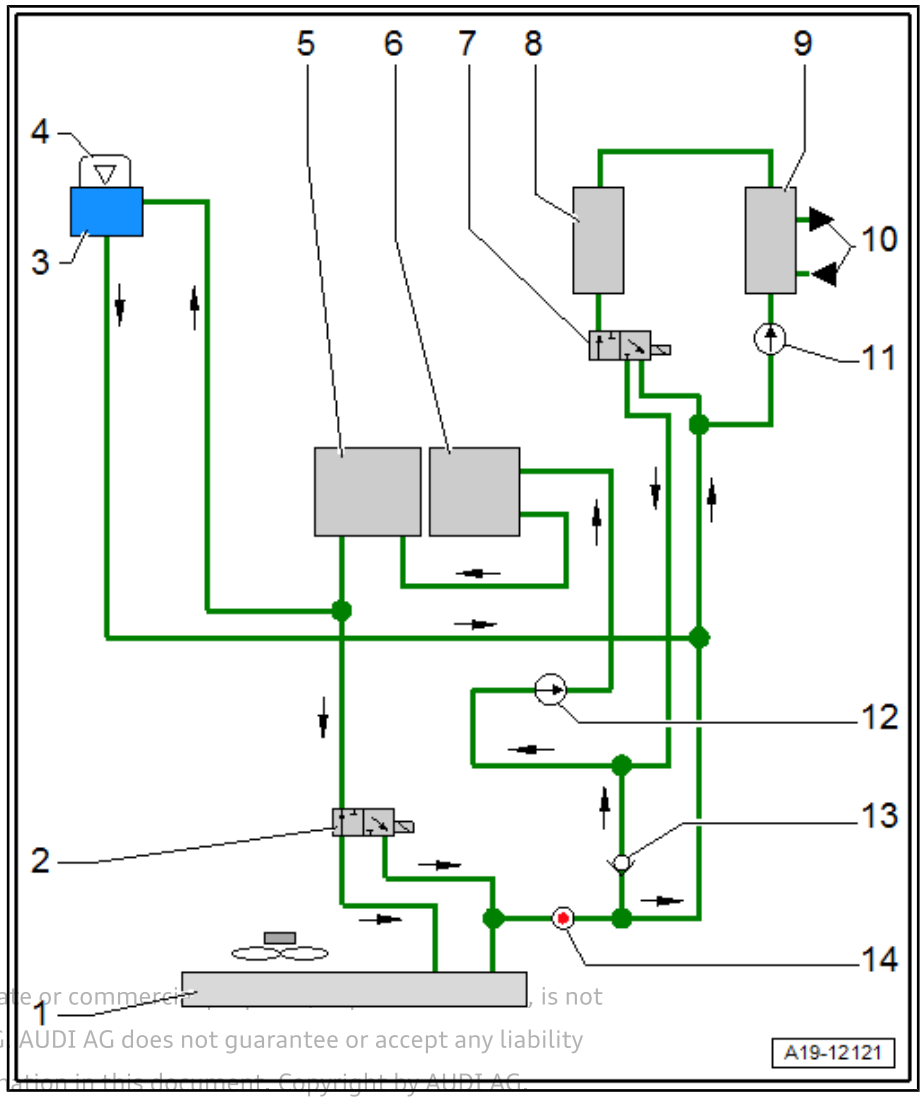
25 - Radiator outlet coolant temperature sender - G83-

26 - Radiator

27 - Coolant pump for low-temperature circuit - V468-

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1.1.4 Connection diagram - coolant hoses, cooling components for high-voltage system



1 - Radiator for high-voltage cooling circuit

2 - Coolant changeover valve 1 - N632-

- ❑ Removing and installing ⇒ “4.13.2 Removing and installing coolant changeover valve 1 N632 ”, page 384

3 - Coolant expansion tank

- ❑ With coolant shortage indicator sender 2 - G837-
- ❑ With filler cap
- ❑ Removing and installing ⇒ “3.2.2 Removing and installing coolant expansion tank - high-voltage cooling circuit”, page 340

4 - Filler cap

- ❑ For coolant expansion tank
- ❑ Checking pressure relief valve ⇒ “1.2.1 Checking pressure relief valve in filler cap”, page 312

5 - Control unit for high-voltage battery charging unit - J1050-

6 - Power and control electronics for electric drive - JX1-

7 - Coolant valve for high-voltage battery - N688-

- ❑ Removing and installing ⇒ “4.13.4 Removing and installing coolant valve for high-voltage battery N688 ”, page 386

8 - Hybrid battery unit - AX1-

9 - Heat exchanger for hybrid battery unit

10 - Refrigerant lines

11 - Coolant pump for high-voltage battery - V590-

- ❑ Removing and installing ⇒ “4.8.5 Removing and installing coolant pump for high-voltage battery V590 ”, page 374

12 - Coolant circulation pump before power and control electronics for electric drive - V508-

- ❑ Removing and installing ⇒ “4.8.4 Coolant circulation pump before power and control electronics for electric drive V508 ”, page 373

13 - Non-return valve

14 - Engine temperature sender 2 - G652-

- ❑ Removing and installing ⇒ “4.12 Removing and installing engine temperature sender 2 G652 ”, page 381

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1.2 Checking cooling system for leaks

⇒ “1.2.1 Checking pressure relief valve in filler cap”, page 312

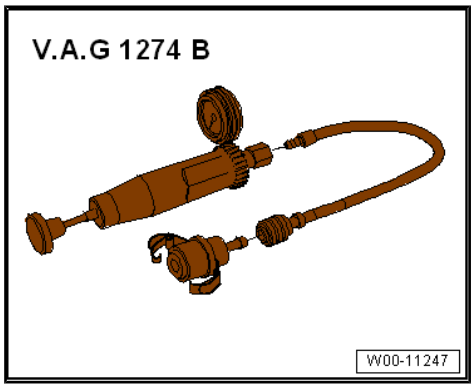
⇒ “1.2.2 Checking cooling system for leaks - engine cooling system”, page 312

⇒ “1.2.3 Checking cooling system for leaks - high-voltage cooling circuit”, page 314

1.2.1 Checking pressure relief valve in filler cap

Special tools and workshop equipment required

- Cooling system tester - V.A.G 1274 B-

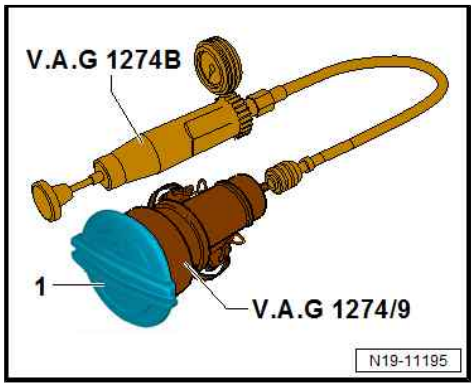


- Adapter for cooling system tester - V.A.G 1274/9-



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– 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.

All filler caps

– Renew filler cap if pressure relief valve does not open as described.

1.2.2 Checking cooling system for leaks - engine cooling system

Special tools and workshop equipment required



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- ♦ Cooling system tester - V.A.G 1274 B-
- ♦ Adapter for cooling system tester - V.A.G 1274/8-
- ♦ Adapter for cooling system tester - V.A.G 1274/9-

Procedure

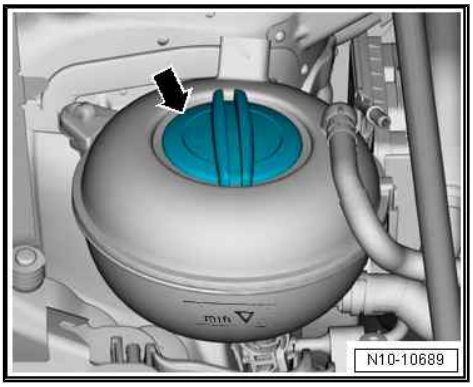
- Engine must be warm.
- Ignition switched off.

⚠ CAUTION

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

Danger of scalding skin and other parts of the body.

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



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

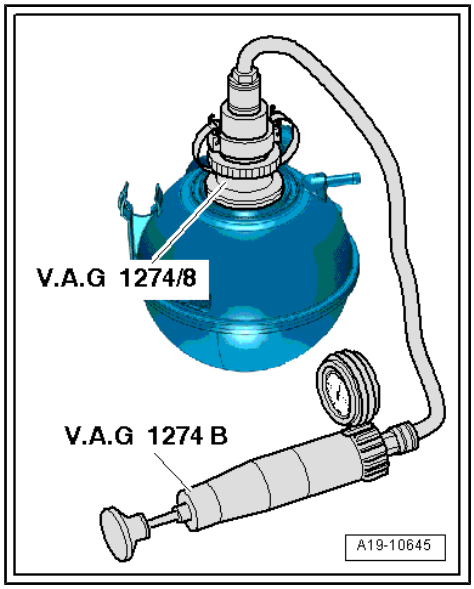
– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
– Using hand pump on cooling system tester, build up a pressure of approx. 1.5 bar.

• 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.



1.2.3 Checking cooling system for leaks - high-voltage cooling circuit

DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

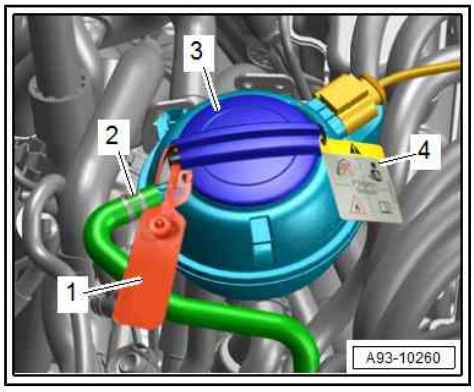
Danger of severe injuries in the event of an explosion.

– **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
– **If the warning lamps for "low coolant" and "fault in high-voltage battery" light up, move the vehicle into the dedicated separate storage area outside.**
– **Inform a high-voltage expert at the importer.**

• On vehicles manufactured during a limited period, the filler cap was bonded to the coolant expansion tank before delivery of the vehicle. It is not possible to open the filler cap without damaging it irreparably. In this case, the filler cap and the coolant expansion tank must be renewed.

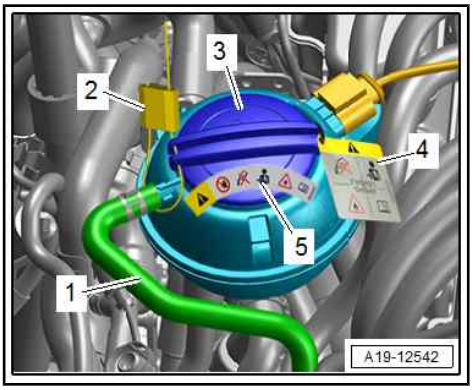
Version 1

– Cut through sealing tag -1- and open filler cap -3- on coolant expansion tank.



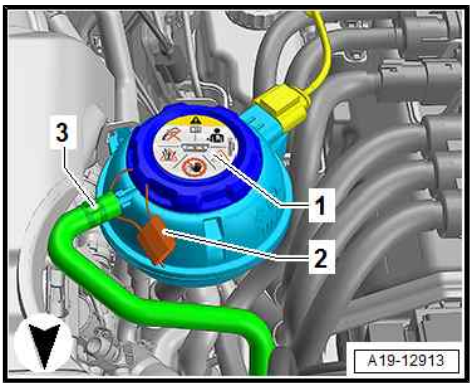
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Version 2



– Detach warning sticker -5-.
– Cut through sealing tag -2- and open filler cap -3- on coolant expansion tank.

Version 3



– Cut through sealing tag -2- and open filler cap -1- on coolant expansion tank.

For further procedure for checking high-voltage cooling system, refer to:

⇒ Vehicle diagnostic tester

`High-voltage`

`High-voltage cooling system leak test`

– Fill up coolant in cooling system for high-voltage system ⇒ “1.3.4 Filling up cooling system - cooling components for high-voltage system”, page 327 .

1.3 Draining and filling cooling system

⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315

⇒ “1.3.2 Draining cooling system - cooling components for high-voltage system (front)”, page 323

⇒ “1.3.3 Draining cooling system - hybrid battery unit”, page 325

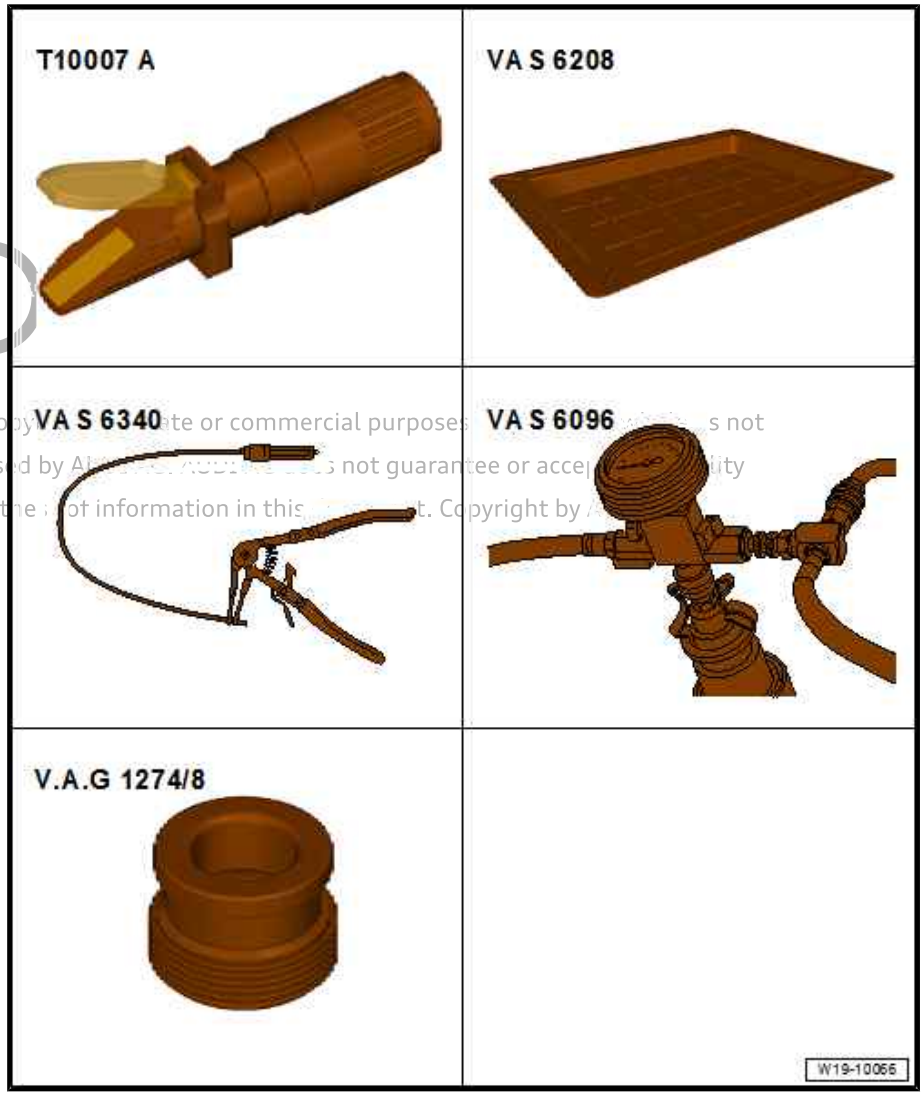
⇒ “1.3.4 Filling up cooling system - cooling components for high-voltage system”, page 327

⇒ “1.3.5 Checking filling quality - high-voltage system”, page 333

1.3.1 Draining and filling cooling system - engine cooling system

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Special tools and workshop equipment required



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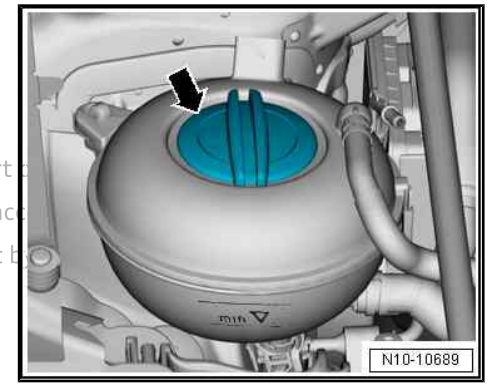
- Refractometer - T10007A-
- Drip tray for workshop hoist - VAS 6208-
- Hose clip pliers - VAS 6340-
- Cooling system charge unit - VAS 6096-
- Adapter for cooling system tester - V.A.G 1274/8-
- Safety goggles
- Protective gloves

Draining

CAUTION

The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.
Danger of scalding skin and other parts of the body.
- **Put on protective gloves.**
- **Put on safety goggles.**
- **Cover filler cap on expansion tank with a cloth and open carefully to release pressure.**

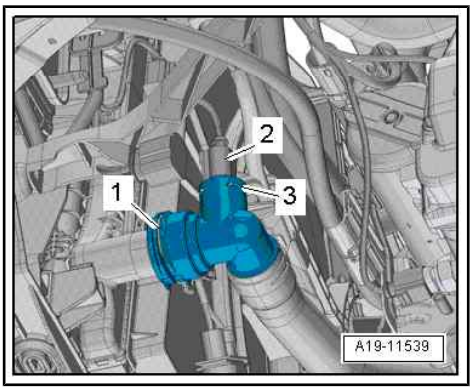
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- Open filler cap -arrow- on coolant expansion tank.
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

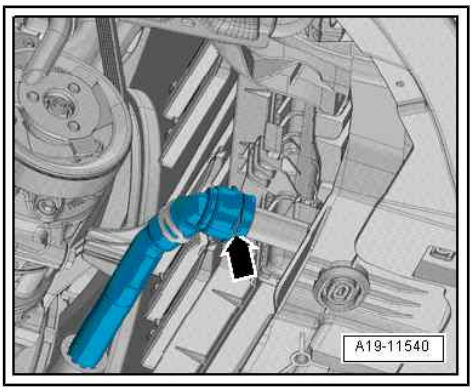
All vehicles except e-tron:

- Unplug electrical connector -2- at radiator outlet coolant temperature sender - G83- .
- Place drip tray for workshop hoist - VAS 6208- underneath.
- Lift retaining clip -1-, disconnect coolant hose from radiator (bottom left) and drain off coolant.



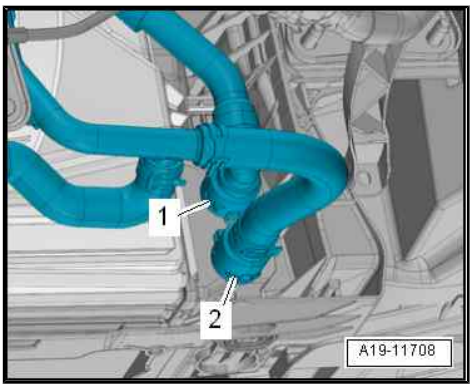
Water radiator for charge air cooling circuit (version 1):

- Lift retaining clip -arrow-, disconnect coolant hose (bottom right) from water radiator for charge air cooling circuit and drain off remaining coolant.



Water radiator for charge air cooling circuit (version 2):

- Lift retaining clips -1, 2-, disconnect coolant hoses from water radiator for charge air cooling circuit and drain off coolant.

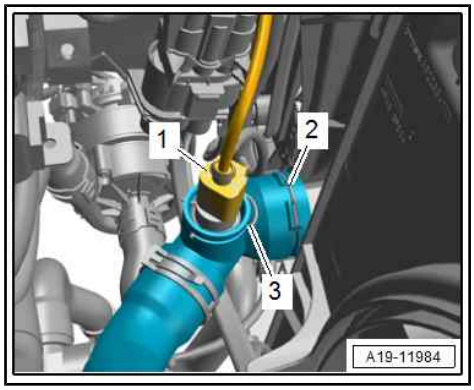


e-tron:

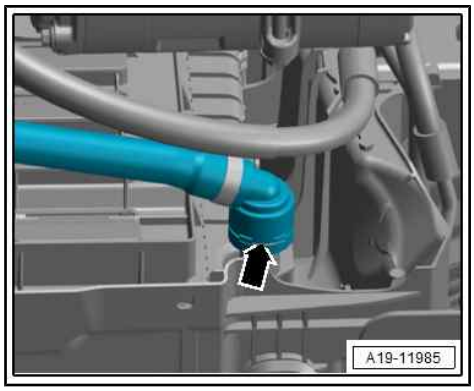
– Unplug electrical connector -1- at radiator outlet coolant temperature sender - G83- .

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

– Lift retaining clip -2-, disconnect coolant hose from radiator (bottom left) and drain off coolant.

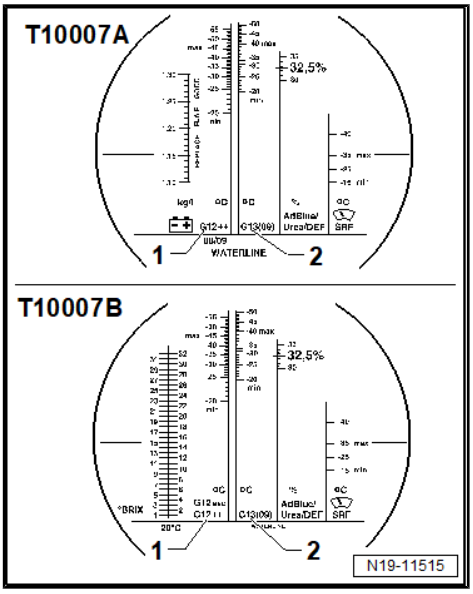


– Lift retaining clip -arrow-, disconnect coolant hose (bottom right) from water radiator for charge air cooling circuit and drain off coolant.



Filling

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Note

- *The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.*
- *Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA) . If you use other coolant additives, this can significantly impair in particular the corrosion protection effect. The resulting damage could lead to loss of coolant and consequently to serious damage to the power unit.*
- *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 power unit reliability under heavy loads, particularly in countries with tropical climates.*
- *Refractometer - T10007A- or refractometer - T10007B- MUST be used to determine the current level of frost protection.*
- *Scale -1- on the refractometer applies to coolant additives G12 ++ and G12evo.*
- *Scale -2- on the refractometer applies to coolant additive G13.*
- *If more than one type of coolant additive has been used: Always use the scale for G13 to determine the anti-freeze 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.*
- *The temperature indicated on the refractometer corresponds to the temperature at which the first ice crystals can form in the coolant.*
- *Do not reuse coolant.*
- *Only use water/coolant additive as a lubricant for coolant hoses.*

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Recommended mixture ratio for coolant

NOTICE

Danger of corrosion damage if unsuitable mixtures of water and coolant additives are used.

– Always use distilled water as this ensures optimum corrosion protection.

- Coolant (40 %) and distilled water (60 %) for frost protection to -25 °C

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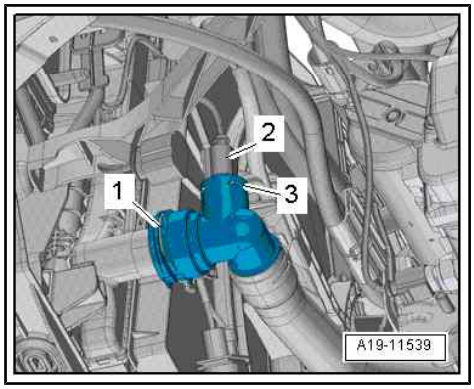
- Coolant (50 %) and distilled water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue (ETKA)

Procedure

- Do not reuse coolant.

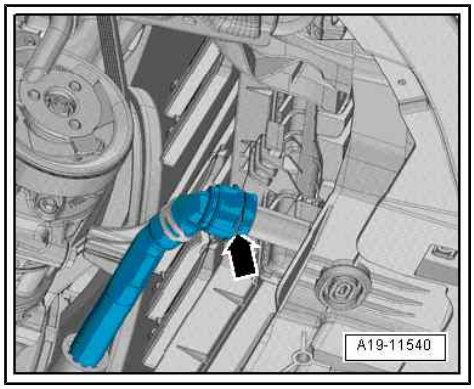
All vehicles except e-tron:

– Connect coolant hose with plug-in connector to radiator (bottom left)
⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .



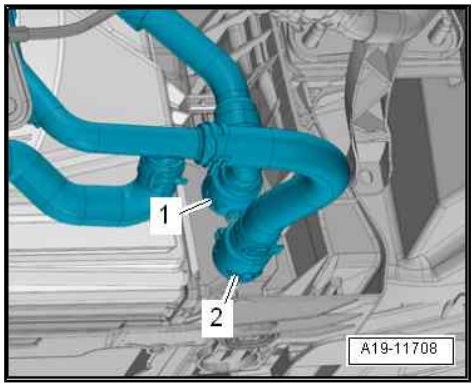
Water radiator for charge air cooling circuit (version 1):

– Connect coolant hose to water radiator for charge air cooling circuit (bottom right) -arrow-.



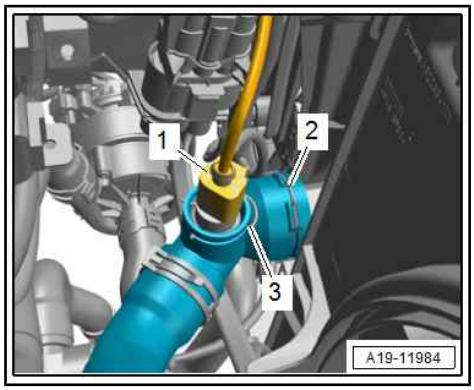
Water radiator for charge air cooling circuit (version 2):

– Connect coolant hoses -1, 2- to water radiator for charge air cooling circuit (bottom right)
⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .

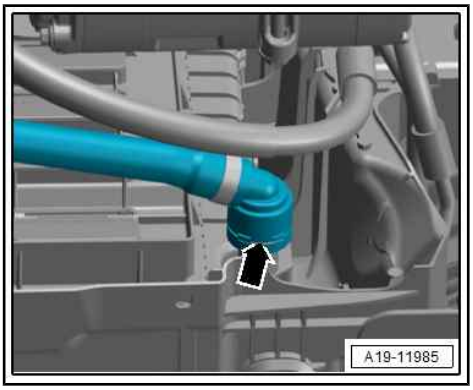


e-tron:

– Connect coolant hose -2- to radiator (bottom left).



– Connect coolant hose to water radiator for charge air cooling circuit (bottom right) -arrow-.



All engine versions (continued):

– Fill reservoir of -VAS 6096- with at least 10 litres of premixed coolant (according to recommended ratio).

– To simplify filling procedure, place filled reservoir on as high a surface as possible, e.g. on a workshop trolley or the engine and gearbox jack.

– 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 -2- into a small container -3-.

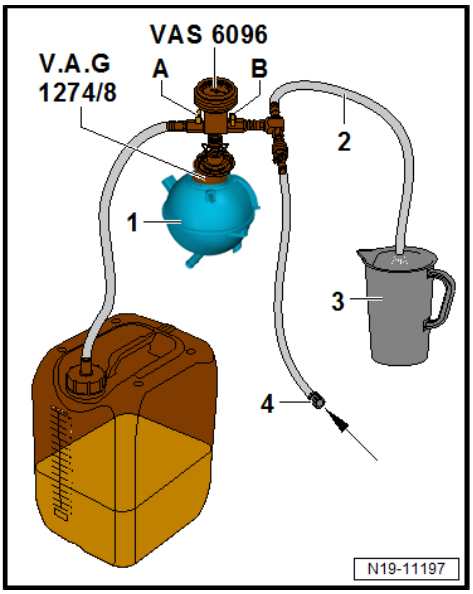
Note:

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).

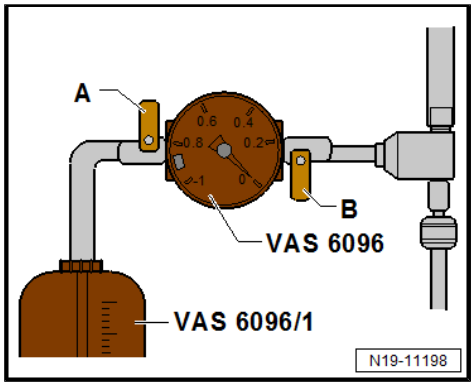
– Connect hose -4- to compressed air supply.

• Pressure: 7 ... 10 bar.



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– Open valve -B- by setting lever in direction of flow.



• The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.

– Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with coolant.

– Close valve -A- again.

– Leave valve -B- open for another 2 minutes.

• The suction jet pump continues to generate a partial vacuum in the cooling system; the needle on the gauge should remain in the green zone.

– Close valve -B-.

• The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.

– If the needle does not reach the green zone, repeat the process.

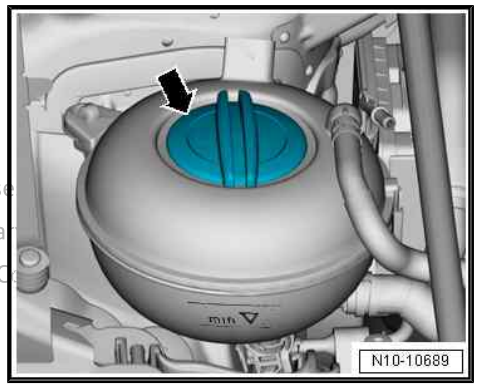
• Check cooling system for leaks if the vacuum is not maintained.

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

– On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.

– Set temperature to “HI”.

– 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).

– Switch off ignition and allow engine to cool down.

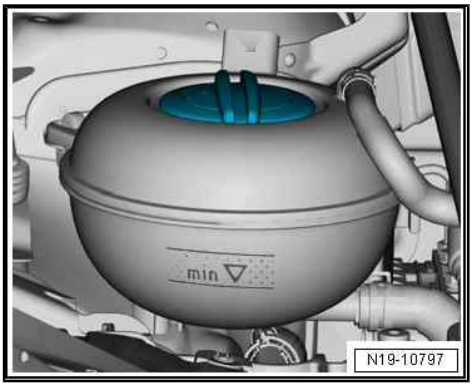
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– Check coolant level.

• 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.



1.3.2 Draining cooling system - cooling components for high-voltage system (front)

Special tools and workshop equipment required

♦ Drip tray for workshop hoist - VAS 6208-



♦ Safety goggles

♦ Protective gloves

• On vehicles manufactured during a limited period, the filler cap was bonded to the coolant expansion tank before delivery of the vehicle. It is not possible to open the filler cap without damaging it irreparably. In this case, the filler cap and the coolant expansion tank must be renewed.

• Engine cold.

Draining (version 1)

CAUTION

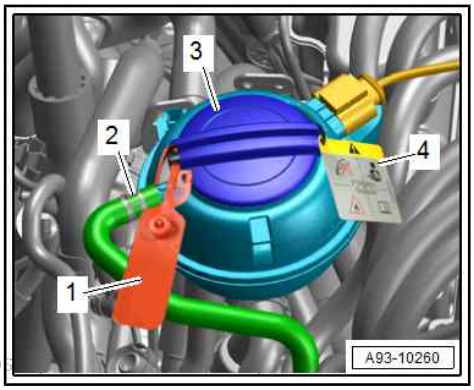
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



– Cut through sealing tag -1- and open filler cap -3- on coolant expansion tank.

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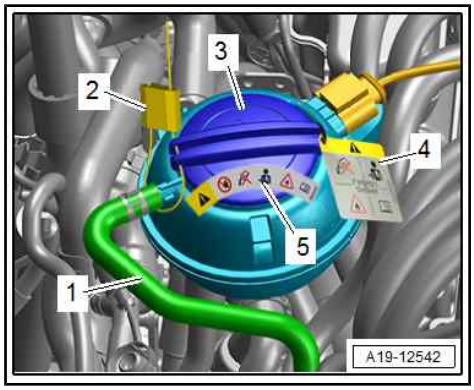
Draining (version 2)

CAUTION

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

Danger of scalding skin and other parts of the body.

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



– Detach warning sticker -5-.

– Cut through sealing tag -2- and open filler cap -3- on coolant expansion tank.

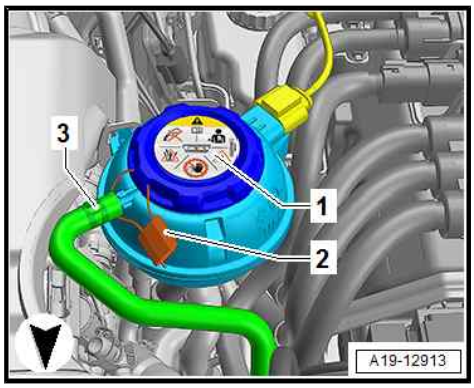
Draining (version 3)

CAUTION

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

Danger of scalding skin and other parts of the body.

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



– Cut through sealing tag -2- and open filler cap -1- on coolant expansion tank.

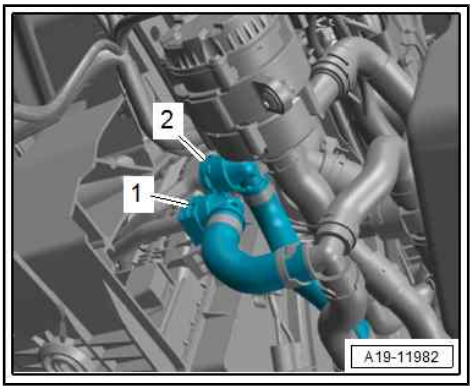
All vehicles (continued):

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

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

– Lift retaining clips -1, 2-, disconnect coolant hose from radiator for high-voltage cooling circuit and drain off coolant.



DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

- **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
- **If the warning lamps for "low coolant" and "fault in high-voltage battery" light up, move the vehicle into the dedicated separate storage area outside.**
- **Inform a high-voltage expert at the importer.**

♦ The high-voltage battery cannot detect coolant leaking into the battery.

♦ The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.

♦ The notice on the filler cap provides an additional warning of the danger involved.

– Connect coolant hoses to radiator for high-voltage cooling circuit
⇒ "2 Connecting coolant hose with plug-in connector", page 336 .

– Fill up with coolant
⇒ "1.3.4 Filling up cooling system - cooling components for high-voltage system", page 327 .

– Attach sealing tag to filler cap on coolant expansion tank
⇒ page 332 .

1.3.3 Draining cooling system - hybrid battery unit

Special tools and workshop equipment required

♦ Drip tray for workshop hoist - VAS 6208-



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♦ Safety goggles

♦ Protective gloves

• On vehicles manufactured during a limited period, the filler cap was bonded to the coolant expansion tank before delivery of the vehicle. It is not possible to open the filler cap without

damaging it irreparably. In this case, the filler cap and the coolant expansion tank must be renewed.

- Engine cold.

Draining (version 1)

CAUTION

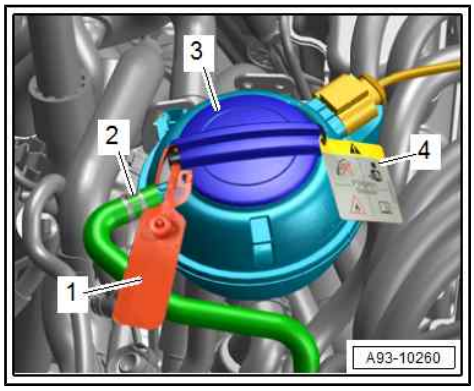
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



– Cut through sealing tag -1- and open filler cap -3- on coolant expansion tank.

Draining (version 2)

CAUTION

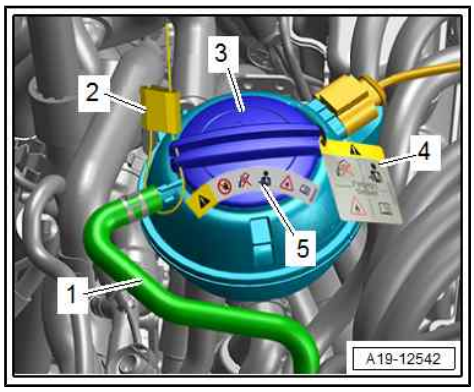
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



– Detach warning sticker -5-.

– Cut through sealing tag -2- and open filler cap -3- on coolant expansion tank.

Draining (version 3)

CAUTION

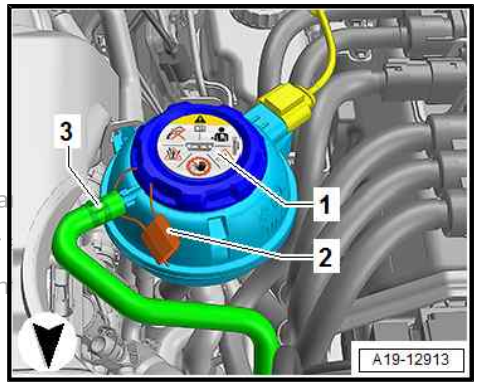
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



– Cut through sealing tag -2- and open filler cap -1- on coolant expansion tank.

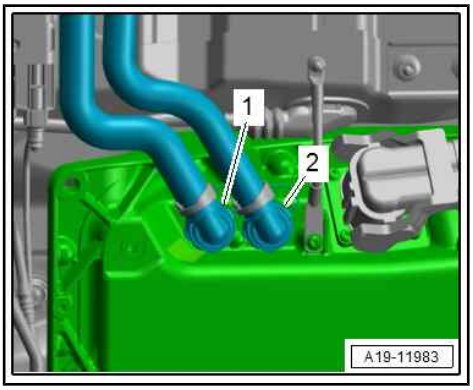
All vehicles (continued):

– Remove underbody trim (right-side) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .

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

– Lift retaining clips -1, 2-, disconnect coolant hose from hybrid battery unit - AX1- and drain off coolant.



DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

- **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
- **If the warning lamps for "low coolant" and "fault in high-voltage battery" light up, move the vehicle into the dedicated separate storage area outside.**
- **Inform a high-voltage expert at the importer.**

♦ The high-voltage battery cannot detect coolant leaking into the battery.

♦ The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.

♦ The notice on the filler cap provides an additional warning of the danger involved.

– Connect coolant hoses to hybrid battery unit - AX1- ⇒ "2 Connecting coolant hose with plug-in connector", page 336 .

– Fill up with coolant ⇒ "1.3.4 Filling up cooling system - cooling components for high-voltage system", page 327 .

– Attach sealing tag to filler cap on coolant expansion tank ⇒ page 332 .

Tightening torques

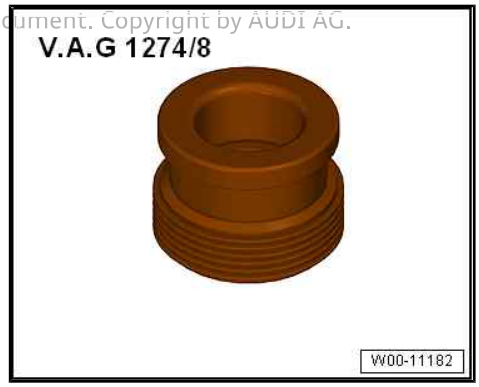
♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

1.3.4 Filling up cooling system - cooling components for high-voltage system

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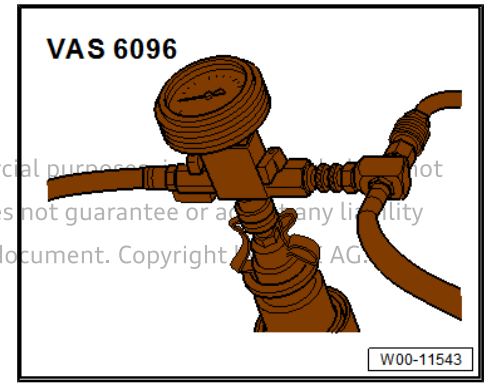
Special tools and workshop equipment required

♦ Adapter for cooling system tester - V.A.G 1274/8-

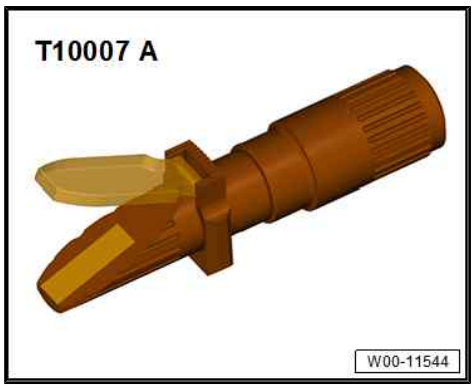


- Cooling system charge unit - VAS 6096-

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- Refractometer - T10007 A-



- Safety goggles
- Protective gloves

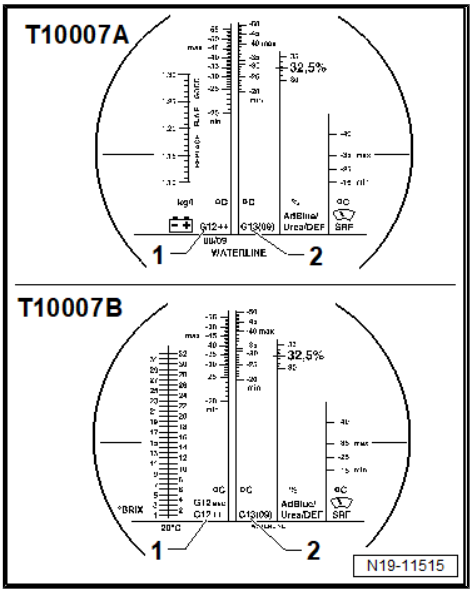
Filling

- Always use cooling system charge unit - VAS 6096- when filling the cooling system. Otherwise, malfunctions may occur.

NOTICE

Danger of corrosion damage if unsuitable mixtures of water and coolant additives are used.

– Always use distilled water as this ensures optimum corrosion protection.



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 damage to the power unit.*
- *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 power unit reliability under heavy loads, particularly in countries with tropical climates.*
- *Refractometer - T10007A- or refractometer - T10007B- MUST be used to determine the current level of frost protection.*
- *Scale -1- on the refractometer applies to coolant additives G12 ++ and G12evo.*
- *Scale -2- on the refractometer applies to coolant additive G13.*
- *If more than one type of coolant additive has been used: Always use the scale for G13 to determine the anti-freeze 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.*
- *The temperature indicated on the refractometer corresponds to the temperature at which the first ice crystals can form in the coolant.*
- *Do not reuse coolant.*
- *Only use water/coolant additive as a lubricant for coolant hoses.*

Recommended mixture ratio for coolant

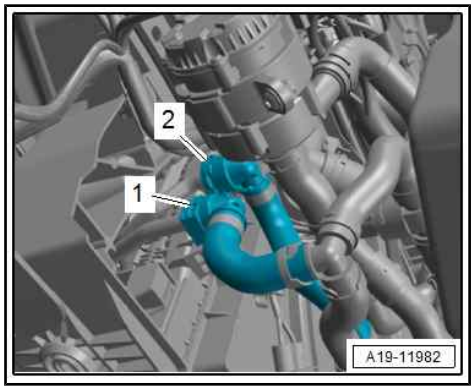
- Coolant (40 %) and distilled water (60 %) for frost protection to -25 °C
- Coolant (50 %) and distilled water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue (ETKA)

Procedure

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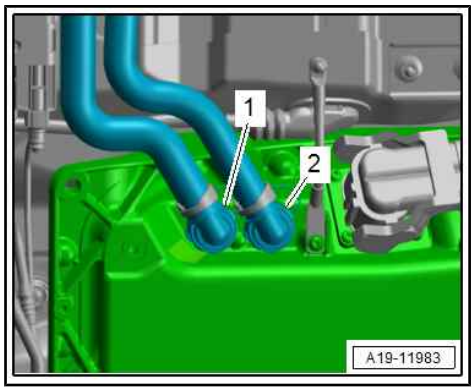
Connecting radiator for high-voltage cooling circuit:

– Connect coolant hoses with plug-in connectors -1, 2- to radiator for high-voltage cooling circuit
⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .



Connecting high-voltage battery unit:

– Connect coolant hoses with plug-in connectors -1, 2- to radiator for high-voltage cooling circuit
⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .



Continued:

– 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 -2- into a small container -3-.

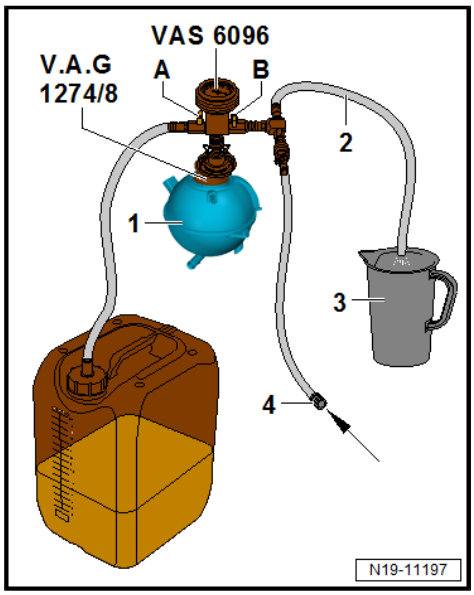
Note:

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 -4- to compressed air supply.

• Pressure: 7 ... 10 bar.



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– Open valve -B- by setting lever in direction of flow.

• The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.

– Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with coolant.

– Close valve -A- again.

– Leave valve -B- open for another 2 minutes.

• The suction jet pump continues to generate a partial vacuum in the cooling system; the needle on the gauge should remain in the green zone.

– Close valve -B-.

• The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.

– If the needle does not reach the green zone, repeat the process.

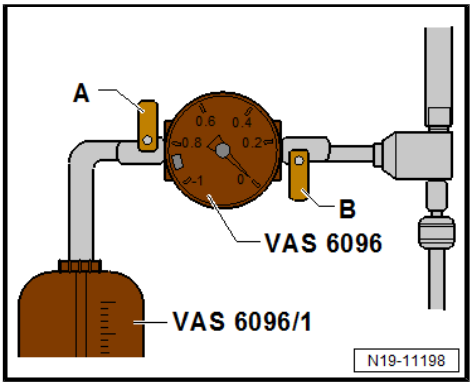
– Check cooling system for leaks if the vacuum is not maintained.

– Detach compressed air hose.

– Open valve -A-.

• The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096- ; the cooling system is then filled.

– Detach cooling system charge unit - VAS 6096- from coolant expansion tank.



– Top up coolant to MAX mark.

– Close filler cap on expansion tank.

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Filling and bleeding high-voltage cooling circuit (low-temperature circuit 2):

– Connect ⇒ Vehicle diagnostic tester and switch on ignition.

– Select `Diagnosis` mode and begin diagnosis.

– Select `Test plan` tab.

– Choose `Select own test` and select following options one after the other:

♦ Drive train

♦ CUKB CXUA 1.4 TSI e-tron engine OBD II

♦ 01 - Self-diagnosis compatible systems

♦ 01 - Motronic engine management MED17

♦ 01 - Engine electronics functions

♦ 01 - Fill up and bleed cooling system

– Follow instructions shown on vehicle diagnostic tester .

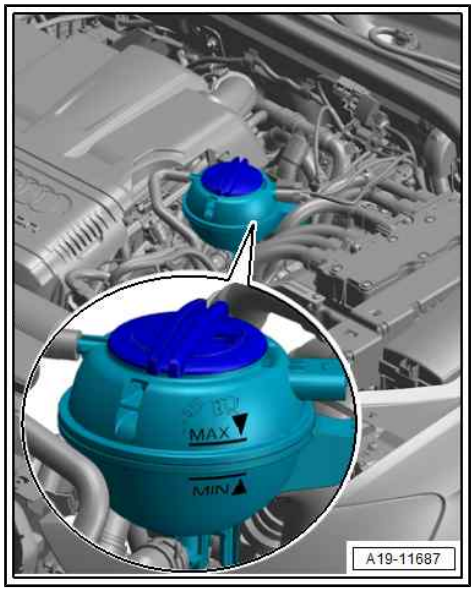
– Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



– Check coolant level.

• The coolant level must be between the MIN and MAX markings.

– Top up with coolant again if necessary.



NOTICE

Danger of short circuit in the high-voltage battery if coolant leaks into the battery.

– If the coolant level in the coolant expansion tank has dropped, do NOT add any coolant until the cause of the leak has been eliminated.

♦ The high-voltage battery cannot detect coolant leaking into the battery.

♦ The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.

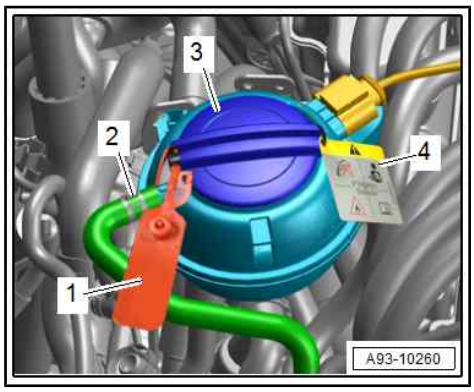
♦ The notice on the filler cap provides an additional warning of the danger involved.

Version 1

– Close filler cap -3- on coolant expansion tank.

– Finally, guide sealing tag -1- (⇒ Electronic parts catalogue) through holes in filler cap -3- and wrap it around coolant hose connection -2-, as shown in illustration.

– Check whether warning notice -4- is attached to expansion tank ⇒ Electronic parts catalogue .



Version 2

– Close filler cap -3- on coolant expansion tank.

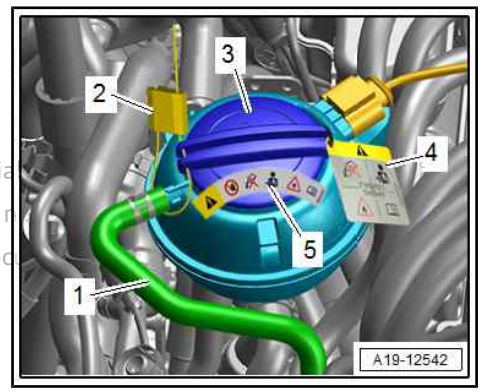
– Guide sealing tag -2- (⇒ Electronic parts catalogue) through hole in filler cap -3- and wrap it around coolant hose connection -1-.

– Close sealing tag.

– Seal filler cap -3- for coolant expansion tank; to do so, attach warning sticker -5- as shown in illustration.

• The warning sticker -5- must be attached so that it projects beyond the edge of the filler cap -3-.

– Check that there is a warning label -4- on coolant expansion tank; attach one if necessary ⇒ Electronic parts catalogue .



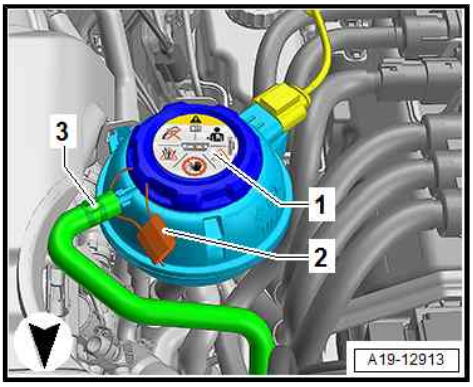
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Version 3

– Close filler cap -1- on coolant expansion tank.

– Finally, guide sealing tag -2- (⇒ Electronic parts catalogue) through holes in filler cap -1- and wrap it around coolant hose connection -3-, as shown in illustration.

– Check whether warning notice -1- is attached to filler cap ⇒ Electronic parts catalogue .



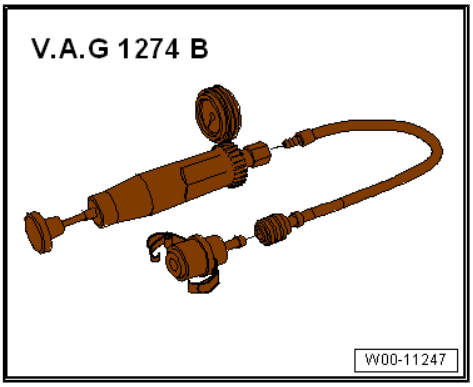
1.3.5 Checking filling quality - high-voltage system

Note

It is necessary to check the filling quality in order to determine whether there is air in the cooling system. If there is air in the cooling system, the coolant level may gradually drop below the minimum level, making a repeat repair necessary.

Special tools and workshop equipment required

♦ Cooling system tester - V.A.G 1274 B-

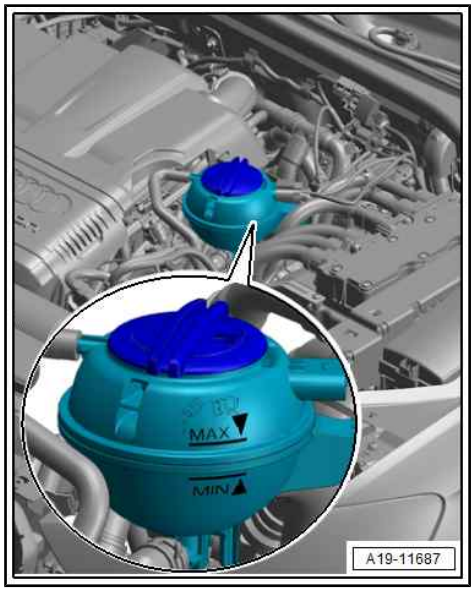


♦ Adapter for cooling system tester - V.A.G 1274/8-



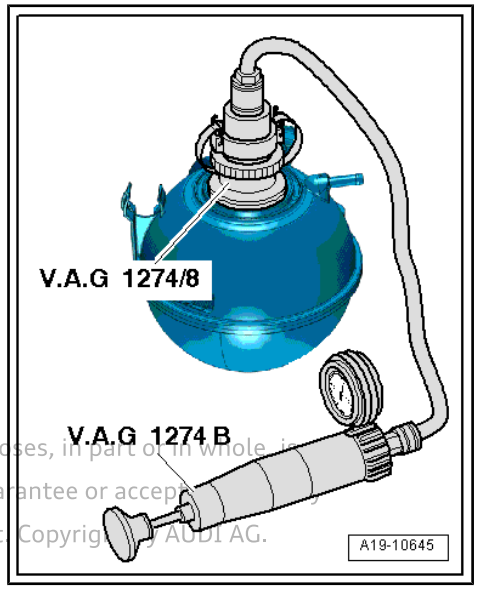
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– Open filler cap on coolant expansion tank.
– Check coolant level.
• The coolant level must be at the MAX mark. Top up coolant if necessary.



– 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 1.6 bar.
– Observe coolant level in expansion tank.

If there is now no longer any coolant in the expansion tank, this means that there is an air bubble in the cooling system. The bleeding procedure must be repeated using the vehicle diagnostic tester.



◆ `Guided Functions`
◆ `Engine electronics`
◆ `Fill/bleed cooling system`

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– After bleeding, check filling quality again.

If some coolant remains in the expansion tank, the cooling system has been filled correctly.

– Switch on ignition.
– Check warning lamps in dash panel insert - KX2- .

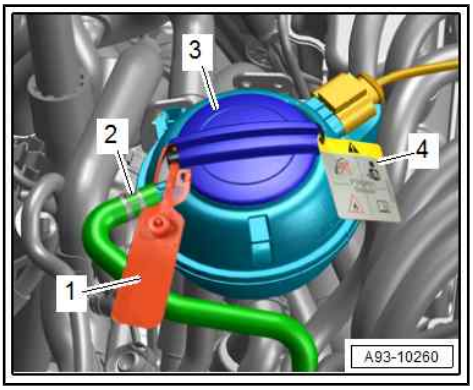
NOTICE

Risk of fire in high-voltage battery due to insulation fault. If the warning lamps for “low coolant” and “fault in high-voltage battery” light up, there may be an insulation fault in the high-voltage battery. Coolant leaking into the battery can cause a fire in the high-voltage battery.

– **Move the vehicle into a quarantine area.**
– **The high-voltage system must be checked by a suitably qualified person.**

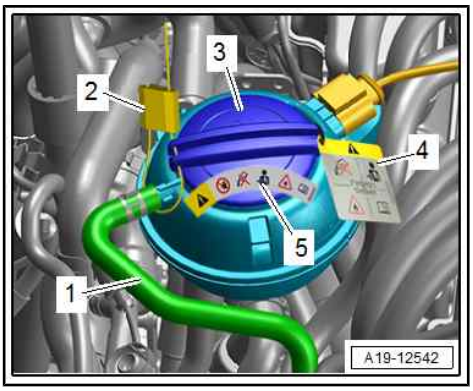
If the warning lamps for “low coolant” and “fault in high-voltage battery” are not lit:

Version 1



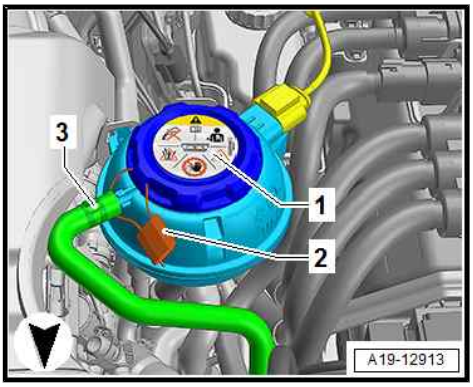
– Close filler cap -3- on coolant expansion tank.
– Finally, guide sealing tag -1- (⇒ Electronic parts catalogue) through holes in filler cap -3- and wrap it around coolant hose connection -2-, as shown in illustration.
– Check whether warning notice -4- is attached to expansion tank ⇒ Electronic parts catalogue .

Version 2



– Close filler cap -3- on coolant expansion tank.
– Guide sealing tag -2- (⇒ Electronic parts catalogue) through hole in filler cap -3- and wrap it around coolant hose connection -1-.
– Close sealing tag.
– Seal filler cap -3- for coolant expansion tank; to do so, attach warning sticker -5- as shown in illustration.
• The warning sticker -5- must be attached so that it projects beyond the edge of the filler cap -3-.
– Check that there is a warning label -4- on coolant expansion tank; attach one if necessary ⇒ Electronic parts catalogue .

Version 3



– Close filler cap -1- on coolant expansion tank.
– Finally, guide sealing tag -2- (⇒ Electronic parts catalogue) through holes in filler cap -1- and wrap it around coolant hose connection -3-, as shown in illustration.
– Check whether warning notice -1- is attached to filler cap ⇒ Electronic parts catalogue .

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2 Connecting coolant hose with plug-in connector

– If damaged, renew retaining clip -4-.

– If damaged, renew O-ring. To do so, remove O-ring -2- from plug-in connector -3- using a suitable tool (do not use a sharp tool). Take care not to damage the plug-in connector or the surface on which the O-ring is seated.

– Lightly lubricate new O-ring with coolant and fit O-ring in plug-in connector.

– Press plug-in connector onto connection -1- until it engages audibly.

– Press plug-in connector in again and then pull to check that it is correctly engaged.



3 Coolant expansion tank

⇒ “3.1 Exploded view - coolant expansion tank”, page 337

3.1 Exploded view - coolant expansion tank

⇒ “3.1.1 Exploded view - coolant expansion tank, engine cooling circuit”, page 337

⇒ “3.1.2 Exploded view - coolant expansion tank, high-voltage cooling circuit”, page 338

3.1.1 Exploded view - coolant expansion tank, engine cooling circuit

1 - Coolant expansion tank

- ❑ Removing and installing ⇒ “3.2.1 Removing and installing coolant expansion tank - engine cooling circuit”, page 338

2 - Clamp

3 - Filler cap

- ❑ Checking ⇒ “1.2.1 Checking pressure relief valve in filler cap”, page 312

4 - Electrical connector

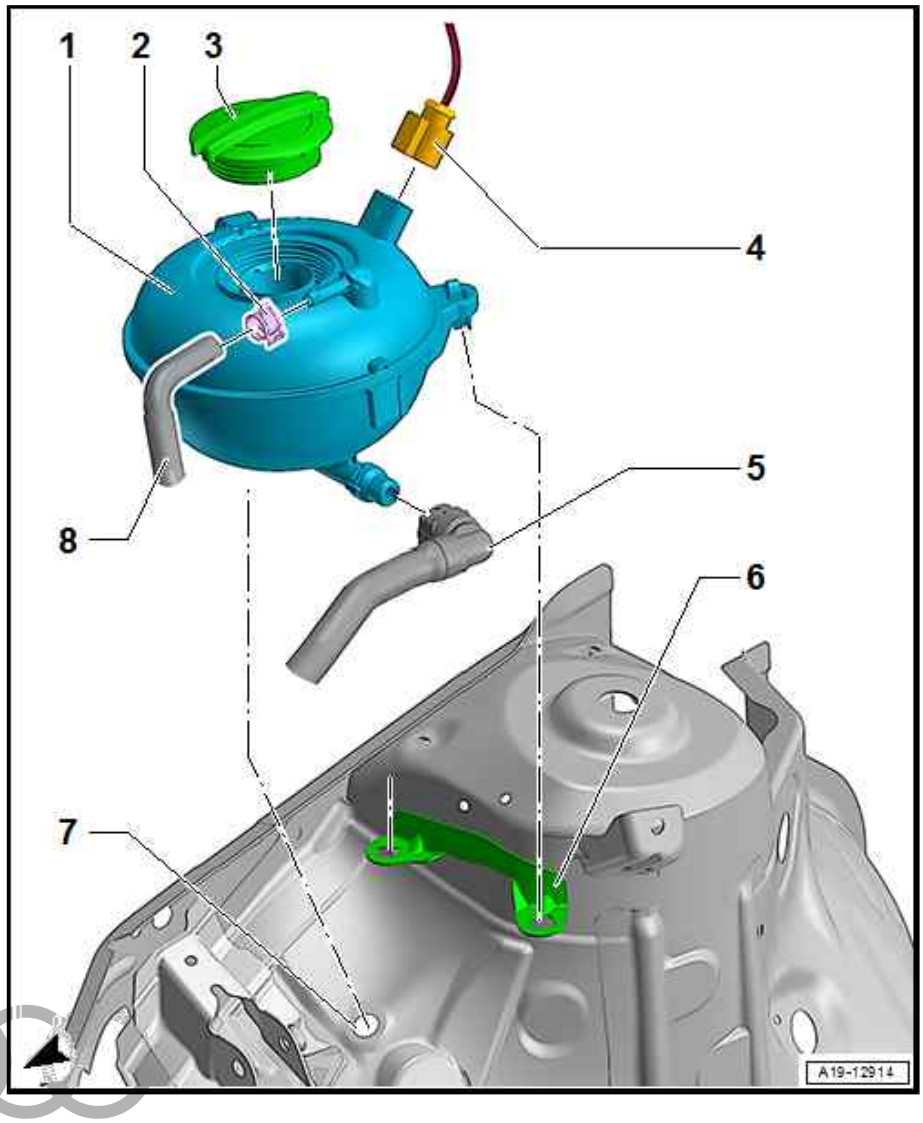
- ❑ For coolant shortage indicator sender - G32-

5 - Coolant hose

6 - Bracket

7 - Opening

8 - Coolant hose



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3.1.2 Exploded view - coolant expansion tank, high-voltage cooling circuit

1 - Coolant hose

2 - Clamp

3 - Sealing tag

- ❑ Allocation ⇒ Electronic parts catalogue
- ❑ Attach sealing tag to filler cap on coolant expansion tank ⇒ page 332 .

4 - Filler cap

- ❑ Check whether warning notice is attached to filler cap ⇒ Electronic parts catalogue

5 - Coolant expansion tank

- ❑ Removing and installing ⇒ “3.2.2 Removing and installing coolant expansion tank - high-voltage cooling circuit”, page 340

6 - Electrical connector

7 - Nuts

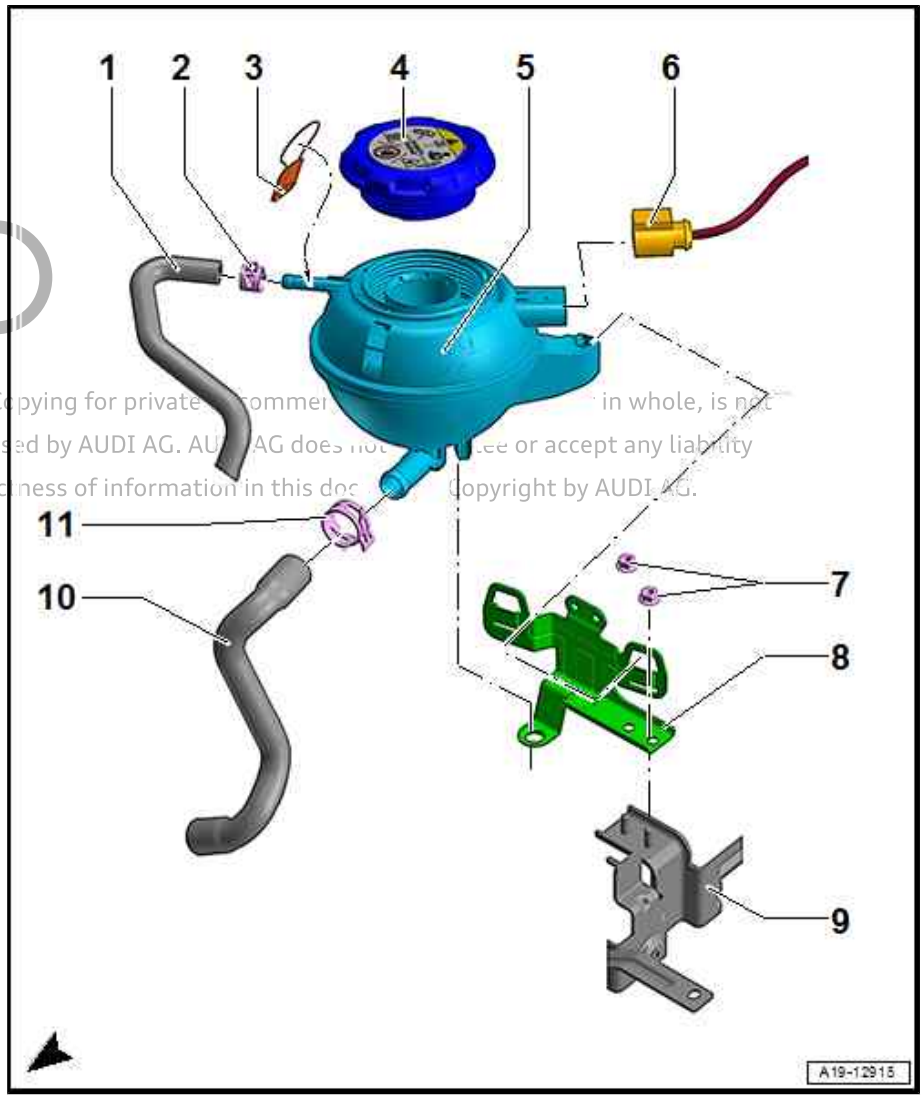
- ❑ 8 Nm

8 - Bracket

9 - Retaining bracket

10 - Coolant hose

11 - Clamp



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3.2 Removing and installing coolant expansion tank

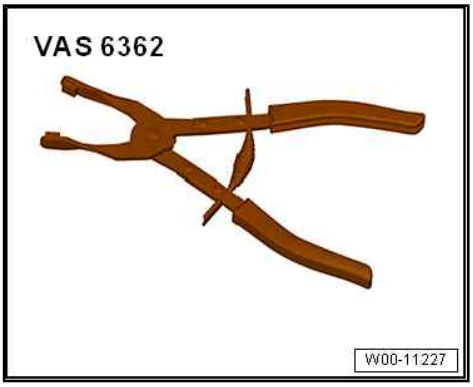
⇒ “3.2.1 Removing and installing coolant expansion tank - engine cooling circuit”, page 338

⇒ “3.2.2 Removing and installing coolant expansion tank - high-voltage cooling circuit”, page 340

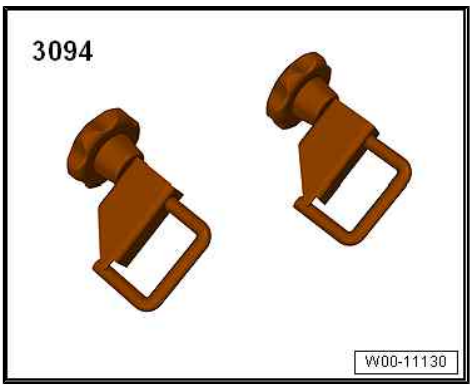
3.2.1 Removing and installing coolant expansion tank - engine cooling circuit

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-



♦ Hose clamps up to 25 mm - 3094-



Removing

• Engine cold.

⚠ CAUTION

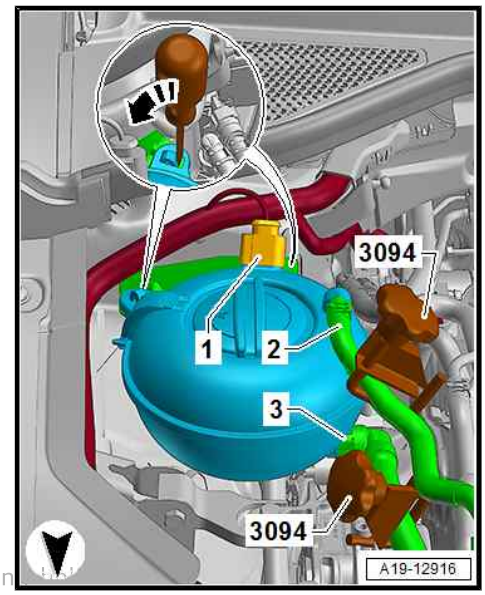
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



– Release and unplug electrical connector -1- at coolant shortage indicator sender - G32- .

– Clamp off breather line -2- with hose clamp, up to 25 mm - 3094- , release hose clip and disconnect breather line from coolant expansion tank.

– Release fasteners -arrow- using a screwdriver, pull off coolant expansion tank upwards and move to one side.

– Place a suitable drip tray under coolant expansion tank to collect coolant.

– Clamp off coolant hose -3- with hose clamp, up to 25 mm - 3094- , release hose clip or remove retaining clip and disconnect coolant hose from coolant expansion tank.

– If necessary, move crankcase breather line clear.

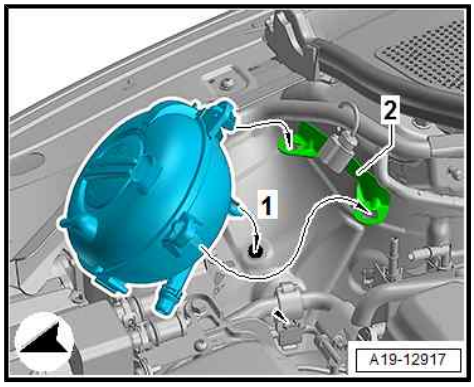
– Detach coolant expansion tank.

Installing

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

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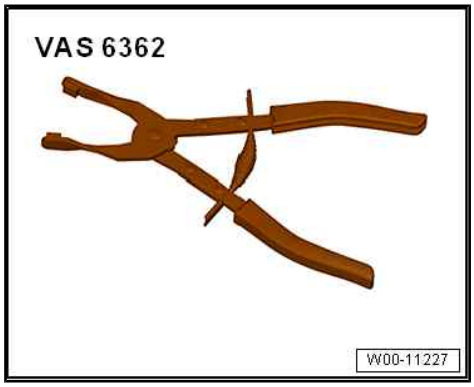
– Insert guide piece -1- into opening in vehicle body.
– Pivot coolant expansion tank into bracket -2- on suspension turret, and push down until it engages. Check it is properly engaged by pulling at it.
– Check coolant level and top up coolant if necessary ⇒ page 322 .



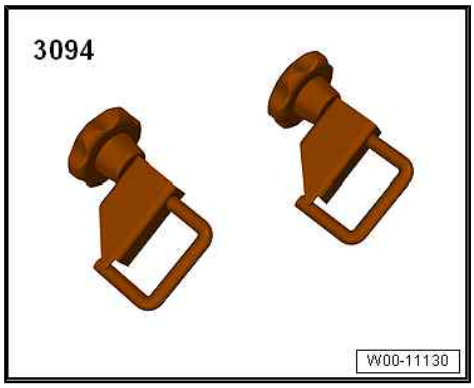
3.2.2 Removing and installing coolant expansion tank - high-voltage cooling circuit

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-



♦ Hose clamps up to 25 mm - 3094-



- On vehicles manufactured during a limited period, the filler cap was bonded to the coolant expansion tank before delivery of the vehicle. It is not possible to open the filler cap without damaging it irreparably. In this case, the filler cap and the coolant expansion tank must be renewed.
- Engine cold.

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CAUTION

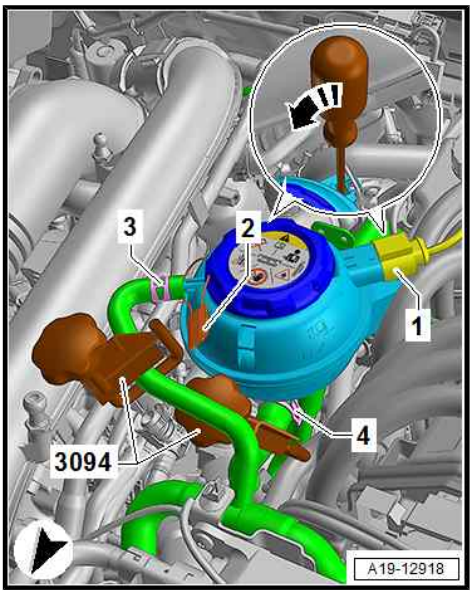
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

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

Removing

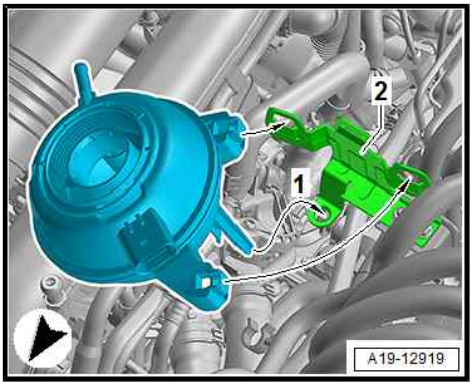
- Release and unplug electrical connector -1- at coolant shortage indicator sender - G32- .
- Clamp off breather line -2- with hose clamp, up to 25 mm - 3094- , release hose clip and disconnect breather line from coolant expansion tank.
- Release fasteners -arrow- using a screwdriver, pull off coolant expansion tank upwards and move to one side.
- Place a suitable drip tray under coolant expansion tank to collect coolant.
- Clamp off coolant hose (bottom) with hose clamp, up to 25 mm - 3094- , release hose clip -3- and disconnect coolant hose from coolant expansion tank.
- Detach coolant expansion tank.



Installing

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

- Insert guide piece into opening -1- on bracket.
- Pivot coolant expansion tank into bracket -2-, and push down until it engages. Check it is properly engaged by pulling at it.
- Check coolant level and top up coolant if necessary ⇒ page 331 .



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4 Coolant pump/thermostat assembly

⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342

⇒ “4.2 Exploded view - electric coolant pump”, page 345

⇒ “4.3 Exploded view - coolant temperature senders”, page 348

⇒ “4.4 Exploded view - coolant valves”, page 350

⇒ “4.5 Removing and installing coolant pump”, page 351

⇒ “4.6 Removing and installing toothed belt sprocket for coolant pump”, page 359

⇒ “4.7 Removing and installing thermostat”, page 363

⇒ “4.8 Removing and installing electric coolant pump”, page 369

⇒ “4.9 Removing and installing coolant temperature sender G62 ”, page 375

⇒ “4.10 Removing and installing radiator outlet coolant temperature sender G83 ”, page 379

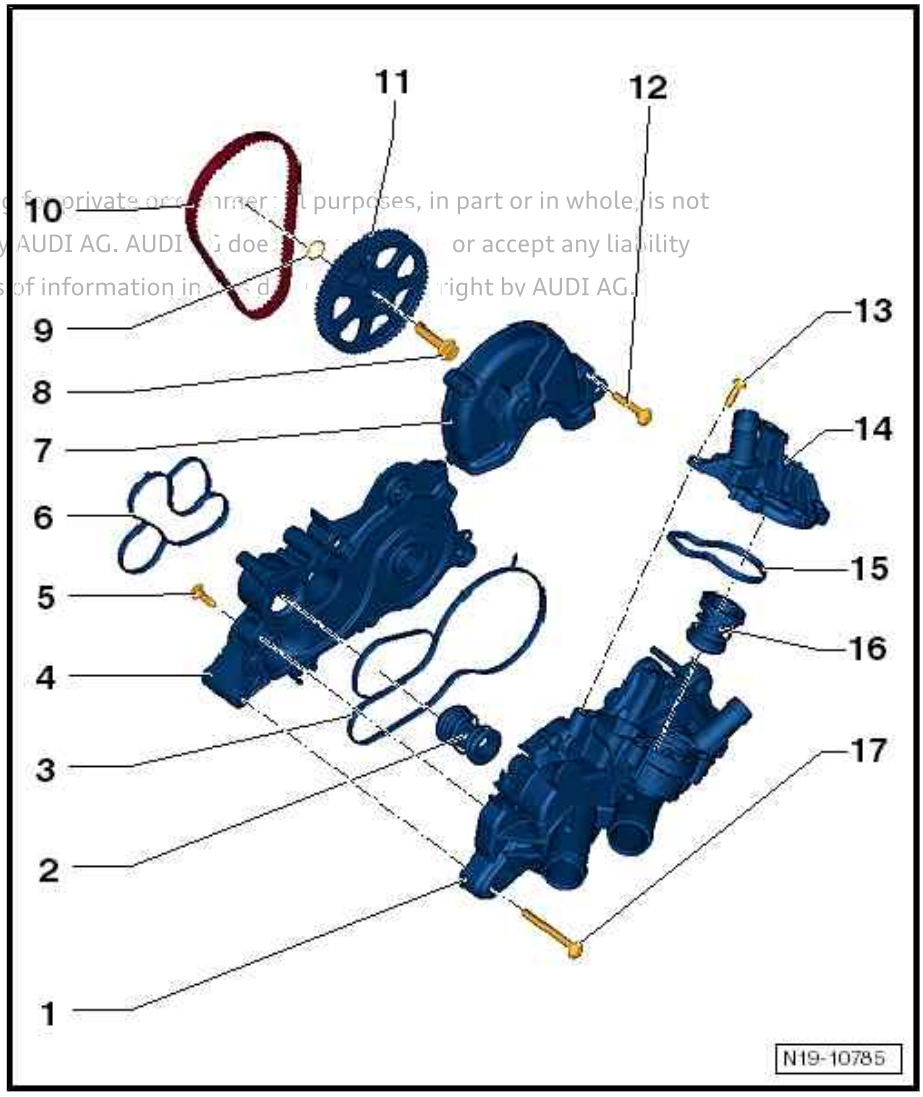
⇒ “4.11 Removing and installing coolant temperature sender for heater G241 ”, page 381

⇒ “4.12 Removing and installing engine temperature sender 2 G652 ”, page 381

⇒ “4.13 Removing and installing coolant valves”, page 382

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4.1 Exploded view - coolant pump/thermostat



1 - Thermostat housing

- ❑ Removing and installing ⇒ “4.7.3 Removing and installing thermostat for coolant circuit for cylinder block”, page 368

2 - Thermostat 2

- ❑ For coolant circuit for cylinder block
- ❑ Different versions available ⇒ Electronic parts catalogue
- ❑ Removing and installing ⇒ “4.7.3 Removing and installing thermostat for coolant circuit for cylinder block”, page 368

3 - Gasket

- ❑ Renew after removing

4 - Coolant pump

- ❑ Removing and installing ⇒ “4.5 Removing and installing coolant pump”, page 351

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 345

6 - Gasket

- ❑ Renew after removing
- ❑ Make sure gasket is correctly seated
- ❑ Lubricate lightly with coolant prior to installing

7 - Toothed belt cover

- ❑ For toothed belt for coolant pump

8 - Bolt

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

9 - O-ring

- ❑ Renew
- ❑ Only for engines with cylinder shut-off
- ❑ Removing and installing ⇒ “4.6.2 Removing and installing toothed belt sprocket for coolant pump - engines with cylinder shut-off”, page 360

10 - Toothed belt

- ❑ For coolant pump
- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ When reinstalling, check for damage and renew if necessary

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11 - Toothed belt sprocket

- ❑ For coolant pump
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Removing and installing
  ⇒ “4.6 Removing and installing toothed belt sprocket for coolant pump”, page 359
- ❑ Installation position:

♦ Engines without cylinder shut-off ⇒ page 360

♦ Engines with cylinder shut-off ⇒ page 363

- ❑ 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 (primary coolant circuit) - tightening torque”“ , page 345

14 - Cover

- ❑ For thermostat
- ❑ Two connections for coolant hoses from June 2013 onwards

15 - Gasket

- ❑ Renew after removing

16 - Thermostat 1

- ❑ For primary coolant circuit (radiator)
- ❑ Different versions available ⇒ Electronic parts catalogue
- ❑ Removing and installing ⇒ “4.7 Removing and installing thermostat”, page 363
- ❑ Installation position
  ⇒ Fig. ““Installation position of thermostat for primary coolant circuit (radiator)”“ , page 344

17 - Bolt

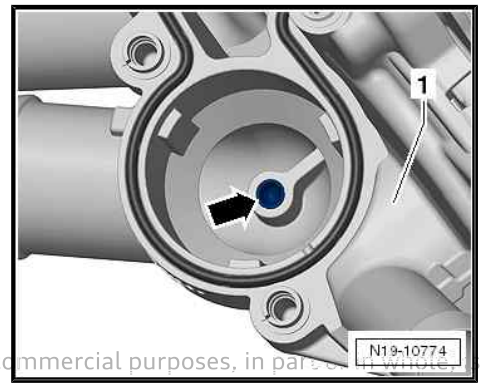
- ❑ Tightening torque and sequence:

All vehicles except e-tron ⇒ page 354

e-tron ⇒ page 358

Installation position of thermostat for primary coolant circuit (radiator)

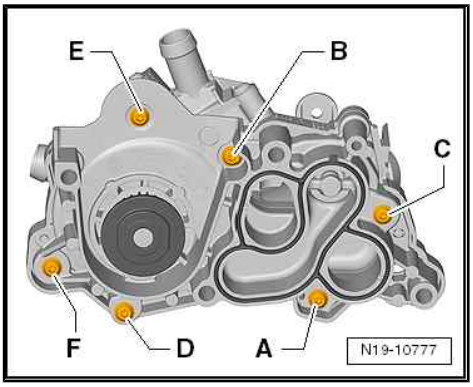
- Must be positioned with centring pin in guide -arrow- in thermostat housing.



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Thermostat housing to coolant pump - tightening torque and sequence

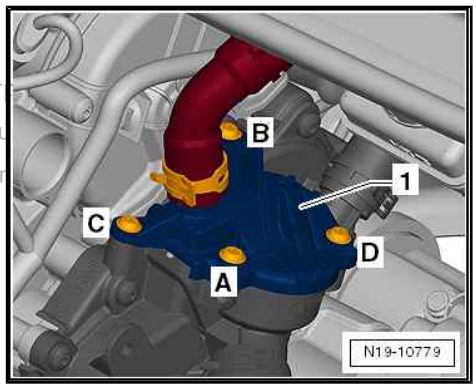
– Tighten bolts in the sequence -A ... F- to 7 Nm.



Cover for thermostat to thermostat housing (primary coolant circuit) - tightening torque

– Tighten bolts for cover -1- in the sequence -A ... D- to 7 Nm.

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4.2 Exploded view - electric coolant pump

⇒ “4.2.1 Exploded view - electric coolant pump, all vehicles except e-tron”, page 345

⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

4.2.1 Exploded view - electric coolant pump, all vehicles except e-tron

1 - Continued coolant circulation pump - V51-

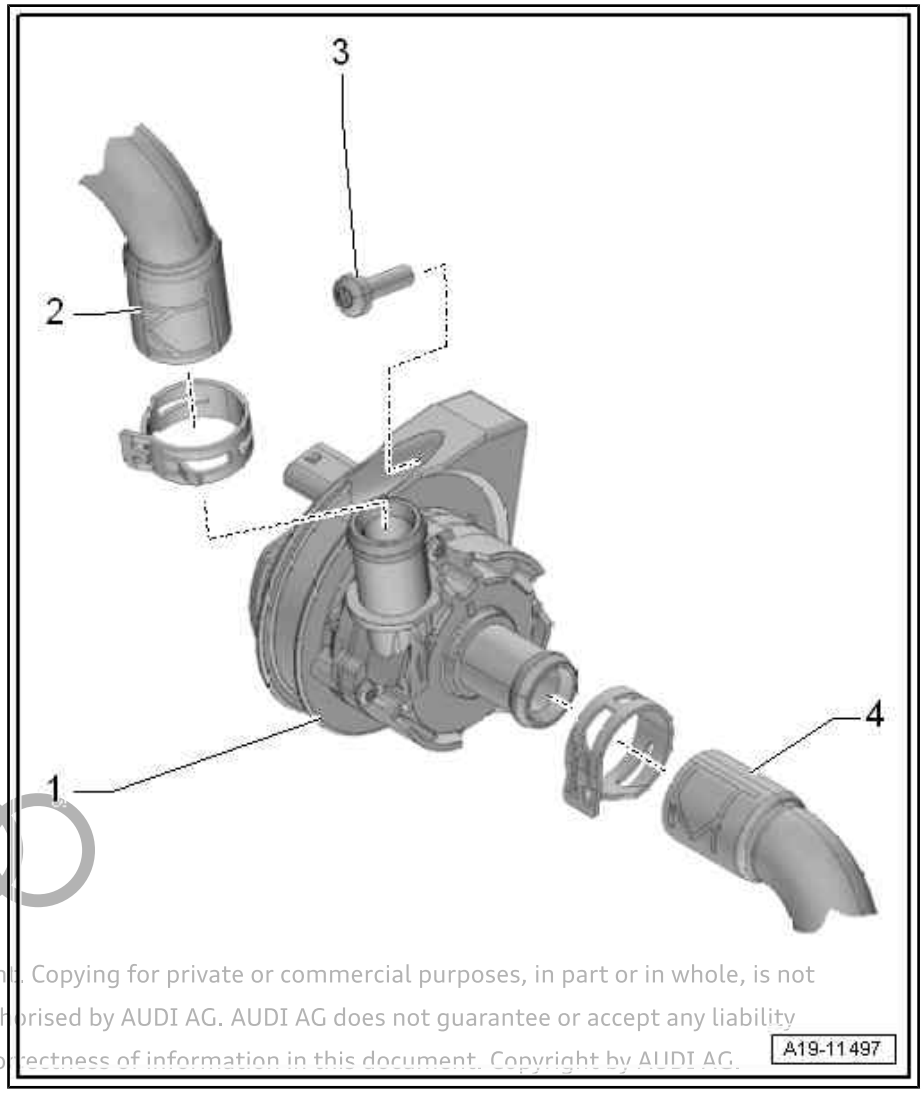
- ❑ With bracket
- ❑ Removing and installing ⇒ “4.8.1 Removing and installing continued coolant circulation pump V51 ”, page 369

2 - Coolant hose

3 - Bolt

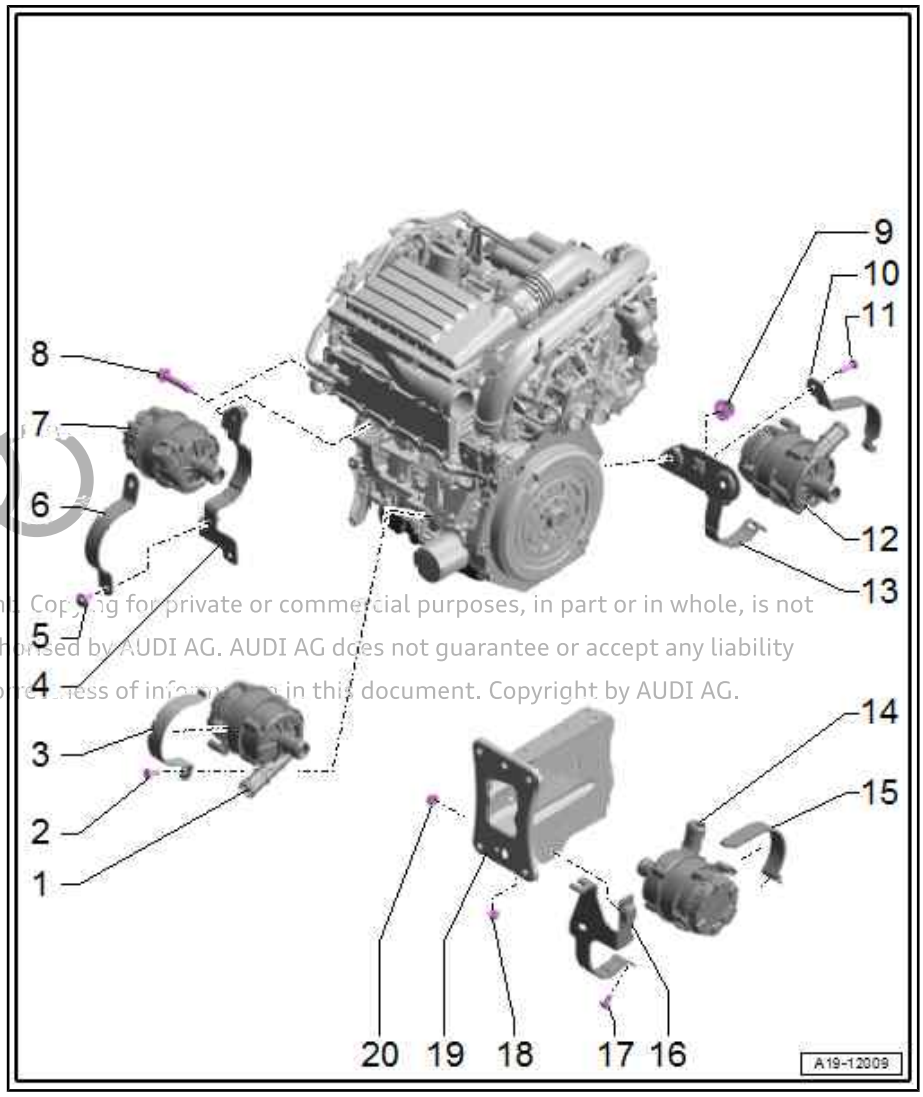
- ❑ 8 Nm

4 - Coolant hose



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4.2.2 Exploded view - electric coolant pump, e-tron



1 - Coolant pump for high-temperature circuit - V467-

- ❑ Removing and installing ⇒ “4.8.2 Removing and installing coolant pump for high-temperature circuit V467 ”, page 370

2 - Bolt

- ❑ 9 Nm

3 - Retaining bracket

4 - Bracket

5 - Bolt

- ❑ 9 Nm

6 - Retaining bracket

7 - Coolant pump for low-temperature circuit - V468-

- ❑ Removing and installing ⇒ “4.8.3 Removing and installing coolant pump for low-temperature circuit V468 ”, page 371

8 - Bolt

- ❑ 20 Nm

9 - Nut

- ❑ 20 Nm

10 - Retaining bracket

11 - Bolt

- ❑ 9 Nm

12 - Coolant pump for high-voltage battery - V590-

- ❑ Removing and installing ⇒ “4.8.5 Removing and installing coolant pump for high-voltage battery V590 ”, page 374

13 - Bracket

14 - Coolant circulation pump before power and control electronics for electric drive - V508-

- ❑ Removing and installing ⇒ “4.8.4 Coolant circulation pump before power and control electronics for electric drive V508 ”, page 373

15 - Retaining bracket

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

16 - Bracket

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

17 - Bolt

- ❑ 9 Nm

18 - Nut

- ❑ 9 Nm

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19 - Longitudinal member

20 - Nut

- ❑ 9 Nm

4.3 Exploded view - coolant temperature senders

⇒ “4.3.1 Exploded view - coolant temperature senders, all vehicles except e-tron”, page 348

⇒ “4.3.2 Exploded view - coolant temperature senders, e-tron”, page 349

4.3.1 Exploded view - coolant temperature senders, all vehicles except e-tron

1 - O-ring

- ❑ Renew after removing

2 - Radiator outlet coolant temperature sender - G83-

- ❑ Removing and installing ⇒ “4.10.1 Removing and installing radiator outlet coolant temperature sender G83 - all vehicles except e-tron”, page 379

3 - Support ring

4 - O-ring

- ❑ Renew after removing

5 - Coolant temperature sender - G62-

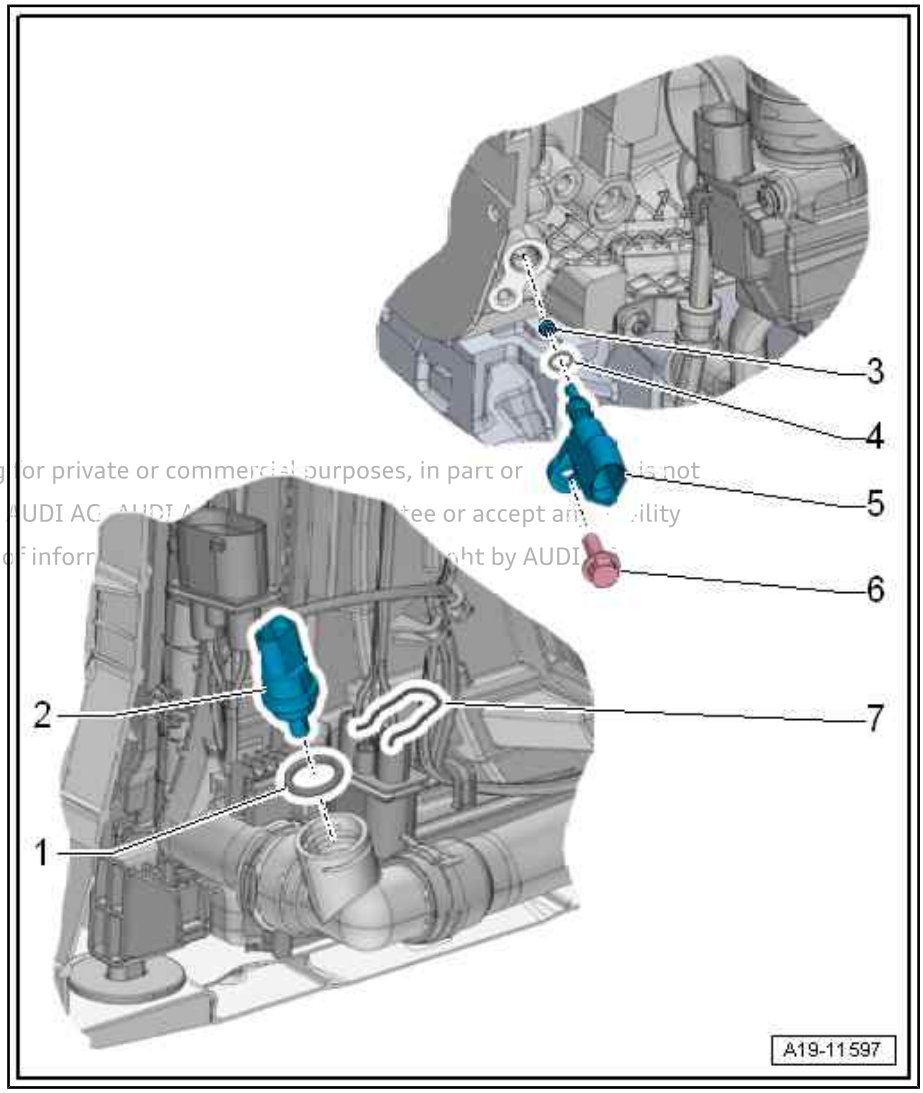
- ❑ Removing and installing ⇒ “4.9.1 Removing and installing coolant temperature sender G62 - all vehicles except e-tron”, page 375

6 - Bolt

- ❑ 8 Nm

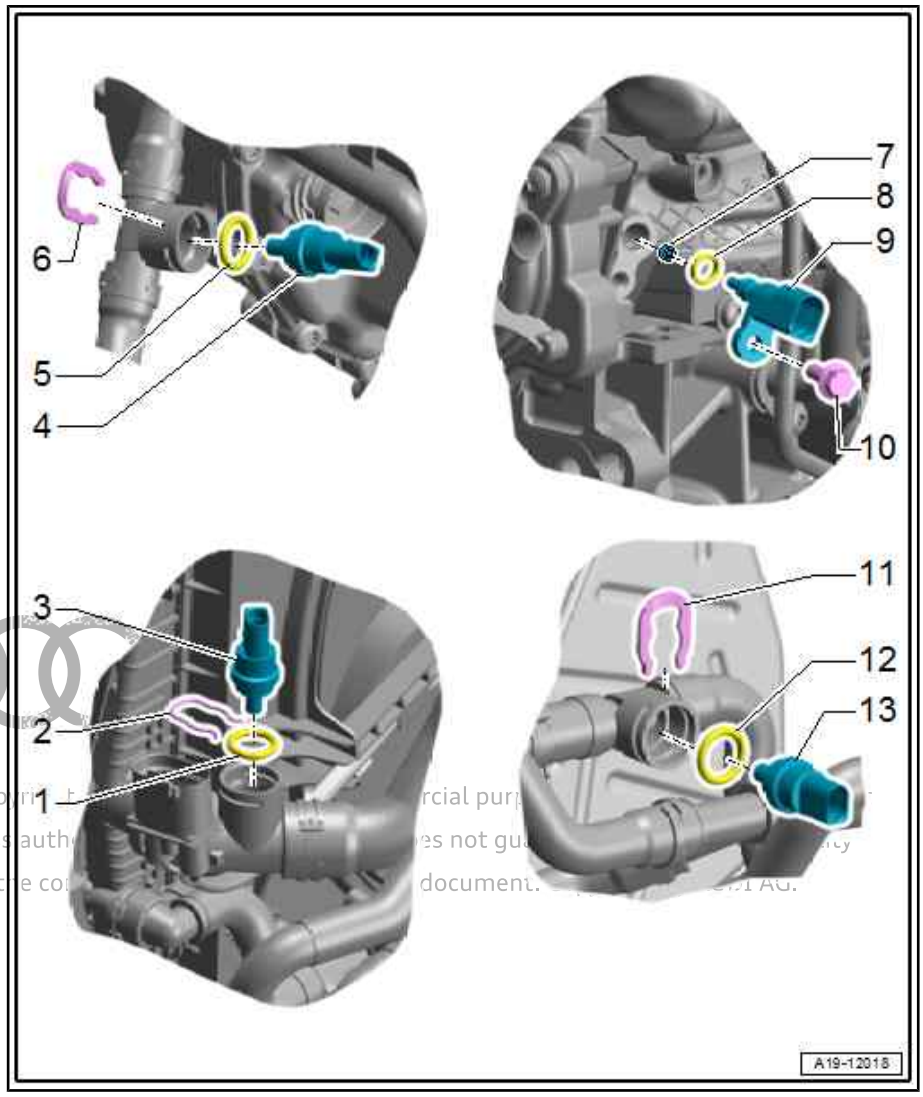
7 - Retaining clip

- ❑ Check for firm attachment



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4.3.2 Exploded view - coolant temperature senders, e-tron



1 - O-ring
- ❑ Renew after removing

2 - Retaining clip
- ❑ Check for firm attachment

3 - Radiator outlet coolant temperature sender - G83-
- ❑ Removing and installing ⇒ “4.10.2 Removing and installing radiator outlet coolant temperature sender G83 - e-tron”, page 380

4 - Coolant temperature sender for heater - G241-
- ❑ Removing and installing ⇒ “4.11 Removing and installing coolant temperature sender for heater G241 ”, page 381

5 - O-ring
- ❑ Renew after removing

6 - Retaining clip
- ❑ Check for firm attachment

7 - Support ring

8 - O-ring
- ❑ Renew after removing

9 - Coolant temperature sender - G62-
- ❑ Removing and installing ⇒ “4.9.2 Removing and installing coolant temperature sender G62 - e-tron”, page 376

10 - Bolt
- ❑ 8 Nm

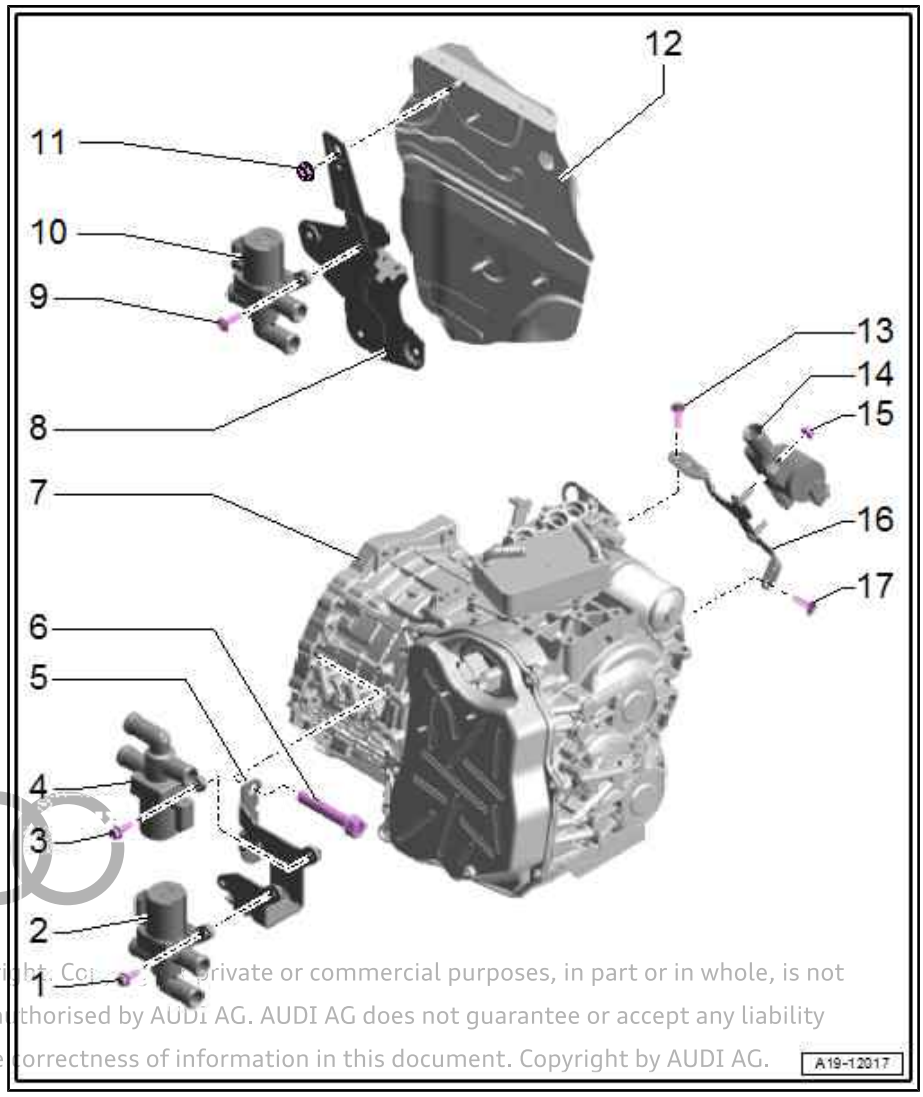
11 - Retaining clip
- ❑ Check for firm attachment

12 - O-ring
- ❑ Renew after removing

13 - Engine temperature sender 2 - G652-
- ❑ Removing and installing ⇒ “4.12 Removing and installing engine temperature sender 2 G652 ”, page 381

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4.4 Exploded view - coolant valves



1 - Bolt
- ❑ 9 Nm

2 - Coolant changeover valve 1 - N632-
- ❑ Removing and installing ⇒ “4.13.2 Removing and installing coolant changeover valve 1 N632 ”, page 384

3 - Bolt
- ❑ 9 Nm

4 - Coolant changeover valve 2 - N633-
- ❑ Removing and installing ⇒ “4.13.3 Removing and installing coolant changeover valve 2 N633 ”, page 385

5 - Bracket

6 - Bolt
- ❑ Tightening torque ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox

7 - Final drive

8 - Bracket

9 - Bolt
- ❑ 9 Nm

10 - Coolant valve for high-voltage battery - N688-
- ❑ Removing and installing ⇒ “4.13.4 Removing and installing coolant valve for high-voltage battery N688 ”, page 386

11 - Nut
- ❑ 9 Nm

12 - Plenum chamber partition panel

13 - Bolt
- ❑ 9 Nm

14 - Coolant valve for gearbox - N488-
- ❑ Removing and installing ⇒ “4.13.1 Removing and installing coolant valve for gearbox N488 ”, page 382

15 - Nut
- ❑ 9 Nm

16 - Bracket

17 - Bolt
- ❑ 9 Nm

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4.5 Removing and installing coolant pump

⇒ “4.5.1 Removing and installing coolant pump - all vehicles except e-tron”, page 351

⇒ “4.5.2 Removing and installing coolant pump - e-tron”, page 355

4.5.1 Removing and installing coolant pump - all vehicles except e-tron

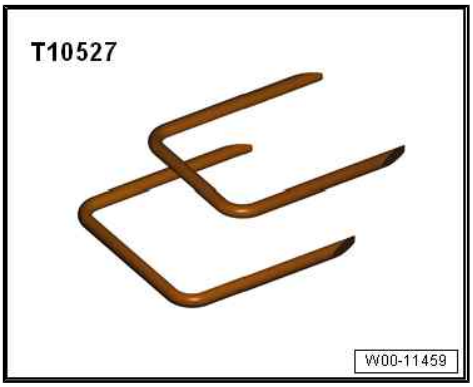
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Special tools and workshop equipment required

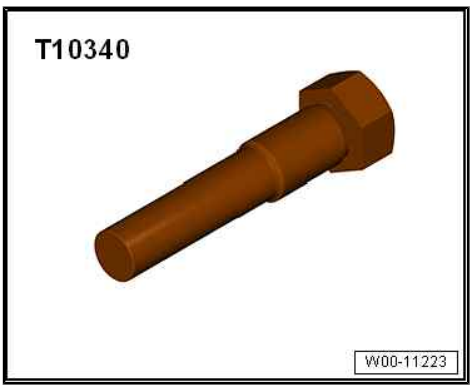
- Torque wrench -VAS 6583-



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



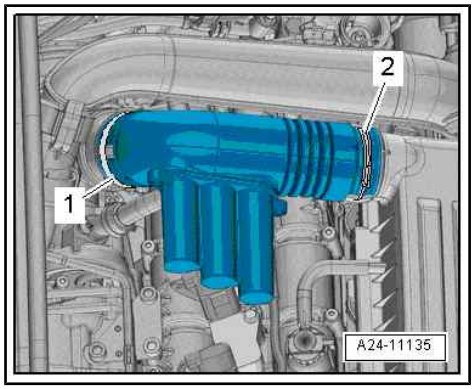
- Locking pin - T10340-



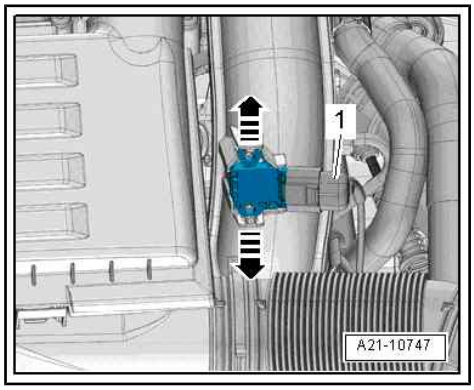
Removing

– Drain coolant
⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .

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

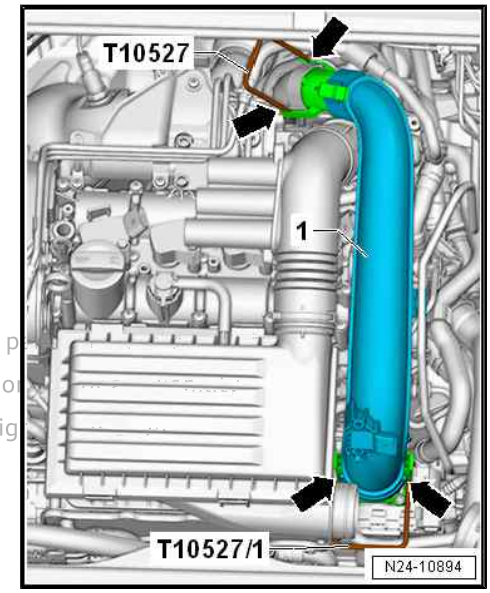


– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



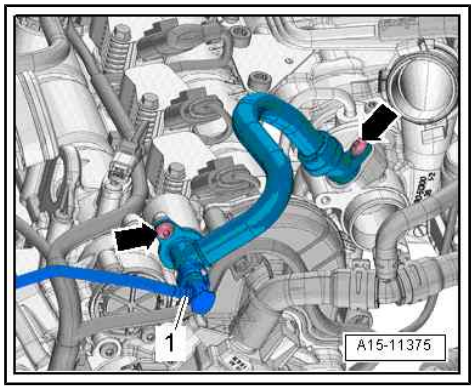
– Move air hoses clear at air pipe.

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

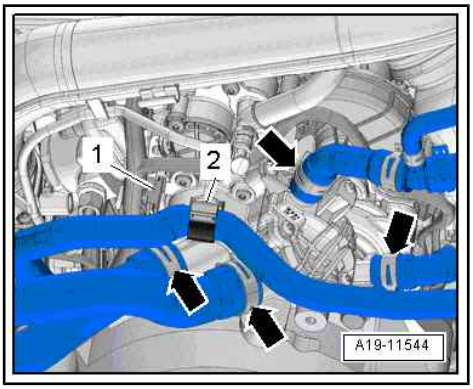


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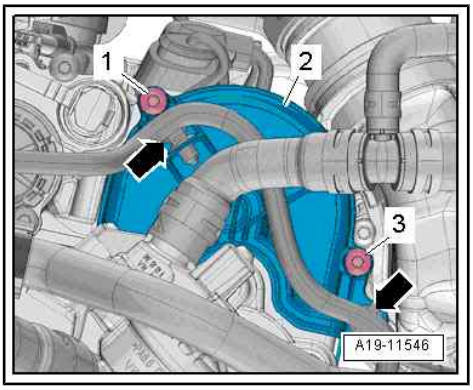
– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).



– Move clear electrical wiring harness -1- and coolant hose -2-.
– Release hose clips -arrows- and disconnect coolant hoses.



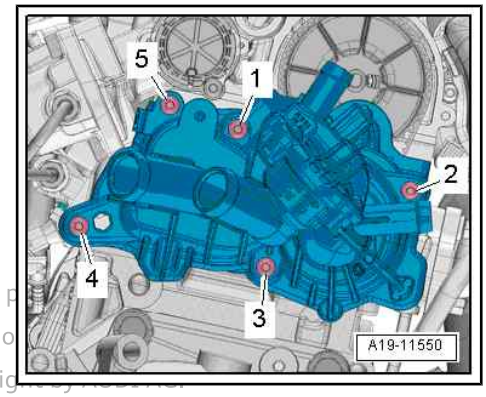
– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



– Slacken and remove bolts in the sequence: -5 ... 1-.
– Detach coolant pump with toothed belt.

Installing

- Renew gaskets and O-rings after removal.
- When reinstalling toothed belt of coolant pump, check it for damage and renew if necessary.
- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .



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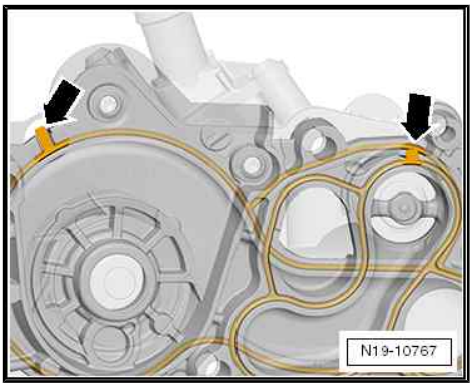
– Check that gaskets are correctly seated -arrows-.
– Lubricate gasket for coolant pump lightly with coolant.

Note:

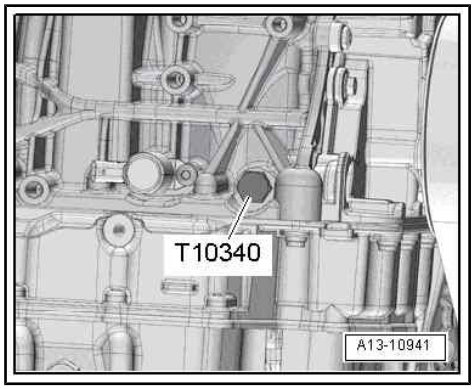
To ensure that the toothed belt is correctly tensioned, the following steps must be performed in the specified order.

A second mechanic is required in order to tension the toothed belt.

– Position cylinder 1 at “TDC”.



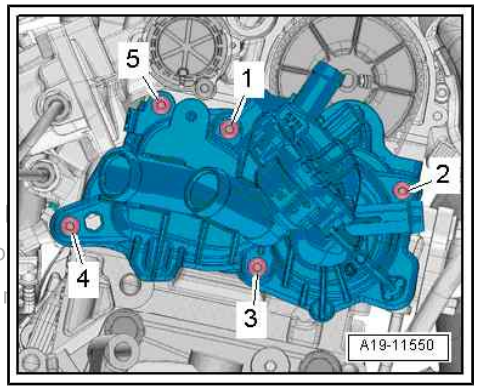
– Rotate crankshaft to “TDC” as follows:
– Unscrew plug for “TDC” hole on cylinder block.
– Screw locking pin - T10340- into cylinder block until head of pin makes contact.
– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.
– Turn crankshaft by 90° in direction of engine rotation.
– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.
– Rotate crankshaft in normal direction of rotation until contact is made.
• The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)
– Fit toothed belt so that it is centred and move coolant pump into installation position.



– Tighten bolts to initial torque in the specified sequence:

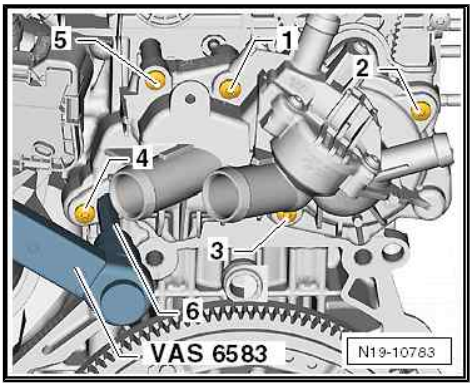
Stage	Bolts	Tightening torque
1.	-1 … 5-	Screw in by hand until contact is made
2.	-1 … 5-	10 Nm

– Loosen all bolts again by one turn.



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– 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.

- 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:

- Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .

Tightening torques

- Coolant pump ⇒ page 354
- ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441
- ⇒ Electrical system; Rep. gr. 27 ; Battery; Exploded view - battery
- ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85

4.5.2 Removing and installing coolant pump - e-tron

Special tools and workshop equipment required

- Torque wrench - VAS 6583-



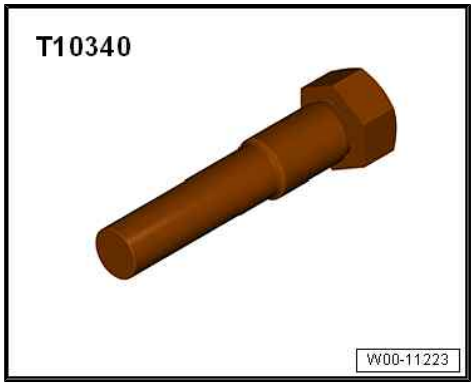
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- Release tool - T10527- and -T10527/1-



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- Locking pin - T10340-



Removing

DANGER

High voltage can cause fatal injury.

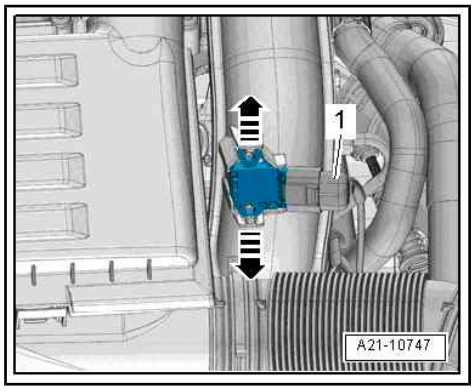
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

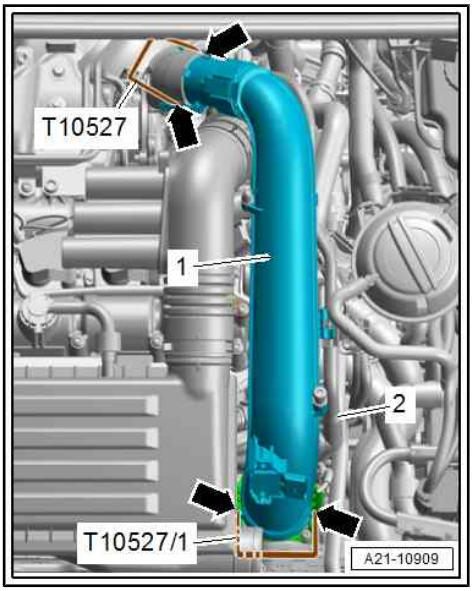
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove coolant pipes (left-side) for high-voltage cooling system
⇒ “5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron”, page 395 .

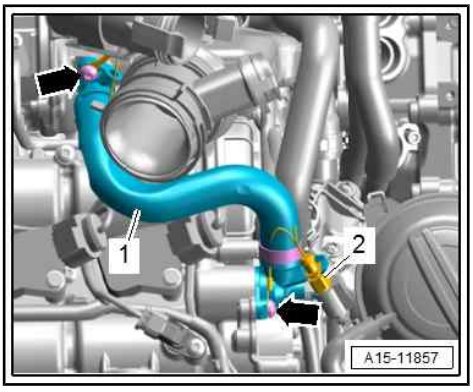
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



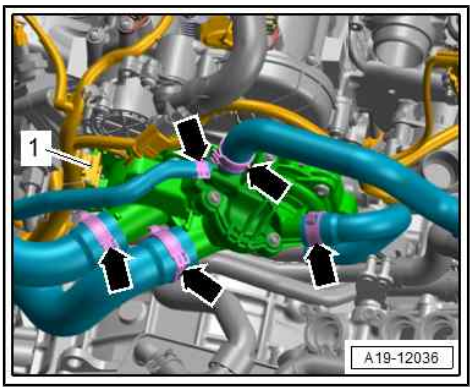
– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.
– Move line for activated charcoal filter system clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.



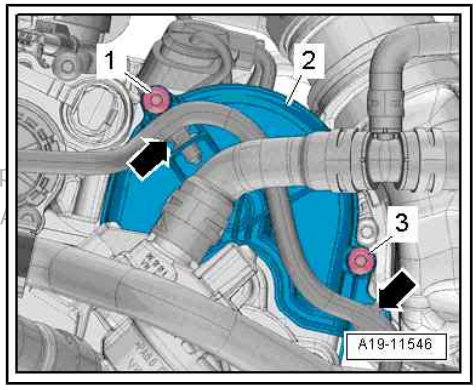
– Version with crankcase breather heating: Unplug electrical connector -2-.
– Remove bolts -arrows- and detach crankcase breather hose -1-.
– Version with crankcase breather heating: The earth wires must be re-secured with bolts -arrows- when installing.



– Move electrical wiring harness -1- clear.
– Release hose clips -arrows- and disconnect coolant hoses.



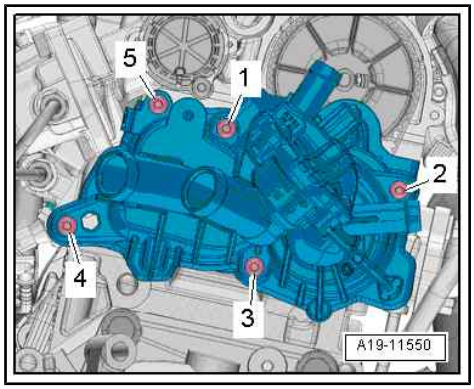
– Move electrical wiring harness clear -arrows-.
– Unscrew bolts -1, 3- and remove cover -2- for toothed belt for coolant pump.



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– Slacken and remove bolts in the sequence: -5 ... 1-.

– Detach coolant pump with toothed belt.

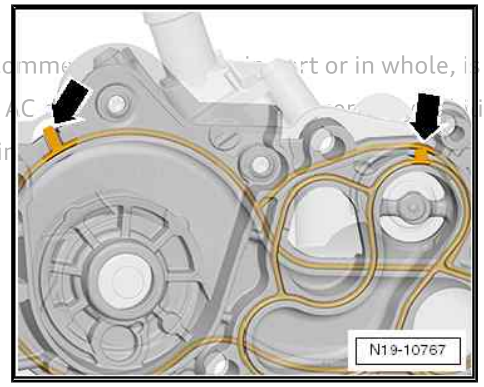


Installing

- Renew gaskets and O-rings after removal.
- When reinstalling toothed belt of coolant pump, check it for damage and renew if necessary.
- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check that gaskets are correctly seated -arrows-.

– Lubricate gasket for coolant pump lightly with coolant.



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Note:

To ensure that the toothed belt is correctly tensioned, the following steps must be performed in the specified order.

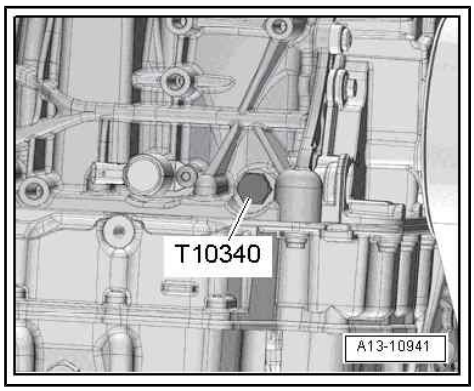
A second mechanic is required in order to tension the toothed belt.

– Position cylinder 1 at “TDC”.

– Rotate crankshaft to “TDC” as follows:

– Unscrew plug for “TDC” hole on cylinder block.

– Screw locking pin - T10340- into cylinder block until head of pin makes contact.



– If the locking pin cannot be screwed in far enough for the head of the pin to make contact, the crankshaft is not in the correct position. Remove locking pin again.

– Turn crankshaft by 90° in direction of engine rotation.

– Screw locking pin into cylinder block until head of pin makes contact, then tighten to 30 Nm.

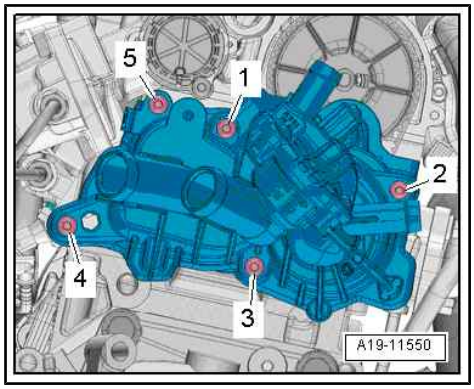
– Rotate crankshaft in normal direction of rotation until contact is made.

- The crank web is now in contact with the locking pin. (The locking pin - T10340- locks the crankshaft only in the direction of engine rotation.)

– Fit toothed belt so that it is centred and move coolant pump into installation position.

– Tighten bolts to initial torque in the specified sequence:

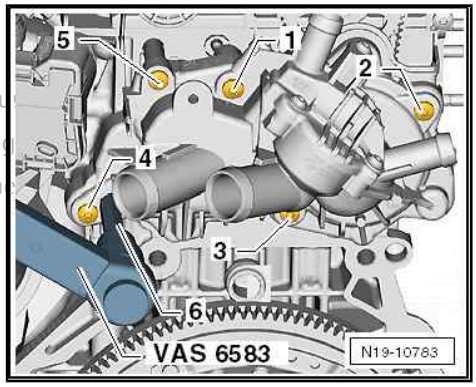
Stage	Bolts	Tightening torque
1.	-1 … 5-	Screw in by hand until contact is made
2.	-1 … 5-	10 Nm



– Loosen all bolts again by one turn.

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– 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.

• 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:

– Install coolant pipes (left-side) for high-voltage cooling system ⇒ “5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron”, page 395 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system ⇒ “11 Re-energising high-voltage system”, page 691 .

• Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .

Tightening torques

♦ Coolant pump ⇒ page 358

♦ ⇒ “2.1.2 Exploded view - charge air system, e-tron”, page 442

♦ ⇒ “1.3 Plug for TDC drilling in cylinder block - tightening torque”, page 85

4.6 Removing and installing toothed belt sprocket for coolant pump

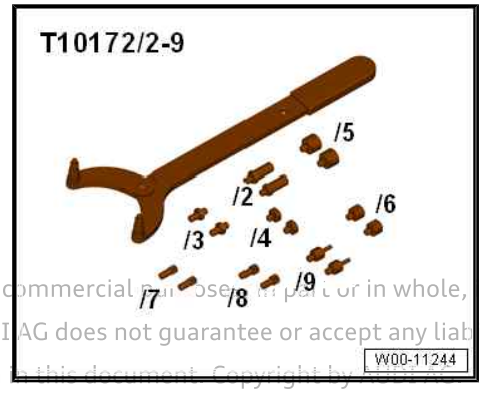
⇒ “4.6.1 Removing and installing toothed belt sprocket for coolant pump - engines without cylinder shut-off”, page 359

⇒ “4.6.2 Removing and installing toothed belt sprocket for coolant pump - engines with cylinder shut-off”, page 360

4.6.1 Removing and installing toothed belt sprocket for coolant pump - engines without cylinder shut-off

Special tools and workshop equipment required

♦ Counterhold tool - T10172- with adapters -T10172/2-



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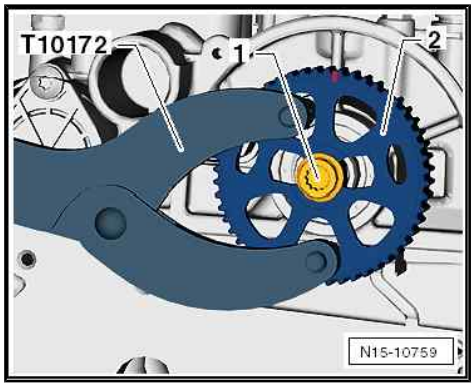
♦ Sealant ⇒ Electronic parts catalogue

Removing

– Remove coolant pump ⇒ “4.5 Removing and installing coolant pump”, page 351 .

– Loosen bolt -1- using counterhold tool - T10172- with adapters -T10172/2- .

– Remove bolt and take off toothed belt drive sprocket -2-.



Installing

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

– Fit toothed belt drive sprocket:

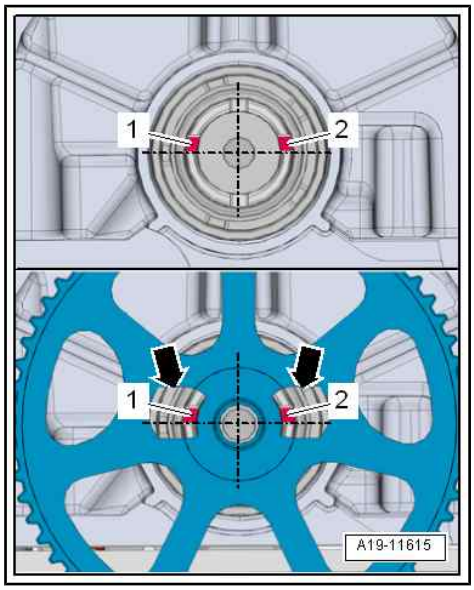
• Grooves -1, 2- in camshaft are arranged asymmetrically.

• 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

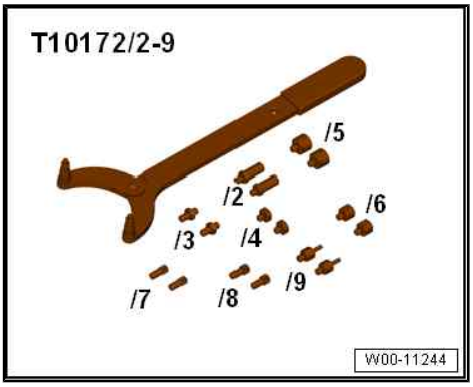
♦ ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342



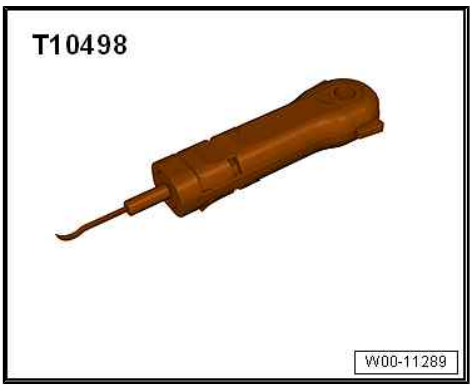
4.6.2 Removing and installing toothed belt sprocket for coolant pump - engines with cylinder shut-off

Special tools and workshop equipment required

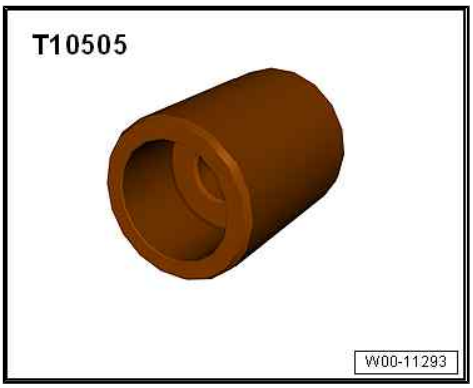
♦ Counterhold tool - T10172- with adapters -T10172/2-



♦ Assembly tool - T10498-



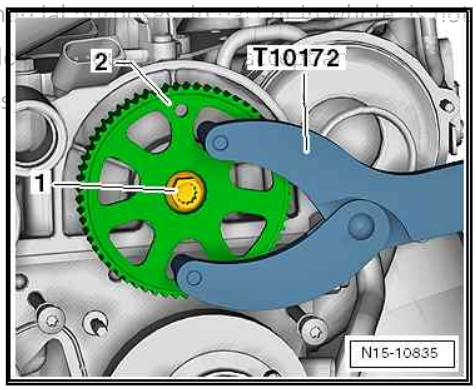
♦ Assembly sleeve - T10505-



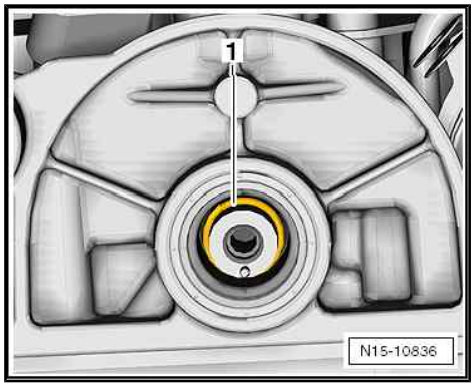
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Removing

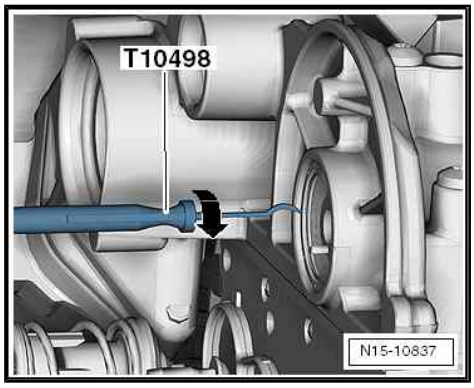
– Remove coolant pump
⇒ “4.5 Removing and installing coolant pump”, page 351
– Loosen bolt -1- using counterhold tool - T10172- .
– Remove bolt and take off toothed belt drive sprocket -2-.



- The O-ring -1- in the camshaft must be renewed every time the toothed belt drive sprocket is removed. (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.

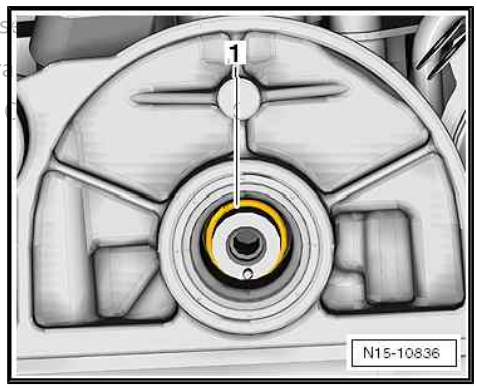


Installing

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rmation in this document.

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

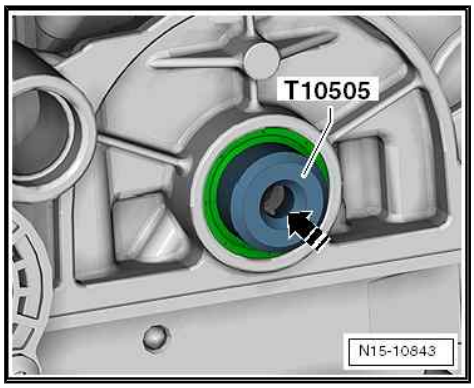
– Fit new O-ring -1- onto stub of camshaft.



- Pin on camshaft must engage in recess on assembly tool - T10505- .

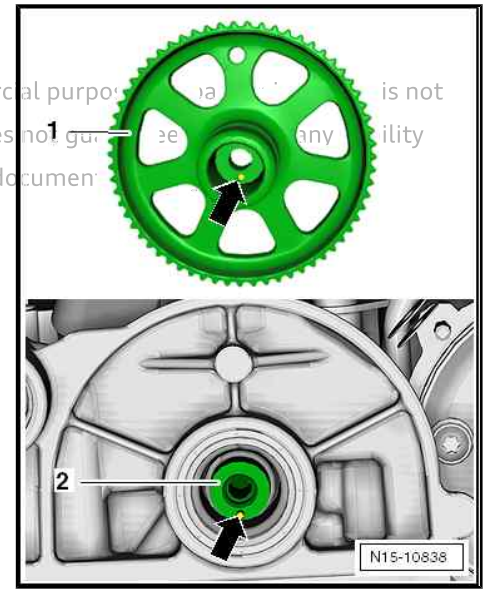
– Fit assembly tool - T10505- onto camshaft and press onto stop by hand -arrow-.
– Remove assembly tool.

- 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 ⇒ “4.5 Removing and installing coolant pump”, page 351 .

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Tightening torques

◆ ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342

4.7 Removing and installing thermostat

⇒ “4.7.1 Removing and installing thermostat for primary coolant circuit (radiator) - all vehicles except e-tron”, page 363

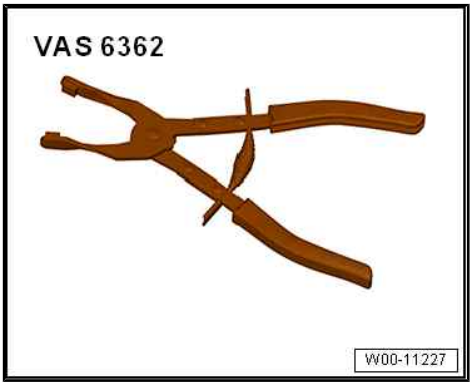
⇒ “4.7.2 Removing and installing thermostat for primary coolant circuit (radiator) - e-tron”, page 365

⇒ “4.7.3 Removing and installing thermostat for coolant circuit for cylinder block”, page 368

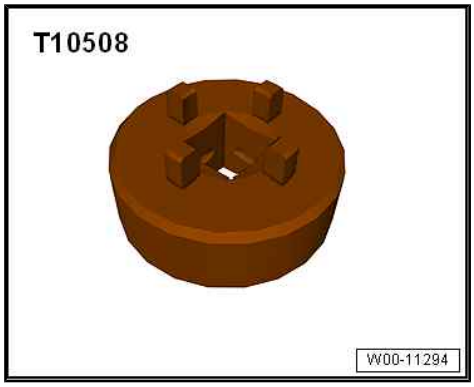
4.7.1 Removing and installing thermostat for primary coolant circuit (radiator) - all vehicles except e-tron

Special tools and workshop equipment required

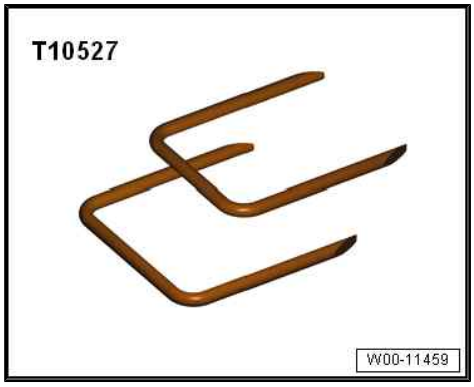
◆ Hose clip pliers - VAS 6362-



♦ Key - T10508-



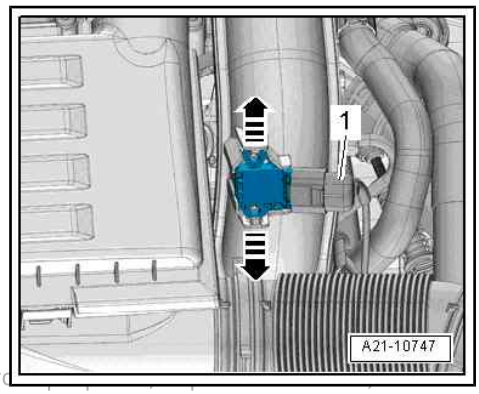
♦ Release tool - T10527- and -T10527/1-



Removing

– Drain coolant
⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .

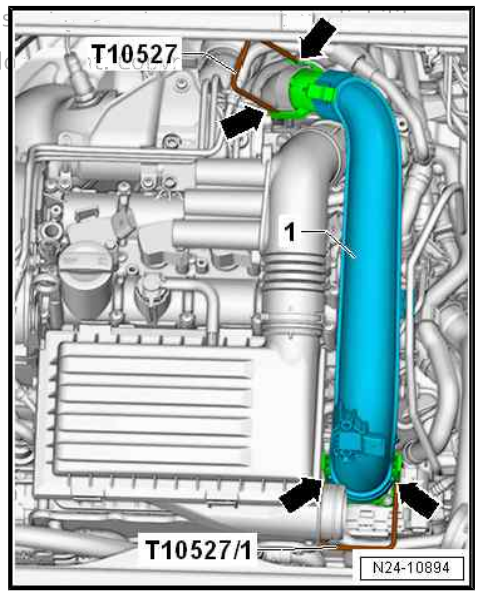
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



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...with respect to the correctness of information in this d

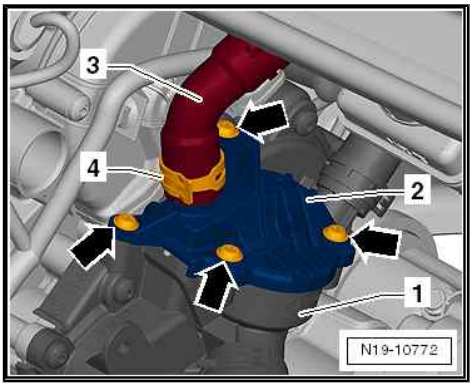
– Move air hoses clear at air pipe.

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

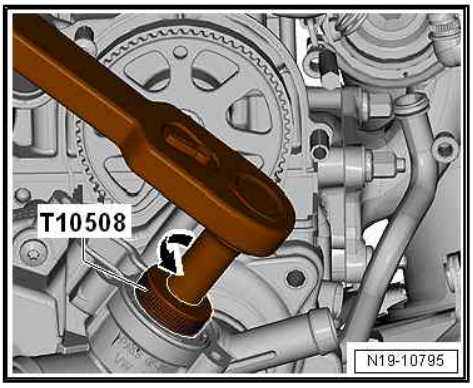


– Release hose clip -4- and detach coolant hose -3-.

– Remove bolts -arrows- and detach cover -2- from thermostat housing.



– Turn thermostat anti-clockwise -arrow- using special wrench - T10508- and detach.



Installing

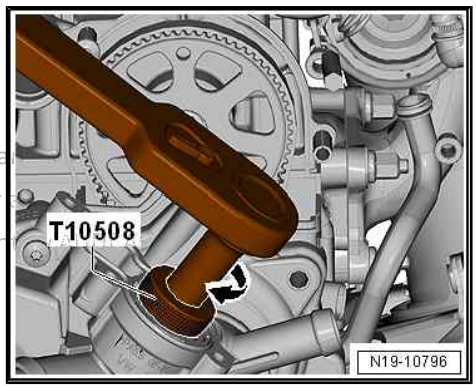
Installation is carried out in reverse order; note the following:

- Renew gasket.

– Lubricate gasket lightly with coolant.

- Installation position of thermostat
  ⇒ Fig. ""Installation position of thermostat for primary coolant circuit (radiator)"" , page 344 .

– Bring thermostat into position with special wrench - T10508- , press down slightly and turn clockwise -arrow- as far as stop.



- Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .

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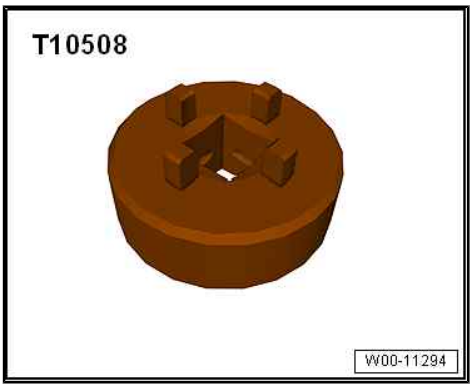
Tightening torques

♦ ⇒ Fig. ""Cover for thermostat to thermostat housing (primary coolant circuit) - tightening torque"" , page 345

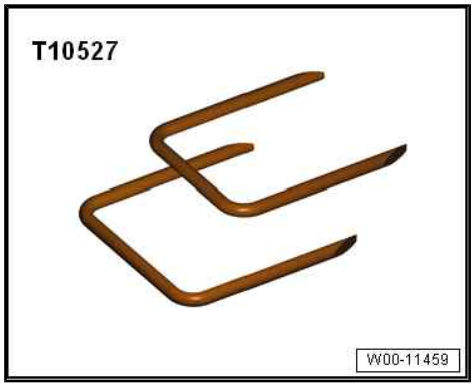
4.7.2 Removing and installing thermostat for primary coolant circuit (radiator) - e-tron

Special tools and workshop equipment required

♦ Key - T10508-



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

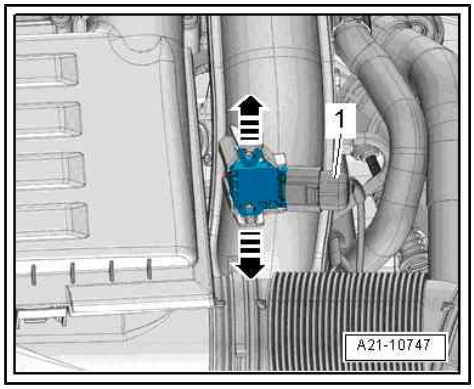


Removing

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Drain coolant
⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .

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

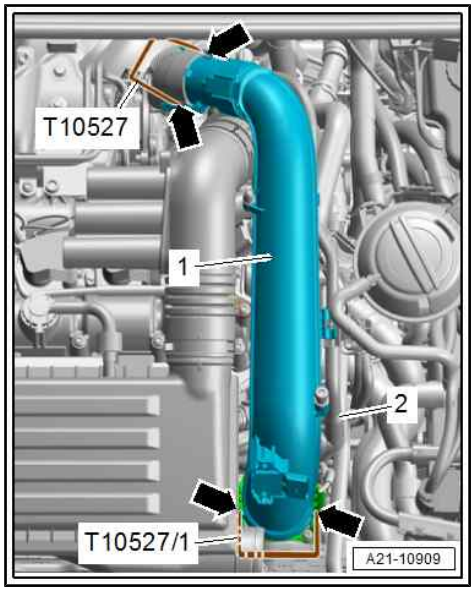


– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.

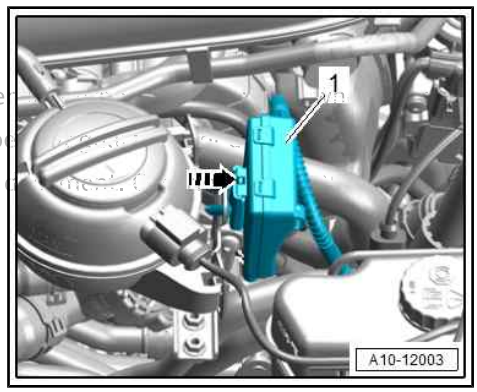
– Move line for activated charcoal filter system clear at air pipe.

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

– Detach air pipe -1-.



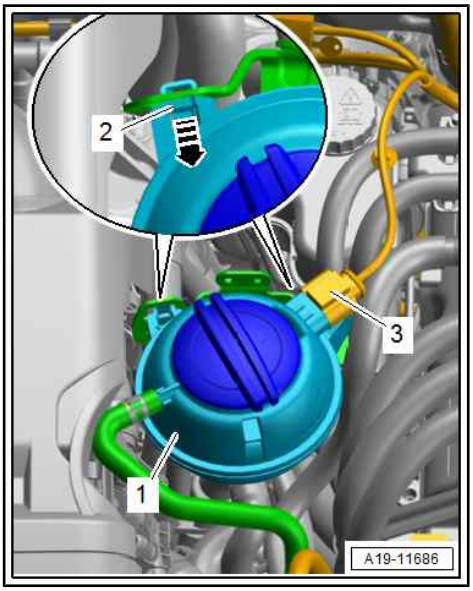
– Version with gearbox breather: Release catch -arrow- and push gearbox breather to one side.



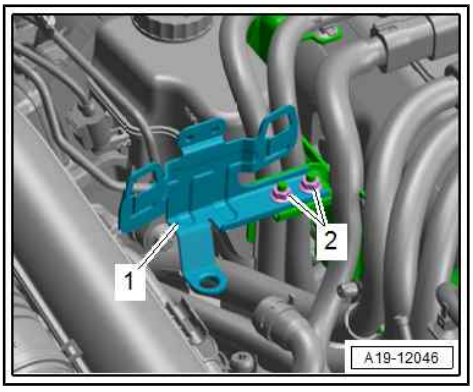
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– Unplug electrical connector -3-.

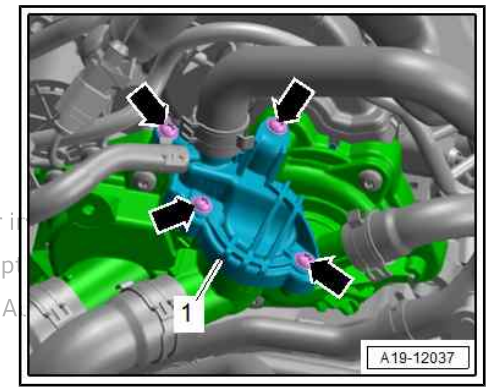
– Release fasteners -2- with a small screwdriver -arrow- and disengage coolant expansion tank -1- from bracket.



– Remove nuts -2- and detach bracket -1-.



– Remove bolts -arrows- and detach cover -2- from thermostat housing.



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– Turn thermostat anti-clockwise -arrow- using special wrench - T10508- and detach.

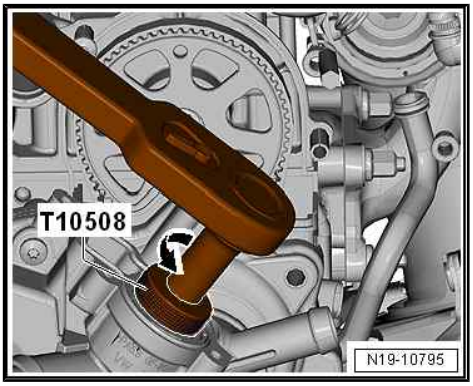
Installing

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

- Renew gasket.

– Lubricate gasket lightly with coolant.

- Installation position of thermostat
⇒ Fig. ““Installation position of thermostat for primary coolant circuit (radiator)““ , page 344 .

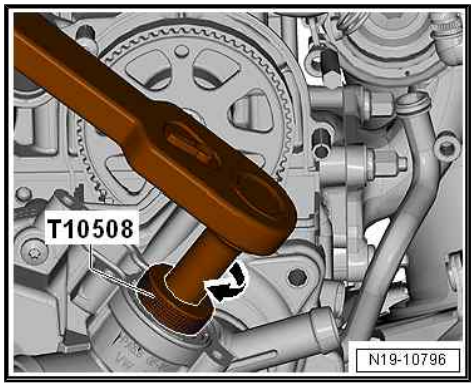


– Bring thermostat into position with special wrench - T10508- , press down slightly and turn clockwise -arrow- as far as stop.

• Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .



Tightening torques

♦ ⇒ Fig. ““Cover for thermostat to thermostat housing (primary coolant circuit) - tightening torque”“ , page 345

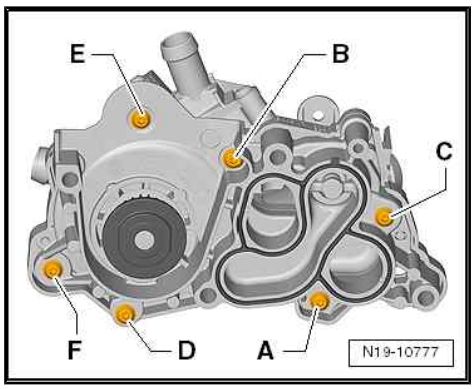
4.7.3 Removing and installing thermostat for coolant circuit for cylinder block

Removing

– Remove coolant pump ⇒ “4.5 Removing and installing coolant pump”, page 351 .

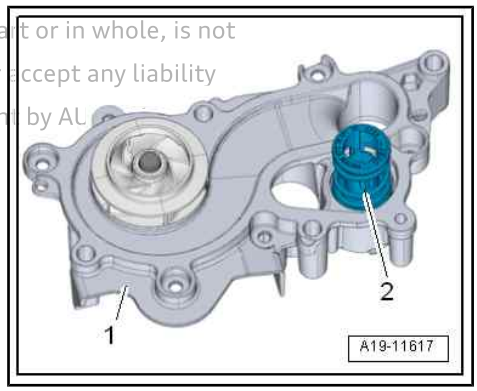
– Remove bolts in the sequence -F … A-.

– Detach coolant pump from thermostat housing.



– Detach thermostat -2- from coolant pump -1-.

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Installing

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

• Renew gasket.

– Lubricate gasket lightly with coolant.

– Fit thermostat housing onto coolant pump.

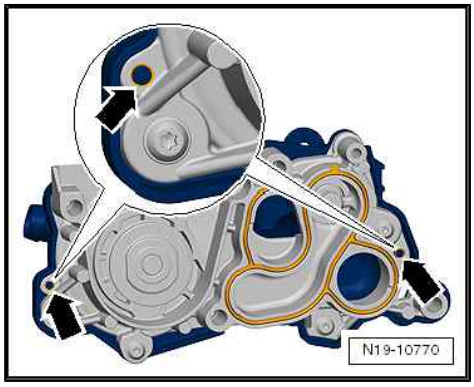
• Centring pins on thermostat must be fitted in guides -arrows- on coolant pump.

– Tighten bolts for thermostat housing ⇒ Fig. ““Thermostat housing to coolant pump - tightening torque and sequence”“ , page 345 .

– Install coolant pump ⇒ “4.5 Removing and installing coolant pump”, page 351 .

• Do not reuse coolant.

– Fill up with coolant ⇒ page 318 .



Tightening torques

♦ ⇒ Fig. ““Thermostat housing to coolant pump - tightening torque and sequence”“ , page 345

4.8 Removing and installing electric coolant pump

⇒ “4.8.1 Removing and installing continued coolant circulation pump V51 ”, page 369

⇒ “4.8.2 Removing and installing coolant pump for high-temperature circuit V467 ”, page 370

⇒ “4.8.3 Removing and installing coolant pump for low-temperature circuit V468 ”, page 371

⇒ “4.8.4 Coolant circulation pump before power and control electronics for electric drive V508 ”, page 373

⇒ “4.8.5 Removing and installing coolant pump for high-voltage battery V590 ”, page 374

4.8.1 Removing and installing continued coolant circulation pump - V51-

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-

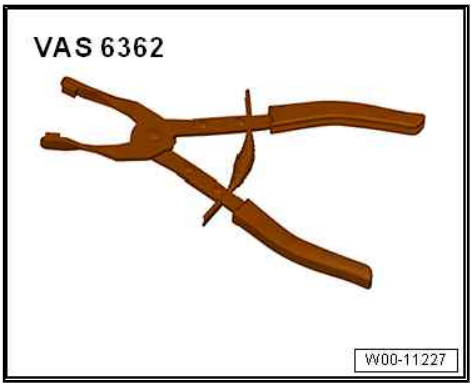


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- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6362-



Removing

- Engine cold.

CAUTION

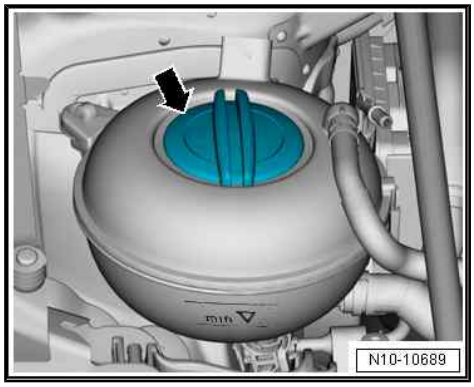
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

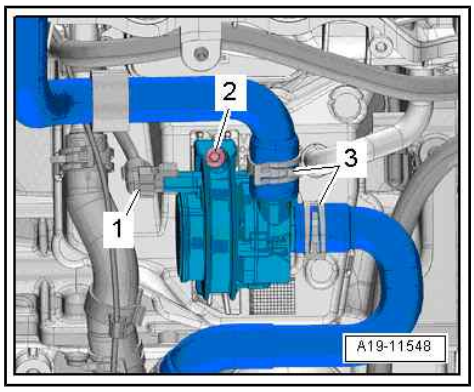
– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



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

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



– Unplug electrical connector -1-.

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

– Use hose clamps up to 25 mm - 3094- to clamp off coolant hoses at continued coolant circulation pump - V51- .

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

– Remove bolt -2- and detach continued coolant circulation pump - V51- .

Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level and top up coolant if necessary ⇒ page 322 .

Tightening torques

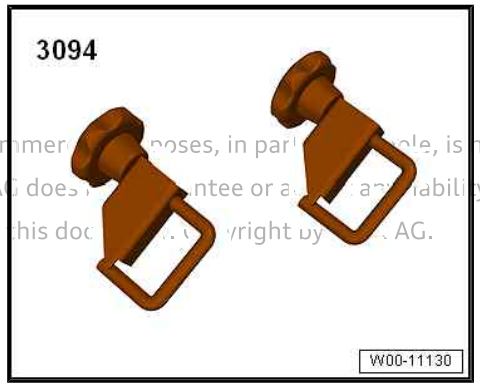
♦ ⇒ “4.2.1 Exploded view - electric coolant pump, all vehicles except e-tron”, page 345

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

4.8.2 Removing and installing coolant pump for high-temperature circuit - V467-

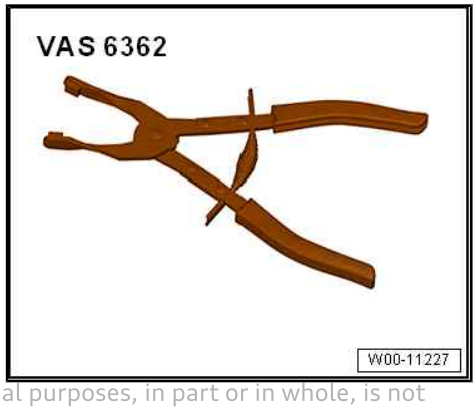
Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



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♦ Hose clip pliers - VAS 6362-



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Removing

- Engine cold.

⚠ CAUTION

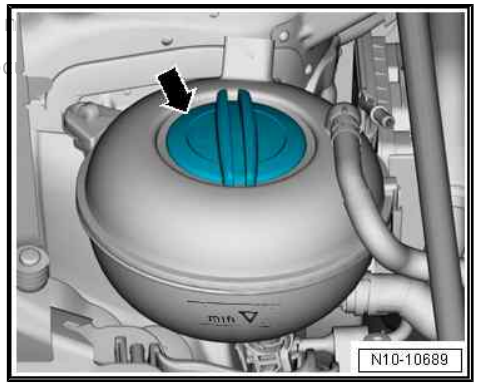
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

– Put on protective gloves.

– Put on safety goggles.

– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.



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

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

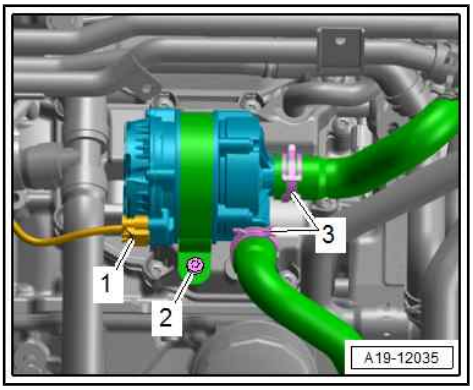
– Unplug electrical connector -1-.

– Place a cloth underneath to catch escaping coolant.

– Use hose clamps up to 25 mm - V467- to clamp off coolant hoses at coolant pump for high-temperature circuit - 3094- .

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

– Unscrew bolt -2- and detach retaining bracket and coolant pump for high-temperature circuit - V467- .



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level and top up coolant if necessary ⇒ page 322 .

Tightening torques

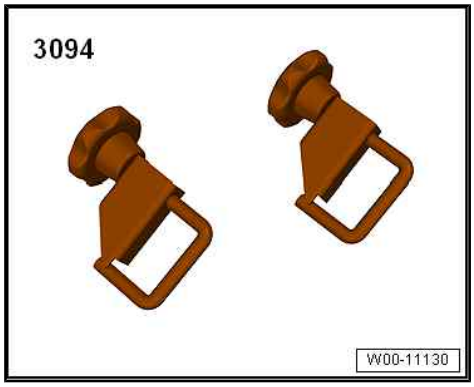
♦ ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

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

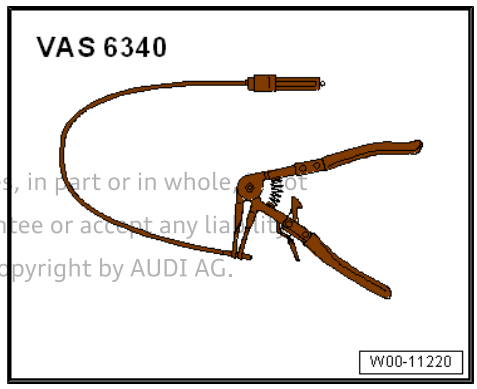
4.8.3 Removing and installing coolant pump for low-temperature circuit - V468-

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-



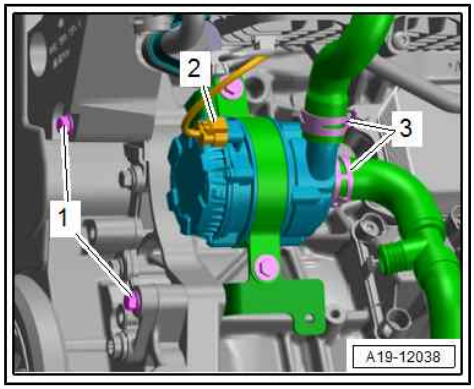
- Hose clip pliers - VAS 6340-



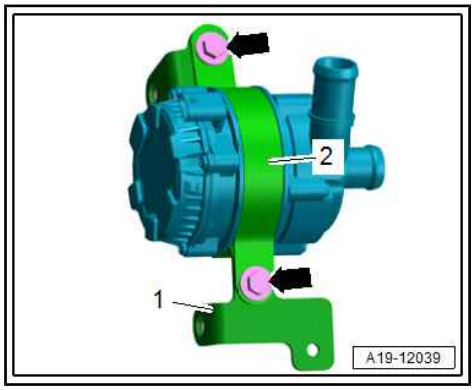
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Removing

- Engine cold.
- Remove electrical air conditioner compressor -V470- from bracket and tie up to right side ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Unplug electrical connector -2- and move wiring clear.
- Remove bolts -1-.
- Place a cloth underneath to catch escaping coolant.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -3- and disconnect hoses.
- Remove coolant pump for low-temperature circuit - V468- .



- Remove bolts -arrows-.
- Detach bracket -1- and retaining bracket -2-.



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .
- Check coolant level ⇒ page 323 .

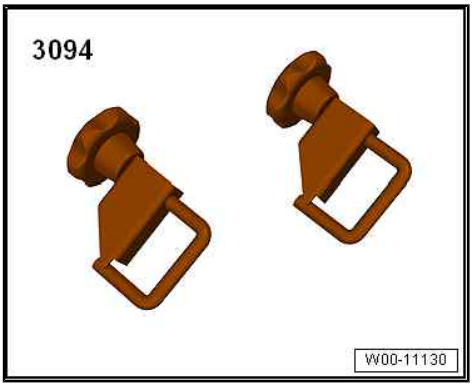
Tightening torques

- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

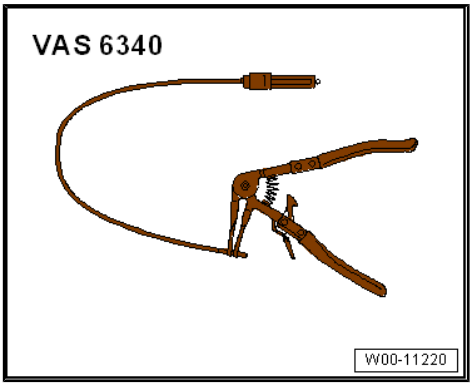
4.8.4 Coolant circulation pump before power and control electronics for electric drive - V508-

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6340-



Removing

- Engine cold.

– To relieve residual pressure in cooling system, open filler cap on coolant expansion tank briefly and then close cap again (it should click into place).

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

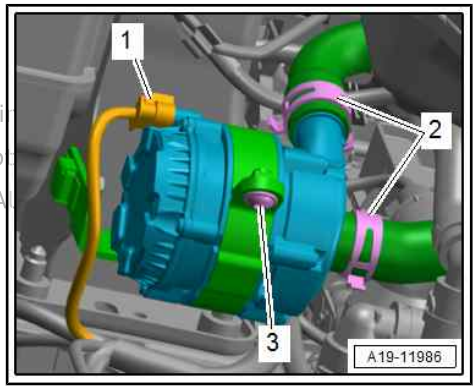
Version 1:

– Unplug electrical connector -1-.

– Remove bolt -3- and detach retaining bracket.

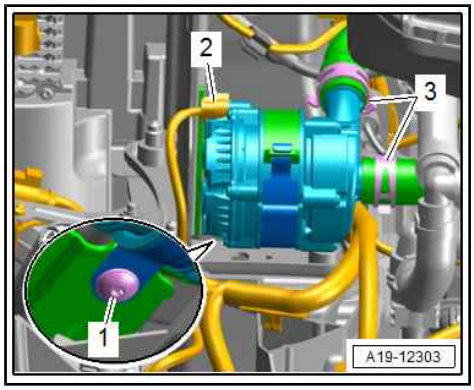
– Place a cloth underneath to catch escaping coolant.

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -2- and disconnect hoses.



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Version 2:



– Unplug electrical connector -2-.
– Remove bolt -1- and detach retaining bracket.
– Place a cloth underneath to catch escaping coolant.
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -3- and disconnect hoses.

Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .
– Check coolant level and top up coolant if necessary ⇒ page 331 .

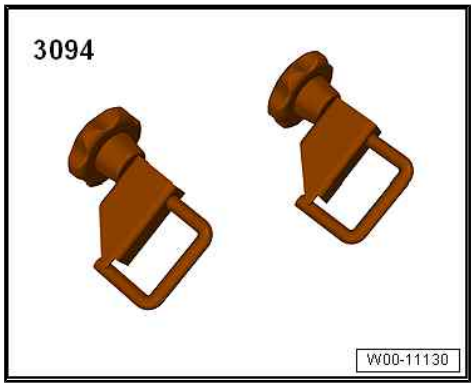
Tightening torques

♦ ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

4.8.5 Removing and installing coolant pump for high-voltage battery - V590-

Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



♦ Hose clip pliers - VAS 6362-



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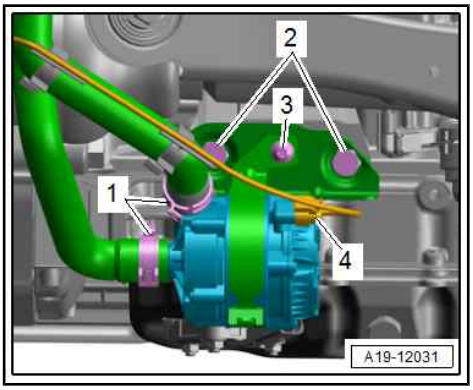
Removing

- Engine cold.
– To relieve residual pressure in cooling system, open filler cap on coolant expansion tank briefly and then close cap again (it should click into place).
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Unplug electrical connector -4-.

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -1- and disconnect hoses.

– Remove bolt -3- and detach coolant pump for high-voltage battery - V590- .



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level and top up coolant if necessary ⇒ page 331 .

Tightening torques

- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.9 Removing and installing coolant temperature sender - G62-

⇒ “4.9.1 Removing and installing coolant temperature sender G62 - all vehicles except e-tron”, page 375

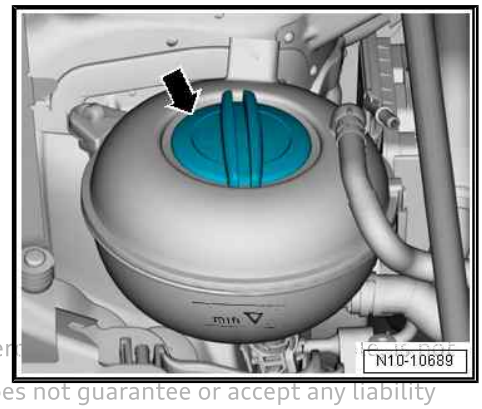
⇒ “4.9.2 Removing and installing coolant temperature sender G62 - e-tron”, page 376

4.9.1 Removing and installing coolant temperature sender - G62- - all vehicles except e-tron

Removing

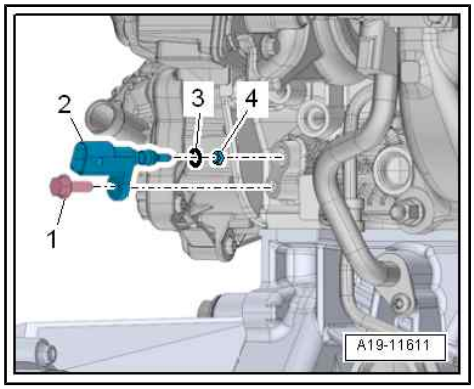
- Engine cold.

– 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).



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– Unplug electrical connector.
– Place a cloth underneath to catch escaping coolant.
– Unscrew bolt -1- and pull off coolant temperature sender - G62- -item 2-.
– 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.
– To avoid loss of coolant, insert new coolant temperature sender immediately.



Installing

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

• Renew O-ring.
– Check coolant level ⇒ page 323 .

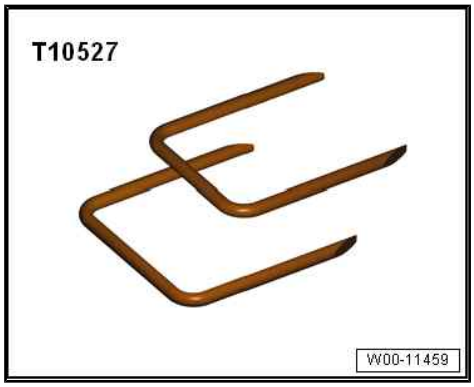
Tightening torques

♦ ⇒ “4.3.1 Exploded view - coolant temperature senders, all vehicles except e-tron”, page 348

4.9.2 Removing and installing coolant temperature sender - G62- - e-tron

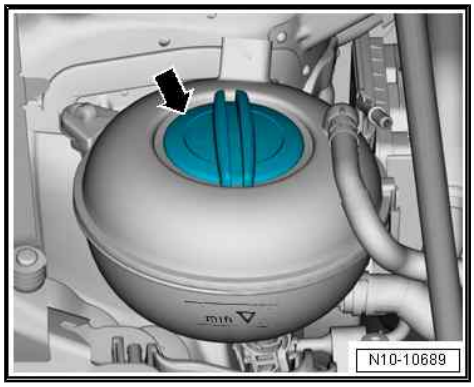
Special tools and workshop equipment required

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



Removing

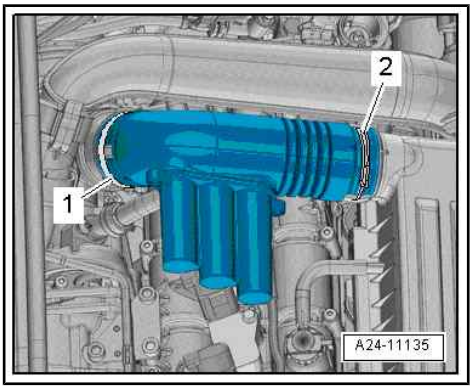
• Engine cold.
– To relieve residual pressure in cooling system, open filler cap -arrow- on coolant expansion tank briefly and then close cap again (it should click into place).
– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .



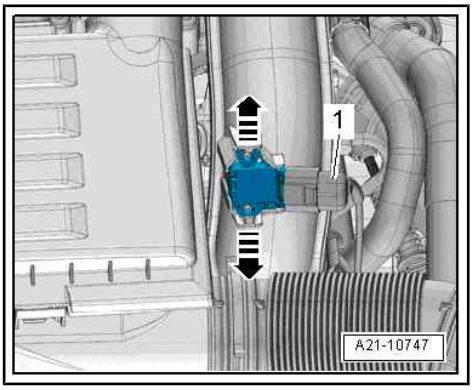
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Version with secondary air system:

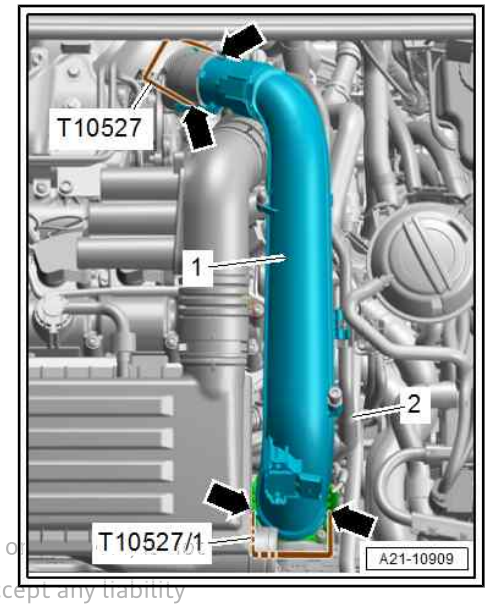
– Loosen hose clips -1, 2- and remove air pipe.



– Unplug electrical connector -1-.

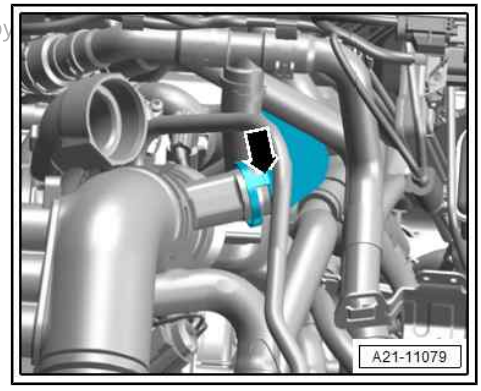


– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.
– Move line for activated charcoal filter system clear at air pipe.
– Release fasteners -arrows- with release release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.



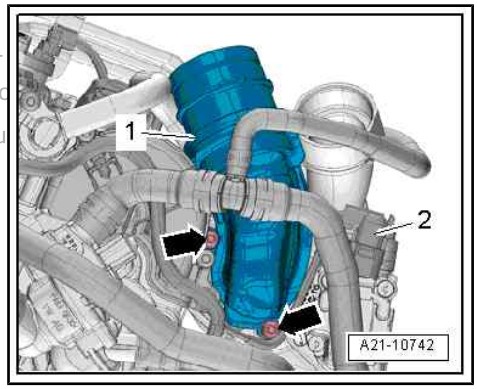
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– Press release tabs on both sides and disconnect secondary air hose -arrow-.



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– Remove bolts -arrow-, detach connection -1- and move to one side.



All vehicles (continued):

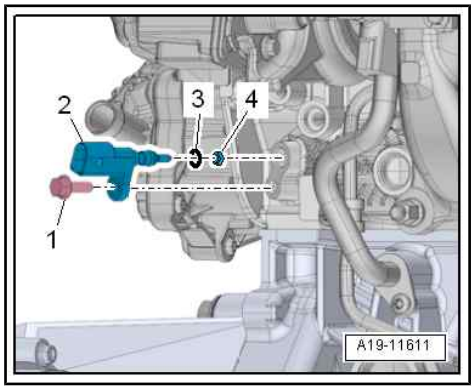
– Unplug electrical connector.

– Place a cloth underneath to catch escaping coolant.

– Unscrew bolt -1- and pull off coolant temperature sender - G62- -item 2-.

– 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.

– To avoid loss of coolant, insert new coolant temperature sender immediately.



Installing

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

• Renew O-ring.

– Check coolant level ⇒ page 323 .

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

♦ ⇒ “4.3.2 Exploded view - coolant temperature senders, e-tron”, page 349

4.10 Removing and installing radiator outlet coolant temperature sender - G83-

⇒ "4.10.1 Removing and installing radiator outlet coolant temperature sender G83 - all vehicles except e-tron", page 379

⇒ "4.10.2 Removing and installing radiator outlet coolant temperature sender G83 - e-tron", page 380

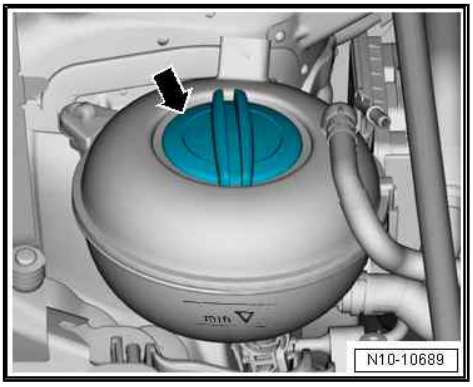
4.10.1 Removing and installing radiator outlet coolant temperature sender - G83- - all vehicles except e-tron

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).

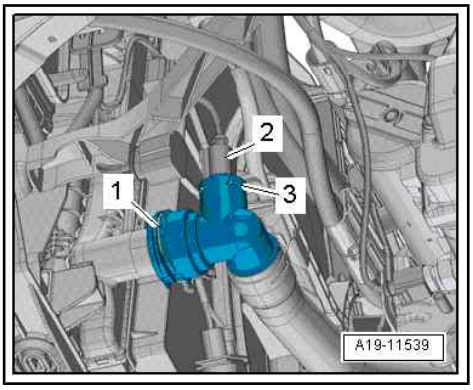
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .



– Unplug electrical connector -2- (installation position on radiator, version 1).

– Place a cloth underneath to catch escaping coolant.

– Pull off retaining clip -3- and detach radiator outlet coolant temperature sender - G83- .



Installing

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

- Renew O-ring.

– To avoid loss of coolant, insert new coolant temperature sender immediately.

– Check coolant level ⇒ page 323 .

Tightening torques

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

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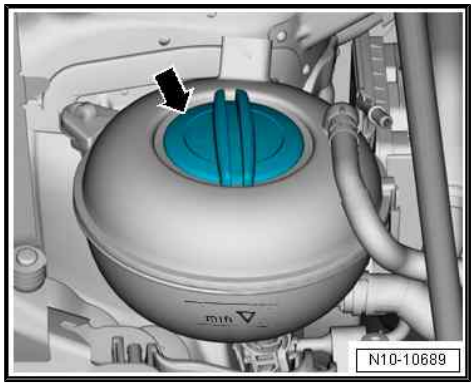
4.10.2 Removing and installing radiator outlet coolant temperature sender - G83- - e-tron

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).

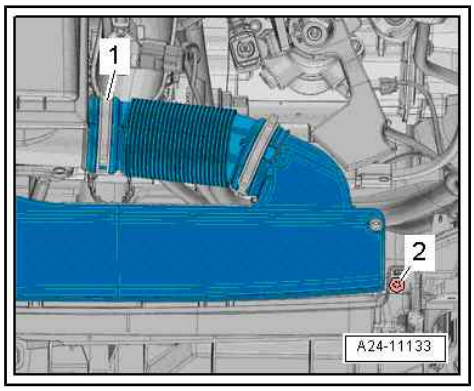
– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .



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

– Remove bolt -2- on both sides.

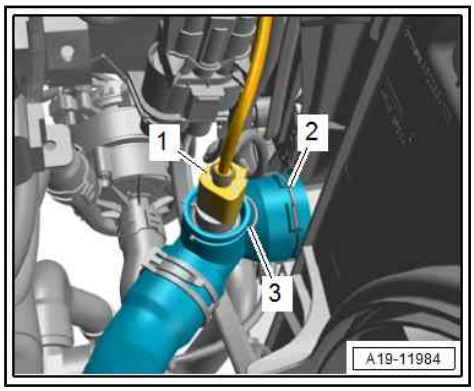
– Unclip air duct at lock carrier and detach.



– Unplug electrical connector -1-.

– Place a cloth underneath to catch escaping coolant.

– Pull off retaining clip -3- and detach radiator outlet coolant temperature sender - G83- .



Installing

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

- Renew O-ring.

– To avoid loss of coolant, insert new coolant temperature sender immediately.

– Check coolant level ⇒ page 323 .

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

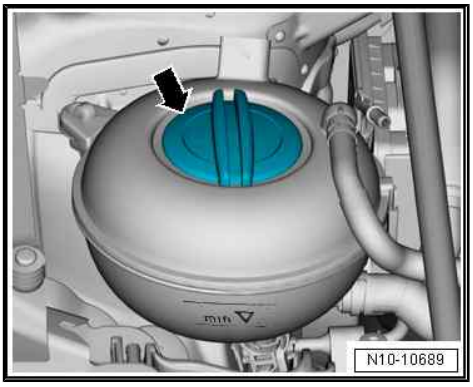
Tightening torques

◆ ⇒ “4.3.2 Exploded view - coolant temperature senders, e-tron”, page 349

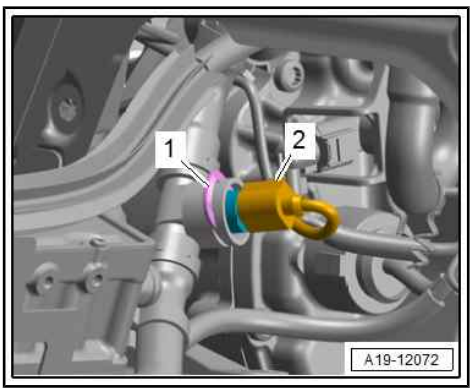
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4.11 Removing and installing coolant temperature sender for heater - G241-

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 noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .



- Unplug electrical connector -2-.
- Place a cloth underneath to catch escaping coolant.
- Pull off retaining clip -1- and detach coolant temperature sender for heater - G241- .

Installing

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

- Renew O-ring.
- To avoid loss of coolant, insert new coolant temperature sender immediately.
- Check coolant level ⇒ page 323 .

Tightening torques

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

4.12 Removing and installing engine temperature sender 2 - G652-

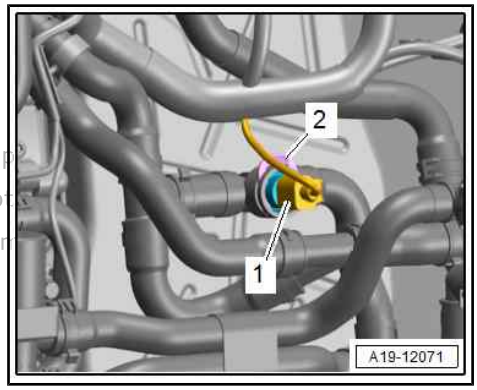
Fitting location: between gearbox and radiator cowl

- Engine cold.
- To relieve residual pressure in cooling system, open filler cap on coolant expansion tank briefly and then close cap again (it should click into place).
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

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– Unplug electrical connector -1-.
– Place a cloth underneath to catch escaping coolant.
– Pull out retaining clip -2- and detach engine temperature sender 2 - G652- .



Installing

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

- Renew O-ring.
– To avoid loss of coolant, insert new coolant temperature sender immediately.
– Check coolant level and top up coolant if necessary ⇒ page 331 .

Tightening torques

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

4.13 Removing and installing coolant valves

⇒ “4.13.1 Removing and installing coolant valve for gearbox N488 ”, page 382

⇒ “4.13.2 Removing and installing coolant changeover valve 1 N632 ”, page 384

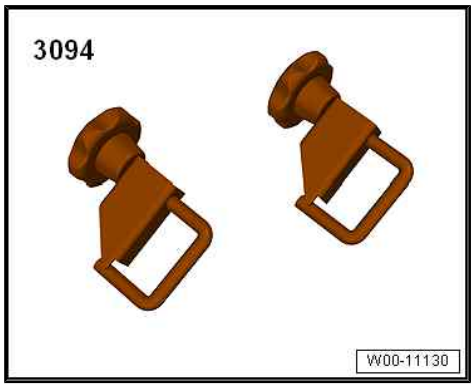
⇒ “4.13.3 Removing and installing coolant changeover valve 2 N633 ”, page 385

⇒ “4.13.4 Removing and installing coolant valve for high-voltage battery N688 ”, page 386

4.13.1 Removing and installing coolant valve for gearbox - N488-

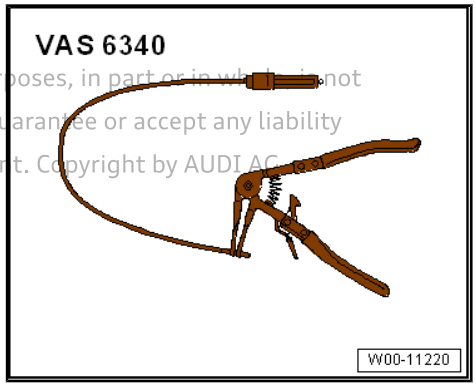
Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



♦ Hose clip pliers - VAS 6340-

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Removing

DANGER

High voltage can cause fatal injury.

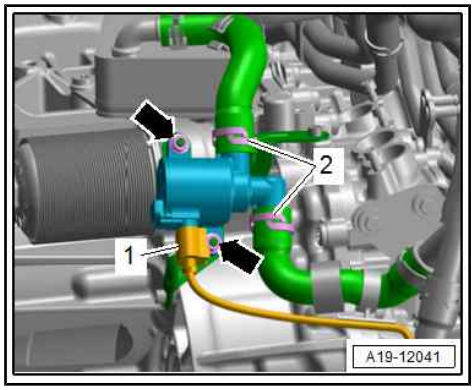
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove bracket for power and control electronics for electric drive - JX1-
⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650 .

– Unplug electrical connector -1-.
– Remove bolts -arrows-.
– Place a cloth underneath to catch escaping coolant.
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -2- and disconnect hoses.
– Remove coolant valve for gearbox - N488- (shown with gearbox removed).



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .
– Install power and control electronics for electric drive - JX1- ⇒ “5.3 Removing and installing power and control electronics for electric drive”, page 638 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system ⇒ “11 Re-energising high-voltage system”, page 691 .
– Check coolant level and top up coolant if necessary ⇒ page 322 .

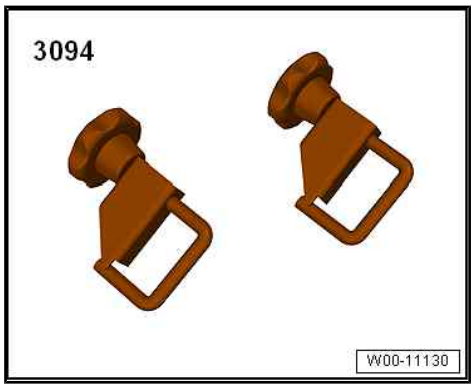
Tightening torques

◆ ⇒ “4.4 Exploded view - coolant valves”, page 350

4.13.2 Removing and installing coolant changeover valve 1 - N632-

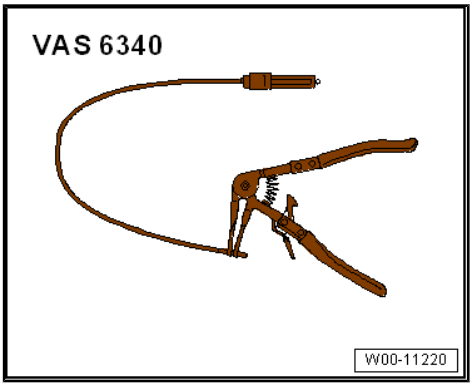
Special tools and workshop equipment required

◆ Hose clamps up to 25 mm - 3094-



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♦ Hose clip pliers - VAS 6340-



Removing

- Engine cold.

– To relieve residual pressure in cooling system, open filler cap on coolant expansion tank briefly and then close cap again (it should click into place).

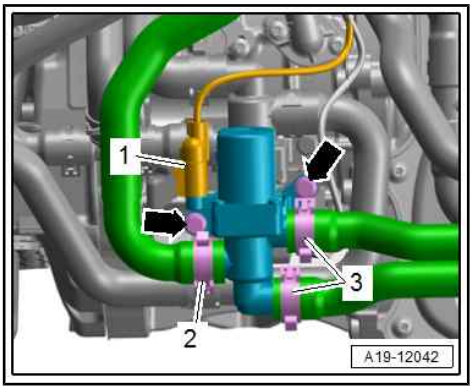
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Unplug electrical connector -1-.

– Place a cloth underneath to catch escaping coolant.

– Clamp off coolant hoses using hose clamps, up to 25 mm - 3094- , release hose clips -2 and 3- and disconnect hoses.

– Unscrew bolts -arrows- and detach coolant changeover valve 1 - N632- .



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level and top up coolant if necessary ⇒ page 331 .

Tightening torques

♦ ⇒ “4.4 Exploded view - coolant valves”, page 350

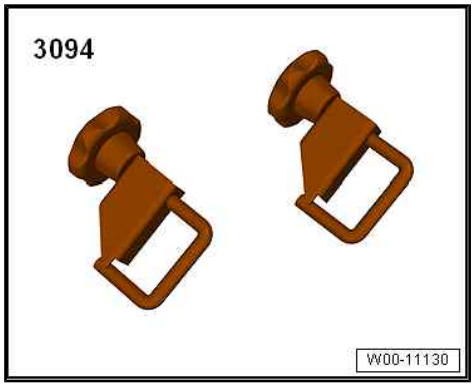
♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.13.3 Removing and installing coolant changeover valve 2 - N633-

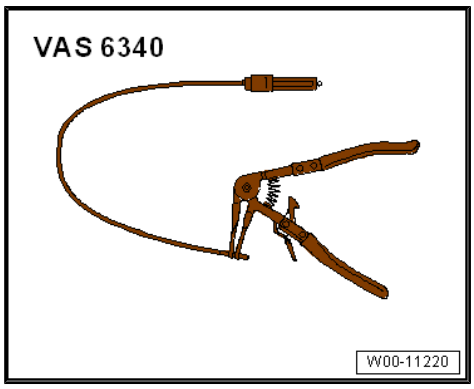
Special tools and workshop equipment required

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- Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6340-



Removing

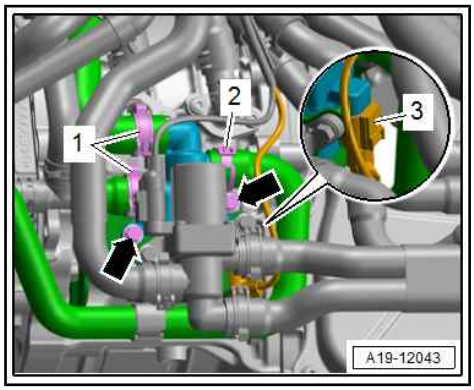
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Unplug electrical connector -3-.

– Place a cloth underneath to catch escaping coolant.

– Clamp off coolant hoses using hose clamps, up to 25 mm - 3094- , release hose clips -1 and 2- and disconnect hoses.

– Unscrew bolts -arrows- and detach coolant changeover valve 2 - N633- .



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level and top up coolant if necessary ⇒ page 322 .

Tightening torques

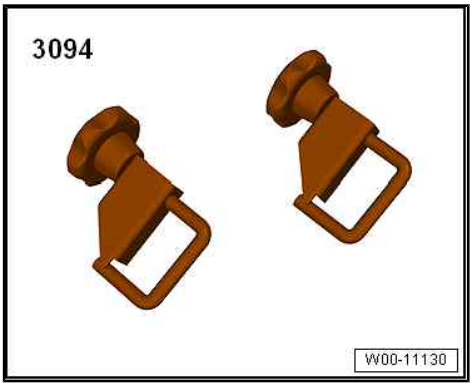
- ⇒ “4.4 Exploded view - coolant valves”, page 350
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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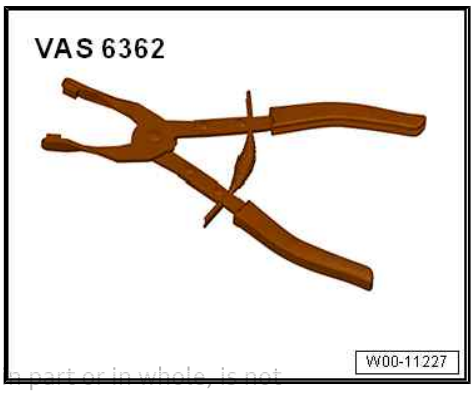
4.13.4 Removing and installing coolant valve for high-voltage battery - N688-

Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



♦ Hose clip pliers - VAS 6362-



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Removing

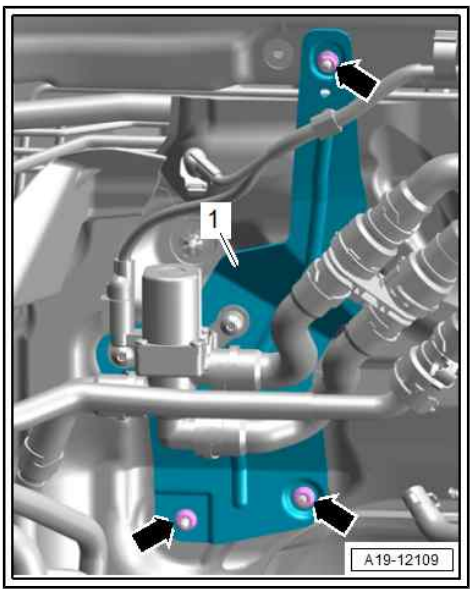
- Engine cold.

– To relieve residual pressure in cooling system, open filler cap on coolant expansion tank briefly and then close cap again (it should click into place).

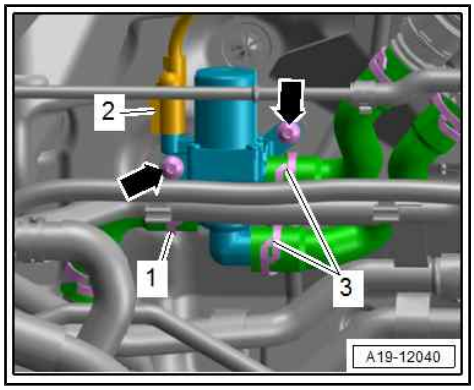
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove nuts -arrows-.

– Tilt bracket -1- towards front.



– Unplug electrical connector -2-.
– Place a cloth underneath to catch escaping coolant.
– Remove bolts -arrows-.
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -3- and disconnect hoses.
– Detach coolant valve for high-voltage battery - N688- .



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Check coolant level and top up coolant if necessary ⇒ page 331 .

Tightening torques

◆ ⇒ “4.4 Exploded view - coolant valves”, page 350

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5 Coolant pipes

⇒ “5.1 Exploded view - coolant pipes”, page 389

⇒ “5.2 Removing and installing coolant pipes”, page 391

5.1 Exploded view - coolant pipes

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⇒ “5.1.1 Exploded view - coolant pipes, all vehicles except e-tron”, page 389

⇒ “5.1.2 Exploded view - coolant pipes, e-tron”, page 390

5.1.1 Exploded view - coolant pipes, all vehicles except e-tron

- The arrow markings on coolant pipes and on ends of hoses must align.

1 - Coolant hose

2 - Coolant pipe

- ❑ Clipped onto intake manifold (bottom)
- ❑ Removing and installing ⇒ “5.2.1 Removing and installing coolant pipe - all vehicles except e-tron”, page 391

3 - Bolt

- ❑ 8 Nm

4 - Coolant hose

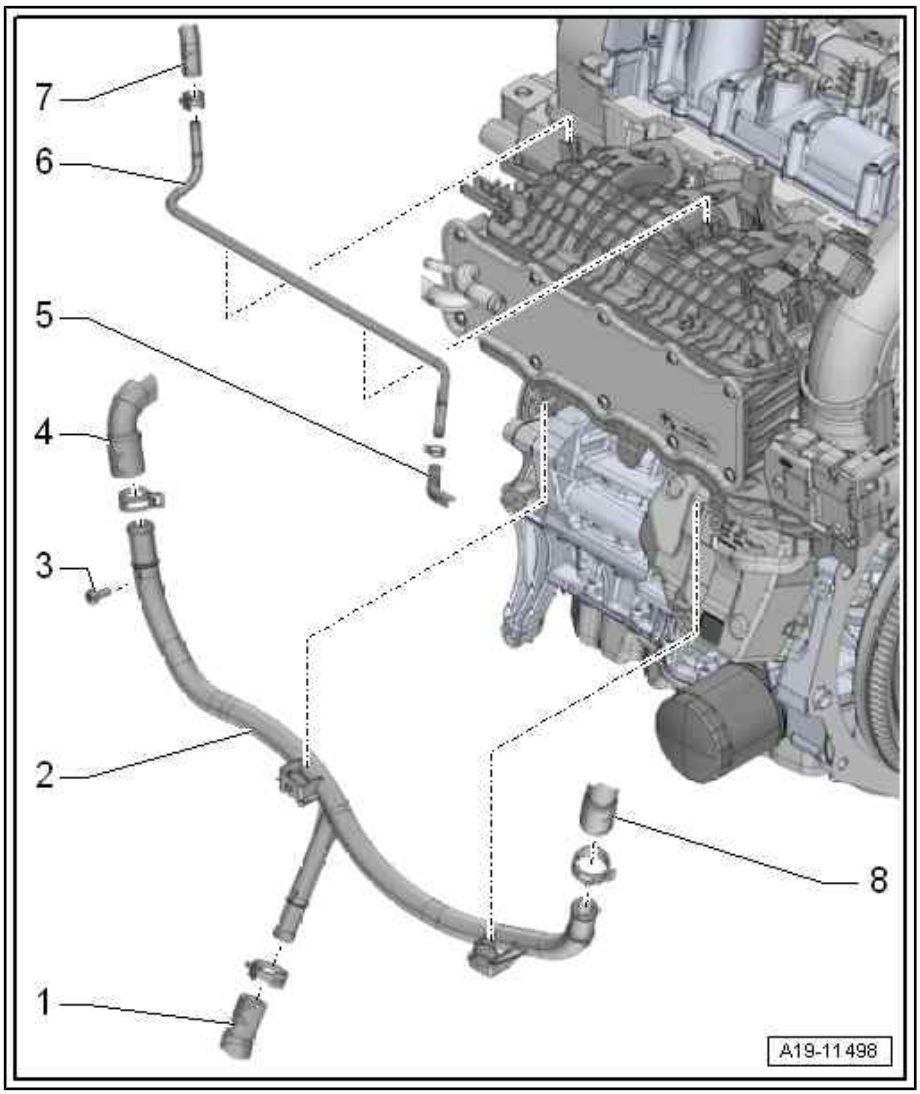
5 - Coolant hose

6 - Coolant pipe

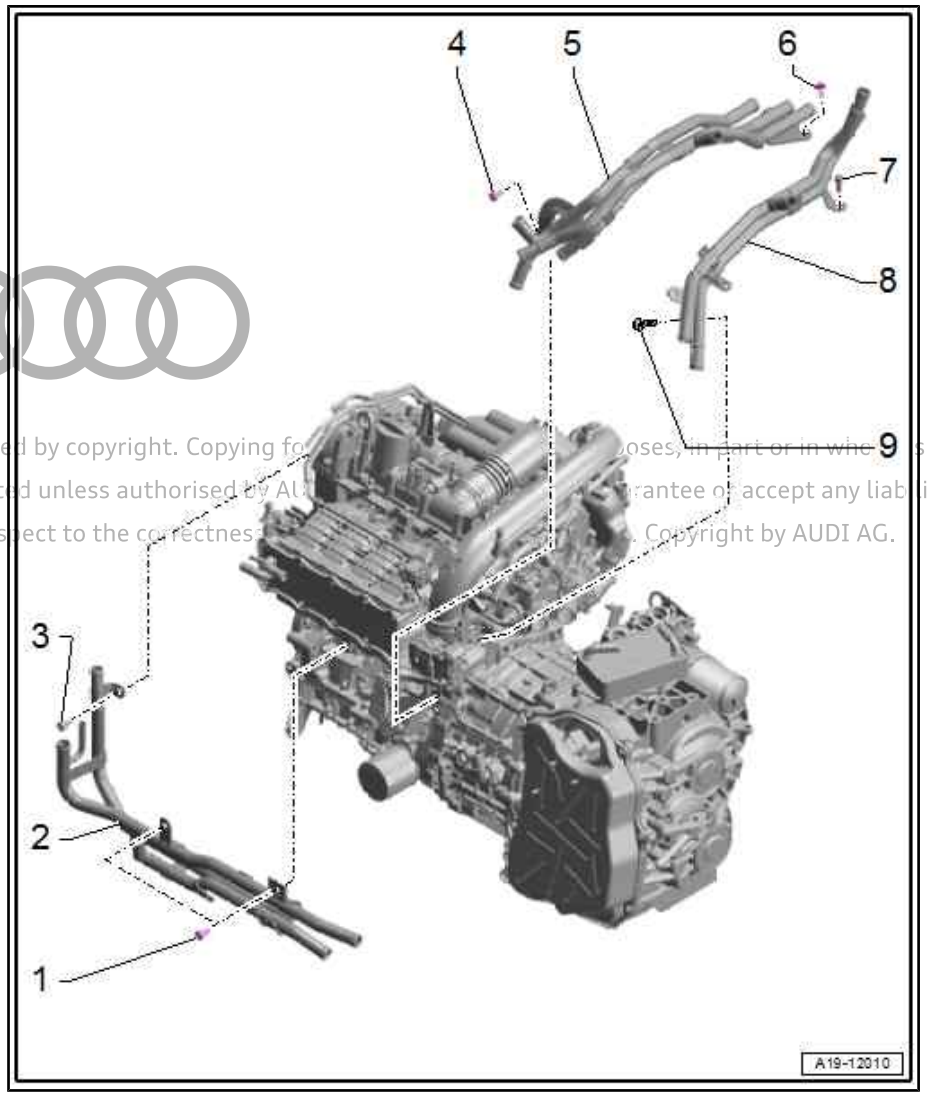
- ❑ Clipped onto intake manifold (top)

7 - Coolant hose

8 - Coolant hose



5.1.2 Exploded view - coolant pipes, e-tron



1 - 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

2 - Coolant pipes (front)

- ❑ Removing and installing ⇒ “5.2.2 Removing and installing coolant pipes (front) - e-tron”, page 392

3 - Bolt

- ❑ 9 Nm

4 - Bolt

- ❑ 20 Nm

5 - Coolant pipes (left-side)

- ❑ Removing and installing ⇒ “5.2.3 Removing and installing coolant pipes (left-side) - e-tron”, page 393

6 - Bolt

- ❑ 9 Nm

7 - Bolt

- ❑ 9 Nm

8 - Coolant pipes (left-side) for high-voltage cooling system

- ❑ Removing and installing ⇒ “5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron”, page 395

9 - Bolt

- ❑ 9 Nm

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5.2 Removing and installing coolant pipes

⇒ “5.2.1 Removing and installing coolant pipe - all vehicles except e-tron”, page 391

⇒ “5.2.2 Removing and installing coolant pipes (front) - e-tron”, page 392

⇒ “5.2.3 Removing and installing coolant pipes (left-side) - e-tron”, page 393

⇒ “5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron”, page 395

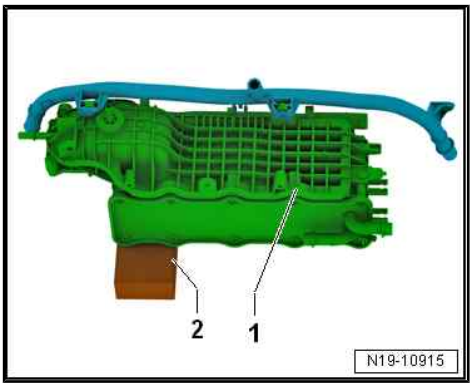
5.2.1 Removing and installing coolant pipe - all vehicles except e-tron

Removing

– Remove intake manifold
⇒ “3.2.1 Removing and installing intake manifold - all vehicles except e-tron”, page 468 .

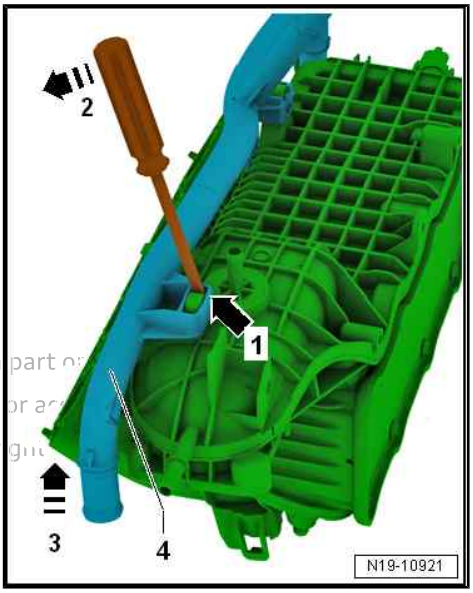
– Place intake manifold -1- on workbench (as shown in illustration).

– Place a piece of wood -2- (or similar) under intake manifold to support it.



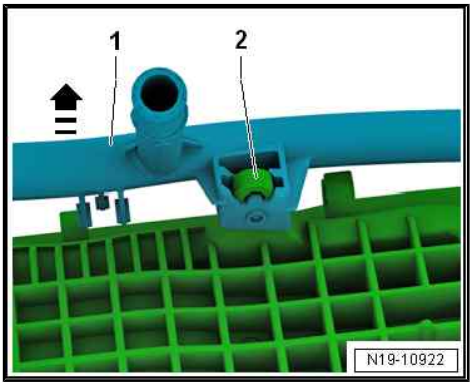
– Insert a flat-bladed screwdriver into opening -arrow 1-.

– 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.

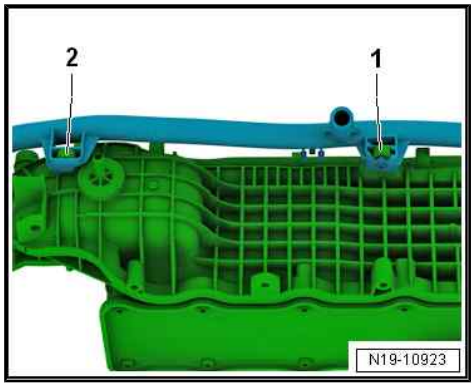


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– Keep lifting coolant pipe -1- in direction of -arrow- until it is released from mounting -2-.



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:

- Renew seals and O-rings.
- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

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– Install intake manifold ⇒ “3.2.1 Removing and installing intake manifold - all vehicles except e-tron”, page 468 .
– Check coolant level and top up coolant if necessary ⇒ page 322 .

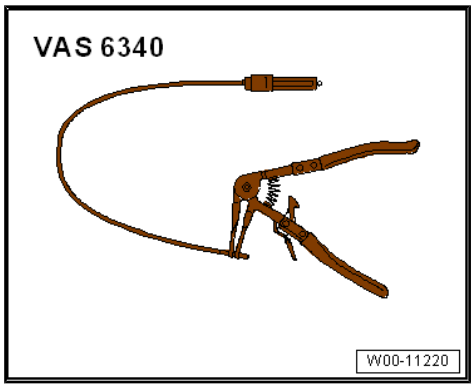
Tightening torques

♦ ⇒ “3.1.1 Exploded view - intake manifold, all vehicles except e-tron”, page 465

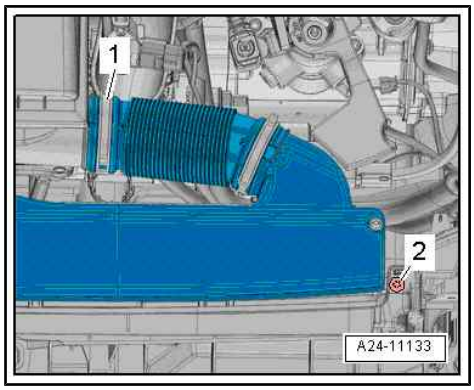
5.2.2 Removing and installing coolant pipes (front) - e-tron

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6340-

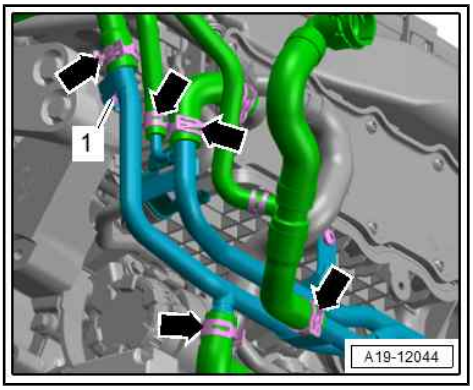


Removing

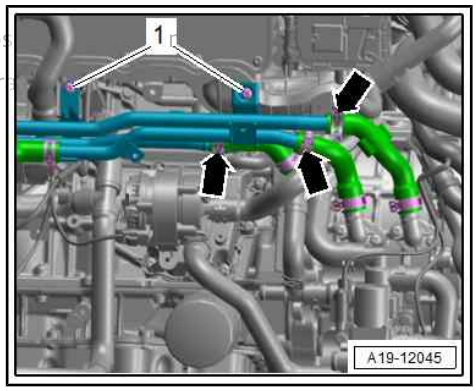


– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .
– Drain coolant ⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .
– Release hose clip -1- and detach air hose.
– Remove bolt -2- on both sides.
– Unclip air duct at lock carrier and detach.

– Release hose clips -arrows- and disconnect coolant hoses.
– Remove bolt -1-.



– Move high-voltage wire clear.
– Remove bolts -1-.
– Release hose clips -arrows- and disconnect coolant hoses.
– Detach coolant pipes (front).



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Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Fill up with coolant
⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .

– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

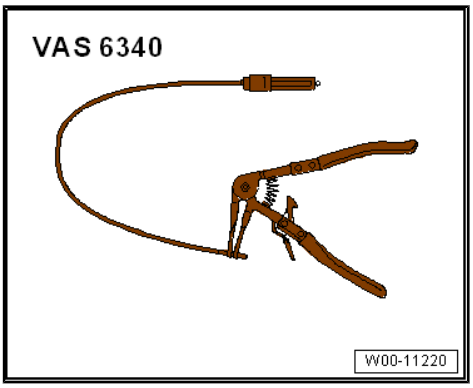
♦ ⇒ “5.1.2 Exploded view - coolant pipes, e-tron”, page 390

♦ ⇒ “2.1 Exploded view - air cleaner housing”, page 462

5.2.3 Removing and installing coolant pipes (left-side) - e-tron

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6340-



Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

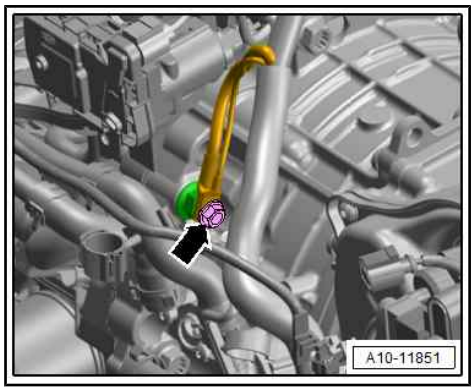
– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove radiator cowl
⇒ “6.4.2 Removing and installing radiator cowl - e-tron”, page 410 .

– Remove coolant pipes (left-side) for high-voltage cooling system
⇒ “5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron”, page 395 .

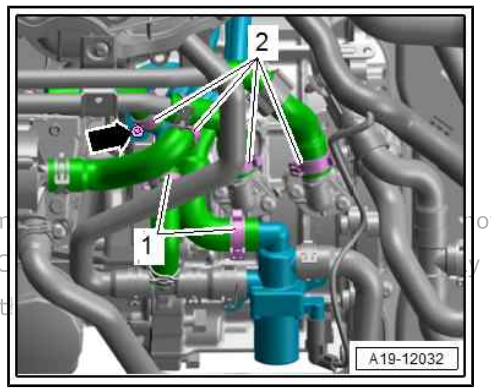
– Remove nut -arrow- and move earth wire clear.



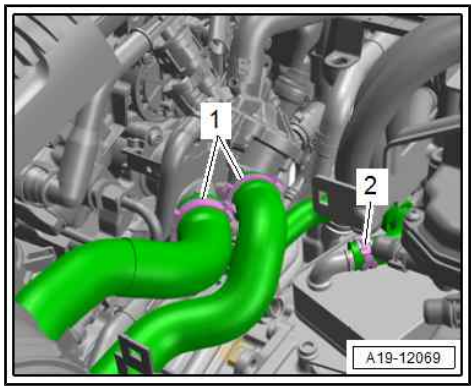
– Remove bolt -arrow- for coolant pipes (left-side).

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

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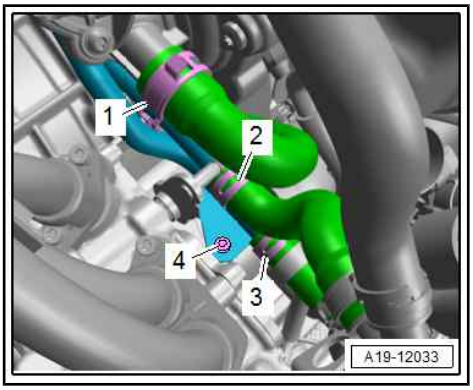


– Release hose clips -1, 2- and detach coolant hoses from coolant pipes (left-side).



– Release hose clips -1, 2, 3- and disconnect coolant hoses.

– Remove bolt -4-, move coolant pipes (left-side) clear and detach.



Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Install coolant pipes (left-side) for high-voltage cooling system ⇒ “5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron”, page 395 .

– Install radiator cowl ⇒ “6.4.2 Removing and installing radiator cowl - e-tron”, page 410 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system ⇒ “11 Re-energising high-voltage system”, page 691 .

– Check coolant level and top up coolant if necessary ⇒ page 322 .

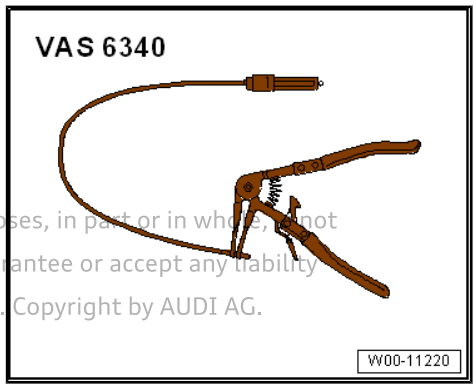
Tightening torques

♦ ⇒ “5.1.2 Exploded view - coolant pipes, e-tron”, page 390

5.2.4 Removing and installing coolant pipes (left-side) for high-voltage cooling system - e-tron

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6340-



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Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

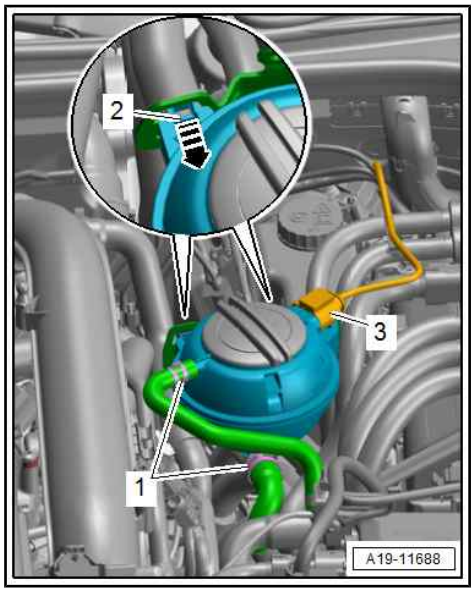
– Drain coolant for high-voltage cooling circuit
⇒ “1.3.2 Draining cooling system - cooling components for high-voltage system (front)”, page 323 .

– Removing and installing mounting for high-voltage battery charging unit
⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661

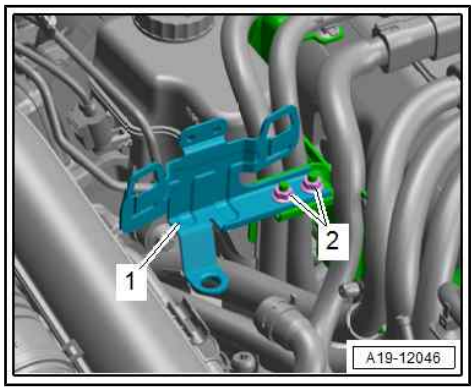
– Unplug electrical connector -3-.

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

– Release fastener -2- with a small screwdriver and disengage coolant expansion tank from bracket.

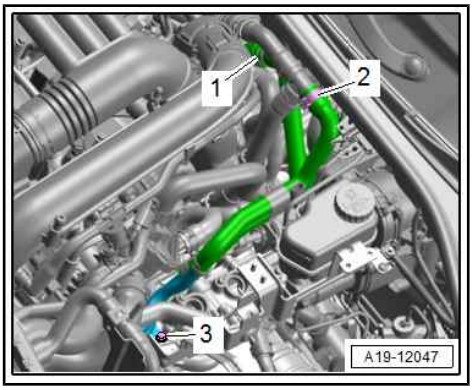


– Remove nuts -2- and detach bracket -1-.



– Remove bolt -3-.

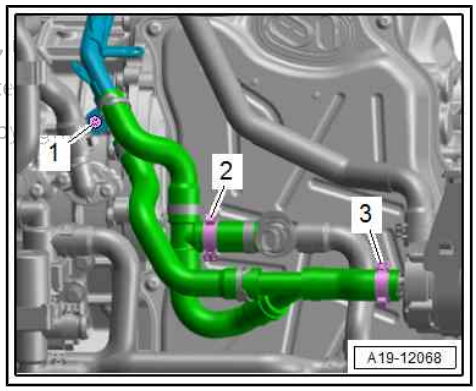
– Lift retaining clip -1-, release hose clip -2- and disconnect coolant hoses (shown with high-voltage components removed).



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

– Remove bolt -1-.

– Move coolant pipes (left-side) for high-voltage cooling system clear and detach (shown with lock carrier removed).



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Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Fill up high-voltage cooling circuit with coolant
⇒ “1.3.4 Filling up cooling system - cooling components for high-voltage system”, page 327 .

Tightening torques

◆ ⇒ “5.1.2 Exploded view - coolant pipes, e-tron”, page 390

6 Radiators/radiator fan

⇒ “6.1 Exploded view - radiators/radiator fan”, page 398

⇒ “6.2 Exploded view - radiator cowl and radiator fan”, page 403

⇒ “6.3 Removing and installing radiator”, page 404

⇒ “6.4 Removing and installing radiator cowl”, page 410

⇒ “6.5 Removing and installing radiator fan”, page 411

6.1 Exploded view - radiators/radiator fan

⇒ “6.1.1 Exploded view - radiators/radiator fan, all vehicles except e-tron (version 1)”, page 398

⇒ “6.1.2 Exploded view - radiators/radiator fan, all vehicles except e-tron (version 2)”, page 400

⇒ “6.1.3 Exploded view - radiators/radiator fan, e-tron”, page 401

6.1.1 Exploded view - radiators/radiator fan, all vehicles except e-tron (version 1)

1 - Radiator

- ❑ Must be removed together with water radiator for charge air cooling circuit
- ❑ Removing and installing ⇒ “6.3.1 Removing and installing radiator - all vehicles except e-tron”, page 404

2 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

3 - Retaining clip

4 - O-ring

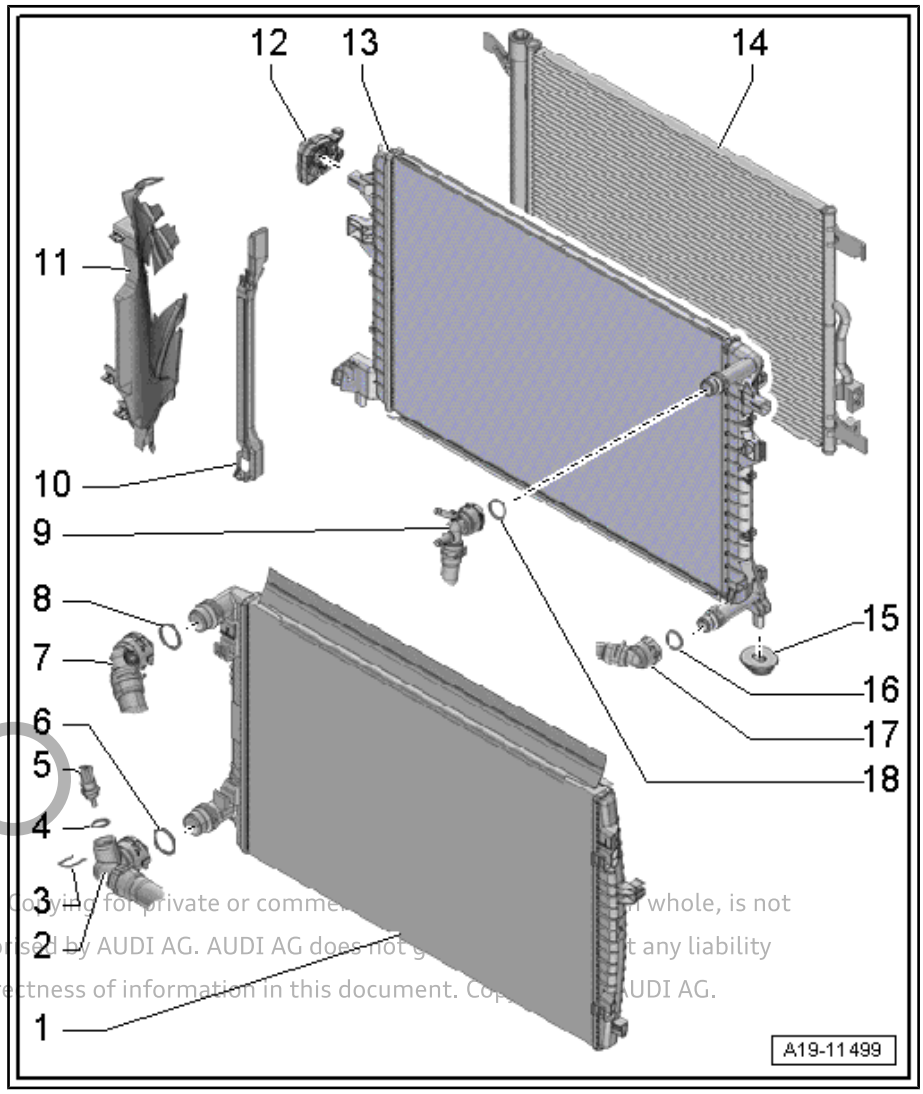
- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

5 - Radiator outlet coolant temperature sender - G83-

- ❑ Removing and installing ⇒ “4.10.1 Removing and installing radiator outlet coolant temperature sender G83 - all vehicles except e-tron”, page 379

6 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant



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7 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

8 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

9 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

10 - Air duct

11 - Air duct

12 - Rubber mounting

- ❑ For radiator

13 - Water radiator for charge air cooling circuit

- ❑ Must be removed together with radiator
- ❑ Removing and installing
  ⇒ “6.3.1 Removing and installing radiator - all vehicles except e-tron”, page 404

14 - Condenser

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser

15 - Rubber bush

- ❑ For radiator

16 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

17 - Coolant hose

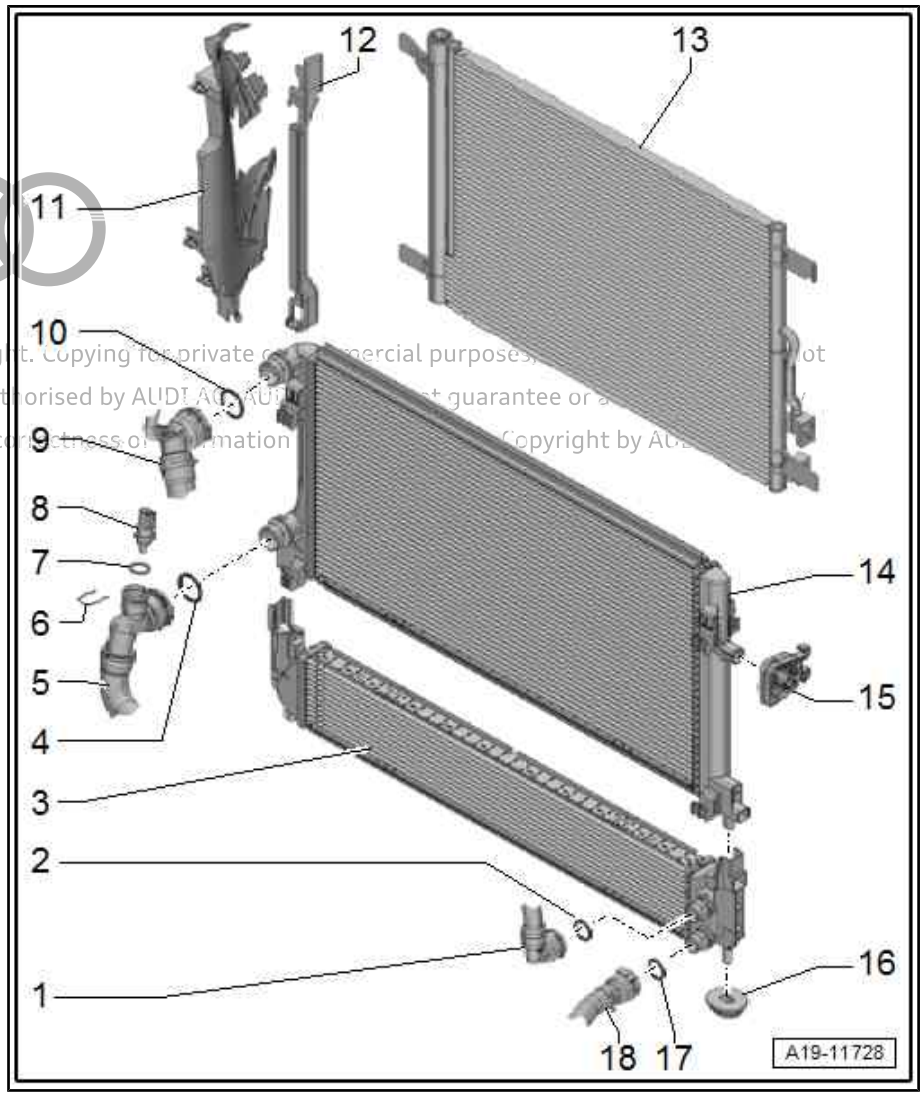
- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

18 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

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6.1.2 Exploded view - radiators/radiator fan, all vehicles except e-tron (version 2)



1 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

2 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

3 - Water radiator for charge air cooling circuit

- ❑ Removing and installing ⇒ “6.3.1 Removing and installing radiator - all vehicles except e-tron”, page 404

4 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

5 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

6 - Retaining clip

7 - O-ring

- ❑ Check for damage and renew if necessary

8 - Radiator outlet coolant temperature sender - G83-

- ❑ Removing and installing ⇒ “4.10.1 Removing and installing radiator outlet coolant temperature sender G83 - all vehicles except e-tron”, page 379

9 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

10 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

11 - Air duct

12 - Air duct

13 - Condenser

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser

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14 - Radiator

- ❑ Removing and installing ⇒ “6.3.1 Removing and installing radiator - all vehicles except e-tron”, page 404

15 - Rubber mounting

- ❑ For radiator

16 - Rubber mounting

- ❑ For radiator

17 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

18 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

6.1.3 Exploded view - radiators/radiator fan, e-tron

1 - Radiator

- ❑ Removing and installing ⇒ “6.3.2 Removing and installing radiator - e-tron”, page 406

2 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

3 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

4 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

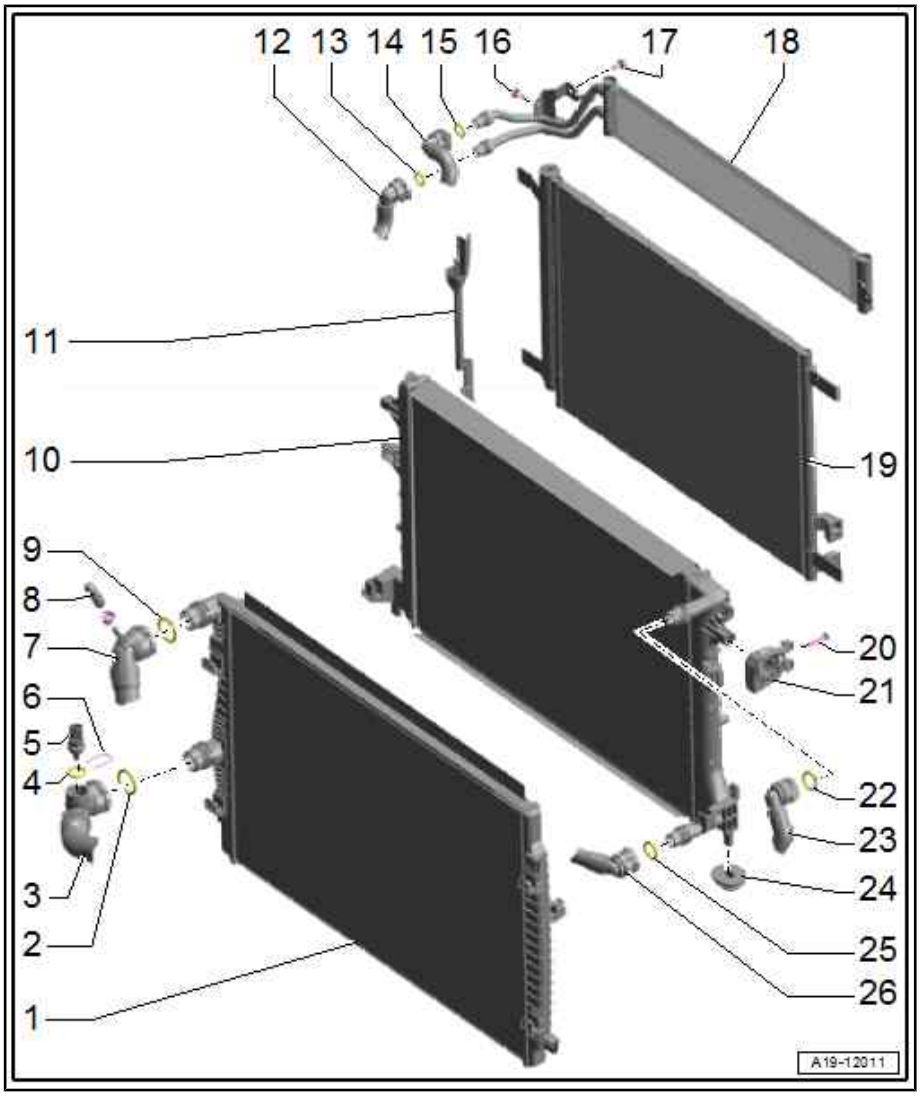
5 - Radiator outlet coolant temperature sender - G83-

- ❑ Removing and installing ⇒ “4.10.2 Removing and installing radiator outlet coolant temperature sender G83 - e-tron”, page 380

6 - Retaining clip

7 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336



8 - Coolant hose

9 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

10 - Water radiator for charge air cooling circuit

- ❑ Removing and installing ⇒ “6.3.2 Removing and installing radiator - e-tron”, page 406

11 - Cowl

12 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

13 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

14 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

15 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

16 - 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

17 - 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

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18 - Auxiliary radiator for high-voltage cooling system

19 - Condenser

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser

20 - 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

21 - Rubber mounting

- ❑ For radiator

22 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

23 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

24 - Rubber bush

- ❑ For radiator

25 - O-ring

- ❑ Check for damage and renew if necessary
- ❑ Lubricate with coolant

26 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ “2 Connecting coolant hose with plug-in connector”, page 336

6.2 Exploded view - radiator cowl and radiator fan

1 - Bolt

- ❑ 5 Nm

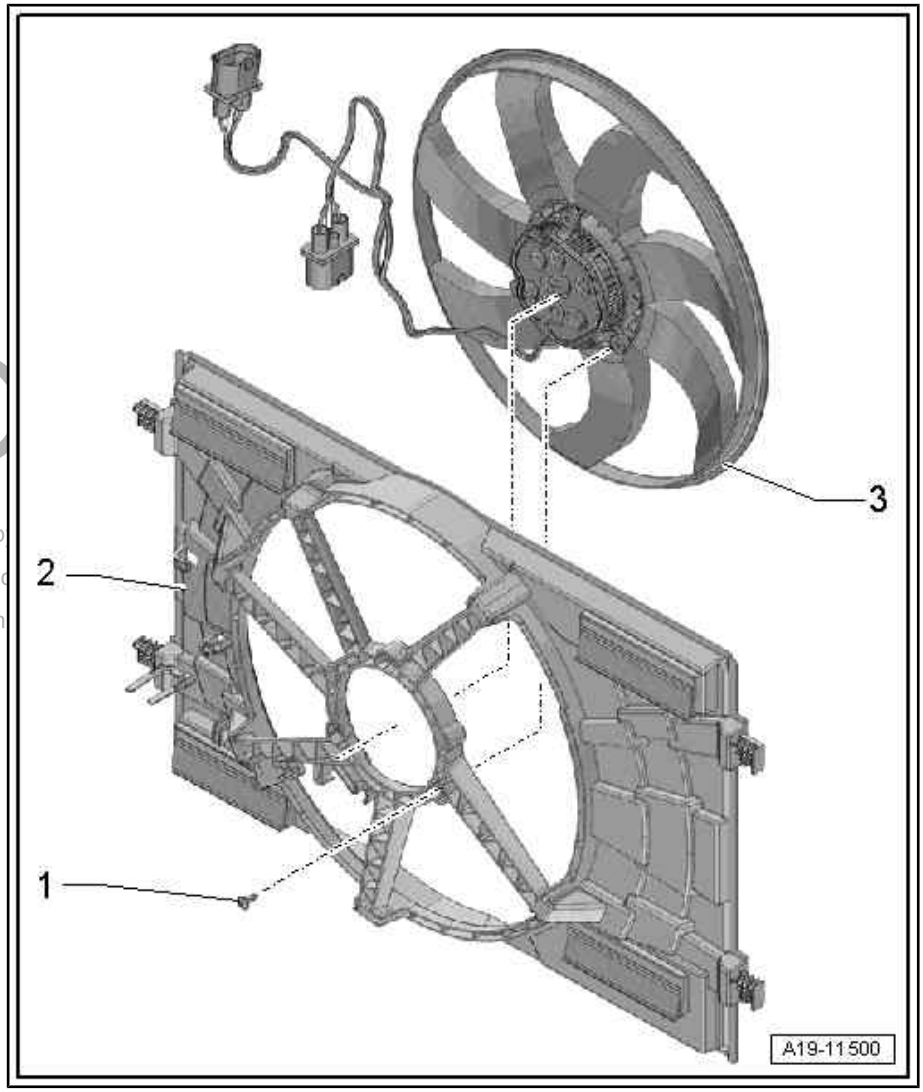
2 - Radiator cowl

- ❑ Removing and installing ⇒ “6.4 Removing and installing radiator cowl”, page 410

3 - Radiator fan - V7-

- ❑ Removing and installing ⇒ “6.5 Removing and installing radiator fan”, page 411

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6.3 Removing and installing radiator

⇒ “6.3.1 Removing and installing radiator - all vehicles except e-tron”, page 404

⇒ “6.3.2 Removing and installing radiator - e-tron”, page 406

6.3.1 Removing and installing radiator - all vehicles except e-tron

Removing

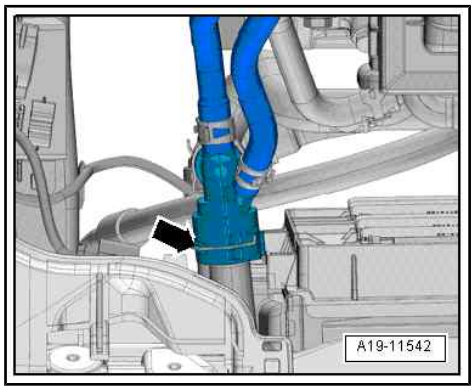
– Drain coolant
⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .

– Remove radiator cowl
⇒ “6.4 Removing and installing radiator cowl”, page 410 .

– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

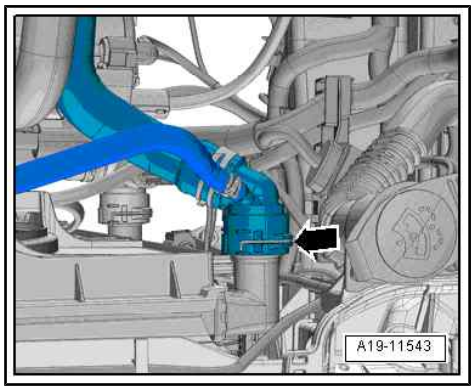
Vehicles with water radiator for charge air cooling circuit (version 1):

– Lift retaining clip -arrow- and disconnect coolant hose (top right) from water radiator for charge air cooling circuit.

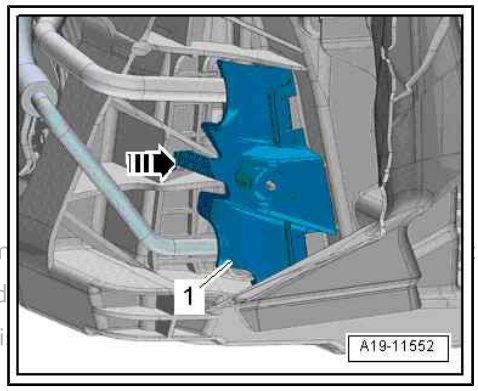


All vehicles (continued):

– Lift retaining clip -arrow- and disconnect coolant hose (top left) from radiator.



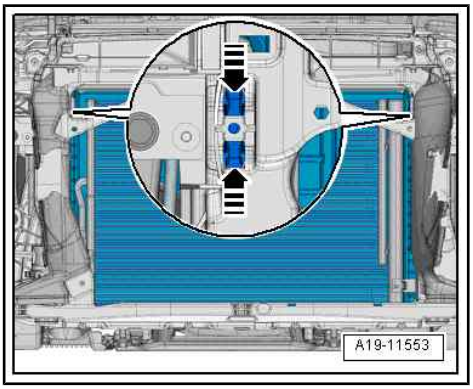
– Release fastener -arrow- and remove cover -1- towards front.



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– Pinch fasteners (both sides) -arrows- off radiator mounting with side-cutting pliers. Push radiator for engine coolant with water radiator for charge air cooling circuit (top) slightly towards rear.

– When installing the radiator, the radiator mounting is re-used; it must be bolted onto the lock carrier. For bolts, refer to ⇒ Electronic parts catalogue (ETKA) .

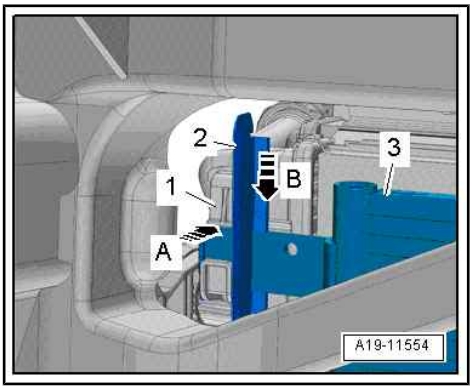


– Unclip air duct -2- downwards on both sides -arrow B-.

– Release catches on both sides -arrow A- and detach condenser -3- from water radiator for charge air cooling circuit -1-.

– Tie up condenser to lock carrier.

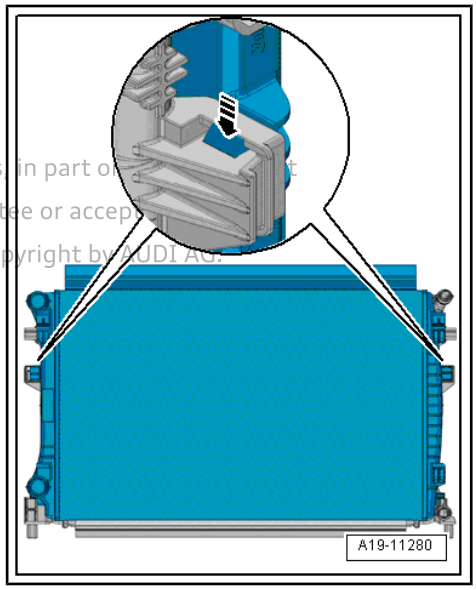
– Detach radiator with water radiator for charge air cooling circuit.



Vehicles with radiator (version 1):

– Press locking tabs on left and right sides of radiator simultaneously -arrow-, and detach radiator from water radiator for charge air cooling circuit.

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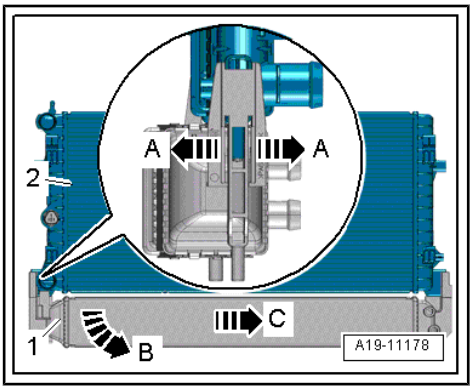


Vehicles with radiator (version 2):

– Release fasteners at water radiator for charge air cooling circuit -1- -arrows A-.

– Detach water radiator for charge air cooling circuit from radiator -2- -arrow B- and disengage -arrow C-.

– Remove both radiators.



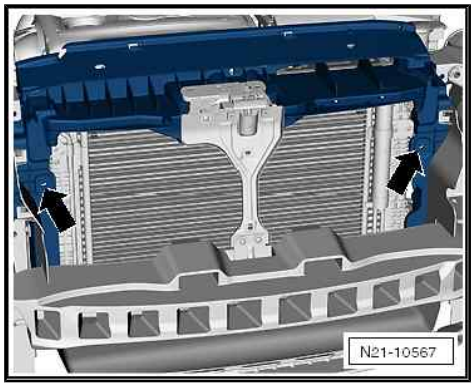
Installing

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

- Do not reuse coolant.
- If there are slight impressions on the fins, refer to ⇒ “4.9 Installing radiators and condensers”, page 12 .

Note:

Bolt radiator mountings to lock carrier -arrows- if fasteners have been pinched off. For bolts, refer to ⇒ Electronic parts catalogue (ETKA) .



Tightening torque: 5 Nm

- Check O-rings for damage and renew if necessary.
- Install radiator cowl
  ⇒ “6.4 Removing and installing radiator cowl”, page 410 .
- Connect coolant hose with plug-in connector
  ⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .
- Fill up with coolant ⇒ page 318 .
- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

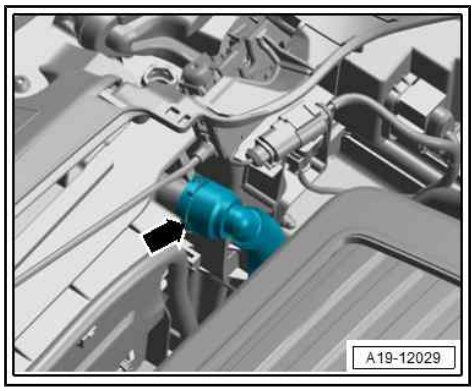
Tightening torques

- ⇒ “6.1 Exploded view - radiators/radiator fan”, page 398

6.3.2 Removing and installing radiator - e-tron

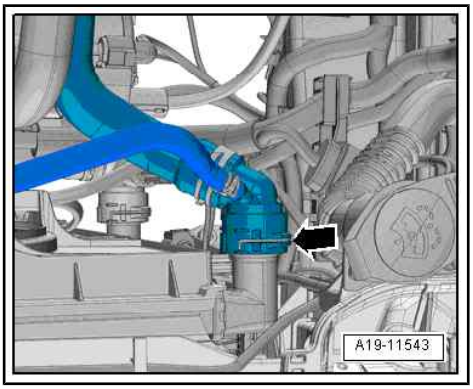
Removing

- Drain coolant
  ⇒ “1.3.1 Draining and filling cooling system - engine cooling system”, page 315 .
- Drain coolant for high-voltage cooling circuit
  ⇒ “1.3.2 Draining cooling system - cooling components for high-voltage system (front)”, page 323 .
- Remove radiator cowl
  ⇒ “6.4 Removing and installing radiator cowl”, page 410 .
- Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
- Disconnect refrigerant lines from condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Detaching and attaching refrigerant lines at condenser .
- Lift retaining clip -arrow- and disconnect coolant hose (top right) from water radiator for charge air cooling circuit.



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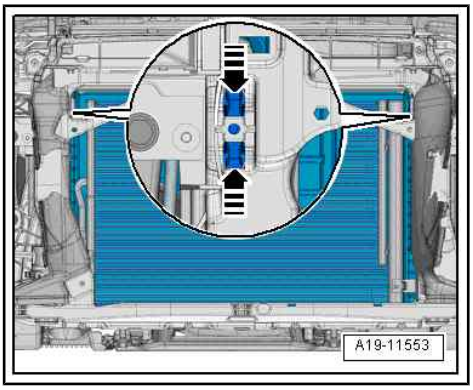
– Lift retaining clip -arrow- and disconnect coolant hose (top left) from radiator.



– Pinch fasteners (both sides) -arrows- off radiator mounting with side-cutting pliers. Push radiator for engine coolant with water radiator for charge air cooling circuit (top) slightly towards rear.

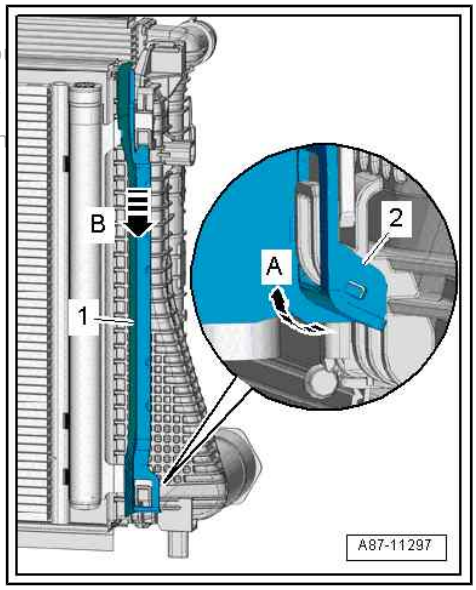
Note:

When installing the radiator, the radiator mounting is re-used; it must be bolted onto the lock carrier. For bolts, refer to ⇒ Electronic parts catalogue (ETKA) .

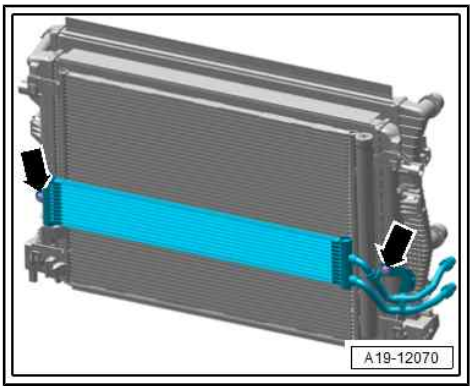


– Release sealing lip -1- (both sides) at bottom of charge air cooler/water radiator for charge air cooling circuit -item 2- -arrow A- and disengage at top -arrow B-.

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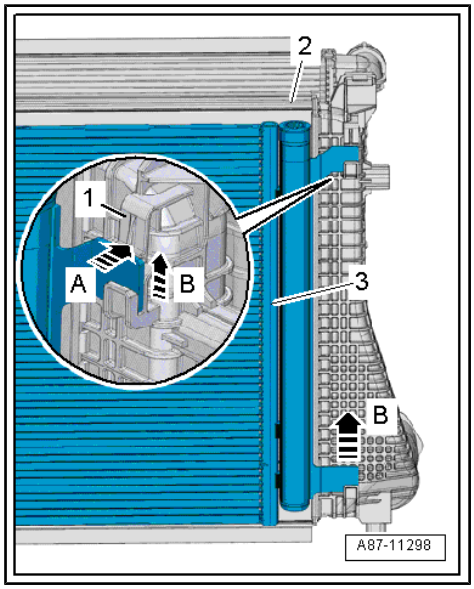


– Remove bolts -arrows- and secure auxiliary radiator for high-voltage cooling system to lock carrier.

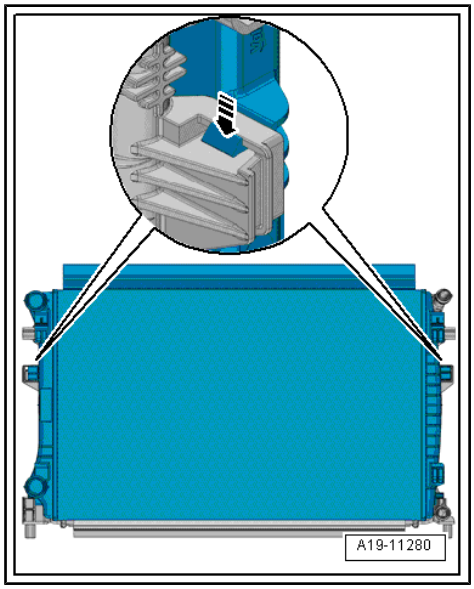


– Have a second mechanic release retaining clips -1- in direction of -arrow A-; lift condenser -3- upwards out of mountings on charge air cooler/water radiator for charge air cooling circuit -item 2- -arrows B- and secure to lock carrier.

– Detach radiator with water radiator for charge air cooling circuit.



– Press locking tabs on left and right sides of radiator simultaneously -arrow-, and detach radiator from water radiator for charge air cooling circuit.

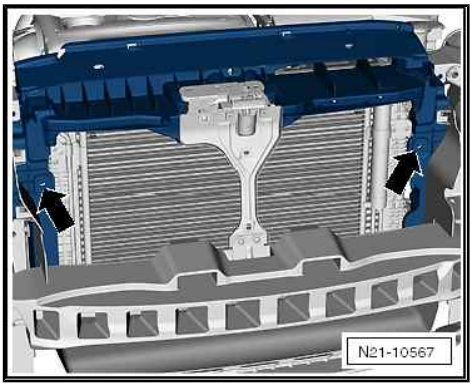


Installing

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

- Do not reuse coolant.
- If there are slight impressions on the fins, refer to ⇒ “4.9 Installing radiators and condensers”, page 12 .

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Note:

Bolt radiator mountings to lock carrier -arrows- if fasteners have been pinched off. For bolts, refer to ⇒ Electronic parts catalogue (ETKA) .

Tightening torque: 5 Nm

– Check O-rings for damage and renew if necessary.

– Attach refrigerant lines to condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Detaching and attaching refrigerant lines at condenser .

– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

– Install radiator cowl
⇒ “6.4 Removing and installing radiator cowl”, page 410 .

– Connect coolant hose with plug-in connector
⇒ “2 Connecting coolant hose with plug-in connector”, page 336 .

• Do not reuse coolant.

DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

– If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.

– If the warning lamps for “low coolant” and “fault in high-voltage battery” light up, move the vehicle into the dedicated separate storage area outside.

– Inform a high-voltage expert at the importer.

♦ The high-voltage battery cannot detect coolant leaking into the battery.

♦ The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.

♦ The notice on the filler cap provides an additional warning of the danger involved.

– Fill up high-voltage cooling circuit with coolant
⇒ “1.3.4 Filling up cooling system - cooling components for high-voltage system”, page 327 .

– Attach sealing tag to filler cap on coolant expansion tank
⇒ page 332 .

– Fill up with coolant ⇒ page 318 .

Tightening torques

♦ ⇒ “6.1.3 Exploded view - radiators/radiator fan, e-tron”, page 401

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6.4 Removing and installing radiator cowl

⇒ “6.4.1 Removing and installing radiator cowl - all vehicles except e-tron”, page 410

⇒ “6.4.2 Removing and installing radiator cowl - e-tron”, page 410

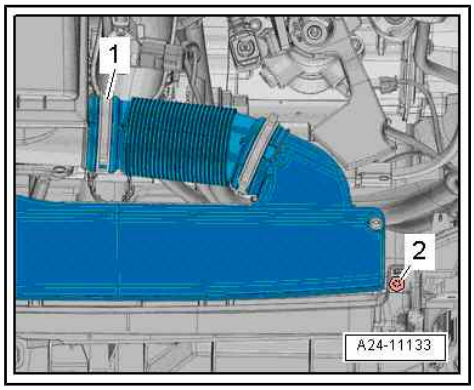
6.4.1 Removing and installing radiator cowl - all vehicles except e-tron

Removing

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

– Remove bolt -2- on both sides.

– Unclip air duct at lock carrier and detach.



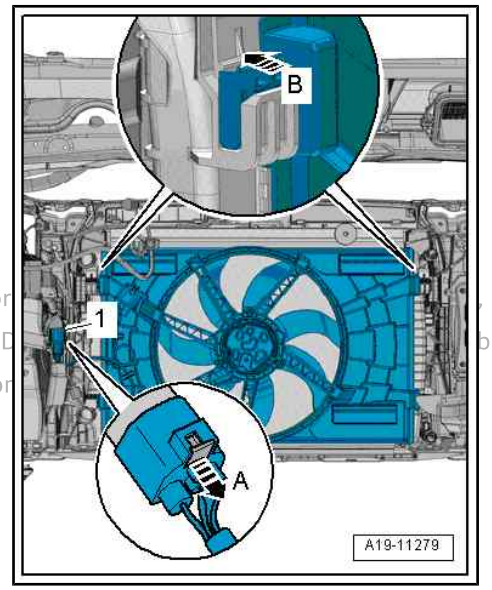
CAUTION

Your hands can be injured if the radiator fan starts up automatically.

– Do not reach into the radiator fan when unplugging the connector.

– Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow A- and press down release catch).

– Press locking tabs on left and right sides of radiator cowl -arrow B- and at the same time lift radiator cowl off radiator.



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Installing

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

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Tightening torques

◆ ⇒ “2.1 Exploded view - air cleaner housing”, page 462

6.4.2 Removing and installing radiator cowl - e-tron

Removing

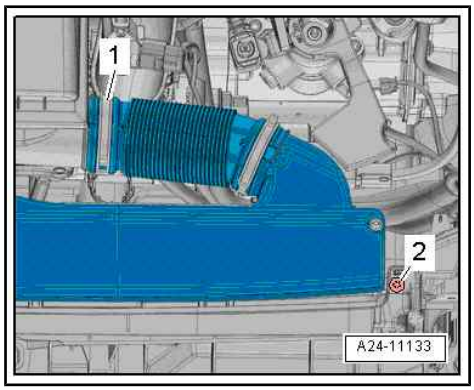
– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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

– Remove bolt -2- on both sides.

– Unclip air duct at lock carrier and detach.

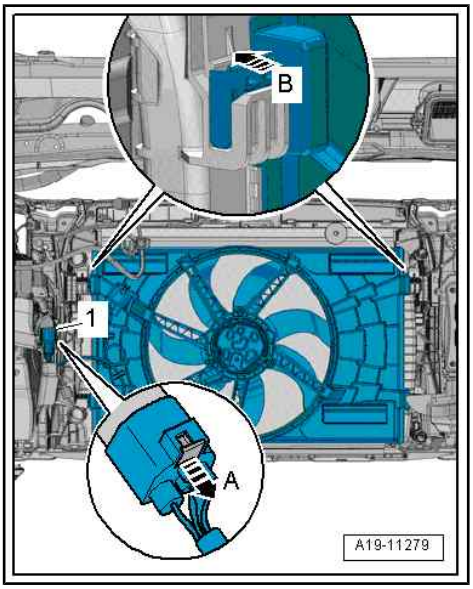
– Move high-voltage wire for high-voltage battery charging unit - P25- clear at radiator cowl.



CAUTION

Your hands can be injured if the radiator fan starts up automatically.

– Do not reach into the radiator fan when unplugging the connector.



– Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow A- and press down release catch).

– Press locking tabs on left and right sides of radiator cowl simultaneously -arrow B-, lift radiator cowl off radiator and remove carefully from below.

Installing

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

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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Tightening torques

◆ ⇒ “2.1 Exploded view - air cleaner housing”, page 462

6.5 Removing and installing radiator fan

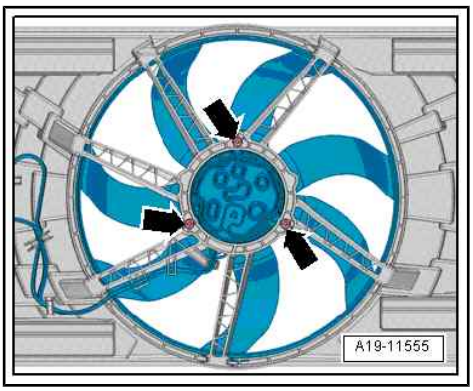
Removing

– Re-install all cable ties in original positions.

– Remove radiator cowl ⇒ “6.4 Removing and installing radiator cowl”, page 410 .

– Unplug electrical connector.

– Unscrew bolts -arrows- and remove radiator fan - V7- .



Installing

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

– Install radiator cowl ⇒ “6.4 Removing and installing radiator cowl”, page 410 .

Tightening torques

◆ ⇒ “6.2 Exploded view - radiator cowl and radiator fan”, page 403

21 – Turbocharging/supercharging

1 Turbocharger

⇒ “1.1 Exploded view - turbocharger”, page 412

⇒ “1.2 Removing and installing turbocharger”, page 422

⇒ “1.3 Renewing vacuum unit for turbocharger”, page 434

⇒ “1.4 Removing and installing charge pressure positioner V465 ”, page 434

⇒ “1.5 Removing and installing connection for turbocharger”, page 436

1.1 Exploded view - turbocharger

⇒ “1.1.1 Exploded view - turbocharger, 1.2 ltr. TFSI”, page 412

⇒ “1.1.2 Exploded view - turbocharger, 1.4 ltr. TFSI engine with electric charge pressure control”, page 414

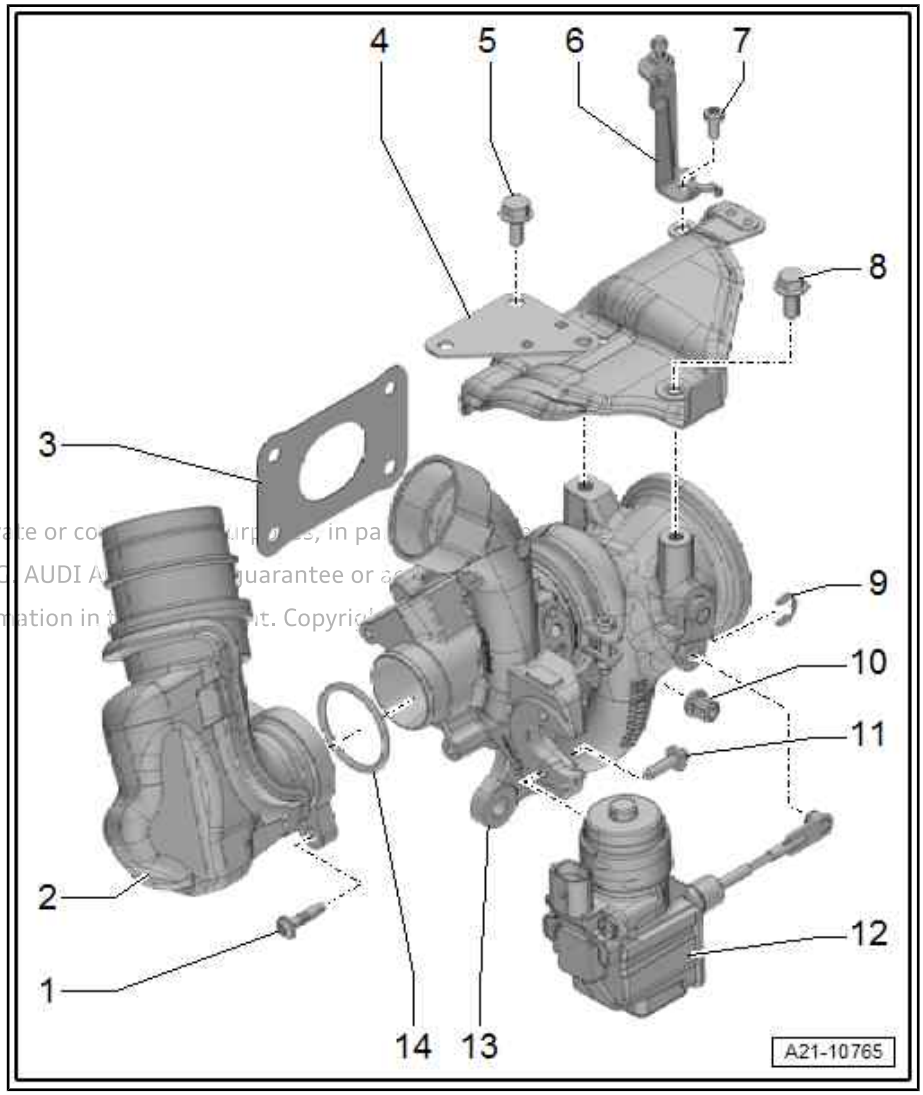
⇒ “1.1.3 Exploded view - turbocharger, 1.4 ltr. TFSI engine with pneumatic charge pressure control”, page 417

⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418

⇒ “1.1.5 Exploded view - turbocharger and pipes/hoses, all vehicles except e-tron”, page 421

1.1.1 Exploded view - turbocharger, 1.2 ltr. TFSI

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1 - Bolt
- ❑ 8 Nm

2 - Connection
- ❑ Removing and installing
⇒ “1.5 Removing and installing connection for turbocharger”, page 436

3 - Gasket
- ❑ Renew after removing

4 - Heat shield

5 - Bolt
- ❑ 20 Nm

6 - Bracket
- ❑ With ball stud for engine cover panel

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7 - Bolt
- ❑ 8 Nm

8 - Bolt
- ❑ 20 Nm

9 - Securing clip

10 - Nut
- ❑ Renew after removing
- ♦ 1st stage: Screw in by hand until contact is made
- ♦ 2nd stage: 10 Nm
- ♦ 3rd stage: 14 Nm

11 - Bolt
- ❑ 9 Nm

12 - Charge pressure positioner - V465-
- ❑ Removing and installing
⇒ “1.4.1 Removing and installing charge pressure positioner V465 - 1.2 ltr. TFSI”, page 434

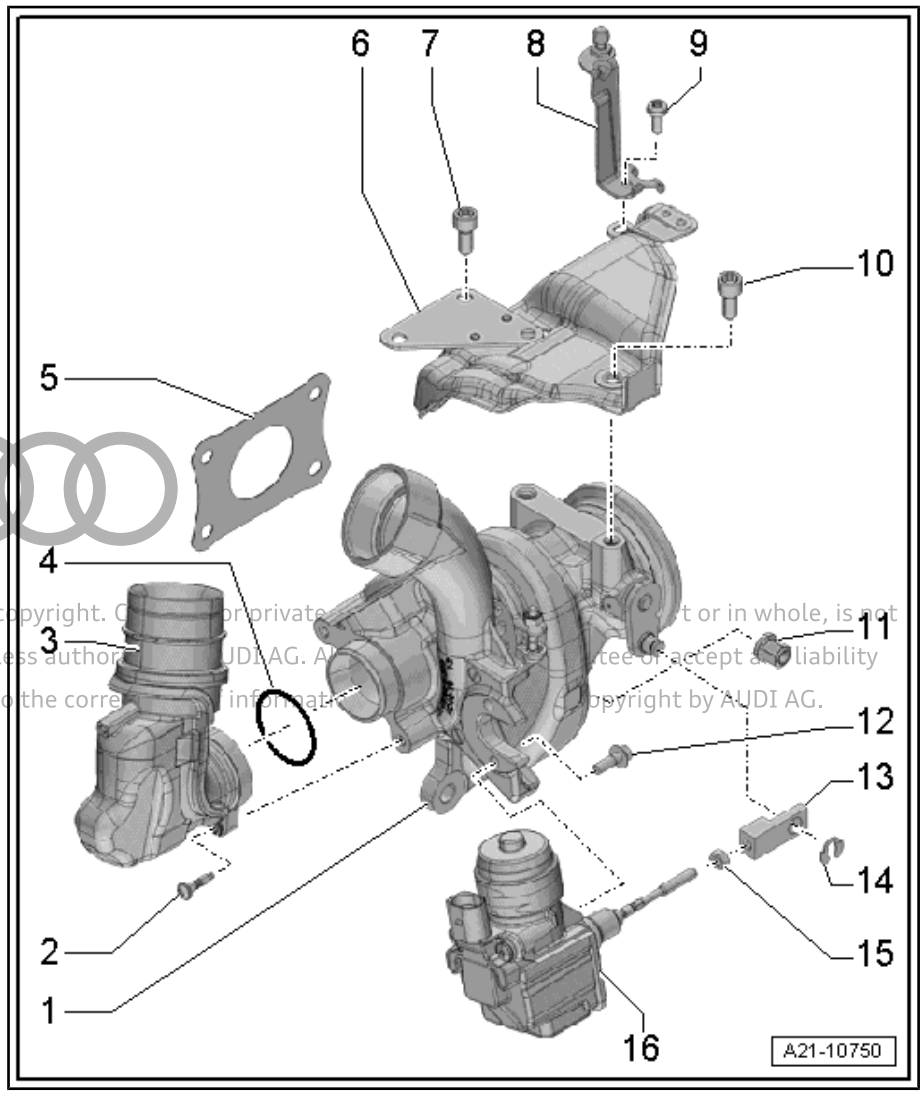
13 - Turbocharger
- ❑ Removing and installing
⇒ “1.2.1 Removing and installing turbocharger - all vehicles except e-tron”, page 422

14 - O-ring
- ❑ Renew after removing

1.1.2 Exploded view - turbocharger, 1.4 ltr. TFSI engine with electric charge pressure control

Exploded view - turbocharger, version I:

Exploded view - turbocharger, version II ⇒ page 415



1 - Turbocharger
- ❑ Removing and installing ⇒ “1.2.1 Removing and installing turbocharger - all vehicles except e-tron”, page 422

2 - Bolt
- ❑ 8 Nm

3 - Connection
- ❑ Removing and installing ⇒ “1.5 Removing and installing connection for turbocharger”, page 436

4 - O-ring
- ❑ Renew after removing

5 - Gasket
- ❑ Renew after removing

6 - Heat shield

7 - Bolt
- ❑ 20 Nm

8 - Bracket
- ❑ With ball stud for engine cover panel

9 - Bolt
- ❑ 8 Nm

10 - Bolt
- ❑ 20 Nm

11 - Nut
- ❑ Renew after removing

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- ♦ 1st stage: Screw in by hand until contact is made
- ♦ 2nd stage: 10 Nm
- ♦ 3rd stage: 14 Nm

12 - Bolt
- ❑ 9 Nm

13 - Operating lever
- ❑ For charge pressure positioner - V465- (version 1)

14 - Securing clip
- ❑ For charge pressure positioner - V465- (version 1)

15 - Lock nut
- ❑ For charge pressure positioner - V465- (version 1)
- ❑ 10 Nm

16 - Charge pressure positioner - V465- (version 1)

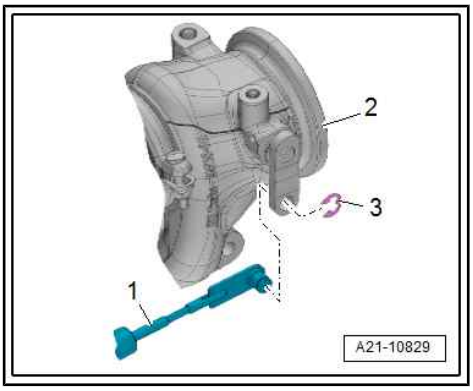
- ❑ Depending on version, a clip may be installed on linkage of charge pressure positioner
- ❑ Charge pressure positioner - V465- (version 2)
  ⇒ Fig. “” Charge pressure positioner -V465- (version 2)”“ , page 415
- ❑ Removing and installing
  ⇒ “1.4.2 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version I”, page 435

Charge pressure positioner - V465- (version 2)

1 - Operating lever

2 - Turbocharger

3 - Securing clip



Exploded view - turbocharger, version II

1 - Connection

- ❑ Removing and installing
  ⇒ “1.5 Removing and installing connection for turbocharger”, page 436

2 - Bolt

- ❑ 8 Nm

3 - O-ring

- ❑ Renew after removing
- ❑ Lubricate O-ring lightly with clean engine oil prior to installation

4 - Gasket

- ❑ Renew after removing

5 - Bracket

- ❑ For coolant lines

6 - Bolt

- ❑ 20 Nm

7 - Turbocharger

- ❑ Removing and installing
  ⇒ “1.2.1 Removing and installing turbocharger - all vehicles except e-tron”, page 422

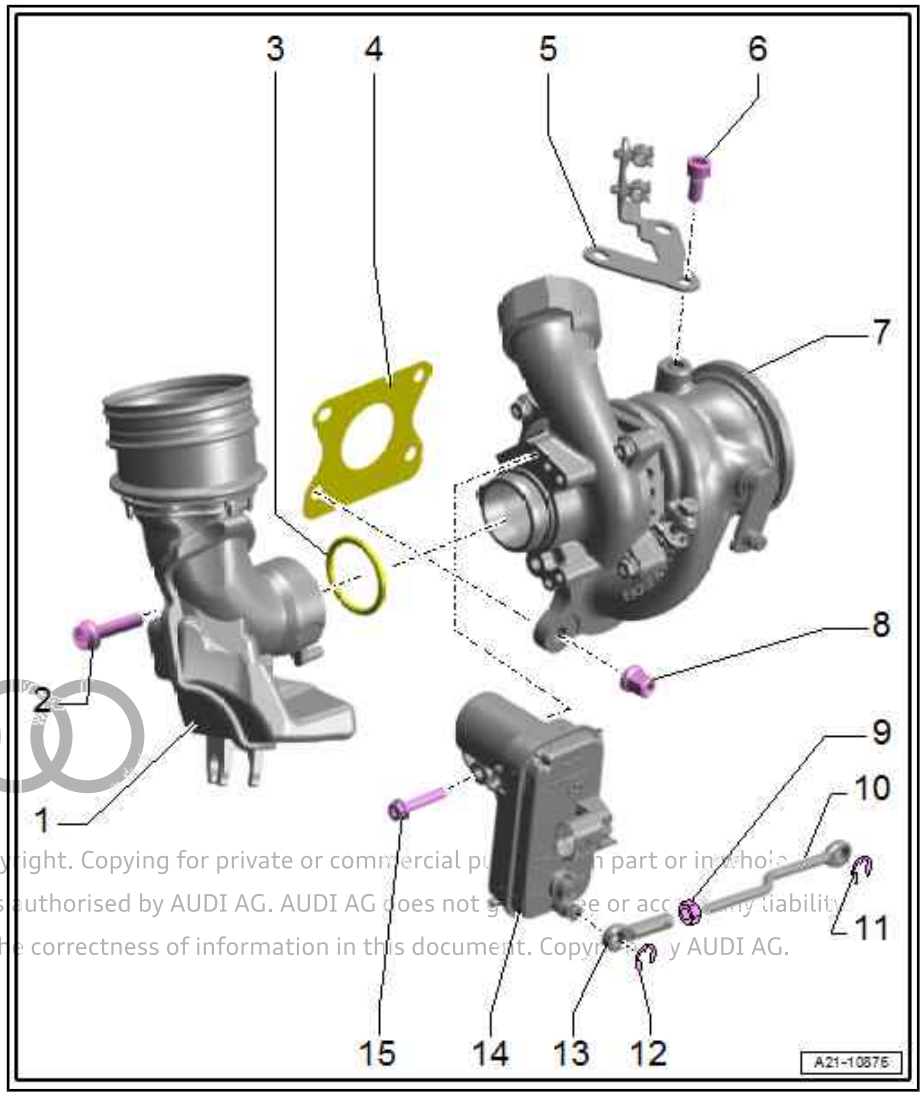
8 - Nut

- ❑ Renew after removing

♦ 1st stage: Screw in by hand until contact is made

♦ 2nd stage: 10 Nm

♦ 3rd stage: 14 Nm



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9 - Lock nut

- ❑ For charge pressure positioner - V465-
- ❑ 10 Nm

10 - Actuating lever

- ❑ For charge pressure positioner - V465-

11 - Securing clip

12 - Securing clip

13 - Operating lever

- ❑ For charge pressure positioner - V465-

14 - Charge pressure positioner - V465-

- ❑ Removing and installing
  ⇒ “1.4.3 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version II”, page 435

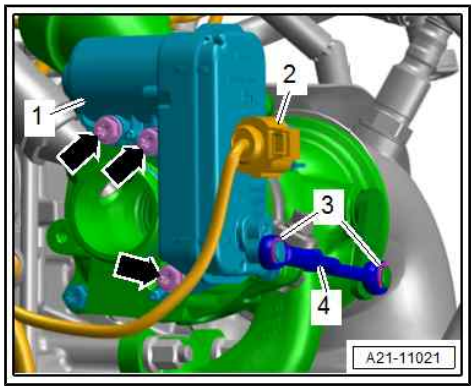
15 - Bolt

- ❑ Renew after removing
- ❑ Tightening torque ⇒ page 416

Tightening torque for bolts securing charge pressure positioner - V465-

– Tighten new bolts -arrows- to 8 Nm + 45°.

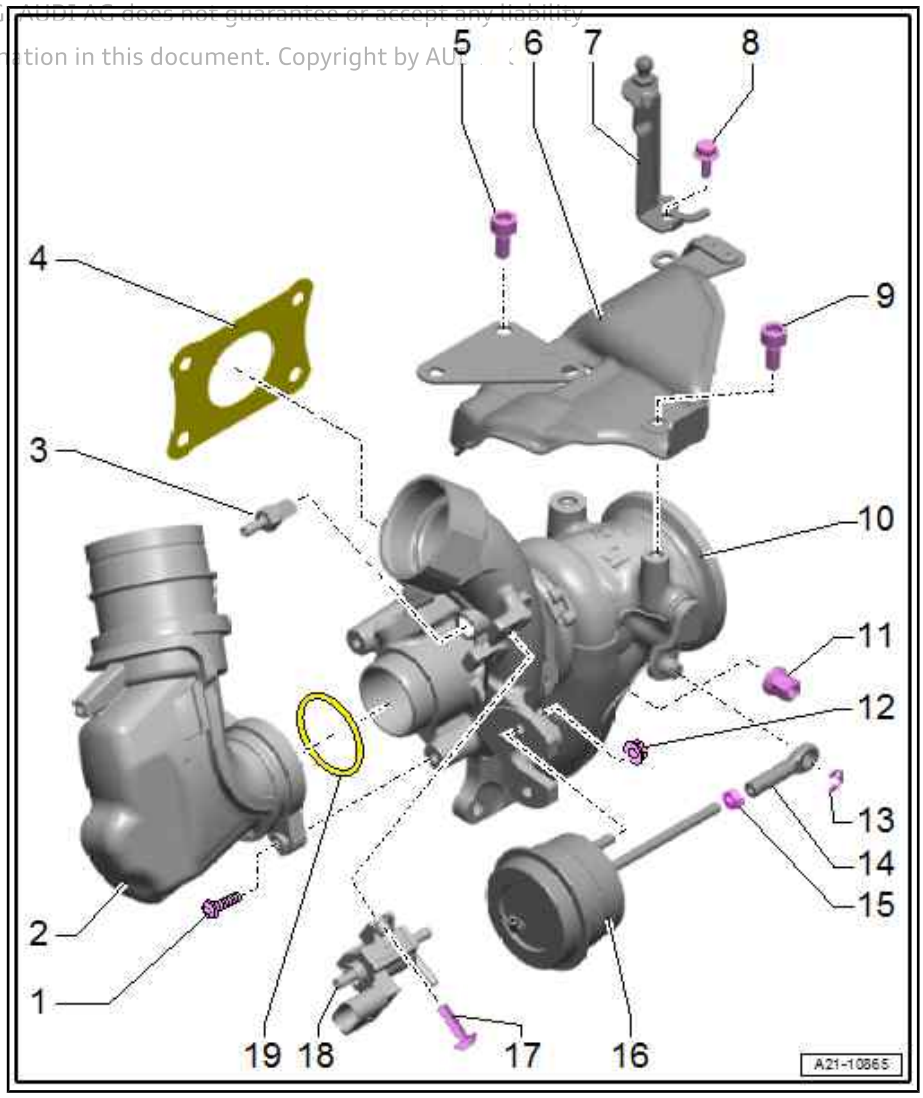
• Always renew all three bolts -arrows- if one or more are loose.



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1.1.3 Exploded view - turbocharger, 1.4 ltr. TFSI engine with pneumatic charge pressure control

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1 - Bolt
- ❑ 8 Nm

2 - Connection
- ❑ Removing and installing ⇒ “1.5 Removing and installing connection for turbocharger”, page 436

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
- ❑ Removing and installing ⇒ “1.2.1 Removing and installing turbocharger - all vehicles except e-tron”, page 422

11 - Nut
- ❑ Renew after removing
- ♦ 1st stage: Screw in by hand until contact is made
- ♦ 2nd stage: 10 Nm
- ♦ 3rd stage: 14 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 434

17 - Bolt
- ❑ 8 Nm

18 - Charge pressure control solenoid valve - N75-

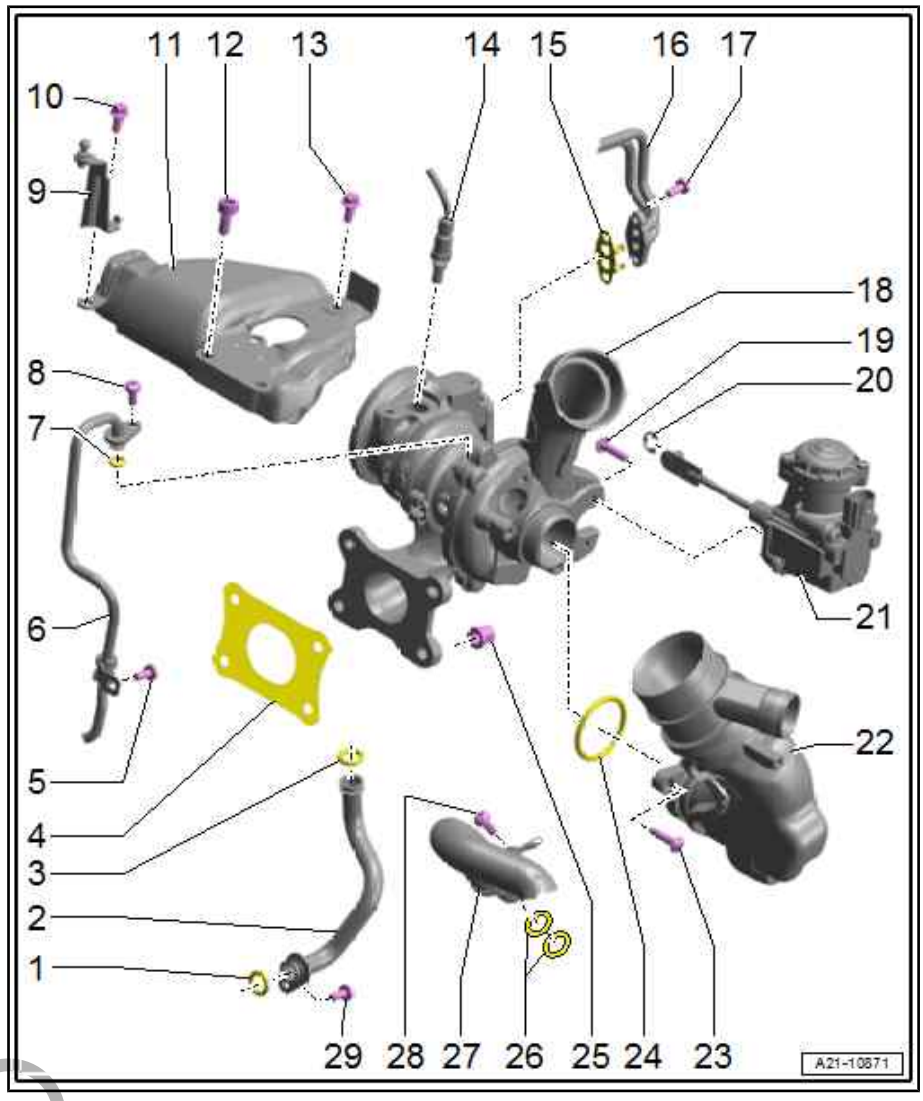
19 - O-ring

- ❑ Renew after removing

1.1.4 Exploded view - turbocharger, e-tron

Exploded view - turbocharger, version I:

Exploded view - turbocharger, version II ⇒ page 419



1 - O-ring

- ❑ Renew after removing

2 - Oil return line

3 - O-ring

- ❑ Renew after removing

4 - Gasket

- ❑ Renew after removing

5 - Bolt

- ❑ 9 Nm

6 - Oil supply line

7 - O-ring

- ❑ Renew after removing

8 - Bolt

- ❑ 9 Nm

9 - Bracket

- ❑ With ball stud for engine cover panel

10 - Bolt

- ❑ 8 Nm

11 - Heat shield

12 - Bolt

- ❑ 20 Nm

13 - Bolt

- ❑ 8 Nm

14 - Lambda probe - G39-

- ❑ Removing and installing ⇒ “7.2 Removing and installing Lambda probe”, page 504

15 - Gasket

- ❑ Renew after removing

16 - Coolant lines

- ❑ Supply and return

17 - Bolt

- ❑ 8 Nm

18 - Turbocharger

- ❑ Removing and installing ⇒ “1.2.2 Removing and installing turbocharger - e-tron”, page 427

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19 - Bolt

- ❑ 9 Nm

20 - Securing clip

21 - Charge pressure positioner - V465-

- ❑ Removing and installing
  ⇒ “1.4.2 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version I”, page 435

22 - Connection

- ❑ Removing and installing ⇒ “1.5 Removing and installing connection for turbocharger”, page 436

23 - Bolt

- ❑ 8 Nm

24 - O-ring

- ❑ Renew after removing

25 - Nut

- ❑ Renew after removing

- ♦ 1st stage: Screw in by hand until contact is made
- ♦ 2nd stage: 10 Nm
- ♦ 3rd stage: 14 Nm

26 - O-rings

- ❑ Renew after removing

27 - Hose

- ❑ For crankcase breather

28 - Bolt

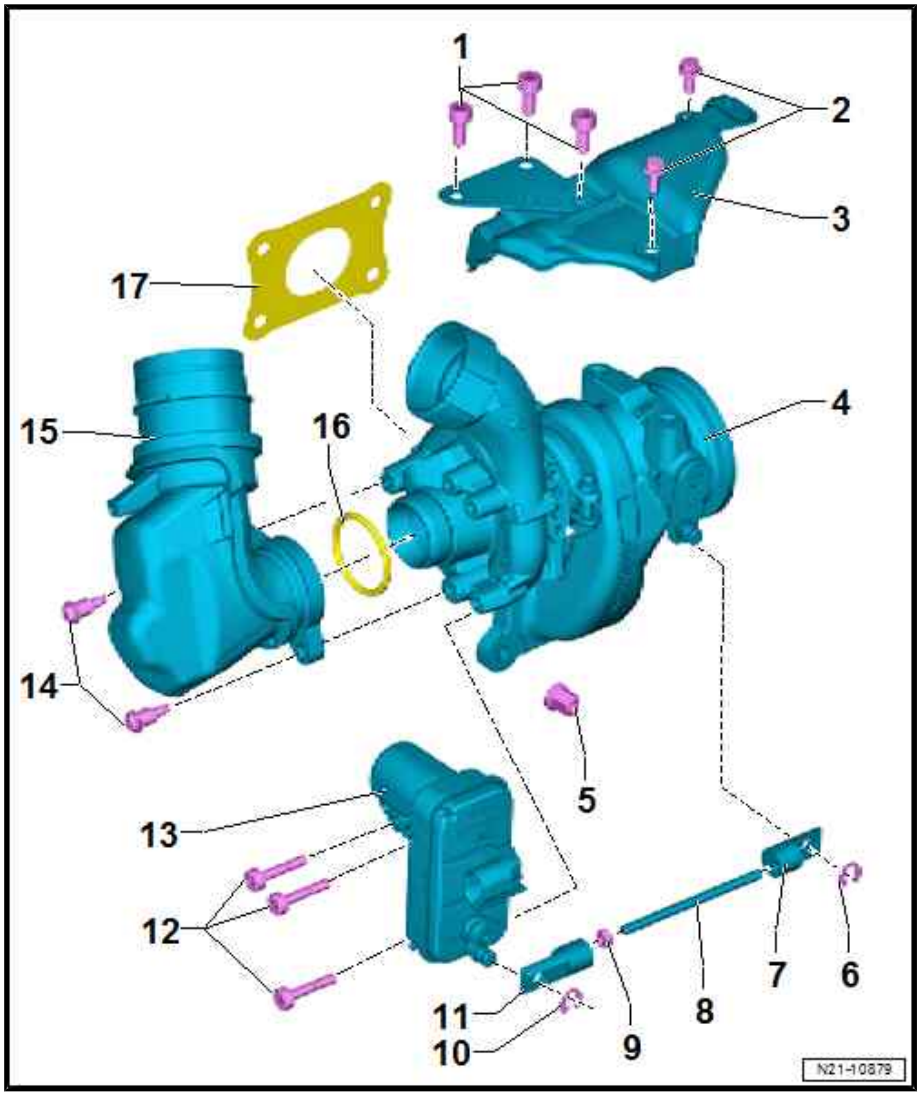
- ❑ 8 Nm

29 - Bolt

- ❑ 9 Nm

Exploded view - turbocharger, version II:

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1 - Bolt
- ❑ 25 Nm

2 - Bolt/nut
- ❑ 8 Nm

3 - Heat shield

4 - Turbocharger
- ❑ Removing and installing ⇒ “1.2.2 Removing and installing turbocharger - e-tron”, page 427

5 - Nut
- ❑ Renew after removing
- ♦ 1st stage: Screw in by hand until contact is made
- ♦ 2nd stage: 10 Nm
- ♦ 3rd stage: 14 Nm

6 - Securing clip
- ❑ Renew

7 - Operating lever

8 - Control rod

9 - Lock nut
- ❑ 6 Nm
- ❑ Secure with sealing paint

10 - Securing clip
- ❑ Renew

11 - Operating lever

12 - Bolt
- ❑ Renew after removing
- ❑ Removing and installing ⇒ page 421

13 - Charge pressure positioner - V465-

Note

- ♦ *When installing, note the following:*
- ♦ *Different charge pressure positioner versions may be fitted.*

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- ❑ Removing and installing ⇒ “1.4.3 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version II”, page 435

14 - Bolt
- ❑ 8 Nm

15 - Connection
- ❑ Removing and installing ⇒ “1.5 Removing and installing connection for turbocharger”, page 436

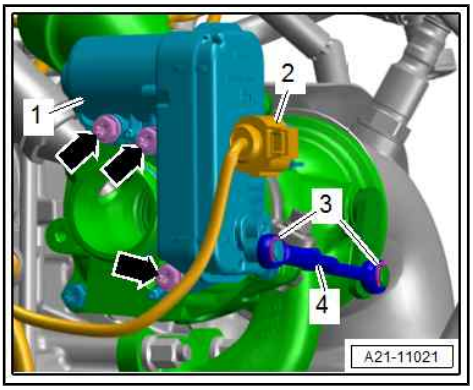
16 - O-ring
- ❑ Renew

17 - Gasket
- ❑ Renew

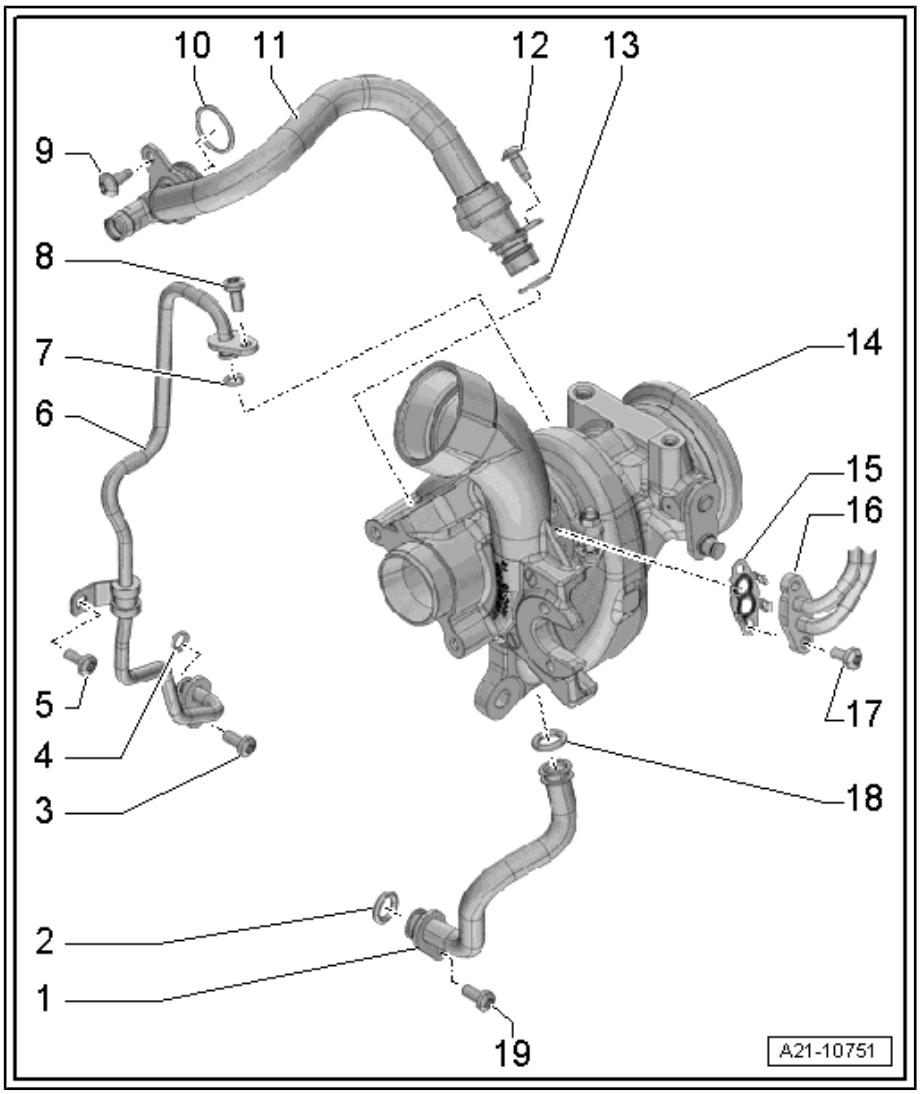
Tightening torque for bolts securing charge pressure positioner - V465-

– Tighten new bolts -arrows- to 8 Nm + 45°.

• Always renew all three bolts -arrows- if one or more are loose.



1.1.5 Exploded view - turbocharger and pipes/hoses, all vehicles except e-tron



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

❑ 8 Nm

10 - O-ring

❑ Renew after removing

11 - Hose

❑ For crankcase breather

12 - Bolt

❑ 8 Nm

13 - O-ring

❑ Renew after removing

14 - Turbocharger

❑ Removing and installing
⇒ “1.2.1 Removing and installing turbocharger - all vehicles except e-tron”, page 422

15 - Gasket

❑ Renew after removing

16 - Coolant lines

❑ Supply and return

17 - Bolt

❑ 8 Nm

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18 - O-ring

- ❑ Renew after removing

19 - Bolt

- ❑ 9 Nm

1.2 Removing and installing turbocharger

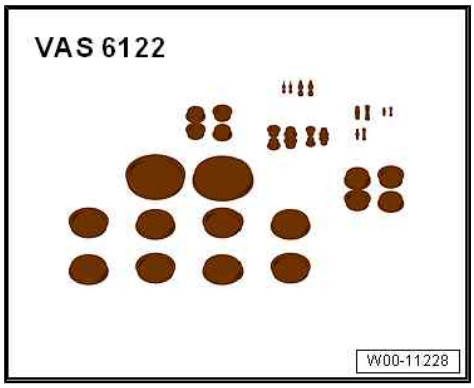
⇒ "1.2.1 Removing and installing turbocharger - all vehicles except e-tron", page 422

⇒ "1.2.2 Removing and installing turbocharger - e-tron", page 427

1.2.1 Removing and installing turbocharger - all vehicles except e-tron

Special tools and workshop equipment required

- ♦ Engine bung set - VAS 6122-



- ♦ Hose clip pliers - VAS 6362-



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



Removing

- Observe rules for cleanliness
  ⇒ “4.2 Rules for cleanliness”, page 9 .
- Re-install all heat insulation sleeves in the same locations when installing.

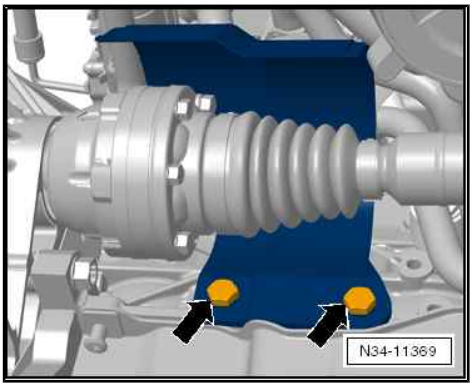
If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:

- ♦ Check air cleaner housing, air filter element and intake 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 the charge air cooler if necessary.

– Remove engine cover panel
  ⇒ “3.1 Removing and installing engine cover panel”, page 79 .

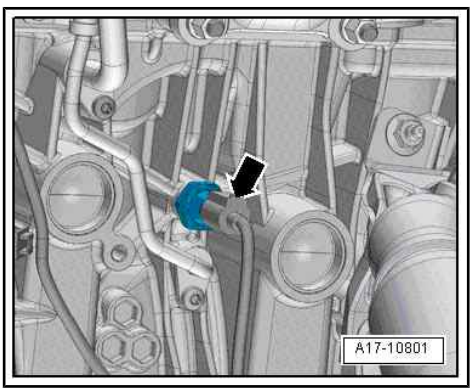
– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



All engines except 1.2 ltr. engine:

– Detach heat insulation sleeve.

– Unplug electrical connector -arrow- on oil pressure switch - F22- .

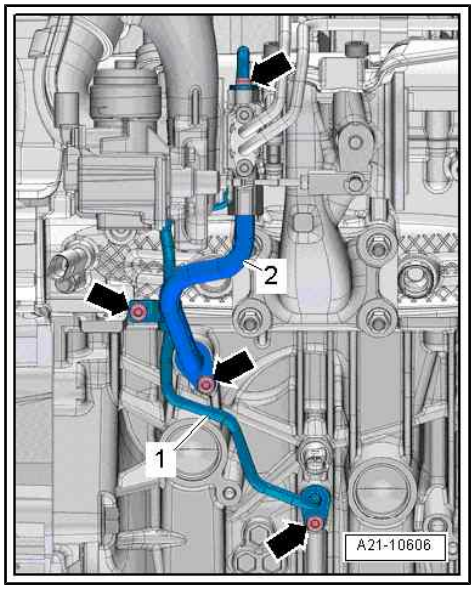


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All engine versions (continued):

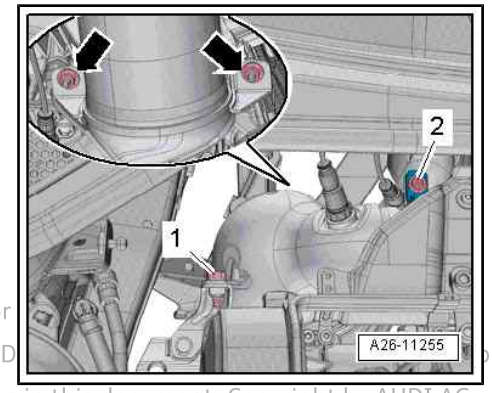
– Remove bolts -arrows- and detach oil supply line -1- and oil return line -2-.

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



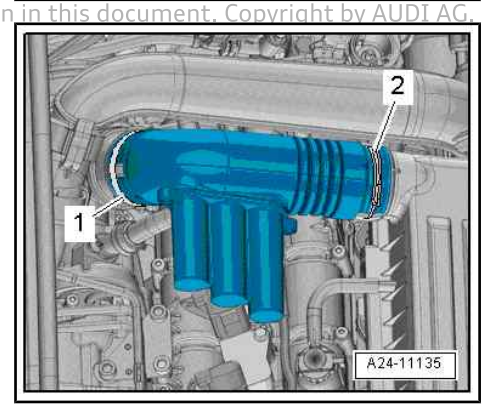
– Unscrew bolt -2- and remove screw-type clip.

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

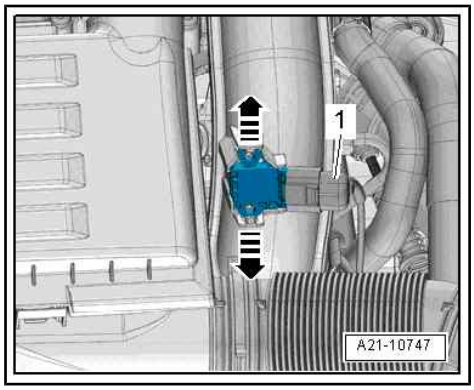


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– Loosen hose clips -1, 2- and remove air pipe.

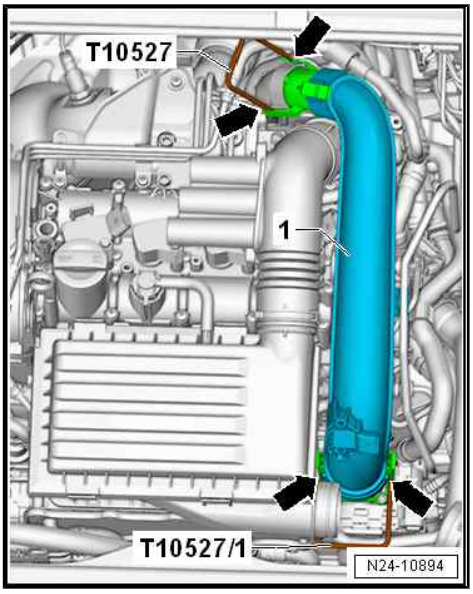


– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



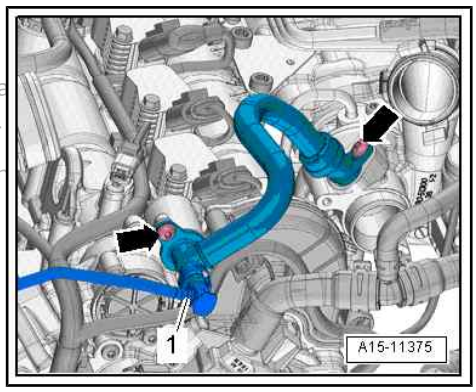
– Move air hoses clear at air pipe.

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



– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).

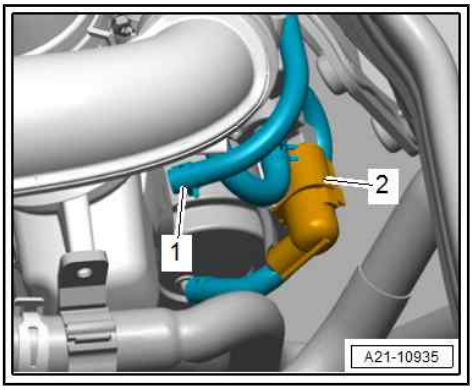
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Engine with pneumatic charge pressure control:

– Unplug electrical connector -2- at charge pressure control solenoid valve - N75- .

– Detach vacuum hose -1-.

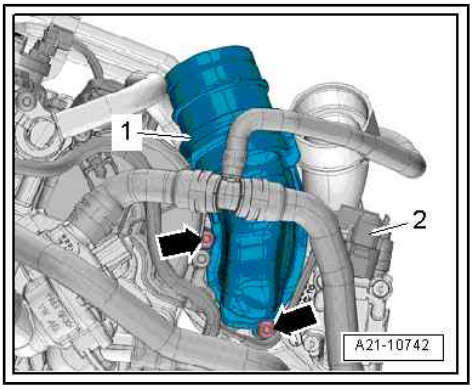


All engines except version with pneumatic charge pressure control:

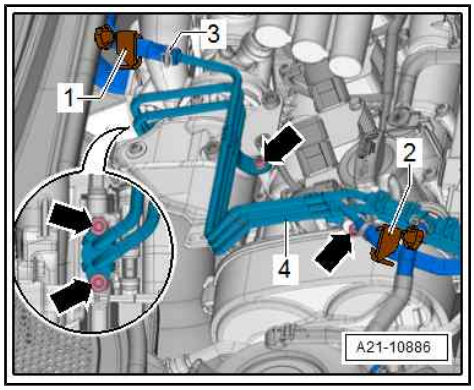
– Unplug electrical connector -2- at charge pressure positioner - V465- .

All engine versions (continued):

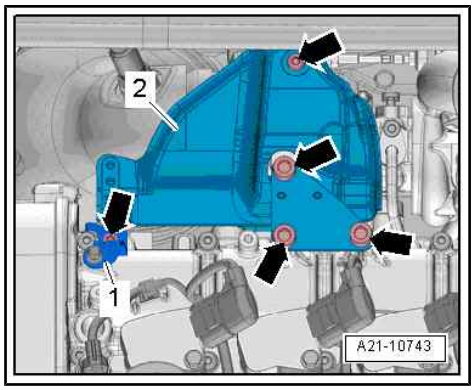
– Remove bolts -arrows- and detach connection -1-.



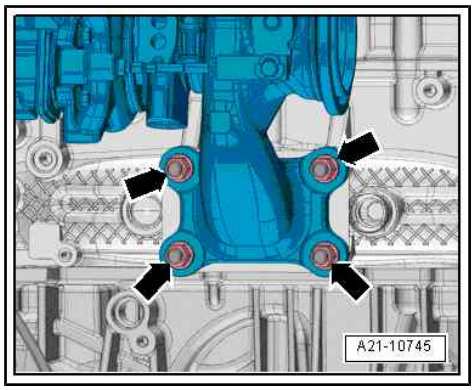
– Clamp off coolant hoses with hose clamps up to 25 mm - 3094- -1 and 2-.
– Release hose clip -3- and disconnect coolant hose.
– Remove bolts -arrows- and pivot coolant lines -4- to right side.



– Remove bolts -arrows- and detach bracket with heat shield -2- and bracket -1- for engine cover panel.

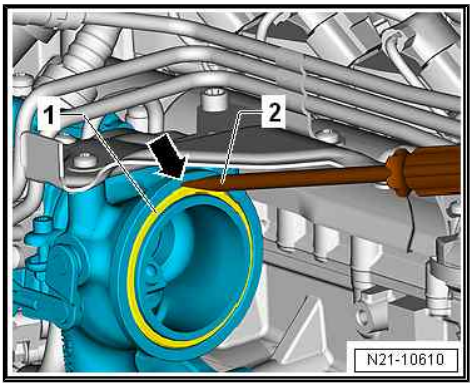


– Remove nuts -arrows- and detach turbocharger.



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– Insert screwdriver -2- into groove -arrow- on turbocharger and lever out seal -1-.



Installing

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

- Renew seals and O-rings.
- Renew self-locking bolts and nuts after removal.
- Fill turbocharger with engine oil at connection for oil supply line.
- Secure all hose connections with correct type of hose clips (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.

– Check coolant level and top up if necessary ⇒ page 322 .

– If a turbocharger with a new charge pressure positioner - V465- has been installed, select `Guided Functions` on ⇒ Vehicle diagnostic tester and perform function `0001 - Adapt/set charge pressure positioner V465`.

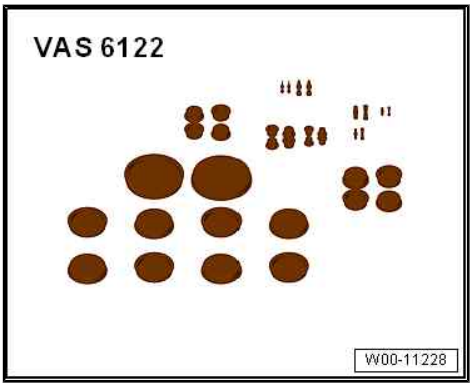
Tightening torques

- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 444
- ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 525
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft

1.2.2 Removing and installing turbocharger - e-tron

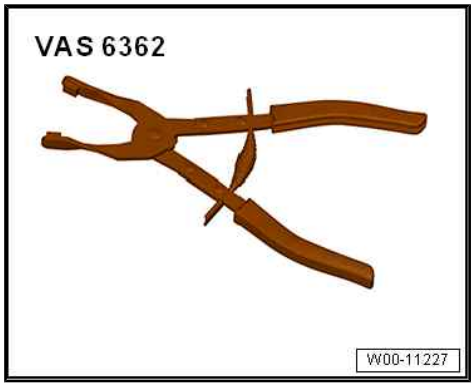
Special tools and workshop equipment required

- Engine bung set - VAS 6122-

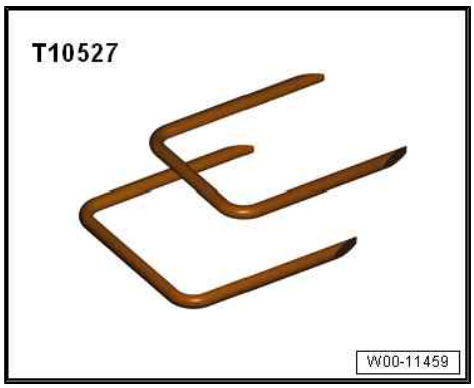


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- Hose clip pliers - VAS 6362-



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



Removing

- Observe rules for cleanliness ⇒ “4.2 Rules for cleanliness”, page 9 .
- Re-install all heat insulation sleeves in the same locations when installing.

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:

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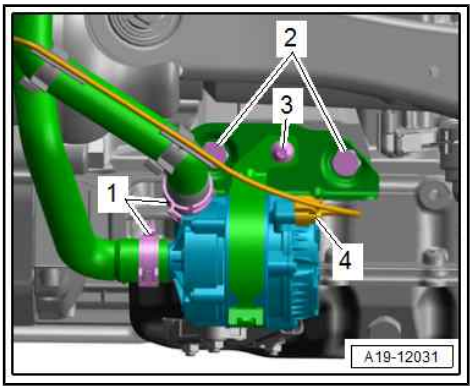
- Check air cleaner housing, air filter element and intake hoses for dirt and foreign particles.
- Check the entire charge air system (including the charge air cooler) for foreign matter.

If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew the charge air cooler if necessary.

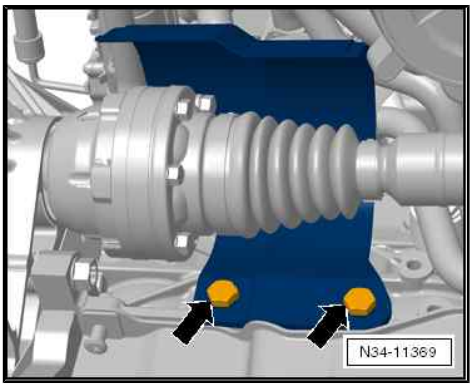
– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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

– Unplug electrical connector -4- and move wiring clear.
– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards side.

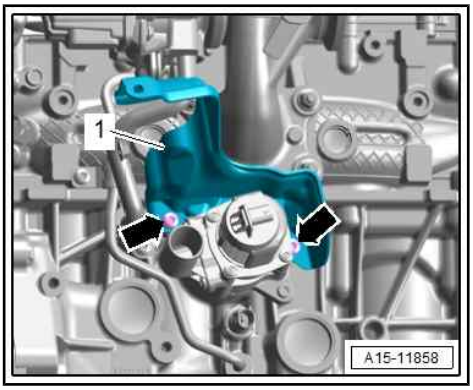


– Remove centre hex studs -arrows- and detach heat shield for drive shaft (right-side).



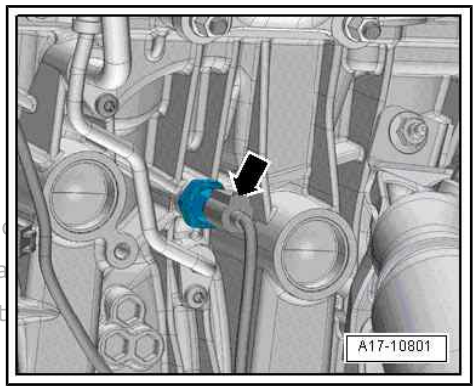
Version with secondary air system:

– Remove secondary air pump motor - V101- ⇒ “4.2 Removing and installing secondary air pump motor V101 ”, page 543 .
– Remove bolts -arrows- and detach heat shield -1-.



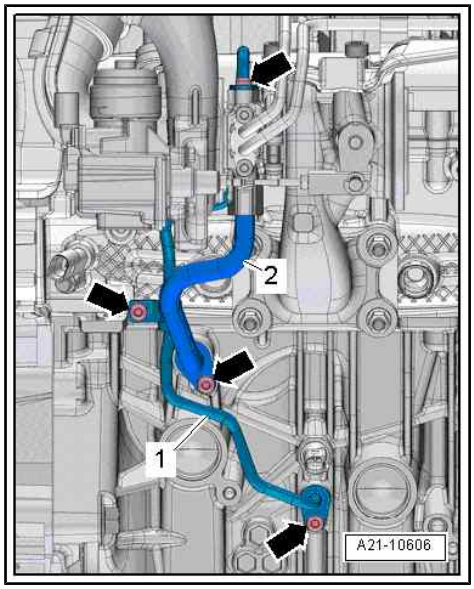
All vehicles (continued):

– Detach heat insulation sleeve.
– Unplug electrical connector -arrow- on oil pressure switch - F22- .

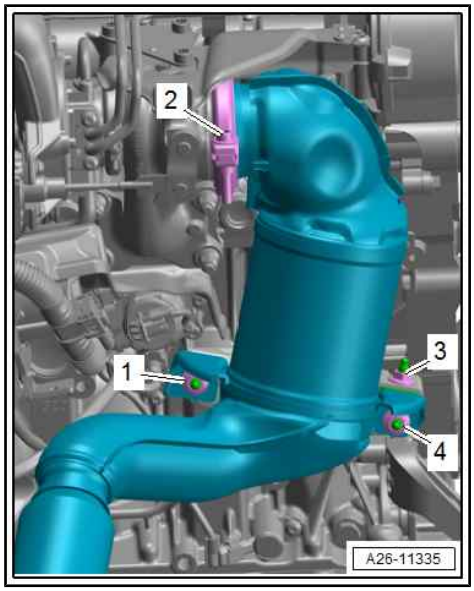


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– Remove bolts -arrows- and detach oil supply line -1- and oil return line -2-.
– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

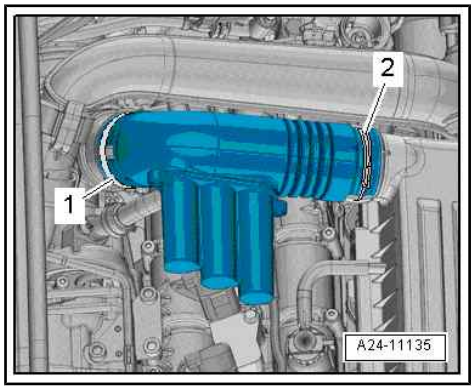


– Unscrew bolt -2- and remove screw-type clip.
– Unscrew nuts -1, 4- and tie up catalytic converter.



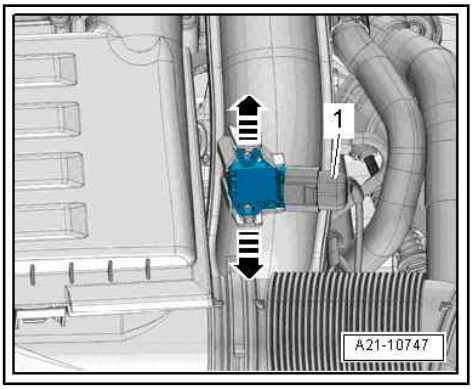
Version without secondary air system:

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

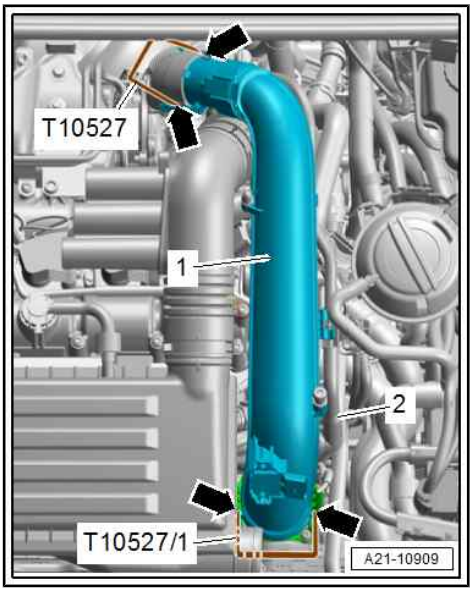


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– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .

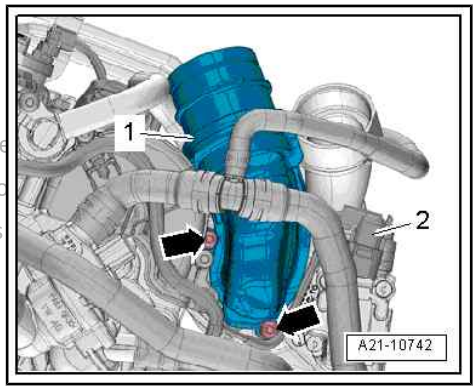


– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.
– Move line for activated charcoal filter system clear at air pipe.
– Release fasteners -arrows- with release release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.



– Unplug electrical connector -2- at charge pressure positioner - V465- .
– Remove bolts -arrow-, detach connection -1- and move to one side.

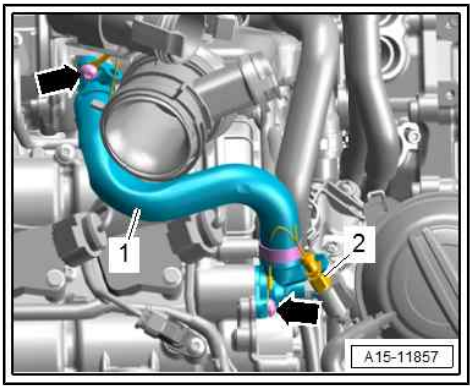
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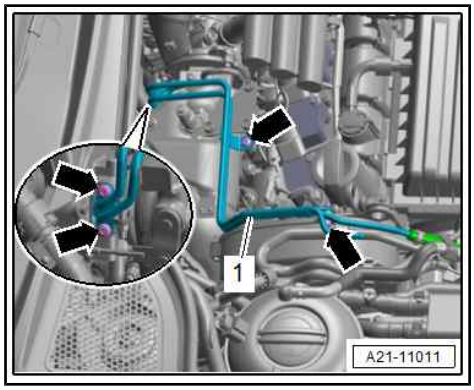
All vehicles (continued):

– Version with crankcase breather heating: Unplug electrical connector -2-.
– Remove bolts -arrows- and detach crankcase breather hose -1-.

• Version with crankcase breather heating: The earth wires must be re-secured with bolts -arrows- when installing.

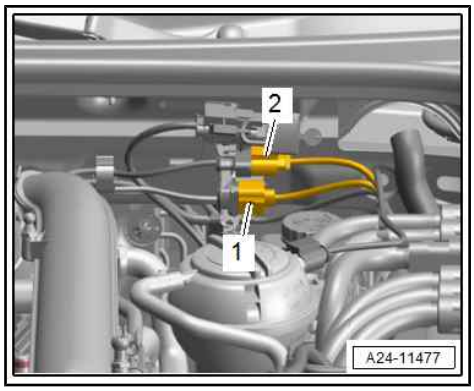


– Remove bolts -arrows- and pivot coolant lines -1- to right side.



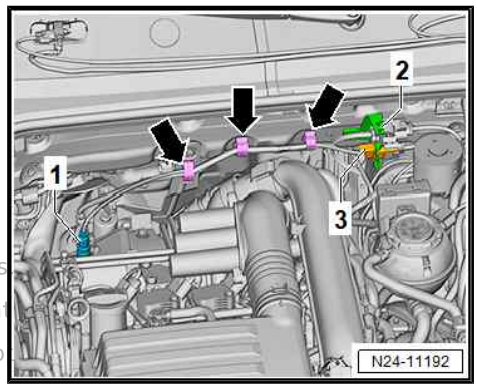
Vehicles without particulate filter:

– Take electrical connector -1- for Lambda probe - G39- out of bracket, unplug and move wiring clear.



Vehicles with particulate filter:

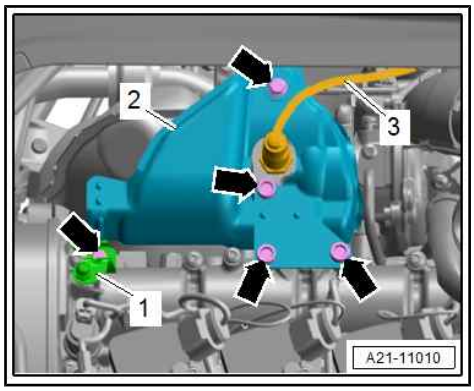
– Take electrical connector -3- for Lambda probe 1 before catalytic converter - GX10- out of bracket -2-, unplug it and move wiring clear at retainers -arrows-.



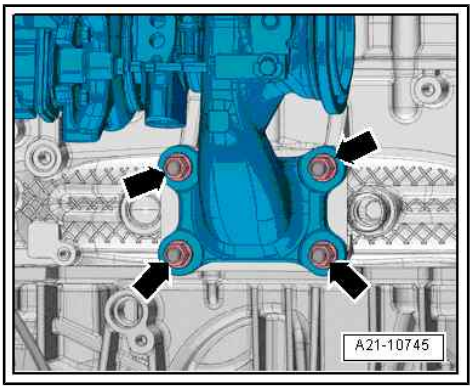
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All vehicles (continued):

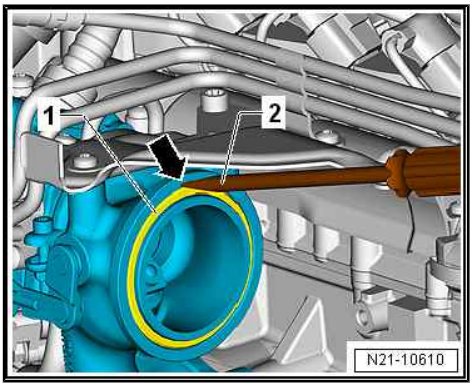
– Remove bolts -arrows- and detach heat shield -2- and bracket -1- for engine cover panel (guide out wire -3- for Lambda probe while doing so).



– 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 reverse order; note the following:

- Renew seals and O-rings.
- Renew self-locking bolts and nuts after removal.
- Fill turbocharger with engine oil at connection for oil supply line.
- Secure all hose connections with correct type of hose clips (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.

– Check coolant level and top up if necessary ⇒ page 322 .

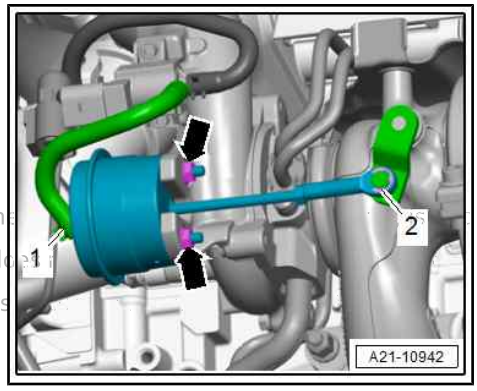
– If a turbocharger with a new charge pressure positioner - V465- has been installed, select `Guided Functions` on ⇒ Vehicle diagnostic tester and perform function `0001 - Adapt/set charge pressure positioner V465`.

Tightening torques

- ⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418
- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 444
- ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence””, page 525
- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ “4.1 Exploded view - secondary air system”, page 542
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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1.3 Renewing vacuum unit for turbocharger



Removing

– Detach vacuum hose -1-.

– Detach securing clip -2-.

– Remove bolts -arrows- and detach vacuum unit.

Installing

Installation is carried out in reverse sequence.

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Tightening torques

♦ ⇒ “1.1.3 Exploded view - turbocharger, 1.4 ltr. TFSI engine with pneumatic charge pressure control”, page 417

1.4 Removing and installing charge pressure positioner - V465-

⇒ “1.4.1 Removing and installing charge pressure positioner V465 - 1.2 ltr. TFSI”, page 434

⇒ “1.4.2 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version I”, page 435

⇒ “1.4.3 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version II”, page 435

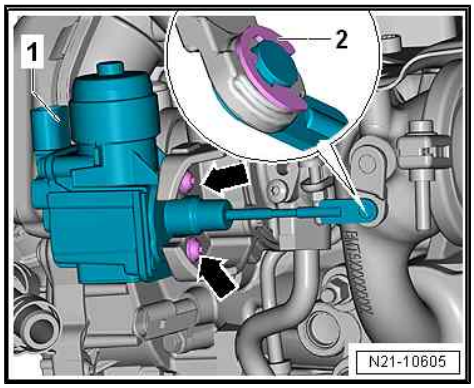
1.4.1 Removing and installing charge pressure positioner - V465- - 1.2 ltr. TFSI

Special tools and workshop equipment required

♦ Locking tool - T40265-



Removing



– Unplug electrical connector -1-.

– Pull off securing clip -2- with locking tool - T40265- .

– Remove bolts -arrows- and detach charge pressure positioner - V465- .

Installing

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

– Select `Guided Functions` on ⇒ Vehicle diagnostic tester and perform function `0001 - Adapt/set charge air pressure actuator V465`.

Tightening torques

♦ ⇒ “1.1.1 Exploded view - turbocharger, 1.2 ltr. TFSI”, page 412

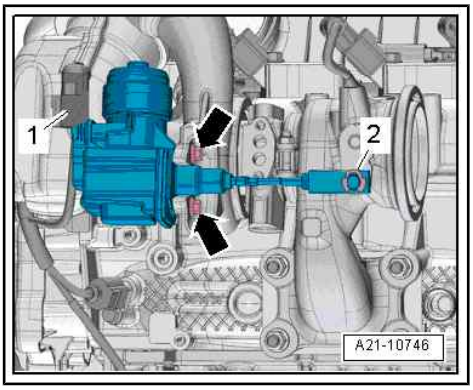
1.4.2 Removing and installing charge pressure positioner - V465- - 1.4 ltr. TFSI, version I

Removing

e-tron:

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

All vehicles (continued):



– Unplug electrical connector -1-.

– Detach securing clip -2-.

– Remove bolts -arrows- and detach charge pressure positioner - V465- .

Installing

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

Charge pressure positioner - V465- (version 1):

– Fit thread of charge pressure positioner -V465- at central position in joint element.

– Set charge pressure positioner - V465- : Select `Guided Functions` on ⇒ Vehicle diagnostic tester and perform function `0001 - Adapt/set charge air pressure actuator V465`.

– Adjust to specified value by turning linkage. For specified value, see ⇒ Vehicle diagnostic tester.

– Tighten lock nut.

Charge pressure positioner - V465- (version 2):

– Select `Guided Functions` on ⇒ Vehicle diagnostic tester and perform function `0001 - Adapt/set charge air pressure actuator V465`.

e-tron:

– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

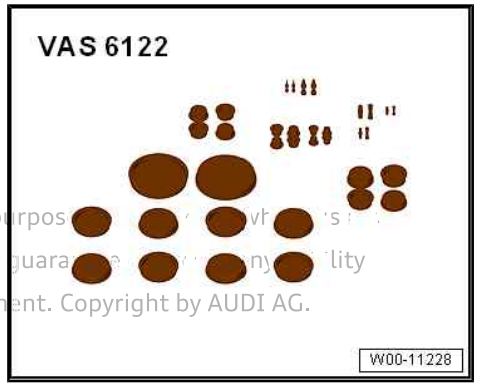
◆ ⇒ “1.1 Exploded view - turbocharger”, page 412

1.4.3 Removing and installing charge pressure positioner - V465- - 1.4 ltr. TFSI, version II

Special tools and workshop equipment required

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- Engine bung set - VAS 6122-



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- Socket Torx T30 - T10405-



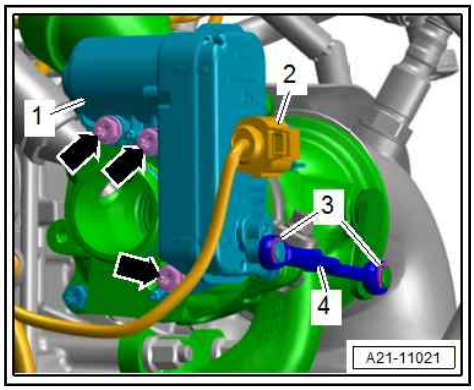
Removing

– Remove connection for turbocharger ⇒ “1.5 Removing and installing connection for turbocharger”, page 436 .

– Remove securing clips -3- and detach actuating lever -4-.

– Remove bolts -arrows-.

– Detach charge pressure positioner - V465- -item 1- and unplug electrical connector -2-.



Installing

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

- Renew O-rings after removing.
- Renew bolts securing charge pressure positioner - V465- .

– Select `Guided Functions` on ⇒ Vehicle diagnostic tester and perform function `0001 - Adapt/set charge air pressure actuator V465`.

Tightening torques

- Bolts securing charge pressure positioner - V465- ⇒ page 416
- ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342

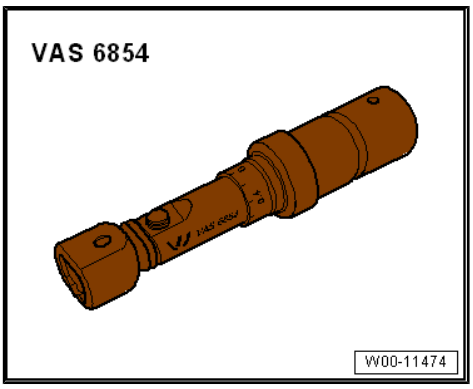
1.5 Removing and installing connection for turbocharger

Special tools and workshop equipment required

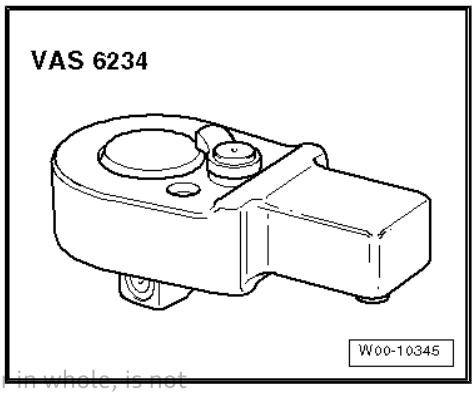
- Socket Torx T30 - T10405-



- Torque wrench - VAS 6854-

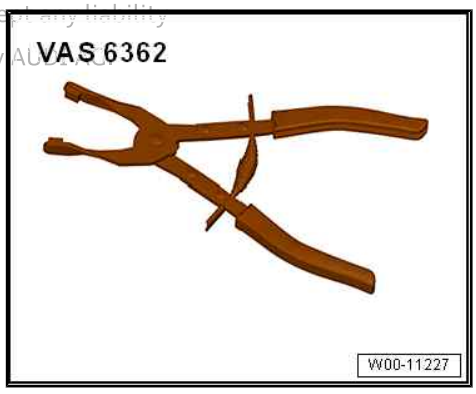


- Ratchet insert 1/4" - VAS 6234-

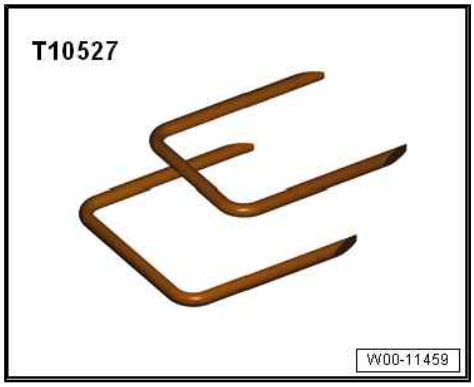


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- Hose clip pliers - VAS 6362-

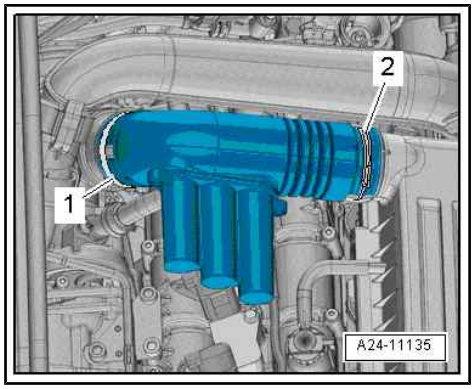


♦ Release tool - T10527- and -T10527/1-

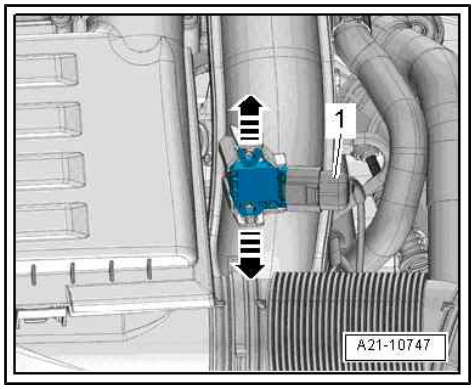


Removing

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

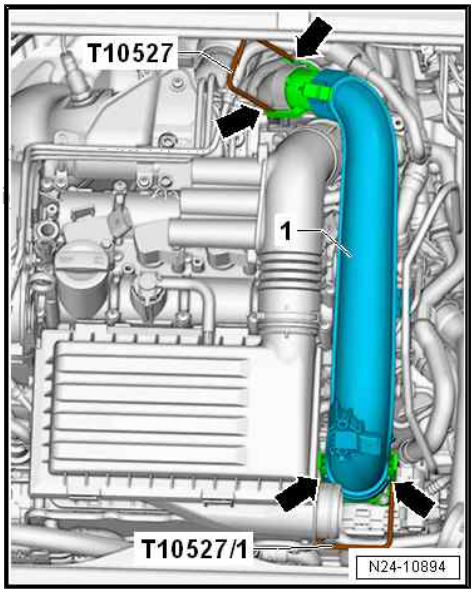


– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



– Move air hoses clear at air pipe.

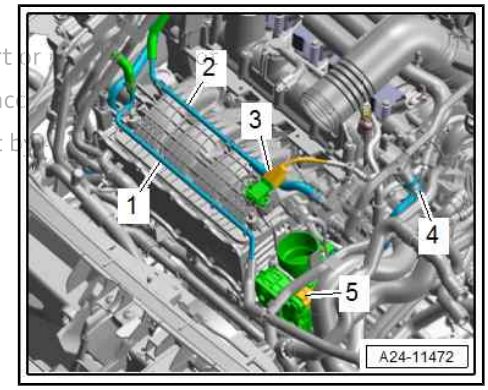
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- , and detach air pipe -1-.



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– Release and detach vacuum line -4-.

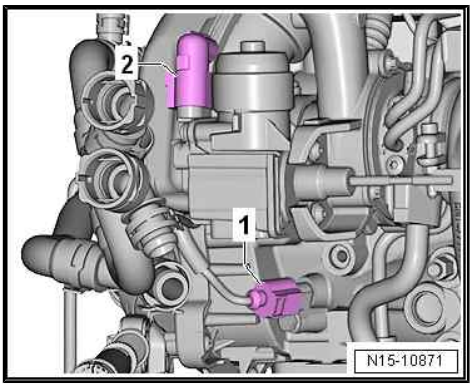
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– Release and unplug electrical connectors -1- from coolant temperature sender - G62- .

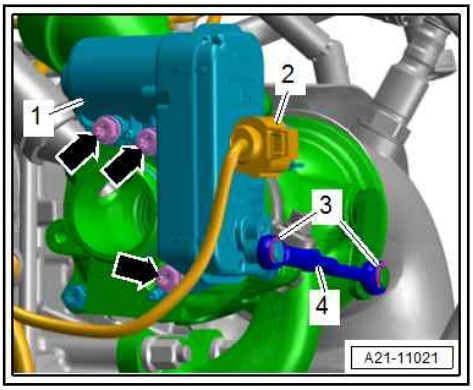
Vehicles with charge pressure positioner - V465- , version 1:

– Release and unplug electrical connectors -2- from charge pressure positioner - V465- .



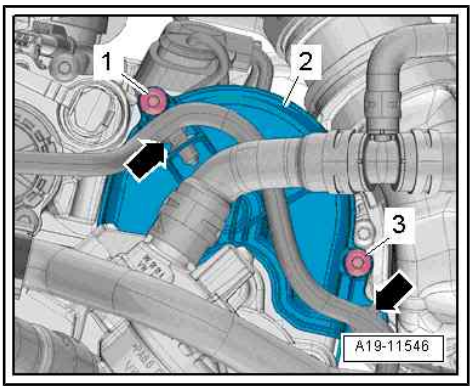
Vehicles with charge pressure positioner - V465- , version 2:

– Release and unplug electrical connectors -2- from charge pressure positioner - V465- .

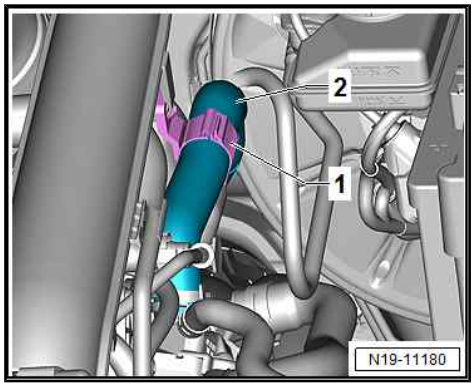


All vehicles (continued):

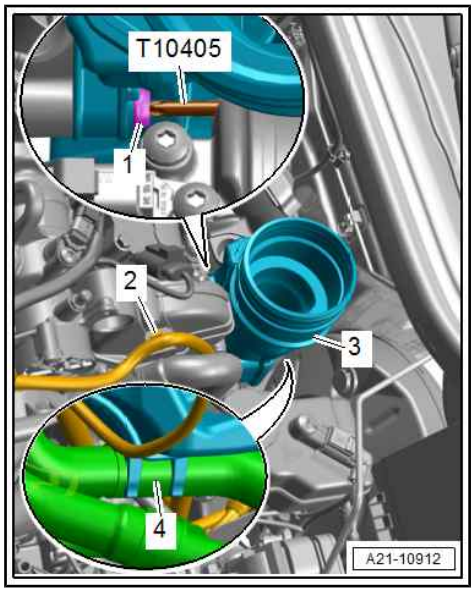
– Move electrical wiring harness clear -arrows- at cover -2-.



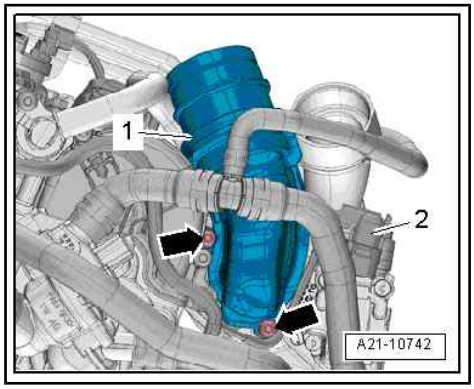
– Release hose clip -1- and push coolant hose -2- to one side.



– Move electrical wiring harness -2- and coolant hose -4- clear and push to one side.
– Unscrew bolt -1- using socket Torx T30 - T10405- .



– Remove bolts -arrows-.
– Remove connection -1- together with vacuum line.



Installing:

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

Note

Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .

– Renew gaskets, seals and O-rings.
– Lightly lubricate O-rings with clean engine oil prior to installation.

Tightening torques

- ⇒ “1.1 Exploded view - turbocharger”, page 412
- ⇒ “2.1 Exploded view - charge air system”, page 441
- ⇒ “4.1 Exploded view - coolant pump/thermostat”, page 342

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2 Charge air system

⇒ “2.1 Exploded view - charge air system”, page 441

⇒ “2.2 Exploded view - hose connections for charge air system”, page 444

⇒ “2.3 Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299 ”, page 444

⇒ “2.4 Removing and installing charge air cooler”, page 445

⇒ “2.5 Checking charge air system for leaks”, page 447

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2.1 Exploded view - charge air system

⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

⇒ “2.1.2 Exploded view - charge air system, e-tron”, page 442

2.1.1 Exploded view - charge air system, all vehicles except e-tron

- Check that all air pipes and hoses and vacuum lines are correctly fitted and that there are no leaks before carrying out tests or repairs.

1 - 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 ⇒ “2.4.1 Removing and installing charge air cooler - all vehicles except e-tron”, page 445

6 - Sealing strip

- ❑ Renew after removing

7 - Gasket

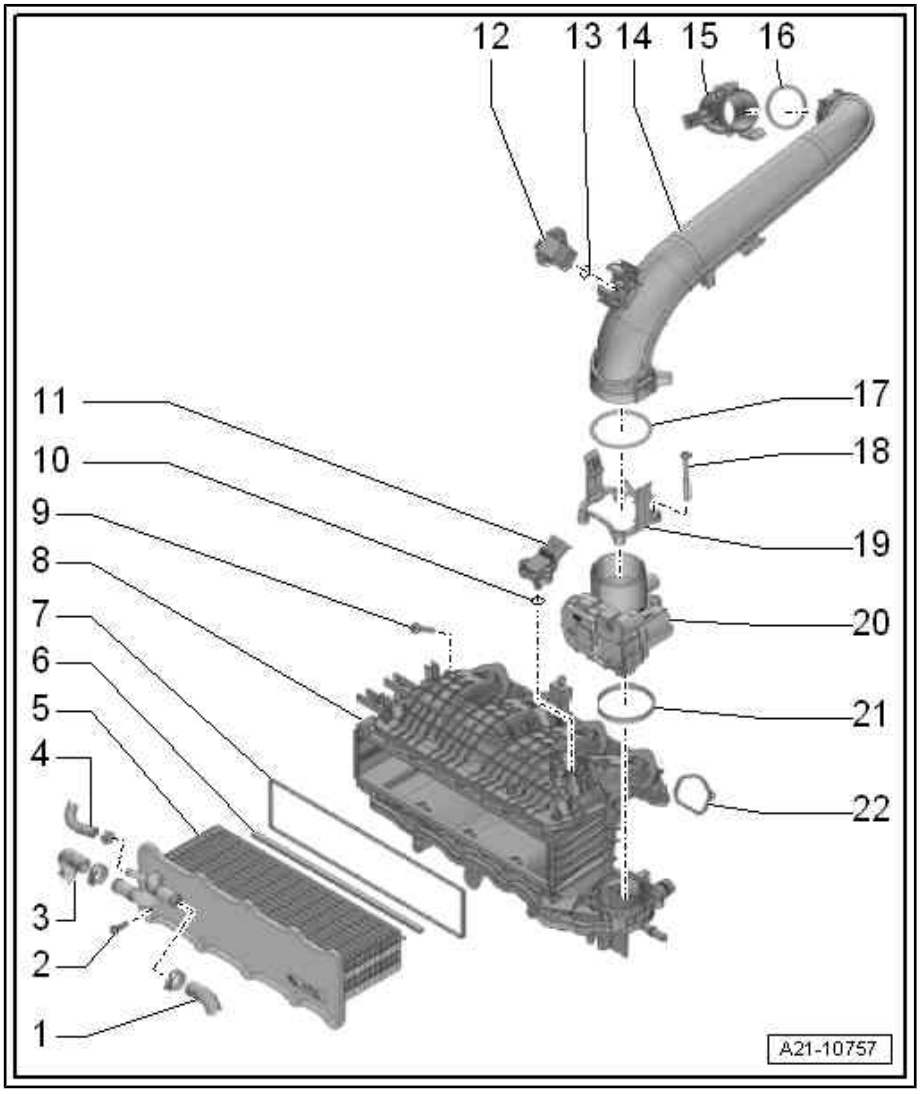
- ❑ Renew after removing

8 - Intake manifold

Removing and installing ⇒ “3.1.1 Exploded view - intake manifold, all vehicles except e-tron”, page 465

9 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Intake manifold - tightening torque and sequence”“ , page 466



10 - O-ring

- ❑ Renew after removing
- ❑ Lubricate lightly with fresh engine oil when fitting

11 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ❑ Removing and installing ⇒ “5.2 Removing and installing fuel pressure sender G247 ”, page 486

12 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ❑ Removing and installing
  ⇒ “2.3 Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299 ”, page 444

13 - O-ring

- ❑ If necessary, renew after removing
- ❑ Lubricate lightly with fresh engine oil when fitting

14 - Air pipe

- ❑ To remove, use release tools - T10527- and -T10527/1-

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)

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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 - GX3-

- ❑ Removing and installing ⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475

21 - Seal

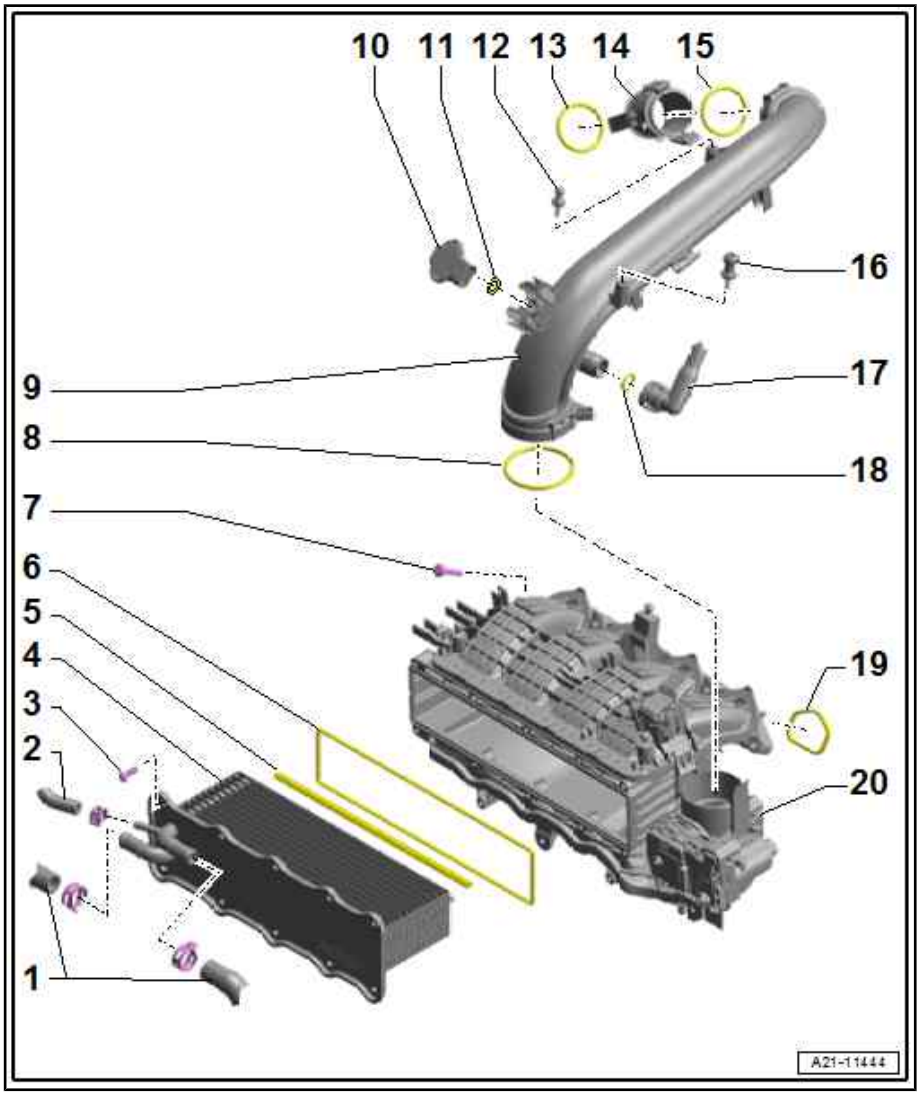
- ❑ Renew after removing

22 - Gasket

- ❑ 4x
- ❑ Renew after removing

2.1.2 Exploded view - charge air system, e-tron

- Check that all air pipes and hoses and vacuum lines are correctly fitted and that there are no leaks before carrying out tests or repairs.



1 - Coolant hoses

2 - Coolant hose

3 - 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

4 - Charge air cooler

- ❑ Removing and installing ⇒ “2.4.2 Removing and installing charge air cooler - e-tron”, page 447

5 - Sealing strip

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

6 - Gasket

- ❑ Renew after removing

7 - Bolt

- ❑ Tightening torque and sequence ⇒ page 468

8 - O-ring

- ❑ Renew after removing

9 - Air pipe

- ❑ To remove, use release tools - T10527- and - T10527/1-

10 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ❑ Removing and installing ⇒ “2.3 Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299 ”, page 444

11 - O-ring

- ❑ If necessary, renew after removing

12 - Ball stud

- ❑ For engine cover panel

13 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

14 - Connection

15 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

16 - Ball stud

- ❑ For engine cover panel

17 - Hose

- ❑ For crankcase breather

18 - O-ring

- ❑ Check for damage and renew if necessary

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19 - Gasket

- ❑ 4x
- ❑ Renew after removing

20 - Intake manifold

- ❑ Removing and installing ⇒ “3.2.2 Removing and installing intake manifold - e-tron”, page 472

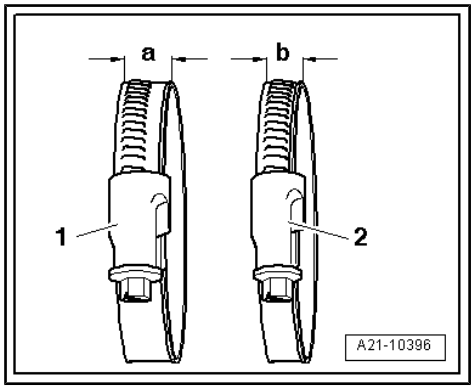
2.2 Exploded view - hose connections for charge air system

- Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.
- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .
- The screw sections of used screw-type clips must be sprayed with rust remover prior to fitting so that the air hoses can be attached securely to the hose connections.

Tightening torque for

1 - Hose clip with width -a- = 12 mm: 5.5 Nm

2 - Hose clip with width -b- = 9 mm: 3 Nm



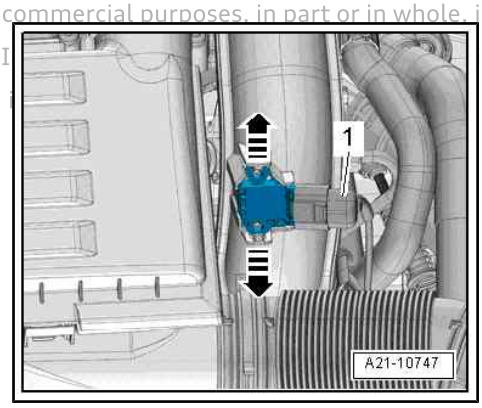
2.3 Removing and installing charge pressure sender - G31- / intake air temperature sender 2 - G299-

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Removing

– Unplug electrical connector -1-.

– Release catches -arrows- and detach charge pressure sender - G31- / intake air temperature sender 2 - G299- .



Installing

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

– If necessary, renew O-ring after removal.

2.4 Removing and installing charge air cooler

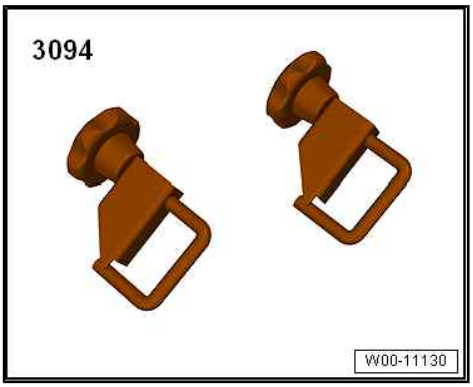
⇒ “2.4.1 Removing and installing charge air cooler - all vehicles except e-tron”, page 445

⇒ “2.4.2 Removing and installing charge air cooler - e-tron”, page 447

2.4.1 Removing and installing charge air cooler - all vehicles except e-tron

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-

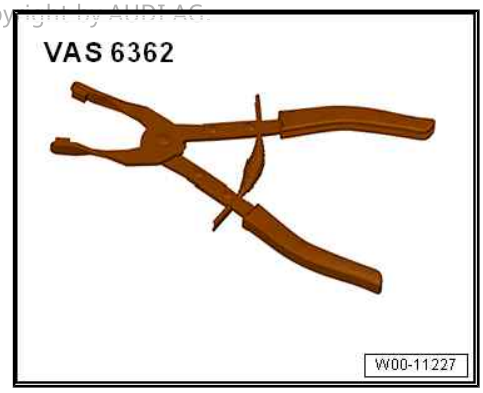


- Drip tray for workshop hoist - VAS 6208-



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- Hose clip pliers - VAS 6362-



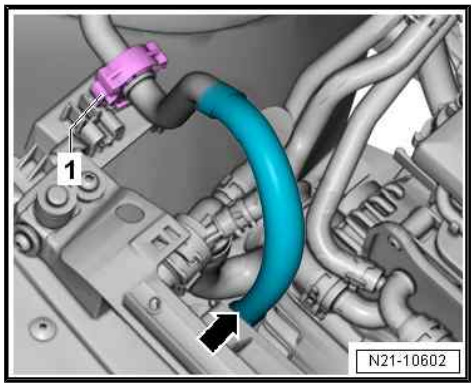
Removing

- Observe rules for cleanliness
  ⇒ “4.2 Rules for cleanliness”, page 9 .

– Remove radiator cowl
  ⇒ “6.4.1 Removing and installing radiator cowl - all vehicles except e-tron”, page 410 .

– 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 .

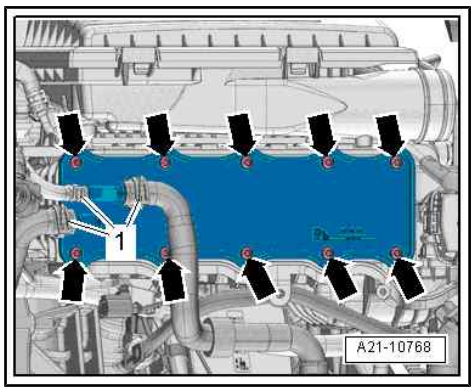
– Open clamp -1- and push hose -arrow- to one side.



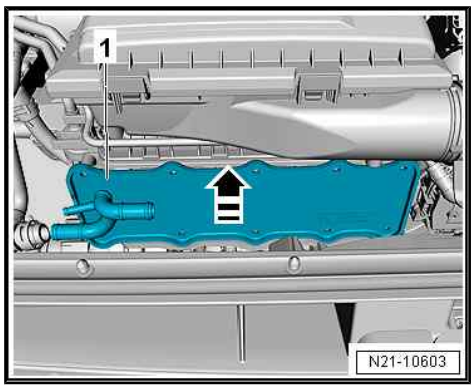
– Place drip tray for workshop hoist - VAS 6208- underneath.

– Clamp off coolant hoses on charge air cooler with hose clamps up to 25 mm - 3094- .

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



– Pull charge air cooler -1- forwards and, at the same time, out of intake manifold in direction of -arrow-.



Installing

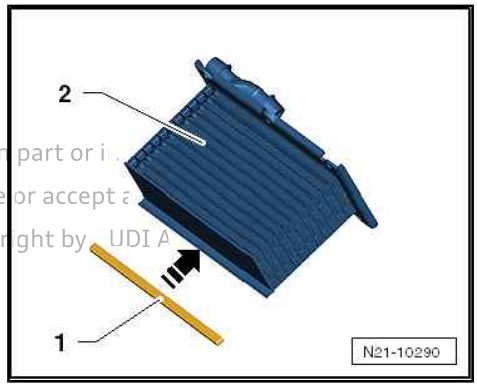
Installation is carried out in reverse order; note the following:

- If there are slight impressions on the fins, refer to ⇒ “4.9 Installing radiators and condensers”, page 12 .

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– Attach sealing strip -1- to charge air cooler -2- (-arrow-).

– Insert new gasket into groove on intake manifold.

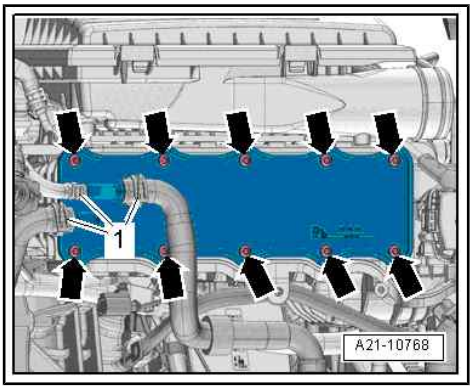


– Tighten bolts -arrows- in diagonal sequence, working from the middle outwards.

– Fit hose clips -1-.

– Install radiator cowl
⇒ “6.4.1 Removing and installing radiator cowl - all vehicles except e-tron”, page 410 .

– Check coolant level and top up if necessary ⇒ page 322 .



Tightening torques

♦ ⇒ “2.1.1 Exploded view - charge air system, all vehicles except e-tron”, page 441

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

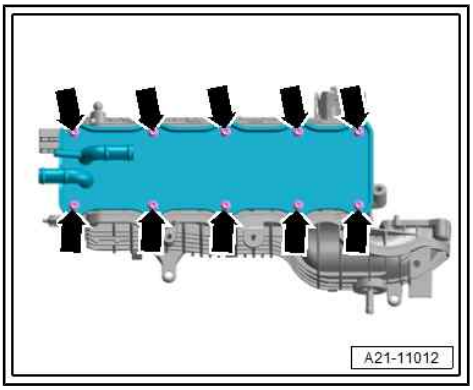
2.4.2 Removing and installing charge air cooler - e-tron

Removing

• Observe rules for cleanliness
⇒ “4.2 Rules for cleanliness”, page 9 .

– Remove intake manifold
⇒ “3.2.2 Removing and installing intake manifold - e-tron”, page 472 .

– Remove bolts -arrows- and detach charge air cooler from intake manifold.



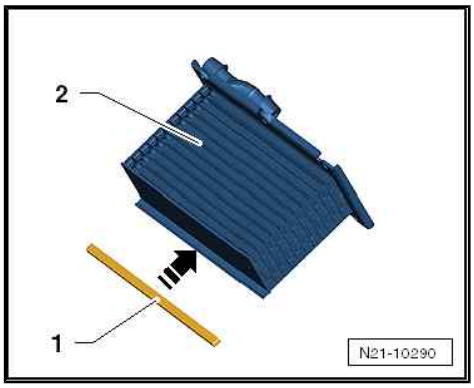
Installing

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

• If there are slight impressions on the fins, refer to
⇒ “4.9 Installing radiators and condensers”, page 12 .

– Attach sealing strip -1- to charge air cooler -2- (-arrow-).

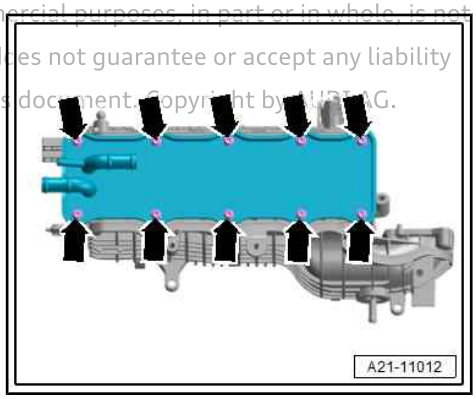
– Insert new gasket into groove on intake manifold.



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– Tighten bolts -arrows- in diagonal sequence, working from the middle outwards.

– Install intake manifold
⇒ “3.2.2 Removing and installing intake manifold - e-tron”, page 472 .



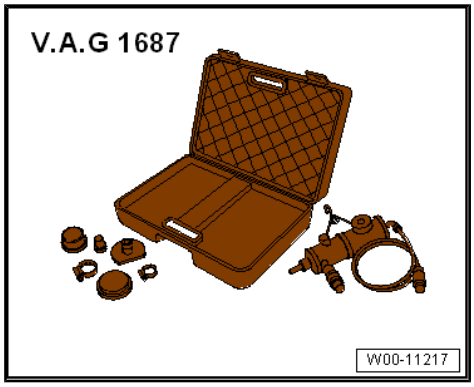
Tightening torques

♦ ⇒ “2.1.2 Exploded view - charge air system, e-tron”, page 442

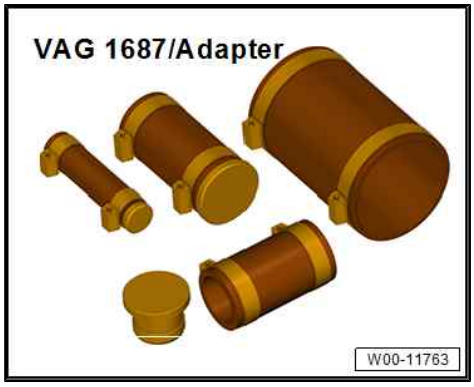
2.5 Checking charge air system for leaks

Special tools and workshop equipment required

- Charge air system tester - V.A.G 1687-



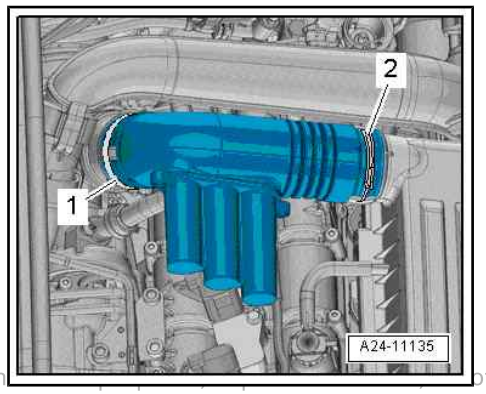
- Adapter - V.A.G 1687/11- and adapter - V.A.G 1687/15-



Procedure

- Observe rules for cleanliness
  ⇒ “4.2 Rules for cleanliness”, page 9 .

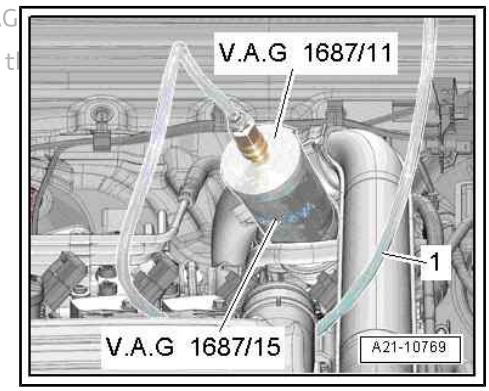
– Loosen hose clips -1, 2- and remove air pipe.



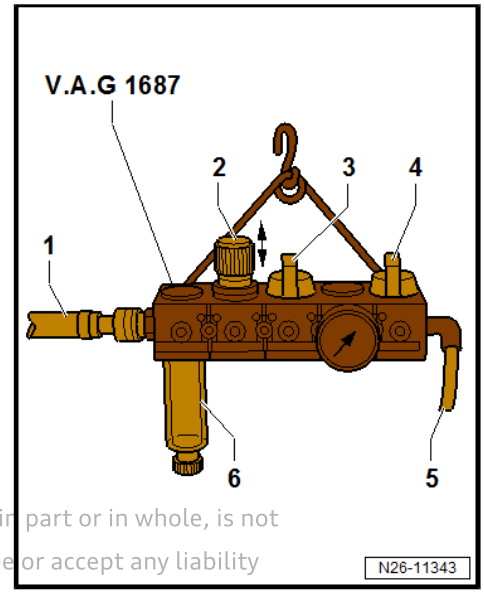
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– Connect adapter - V.A.G 1687/15- with -V.A.G 1687/11- to turbocharger.

– Connect hose -1- of charge air system tester -V.A.G 1687- to adapter.



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-.

– If there is water in sight glass, remove drain plug -6- and drain water.

– Open valve -3-.

Risk of damage if pressure is set too high.

• The pressure must not exceed 0.2 bar.

– Adjust pressure to 0.2 bar via pressure control valve -2-.

– Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.2 bar again.

– Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detection spray or use ultrasonic tester - V.A.G 1842- . (Refer to ⇒ operating instructions -V.A.G 1842- .)

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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.

– Release pressure in test circuit by detaching hose coupling from adapter before removing adapter.

Assembling

Assembly is performed in reverse sequence; note the following:

– Renew seal and O-rings.

Tightening torques

◆ ⇒ “2.2 Exploded view - hose connections for charge air system”, page 444

24 – Mixture preparation - injection

1 Injection system

⇒ “1.1 Overview of fitting locations - injection system”, page 450

1.1 Overview of fitting locations - injection system

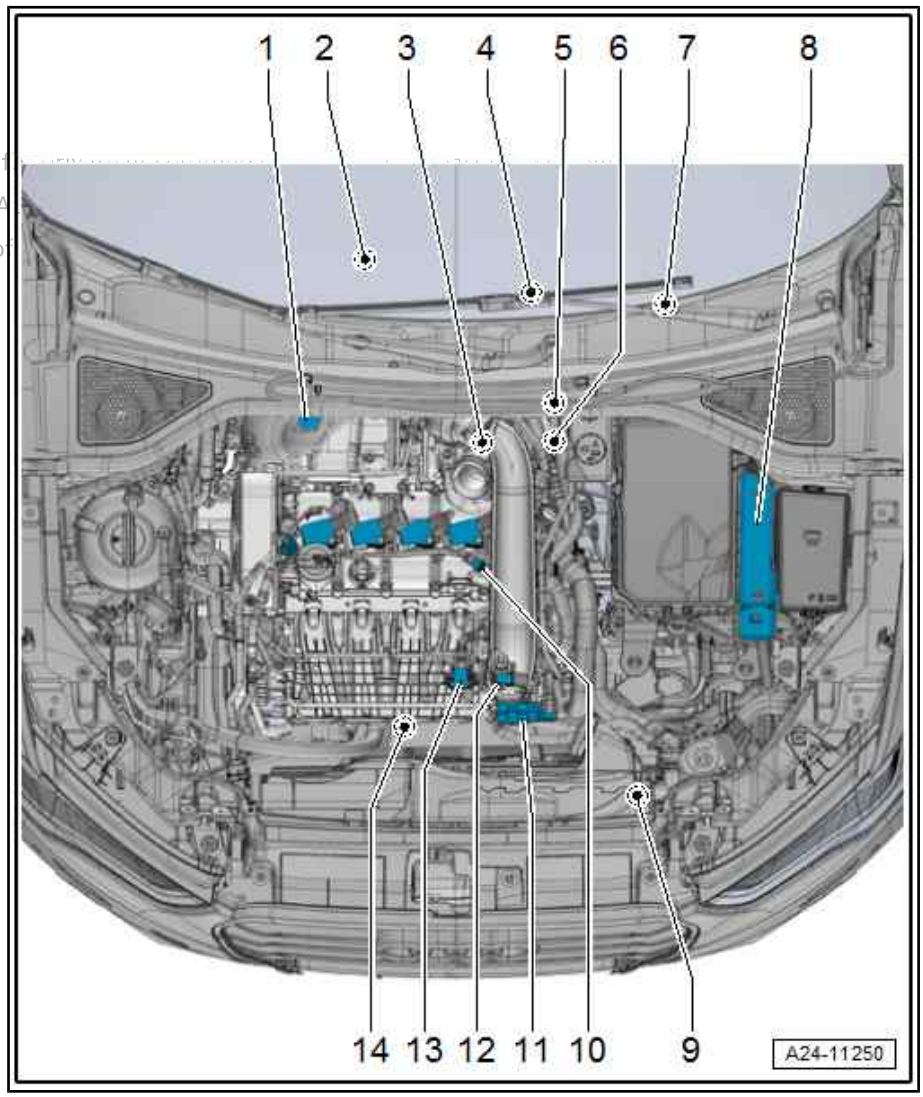
⇒ “1.1.1 Overview of fitting locations - injection system, all vehicles except e-tron”, page 450

⇒ “1.1.2 Overview of fitting locations - injection system, e-tron”, page 457

1.1.1 Overview of fitting locations - injection system, all vehicles except e-tron

Overview of fitting locations - engine compartment

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1 - Lambda probe - G39- and Lambda probe heater - Z19-

- ❑ Exploded view
  ⇒ “7.1.1 Exploded view - Lambda probe, all vehicles except e-tron”, page 500

2 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- ❑ Exploded view
  ⇒ “7.1.1 Exploded view - Lambda probe, all vehicles except e-tron”, page 500

3 - Charge pressure positioner - V465-

- ❑ Fitting location
  ⇒ Fig. ““Fitting location of charge pressure positioner -V465- ””, page 453

4 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ❑ Fitting location
  ⇒ Fig. ““ Accelerator position sender -G79- and accelerator position sender 2 -G185- ””, page 452
- ❑ Removing and installing
  ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Accelerator mechanism; Exploded view - accelerator pedal module

5 - Vacuum sender - G608-

- ❑ Fitting location
  ⇒ Fig. ""Fitting location of brake light switch -F- / brake pedal switch -F63- and vacuum sender -G608- "" , page 452
- ❑ Removing and installing ⇒ Brake system; Rep. gr. 45 ; Overview of fitting locations; Overview of fitting locations - ABS/ESP

6 - Brake light switch - F- / brake pedal switch - F63-

- ❑ Fitting location
  ⇒ Fig. ""Fitting location of brake light switch -F- / brake pedal switch -F63- and vacuum sender -G608- "" , page 452
- ❑ 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 452

8 - Engine control unit - J623-

- ❑ Removing and installing
  ⇒ "8.1.1 Removing and installing engine control unit J623 without protective housing", page 509

9 - Radiator outlet coolant temperature sender - G83-

- ❑ Fitting location
  ⇒ Fig. ""Fitting location of radiator outlet coolant temperature sender -G83- "" , page 453
- ❑ Exploded view
  ⇒ "4.3.1 Exploded view - coolant temperature senders, all vehicles except e-tron", page 348

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10 - Hall sender - G40- (camshaft position sensor)

- ❑ Exploded view ⇒ "1.1 Exploded view - ignition system", page 548

11 - Throttle valve module - GX3-

- ❑ With throttle valve module - J338- , 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 ⇒ "3.1.1 Exploded view - intake manifold, all vehicles except e-tron", page 465

12 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ❑ Exploded view ⇒ "2.1.1 Exploded view - charge air system, all vehicles except e-tron", page 441

13 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ❑ Exploded view ⇒ "3.1.1 Exploded view - intake manifold, all vehicles except e-tron", page 465

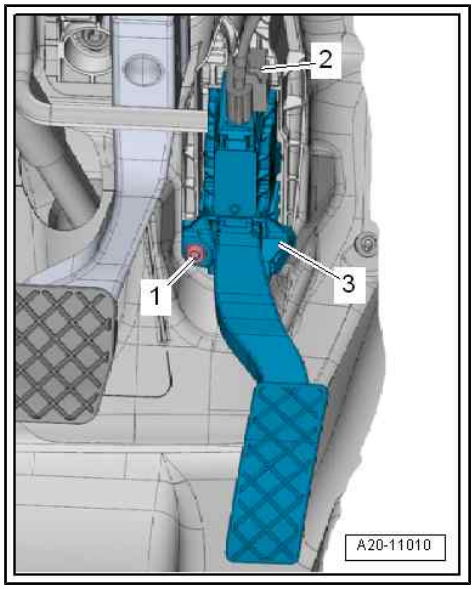
14 - Continued coolant circulation pump - V51-

- ❑ Fitting location ⇒ Fig. ""Fitting location of continued coolant circulation pump - V51- "" , page 453
- ❑ Exploded view ⇒ "4.2.1 Exploded view - electric coolant pump, all vehicles except e-tron", page 345

Accelerator position sender - G79- and accelerator position sender 2 - G185-

- Integrated in accelerator pedal module. Accelerator position senders cannot be renewed separately if defective.

2 - Electrical connector for accelerator pedal module

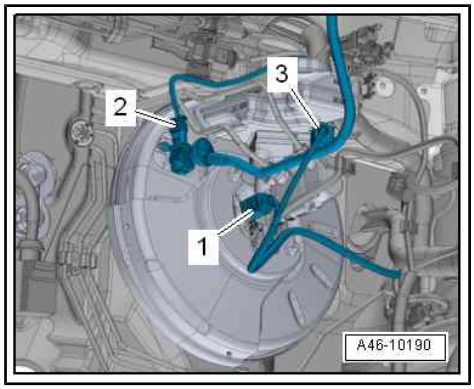


Fitting location of brake light switch - F- / brake pedal switch - F63- and vacuum sender - G608-

- On brake servo in engine compartment

1 - Brake light switch - F- / brake pedal switch - F63-

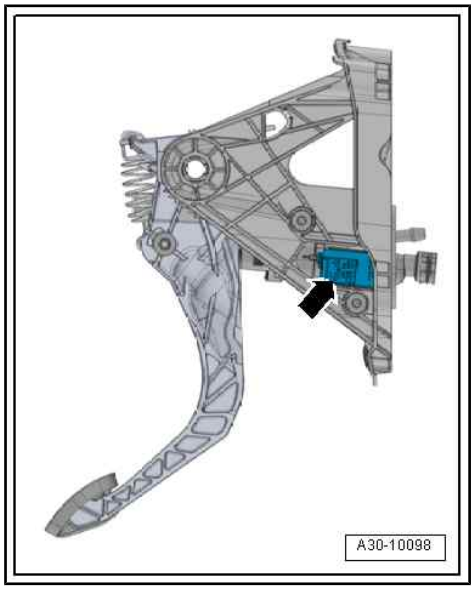
2 - Vacuum sender - G608-



Fitting location of clutch position sender - G476-

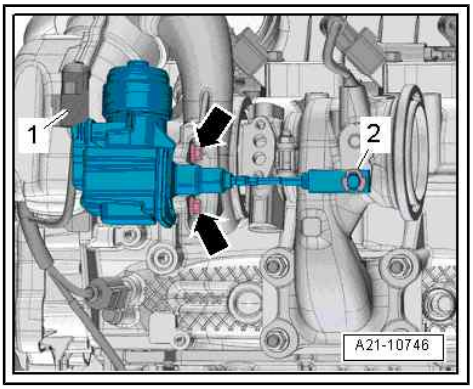
- On mounting bracket for clutch pedal -arrow-

Removing and installing ⇒ Rep. gr. 30 ; Clutch mechanism; Removing and installing clutch position sender - G476-



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Fitting location of charge pressure positioner - V465-

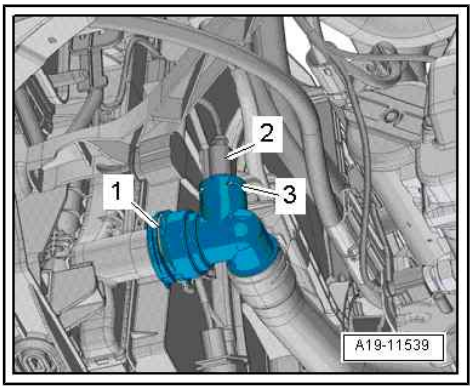


- On turbocharger

1 - Electrical connector for charge pressure positioner - V465- (shown from rear on 1.4 ltr. engine, with engine removed)

Removing and installing
⇒ “1.4.2 Removing and installing charge pressure positioner V465 - 1.4 ltr. TFSI, version I”, page 435

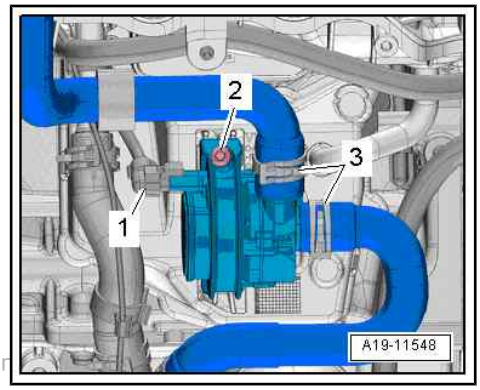
Fitting location of radiator outlet coolant temperature sender - G83-



- At bottom left of radiator

1 - Electrical connector for radiator outlet coolant temperature sender - G83-

Fitting location of continued coolant circulation pump - V51-

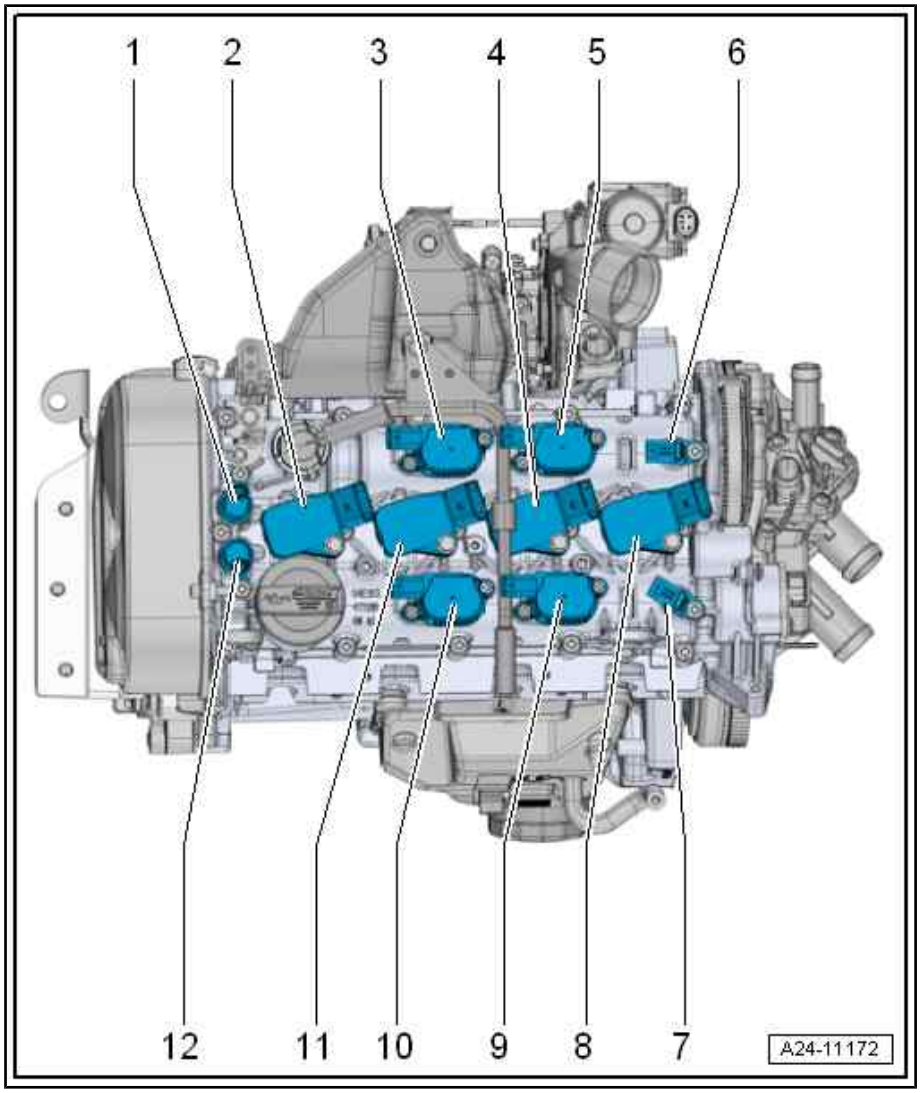


- ♦ At front of engine

1 - Electrical connector for continued coolant circulation pump - V51-

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Overview of fitting locations - engine (view from above)



1 - Exhaust camshaft control valve 1 - N318-

- ❑ Only for engines with two camshaft adjusters
- ❑ Exploded view ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

2 - Ignition coil 1 with output stage - N70-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

3 - Exhaust cam actuator for cylinder 2

- ❑ Only for engines with cylinder shut-off

- ♦ 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 ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

4 - Ignition coil 3 with output stage - N291-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

5 - Exhaust cam actuator for cylinder 3

- ❑ Only for engines with cylinder shut-off

- ♦ 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 ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

6 - Hall sender 2 - G163- (camshaft position sensor)

- ❑ Only for engines with two camshaft adjusters
- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

7 - Hall sender - G40- (camshaft position sensor)

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

8 - Ignition coil 4 with output stage - N292-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

9 - Inlet cam actuator for cylinder 3

- ❑ Only for engines with cylinder shut-off

- ♦ Inlet cam actuator for cylinder 3 - N591-
- ♦ Inlet cam actuator A for cylinder 3 - N592-
- ♦ Inlet cam actuator B for cylinder 3 - N593-

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❑ Exploded view ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

10 - Inlet cam actuator for cylinder 2

❑ Only for engines with cylinder shut-off

- ♦ 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 ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

11 - Ignition coil 2 with output stage - N127-

❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

12 - Camshaft control valve 1 - N205-

❑ Exploded view ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

Overview of fitting locations - engine (view from left side)

1 - Knock sensor 1 - G61-

❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

2 - Oil pressure switch

- ♦ 1.2 ltr. engine (without oil pressure control): oil pressure switch - F1-
- ♦ 1.4 ltr. engine (with oil pressure control): oil pressure switch for reduced oil pressure - F378-

❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

3 - Fuel pressure sender - G247-

❑ Exploded view ⇒ “4.1 Exploded view - fuel rail with injectors”, page 479

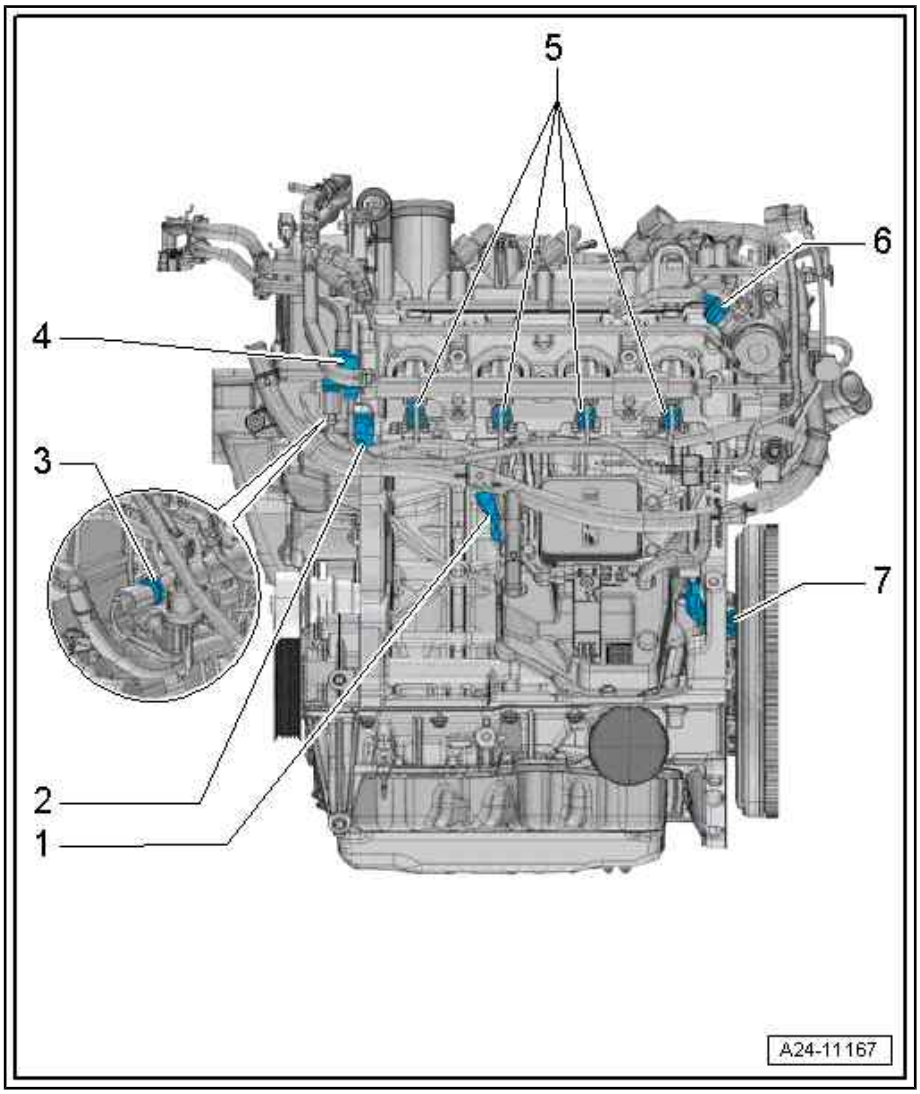
4 - Activated charcoal filter solenoid valve 1 - N80-

❑ Removing and installing ⇒ “3.5 Removing and installing activated charcoal filter solenoid valve 1 N80 ”, page 478

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 479



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6 - Fuel pressure regulating valve - N276-

- ❑ At high-pressure pump
- ❑ Exploded view ⇒ “6 High-pressure pump”, page 492

7 - Engine speed sender - G28-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

Overview of fitting locations - engine (view from right side)

1 - Oil level and oil temperature sender - G266-

- ❑ Exploded view ⇒ “1.1 Exploded view - sump/oil pump”, page 273

2 - Coolant temperature sender - G62-

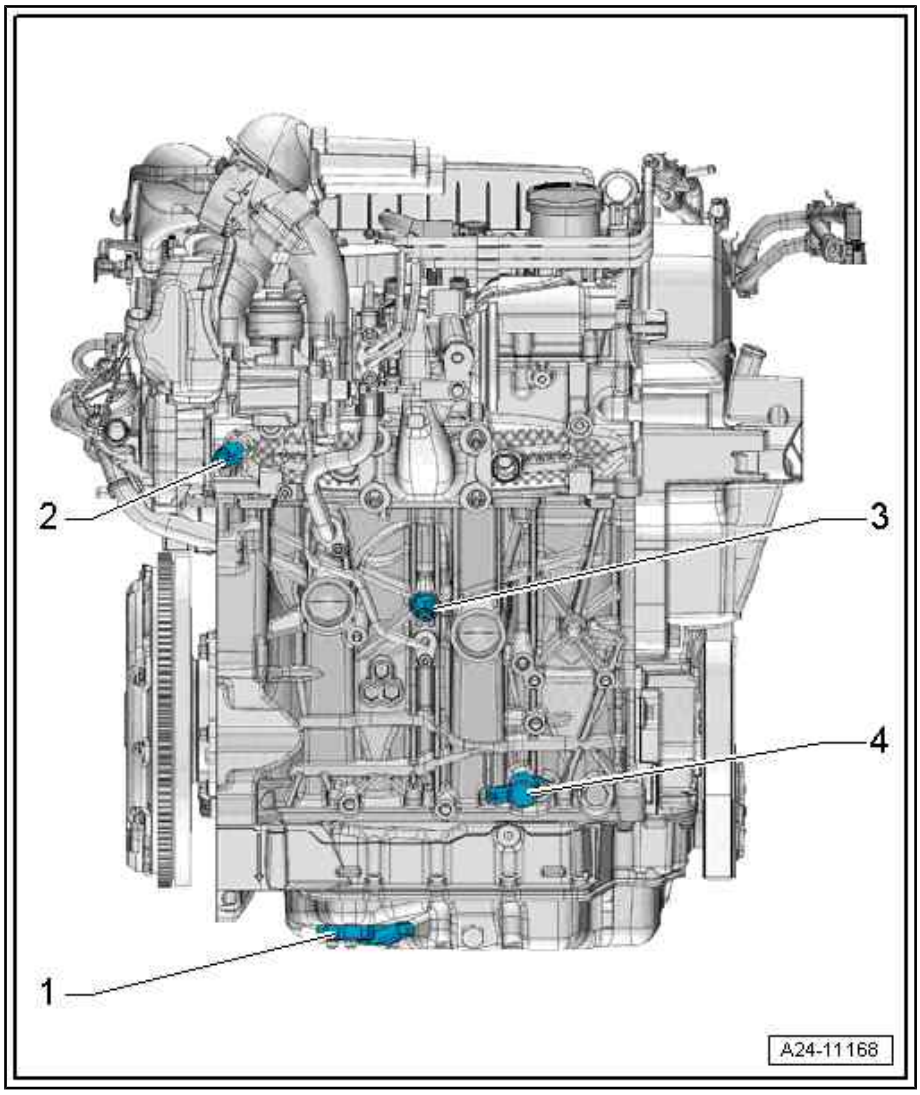
- ❑ Exploded view ⇒ “4.3.1 Exploded view - coolant temperature senders, all vehicles except e-tron”, page 348

3 - Oil pressure switch - F22-

- ❑ Not for 1.2 ltr. engine
- ❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

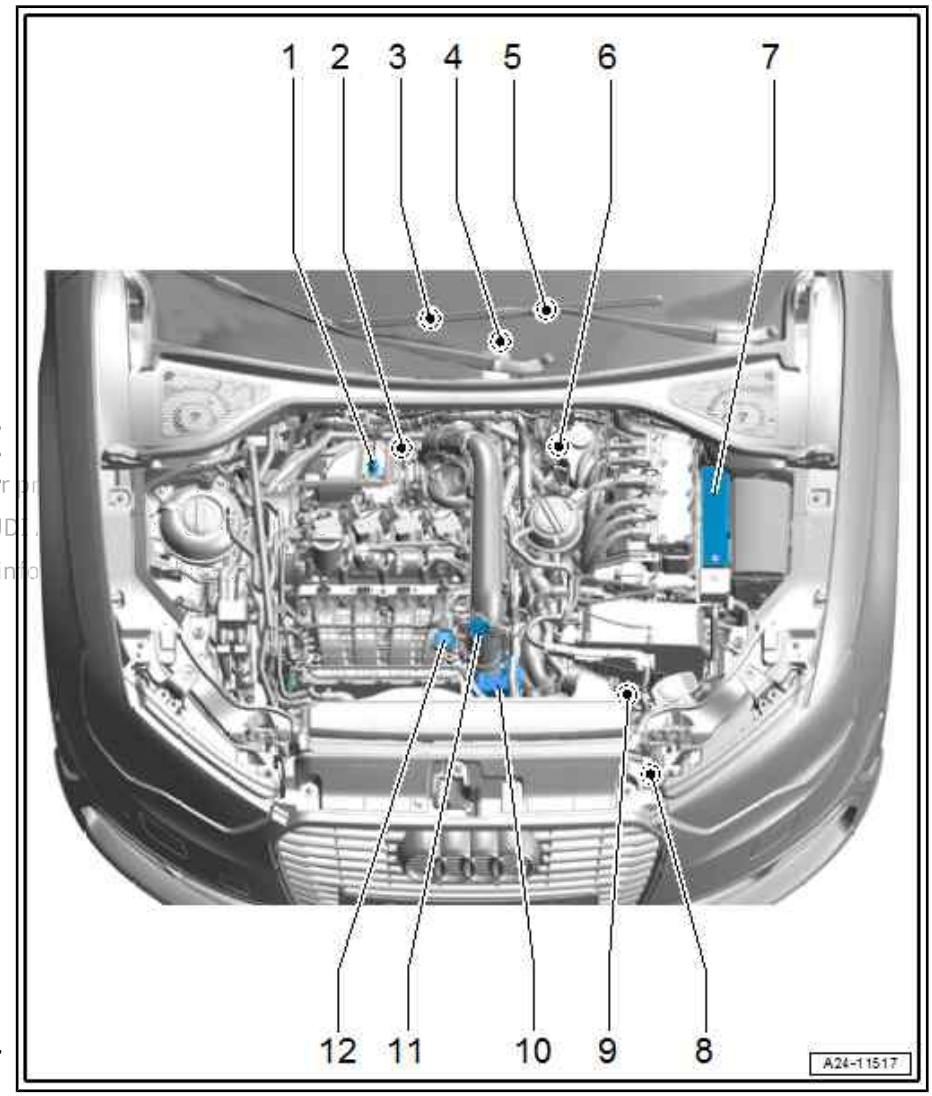
4 - Valve for oil pressure control - N428-

- ❑ Not for 1.2 ltr. engine
- ❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299



1.1.2 Overview of fitting locations - injection system, e-tron

Overview of fitting locations - engine compartment



1 - Lambda probe - G39- and Lambda probe heater - Z19-

- ❑ Exploded view ⇒ “7.1.2 Exploded view - Lambda probe, e-tron without particulate filter”, page 501

2 - Coolant valve for high-voltage battery - N688-

- ❑ Exploded view ⇒ “4.4 Exploded view - coolant valves”, page 350

3 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- ❑ Exploded view ⇒ “7.1.2 Exploded view - Lambda probe, e-tron without particulate filter”, page 501

4 - Coolant temperature sender for heater - G241-

- ❑ Fitting location ⇒ Fig. ““Fitting location for coolant temperature sender for heater - G241- ”“ , page 458
- ❑ Exploded view ⇒ “4.3.2 Exploded view - coolant temperature senders, e-tron”, page 349

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 452
- ❑ Removing and installing ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Accelerator mechanism; Exploded view - accelerator pedal module

6 - Brake pedal position sender - G100- / brake pedal position sender 2 - G836-

- ❑ Fitting location ⇒ Fig. ““Fitting location for brake pedal position sender -G100- / brake pedal position sender 2 -G836- ”“ , page 458

7 - Engine control unit - J623-

- ❑ Removing and installing ⇒ “8.1.1 Removing and installing engine control unit J623 without protective housing”, page 509

8 - Radiator outlet coolant temperature sender - G83-

- ❑ Fitting location ⇒ Fig. ““Fitting location of radiator outlet coolant temperature sender -G83- ”“ , page 453
- ❑ Exploded view ⇒ “4.3.2 Exploded view - coolant temperature senders, e-tron”, page 349

9 - Engine temperature sender 2 - G652-

- ❑ Fitting location ⇒ Fig. ““Fitting location for engine temperature sender 2 -G652- ”“ , page 458

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- ❑ Exploded view ⇒ “4.3.2 Exploded view - coolant temperature senders, e-tron”, page 349

10 - Throttle valve module - GX3-

- ❑ With throttle valve module - J338- , 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 ⇒ “3.1.2 Exploded view - intake manifold, e-tron”, page 467

11 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ❑ Exploded view ⇒ “2.1.2 Exploded view - charge air system, e-tron”, page 442

12 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

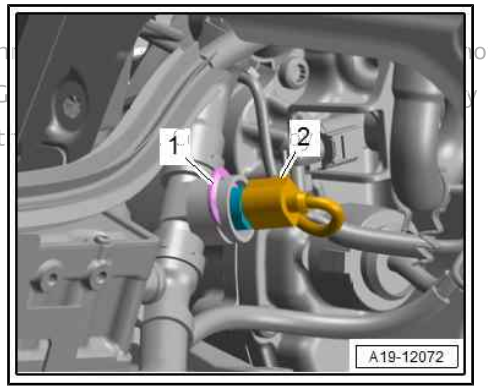
- ❑ Exploded view ⇒ “3.1.2 Exploded view - intake manifold, e-tron”, page 467

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Fitting location for coolant temperature sender for heater - G241-

- ♦ Behind gearbox

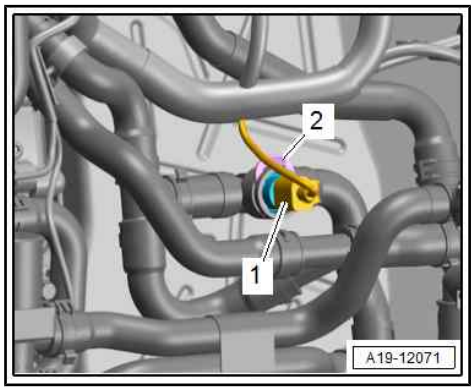
2 - Electrical connector for coolant temperature sender for heater - G241-



Fitting location for engine temperature sender 2 - G652-

- ♦ On front of gearbox

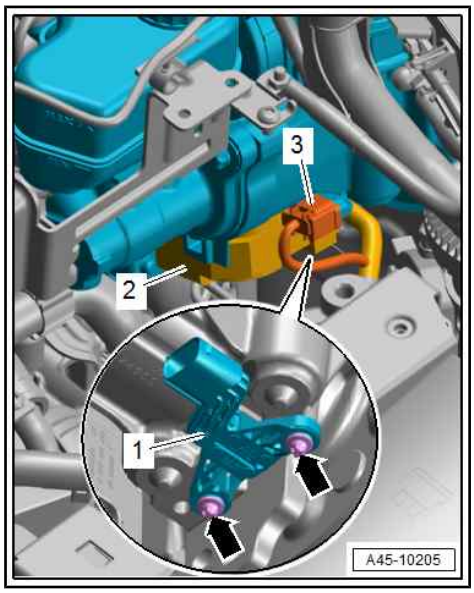
1 - Electrical connector for engine temperature sender 2 - G652-



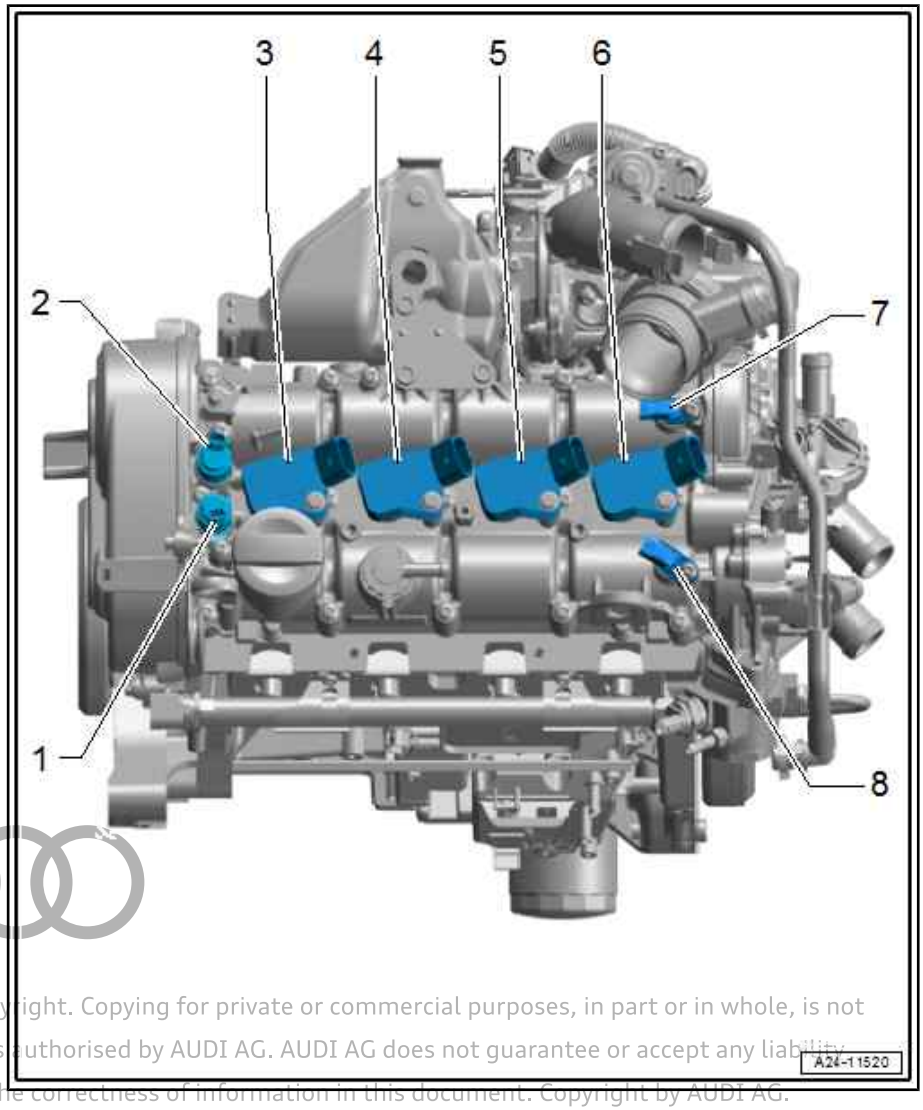
Fitting location for brake pedal position sender - G100- / brake pedal position sender 2 - G836-

- ♦ On electromechanical brake servo motor - V548-

1 - Brake pedal position sender - G100- / brake pedal position sender 2 - G836-



Overview of fitting locations - engine (view from above)



1 - Camshaft control valve 1 - N205-

- ❑ Exploded view ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

2 - Exhaust camshaft control valve 1 - N318-

- ❑ Exploded view ⇒ “3.1.1 Exploded view - camshaft housing”, page 250

3 - Ignition coil 1 with output stage - N70-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

4 - Ignition coil 2 with output stage - N127-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

5 - Ignition coil 3 with output stage - N291-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

6 - Ignition coil 4 with output stage - N292-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

7 - Hall sender 2 - G163- (camshaft position sensor)

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

8 - Hall sender - G40- (camshaft position sensor)

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

Overview of fitting locations - engine (view from left side)

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1 - Coolant pump for low-temperature circuit - V468-

- ❑ Exploded view ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

2 - Activated charcoal filter solenoid valve 1 - N80-

3 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

4 - Fuel pressure sender - G247-

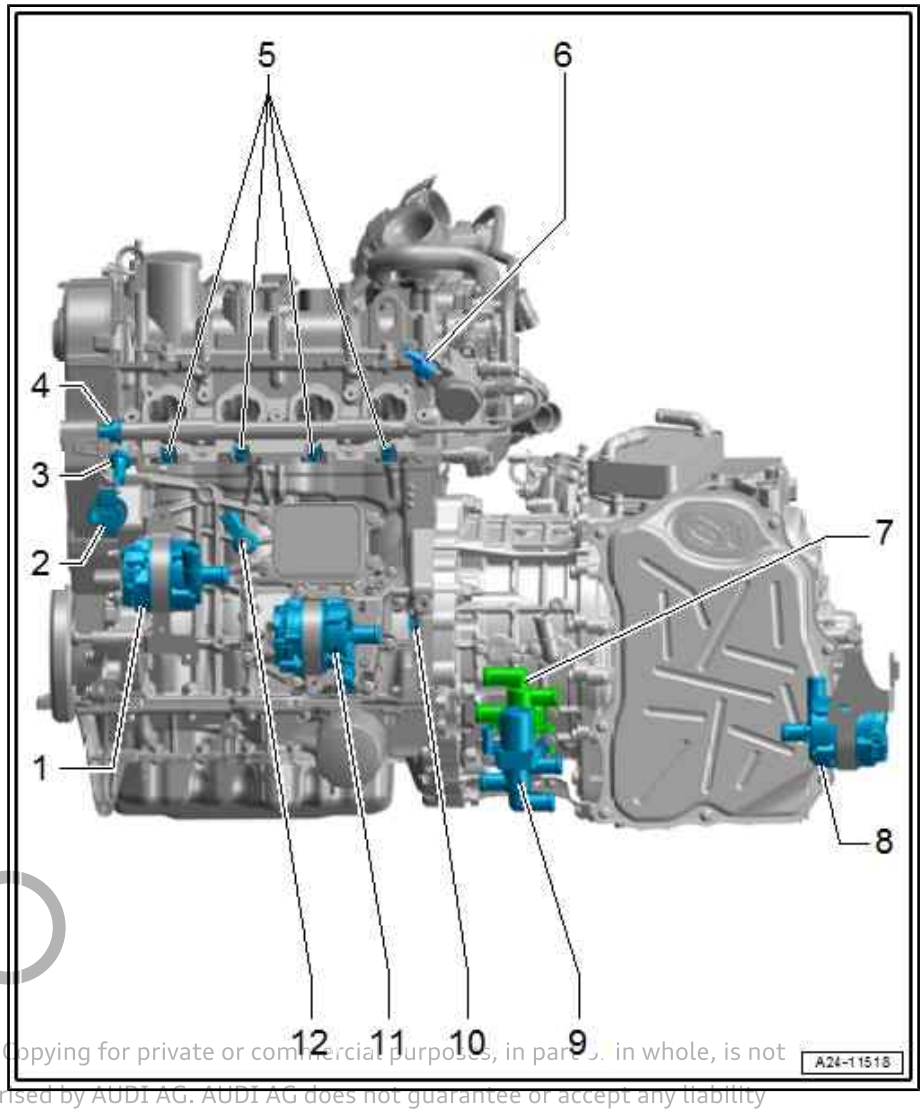
- ❑ Exploded view ⇒ “4.1 Exploded view - fuel rail with injectors”, page 479

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 479

6 - Fuel pressure regulating valve - N276-

- ❑ At high-pressure pump
- ❑ Exploded view ⇒ “6 High-pressure pump”, page 492



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7 - Coolant changeover valve 2 - N633-

- ❑ Exploded view ⇒ “4.4 Exploded view - coolant valves”, page 350

8 - Coolant circulation pump before power and control electronics for electric drive - V508-

- ❑ Exploded view ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

9 - Coolant changeover valve 1 - N632-

- ❑ Exploded view ⇒ “4.4 Exploded view - coolant valves”, page 350

10 - Engine speed sender - G28-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

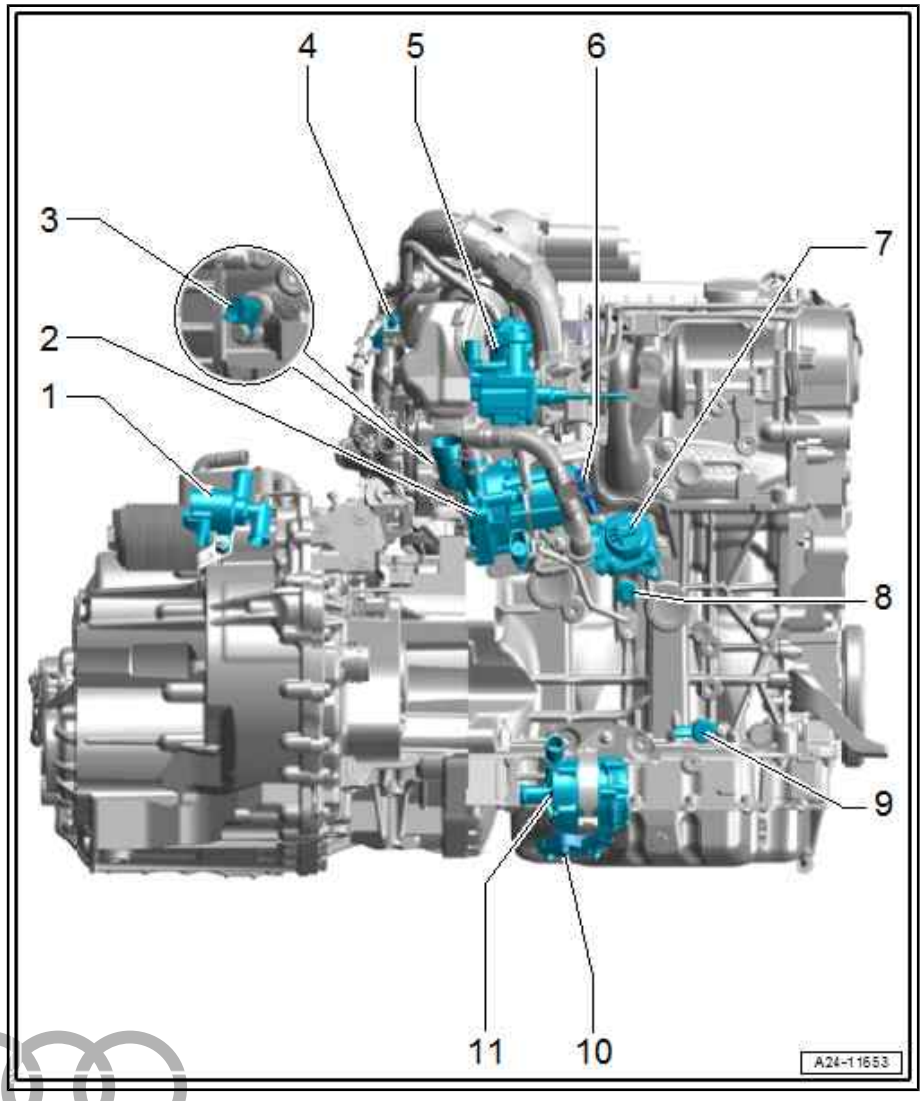
11 - Coolant pump for high-temperature circuit - V467-

- ❑ Exploded view ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

12 - Knock sensor 1 - G61-

- ❑ Exploded view ⇒ “1.1 Exploded view - ignition system”, page 548

Overview of fitting locations - engine (view from right side)



1 - Coolant valve for gearbox - N488-

- ❑ Exploded view ⇒ “4.4 Exploded view - coolant valves”, page 350

2 - Secondary air pump motor - V101-

- ❑ Exploded view ⇒ “4.1 Exploded view - secondary air system”, page 542

3 - Coolant temperature sender - G62-

- ❑ Exploded view ⇒ “4.3 Exploded view - coolant temperature senders”, page 348

4 - Heating element for crankcase breather - N79-

5 - Position sender for charge pressure positioner - G581- / charge pressure positioner - V465-

6 - Sender 1 for secondary air pressure - G609-

- ❑ Exploded view ⇒ “4.1 Exploded view - secondary air system”, page 542

7 - Secondary air inlet valve - N112-

- ❑ Exploded view ⇒ “4.1 Exploded view - secondary air system”, page 542

8 - Oil pressure switch - F22-

- ❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

9 - Valve for oil pressure control - N428-

- ❑ Exploded view ⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 299

10 - Oil level and oil temperature sender - G266-

- ❑ Exploded view ⇒ “1.1 Exploded view - sump/oil pump”, page 273

11 - Coolant pump for high-voltage battery - V590-

- ❑ Exploded view ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

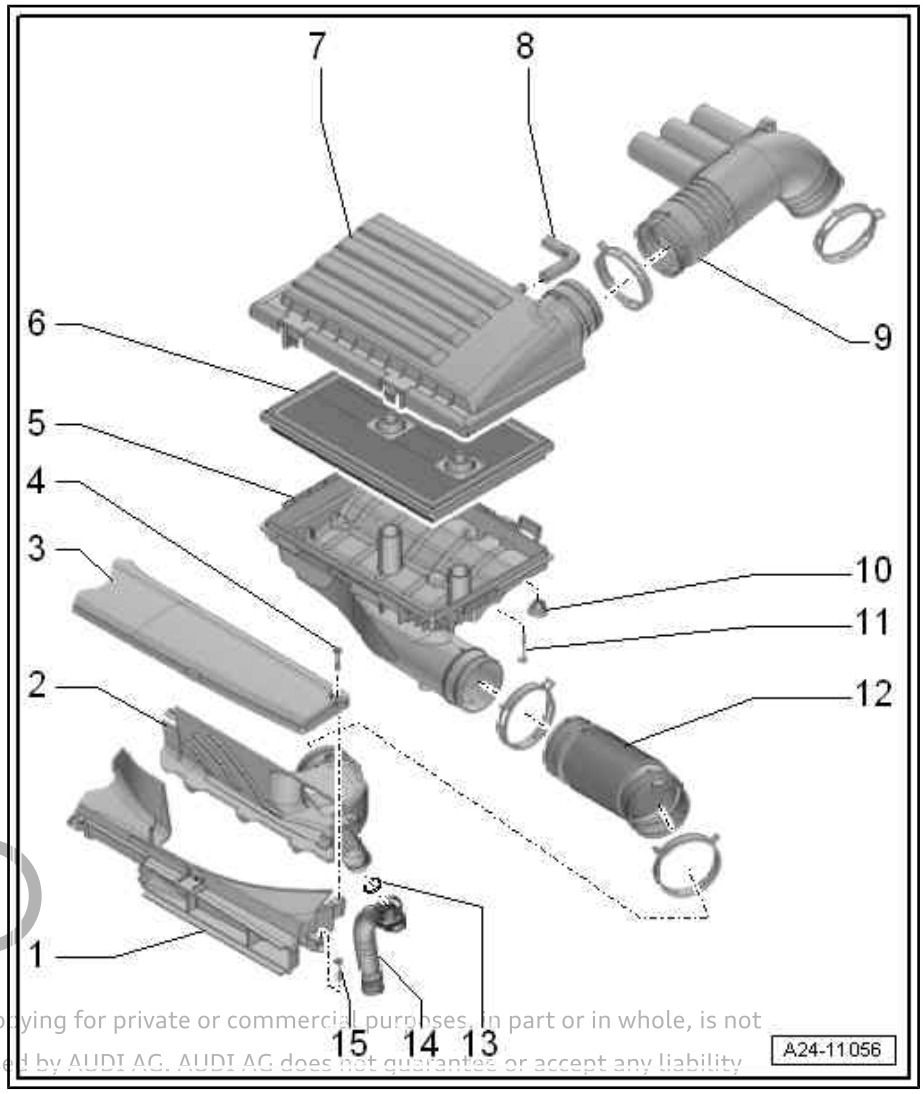
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2 Air cleaner

⇒ “2.1 Exploded view - air cleaner housing”, page 462

⇒ “2.2 Removing and installing air cleaner housing”, page 463

2.1 Exploded view - air cleaner housing



1 - Air duct (bottom section)
- ❑ On lock carrier

2 - Air duct (top section)
- ❑ On lock carrier

3 - Cover
- ❑ For air duct

4 - Bolt
- ❑ 2 Nm

5 - Air cleaner (bottom section)
- ❑ Remove any salt residue, dirt and leaves

6 - Air filter element
- ❑ Use genuine air filter element ⇒ Electronic parts catalogue
- ❑ Change intervals ⇒ Maintenance tables
- ❑ Removing and installing ⇒ Maintenance ; Booklet 821 ; Maintenance; Air cleaner: renewing filter element and cleaning housing

7 - Air cleaner (top section)
- ❑ Remove any salt residue, dirt and leaves

8 - Hose
- ❑ For crankcase breather
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue

9 - Air hose

10 - Rubber buffer

11 - Bolt
- ❑ 1.5 Nm

12 - Air hose

13 - O-ring
- ❑ Renew if damaged

14 - Water drain hose
- ❑ Clean

15 - Bolt
- ❑ 2 Nm

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2.2 Removing and installing air cleaner housing

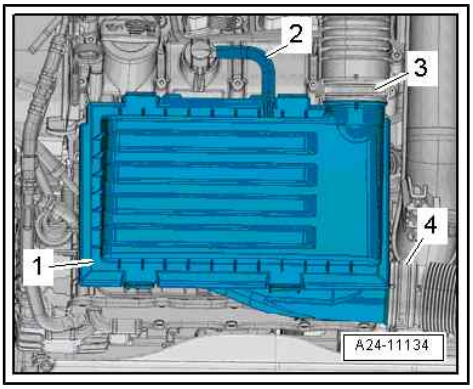
Removing

– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 79 .

Engines without cylinder shut-off:

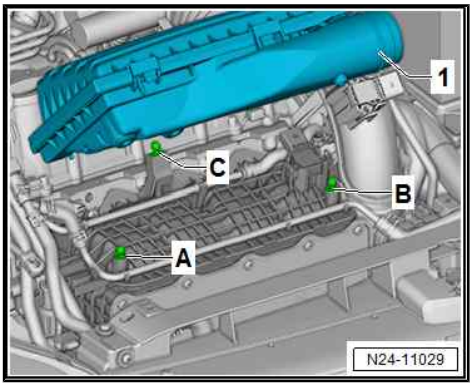
– Detach air hose -2-.

– Release hose clips -3 and 4- and detach air ducts.



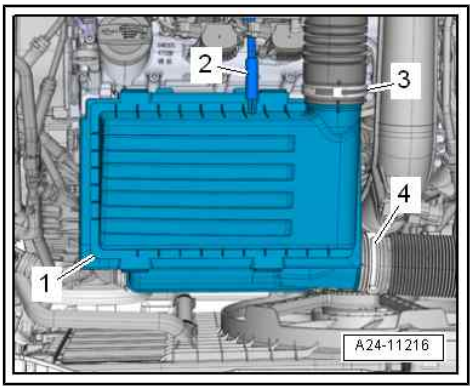
– Lift air cleaner housing -1- off ball studs in the following order:

- First detach air cleaner housing from ball stud -C- at rear of intake manifold.
- Then detach air cleaner housing from the two ball studs -A and B- at front of intake manifold.



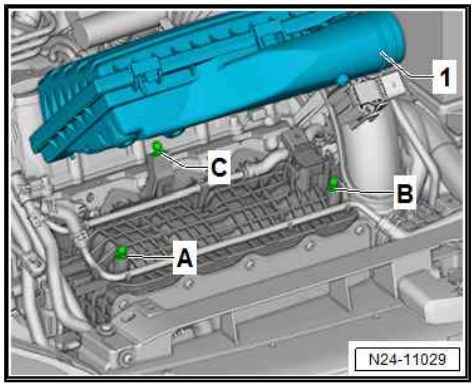
Engines with cylinder shut-off:

– Release hose clips -3 and 4- and detach air ducts and crankcase breather hose -2-.



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– Lift air cleaner housing -1- off ball studs in the following order:



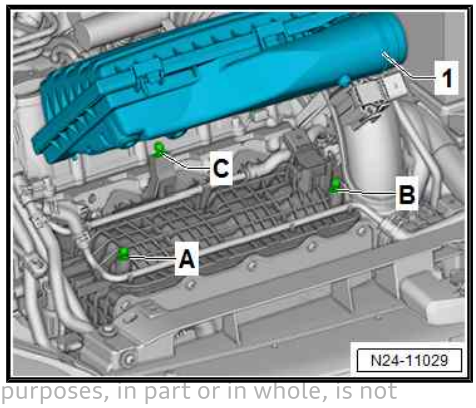
- First detach air cleaner housing from ball stud -C- at rear of intake manifold.
- Then detach air cleaner housing from the two ball studs -A and B- at front of intake manifold.

Installing

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.
- If necessary, use soap solution to install air hoses.
- Secure all hose connections with correct type of hose clips (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.

Observe the correct sequence during installation.



- First press air cleaner housing onto ball studs -A and B- at front of intake manifold.
- Then press air cleaner housing onto ball stud -C- at rear of intake manifold.

– Install engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 79 .

Tightening torques

◆ ⇒ “2.1 Exploded view - air cleaner housing”, page 462

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3 Intake manifold

⇒ “3.1 Exploded view - intake manifold”, page 465

⇒ “3.2 Removing and installing intake manifold”, page 468

⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475

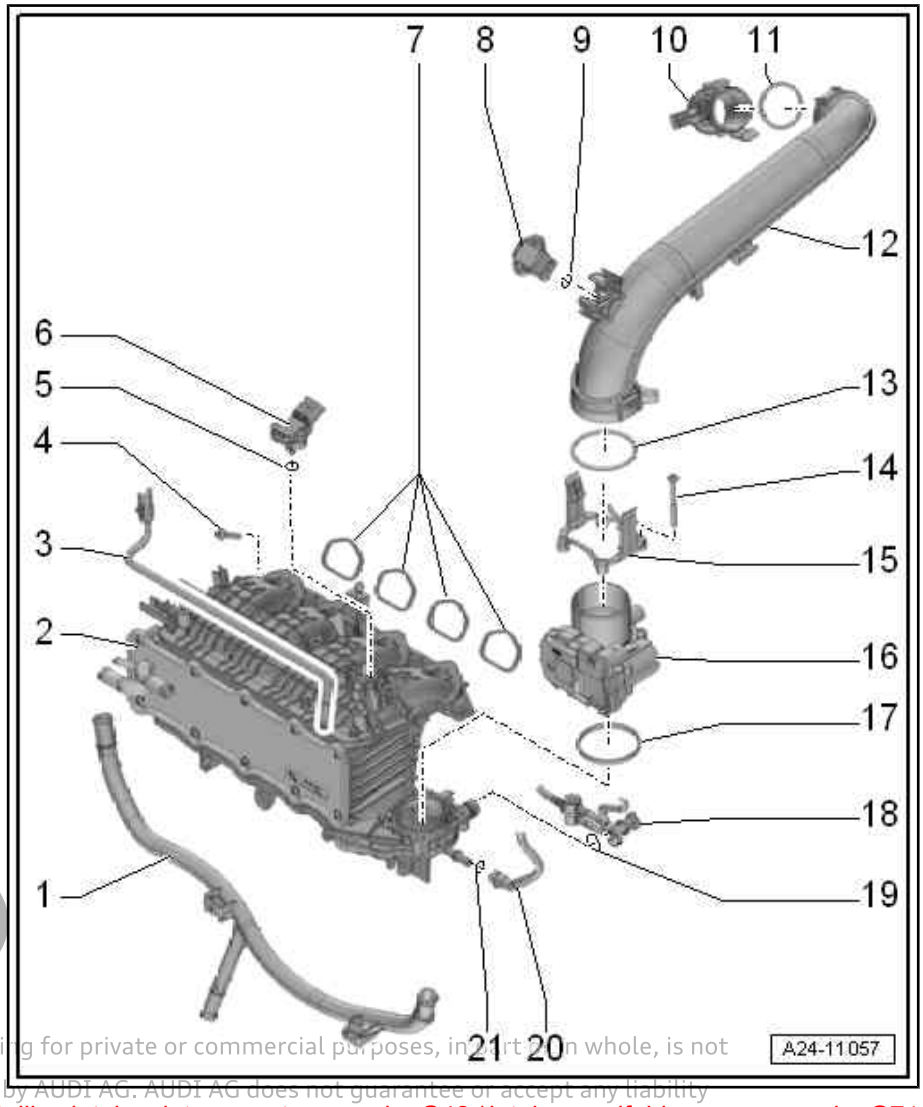
⇒ “3.4 Cleaning throttle valve module GX3 ”, page 477

3.1 Exploded view - intake manifold

⇒ “3.1.1 Exploded view - intake manifold, all vehicles except e-tron”, page 465

⇒ “3.1.2 Exploded view - intake manifold, e-tron”, page 467

3.1.1 Exploded view - intake manifold, all vehicles except e-tron



1 - Coolant pipe

- ❑ Clipped onto intake manifold
- ❑ Removing and installing ⇒ “5.2.1 Removing and installing coolant pipe - all vehicles except e-tron”, page 391

2 - Intake manifold

- ❑ Combined with charge air cooler
- ❑ Removing and installing ⇒ “3.2.1 Removing and installing intake manifold - all vehicles except e-tron”, page 468

3 - Coolant pipe

- ❑ Clipped onto intake manifold

4 - Bolt

- ❑ Tightening torque and sequence ⇒ Fig. ““Intake manifold - tightening torque and sequence”“ , page 466

5 - O-ring

- ❑ Check for damage
- ❑ Supplied with ⇒ Item 6 (page 465) ; not available separately

6 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ❑ Removing and installing ⇒ “5.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 ”, page 486

7 - Gaskets

- ❑ Renew after removing

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8 - Charge pressure sender - G31- / intake air temperature sender 2 - G299-

- ❑ Removing and installing
  ⇒ “2.3 Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299 ”, page 444

9 - O-ring

- ❑ Renew after removing
- ❑ Lubricate lightly with fresh engine oil when fitting

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 - GX3-

- ❑ Removing and installing ⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475
- ❑ Cleaning ⇒ “3.4 Cleaning throttle valve module GX3 ”, page 477
- ❑ After throttle valve module - GX3- has been renewed, it must be re-adapted to engine control unit - J623- . Use vehicle diagnostic tester

17 - Seal

- ❑ Renew after removing

18 - Vacuum line

19 - O-ring

- ❑ Check for damage
- ❑ Supplied with ⇒ Item 18 (page 466) ; not available separately

20 - Vacuum line

21 - O-ring

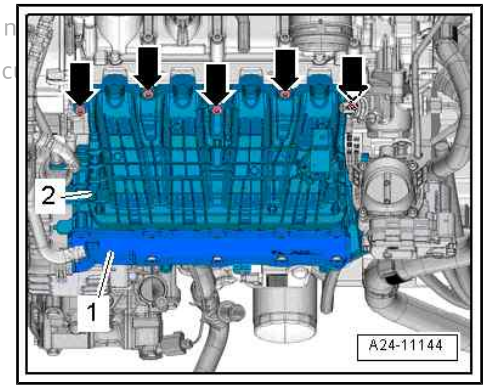
- ❑ Check for damage
- ❑ Supplied with ⇒ Item 20 (page 466) ; not available separately

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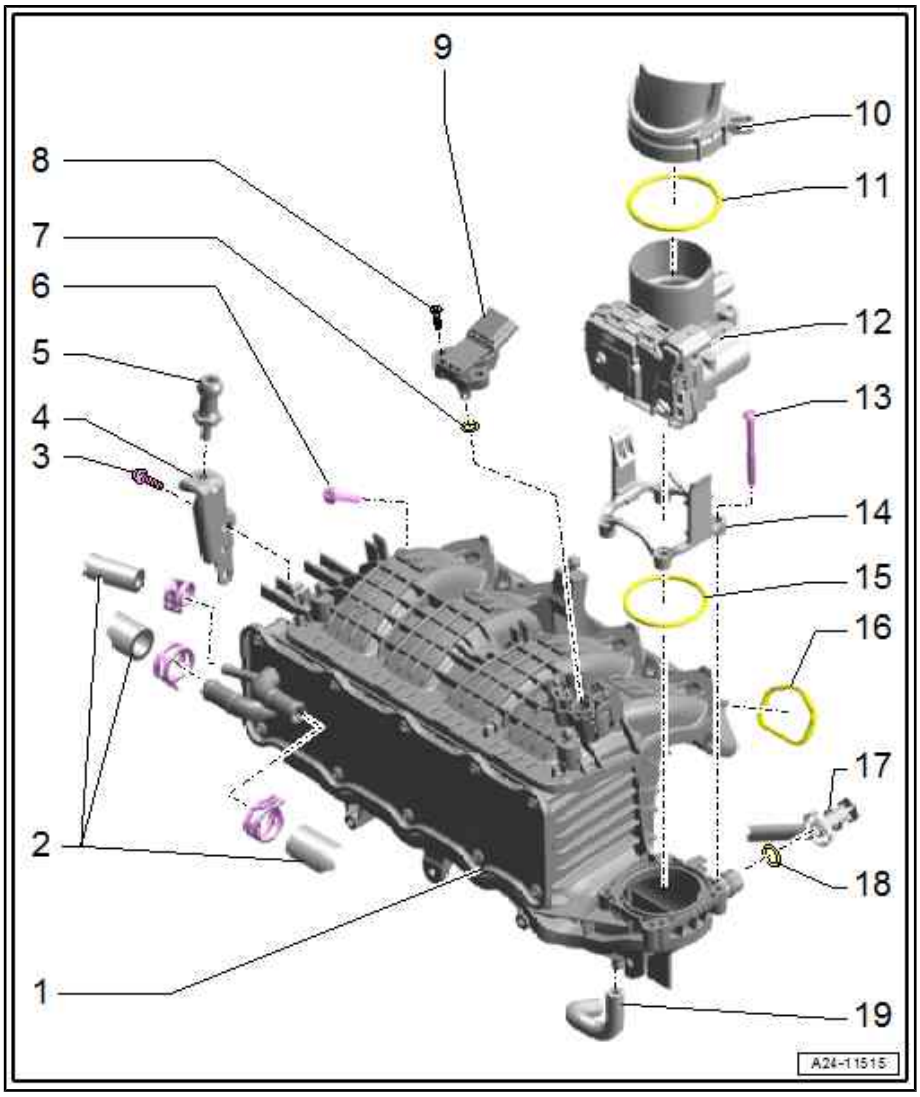
Intake manifold - tightening torque and sequence

– 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



3.1.2 Exploded view - intake manifold, e-tron



1 - Intake manifold

- ❑ Combined with charge air cooler
- ❑ Removing and installing ⇒ “3.2.2 Removing and installing intake manifold - e-tron”, page 472

2 - Coolant hoses

3 - 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

4 - Bracket

5 - Ball stud

- ❑ For engine cover panel

6 - Bolt

- ❑ Tightening torque and sequence ⇒ page 468

7 - O-ring

- ❑ Renew after removing

8 - 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

9 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ❑ Removing and installing ⇒ “5.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 ”, page 486

10 - Air pipe

11 - O-ring

- ❑ Renew after removal (apply thin coating of clean engine oil prior to installation)

12 - Throttle valve module - GX3-

- ❑ Removing and installing ⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475
- ❑ Cleaning ⇒ “3.4 Cleaning throttle valve module GX3 ”, page 477
- ❑ After throttle valve module - GX3- has been renewed, it must be re-adapted to engine control unit - J623- ⇒ Vehicle diagnostic tester

13 - 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

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14 - Retaining clip

- ❑ For air pipe

15 - O-ring

- ❑ Renew after removing

16 - Gasket

- ❑ 4x
- ❑ Renew after removing

17 - Line for activated charcoal filter system

18 - O-ring

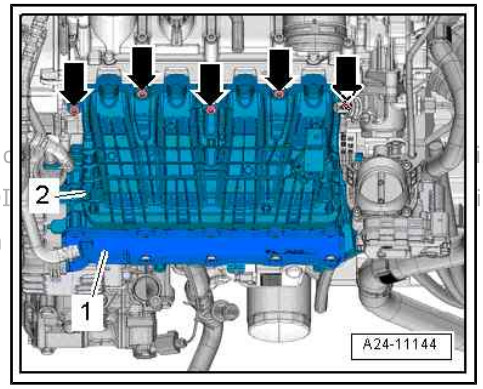
- ❑ Check for damage and renew if necessary

19 - Crankcase breather hose

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



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3.2 Removing and installing intake manifold

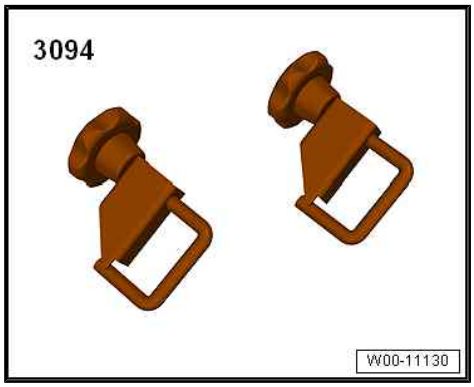
⇒ “3.2.1 Removing and installing intake manifold - all vehicles except e-tron”, page 468

⇒ “3.2.2 Removing and installing intake manifold - e-tron”, page 472

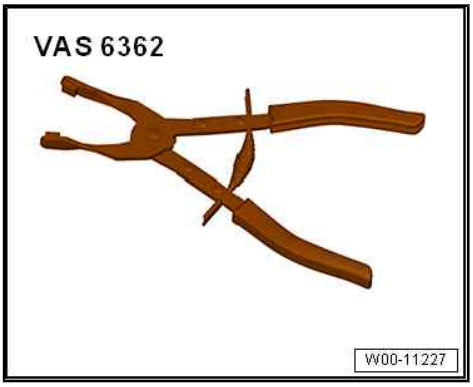
3.2.1 Removing and installing intake manifold - all vehicles except e-tron

Special tools and workshop equipment required

- ♦ Hose clamps up to 25 mm - 3094-

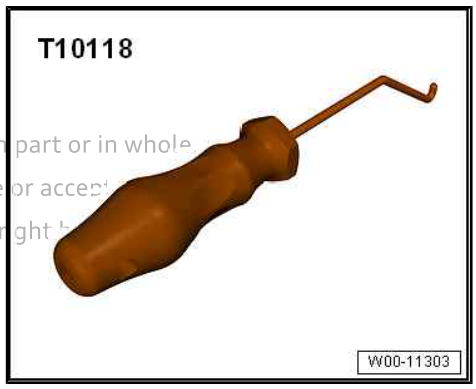


♦ Hose clip pliers - VAS 6362-

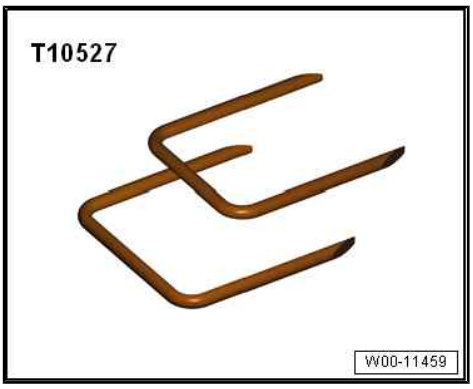


♦ Assembly tool - T10118-

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



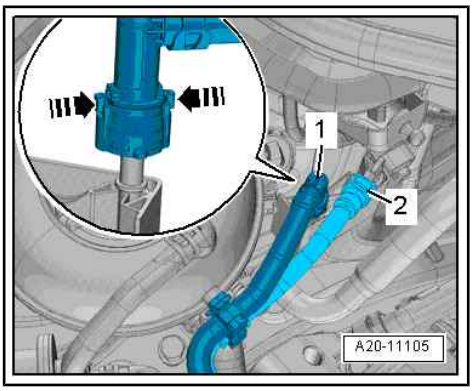
Removing

– Remove air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

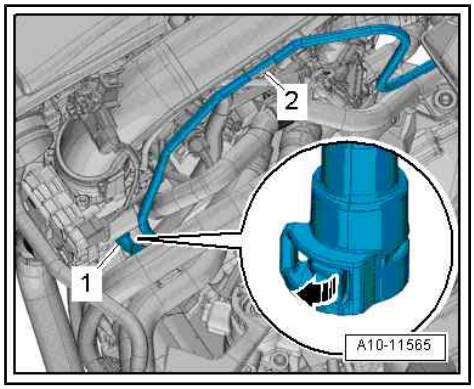
– Disconnect hose connector -1- ⇒ Fuel supply system; Rep. gr. 20 ; Plug-in connectors; Disconnecting plug-in connectors .

– Press release tab on hose -2- for activated charcoal filter.

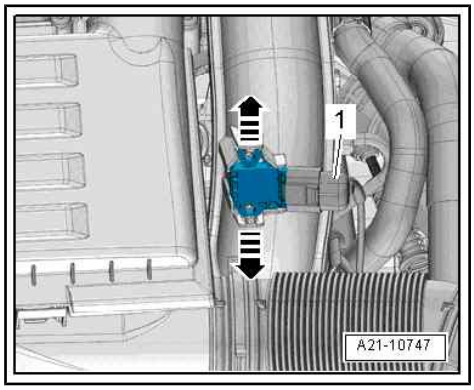
– Disconnect hose and move it clear.



– Release catch -arrow- and disconnect vacuum hose -1-.
– Move vacuum hose clear at air pipe -2-.

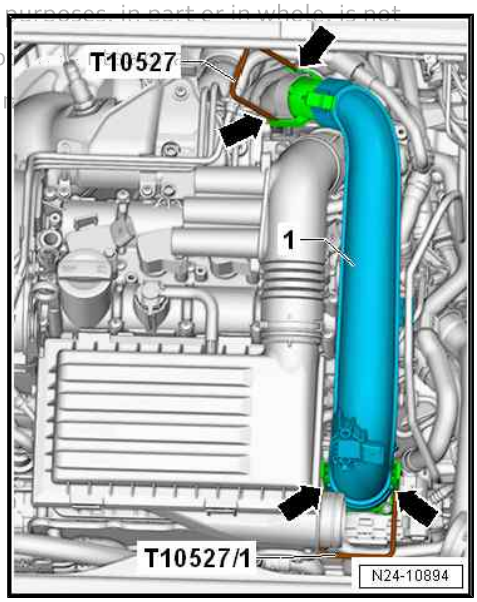


– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



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



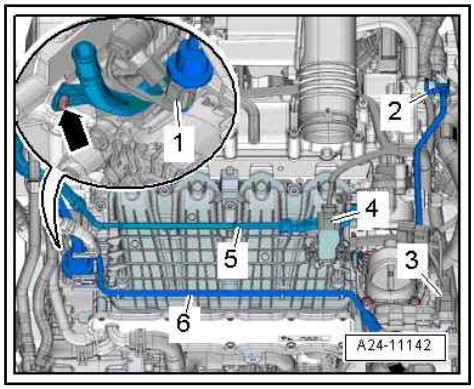
– Unplug electrical connectors:

1 - For activated charcoal filter solenoid valve 1 - N80-

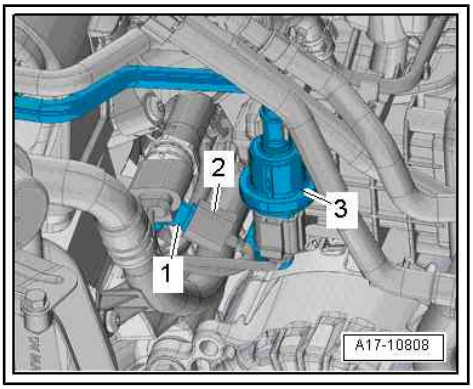
3 - For throttle valve module - GX3-

4 - For intake manifold pressure sender - G71-

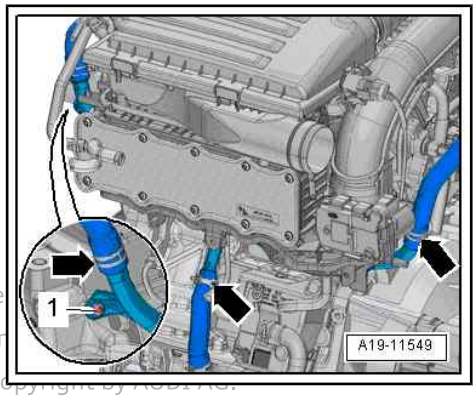
– Press release tabs on both sides and disconnect hose -2- for activated charcoal filter.
– Unclip fuel supply line -5- and coolant line -6- from intake manifold and push them to one side.



– Unplug electrical connector -2- on oil pressure switch for reduced oil pressure - F378- -item 1- with assembly tool - T10118- .
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

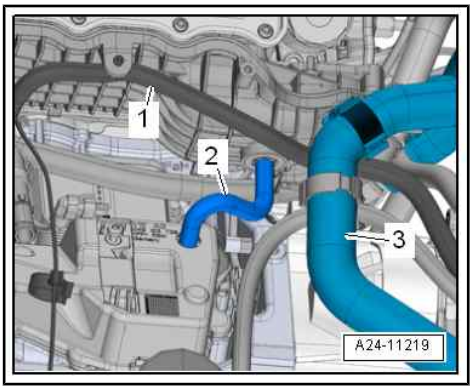


– Remove bolt -1-.
– Clamp off coolant hoses with hose clamps up to 25 mm - 3094- .
– Place a cloth underneath to catch escaping coolant.
– Release hose clips -arrows- and disconnect coolant hoses.

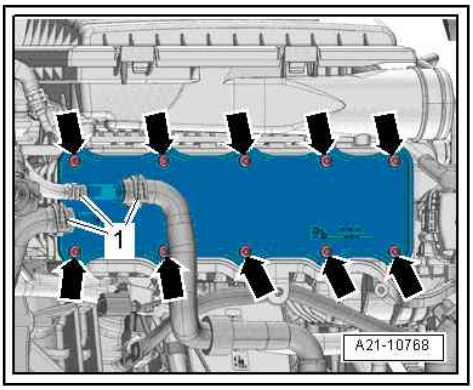


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– Move electrical wiring harness -1- and coolant hose -3- clear at intake manifold.
– Disconnect crankcase breather hose -2-.



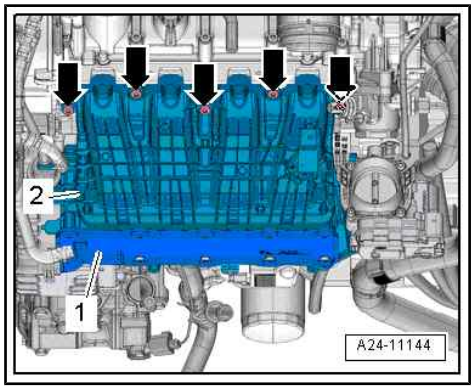
– Remove bolts -arrows-.



– Remove bolts -arrows-.

– Detach intake manifold -2-; at the same time pull off charge air cooler -1-.

– Remove coolant pipe
⇒ “5.2.1 Removing and installing coolant pipe - all vehicles except e-tron”, page 391 .



Installing

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

- Check gaskets and O-rings and renew if necessary
⇒ “3.1.1 Exploded view - intake manifold, all vehicles except e-tron”, page 465 .

– Install charge air cooler
⇒ “2.4.1 Removing and installing charge air cooler - all vehicles except e-tron”, page 445 .

Tightening torques

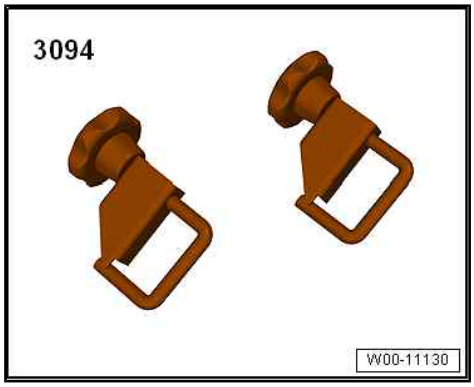
- ⇒ “4.2.1 Exploded view - electric coolant pump, all vehicles except e-tron”, page 345
- ⇒ “5.1.1 Exploded view - coolant pipes, all vehicles except e-tron”, page 389
- ⇒ “6.1 Exploded view - radiators/radiator fan”, page 398
- ⇒ “2.1 Exploded view - air cleaner housing”, page 462
- ⇒ “3.1.1 Exploded view - intake manifold, all vehicles except e-tron”, page 465
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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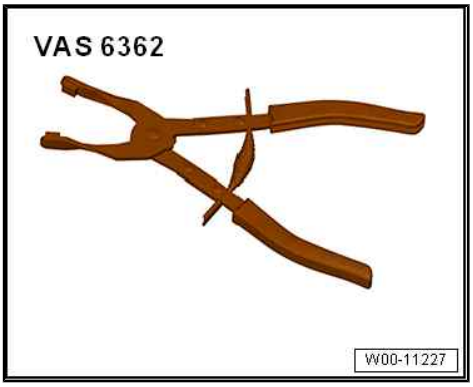
3.2.2 Removing and installing intake manifold - e-tron

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6362-

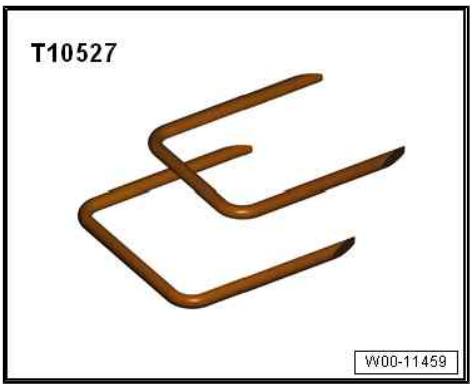


- Assembly tool - T10118-

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



Removing

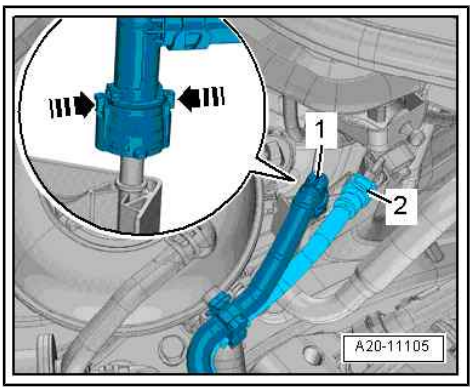
– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

– Disconnect hose connector -1- ⇒ Fuel supply system; Rep. gr. 20 ; Plug-in connectors; Disconnecting plug-in connectors .

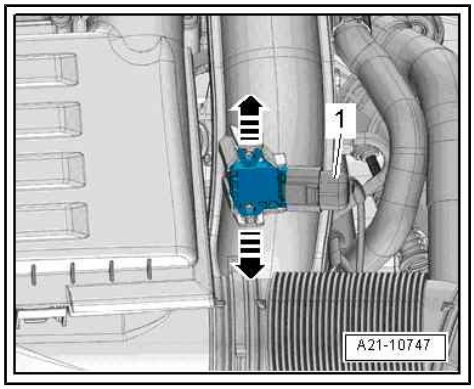
– Move hose clear.

– Press release tabs on both sides of hose -2- for activated charcoal filter.

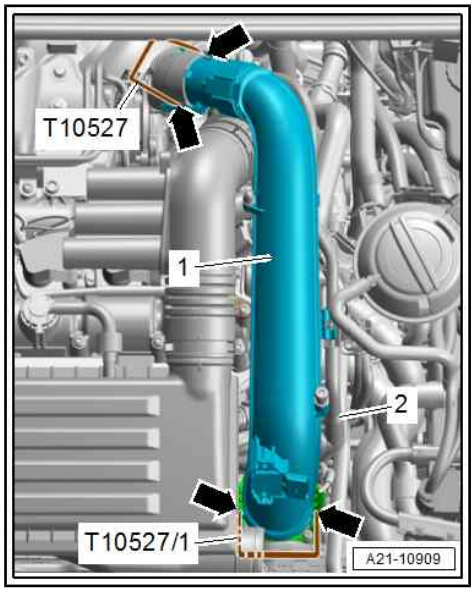
– Disconnect hose and move it clear.



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

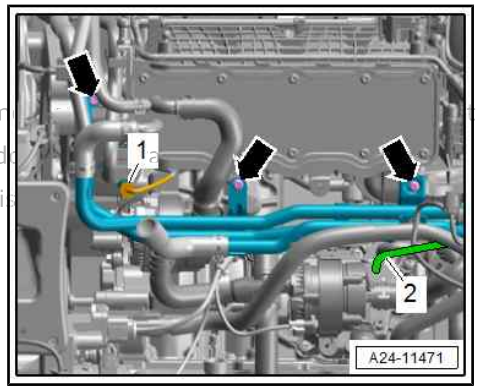


– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.
– Move line for activated charcoal filter system clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1- .
– Detach air pipe -1-.



– Unplug electrical connector -1- at activated charcoal filter solenoid valve 1 - N80- and move wiring clear.
– Disconnect crankcase breather hose -2-.
– Remove bolts -arrows- for coolant pipes (front).

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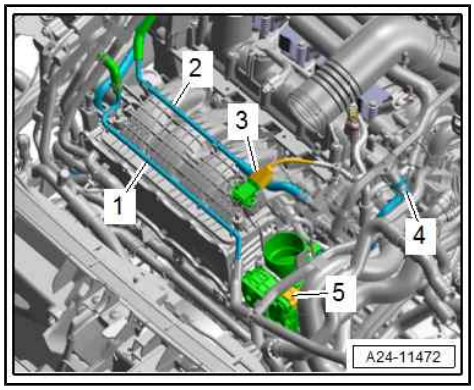


– Unplug electrical connectors:

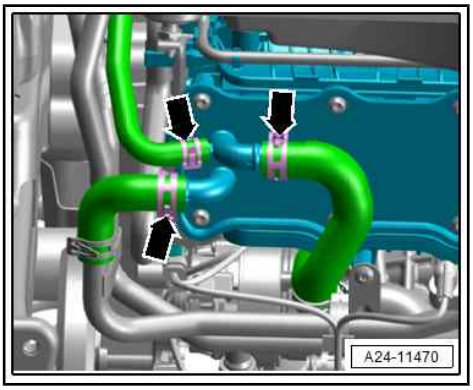
3 - For intake manifold pressure sender - G71-

5 - For throttle valve module - GX3-

– Press release tabs on both sides and disconnect hose -4- for activated charcoal filter.
– Unclip fuel supply line -2- and coolant line -1- from intake manifold and push them to one side.

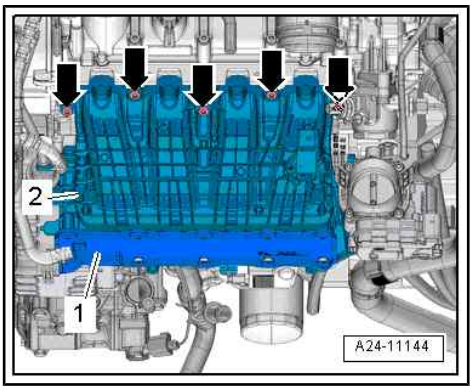


– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.



– Remove bolts -arrows-.

– Detach intake manifold -2- with charge air cooler -1-.



Installing

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

- Renew gaskets and O-rings
  ⇒ “3.1.2 Exploded view - intake manifold, e-tron”, page 467 .

– Check coolant level and top up if necessary ⇒ page 322 .

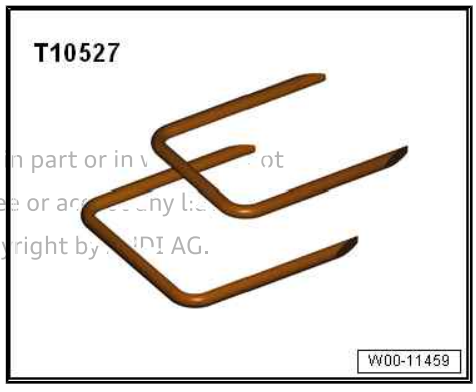
Tightening torques

- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ “5.1.2 Exploded view - coolant pipes, e-tron”, page 390
- ⇒ “3.1.2 Exploded view - intake manifold, e-tron”, page 467

3.3 Removing and installing throttle valve module - GX3-

Special tools and workshop equipment required

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



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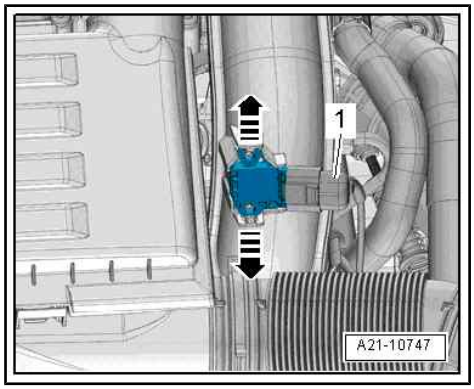
Removing

e-tron:

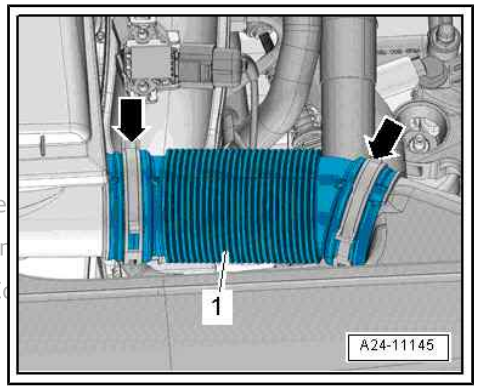
– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

All vehicles (continued):

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



– Open hose clips -arrows- and detach air duct -1-.

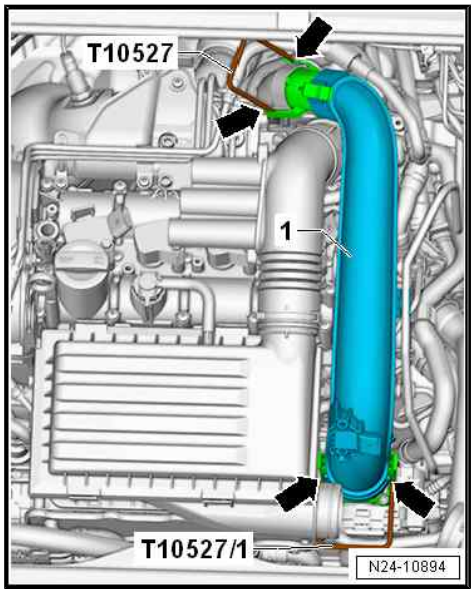


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All vehicles except e-tron:

– Move air hoses clear at air pipe.

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



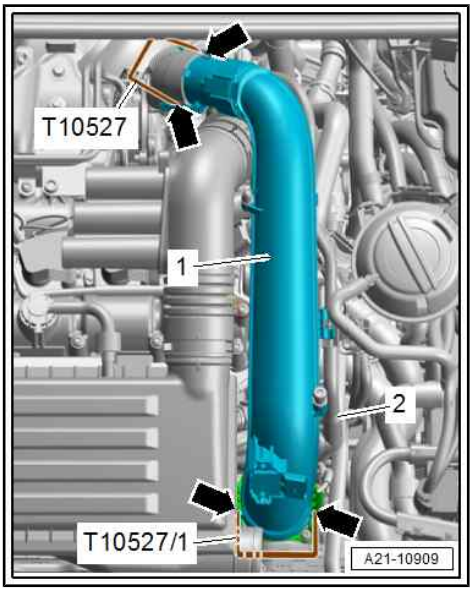
e-tron:

– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.

– Move line for activated charcoal filter system clear at air pipe.

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

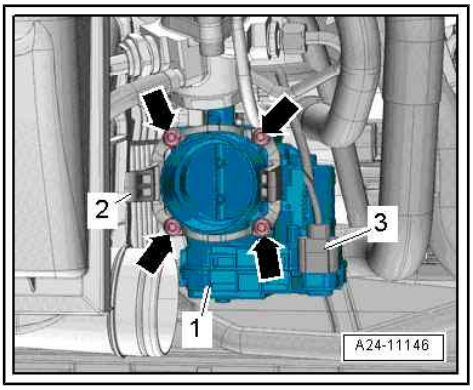
– Detach air pipe -1-.



All vehicles (continued):

– Unplug electrical connector -3-.

– Remove bolts -arrows- and detach throttle valve module - GX3- -item 1- with adapter -2-.



Installing

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

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– After renewing components, erase learnt values and adapt throttle valve module - GX3- to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

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Tightening torques

♦ ⇒ “3.1 Exploded view - intake manifold”, page 465

3.4 Cleaning throttle valve module - GX3-

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

♦ Acetone (commercially available)

♦ Brush

Procedure

– Remove throttle valve module - GX3- ⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475 .

– Open throttle valve by hand and lock it in open position with a wedge (plastic or wood) -arrow-.



CAUTION

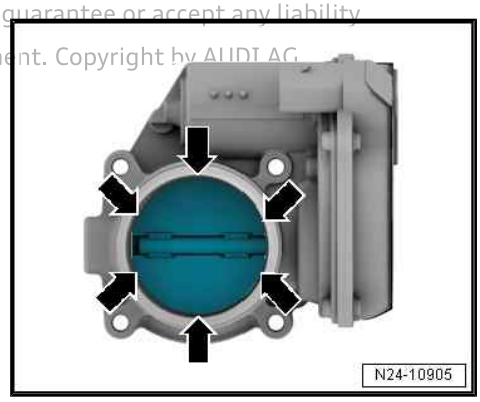
Risk of injury caused by acetone. Acetone is highly flammable and can cause irritation to the eyes and skin.

– Put on safety goggles.

– Put on protective gloves.

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– 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 - GX3- ⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475 .

– Erase learnt values and adapt throttle valve module - GX3- to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

3.5 Removing and installing activated charcoal filter solenoid valve 1 - N80-

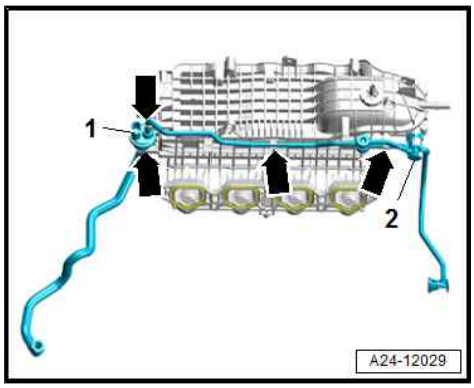
Activated charcoal filter solenoid valve 1 - N80- and connecting pipe are a single component and cannot be removed separately.

Removing

- Intake manifold removed ⇒ “3.2 Removing and installing intake manifold”, page 468 .

– Turn intake manifold over and place on a soft surface.

– Unclip activated charcoal filter solenoid valve 1 - N80- -1- (with connecting pipe) from retainers -arrows- on intake manifold.



– Press release tab on quick connector -2-, unplug activated charcoal filter solenoid valve 1 - N80- -1- (with connecting pipe) from intake manifold and remove.

Installing

Installation is carried out in reverse sequence.

Tightening torques

◆ ⇒ “3.1 Exploded view - intake manifold”, page 465

4 Injectors

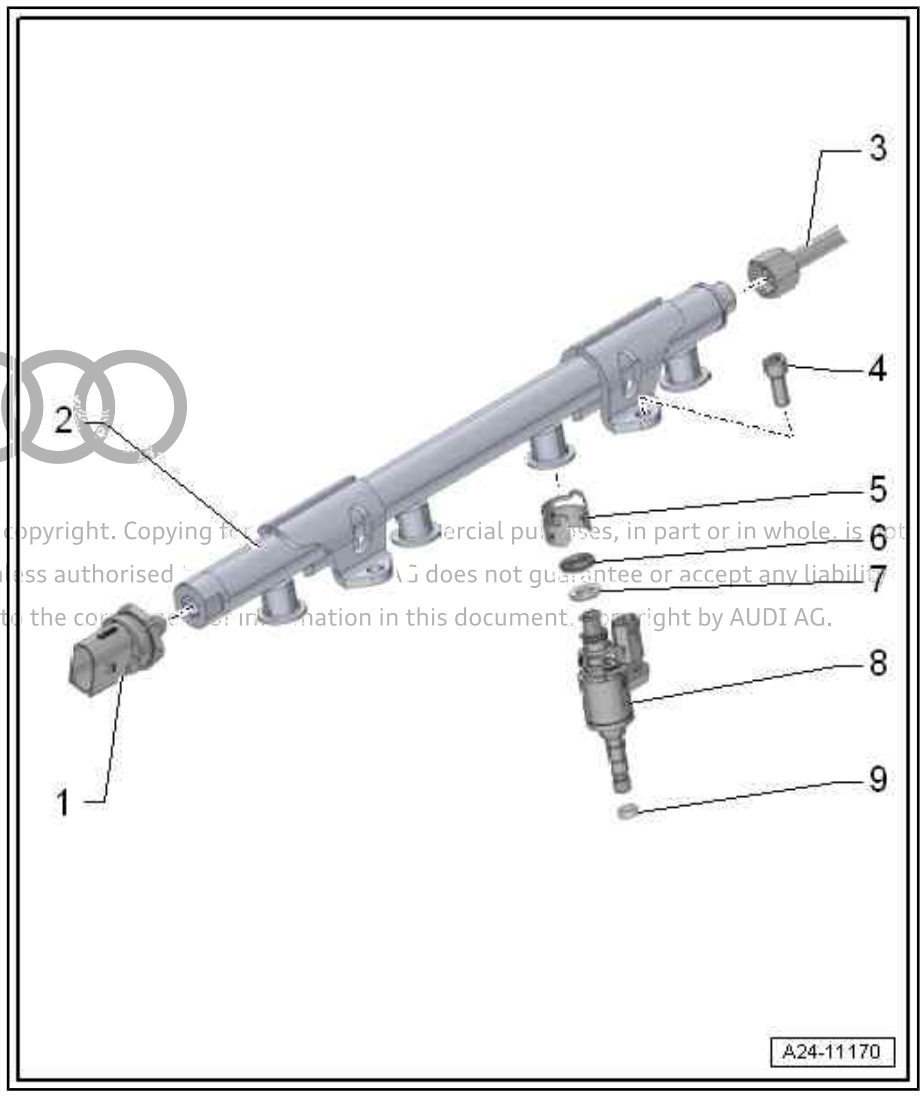
⇒ “4.1 Exploded view - fuel rail with injectors”, page 479

⇒ “4.2 Removing and installing fuel rail”, page 480

⇒ “4.3 Removing and installing injectors”, page 480

⇒ “4.4 Cleaning injectors”, page 484

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 488
- ❑ Removing and installing ⇒ “5.2 Removing and installing fuel pressure sender G247 ”, page 486
- ❑ Lubricate taper and threads lightly with clean engine oil
- ❑ 22 Nm

2 - Fuel rail

- ❑ Removing and installing ⇒ “4.2 Removing and installing fuel rail”, page 480

3 - High-pressure pipe

- ❑ Can be reused
- ❑ Check for damage before installing
- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ Removing and installing ⇒ “6.3 Removing and installing high-pressure pipe”, page 498
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm + 45°

4 - Bolt

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

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

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❑ Lubricate lightly with clean engine oil

7 - Spacer ring

❑ Renew if damaged

8 - Injector

❑ Removing and installing ⇒ “4.3 Removing and installing injectors”, page 480

9 - Combustion chamber ring seal

❑ Do not apply grease or use any other lubricants

❑ Renewing ⇒ “4.3 Removing and installing injectors”, page 480

4.2 Removing and installing fuel rail

Removing

- Observe rules for cleanliness ⇒ “4.2 Rules for cleanliness”, page 9 .

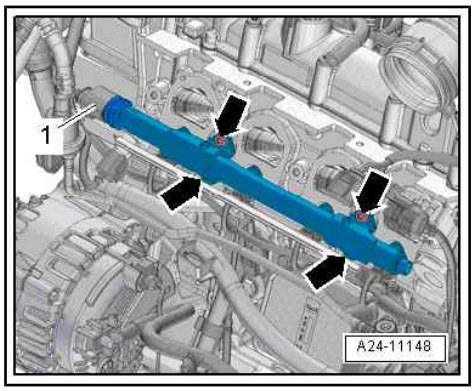
– Remove intake manifold ⇒ “3.2 Removing and installing intake manifold”, page 468 .

– Remove high-pressure pipe ⇒ “6.3 Removing and installing high-pressure pipe”, page 498 .

– Unplug electrical connector -1-.

– Place a cloth underneath to catch escaping fuel.

– Remove bolts -arrows- and pull fuel rail off injectors.



Installing

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

- Renew O-rings after removing.
- Renew support rings after removing.

– 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 hold, and screw bolts in up to base.

– Tighten bolts to specified torque.

- The fuel rail must not be pulled on using the bolts.

– Install high-pressure pipe ⇒ “6.3 Removing and installing high-pressure pipe”, page 498 .

– Install intake manifold ⇒ “3.2 Removing and installing intake manifold”, page 468 .

Tightening torques

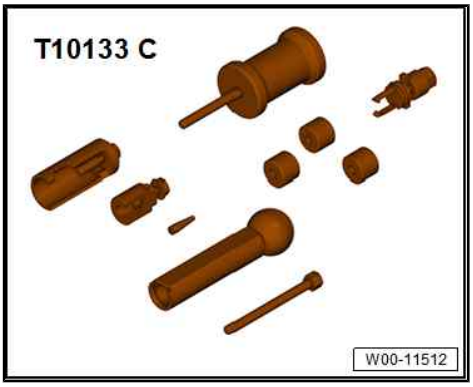
◆ ⇒ “4.1 Exploded view - fuel rail with injectors”, page 479

4.3 Removing and installing injectors

Special tools and workshop equipment required

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♦ Tool set for FSI engines - T10133C- with -T10133/16A- and -T10133/19-



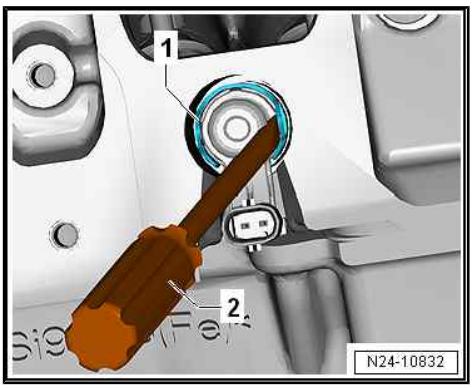
Removing

- Observe rules for cleanliness
  ⇒ “4.2 Rules for cleanliness”, page 9 .
- Injectors must only be installed when engine is cold.

– Remove intake manifold
  ⇒ “3.2 Removing and installing intake manifold”, page 468 .
– Remove fuel rail
  ⇒ “4.2 Removing and installing fuel rail”, page 480 .
– Remove O-ring -4- from injector -2-.
– Unplug electrical connector from corresponding injector.



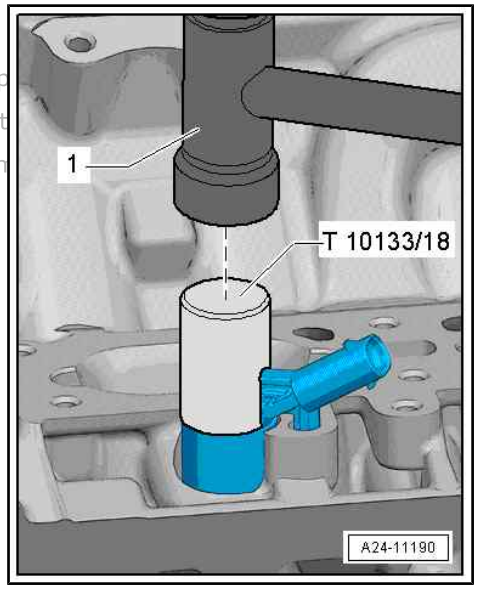
– Use screwdriver -2- to prise support ring -1- off injector.



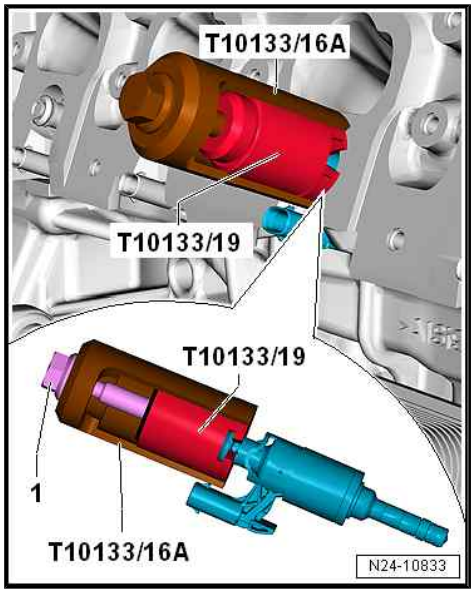
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– Slide stop sleeve -T10133/18- over injector.
– Carefully knock against stop sleeve several times with a plastic hammer -1- to loosen injector.
– Adjust torque wrench to 5 Nm.



– 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.
• Observe correct torque to avoid irreparable damage to injector.
• The combustion chamber ring seal must always be renewed before the injector is re-installed.
– Detach gasket for intake manifold (bottom section).

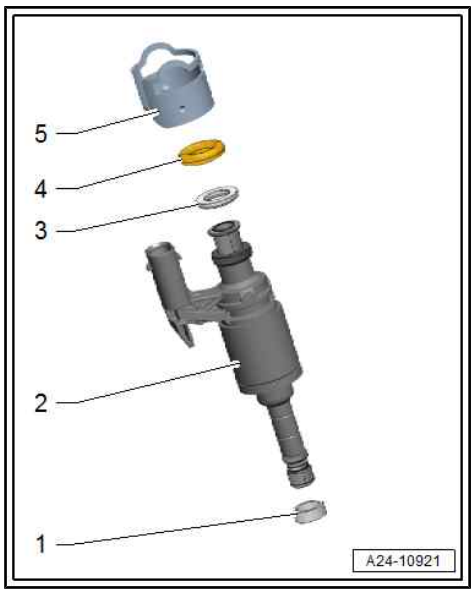


Dismantling injector

– 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.
• Take care not to damage groove on injector.
• Renew injector if groove is damaged.

Installing

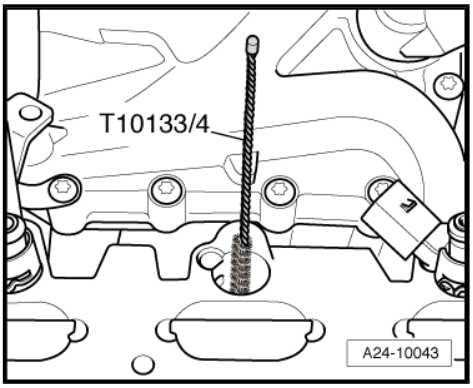
• Use complete repair set when installing.
• Renew support ring.
• Renew combustion chamber ring seal before re-installing injector.
• Lightly lubricate O-rings for injectors with clean engine oil.



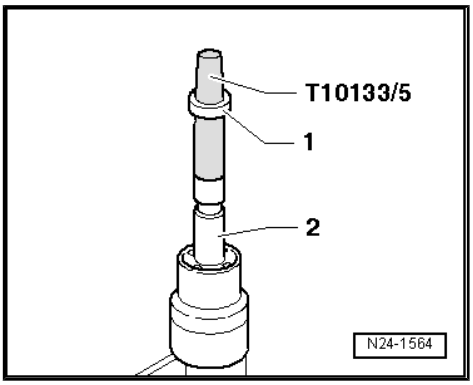
– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

– When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.

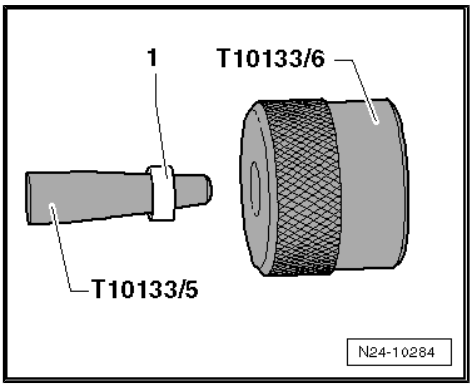
– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.



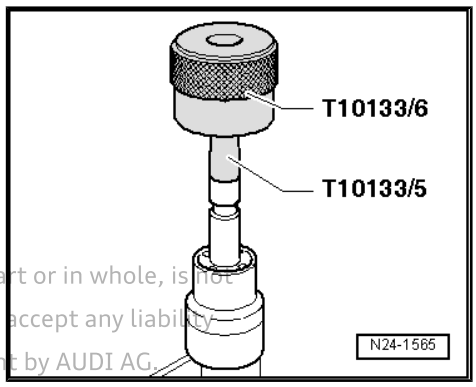
9



– 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.

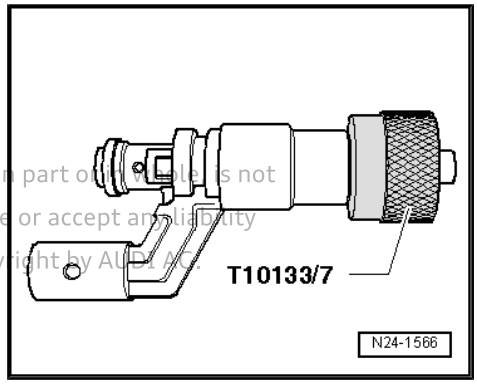


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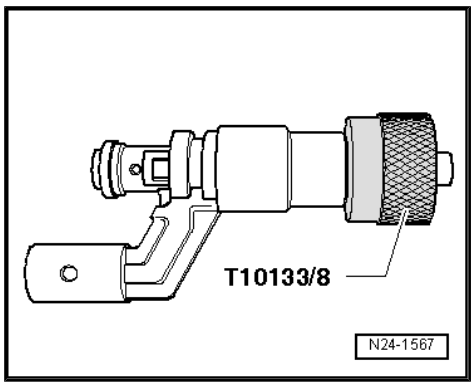
The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages:

– 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.

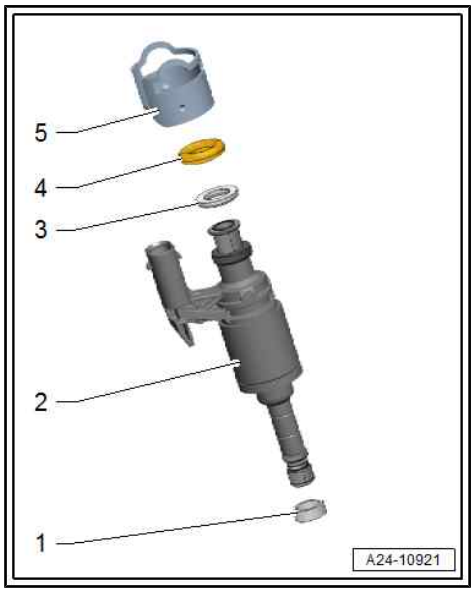
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– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.



– Before installing new injector -2-, lubricate new O-ring -4- lightly with clean engine oil.
• 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.
• It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.
– Fit support ring onto injector.
– Install fuel rail
⇒ “4.2 Removing and installing fuel rail”, page 480 .
– Install intake manifold
⇒ “3.2 Removing and installing intake manifold”, page 468 .
– Delete adaption values for injectors ⇒ Vehicle diagnostic tester, Guided Functions, 01 - Delete adaption values for injectors.



4.4 Cleaning injectors

Special tools and workshop equipment required

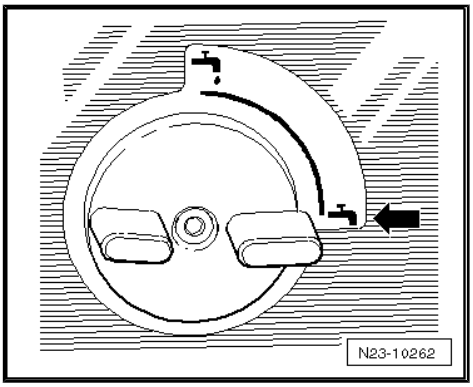
♦ Ultrasonic cleaning unit - VAS 6418-
♦ Mounting plate for injection modules - VAS 6418/1-
♦ Cleaning fluid - VAS 6418/2-

Cleaning

– Remove injectors
⇒ “4.3 Removing and installing injectors”, page 480 .

– 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- .



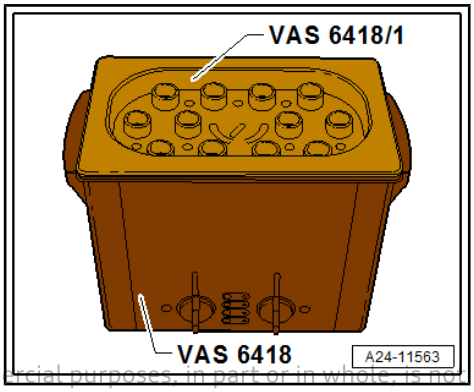
Mixture ratio for cleaning fluid

- 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-

– Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.

- 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- .



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– Switch on cleaning unit by pressing on/off button -C-.

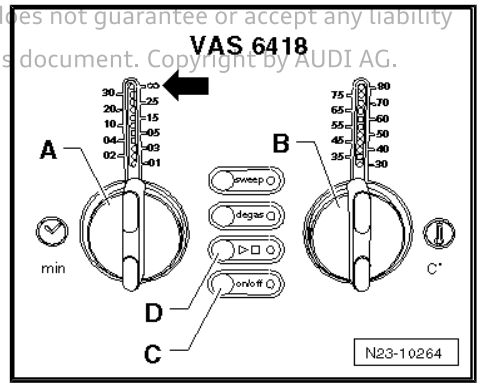
– Select a cleaning time of 30 minutes with rotary control -A-.

– Set rotary control -B- to a temperature of 50°C.

– Press ▶ button -D- to start cleaning procedure.

- The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.

– Install injectors with new combustion chamber seal
⇒ “4.3 Removing and installing injectors”, page 480 .



5 Senders and sensors

⇒ “5.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 ”, page 486

⇒ “5.2 Removing and installing fuel pressure sender G247 ”, page 486

⇒ “5.3 Checking fuel pressure sender G247 ”, page 488

⇒ “5.4 Removing and installing pressure differential sender for particulate filter G1037 ”, page 491

5.1 Removing and installing intake air temperature sender - G42- / intake manifold pressure sender - G71-

e-tron with particulate filter: Designation in current flow diagram is intake manifold sender - GX9- . Consists of:

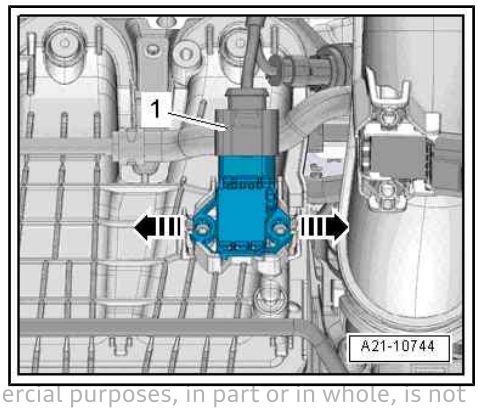
- Intake manifold pressure sender - G71-
- Intake manifold temperature sender - G72-

Removing

– Remove air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

– Unplug electrical connector -1-.

– Release catches -arrows- and detach intake air temperature sender - G42- / intake manifold pressure sender - G71- .



Installing

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

– If necessary, renew O-ring after removal.

Note:

Secure intake air temperature sender - G42- / intake manifold pressure sender - G71- with bolts if fasteners have broken off. For bolts, refer to ⇒ Electronic parts catalogue (ETKA) .

– Install air cleaner housing
⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

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5.2 Removing and installing fuel pressure sender - G247-

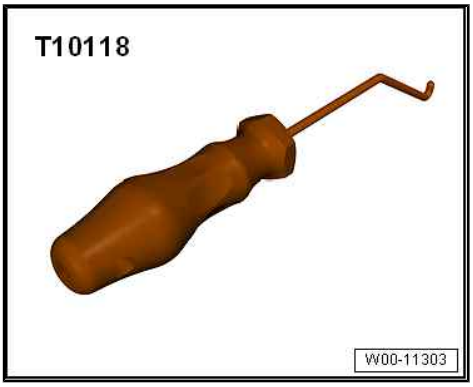
⇒ “5.2.1 Removing and installing fuel pressure sender G247 - all vehicles except e-tron”, page 486

⇒ “5.2.2 Removing and installing fuel pressure sender G247 - e-tron”, page 487

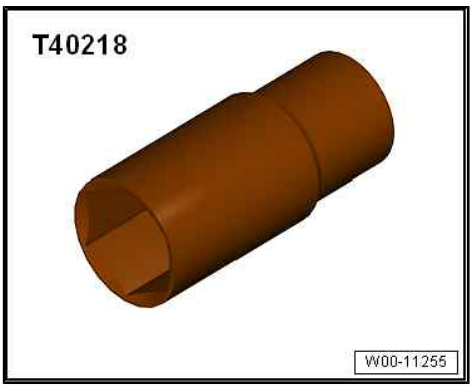
5.2.1 Removing and installing fuel pressure sender - G247- - all vehicles except e-tron

Special tools and workshop equipment required

- Assembly tool - T10118-



- Socket (27 mm) - T40218- or commercially available socket (27 mm)

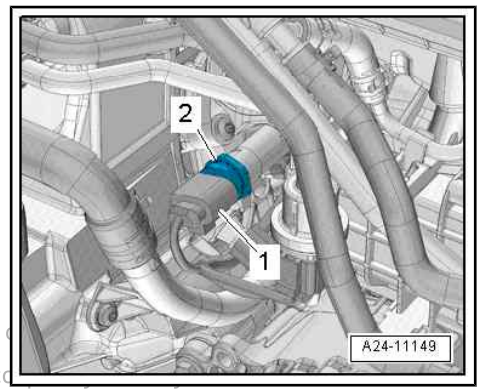


Removing

– Unplug electrical connector -1-.

⚠ CAUTION

The fuel system is pressurised.
Risk of injury as fuel may spray out.
– Put on safety goggles.
– Put on protective gloves.
– Release pressure (wrap a clean cloth around connection and open connection carefully).



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– Unscrew fuel pressure sender - G247- -2- using bit (27 mm) - T40218- .

Installing

Installation is carried out in reverse sequence.

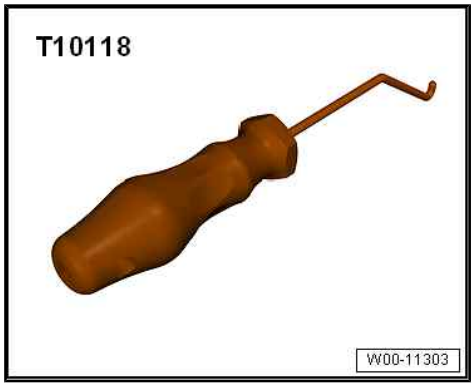
Tightening torques

- ⇒ “4.1 Exploded view - fuel rail with injectors”, page 479

5.2.2 Removing and installing fuel pressure sender - G247- - e-tron

Special tools and workshop equipment required

♦ Assembly tool - T10118-



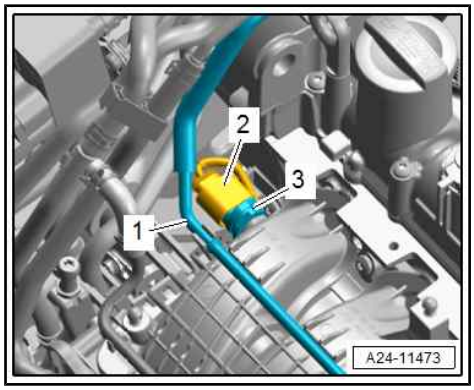
♦ Crow-foot wrench, 27 mm (commercially available)

Removing

– Remove air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

– Unclip fuel supply line -1- from intake manifold and push it to one side.

– Unplug electrical connector -2-.



CAUTION

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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

– Unscrew fuel pressure sender - G247- -item 3- using crow-foot wrench, 27 mm.

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Installing

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

– Install air cleaner housing ⇒ “2.2 Removing and installing air cleaner housing”, page 463 .

Tightening torques

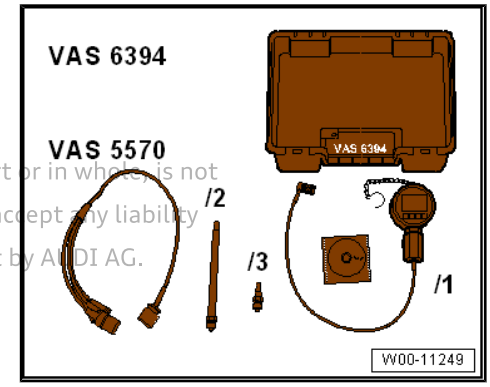
♦ ⇒ “4.1 Exploded view - fuel rail with injectors”, page 479

5.3 Checking fuel pressure sender - G247-

Special tools and workshop equipment required

♦ Vehicle diagnostic tester

♦ Test instrument adapter/DSO (3-pin) - VAS 5570-



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♦ Pressure sensor tester - VAS 6394-

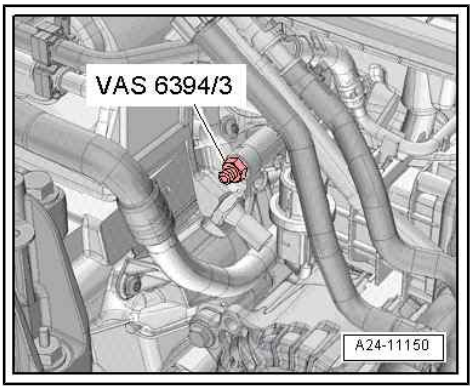
Procedure

- Observe rules for cleanliness
  ⇒ “4.2 Rules for cleanliness”, page 9 .

– Remove fuel pressure sender - G247-
  ⇒ “5.2 Removing and installing fuel pressure sender G247 ”, page 486 .

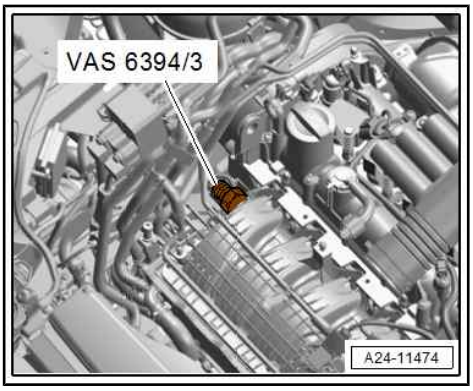
All vehicles except e-tron:

– Lubricate taper seal of adapter -VAS 6394/3- with clean engine oil and screw into fuel rail (22 Nm).



e-tron:

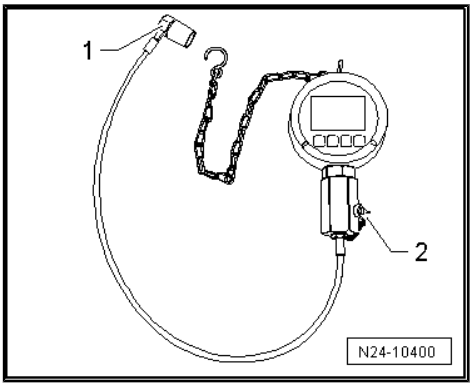
– Lubricate taper seal of adapter -VAS 6394/3- with clean engine oil and screw into fuel rail (22 Nm).



All vehicles (continued):

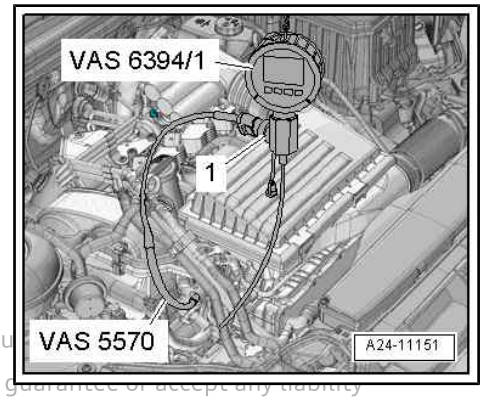
– Unscrew plug -2- and screw fuel pressure sender - G247- into tester -VAS 6394/1- .

– Connect pressure line -1- of tester to adapter - VAS 6394/3- .



All vehicles except e-tron:

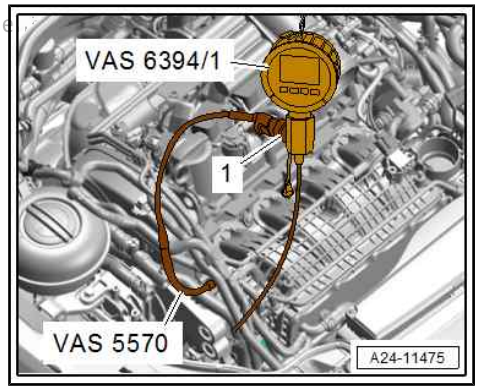
– Connect vehicle and fuel pressure sender - G247- electrically using test instrument adapter/DSO (3-pin) - VAS 5570- .



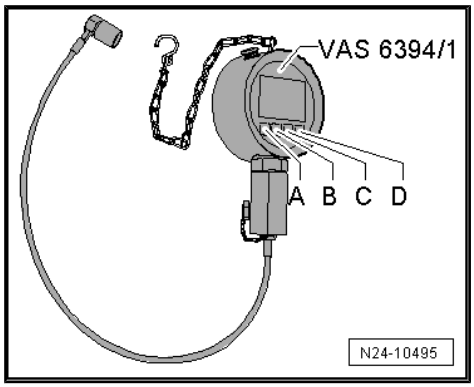
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e-tron:

– Connect vehicle and fuel pressure sender - G247- electrically using test instrument adapter/DSO (3-pin) - VAS 5570- .



All vehicles (continued):



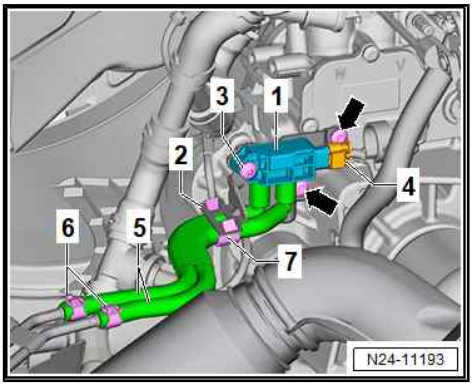
– Switch on tester -VAS 6394/1- by pressing button -A- once briefly.
– You can press and hold button -A- for 2 seconds to switch on the illumination for 20 seconds.
– If tester -VAS 6394/1- does not indicate 0 bar, zero the tester ⇒ Operating instructions .
– Connect a vehicle diagnostic tester .
– Start 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.

5.4 Removing and installing pressure differential sender for particulate filter - G1037-

Removing

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– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Unplug electrical connector -4-.
– Remove bolts -arrows-.
– Open hose clips -6- and detach hoses -5-.
– Remove bolt -3-.
– Unfasten clip -7- at bracket -2-.
– Carefully detach elbow fittings for hoses -5- at pressure differential sender for particulate filter - G1037- .



Note

If elbow fitting -2- breaks off, use long-nose pliers to remove remaining material from hose.

Installing

– Before installing, blow out hoses leading from pressure differential sender for particulate filter - G1037- to emission control module with compressed air towards emission control module.
– Attach elbow fittings to pressure differential sender for particulate filter - G1037- .
– Lightly lubricate connection on pressure sensor and elbow fitting with soap solution.
– Fit pressure differential sender for particulate filter - G1037- with elbow fittings on hoses -5-.

Tightening torques

◆ ⇒ “2.2 Exploded view - retainers and pipes for pressure differential sender for particulate filter G1037 ”, page 527
◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

6 High-pressure pump

⇒ “6.1 Exploded view - high-pressure pump”, page 492

⇒ “6.2 Removing and installing high-pressure pump”, page 496

⇒ “6.3 Removing and installing high-pressure pipe”, page 498

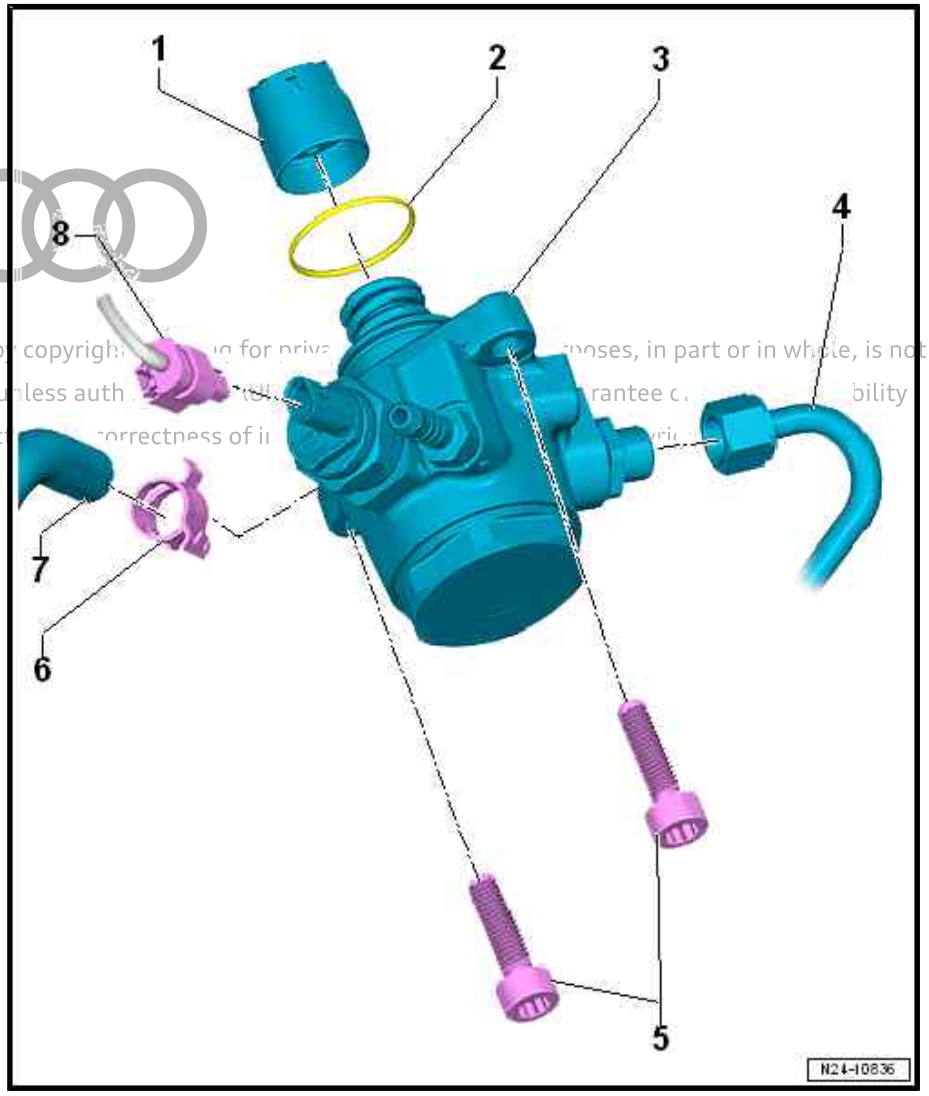
6.1 Exploded view - high-pressure pump

⇒ “6.1.1 Exploded view - high-pressure pump, version 1”, page 492

⇒ “6.1.2 Exploded view - high-pressure pump, version 2”, page 494

⇒ “6.1.3 Exploded view - high-pressure pump, version 3”, page 495

6.1.1 Exploded view - high-pressure pump, version 1



1 - Roller tappet

- ❑ When installing lubricate lightly with clean engine oil

2 - O-ring

- ❑ Renew after removing
- ❑ When installing lubricate lightly with clean engine oil

3 - High-pressure pump

- ❑ With fuel metering valve - N290-
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ “6.2 Removing and installing high-pressure pump”, page 496

4 - High-pressure pipe

- ❑ Can be reused
- ❑ Check for damage before installing
- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ Removing and installing ⇒ “6.3 Removing and installing high-pressure pipe”, page 498
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm +45°

5 - Bolt

- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““High-pressure pump - tightening torque and sequence”“ , page 493

6 - Spring-type clip

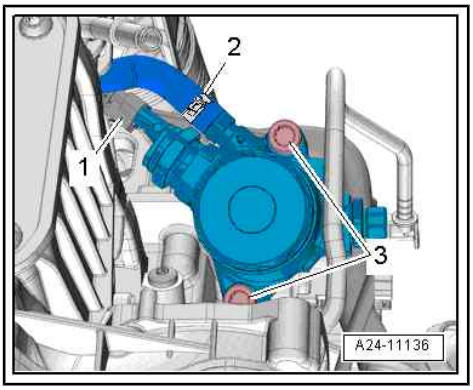
- ❑ Renew after removing

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7 - Fuel return line

8 - Electrical connector

High-pressure pump - tightening torque and sequence



Note:

Different versions of high-pressure pump may have been fitted on this vehicle (different manufacturers). Note different tightening torques.

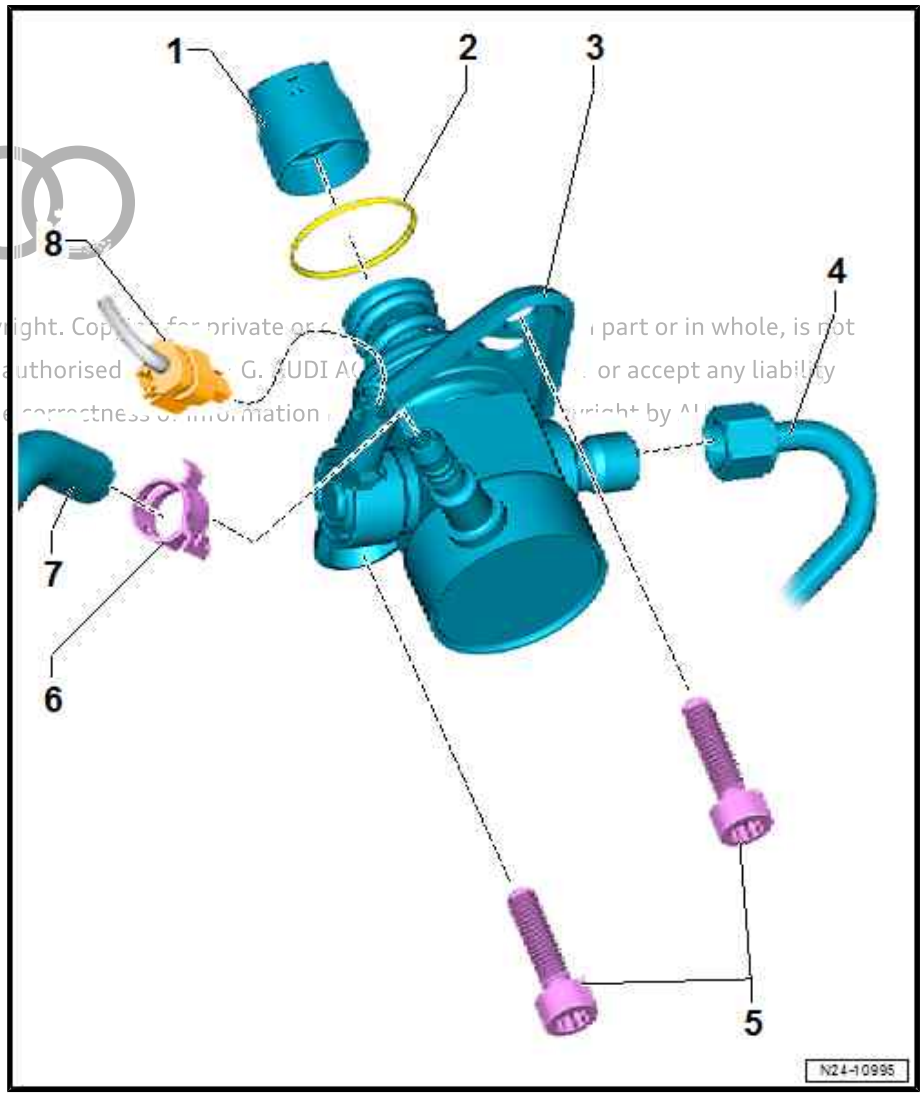
To prevent flange of high-pressure pump from being deformed during installation, fit high-pressure pump as follows:

– Tighten new 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-	M8: 20 Nm
4.	-3-	Turn 90° further

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6.1.2 Exploded view - high-pressure pump, version 2



1 - Roller tappet

- ❑ When installing lubricate lightly with clean engine oil

2 - O-ring

- ❑ Renew after removing
- ❑ When installing lubricate lightly with clean engine oil

3 - High-pressure pump

- ❑ With fuel metering valve - N290-
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ “6.2 Removing and installing high-pressure pump”, page 496

4 - High-pressure pipe

- ❑ Can be reused
- ❑ Check for damage before installing
- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ Removing and installing ⇒ “6.3 Removing and installing high-pressure pipe”, page 498
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm +45°

5 - Bolt

- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ““High-pressure pump - tightening torque and sequence”“ , page 495

6 - Spring-type clip

- ❑ Renew after removing

7 - Fuel return line

8 - Electrical connector

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High-pressure pump - tightening torque and sequence

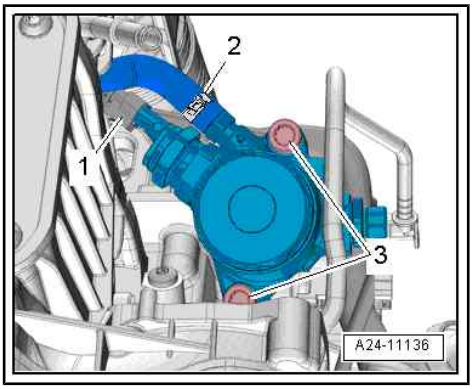
Note:

Different versions of high-pressure pump may have been fitted on this vehicle (different manufacturers). Note different tightening torques.

To prevent flange of high-pressure pump from being deformed during installation, fit high-pressure pump as follows:

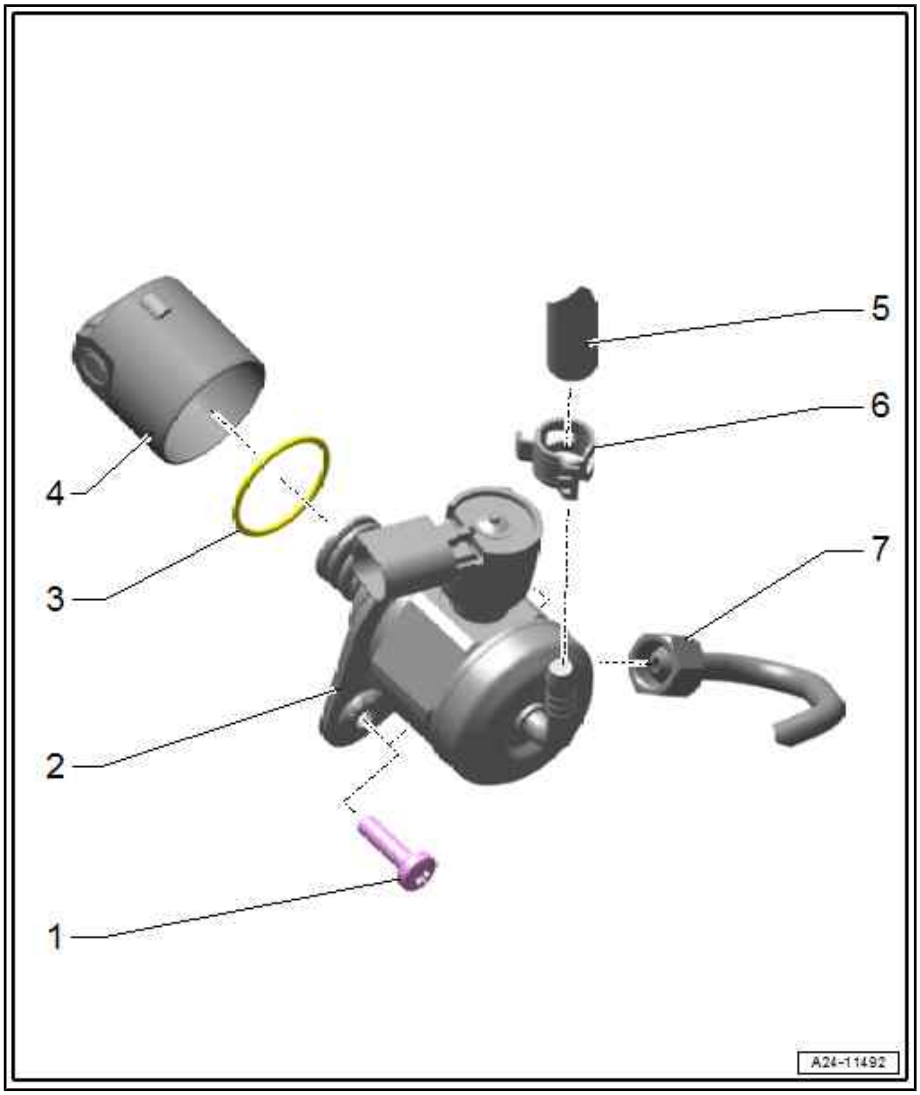
– Tighten new bolts in stages as follows:

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-	M8: 20 Nm
4.	-3-	Turn 90° further



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6.1.3 Exploded view - high-pressure pump, version 3



1 - Bolt

- ❑ Renew after removing
- ❑ Tightening torque and sequence ⇒ Fig. ""High-pressure pump - tightening torque and sequence"" , page 496

2 - High-pressure pump

- ❑ With fuel metering valve - N290-
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ "6.2 Removing and installing high-pressure pump", page 496

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 - Spring-type clip

- ❑ Renew after removing

7 - High-pressure pipe

- ❑ Can be reused
- ❑ Check for damage before installing
- ❑ Connections must not be damaged
- ❑ Do not alter shape

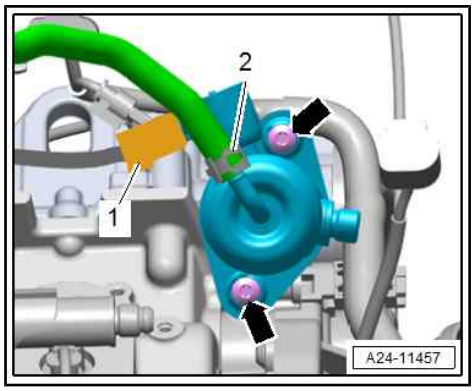
- ❑ Removing and installing ⇒ “6.3 Removing and installing high-pressure pipe”, page 498
- ❑ Lubricate threads of union nuts with clean engine oil
- ❑ 16 Nm +45°

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 new 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-	M6: 8 Nm
4.	-Arrows-	Turn 90° further



6.2 Removing and installing high-pressure pump

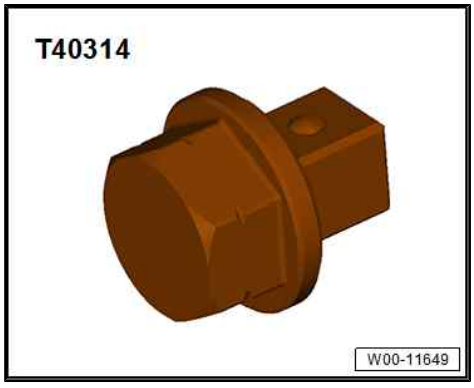
Special tools and workshop equipment required

- ♦ Wrench, 21 mm - T40263-

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- ♦ Adapter - T40314-



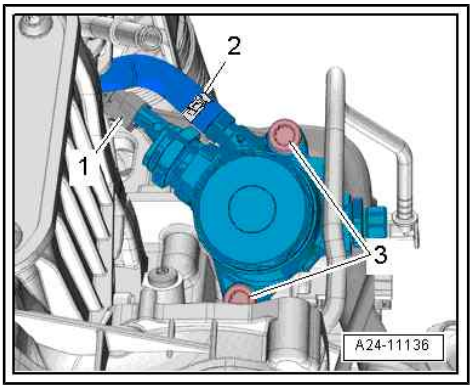
- ♦ Safety goggles
- ♦ Protective gloves

Removing

- Engine cold.
- Observe rules for cleanliness ⇒ “4.2 Rules for cleanliness”, page 9 .

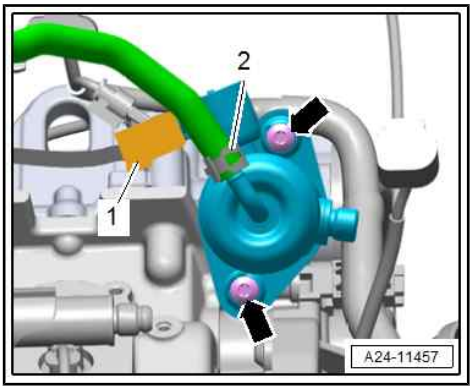
– Remove high-pressure pipe
⇒ “6.3 Removing and installing high-pressure pipe”, page 498 .

Version 1 or 2



– Unplug electrical connector -1-.
– Place a cloth underneath to catch escaping fuel.
– Release hose clip -2- and detach fuel supply hose.
– Unscrew bolts -3- and detach high-pressure pump with roller tappet.

Version 3



– Unplug electrical connector -1-.
– Place a cloth underneath to catch escaping fuel.
– Release hose clip -2- and detach fuel supply hose.
– Unscrew bolts -arrows- and detach high-pressure pump with roller tappet.

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Installing

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

- Secure all hose connections with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue .
- Renew O-ring and spring-type clip after removal.

– 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.

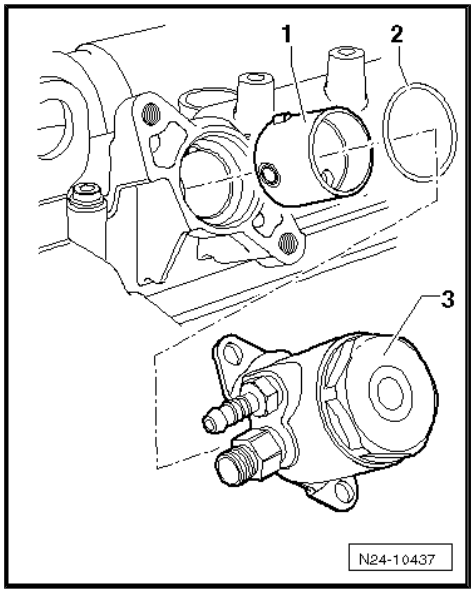
– Insert a new, oiled O-ring -2- into groove on high-pressure pump -3-.

– Tighten bolts hand-tight.

– Tighten new bolts (please note instructions for different high-pressure pump versions)
⇒ “6.1 Exploded view - high-pressure pump”, page 492 .

– Install high-pressure pipe
⇒ “6.3 Removing and installing high-pressure pipe”, page 498 .

– Check fuel system for leaks.



Tightening torques

- ⇒ “6.1.1 Exploded view - high-pressure pump, version 1”, page 492
- ⇒ “6.1.2 Exploded view - high-pressure pump, version 2”, page 494
- ⇒ “6.1.3 Exploded view - high-pressure pump, version 3”, page 495

6.3 Removing and installing high-pressure pipe

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Special tools and workshop equipment required

- Tool insert - T10395/3- from tool set - T10395 A-



Removing

- Observe rules for cleanliness
⇒ “4.2 Rules for cleanliness”, page 9 .

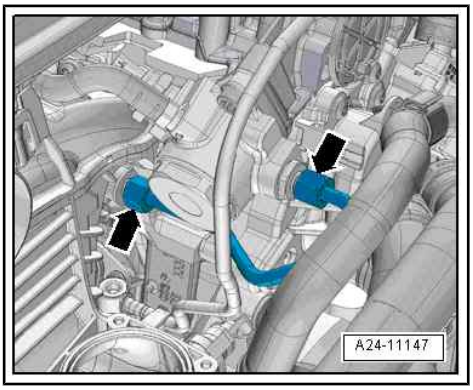
– Remove throttle valve module - GX3-
⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475 .

CAUTION

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



– Unscrew union nuts -arrows- (counterhold at threaded connection on high-pressure pump).

– Detach high-pressure pipe.

Installing

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

- Counterhold connection on high-pressure pump when tightening.
- 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.

– Hand-tighten union nuts for high-pressure pipe (make sure that pipe is not under tension).

– Tighten union nuts (counterhold at threaded connection on high-pressure pump).

– First tighten union nut at high-pressure pump and then at high-pressure pipe.

– Install throttle valve module - GX3-
⇒ “3.3 Removing and installing throttle valve module GX3 ”, page 475 .

Tightening torques

◆ ⇒ “6.1 Exploded view - high-pressure pump”, page 492

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7 Lambda probe

⇒ “7.1 Exploded view - Lambda probe”, page 500

⇒ “7.2 Removing and installing Lambda probe”, page 504

7.1 Exploded view - Lambda probe

⇒ “7.1.1 Exploded view - Lambda probe, all vehicles except e-tron”, page 500

⇒ “7.1.2 Exploded view - Lambda probe, e-tron without particulate filter”, page 501

⇒ “7.1.3 Exploded view - Lambda probe, e-tron with particulate filter”, page 502

7.1.1 Exploded view - Lambda probe, all vehicles except e-tron

- 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; for high-temperature paste refer to ⇒ 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.

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1 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ❑ Removing and installing ⇒ “7.2.1 Removing and installing Lambda probe - all vehicles except e-tron”, page 504
- ❑ 55 Nm

2 - Electrical connector

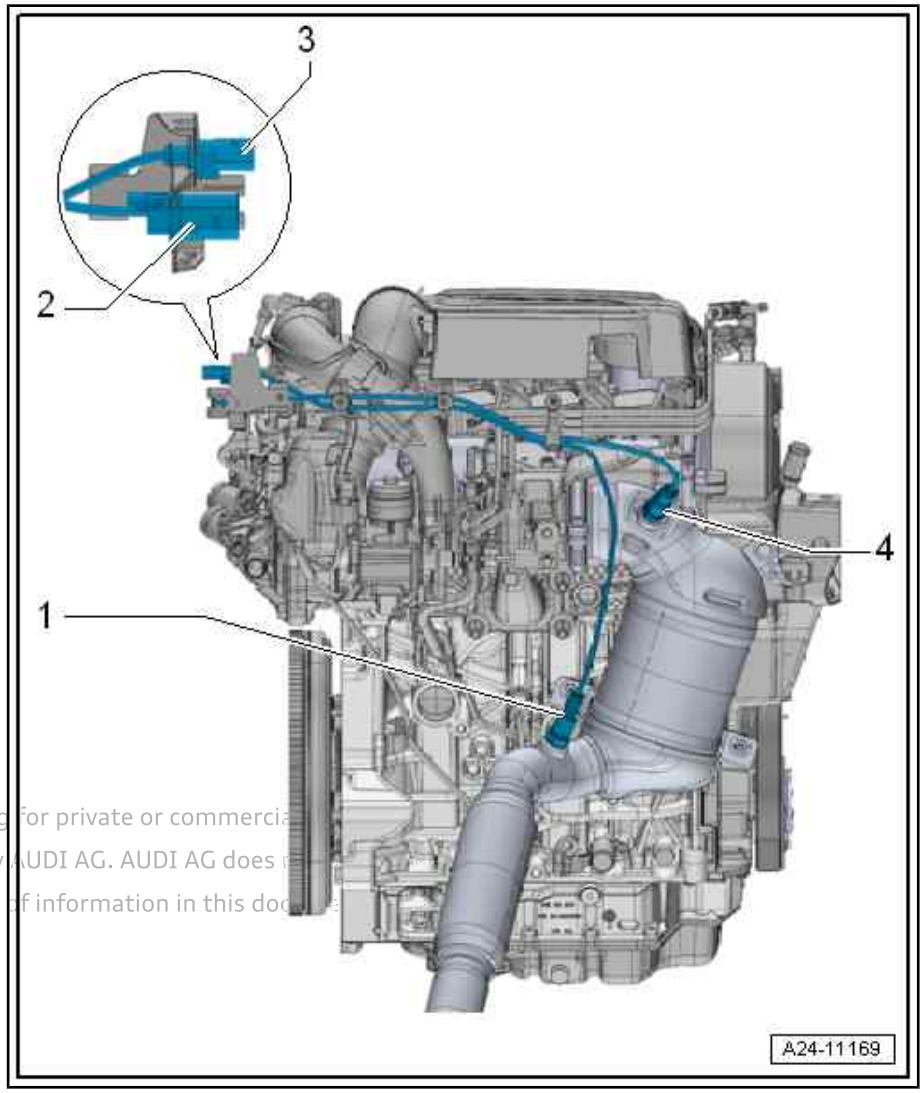
- ❑ For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

3 - Electrical connector

- ❑ For Lambda probe - G39- with Lambda probe heater - Z19-

4 - Lambda probe - G39- with Lambda probe heater - Z19-

- ❑ Removing and installing ⇒ “7.2.1 Removing and installing Lambda probe - all vehicles except e-tron”, page 504
- ❑ 55 Nm



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7.1.2 Exploded view - Lambda probe, e-tron without particulate filter

- 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; for high-temperature paste refer to ⇒ 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.

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1 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

- ❑ Removing and installing ⇒ “7.2.2 Removing and installing Lambda probe - e-tron without particulate filter”, page 505
- ❑ 55 Nm

2 - Electrical connector

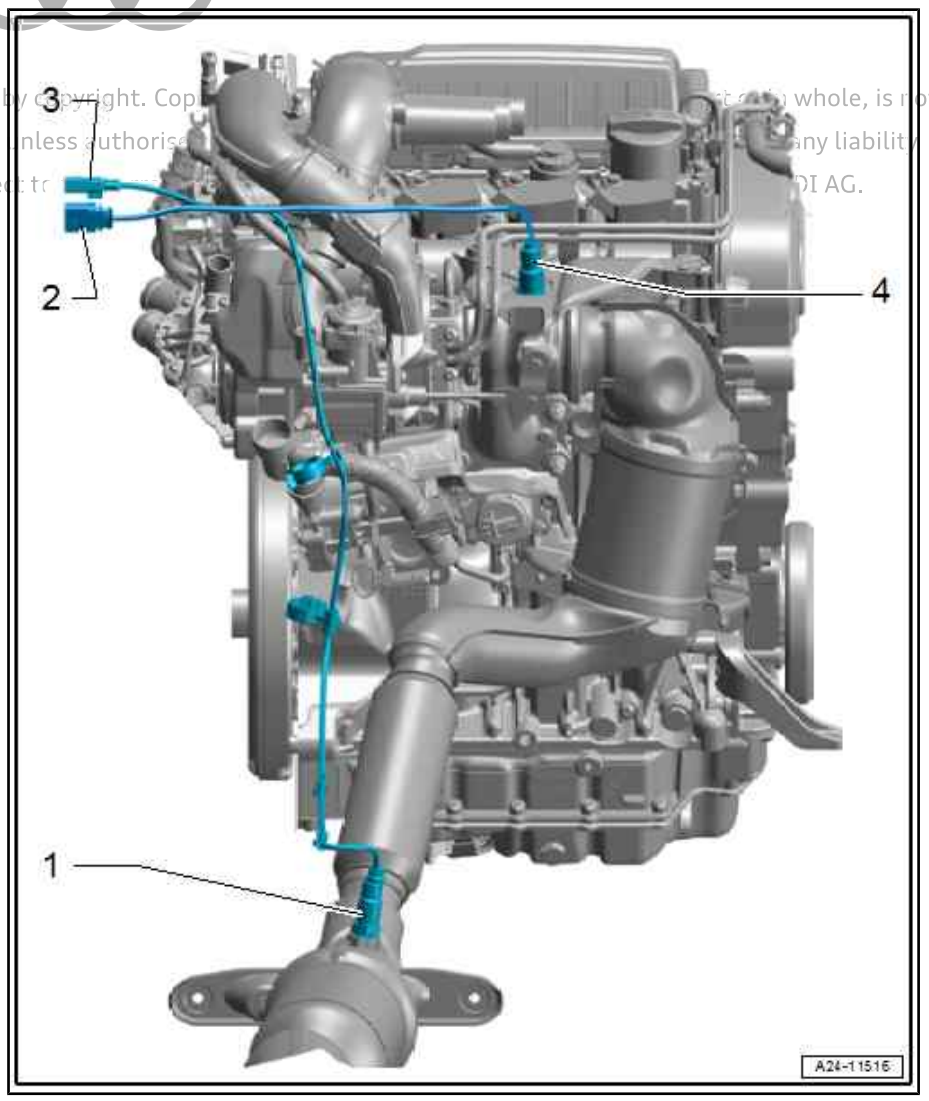
- ❑ For Lambda probe - G39- with Lambda probe heater - Z19-

3 - Electrical connector

- ❑ For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-

4 - Lambda probe - G39- with Lambda probe heater - Z19-

- ❑ Removing and installing ⇒ “7.2.2 Removing and installing Lambda probe - e-tron without particulate filter”, page 505
- ❑ 55 Nm

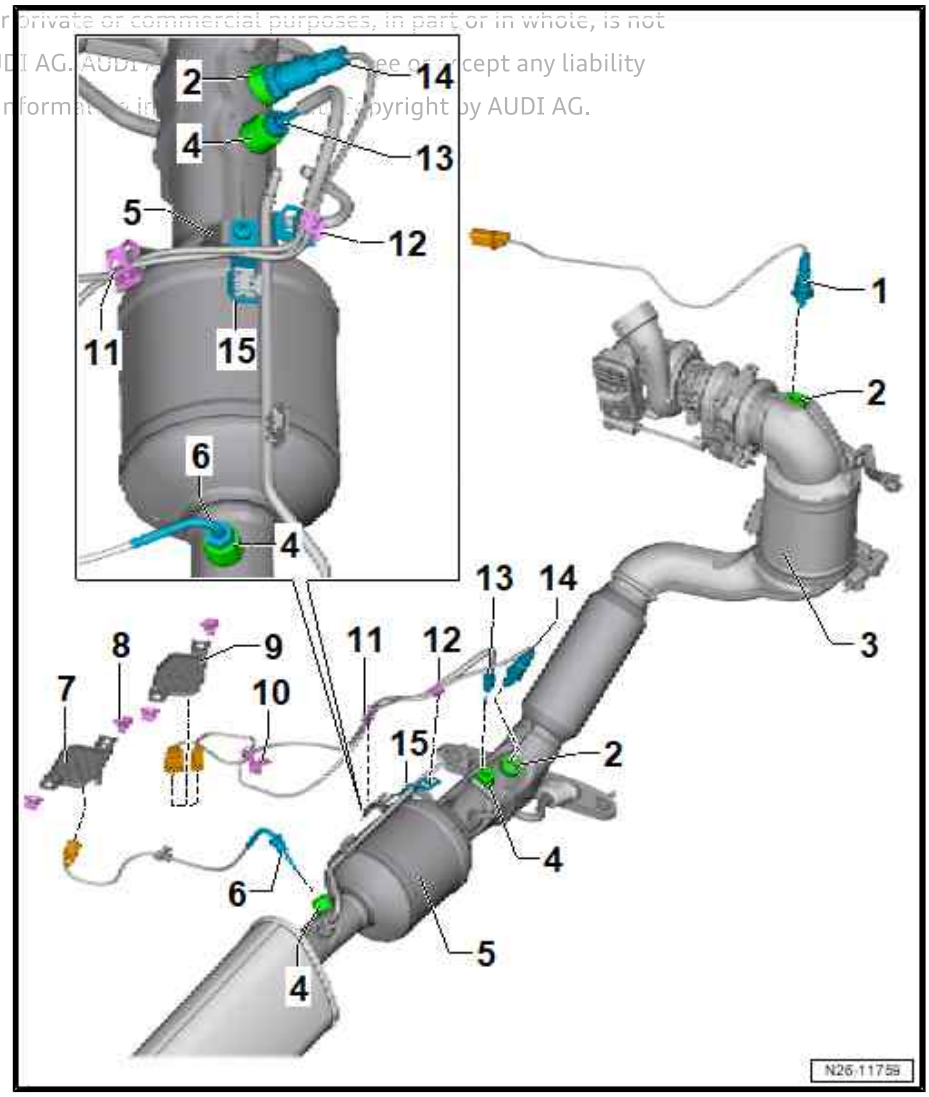


7.1.3 Exploded view - Lambda probe, e-tron with particulate filter

- 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; for high-temperature paste refer to ⇒ 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.

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1 - Lambda probe 1 before catalytic converter - GX10-

- ❑ Removing and installing ⇒ 7.2.3 Removing and installing Lambda probe 1 before catalytic converter GX10 - e-tron with particulate filter”, page 506
- ❑ 52 Nm

2 - Screw thread

- ❑ For Lambda probe
- ❑ Part of exhaust system

3 - Front exhaust pipe with catalytic converter

- ❑ Exploded view ⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525

4 - Screw thread

- ❑ Part of exhaust system

5 - Particulate filter

- ❑ Exploded view ⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525

6 - Temperature sender after particulate filter - G527-

- ❑ Exploded view ⇒ “3.1 Exploded view - exhaust gas temperature control”, page 538

7 - Bracket

8 - Speed nut

- ❑ Renew after removing

9 - Bracket

10 - Wire retainer

11 - Wire retainer

12 - Wire retainer

13 - Temperature sender before particulate filter - G506-

- ❑ Exploded view ⇒ “3.1 Exploded view - exhaust gas temperature control”, page 538

14 - Lambda probe 1 after catalytic converter - GX7-

- ❑ Removing and installing ⇒ “7.2.4 Removing and installing Lambda probe 1 after catalytic converter GX7 - e-tron with particulate filter”, page 507
- ❑ 52 Nm

15 - Bracket

7.2 Removing and installing Lambda probe

⇒ “7.2.1 Removing and installing Lambda probe - all vehicles except e-tron”, page 504

⇒ “7.2.2 Removing and installing Lambda probe - e-tron without particulate filter”, page 505

⇒ “7.2.3 Removing and installing Lambda probe 1 before catalytic converter GX10 - e-tron with particulate filter”, page 506

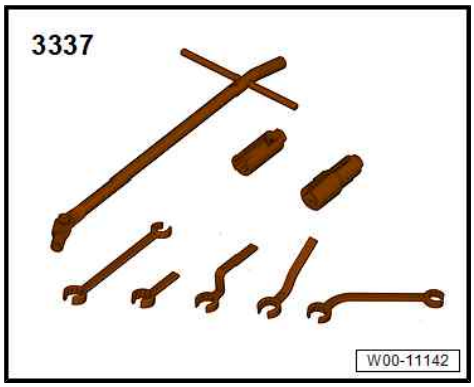
⇒ “7.2.4 Removing and installing Lambda probe 1 after catalytic converter GX7 - e-tron with particulate filter”, page 507

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7.2.1 Removing and installing Lambda probe - all vehicles except e-tron

Special tools and workshop equipment required

- Lambda probe open ring spanner set - 3337-

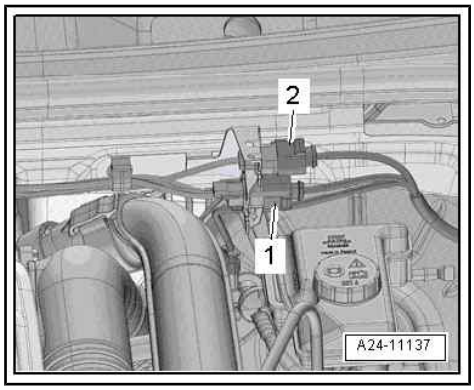


Removing

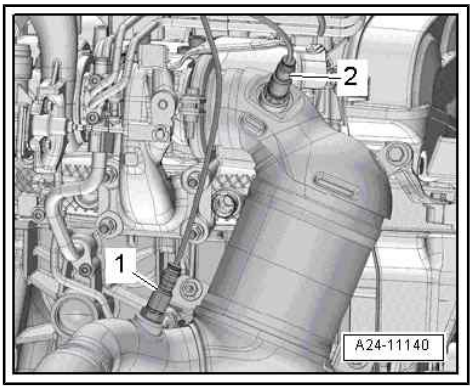
– Unplug corresponding electrical connector:

1 - For Lambda probe - G39- and Lambda probe heater - Z19-

2 - For Lambda probe after catalytic converter - G130- and Lambda probe heater - Z19-



– 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 reverse order; note the following:

- 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.

– After renewing components, erase learnt values and adapt Lambda probe to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

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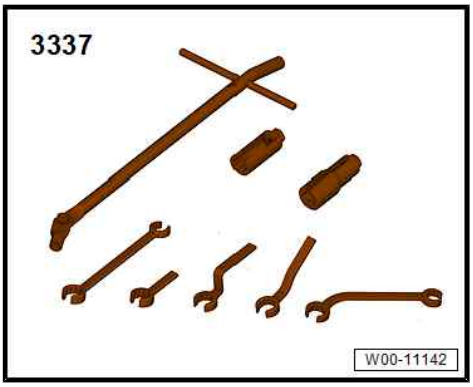
Tightening torques

♦ ⇒ “7.1.1 Exploded view - Lambda probe, all vehicles except e-tron”, page 500

7.2.2 Removing and installing Lambda probe - e-tron without particulate filter

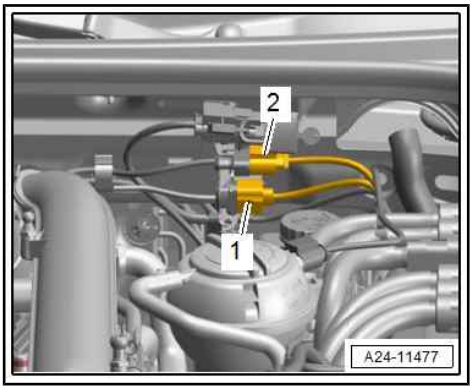
Special tools and workshop equipment required

♦ Lambda probe open ring spanner set - 3337-



Removing

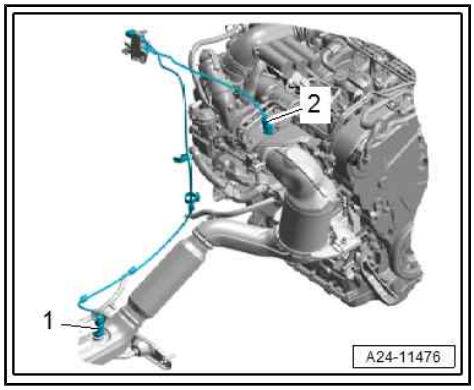
– Unplug corresponding electrical connector:



1 - For Lambda probe - G39- and Lambda probe heater - Z19-

2 - For Lambda probe after catalytic converter - G130- and Lambda probe heater - Z19-

Lambda probe - G39- -item 2-:



– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Unscrew Lambda probe - G39- using a tool from Lambda probe open ring spanner set - 3337- .

Lambda probe after catalytic converter - G130- -item 1-:

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

– Unscrew Lambda probe after catalytic converter - G130- using a tool from Lambda probe open ring spanner set - 3337- .

Installing

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

- 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.

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– After renewing components, erase learnt values and adapt Lambda probe to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

Tightening torques

◆ ⇒ “7.1.2 Exploded view - Lambda probe, e-tron without particulate filter”, page 501

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

7.2.3 Removing and installing Lambda probe 1 before catalytic converter - GX10- - e-tron with particulate filter

Lambda probe 1 before catalytic converter - GX10- consists of:

◆ Lambda probe - G39-

◆ Lambda probe heater - Z19-

Special tools and workshop equipment required

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- Lambda probe open ring spanner set - 3337-



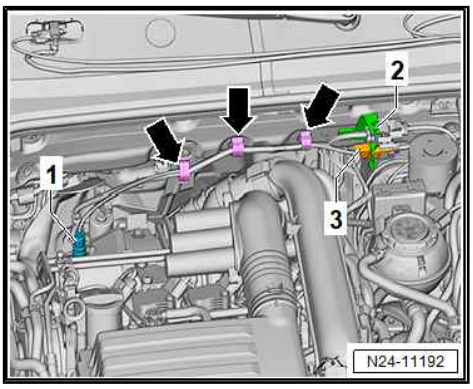
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Removing

– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Take electrical connector -3- out of bracket -2-, unplug it and move electrical wiring clear at retainers -arrows-.

– Unscrew Lambda probe 1 before catalytic converter - GX10- -item 1- using a tool from Lambda probe open ring spanner set - 3337- .



Installing

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

- 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.

– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– After renewing components, erase learnt values and adapt Lambda probe to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

Tightening torques

- ⇒ “7.1.3 Exploded view - Lambda probe, e-tron with particulate filter”, page 502
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

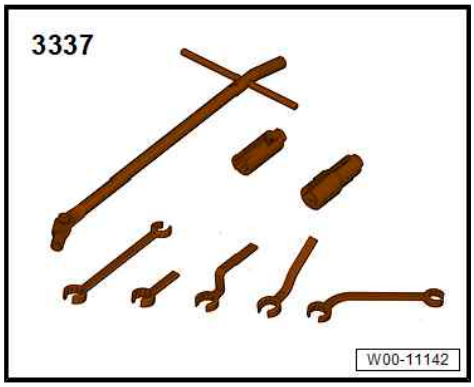
7.2.4 Removing and installing Lambda probe 1 after catalytic converter - GX7- - e-tron with particulate filter

Lambda probe 1 after catalytic converter - GX7- consists of:

- Lambda probe after catalytic converter - G130-
- Lambda probe 1 heater after catalytic converter - Z29-

Special tools and workshop equipment required

- Lambda probe open ring spanner set - 3337-

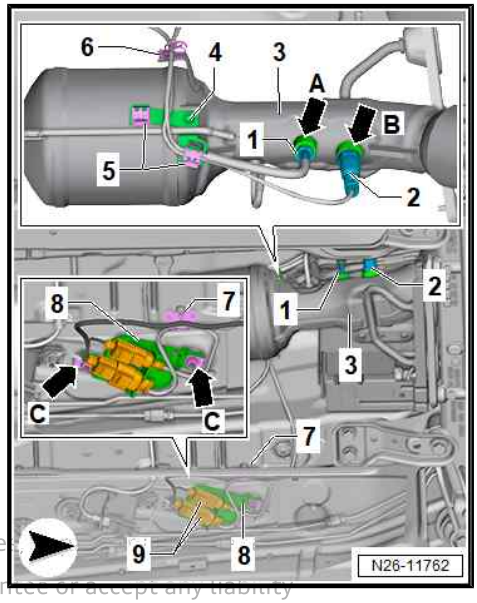


Removing

– Unfasten underbody trim (centre left) in direction of exhaust system and press downwards slightly ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .

– Take 6-pin electrical connector -9- out of bracket -8- on underbody, unplug it and move electrical wiring clear at retainers -5, 6, 7-.

– Unscrew Lambda probe 1 after catalytic converter - GX7- -item 2- using a tool from Lambda probe open ring spanner set - 3337- .



Installing

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

- 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.

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– After renewing components, erase learnt values and adapt Lambda probe to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

Tightening torques

- ⇒ “7.1.3 Exploded view - Lambda probe, e-tron with particulate filter”, page 502
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

8 Engine control unit

⇒ “8.1 Removing and installing engine/motor control unit J623 ”, page 509

8.1 Removing and installing engine/motor control unit - J623-

⇒ “8.1.1 Removing and installing engine control unit J623 without protective housing”, page 509

⇒ “8.1.2 Removing and installing engine control unit J623 with protective housing”, page 510

8.1.1 Removing and installing engine control unit - J623- without protective housing

Special tools and workshop equipment required

- Vehicle diagnostic tester

Removing

– Before removing the engine control unit, the adaption values for the chain length must be read out of the engine control unit.

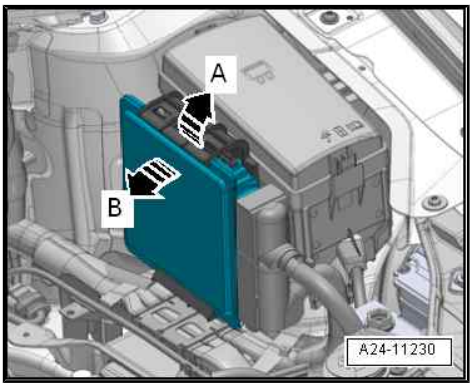
– Activate engine control unit using ⇒ Vehicle diagnostic tester in `Guided Functions` mode, function `Replace engine control unit`.

– Switch off ignition and remove ignition key.

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

– Release retainer -arrow A- and take out engine control unit - J623- -arrow B-.

– Release and unplug connectors for engine control unit - J623- .



Installing

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

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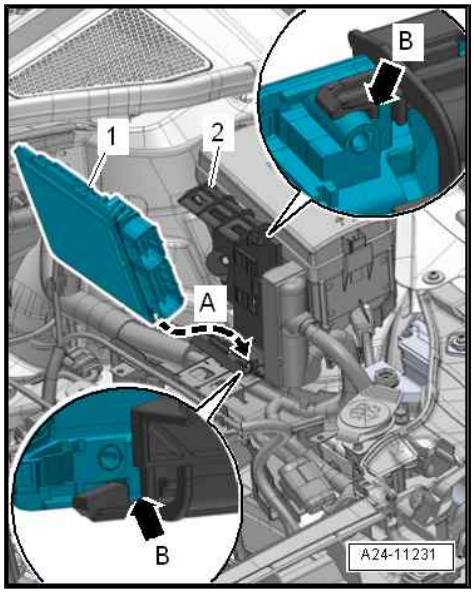
– Insert engine control unit - J623- bottom edge first into bracket -arrow A- and lock at top edge.

• Lugs on engine control unit must engage in notches at top and bottom of bracket -arrows B-.

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

After installing a new engine control unit, the following operation must be performed:

– Activate engine control unit using ⇒ Vehicle diagnostic tester in `Guided Functions` mode, function `Replace engine control unit`.



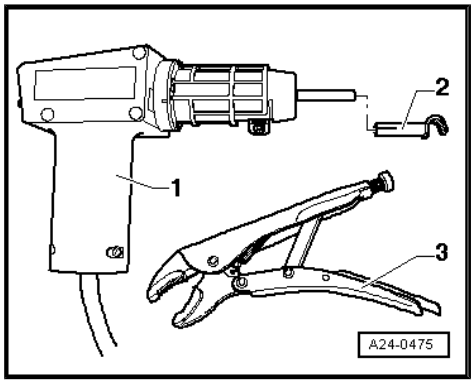
8.1.2 Removing and installing engine control unit - J623- with protective housing

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Removing

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 grinder (commercially available)

♦ Vehicle diagnostic tester

Removing

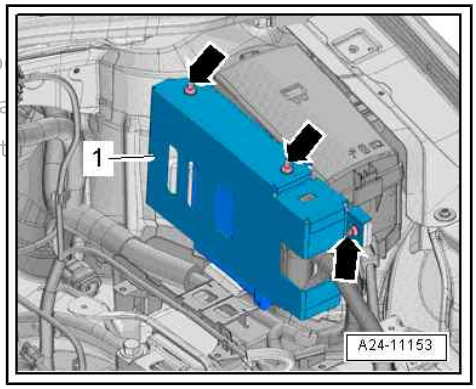
– If engine control unit is to be renewed ⇒ Vehicle diagnostic tester, `Guided Functions`, `Replace engine control unit`.

– Switch off ignition and remove ignition key.

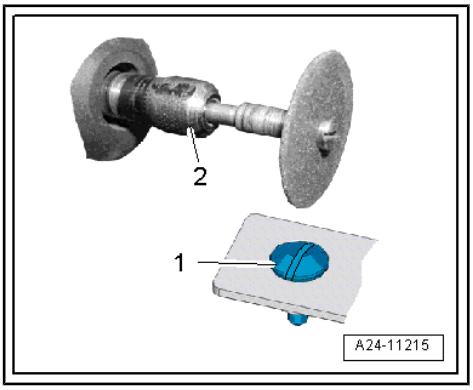
– Remove battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .

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To remove protective housing -1-, unscrew shear bolts -arrows- as follows:



– Make groove (for a screwdriver) in head of shear bolt -1- using a small grinder -2-.
– The threads of the shear bolts are secured with locking fluid.

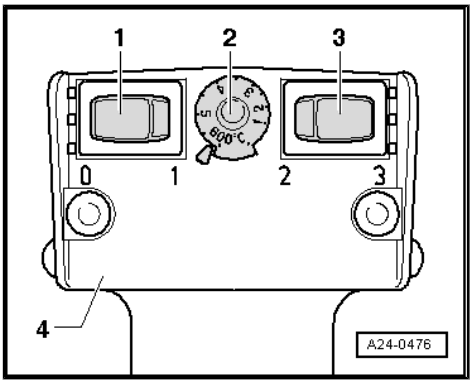


– To unscrew these bolts, the threads must therefore be heated with the hot air blower.
– Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

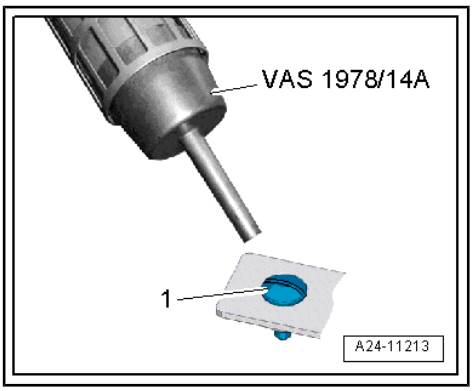
NOTICE

Risk of damage to surrounding components caused by hot air blower (overheating).

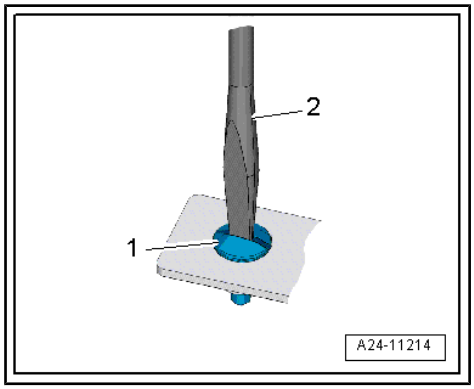
– Cover surrounding components if necessary.



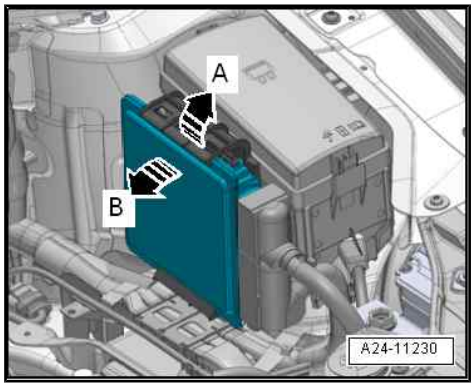
– Heat head of shear bolt -1- for approx. 20 to 30 seconds.



– Unscrew shear bolt -1- using screwdriver -2-.
– Detach protective housing from engine control unit - J623- .



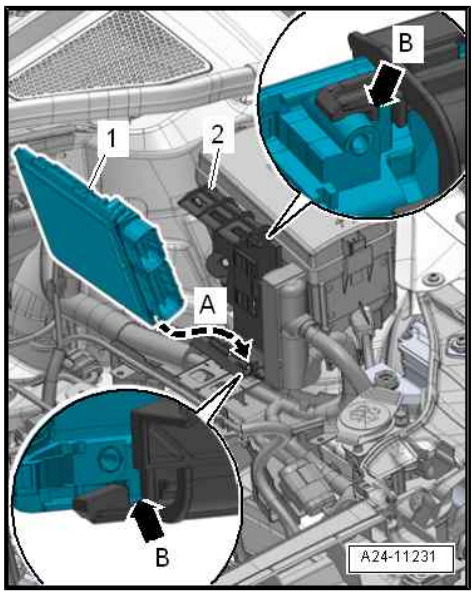
– Release retainer -arrow A- and take out engine control unit - J623- -arrow B-.
– Release and unplug connectors for engine control unit - J623- .



Installing

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

– Insert engine control unit - J623- bottom edge first into bracket -arrow A- and lock at top edge.
• Lugs on engine control unit must engage in notches at top and bottom of bracket -arrows B-.
– Make sure you fit protective housing back on engine control unit - J623- .
– 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.
– Install battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Removing and installing battery .



After installing a new engine control unit, the following operation must be performed:

– Activate engine control unit using ⇒ Vehicle diagnostic tester in `Guided Functions` mode, function `Replace engine control unit`.

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26 – Exhaust system

1 Exhaust pipes/silencers

⇒ “1.1 Exploded view - silencers”, page 513
⇒ “1.2 Removing and installing silencers”, page 517
⇒ “1.3 Separating exhaust pipes/silencers”, page 519
⇒ “1.4 Stress-free alignment of exhaust system”, page 520
⇒ “1.5 Checking exhaust system for leaks”, page 521

1.1 Exploded view - silencers

⇒ “1.1.1 Exploded view - silencers, 1.2 ltr. TFSI”, page 513
⇒ “1.1.2 Exploded view - silencers, 1.4 ltr. TFSI”, page 515
⇒ “1.1.3 Exploded view - silencers, e-tron”, page 516

1.1.1 Exploded view - silencers, 1.2 ltr. TFSI

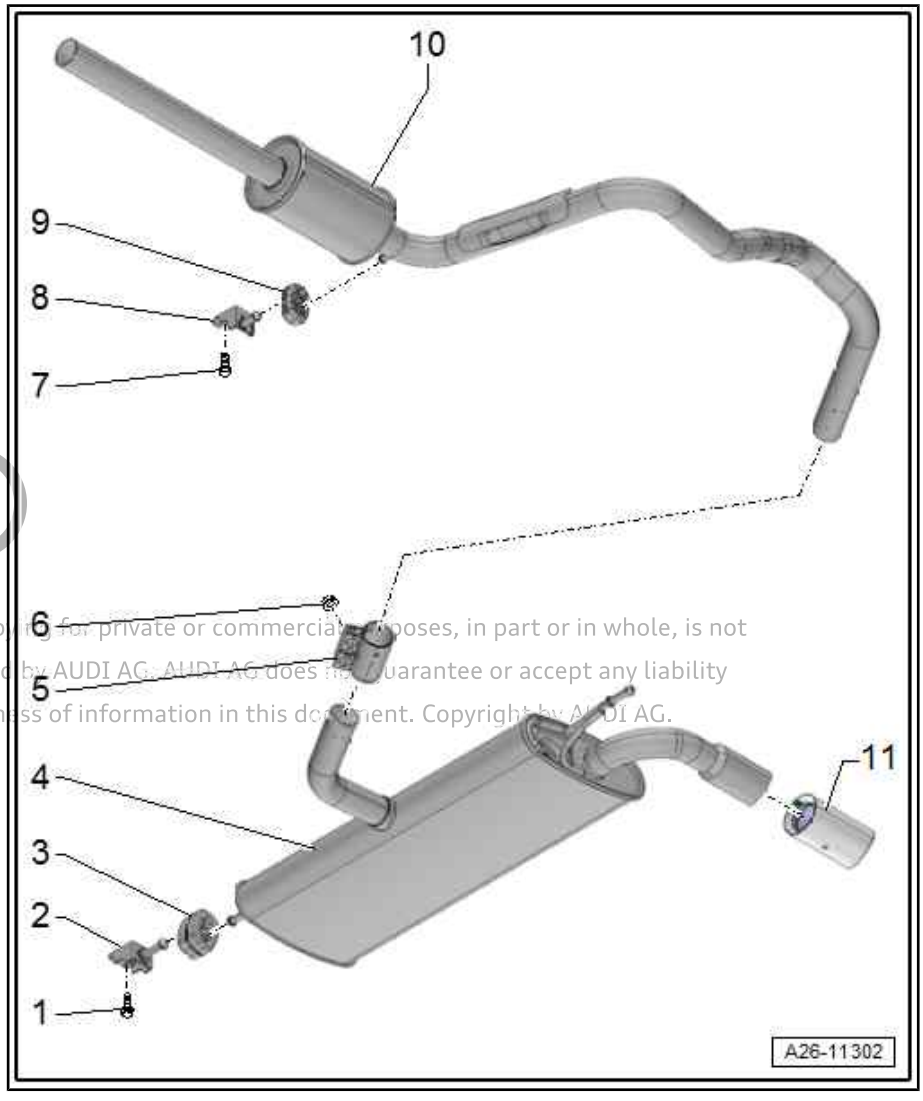
1 - Bolt
- ❑ 20 Nm

2 - Mounting
- ❑ Renew if damaged

3 - Rubber mounting
- ❑ Renew if damaged

4 - Rear silencer
- ❑ Combined in one unit with centre silencer as original equipment. Can be renewed separately for repair purposes
- ❑ Removing and installing ⇒ “1.2 Removing and installing silencers”, page 517
- ❑ Disconnecting exhaust pipes/silencers ⇒ “1.3 Separating exhaust pipes/silencers”, page 519
- ❑ Align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520

5 - Clamp (rear)
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520
- ❑ Installation position ⇒ Fig. ““Installation position of rear clamp”“ , page 516
- ❑ Tighten bolted connections evenly



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6 - Nut

- ❑ 30 Nm

7 - Bolt

- ❑ 20 Nm

8 - Mounting

- ❑ Renew if damaged

9 - Rubber mounting

- ❑ Renew if damaged

10 - Centre silencer

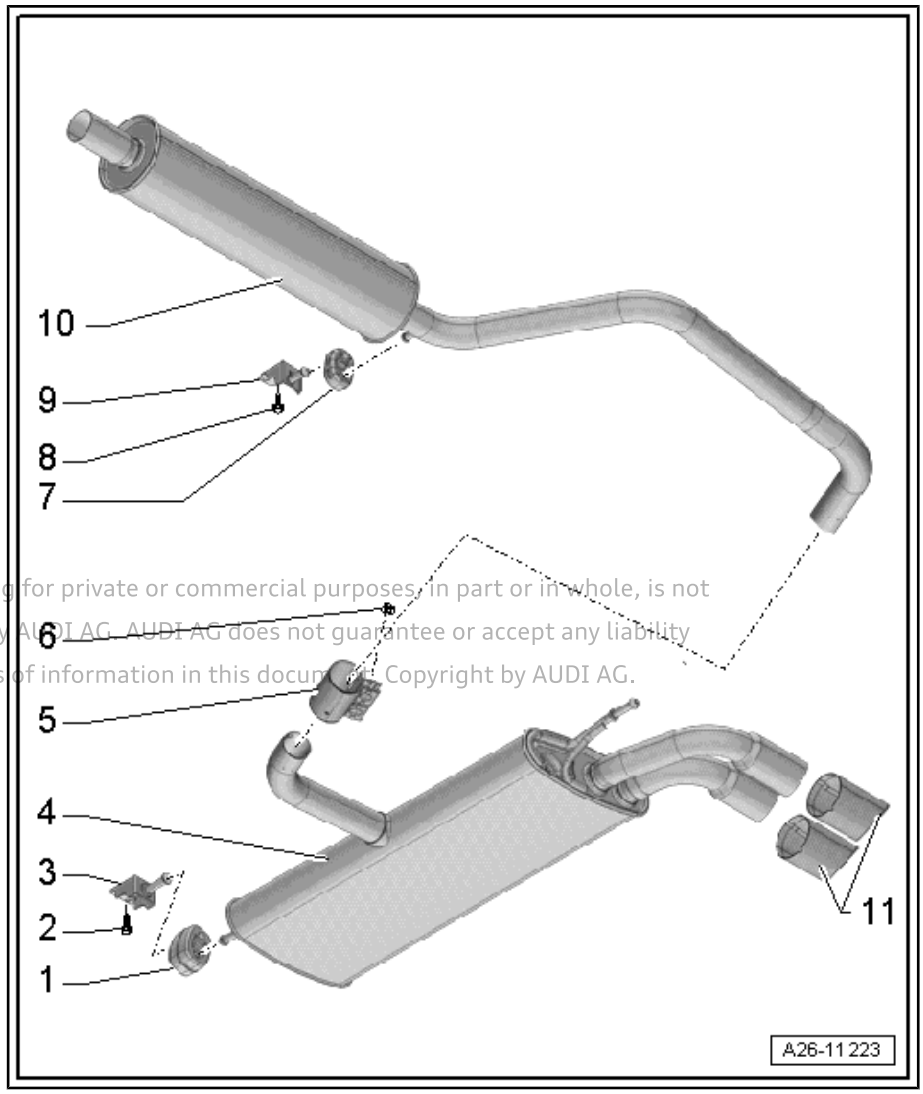
- ❑ Combined in one unit with rear silencer as original equipment. Can be renewed separately for repair purposes
- ❑ Removing and installing ⇒ “1.2 Removing and installing silencers”, page 517
- ❑ Disconnecting exhaust pipes/silencers ⇒ “1.3 Separating exhaust pipes/silencers”, page 519
- ❑ Align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520

11 - Trim

- ❑ For tailpipe
- ❑ Slide onto tailpipe as far as stop

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1.1.2 Exploded view - silencers, 1.4 ltr. TFSI



1 - Rubber mounting
- ❑ Renew if damaged

2 - Bolt
- ❑ 20 Nm

3 - Mounting
- ❑ Renew if damaged

4 - Rear silencer
- ❑ Combined in one unit with centre silencer as original equipment. Can be renewed separately for repair purposes
- ❑ Removing and installing ⇒ “1.2 Removing and installing silencers”, page 517
- ❑ Disconnecting exhaust pipes/silencers ⇒ “1.3 Separating exhaust pipes/silencers”, page 519
- ❑ Align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520

5 - Clamp (rear)
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520
- ❑ Installation position ⇒ Fig. ““Installation position of rear clamp”“ , page 516
- ❑ Tighten bolted connections evenly

6 - Nut
- ❑ 30 Nm

7 - Rubber mounting
- ❑ Renew if damaged

8 - Bolt
- ❑ 20 Nm

9 - Mounting
- ❑ Renew if damaged

10 - Centre silencer
- ❑ Combined in one unit with rear silencer as original equipment. Can be renewed separately for repair purposes
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Removing and installing ⇒ “1.2 Removing and installing silencers”, page 517
- ❑ Disconnecting exhaust pipes/silencers ⇒ “1.3 Separating exhaust pipes/silencers”, page 519

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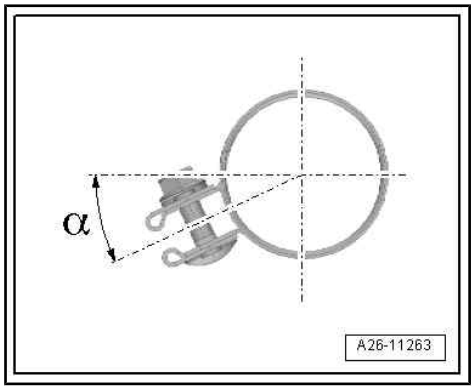
❑ Align exhaust system so it is free of stress
⇒ “1.4 Stress-free alignment of exhaust system”, page 520

11 - Trim

❑ For tailpipes
❑ Not fitted on all versions; for allocation refer to ⇒ Electronic parts catalogue
❑ Slide onto tailpipes as far as stop

Installation position of rear clamp

– Fit clamp in position shown.
• Angle -α- = approx. 20°
• Bolt connections face to rear.
• Nuts facing upwards



1.1.3 Exploded view - silencers, e-tron

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1 - Bolt
❑ 20 Nm

2 - Mounting
❑ Renew if damaged

3 - Rubber mounting
❑ Renew if damaged

4 - Centre and rear silencers
❑ No cutting point provided
❑ Removing and installing ⇒ “1.2 Removing and installing silencers”, page 517

5 - Rear tunnel cross-piece

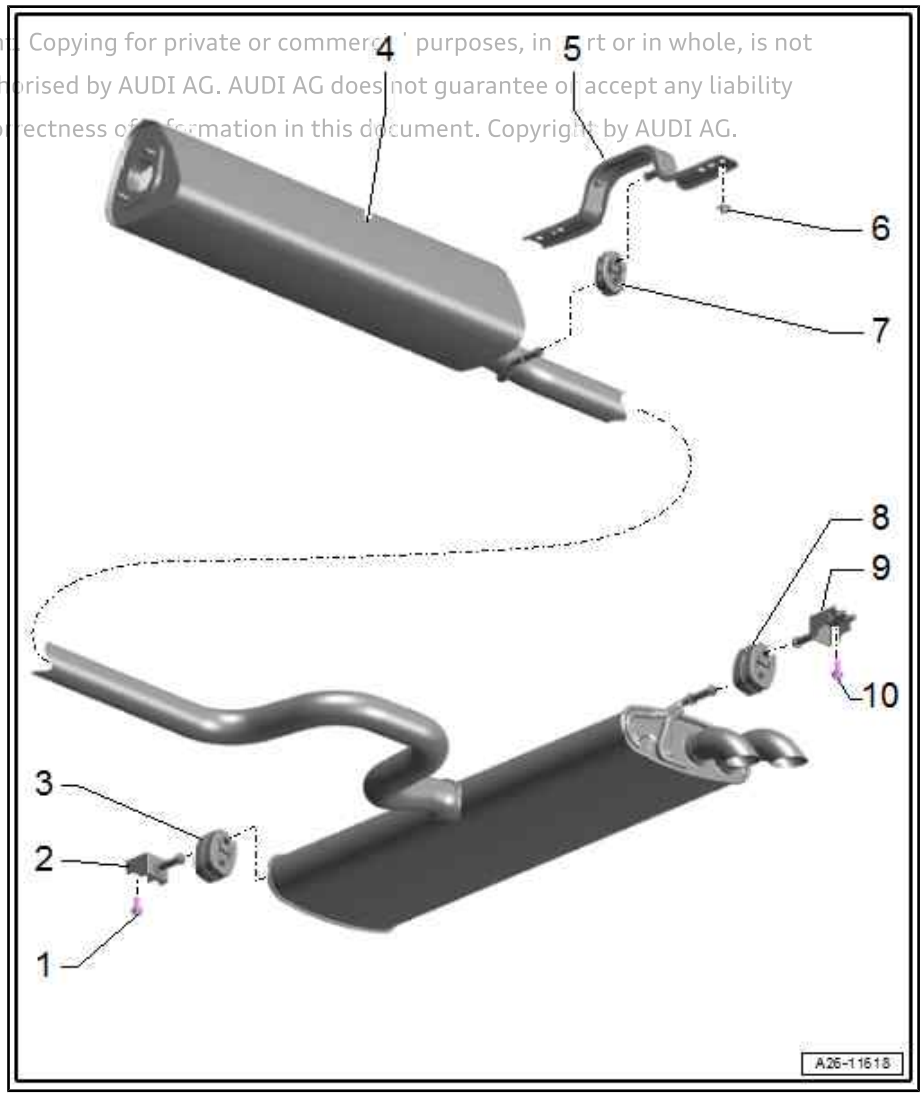
6 - Nut
❑ Tightening torque ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

7 - Rubber mounting
❑ Renew if damaged

8 - Rubber mounting
❑ Renew if damaged

9 - Mounting
❑ Renew if damaged

10 - Bolt
❑ 20 Nm



1.2 Removing and installing silencers

⇒ “1.2.1 Removing and installing silencer(s) - vehicles with torsion beam axle”, page 517

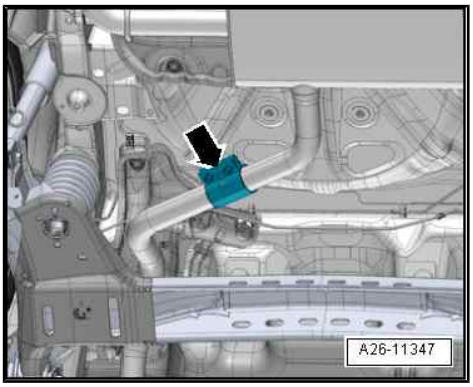
⇒ “1.2.2 Removing and installing silencer - vehicles with multi-link suspension”, page 518

1.2.1 Removing and installing silencer(s) - vehicles with torsion beam axle

Removing

– Vehicles without connection point: separate exhaust pipe/silencer
⇒ “1.3 Separating exhaust pipes/silencers”, page 519 .

– Vehicles with connection point: release clamp -arrow- and push to right side.



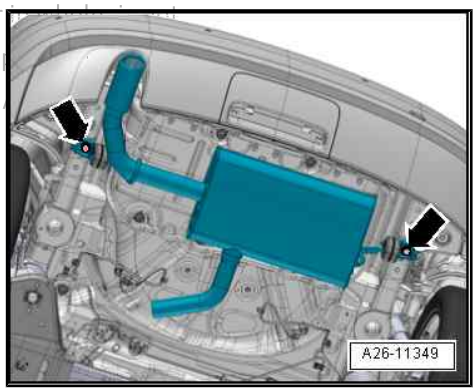
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– Unscrew bolts -arrows- and remove rear silencer.

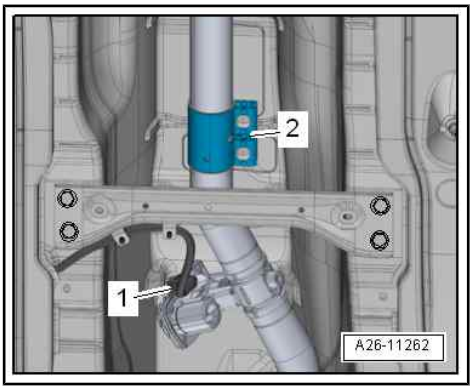
If centre silencer is also being removed:

– Remove underbody trim (rear left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .

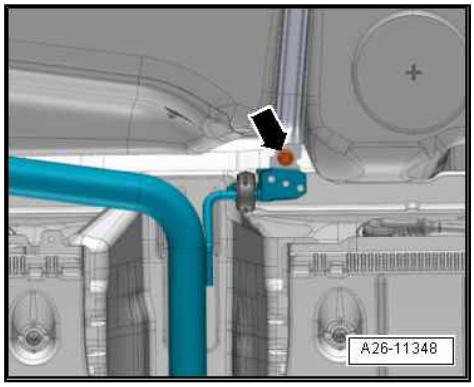
– Remove tunnel cross-piece (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .



– Loosen clamp -2- and push to rear.



– Remove bolt -arrow- and detach centre silencer.



Installing

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

– Align the exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520 .

Tightening torques

- ⇒ “1.1 Exploded view - silencers”, page 513
- ⇒ “2.1 Exploded view - emission control system”, page 522
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

1.2.2 Removing and installing silencer - vehicles with multi-link suspension

- A second mechanic is required for removal of the silencer.

Removing

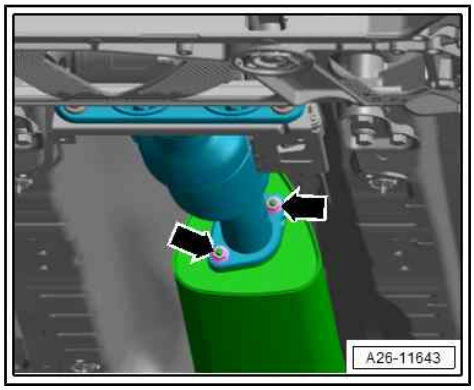
– If fitted, remove underbody trim (rear left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .

– Remove tunnel cross-piece (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .

e-tron:

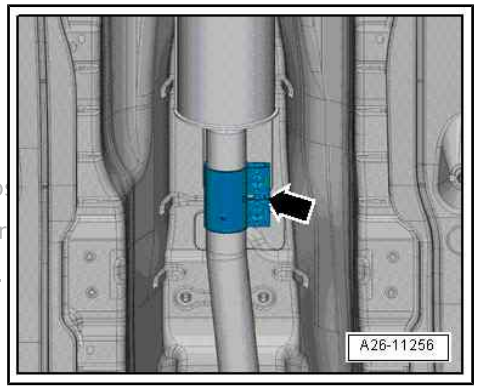
– Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove nuts -arrows-.



All vehicles except e-tron:

– Loosen clamp -arrow- and push towards rear.

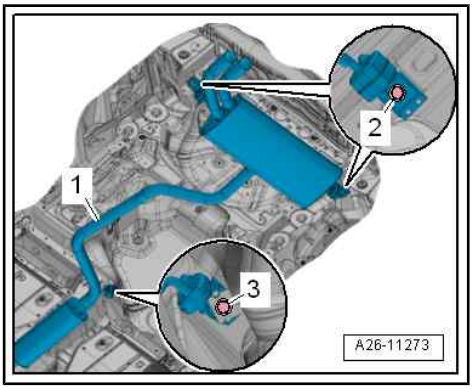


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All vehicles (continued):

– Remove bolt -2- on both sides.

– Unscrew bolt -3- and remove silencer -1-.



Installing

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

– Align the exhaust system so it is free of stress ⇒ “1.4 Stress-free alignment of exhaust system”, page 520 .

Tightening torques

- ⇒ “1.1 Exploded view - silencers”, page 513
- ⇒ “2.1 Exploded view - emission control system”, page 522
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

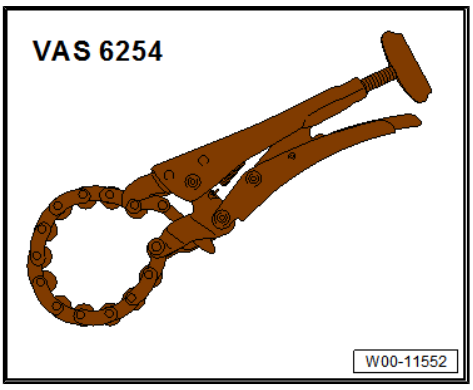
1.3 Separating exhaust pipes/silencers

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- The connecting pipe can be cut through at the cutting location in order to renew the centre and rear silencers separately.
- The cutting point is marked by an indentation on the circumference of the exhaust pipe.
- A cutting point is not provided for the A3 e-tron.

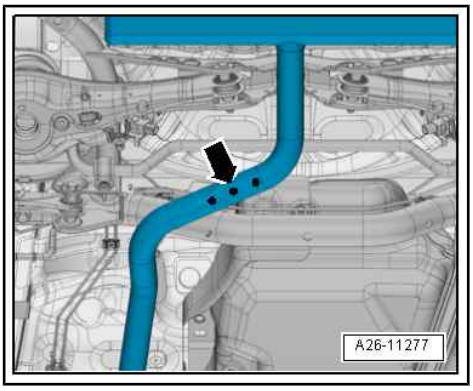
Special tools and workshop equipment required

- Chain pipe cutter - VAS 6254-



Procedure

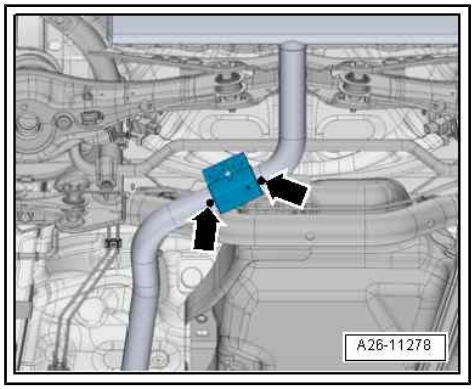
– Cut through exhaust pipe at right angles at the position marked -arrow- using chain pipe cutter - VAS 6254- .



– Position clamp centrally at side marks -arrows- when installing.

– Fit rear clamp
⇒ Fig. ""Installation position of rear clamp"" , page 516 .

– Align the exhaust system so it is free of stress
⇒ "1.4 Stress-free alignment of exhaust system", page 520 .



Tightening torques

◆ ⇒ "1.1 Exploded view - silencers", page 513

1.4 Stress-free alignment of exhaust system

⇒ "1.4.1 Stress-free alignment of exhaust system", page 520
⇒ "1.4.2 Aligning tailpipes", page 521

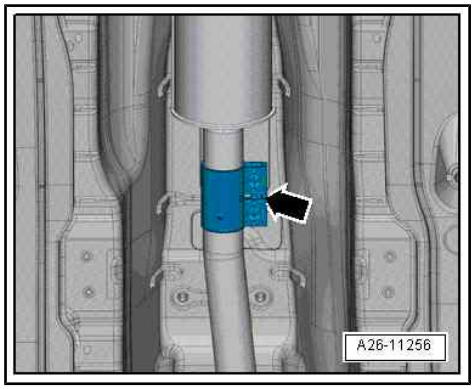
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1.4.1 Stress-free alignment of exhaust system

Procedure

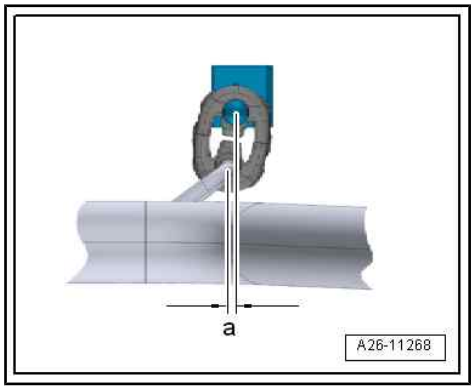
• The exhaust system must be aligned when it is cool.

– Loosen bolt connections for front clamp -arrow-.



– Push exhaust system towards front of vehicle until preloading at mounting for exhaust pipe -a- = 5 mm.

– Fit front clamp
⇒ Fig. ""Installation position of front clamp"" , page 523 .



Tightening torques

◆ ⇒ "1.1 Exploded view - silencers", page 513

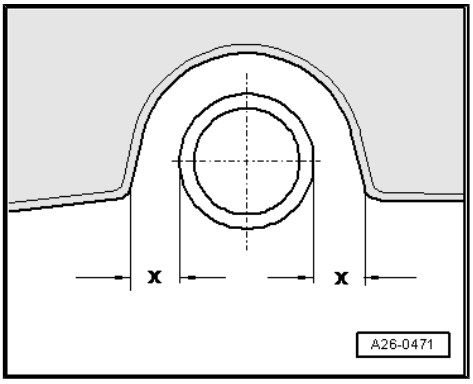
1.4.2 Aligning tailpipes

Procedure

Vehicles with single tailpipe:

– Adjust rear silencer so that there is an even distance between bumper cut-out and tailpipes.

• -x- = -x-.



Vehicles with double tailpipe:

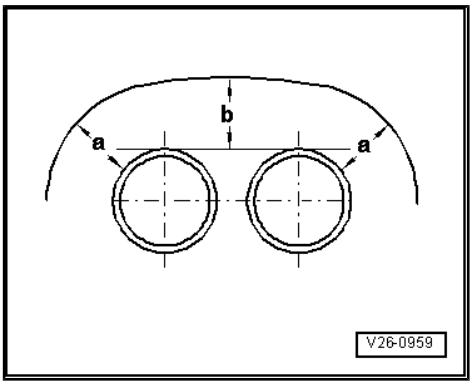
– Align rear silencer so that there is an equal distance -a- and -b- between bumper cut-out and tailpipes.

All vehicles (continued):

– Unfasten rear silencer mounting to align tailpipes.

Tightening torques

◆ ⇒ “1.1 Exploded view - silencers”, page 513



1.5 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.

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2 Emission control system

⇒ “2.1 Exploded view - emission control system”, page 522

⇒ “2.2 Exploded view - retainers and pipes for pressure differential sender for particulate filter G1037 ”, page 527

⇒ “2.3 Removing and installing catalytic converter”, page 528

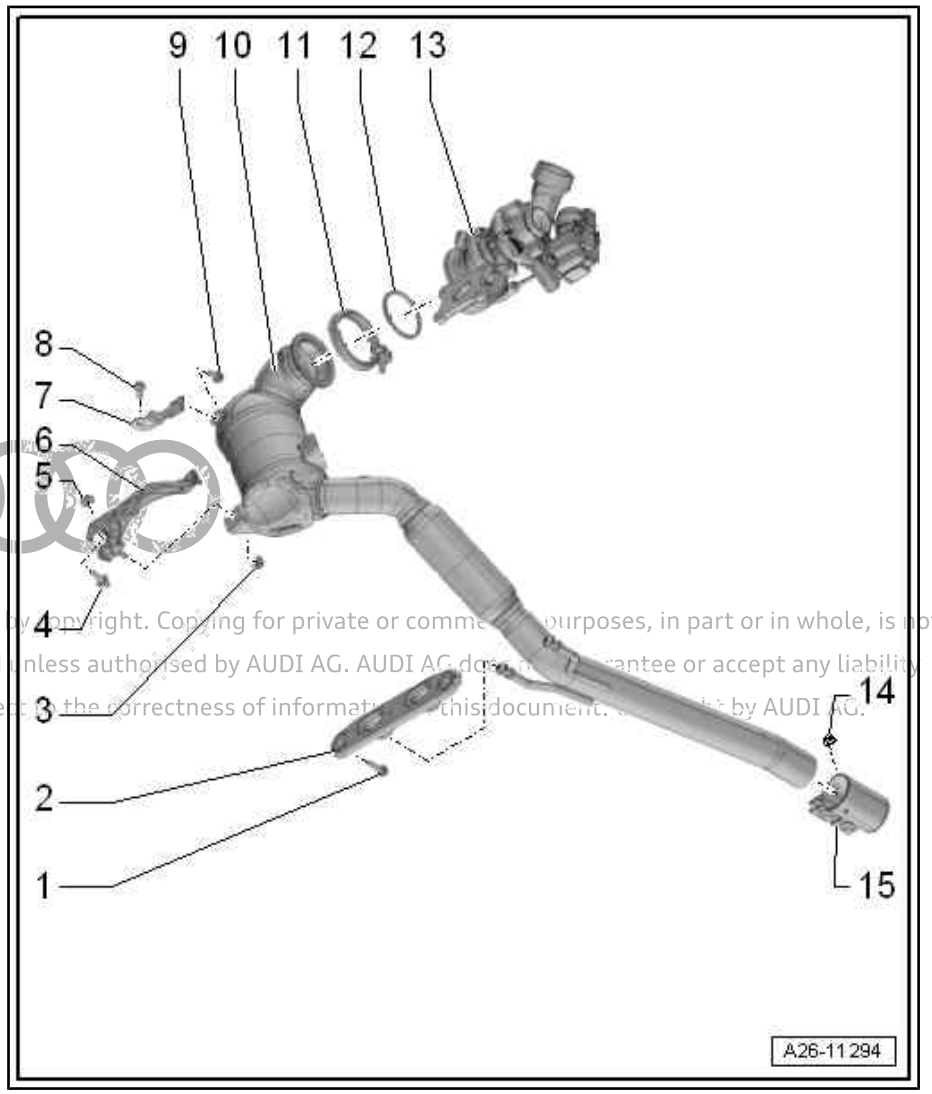
2.1 Exploded view - emission control system

⇒ “2.1.1 Exploded view - emission control system, all vehicles except e-tron”, page 522

⇒ “2.1.2 Exploded view - emission control system, e-tron without particulate filter”, page 524

⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525

2.1.1 Exploded view - emission control system, all vehicles except e-tron



1 - Bolt
- ❑ 20 Nm

2 - Bracket
- ❑ Renew if damaged

3 - Nut
- ❑ Tightening torque and sequence
  ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523

4 - Bolt
- ❑ 20 Nm

5 - Nut
- ❑ Tightening torque and sequence
  ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523

6 - Bracket

7 - Bracket

8 - Bolt
- ❑ Tightening torque and sequence
  ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523

9 - Bolt
- ❑ Tightening torque and sequence
  ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523

10 - Front exhaust pipe with catalytic converter
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue

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- ❑ 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 ⇒ “2.3 Removing and installing catalytic converter”, page 528
- ❑ 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 ⇒ “1.4 Stress-free alignment of exhaust system”, page 520

11 - Screw-type clip

- ❑ Tightening torque and sequence
  ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523

12 - Seal

- ❑ Renew after removing

13 - Turbocharger

14 - Nut

- ❑ 30 Nm

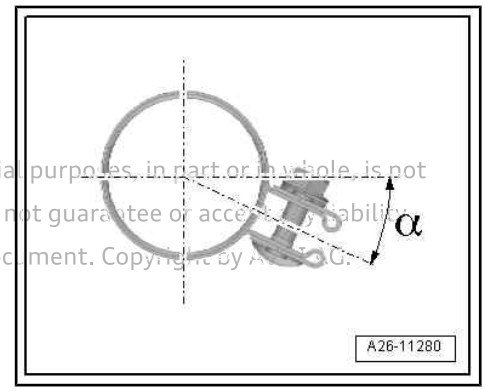
15 - Clamp (front)

- ❑ Before tightening, align exhaust system so it is free of stress
  ⇒ “1.4 Stress-free alignment of exhaust system”, page 520
- ❑ Installation position ⇒ Fig. ““Installation position of front clamp”“ , page 523
- ❑ Tighten bolted connections evenly

Installation position of front clamp

– Fit clamp in position shown.

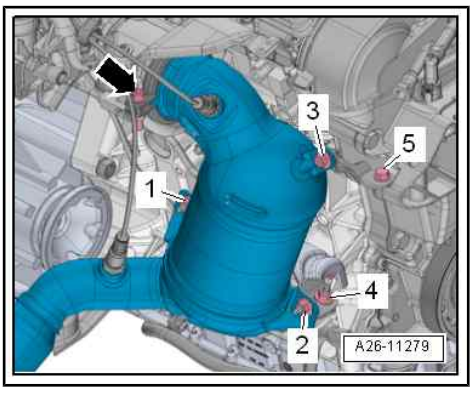
- Angle -α- = approx. 20°
- Bolted connection facing towards right
- Nuts facing upwards



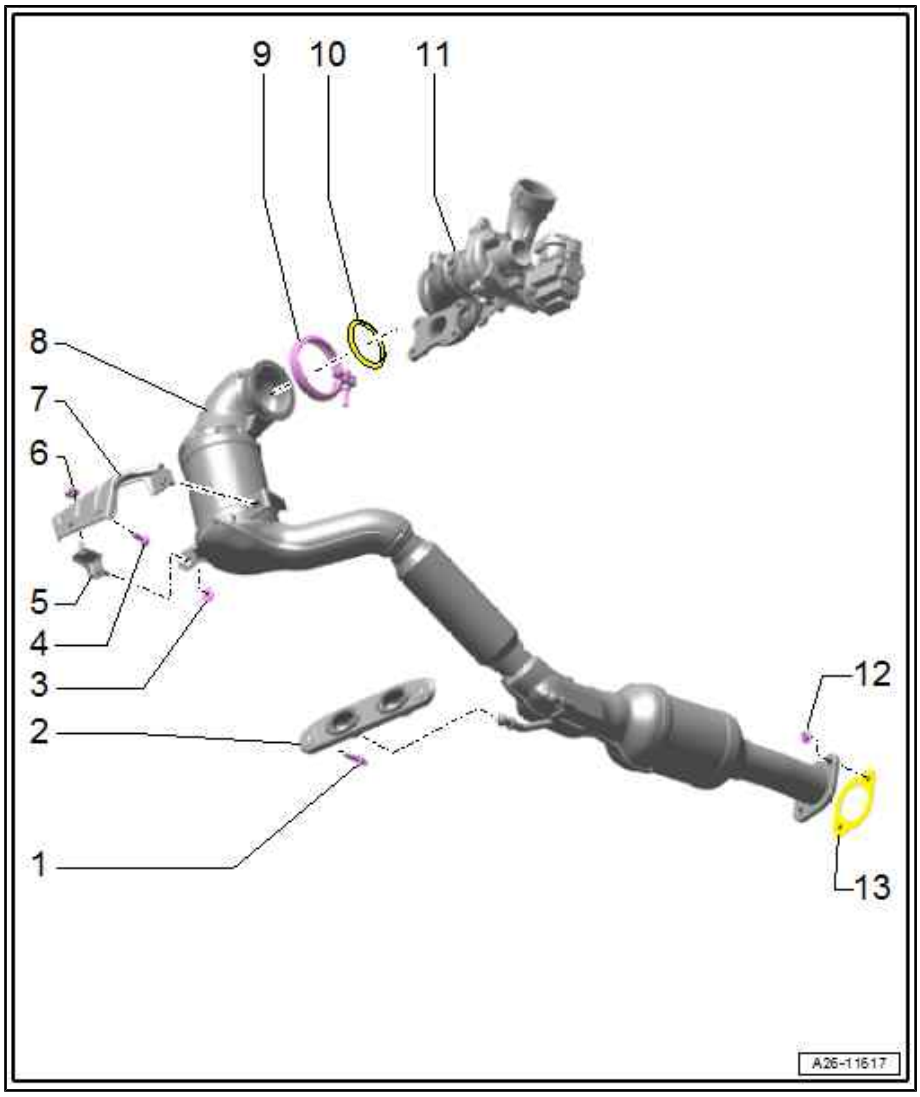
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Installing catalytic converter - tightening torque and sequence

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



2.1.2 Exploded view - emission control system, e-tron without particulate filter



1 - Bolt
- ❑ 20 Nm

2 - Bracket
- ❑ Renew if damaged

3 - Nut
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 525

4 - Bolt
- ❑ 20 Nm

5 - Bracket

6 - Nut
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 525

7 - Heat shield

8 - 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 ⇒ "2.3.2 Removing and installing catalytic converter - e-tron without particulate filter", page 530
- ❑ 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 ⇒ "1.4 Stress-free alignment of exhaust system", page 520

9 - Screw-type clip
- ❑ Tightening torque and sequence ⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 525

10 - Seal
- ❑ Renew after removing

11 - Turbocharger

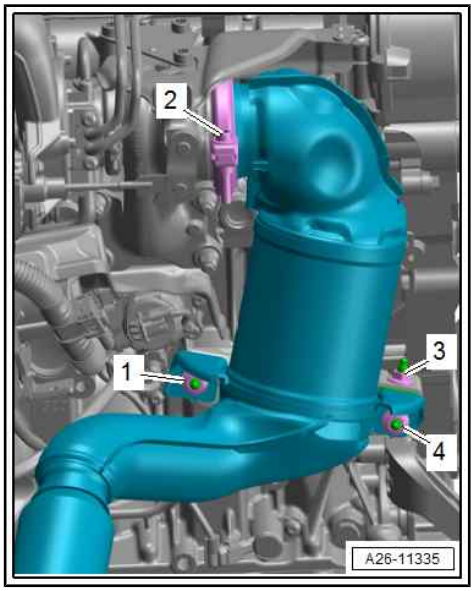
12 - Nut
- ❑ Self-locking; renew after removing
- ❑ 20 Nm

13 - Gasket
- ❑ Renew after removing

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Installing catalytic converter - tightening torque and sequence

1.	–	Fit catalytic converter to turbocharger and attach screw-type clip -2- loosely without tightening it. Loosen nut -3- if necessary.	
2.	–	Fit nuts -1, 3, 4- by hand without tightening	• It must still be possible to move catalytic converter and bracket
3.	–	Tighten screw-type clip -2-	15 Nm
4.	–	Tighten bolts and nuts in the sequence -1, 4, 3-	20 Nm



2.1.3 Exploded view - emission control system, e-tron with particulate filter

1 - Screw-type clip
- ❑ Tightening torque and sequence
⇒ Fig. ""Installing catalytic converter - tightening torque and sequence"" , page 523

2 - Seal
- ❑ Renew after removing

3 - Bolt
- ❑ 20 Nm

4 - Bracket
- ❑ With marking for engine side

5 - Bolt
- ❑ 20 Nm

6 - Bracket

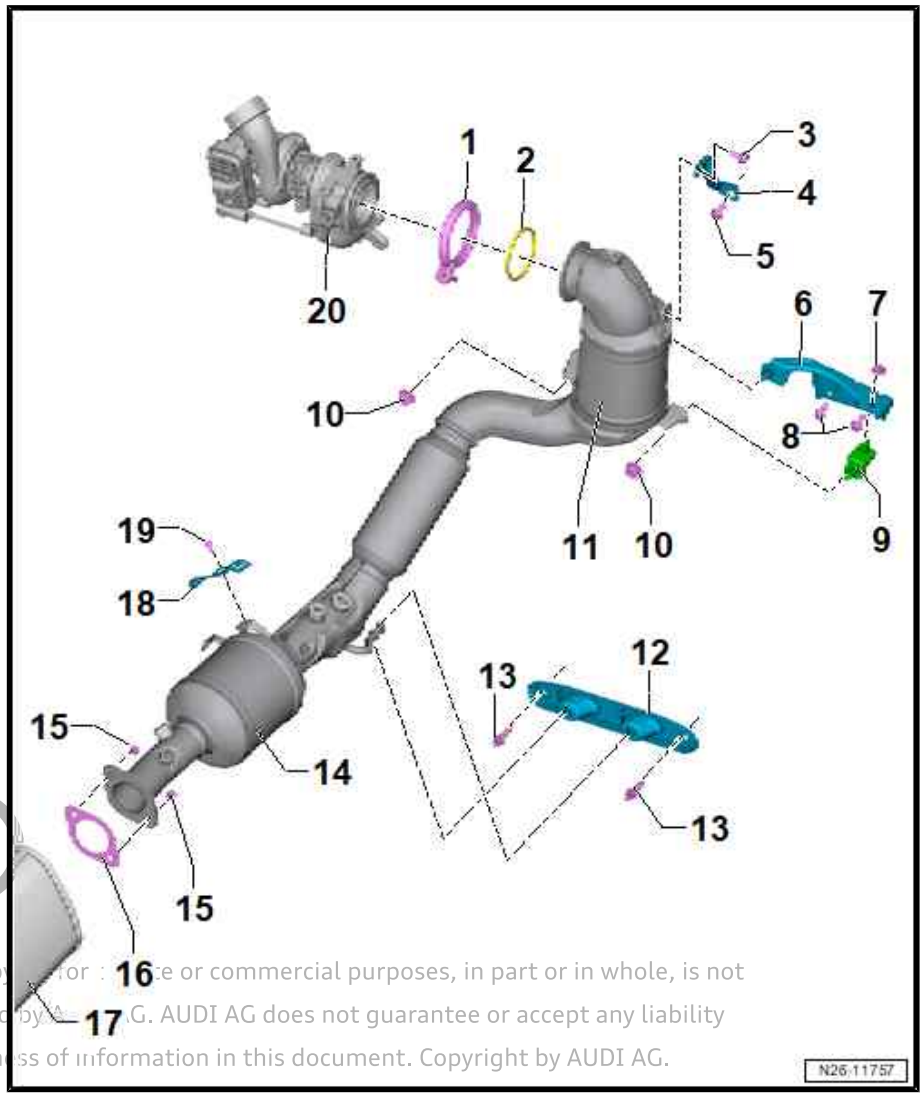
7 - Nut
- ❑ 20 Nm

8 - Bolt
- ❑ 20 Nm

9 - Bracket

10 - Nut
- ❑ 2x
- ❑ 20 Nm

11 - Front exhaust pipe with catalytic converter
- ❑ Combined as one unit with
⇒ Item 14 (page 526)
- ❑ Do not bend flexible joint more than 10° - otherwise it can be damaged
- ❑ Install flexible joint so that it is not under tension.



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- ❑ Take care not to damage wire mesh on flexible joint
- ❑ Protect catalytic converter from damage by knocks and impact
- ❑ Removing and installing
  ⇒ “2.3.3 Removing and installing catalytic converter - e-tron with particulate filter”, page 533
- ❑ 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 ⇒ “1.4 Stress-free alignment of exhaust system”, page 520

12 - Bracket

- ❑ Renew if damaged

13 - Bolt

- ❑ Centre hex studs for securing bracket to high-voltage heater (PTC) - Z115-
- ❑ 20 Nm

14 - Particulate filter

- ❑ Combined as one unit with ⇒ Item 11 (page 525)
- ❑ Removing and installing
  ⇒ “2.3.3 Removing and installing catalytic converter - e-tron with particulate filter”, page 533

15 - Nut

- ❑ Renew after removing
- ❑ 20 Nm

16 - Gasket

- ❑ Renew after removing

17 - Silencer

- ❑ Exploded view ⇒ “1.1.3 Exploded view - silencers, e-tron”, page 516

18 - Bracket

19 - Bolt

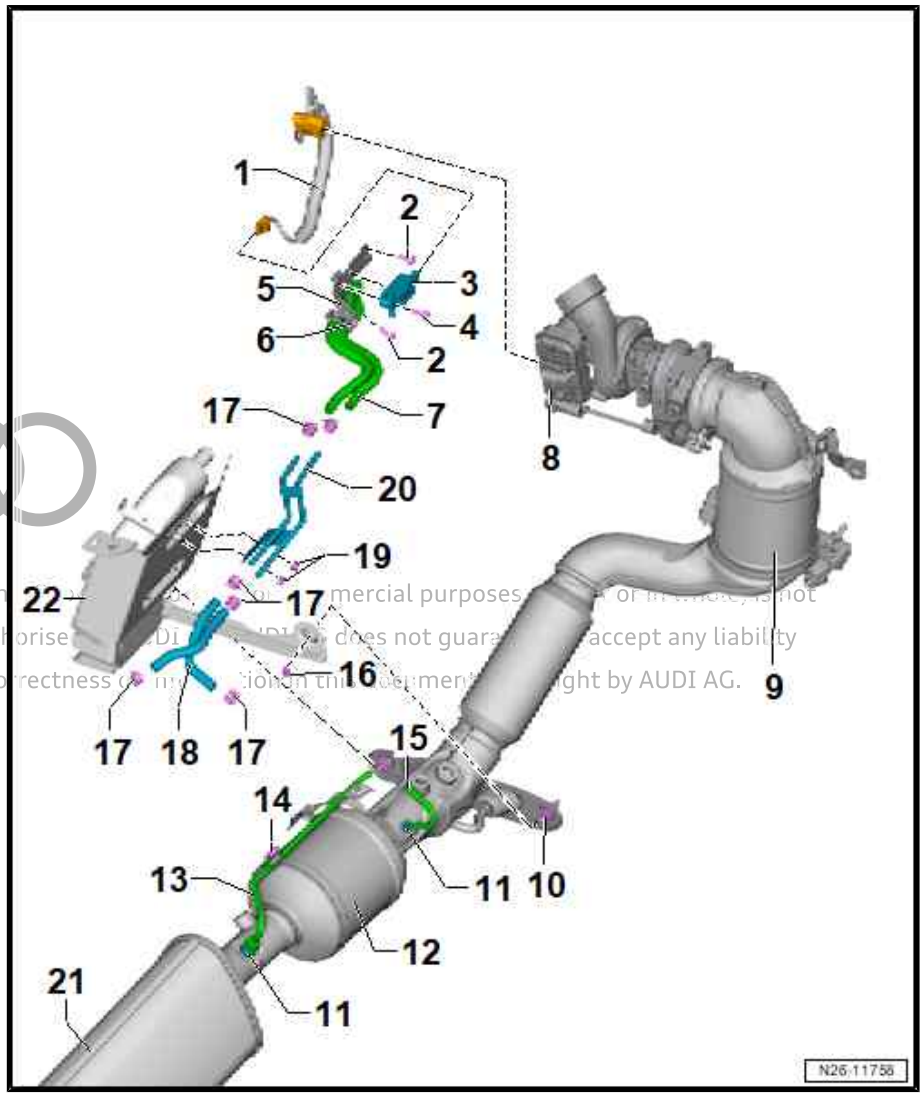
- ❑ 8 Nm

20 - Turbocharger

- ❑ Exploded view ⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418

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2.2 Exploded view - retainers and pipes for pressure differential sender for particulate filter - G1037-



1 - Electrical wiring harness

2 - Bolt

- ❑ 8 Nm

3 - Pressure differential sender for particulate filter - G1037-

- ❑ Removing and installing ⇒ “5.4 Removing and installing pressure differential sender for particulate filter G1037 ”, page 491

4 - Bolt

- ❑ 8 Nm

5 - Retainer

6 - Retainer

7 - Pressure hoses

8 - Turbocharger

- ❑ Exploded view ⇒ “1.1.4 Exploded view - turbocharger, e-tron”, page 418

9 - Front exhaust pipe with catalytic converter

- ❑ Exploded view ⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525

10 - Bolt

- ❑ Centre hex studs for securing bracket to high-voltage heater (PTC) - Z115-
- ❑ 20 Nm

11 - Screw thread

- ❑ For pressure lines
- ❑ Part of exhaust system

12 - Particulate filter

13 - Pressure line

- ❑ 45 Nm

14 - Retainer

15 - Pressure differential line

- ❑ 45 Nm

16 - Nut

- ❑ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing high-voltage heater (PTC) - Z115- / high-voltage heater (PTC) control unit - J848-

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17 - Clip

18 - Pressure hoses

19 - Nut

- ❑ 2x
- ❑ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing high-voltage heater (PTC) - Z115- / high-voltage heater (PTC) control unit - J848-

20 - Pressure differential line

21 - Silencer

- ❑ Exploded view ⇒ “1.1.3 Exploded view - silencers, e-tron”, page 516

22 - High-voltage heater (PTC) - Z115-

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing high-voltage heater (PTC) - Z115- / high-voltage heater (PTC) control unit - J848-

2.3 Removing and installing catalytic converter

⇒ “2.3.1 Removing and installing catalytic converter - all vehicles except e-tron”, page 528

⇒ “2.3.2 Removing and installing catalytic converter - e-tron without particulate filter”, page 530

⇒ “2.3.3 Removing and installing catalytic converter - e-tron with particulate filter”, page 533

2.3.1 Removing and installing catalytic converter - all vehicles except e-tron

Special tools and workshop equipment required

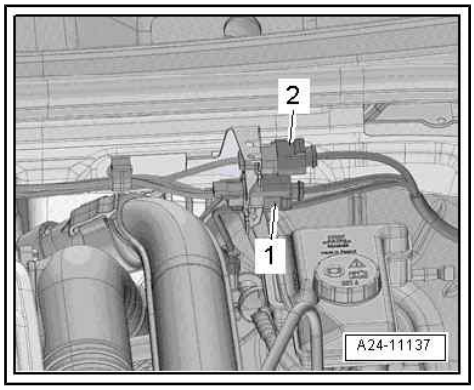
- ♦ High-temperature paste ⇒ Electronic parts catalogue

Removing

- Re-install all cable ties in original positions.

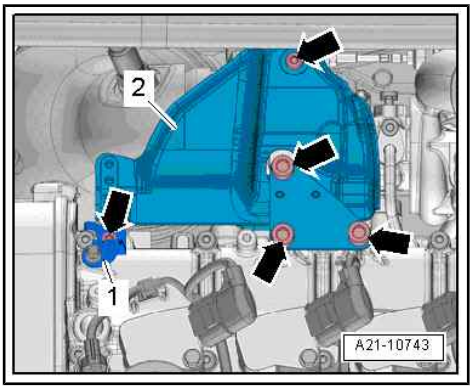
– Remove engine cover panel ⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

– Detach electrical connectors -1, 2- from bracket, unplug connectors and move electrical wiring clear.



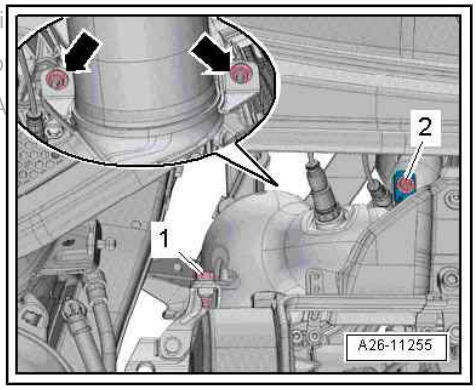
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– Remove bolts -arrows- and detach bracket with heat shield -2- and bracket -1- for engine cover panel.

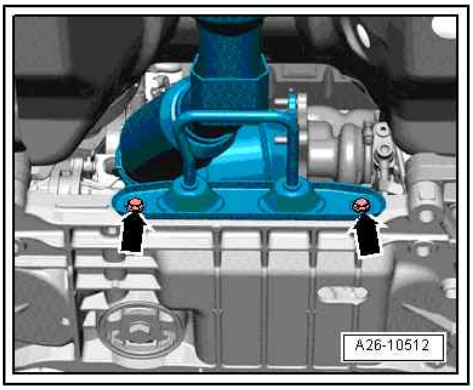


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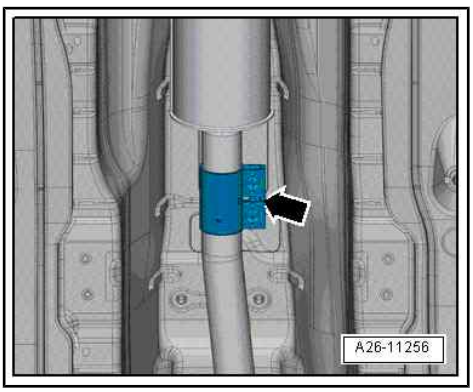
– Unscrew bolt -2- and remove screw-type clip.
– Remove bolt -1- and nuts -arrows-.
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Remove tunnel cross-piece ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .



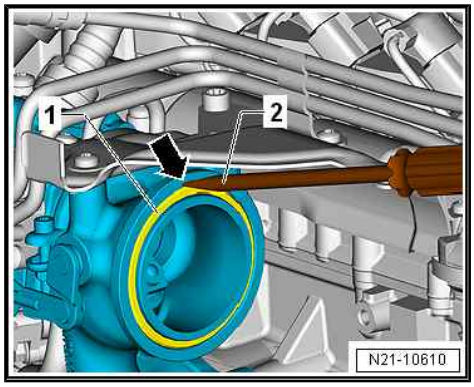
– Remove bolts -arrows-.
– Detach electrical connector from bracket and move clear wiring to Lambda probe.



– 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 reverse order; note the following:

- Renew gasket and self-locking nuts.

– Install engine cover panel
⇒ “3.1.1 Removing and installing engine cover panel - all vehicles except e-tron”, page 79 .

– Align the exhaust system so it is free of stress
⇒ “1.4 Stress-free alignment of exhaust system”, page 520 .

Tightening torques

♦ ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523

♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

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

2.3.2 Removing and installing catalytic converter - e-tron without particulate filter

Special tools and workshop equipment required

♦ High-temperature paste ⇒ Electronic parts catalogue

Removing

- Re-install all cable ties in original positions.

DANGER

High voltage can cause fatal injury.

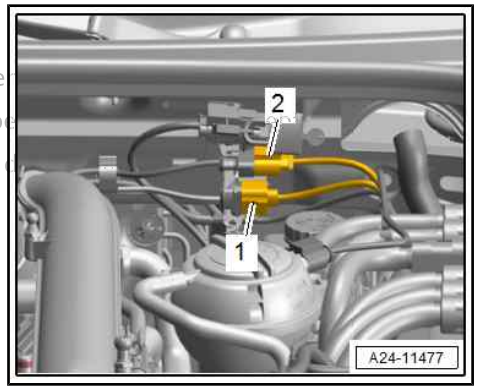
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

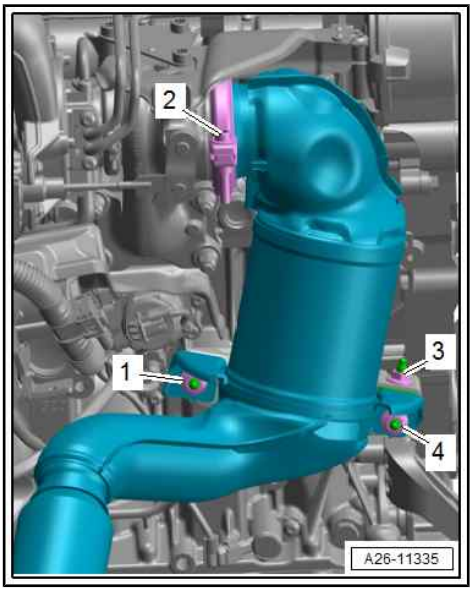
– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Detach electrical connectors -1, 2- from bracket, unplug connectors and move electrical wiring clear.



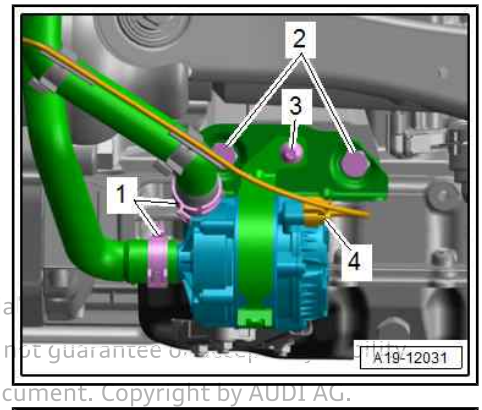
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with respect to the correctness of information in this

– Open screw-type clip -2- and place it on intake funnel of catalytic converter.
– Remove nuts -1, 4-.
– Remove tunnel cross-piece (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Remove underbody trim (centre, right-side) in direction of exhaust system and press downwards slightly ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .



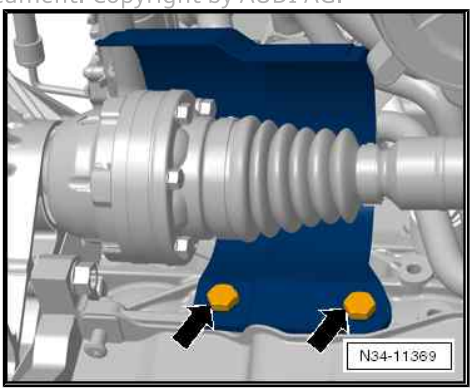
Version with secondary air system:

– Remove front wheel (right-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .
– Unplug electrical connector -4- and move wiring clear.
– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards side.



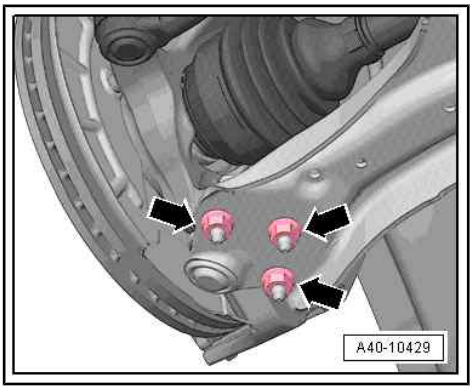
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– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).

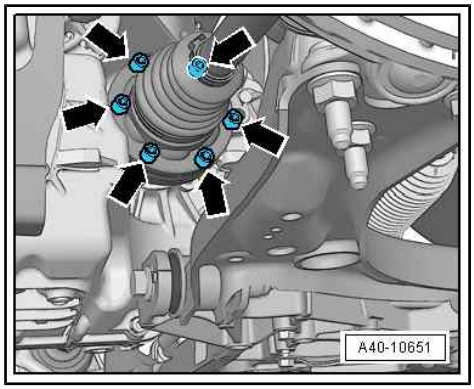


– Remove nuts -arrows- on both sides.
– Pull suspension link out of swivel joint.

• When carrying out repairs, take care to avoid damaging rubber boot of swivel joint (protect boot if necessary).



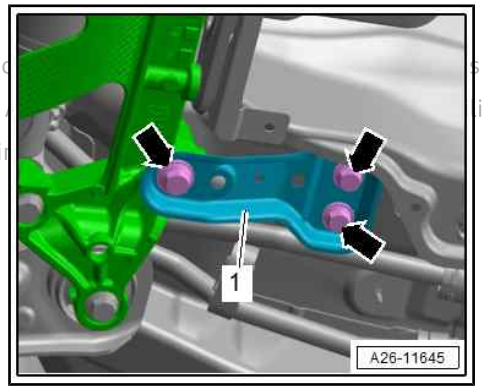
– Unbolt drive shaft from flange shaft of gearbox -arrows- and pivot it downwards. (Shown for left side of vehicle.)



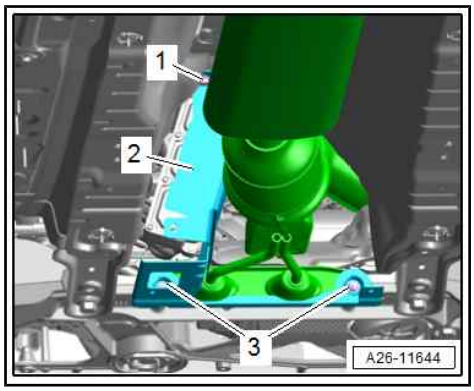
All vehicles (continued):

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

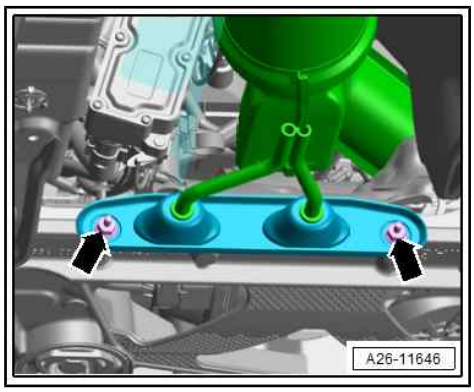
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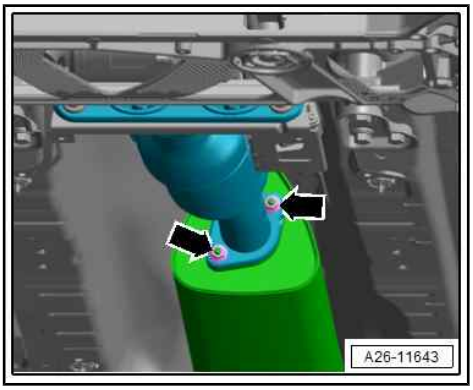
– Remove bolt -1- and nuts -3-.
– Tie up high-voltage heater (PTC) - Z115- -item 2- to one side.



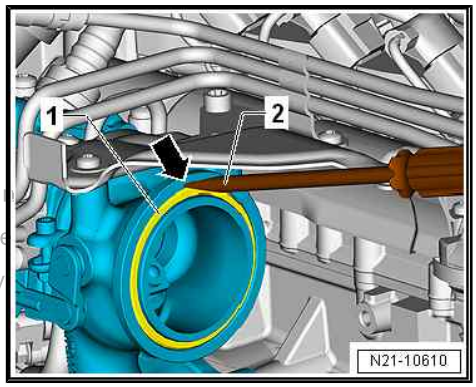
– Remove centre hex studs -arrows-.



– Remove nuts -arrows- and detach catalytic converter.



– Insert screwdriver -2- into groove -arrow- on turbocharger and lever out seal -1-.



Installing

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

- Renew gasket and self-locking nuts.

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– Install engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– **Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.**

– Re-energise high-voltage system ⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

- ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 525
- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing heat shield for drive shaft
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Lower wishbone, swivel joint; Exploded view - lower wishbone, swivel joint
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation
- ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing high-voltage heater (PTC) - Z115- / high-voltage heater (PTC) control unit - J848-

2.3.3 Removing and installing catalytic converter - e-tron with particulate filter

Special tools and workshop equipment required

- High-temperature paste ⇒ Electronic parts catalogue

Removing

Note

Secure all cable ties in the same locations when installing.

DANGER

High voltage can cause fatal injury.

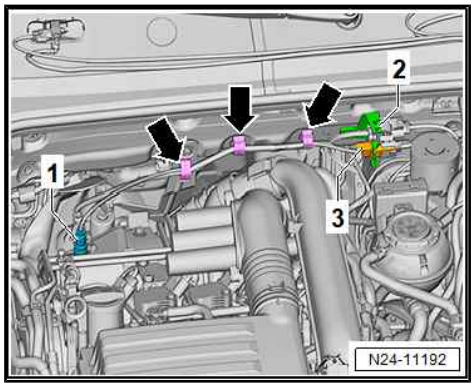
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

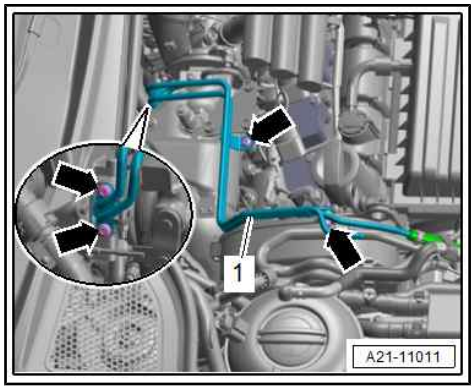
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Take electrical connector -3- out of bracket -2-, unplug it and move electrical wiring clear at retainers -arrows-.

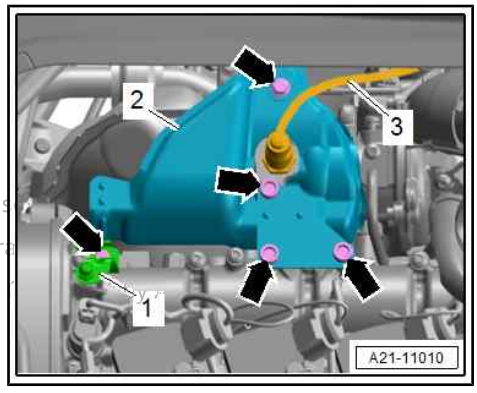


– Remove bolts -arrows- and pivot coolant lines -1- to right side.



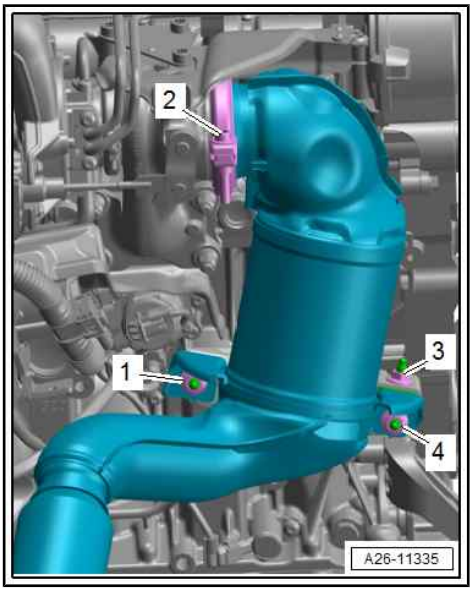
– Remove bolts -arrows- and detach bracket with heat shield -2- and bracket -1- for engine cover panel.

– When doing so, guide out electrical wire for Lambda probe 1 before catalytic converter - GX10- .



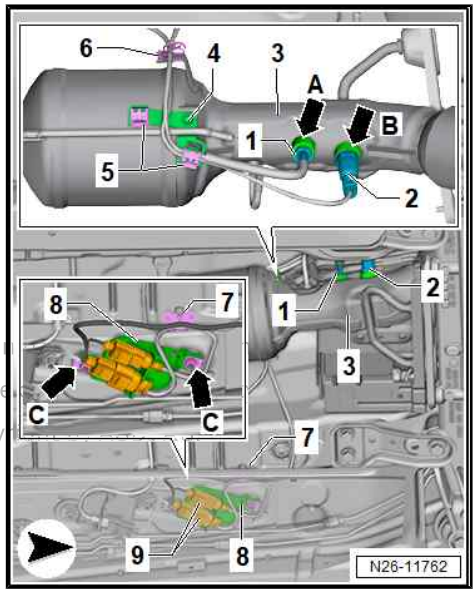
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– Open screw-type clip -2- and place it on intake funnel of catalytic converter.
– Remove nuts -1, 4-.
– Remove tunnel cross-piece (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .
– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Remove underbody trim (centre, right-side) in direction of exhaust system and press downwards slightly ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .
– Detach pressure differential sender for particulate filter - G1037- from gearbox
⇒ “5.4 Removing and installing pressure differential sender for particulate filter G1037 ”, page 491 .

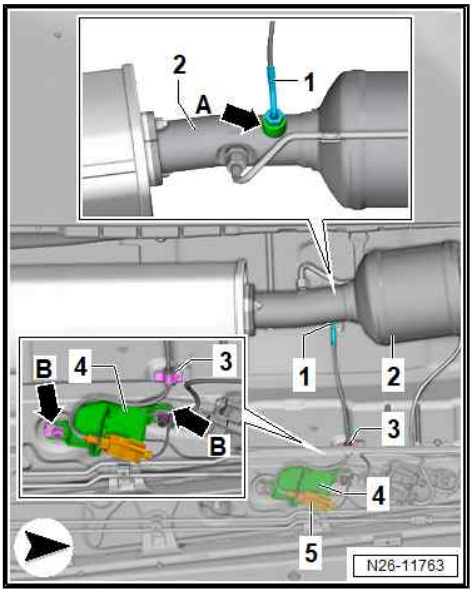


– Take electrical connectors -9- out of bracket -8- on underbody, unplug them and move electrical wiring clear at retainers -5, 6, 7-.

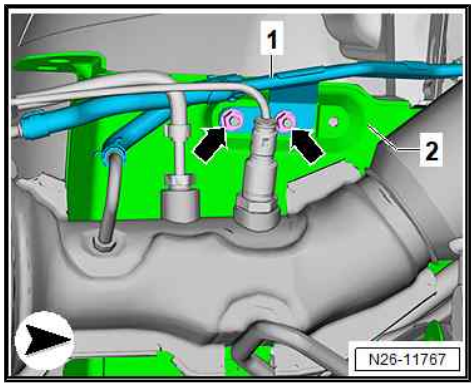
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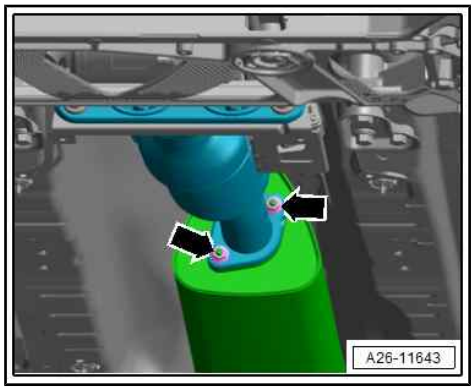
– Take electrical connector -5- out of bracket -4- on underbody, unplug it and move electrical wiring clear.



– Remove nuts -arrows- and detach pressure differential lines -1- from high-voltage heater (PTC) - Z115- -item 2-.

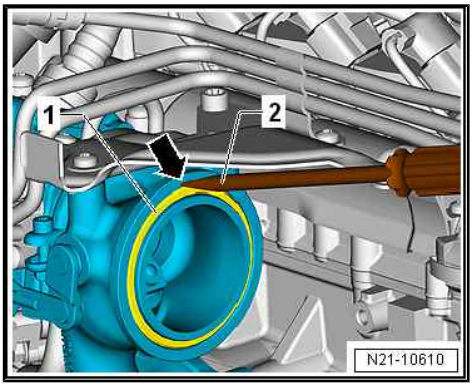


– Remove nuts -arrows-.
– Remove catalytic converter together with particulate filter, temperature senders, Lambda probes and pressure differential sender for particulate filter - G1037- (leave pressure differential sender connected).



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– Insert screwdriver -2- into groove -arrow- on turbocharger and lever out seal -1-.



Installing

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

- Renew gaskets and self-locking nuts.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

– After renewing components, erase learnt values and adapt catalytic converter with particulate filter to engine control unit.

– Switch ignition on and connect ⇒ Vehicle diagnostic tester.

– Select function `0001 - Erase learnt values`.

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Tightening torques

- ⇒ “1.1.3 Exploded view - silencers, e-tron”, page 516
- ⇒ Fig. ““Installing catalytic converter - tightening torque and sequence”“ , page 523
- ⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525
- ⇒ “2.2 Exploded view - retainers and pipes for pressure differential sender for particulate filter G1037 ”, page 527
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit; Removing and installing high-voltage heater (PTC) - Z115- / high-voltage heater (PTC) control unit - J848-
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

2.4 Removing and installing particulate filter

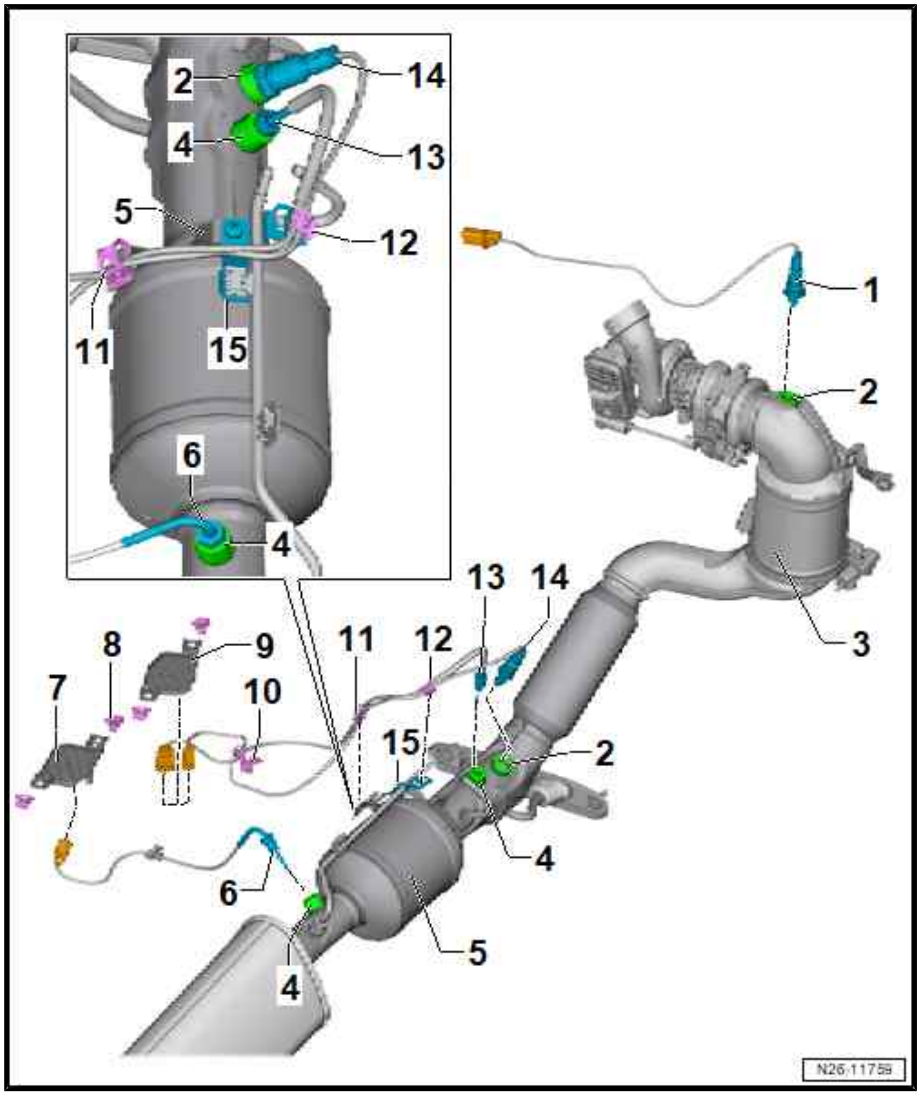
The particulate filter is removed together with the catalytic converter and front exhaust pipe
⇒ “2.3.3 Removing and installing catalytic converter - e-tron with particulate filter”, page 533 .

3 Exhaust gas temperature control

⇒ “3.1 Exploded view - exhaust gas temperature control”, page 538

⇒ “3.2 Removing and installing parts of exhaust gas temperature control”, page 539

3.1 Exploded view - exhaust gas temperature control



1 - Lambda probe 1 before catalytic converter - GX10-

- ❑ Exploded view
  ⇒ “7.1.3 Exploded view - Lambda probe, e-tron with particulate filter”, page 502

2 - Screw thread

- ❑ For Lambda probe
- ❑ Part of exhaust system

3 - Front exhaust pipe with catalytic converter

- ❑ Exploded view
  ⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525

4 - Screw thread

- ❑ Part of exhaust system

5 - Particulate filter

- ❑ Exploded view
  ⇒ “2.1.3 Exploded view - emission control system, e-tron with particulate filter”, page 525

6 - Temperature sender after particulate filter - G527-

- ❑ Removing and installing
  ⇒ “3.2.2 Removing and installing temperature sender after particulate filter G527 ”, page 540
- ❑ 45 Nm

7 - Bracket

8 - Speed nut

- ❑ Renew after removing

9 - Bracket

10 - Wire retainer

11 - Wire retainer

12 - Wire retainer

13 - Temperature sender before particulate filter - G506-

- ❑ Removing and installing
  ⇒ “3.2.1 Removing and installing temperature sender before particulate filter G506 ”, page 539
- ❑ 45 Nm

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14 - Lambda probe 1 after catalytic converter - GX7-

- ❑ Exploded view ⇒ “7.1.3 Exploded view - Lambda probe, e-tron with particulate filter”, page 502

15 - Bracket

3.2 Removing and installing parts of exhaust gas temperature control

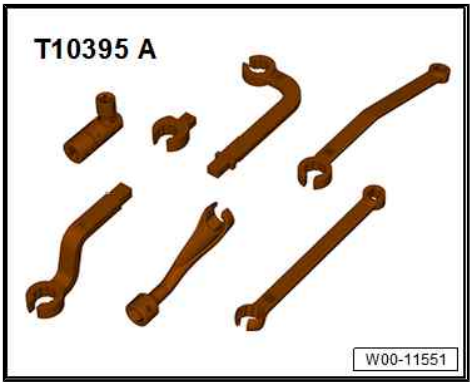
⇒ “3.2.1 Removing and installing temperature sender before particulate filter G506 ”, page 539

⇒ “3.2.2 Removing and installing temperature sender after particulate filter G527 ”, page 540

3.2.1 Removing and installing temperature sender before particulate filter - G506-

Special tools and workshop equipment required

- ♦ Tool set - T10395A- with suitable tool insert



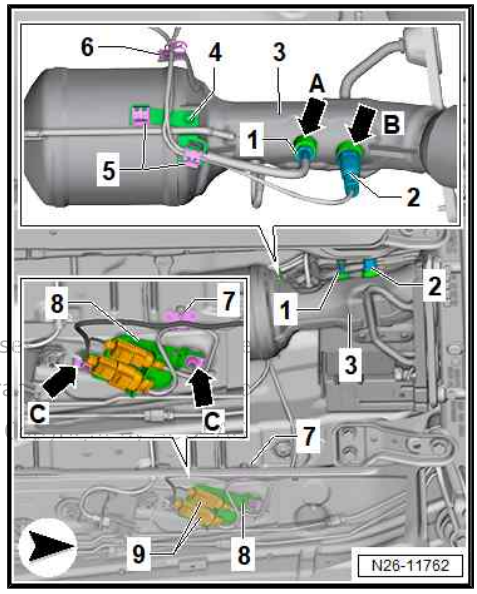
Removing

– Remove underbody trim (centre, left-side) in direction of exhaust system and press downwards slightly ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .

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– Take 2-pin electrical connector -9- out of bracket -8- on underbody, unplug it and move electrical wiring clear at retainers -5, 6, 7-.

– Remove temperature sender before particulate filter - G506- -item 1-



Installing

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

- Take care to protect exhaust gas temperature sender from knocks and impact; if dropped, the exhaust gas temperature sender can no longer be used.
- The electrical wiring of the temperature sensor must be secured at the original locations when installing. The wiring must NOT come into contact with the exhaust pipe.

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– Align temperature sender before particulate filter - G506- as shown.

- Angled shaft faces bracket -4-.
- Angled shaft must not make contact with any other components.

Tightening torques

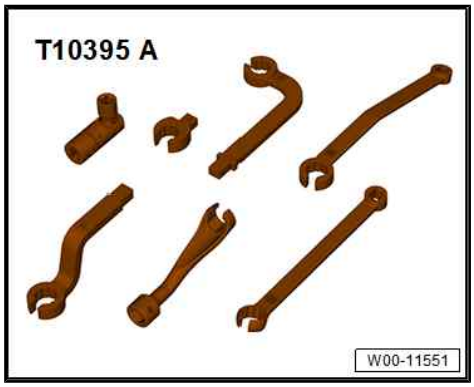
◆ ⇒ “3.1 Exploded view - exhaust gas temperature control”, page 538

◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

3.2.2 Removing and installing temperature sender after particulate filter - G527-

Special tools and workshop equipment required

◆ Tool set - T10395A- with suitable tool insert

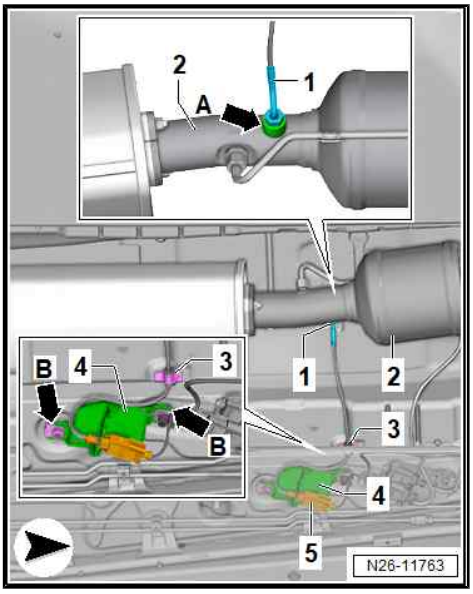


Removing

– Remove underbody trim (centre, left-side) in direction of exhaust system and press downwards slightly ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .

– Move electrical connector -5- clear at bracket -4- on underbody, unplug it and move electrical wiring clear at retainer -3-.

– Remove temperature sender after particulate filter - G527- -item 1-



Installing

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

- Take care to protect exhaust gas temperature sender from knocks and impact; if dropped, the exhaust gas temperature sender can no longer be used.
- The electrical wiring of the temperature sensor must be secured at the original locations when installing. The wiring must NOT come into contact with the exhaust pipe.

Tightening torques

◆ ⇒ “3.1 Exploded view - exhaust gas temperature control”, page 538

◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

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4 Secondary air system

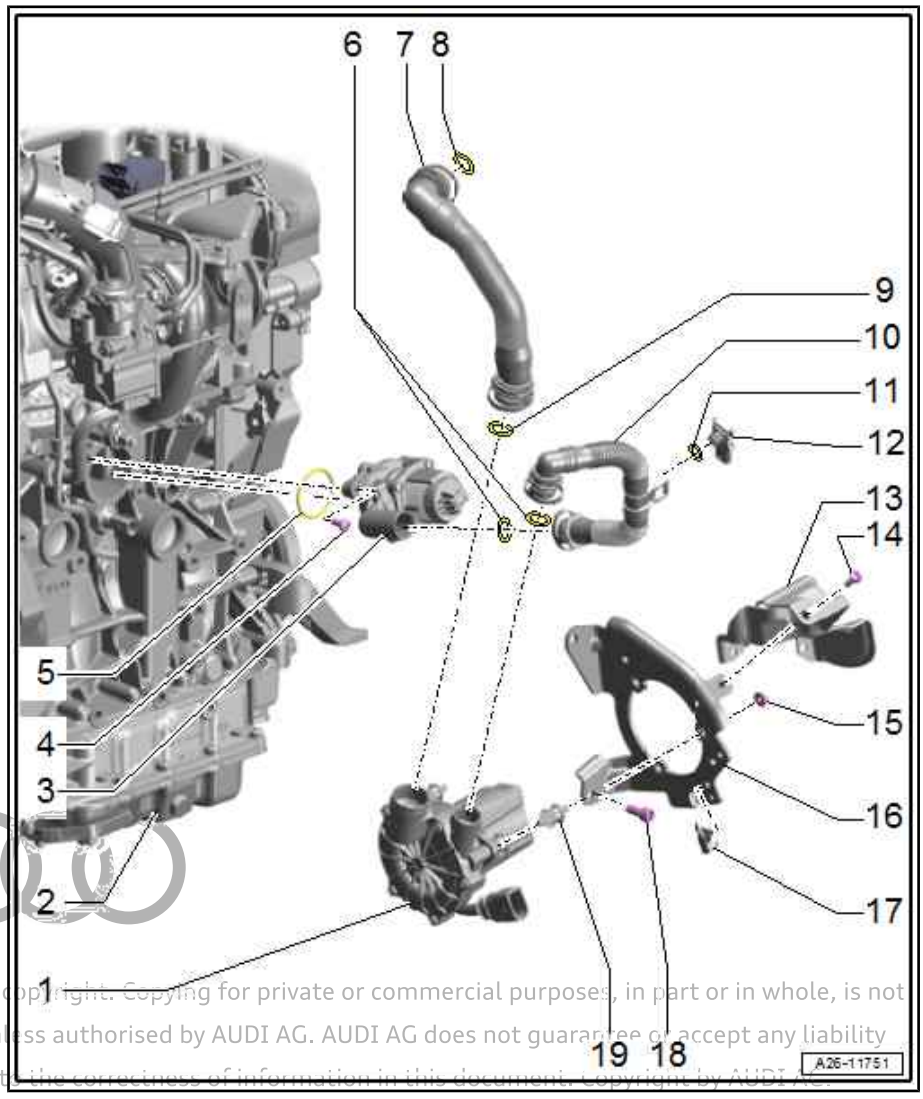
⇒ “4.1 Exploded view - secondary air system”, page 542

⇒ “4.2 Removing and installing secondary air pump motor V101 ”, page 543

⇒ “4.3 Removing and installing secondary air inlet valve N112 ”, page 546

⇒ “4.4 Removing and installing sender 1 for secondary air pressure G609 ”, page 547

4.1 Exploded view - secondary air system



1 - Secondary air pump motor - V101-

- ❑ Removing and installing ⇒ “4.2 Removing and installing secondary air pump motor V101 ”, page 543

2 - Engine

3 - Secondary air inlet valve - N112-

- ❑ Removing and installing ⇒ “4.3 Removing and installing secondary air inlet valve N112 ”, page 546

4 - Bolt

- ❑ 9 Nm

5 - O-ring

- ❑ Renew after removing

6 - O-rings

- ❑ Check for damage and renew if necessary

7 - Pipe

- ❑ For secondary air

8 - O-ring

- ❑ Check for damage and renew if necessary

9 - O-ring

- ❑ Renew after removing

10 - Hose

- ❑ For secondary air

11 - O-ring

- ❑ Renew after removing

12 - Sender 1 for secondary air pressure - G609-

- ❑ Removing and installing ⇒ “4.4 Removing and installing sender 1 for secondary air pressure G609 ”, page 547

13 - Heat shield

14 - Bolt

- ❑ 9 Nm

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15 - Nut

- ❑ 9 Nm

16 - Bracket

- ❑ For secondary air pump motor - V101-

17 - Clip

18 - Bolt

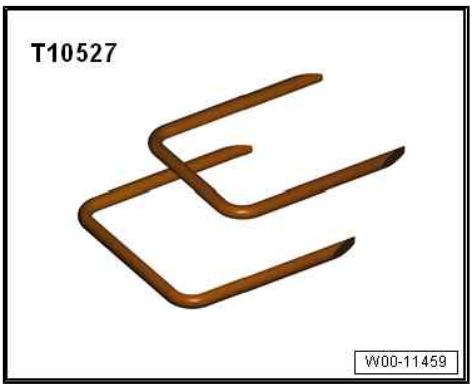
- ❑ 9 Nm

19 - Rubber mounting

4.2 Removing and installing secondary air pump motor - V101-

Special tools and workshop equipment required

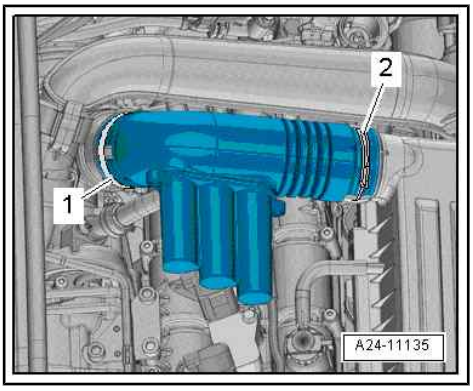
- ♦ Release tool - T10527- and -T10527/1-



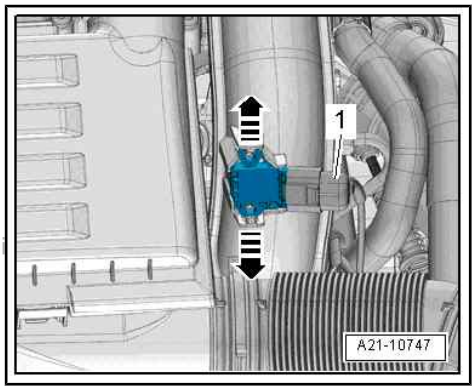
Removing

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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



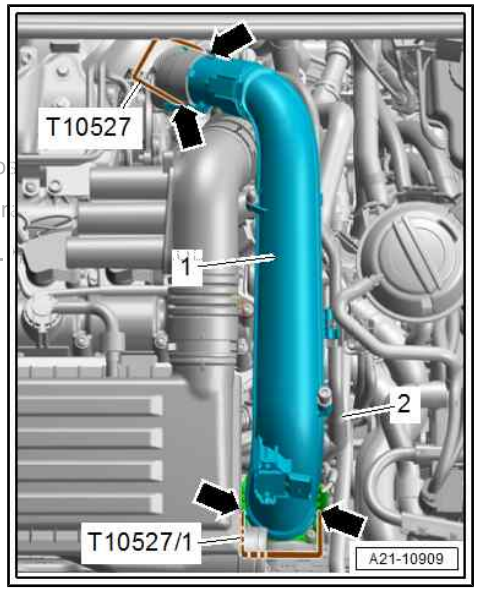
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



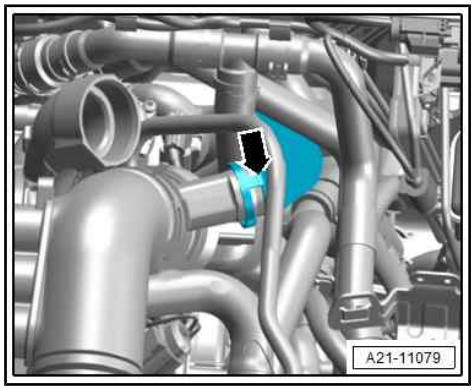
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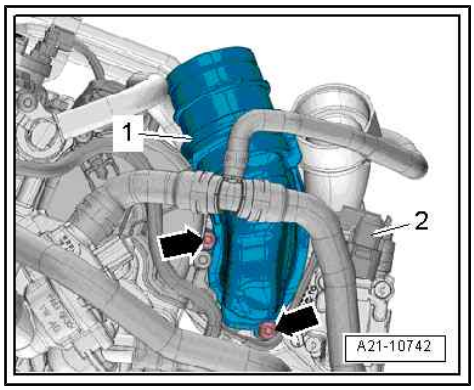
– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.
– Move line for activated charcoal filter system clear at air pipe.
– Release fasteners -arrows- with release tool - T10527- and - T10527/1-.
– Detach air pipe -1-.



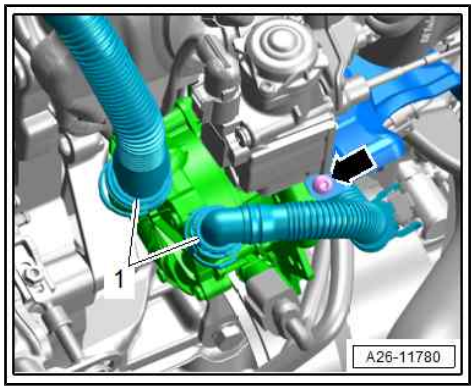
– Press release tabs on both sides and disconnect secondary air hose -arrow-.



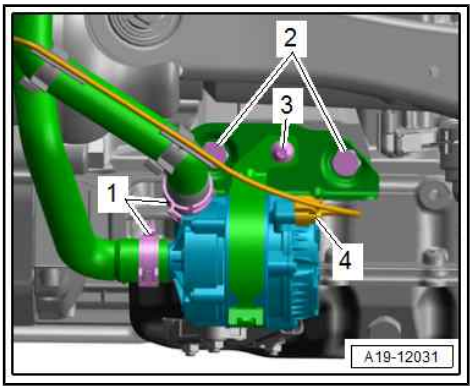
– Remove bolts -arrow-, detach connection -1- and move to one side.



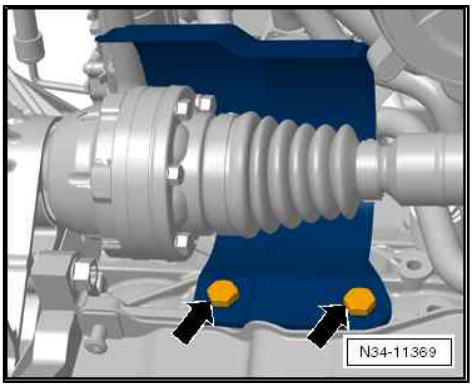
– Remove bolts -arrows-.
– Press release tabs on both sides and disconnect secondary air hoses -1-.
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .



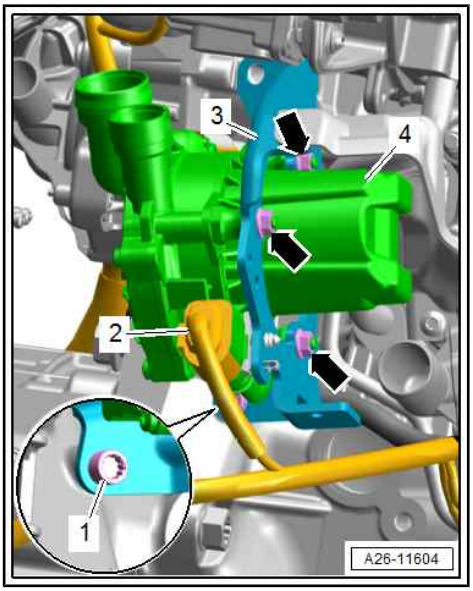
– Unplug electrical connector -4- and move wiring clear.
– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards side.



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



– Unplug electrical connector -2-.
– Remove bolt -1-.
– Detach secondary air pump motor - V101- -item 4- with bracket -3- and place on subframe.
– Remove nuts -arrows- and detach secondary air pump motor - V101- .



Installing

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

– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

- ⇒ “4.1 Exploded view - secondary air system”, page 542
- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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4.3 Removing and installing secondary air inlet valve - N112-

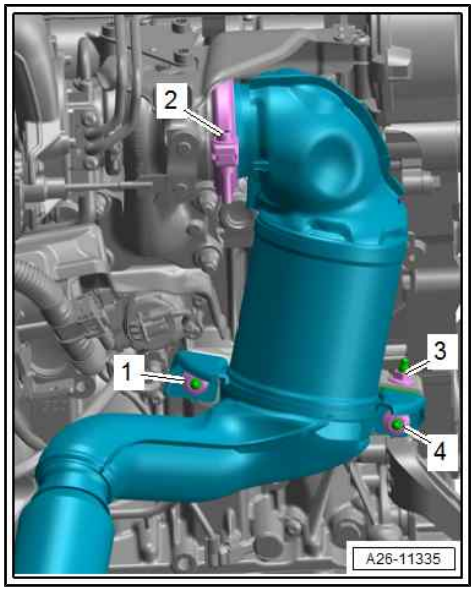
Removing

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

– Unfasten and detach screw-type clip -2-.

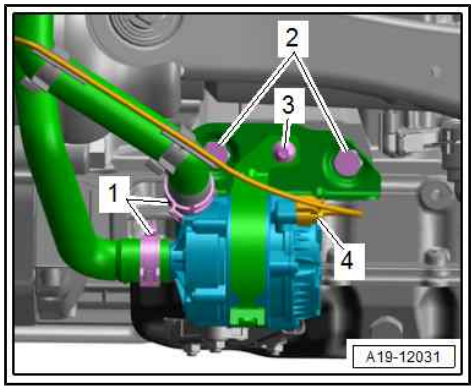
– Unscrew nuts -1, 4- and tie up catalytic converter.

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

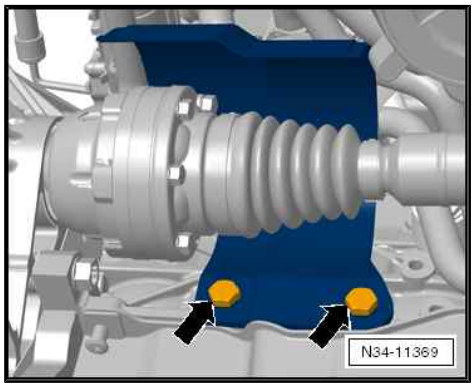


– Unplug electrical connector -4- and move wiring clear.

– Remove nuts -2- and press coolant pump for high-voltage battery - V590- towards side.

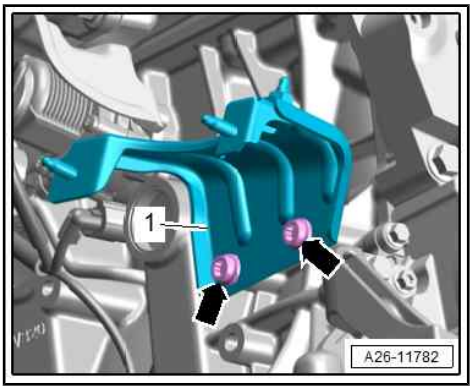


– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).

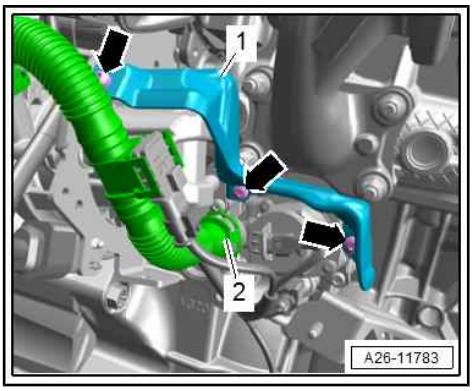


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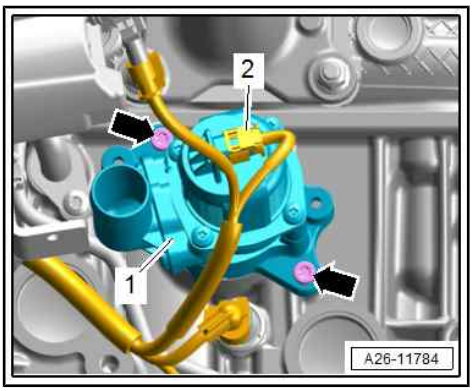
– Remove bolts -arrows- and detach bracket -1- for catalytic converter.



– Press release tabs on both sides and disconnect secondary air hose -2-.
– Remove bolts -arrows- and detach heat shield -1-.



– Unplug electrical connector -2-.
– Unscrew bolts -arrows- and detach secondary air inlet valve -1-.



Installing

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

– Install engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

Tightening torques

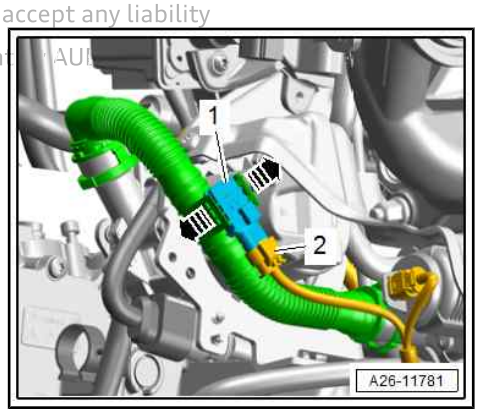
◆ ⇒ “4.1 Exploded view - secondary air system”, page 542
◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.4 Removing and installing sender 1 for secondary air pressure - G609-

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Removing

– Unplug electrical connector -2-.
– Release catches -arrows- and detach sender -1- for secondary air pressure.



Installing

Installation is carried out in reverse sequence.

28 – Ignition system

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1 Ignition system

⇒ “1.1 Exploded view - ignition system”, page 548

⇒ “1.2 Test data - spark plugs”, page 549

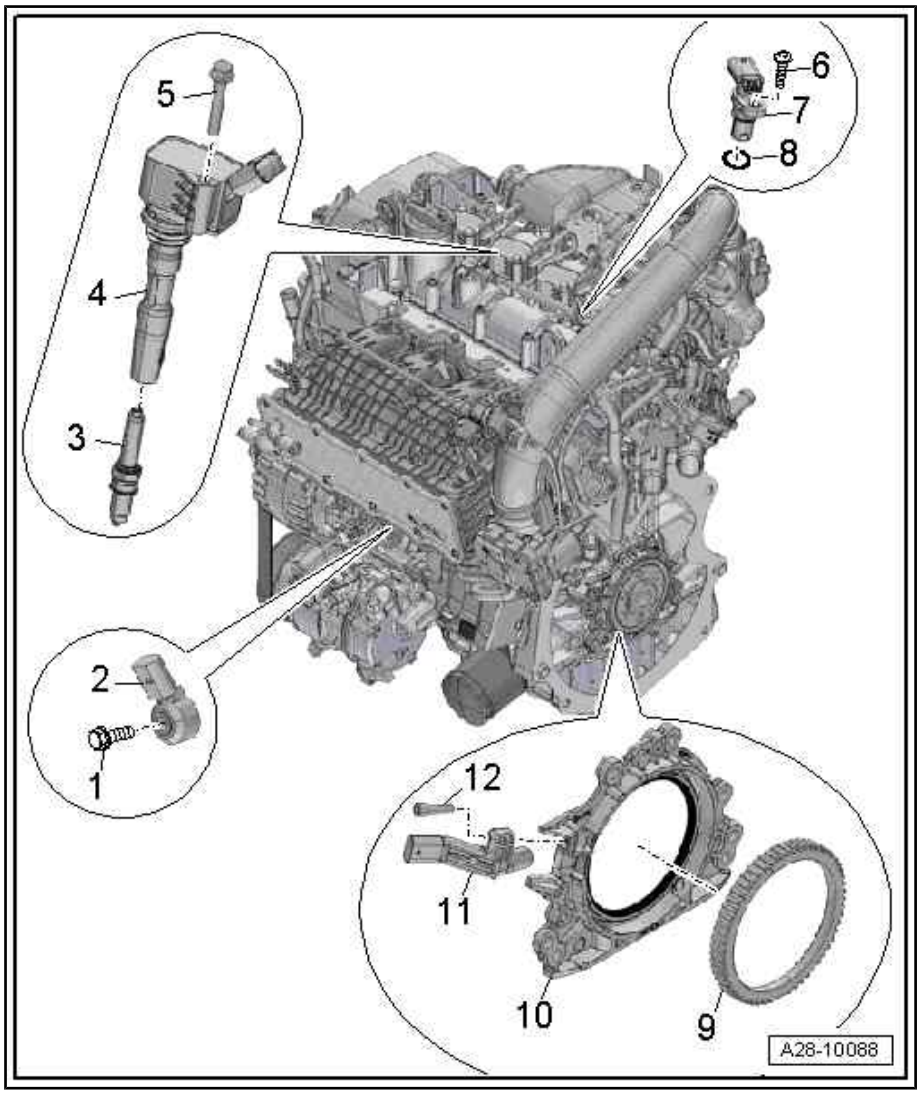
⇒ “1.3 Removing and installing ignition coils”, page 549

⇒ “1.4 Removing and installing knock sensor 1 G61 ”, page 552

⇒ “1.5 Removing and installing Hall senders”, page 553

⇒ “1.6 Removing and installing engine speed sender G28 ”, page 556

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 552

3 - Spark plug

- ❑ Use spark plug socket - 3122 B- to remove and install ⇒ Maintenance ; Booklet 821 ; Maintenance; Spark plugs: renewing
- ❑ Tightening torque ⇒ Maintenance ; Booklet 821 ; Maintenance; Spark plugs: renewing
- ❑ Change interval ⇒ Maintenance tables

4 - Ignition coil

- ◆ Ignition coil 1 with output stage - N70-
- ◆ Ignition coil 2 with output stage - N127-
- ◆ Ignition coil 3 with output stage - N291-
- ◆ Ignition coil 4 with output stage - N292-
  - ❑ Removing and installing ⇒ “1.3 Removing and installing ignition coils”, page 549

5 - Bolt

- ❑ 8 Nm

6 - Bolt

- ❑ 8 Nm

7 - Hall sender - G40-

- ❑ Additionally on engine with two camshaft adjusters: Hall sender 2 - G163-
- ❑ Removing and installing ⇒ “1.5 Removing and installing Hall senders”, page 553

8 - O-ring

- ❑ Renew if damaged

9 - Sender wheel

- ❑ For engine speed sender - G28-
- ❑ Combined as one unit with sealing flange (gearbox end)

10 - Sealing flange (gearbox end)

- ❑ Removing and installing ⇒ “2.3 Removing and installing sealing flange (gearbox end)”, page 102

11 - Engine speed sender - G28-

- ❑ Removing and installing ⇒ “1.6 Removing and installing engine speed sender G28 ”, page 556

12 - Bolt

- ❑ 4.5 Nm

1.2 Test data - spark plugs

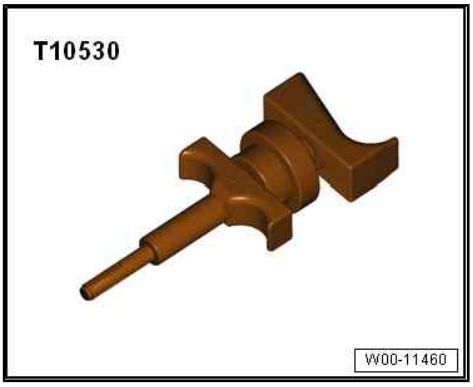
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Engine data	1.2/1.4 ltr. TFSI engine
Idling speed is not adjustable; controlled by the idling speed stabilisation	640 ... 800 rpm
Engine speed limiter (deactivates injectors/closes throttle valve)	approx. 6500 rpm
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.	
Ignition system	Multi-coil system with 4 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Firing order	1-3-4-2

1.3 Removing and installing ignition coils

Special tools and workshop equipment required

- ♦ Puller - T10530-

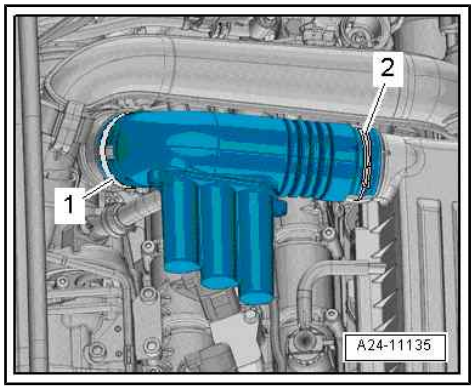


Removing

– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 79 .

Ignition coils for cylinders 2, 3 and 4:

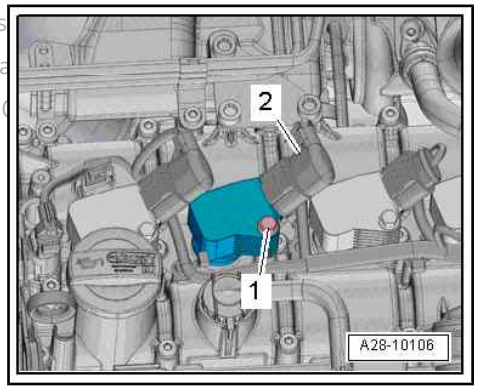
– Loosen hose clips -1, 2- and remove air pipe.



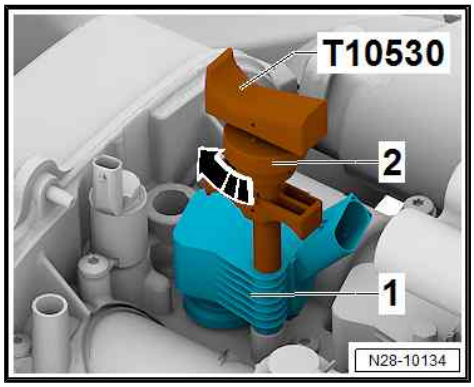
All ignition coils (continued):

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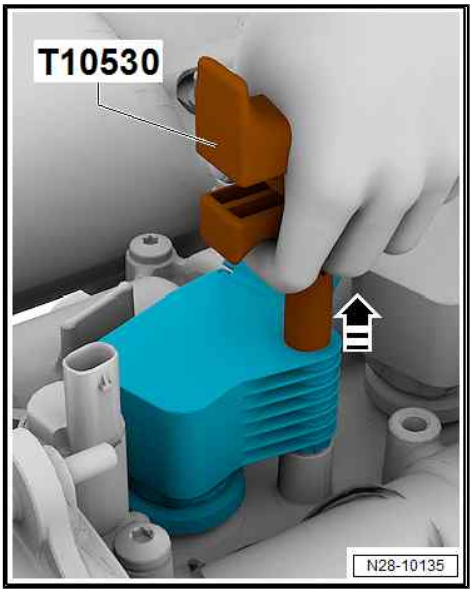
– Unplug electrical connector -2-.
– Remove bolt -1-.



– Press puller - T10530- into hole in ignition coil -1- as far as stop.
– Tighten knurled nut -2- in direction of -arrow-.



– Pull ignition coil out of camshaft housing with puller - T10530- in direction of -arrow-.

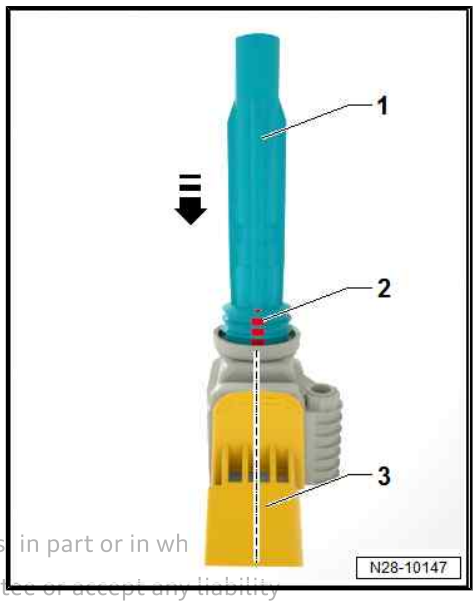


Installing

Installation is carried out in 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-.



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– Apply a thin bead of silicone paste all around end of sealing hose of ignition coil -arrow-.

• Use only the silicone paste approved for this purpose ⇒ Electronic parts catalogue (ETKA) .

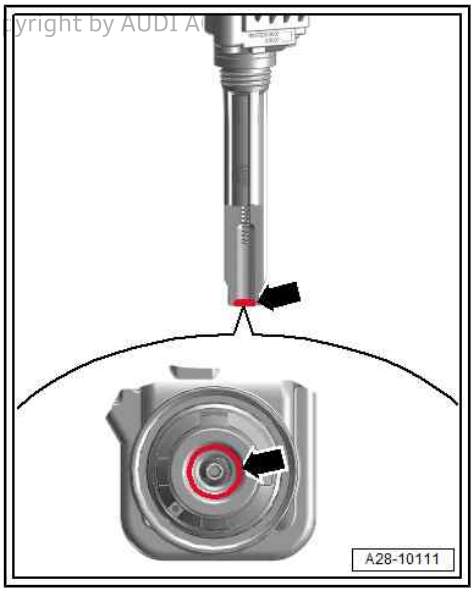
• Using any other paste could damage the ignition coil irreparably.

– 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 79 .



Tightening torques

◆ ⇒ “1.1 Exploded view - ignition system”, page 548

1.4 Removing and installing knock sensor 1 - G61-

⇒ “1.4.1 Removing and installing knock sensor 1 G61 - all vehicles except e-tron”, page 552

⇒ “1.4.2 Removing and installing knock sensor 1 G61 - e-tron”, page 552

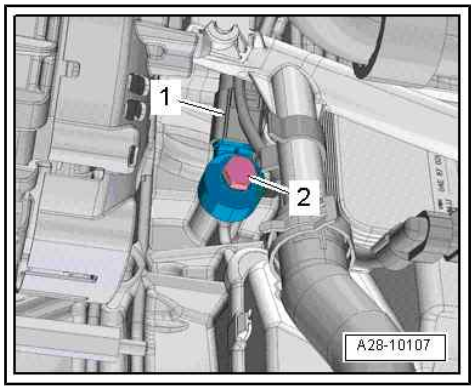
1.4.1 Removing and installing knock sensor 1 - G61- - all vehicles except e-tron

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

Installation is carried out in reverse sequence.

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 548
- ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor

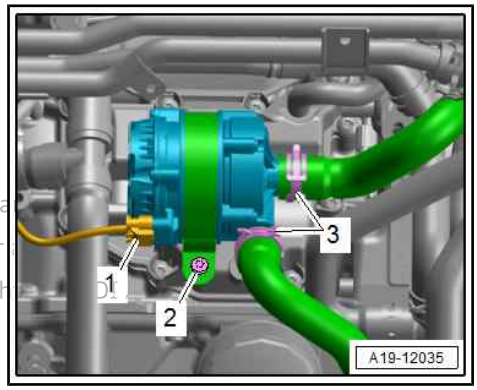
1.4.2 Removing and installing knock sensor 1 - G61- - e-tron

Removing

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

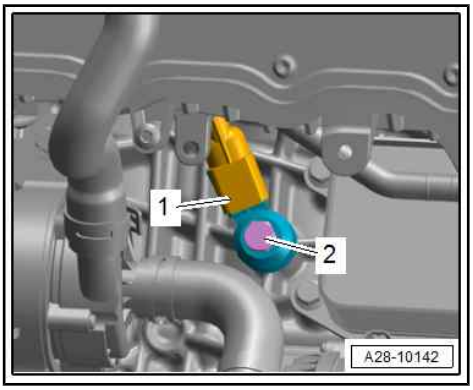
– Unplug electrical connector -1-.

– Remove bolt -2- and push coolant pump for high-temperature circuit - V467- to one side.



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– Unplug electrical connector -1-.
– Unscrew bolt -2- and remove knock sensor 1 - G61- .



Installing

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

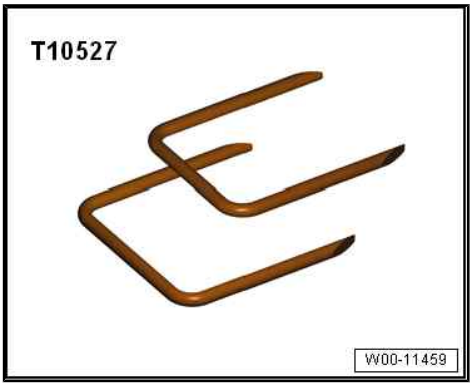
Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 548
- ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

1.5 Removing and installing Hall senders

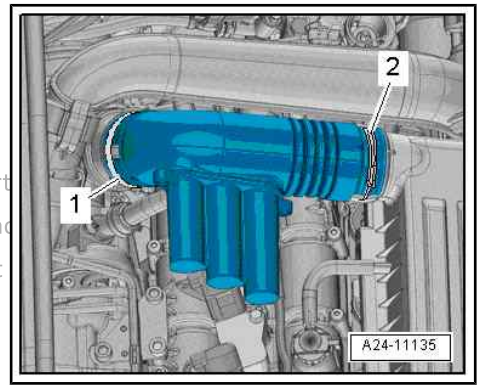
Special tools and workshop equipment required

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



Removing

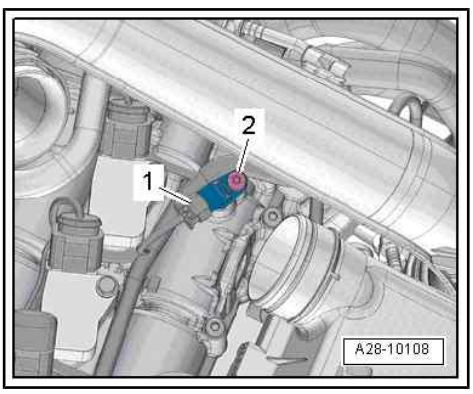
– Remove engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 79 .
– Loosen hose clips -1, 2- and remove air pipe.



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Hall sender - G40- :

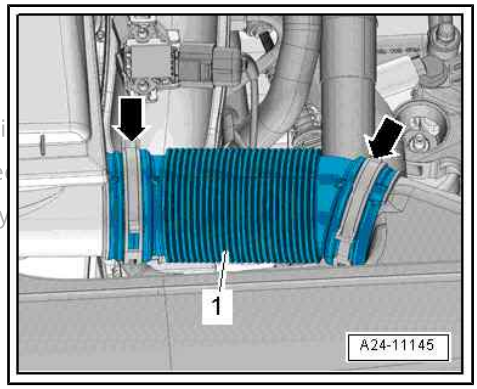
– Unplug electrical connector -1-.
– Unscrew bolt -2- and remove Hall sender - G40- .



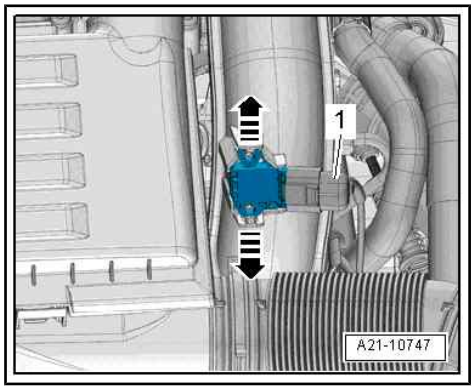
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Hall sender 2 - G163- :

– Open hose clips -arrows- and detach air duct -1-.



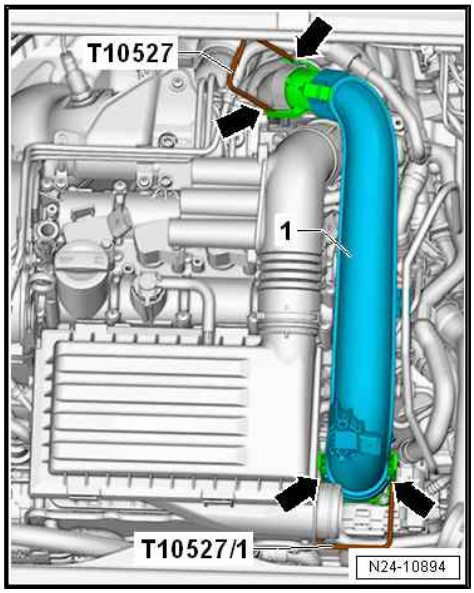
– Unplug electrical connector -1- at charge pressure sender - G31- / intake air temperature sender 2 - G299- .



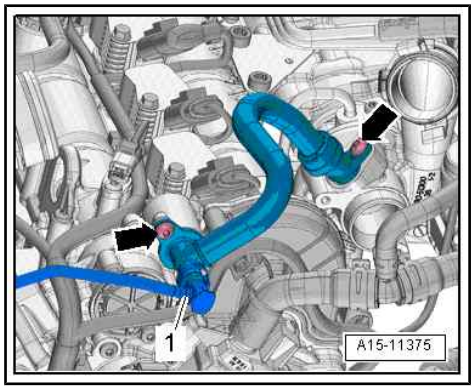
All vehicles except e-tron:

– Move air hoses clear at air pipe.

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



– Remove bolts -arrows- and detach crankcase breather hose (with hose -1- going to activated charcoal filter attached).



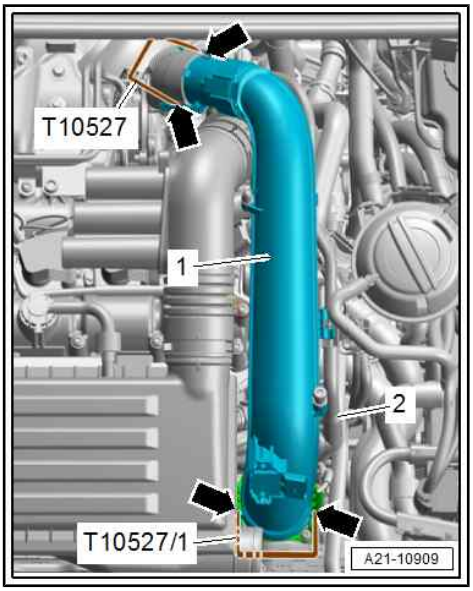
e-tron:

– Press release tabs on both sides and disconnect line -2- for activated charcoal filter system.

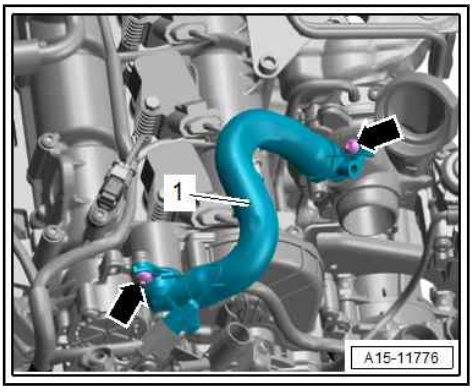
– Move line for activated charcoal filter system clear at air pipe.

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

– Detach air pipe -1-.



– Remove bolts -arrows- and detach crankcase breather hose -1-.

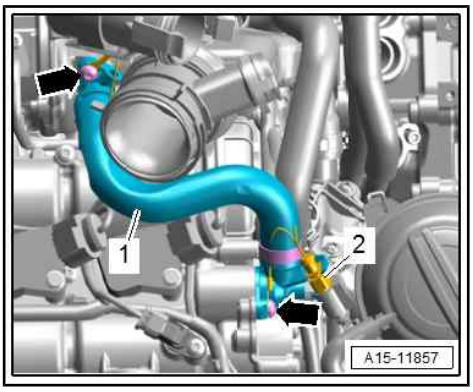


Version with crankcase breather heating:

– Unplug electrical connector -2-.

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

• Version with crankcase breather heating: The earth wires must be re-secured with bolts -arrows- when installing.



All vehicles (continued):

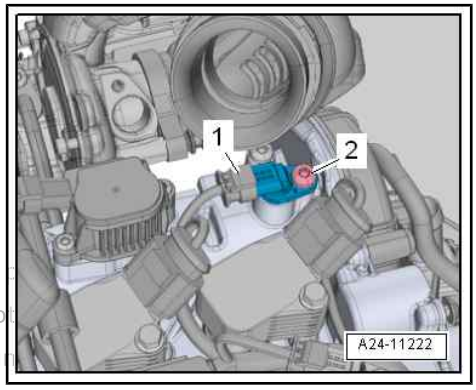
– Unplug electrical connector -1-.

– Unscrew bolt -2- and remove Hall sender 2 - G163- .

Installing

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

– Install engine cover panel ⇒ “3.1 Removing and installing engine cover panel”, page 79 .



Tightening torques

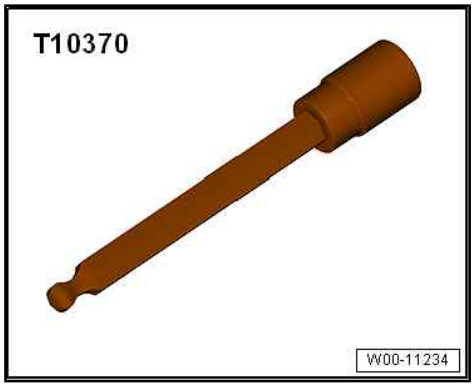
◆ ⇒ “1.1 Exploded view - ignition system”, page 548

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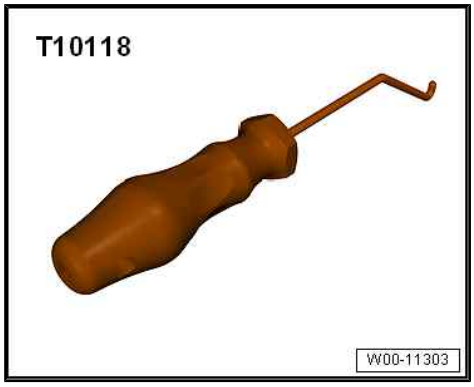
1.6 Removing and installing engine speed sender - G28-

Special tools and workshop equipment required

- Socket, 4 mm - T10370-



- Assembly tool - T10118-



Removing

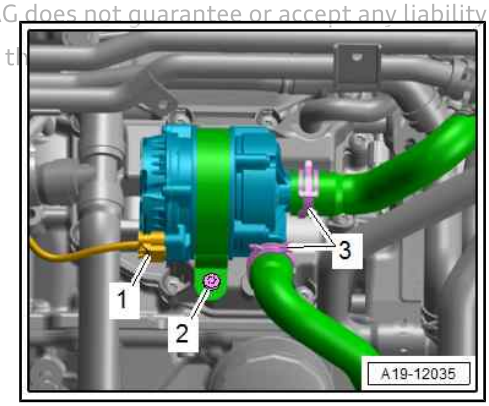
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

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e-tron:

– Unplug electrical connector -1-.

– Remove bolt -2- and push coolant pump for high-temperature circuit - V467- to one side.

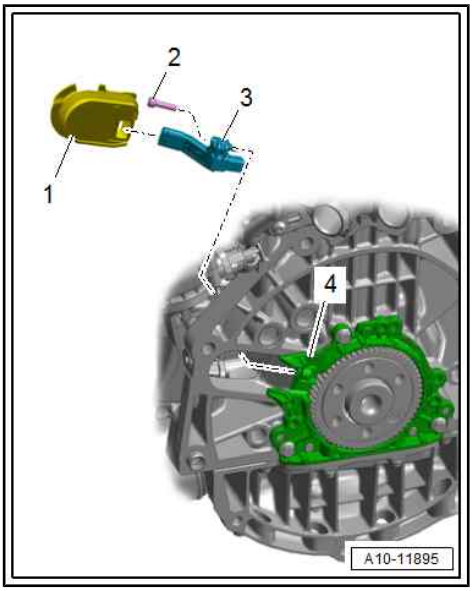


All vehicles (continued):

– Detach dust boot -1-.

– 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 reverse order; note the following:

- The dust boot -1- must always be fitted to ensure adequate sealing.

Tightening torques

◆ ⇒ “1.1 Exploded view - ignition system”, page 548

◆ ⇒ “4.2.2 Exploded view - electric coolant pump, e-tron”, page 347

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

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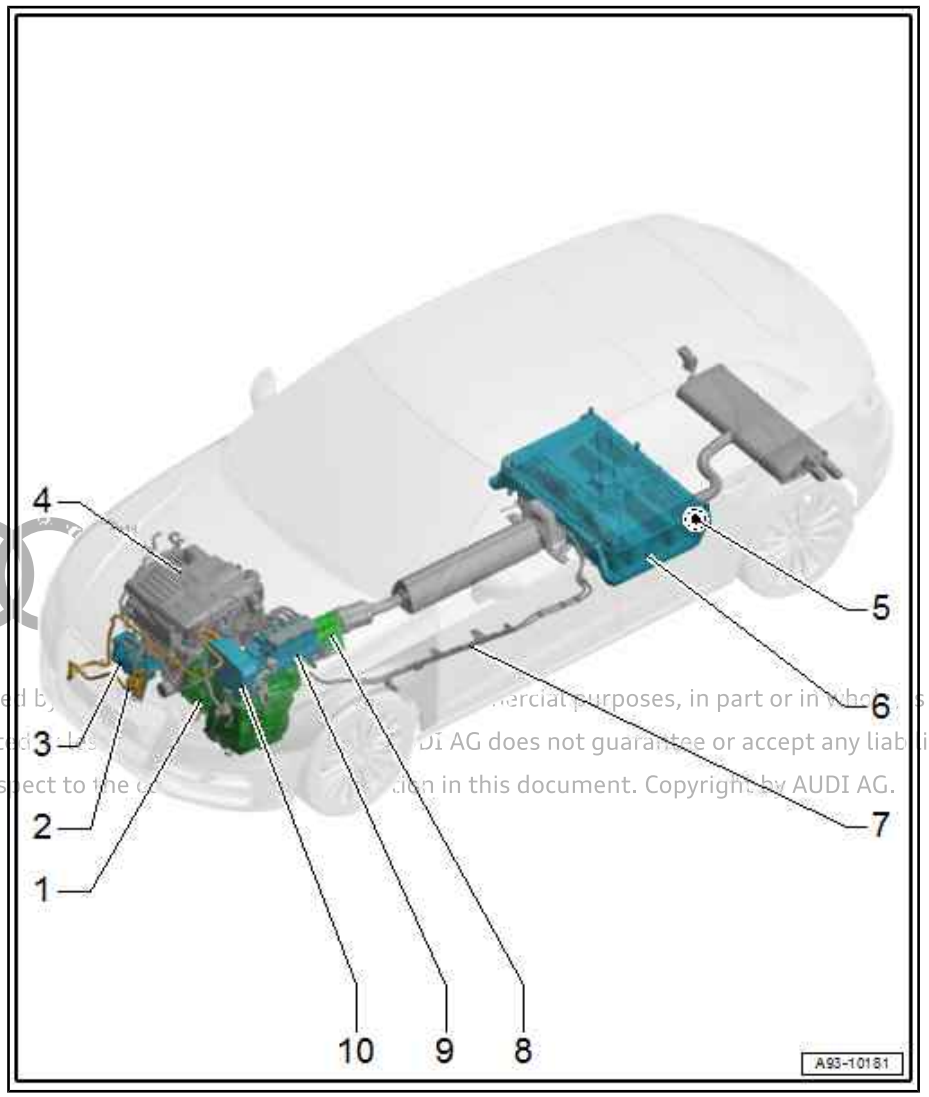
93 – Electric drive systems

1 High-voltage components

⇒ “1.1 Overview of fitting locations - high-voltage components”, page 558

⇒ “1.2 Checking high-voltage components and high-voltage wiring”, page 559

1.1 Overview of fitting locations - high-voltage components



1 - Three-phase current drive - VX54-

- ❑ With electric drive motor - V141-
- ❑ Removing and installing ⇒ “7.1 Removing and installing three-phase current drive VX54 ”, page 662

2 - High-voltage battery charging socket 1 - UX4-

- ❑ Exploded view ⇒ “9.1 Exploded view - charging socket”, page 683

3 - Electrical air conditioner compressor - V470-

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor

4 - Combustion engine

5 - Battery regulation control unit - J840-

- ❑ Exploded view ⇒ “3.1 Exploded view - high-voltage battery”, page 566

6 - Hybrid battery unit - AX1-

- ❑ Exploded view ⇒ “3.1 Exploded view - high-voltage battery”, page 566

7 - High-voltage wiring

- ❑ Overview of fitting locations ⇒ “8.1 Overview of fitting locations - high-voltage wires”, page 663

8 - High-voltage heater (PTC) - Z115-

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit

9 - Power and control electronics for electric drive - JX1-

- ❑ Exploded view ⇒ “5.1 Exploded view - power and control electronics for electric drive”, page 630

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10 - Charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-

❑ Exploded view ⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

1.2 Checking high-voltage components and high-voltage wiring

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system ⇒ “10 De-energising high-voltage system”, page 689 .

– Check high-voltage components and high-voltage wiring for external damage.

– Check insulation for high-voltage wires and potential equalisation lines for damage.

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2 Warning labels

⇒ “2.1 Checking warning labels”, page 560

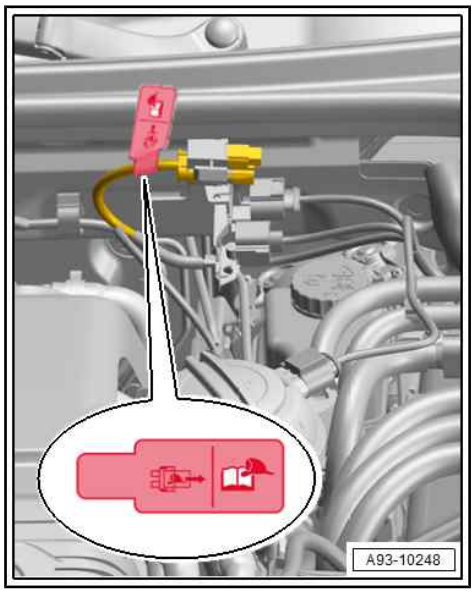
2.1 Checking warning labels

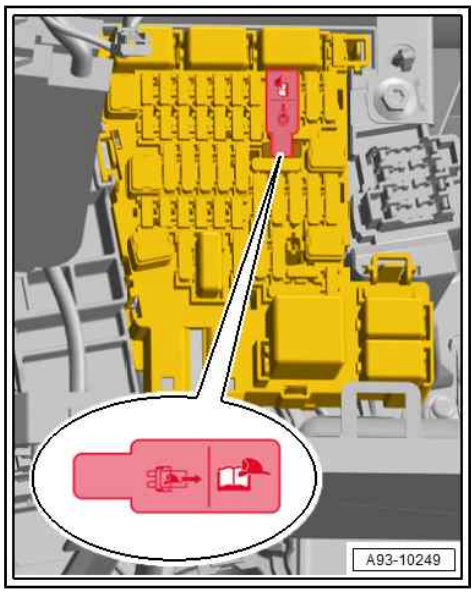
Warning labels are affixed to all high-voltage components.

When performing maintenance work, it is important to ensure that these warning labels do not get damaged or dirty.

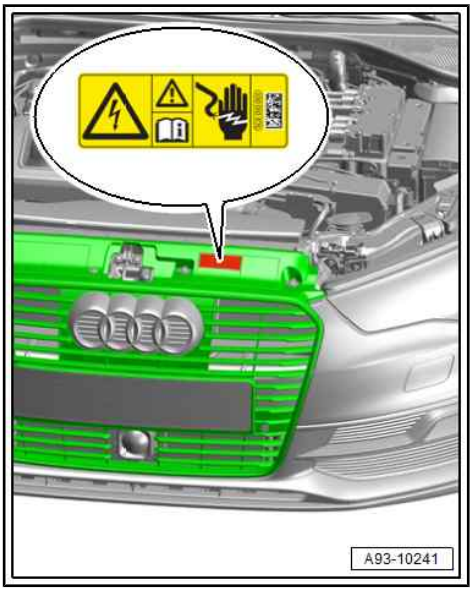
Ensure that all high-voltage components have a warning label.

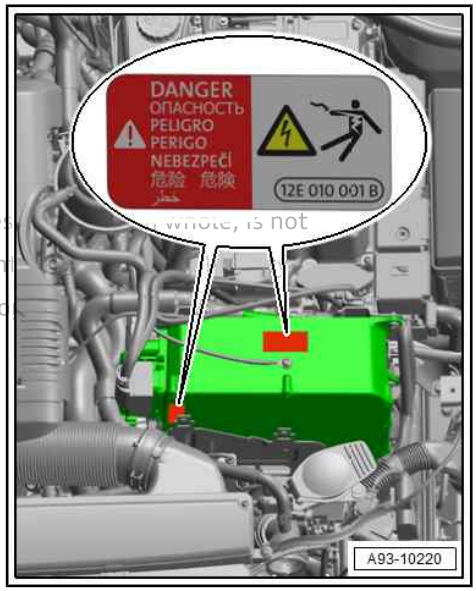
There are warning labels on the following components:

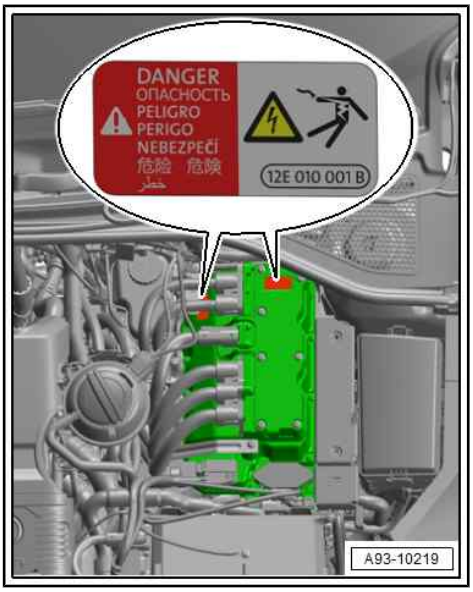




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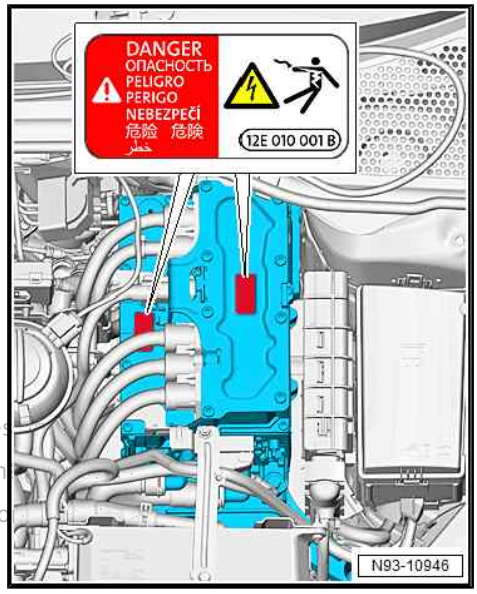


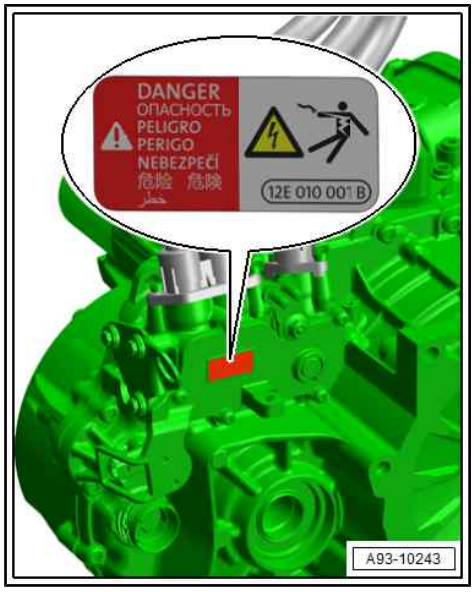


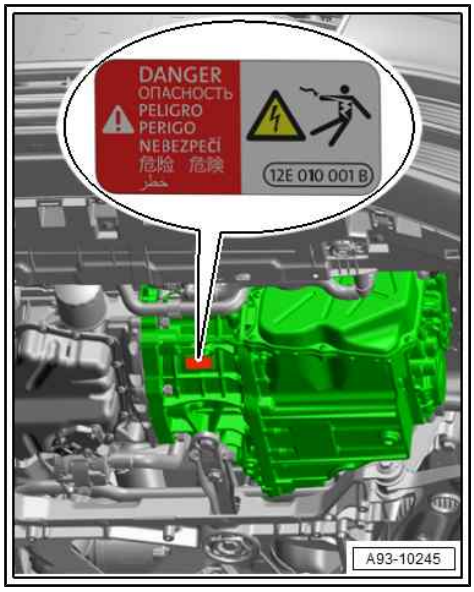


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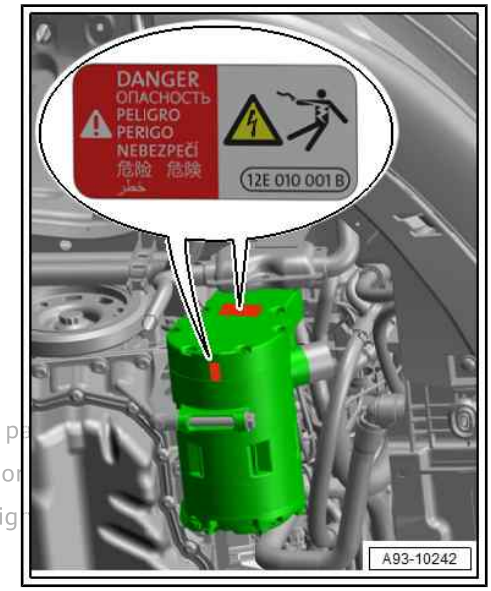
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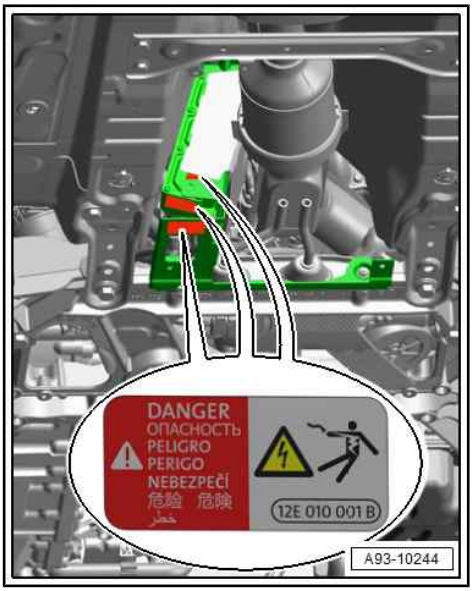


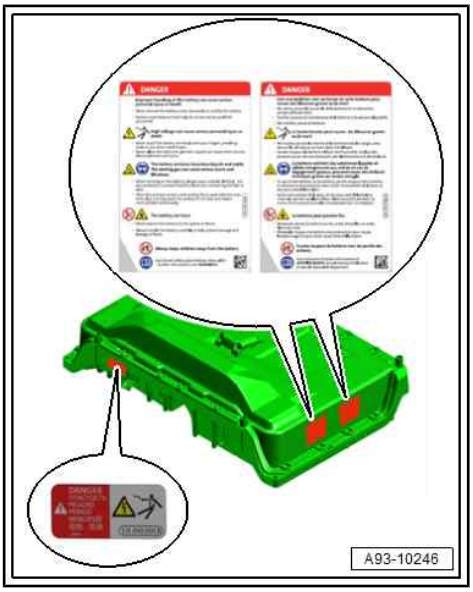


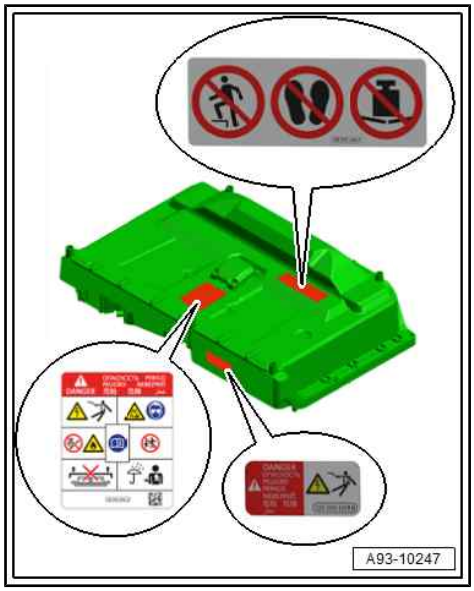


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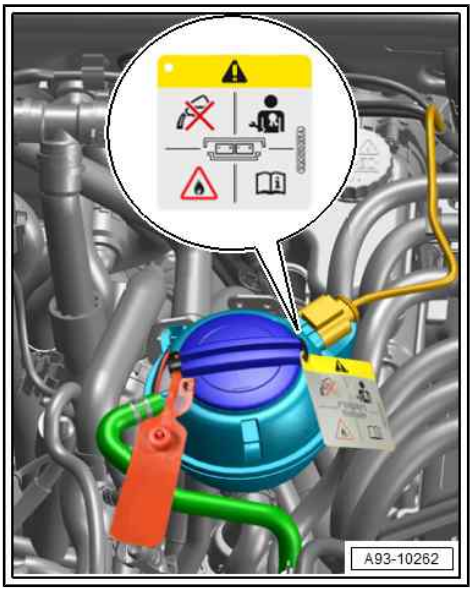








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- Emergency notice in engine compartment on plenum chamber partition panel (maintenance connector for high-voltage system - TW-)
- Emergency notice in passenger compartment under dash panel on fuse carrier (fuse holder C - SC-)
- Lock carrier (front)
- Charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-
- Power and control electronics for electric drive - JX1- - vehicles up to model year 2016
- Power and control electronics for electric drive - JX1- - vehicles from model year 2017 onwards
- Three-phase current drive - VX54- - side
- Three-phase current drive - VX54- - bottom
- Electrical air conditioner compressor - V470-
- High-voltage heater (PTC) - Z115-
- Hybrid battery unit - AX1- - side
- Hybrid battery unit - AX1- - top
- Coolant expansion tank

DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

- **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
- **If the warning lamps for “low coolant” and “fault in high-voltage battery” light up, move the vehicle into the dedicated separate storage area outside.**
- **Inform a high-voltage expert at the importer.**

- The high-voltage battery cannot detect coolant leaking into the battery.
- The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.
- The notice on the filler cap provides an additional warning of the danger involved.
- The components of the power and control electronics for electric drive, charging unit for high-voltage battery, high-voltage heater and electric drive motor are also connected into the engine cooling system.

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3 High-voltage battery unit

⇒ “3.1 Exploded view - high-voltage battery”, page 566

⇒ “3.2 Inspection and classification of hybrid battery unit AX1 ”, page 567

⇒ “3.3 Removing and installing hybrid battery unit AX1 ”, page 568

⇒ “3.4 Performing leak test for high-voltage battery”, page 574

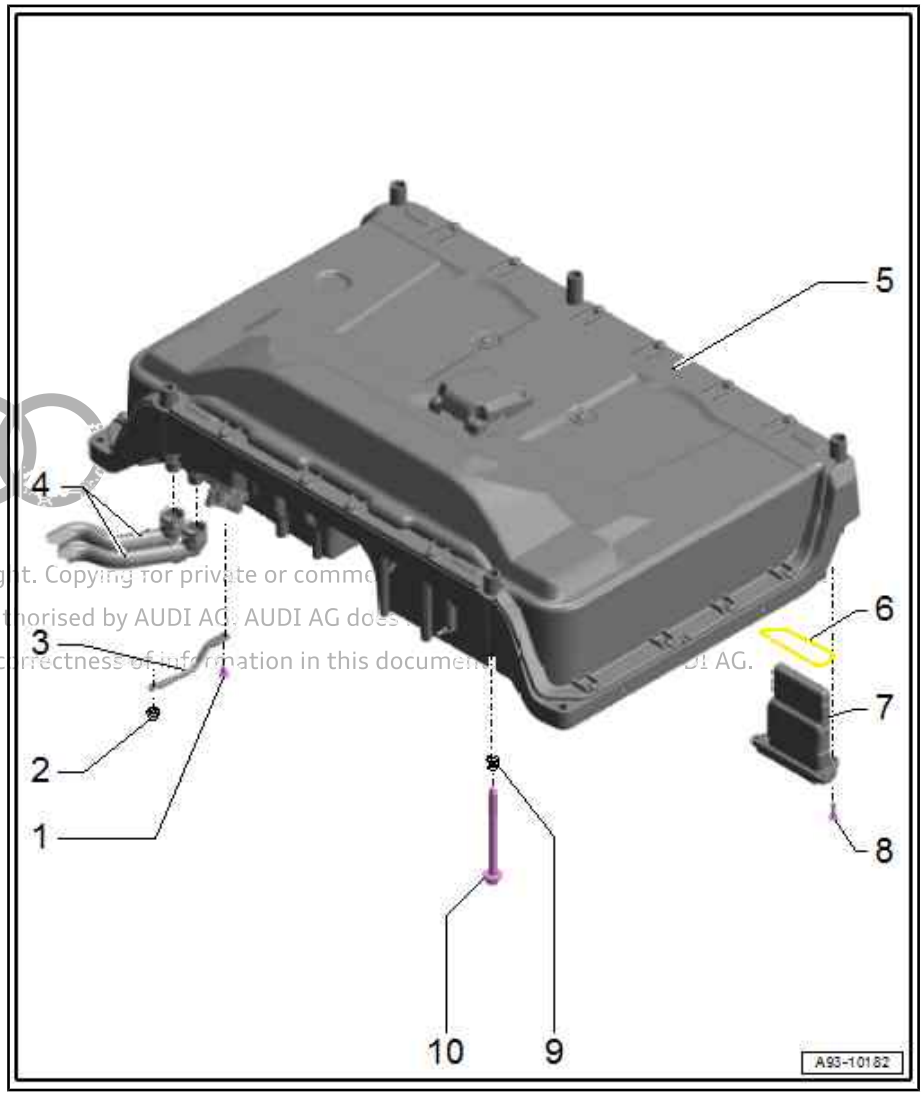
⇒ “3.5 Checking for high-voltage battery leaks”, page 580

⇒ “3.6 Raising high-voltage battery”, page 580

⇒ “3.7 Storing and transporting high-voltage batteries”, page 582

⇒ “3.8 Removing and installing battery regulation control unit J840 ”, page 582

3.1 Exploded view - high-voltage battery



1 - Bolt

- ❑ Tightening torque ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

2 - Nut

- ❑ Tightening torque ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

3 - Potential equalisation line

- ❑ Overview of fitting locations ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

4 - Coolant hoses

5 - Hybrid battery unit - AX1-

- ❑ Removing and installing ⇒ “3.3 Removing and installing hybrid battery unit AX1 ”, page 568

6 - Seal

- ❑ Renew after removing

7 - Battery regulation control unit - J840-

- ❑ Check gasket for damage
- ❑ Removing and installing ⇒ “3.8 Removing and installing battery regulation control unit J840 ”, page 582

8 - Bolt

- ❑ 4x

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❑ 8 Nm

9 - Retaining element

❑ For bolt

10 - Bolt

❑ 5x
❑ Renew after removing
❑ 50 Nm + 270°

3.2 Inspection and classification of hybrid battery unit - AX1-

Special tools and workshop equipment required

♦ Vehicle diagnostic tester
♦ High-voltage diagnostics box - VAS 5581- (if required)
♦ Adapter cable - VAS 5581/1A- (if required)

Procedure

CAUTION

Risk to health due to toxic vapours, dust and liquids.

– Never perform work on high-voltage batteries in which a short circuit has occurred.

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CAUTION

The high-voltage battery can become extremely hot. This can cause injuries.

Take care not to burn your hands.

– Put on protective gloves.

Check hybrid battery unit - AX1- for:

♦ Cracks in battery housing, including top section
♦ Deformation of battery housing, including top section
♦ Temperature-induced discolourations and heat tinting on housing
♦ Escaping electrolyte
♦ Damage to high-voltage contacts
♦ Presence and legibility of information labels
♦ Correct fitting of potential equalisation line
♦ Corrosion damage

– After performing visual check, perform a classification of hybrid battery unit - AX1- .
– Connect vehicle diagnostic tester .

With hybrid battery unit - AX1- removed, use high-voltage diagnostics box - VAS 5581- with adapter cable - VAS 5581/1A- . CAN bus terminal resistor of high-voltage diagnostics box - VAS 5581- is pre-set to 120 ohms and must not be changed.

– Select and start `ODIS-Service` mode.
– Select `Special functions` tab.

– Select the following:

♦ `High-voltage`

♦ `8C - Classification of hybrid battery`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

Note

♦ *The high-voltage expert must be informed if problems are found on the hybrid battery unit - AX1- during the visual check.*

♦ *Do not continue with the work.*

♦ *Place hybrid battery unit - AX1- in quarantine.*

Perform visual check in surrounding area and wiring insulation in cutting area for:

♦ Water ingress

♦ Moisture

♦ Corrosion damage

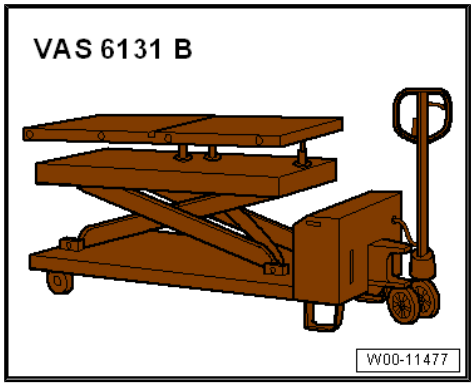
♦ Corrosion damage inside hybrid battery unit - AX1- (battery module assembly and cables)

♦ Damage

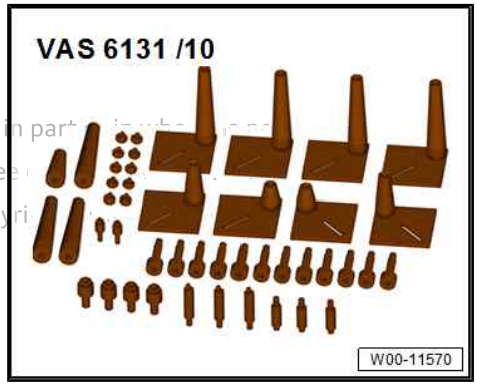
3.3 Removing and installing hybrid battery unit - AX1-

Special tools and workshop equipment required

♦ Scissor-type assembly platform - VAS 6131 B-



♦ Support set for Audi - VAS 6131/10-



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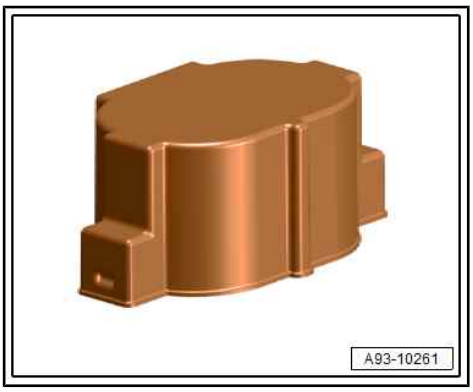
- Supplementary set, Audi Q7 >2005 - VAS 6131/13-



- Drip tray for workshop hoist - VAS 6208-



- Protective transportation cap for DC connector ⇒ Electronic parts catalogue



Removing

- The mean cell voltage of the high-voltage battery must be determined if a battery module needs to be renewed after removing the high-voltage battery
⇒ “4.10 Determining mean cell voltage”, page 595 .

Note:

Use high-voltage diagnostics box - VAS 5581- if high-voltage battery is removed.

DANGER

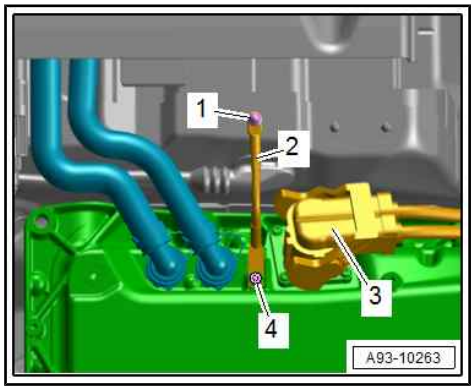
High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

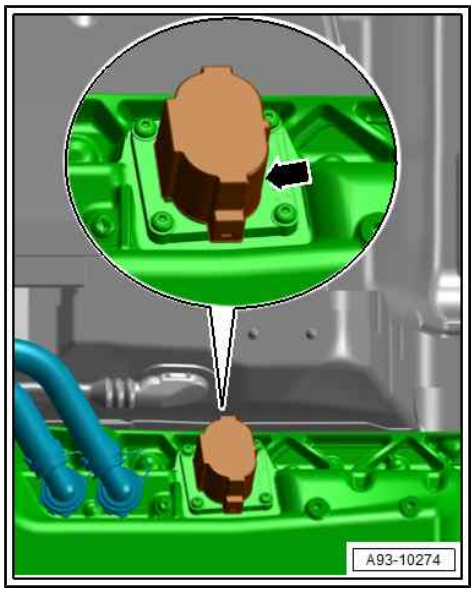
– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

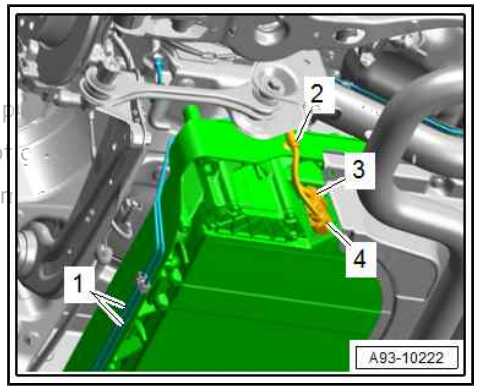
– Remove underbody trim ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .
– Remove silencer
⇒ “1.2.2 Removing and installing silencer - vehicles with multi-link suspension”, page 518 .
– Remove heat shield for high-voltage battery ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Removing and installing heat shield for floor .
– Place drip tray for workshop hoist - VAS 6208- underneath.
– Draining cooling system - hybrid battery unit
⇒ “1.3.3 Draining cooling system - hybrid battery unit”, page 325
– Disconnect high-voltage wire -3- and move it clear.
– Remove nut -1- and bolt -4-.
– Remove potential equalisation line -2-.



– Attach protective transportation cap for DC connector - 12E 971 883- -arrow- to connection for high-voltage wire.

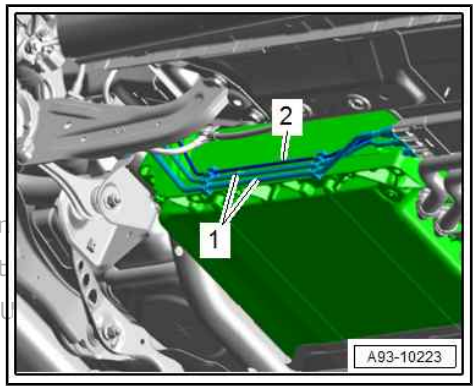


– Unplug electrical connectors -3, 4- and move clear.
– Move brake lines -1- and wiring harness -2- clear.



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– Move fuel lines -1- clear.
– If fitted, move fuel line -2- for auxiliary heater clear.

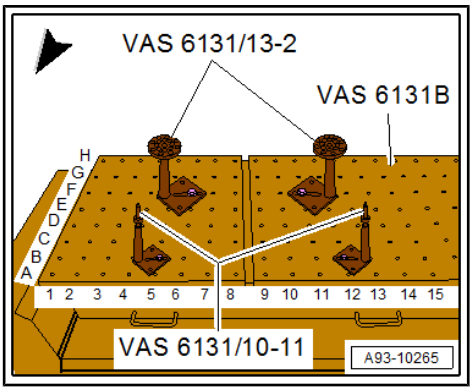


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Set up scissor-type assembly platform with supports as follows:

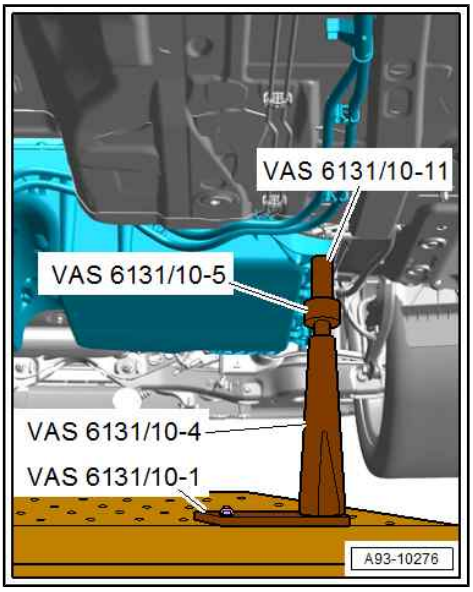
– Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- and supplementary set - VAS 6131/13- as follows:

Platform coordinates	Components from support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/13-			
B5	/10-1	/10-4	/10-5	/10-11
F6	/10-1	/10-4	/10-5	/13-2
B12	/10-1	/10-4	/10-5	/10-11
F11	/10-1	/10-4	/10-5	/13-2

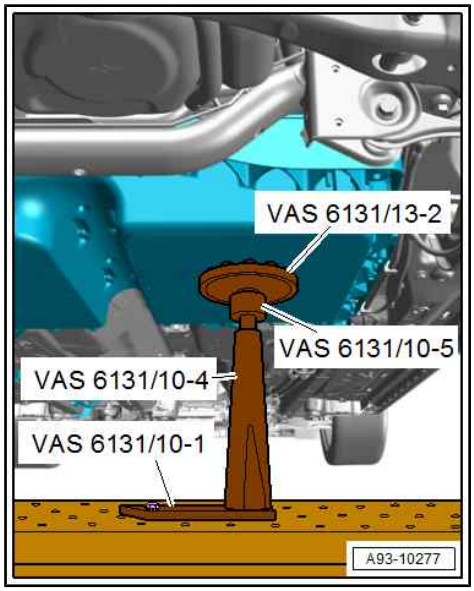


– Initially hand-tighten the support elements on the scissor-type assembly platform.
– Place scissor-type assembly platform in horizontal position.
• Take note of spirit level (bubble gauge).

– Manoeuvre scissor-type assembly platform underneath high-voltage battery so it is perpendicular to direction of travel.
– Fit support elements from -VAS 6131/10- on high-voltage battery at front, as shown in illustration.



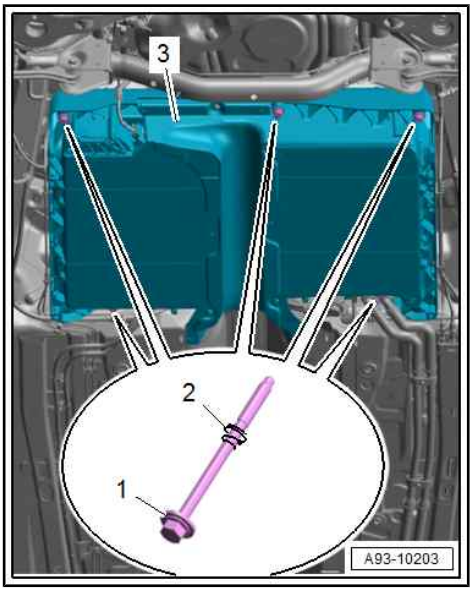
- Fit support elements from -VAS 6131/10- and -VAS 6131/13- on high-voltage battery at rear, as shown in illustration.
- Make sure that threaded spindles are screwed in completely.
- Raise scissor-type assembly platform - VAS 6131 B- as far as possible until support elements are slightly underneath high-voltage battery.
- Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform.



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– Remove bolts -1-.

• The bolts have retaining elements -2-; they cannot therefore fall out.



NOTICE

Danger of damage to wires and hoses if the high-voltage battery is lowered.

– **Check that all connections between high-voltage battery and body have been detached.**

– **Carefully guide high-voltage battery out of body when lowering.**

– Lower high-voltage battery -3- using scissor-type assembly platform.

Note:

The high-voltage battery can be removed from the scissor-type assembly platform - VAS 6131 B- using the workshop hoist - VAS 6100- without changing the position of the scissor-type assembly platform.

– Leave the scissor-type assembly platform - VAS 6131 B- in the removal position so you can use it to reinstall the high-voltage battery.

Installing

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

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• Renew bolts tightened with specified tightening angle.

– Fill up with coolant ⇒ 1.3 Draining and filling cooling system", page 315 .

If hybrid battery unit - AX1- has been renewed, the new battery regulation control unit - J840- must be adapted.

Procedure

– Connect vehicle diagnostic tester .

– Select `Diagnosis` mode and begin diagnosis.

– Select `Test plan` tab.

– Choose `Select own test` and select following options one after the other:

♦ Body

♦ Electrical system

♦ 01 - Self-diagnosis compatible systems

♦ 8C - Hybrid battery management - J840

♦ 8C - Hybrid battery management, functions

♦ 8C - Replace control unit

– Start selected program and follow instructions on display of vehicle diagnostic tester.

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

- High-voltage
- Potential equalisation measurement on high-voltage components
- 8C - Potential equalisation measurement hybrid battery unit AX1

– Start selected program and follow instructions on display of vehicle diagnostic tester.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

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– Re-energise high-voltage system ⇒ “11 Re-energising high-voltage system”, page 691.

Tightening torques

- ⇒ “3.1 Exploded view - high-voltage battery”, page 566
- ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692
- ⇒ “1.1.3 Exploded view - silencers, e-tron”, page 516
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

3.4 Performing leak test for high-voltage battery

Special tools and workshop equipment required

- Y-connector -VAS 691 005/1-
- Test plug -VAS 6911/3-1-
- Sealing plugs -VAS 6911/15-
- Turbocharger tester - V.A.G 1397/A- or pressure sensor - V.A.G 1397B-
- Hand pump - V.A.G 1274B-
- Measuring equipment for time recording (watch/stopwatch)
- Leak detection spray ⇒ Electronic parts catalogue (ETKA)

Note

A leak test must always be performed before removing and after installing the battery housing (top section).

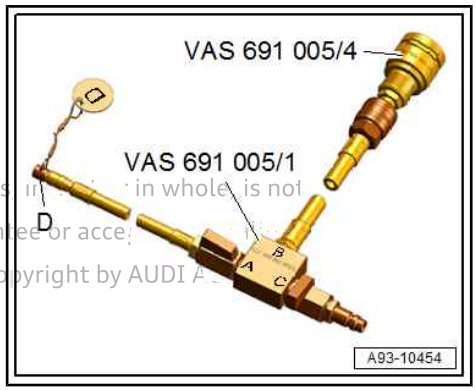
Test requirements

- High-voltage battery 1 - AX2- must be acclimatised.
- After the repair, at least 2 hours must have passed since the bonding procedure.

- The leak test and acclimatisation must be carried out at a constant ambient temperature.
- Testing set - VAS 691 005- has been cleaned.
-

Cleaning testing set - VAS 691 005-

Proceed as follows to ensure that no coolant residue remains in testing set - VAS 691 005- :



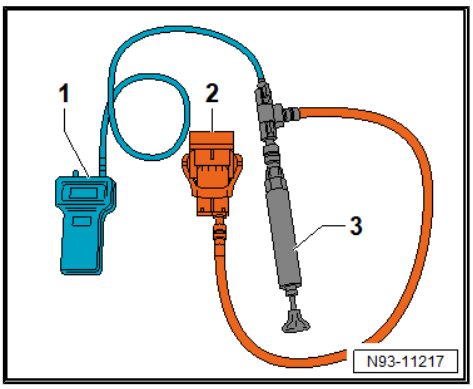
– Fit -VAS 691 005/4- on outlet -B-.
– Fit cleaning nozzle -D- from testing set on outlet -A-.
– Close open outlet -C- with lever.
– Hold outlet -B- upwards and blow through with compressed air; any coolant present will come out of cleaning nozzle -D- when you do this.

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Note

The pressures during the self-test and the leak test are different. The battery housing and testing equipment may be damaged if the specified pressures are not adhered to.

Self-test of testing set using turbocharger tester - V.A.G 1397/A-



– Assemble the following parts:
- ♦ Y-connector -VAS 691 005/1-
- ♦ Test plug -VAS 6911/3-1- -2-
- ♦ Turbocharger tester - V.A.G 1397/A- -1-
- ♦ Hand pump - V.A.G 1274B- -3-

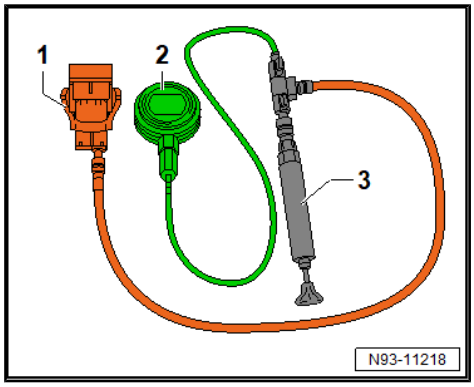
– Open cut-off valves “A” and “C” on Y-connector -VAS 691 005/1- .
– Switch on turbocharger tester - V.A.G 1397A- and select setting “II”.
– Using hand pump - V.A.G 1274B- , build up pressure until turbocharger tester - V.A.G 1397/A- shows a value of 300 … 350 mbar.
– Close cut-off valve “C” on Y-connector -VAS 691 005/1- .
– Wait approx. one minute (settling time), then check drop in pressure on turbocharger tester - V.A.G 1397A- .

Note

If pressure is lost immediately when cut-off valve “C” is closed, this is an indication that -VAS 691 005/1- is defective.

- Maximum pressure loss after 30 seconds: less than 5 mbar

Self-test of testing set using pressure sensor - V.A.G 1397B-



– Assemble the following parts:

♦ Y-connector -VAS 691 005/1-

♦ Test plug -VAS 6911/3-1- -1-

♦ Pressure sensor - V.A.G 1397B- -2-

♦ Hand pump - V.A.G 1274B- -3-

– Open cut-off valve “C” on Y-connector -VAS 691 005/1- .

– Switch on pressure sensor - V.A.G 1397B- and press menu button until “P relative” appears.

– Press “OK” and then press reset button. The display should show 0 mbar.

Note

Excessive pressure will damage the pressure sensor - V.A.G 1397B.- .

– Using hand pump - V.A.G 1274B- , build up pressure until pressure sensor - V.A.G 1397B- shows a value of 300 … 350 mbar.

– Close cut-off valve “C” on Y-connector -VAS 691 005/1- .

– Wait approx. one minute (settling time), then check drop in pressure on pressure sensor - V.A.G 1397B- .

Note

If pressure is lost immediately when cut-off valve “C” is closed, this is an indication that -VAS 691 005/1- is defective.

• Maximum pressure loss after 30 seconds: less than 5 mbar

Acclimatisation test

Note

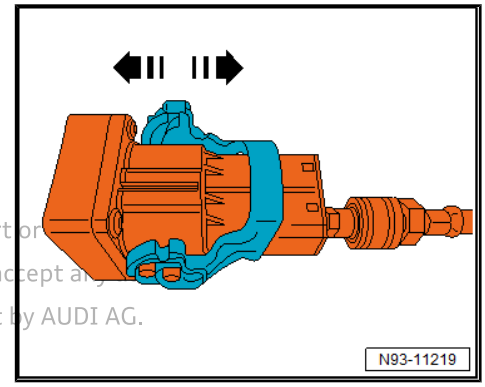
♦ *There must not be any objects on the high-voltage battery 1 - AX2- during the measurement.*

♦ *Leave cut-off valve “C” on Y connector -VAS 691 005/1- open while setting up equipment; otherwise pressure gauge - VAS 611 013- may be damaged.*

♦ *The measurement must only be carried out under constant temperature conditions.*

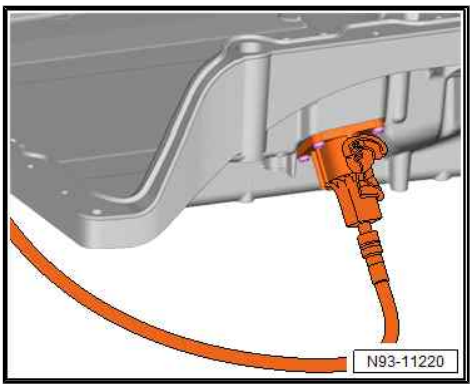
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– Remove cap from test plug -VAS 6911/3-1- .



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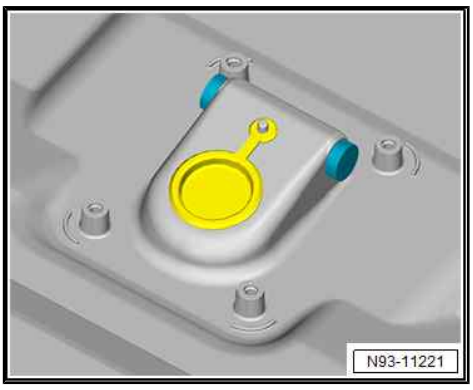
– Connect -VAS 6911/3-1- to high-voltage system connector of hybrid battery unit - AX1- .



Note

- *The new pressure equalisation elements/pressure relief valves are only fitted after the leak test.*
- *Renew pressure equalisation elements/pressure relief valves after removal.*

– Remove cap for pressure equalisation opening on battery (top section).
– Seal pressure equalisation opening on battery (top section) with sealing plug -VAS 6911/15- .
– Connect pressure gauge - VAS 611 013- to connector -VAS 691 005/1- .
– Close cut-off valve “C” on Y-connector -VAS 691 005/1- .
– Switch on pressure gauge - VAS 611 013- and press reset button.
– Monitor increase in pressure over 5 minutes.



Note

- *Pressure should not increase by more than 0.5 mbar over 5 minutes.*
- *If increase in pressure is more than 0.5 mbar, high-voltage battery 1 - AX2- must be acclimatised again.*

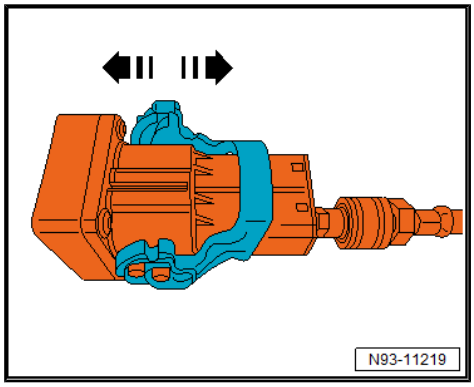
Leak test (building up pressure)

Note

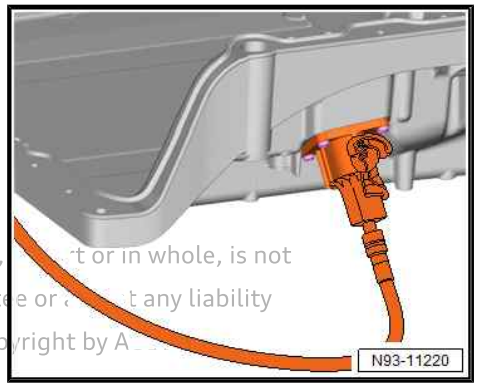
There must not be any objects on the high-voltage battery 1 - AX2- during the measurement.

– Open cut-off valves “A” and “C” on Y-connector -VAS 691 005/1- .

– Remove cap from test plug -VAS 6911/3-1- .



– Connect -VAS 6911/3-1- to high-voltage system connector of hybrid battery unit - AX1- .

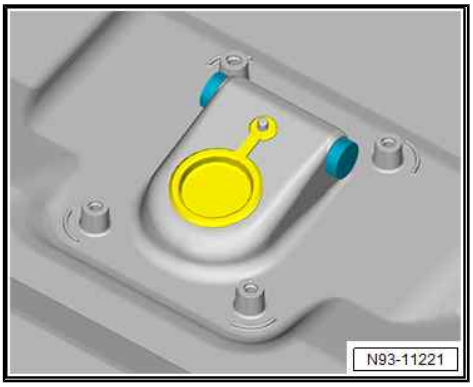


Note

- *The new pressure equalisation elements/pressure relief valves are only fitted after the leak test.*
- *Renew pressure equalisation elements/pressure relief valves after removal.*

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– Remove cap for pressure equalisation opening on battery (top section).
– Seal pressure equalisation opening on battery (top section) with sealing plug -VAS 6911/15- .
– Connect pressure gauge - VAS 611 013- to connector -VAS 691 005/1- .
– Switch on pressure gauge - VAS 611 013- and press reset button.



Note

- *Avoid building up pressure of more than 35 mbar.*
- *Higher pressure can damage the battery housing (top section) and/or the bonded seam.*
- *If it is not possible to build up pressure, there may be a large leak.*

– Using hand pump - V.A.G 1274B- , build up a pressure of 30.1 … 30.2 mbar.
– Close cut-off valve “C” on Y-connector -VAS 691 005/1- .
– Start time measurement once a constant value of 30.0 mbar is reached.
– Wait 10 minutes, then check drop in pressure on pressure gauge - VAS 611 013- .

• Pressure loss is less than 9 mbar: leak-tightness of battery OK

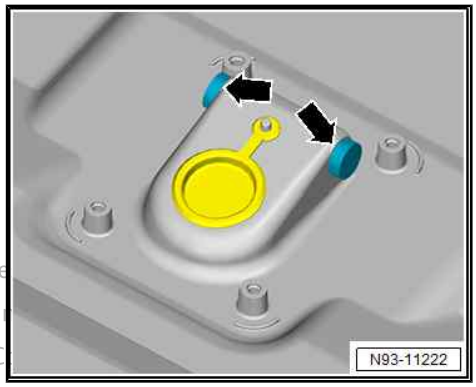
Leak test in event of pressure loss of more than 9 mbar

– Generate pressure as in leak test.

Note

Blisters will form at locations with leaks.

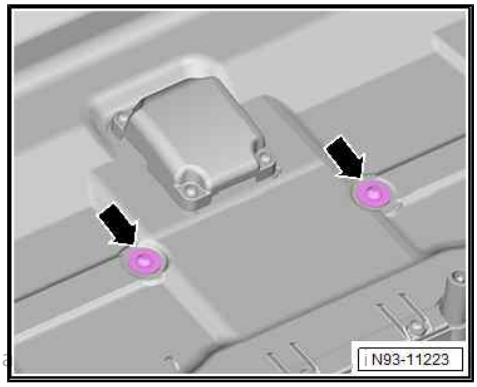
– Using leak detection spray, spray all around the bonded seam of the -battery- .



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Note

- *Other potential locations of leaks are the sealing plugs for the pressure equalisation element openings.*
- *Bolts -arrows- on battery housing (top section)*



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3.5 Checking for high-voltage battery leaks

Special tools and workshop equipment required

- Leak detection system - VAS 6911/14-
- Test connector set - VAS 6911/3-
- Gas leak detector - VAS 523 003-
- Bottle pressure regulator, commercially available

– Connect commercially available bottle pressure regulator to leak detection system - VAS 6911/14- .

– Connect leak detection system - VAS 6911/14- to hybrid battery unit - AX1- using test plug set - VAS 6911/3- .

– Release forming gas into hybrid battery unit - AX1- .

– Move gas leak detector - VAS 523 003- slowly along bonded seam and gaskets, paying attention to display on gas leak detector - VAS 523 003- .

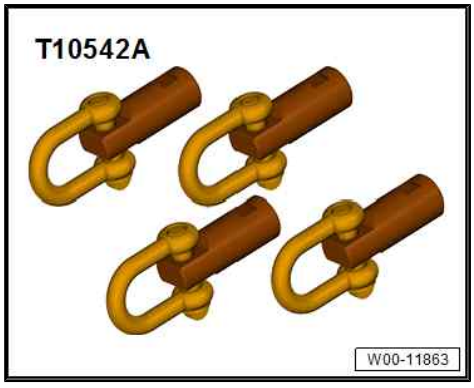
– Locate any leaks.

3.6 Raising high-voltage battery

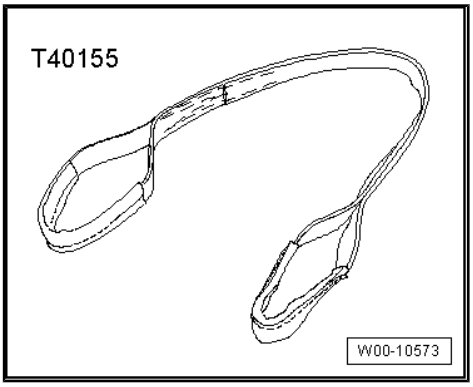
- Observe notes on storing and transporting the lithium-ion high-voltage battery ⇒ Basic information on high-voltage vehicles; Rep. gr. 00 ; Lithium-ion high-voltage battery; Storing and transporting the lithium-ion high-voltage battery .

Special tools and workshop equipment required

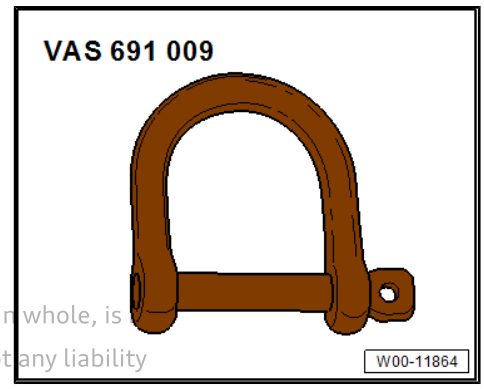
- Adapters - T10542A-



♦ Retaining strap - T40155- (2x)



♦ Shackle - VAS 691 009-



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♦ Workshop hoist - VAS 6100-



Procedure

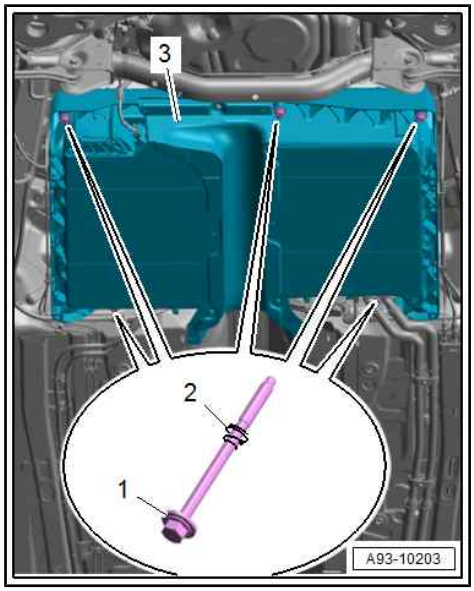
- High-voltage battery removed
  ⇒ “3.3 Removing and installing hybrid battery unit AX1 ”, page 568 .

The bolts -1- have retaining elements -2- to keep them from falling out; they remain in the high-voltage battery -3-.

– Position adapters - T10542A- (comprising -T10542/1- and -T10542/4-) at high-voltage battery as shown in illustration, align shackle with centre of battery and tighten original bolts to 40 Nm.

– Secure a retaining strap - T40155- to both shackles -T10542/4- on left side and a retaining strap - T40155- to both shackles -T10542/4- on right side, as shown in illustration.

– Hook both retaining straps -T40155- into shackle - VAS 691 009- above high-voltage battery.



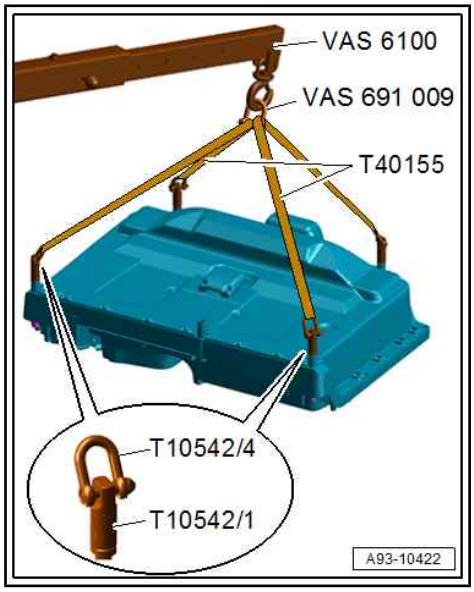
– Attach shackle - VAS 691 009- to workshop hoist - VAS 6100- .

CAUTION

Risk of injury if high-voltage battery drops when it is lifted.

Danger of trapping or crushing parts of the body.

– Secure adapters - T10542A- and original bolts for high-voltage battery to each other (tighten bolts to specified torque).



– Raise high-voltage battery.

3.7 Storing and transporting high-voltage batteries

• Observe notes on storing and transporting the lithium-ion high-voltage battery ⇒ Basic information on high-voltage vehicles; Rep. gr. 00 ; Lithium-ion high-voltage battery; Storing and transporting the lithium-ion high-voltage battery .

3.8 Removing and installing battery regulation control unit - J840-

The following procedure applies when renewing the battery regulation control unit - J840- :

Procedure

– Connect vehicle diagnostic tester .

– Select `Diagnosis` mode and begin diagnosis.

– Select `Test plan` tab.

– Choose `Select own test` and select following options one after the other:

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- Body
- Electrical system
- 01 - Self-diagnosis compatible systems
- 8C - Hybrid battery management - J840
- 8C - Hybrid battery management, functions
- 8C - Replace control unit

– Start selected program and follow instructions on display of vehicle diagnostic tester.

Removing

– Switch off ignition and all electrical equipment, and remove ignition key.

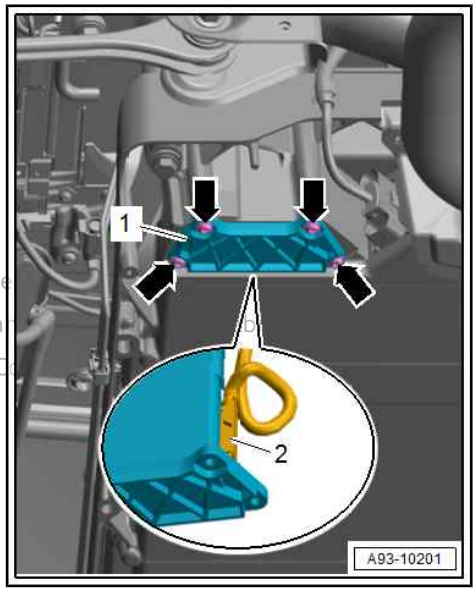
– Remove underbody trim (rear left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .

– Remove bolts -arrows-.

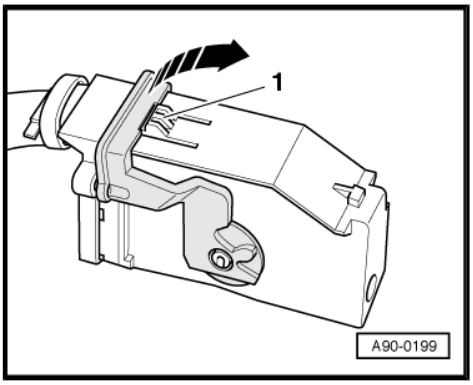
– Pull out control unit -1- downwards.

– Unplug electrical connector -2-.

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– To unplug electrical connector press catch -1-, turn retaining clip in direction of -arrow- and pull off connector.



Installing

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

- Renew seal on battery regulation control unit - J840- after removal.

Tightening torques

- ⇒ “3.1 Exploded view - high-voltage battery”, page 566
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

4 Repairing high-voltage battery

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**

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⇒ “4.1 Overview of fitting locations - high-voltage battery”, page 585

⇒ “4.2 Overview of fitting locations - battery modules”, page 586

⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587

⇒ “4.4 Exploded view - battery housing”, page 589

⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590

⇒ “4.6 Exploded view - battery module assembly”, page 591

⇒ “4.7 Exploded view - traction network connector mounting”, page 592

⇒ “4.8 Exploded view - high-voltage battery cooling system”, page 593

⇒ “4.9 Performing leak test on cooling system for hybrid battery unit AX1 ”, page 593

⇒ “4.10 Determining mean cell voltage”, page 595

⇒ “4.11 Charging and discharging battery modules”, page 596

⇒ “4.12 Opening hybrid battery unit AX1 ”, page 597

⇒ “4.13 Removing and installing switching unit for high-voltage battery SX6 ”, page 599

⇒ “4.14 Removing and installing battery module assembly”, page 603

⇒ “4.15 Removing and installing traction network connector mounting”, page 611

⇒ “4.16 Removing and installing coolant temperature sender 1 for high-voltage battery G898 and coolant temperature sender 2 for high-voltage battery G899 ”, page 612

⇒ “4.17 Bonding hybrid battery unit AX1 ”, page 613

⇒ “4.18 Removing and installing battery module 1 J991 / battery module 2 J992 ”, page 618

⇒ “4.19 Removing and installing battery module 3 J993 / battery module 4 J994 ”, page 621

⇒ “4.20 Removing and installing battery module 5 J995 / battery module 6 J996 ”, page 624

⇒ “4.21 Removing and installing battery module 7 J997 / battery module 8 J998 ”, page 627

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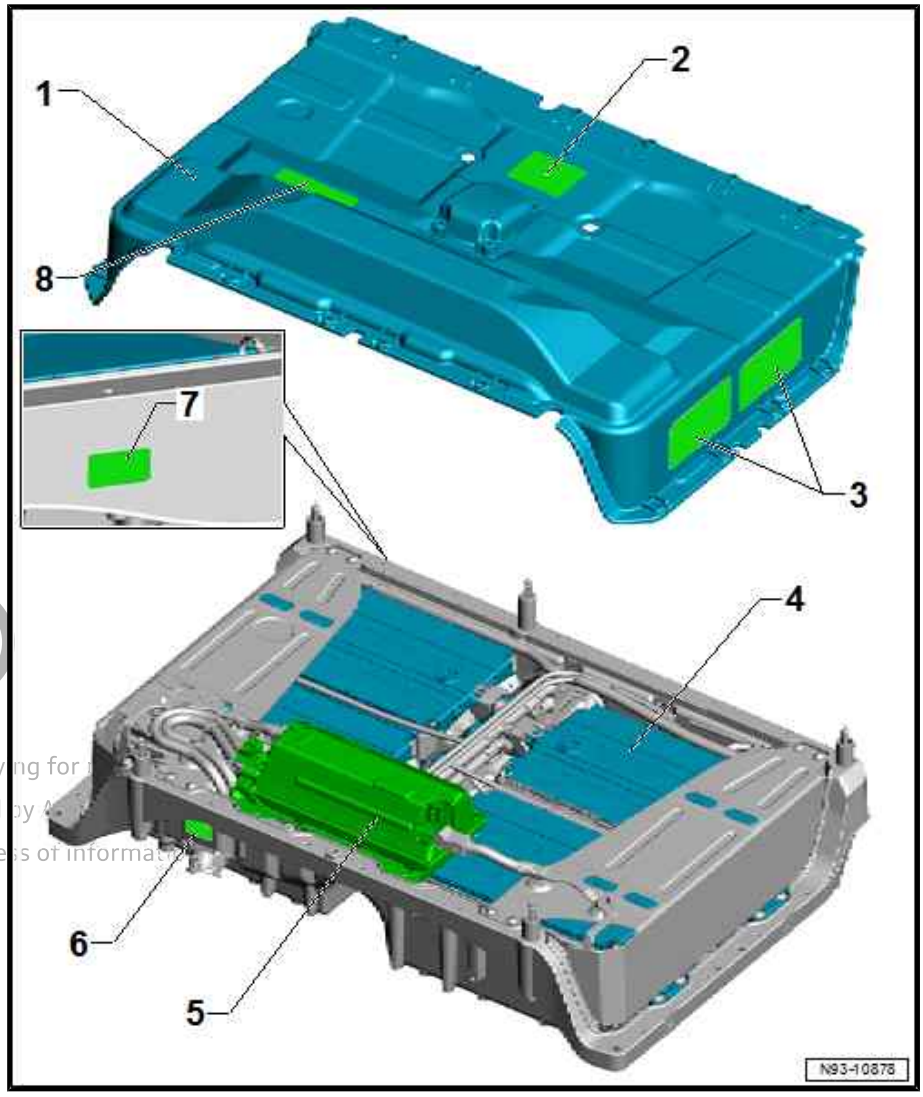
4.1 Overview of fitting locations - high-voltage battery

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.



1 - Battery housing (top section)

- ❑ With shield
- ❑ Renew after removing
- ❑ Exploded view ⇒ “4.4 Exploded view - battery housing”, page 589
- ❑ Removing and installing ⇒ “4.12 Opening hybrid battery unit AX1 ”, page 597

2 - Warning labels

- ❑ Bonding on ⇒ “2.1 Checking warning labels”, page 560

3 - Warning labels

- ❑ For NAR only
- ❑ Bonding on ⇒ “2.1 Checking warning labels”, page 560

4 - Battery modules

- ❑ Overview of fitting locations ⇒ “4.2 Overview of fitting locations - battery modules”, page 586

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5 - Switching unit for high-voltage battery - SX6-

- ❑ Exploded view - switching unit for high-voltage battery - SX6- ⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590
- ❑ Removing and installing ⇒ “4.13 Removing and installing switching unit for high-voltage battery SX6 ”, page 599

6 - Warning labels

- ❑ Bonding on ⇒ “2.1 Checking warning labels”, page 560

7 - Warning labels

- ❑ Bonding on ⇒ “2.1 Checking warning labels”, page 560

8 - Warning labels

- ❑ Bonding on ⇒ “2.1 Checking warning labels”, page 560

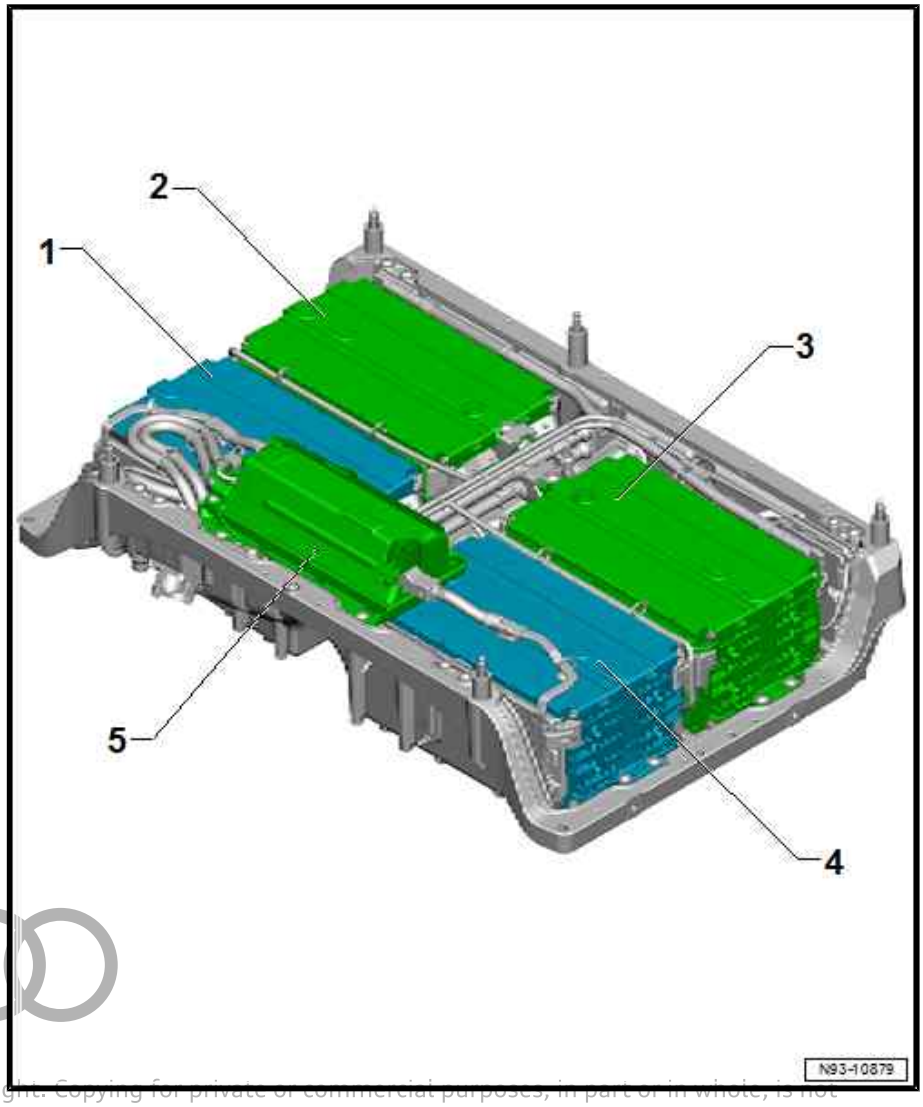
4.2 Overview of fitting locations - battery modules

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.



1 - Battery module 1 - J991- / battery module 2 - J992-

- ❑ Battery module 1 - J991- and battery module 2 - J992- cannot be separated
- ❑ Removing and installing ⇒ “4.18 Removing and installing battery module 1 J991 / battery module 2 J992 ”, page 618

2 - Battery module 3 - J993- / battery module 4 - J994-

- ❑ Battery module 3 - J993- and battery module 4 - J994- cannot be separated
- ❑ Removing and installing ⇒ “4.19 Removing and installing battery module 3 J993 / battery module 4 J994 ”, page 621

3 - Battery module 5 - J995- / battery module 6 - J996-

- ❑ Battery module 5 - J995- and battery module 6 - J996- cannot be separated
- ❑ Removing and installing ⇒ “4.20 Removing and installing battery module 5 J995 / battery module 6 J996 ”, page 624

4 - Battery module 7 - J997- / battery module 8 - J998-

- ❑ Battery module 7 - J997- and battery module 8 - J998- cannot be separated
- ❑ Removing and installing ⇒ “4.21 Removing and installing battery module 7 J997 / battery module 8 J998 ”, page 627

5 - Switching unit for high-voltage battery - SX6-

- ❑ Exploded view ⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590
- ❑ Removing and installing ⇒ “4.13 Removing and installing switching unit for high-voltage battery SX6 ”, page 599

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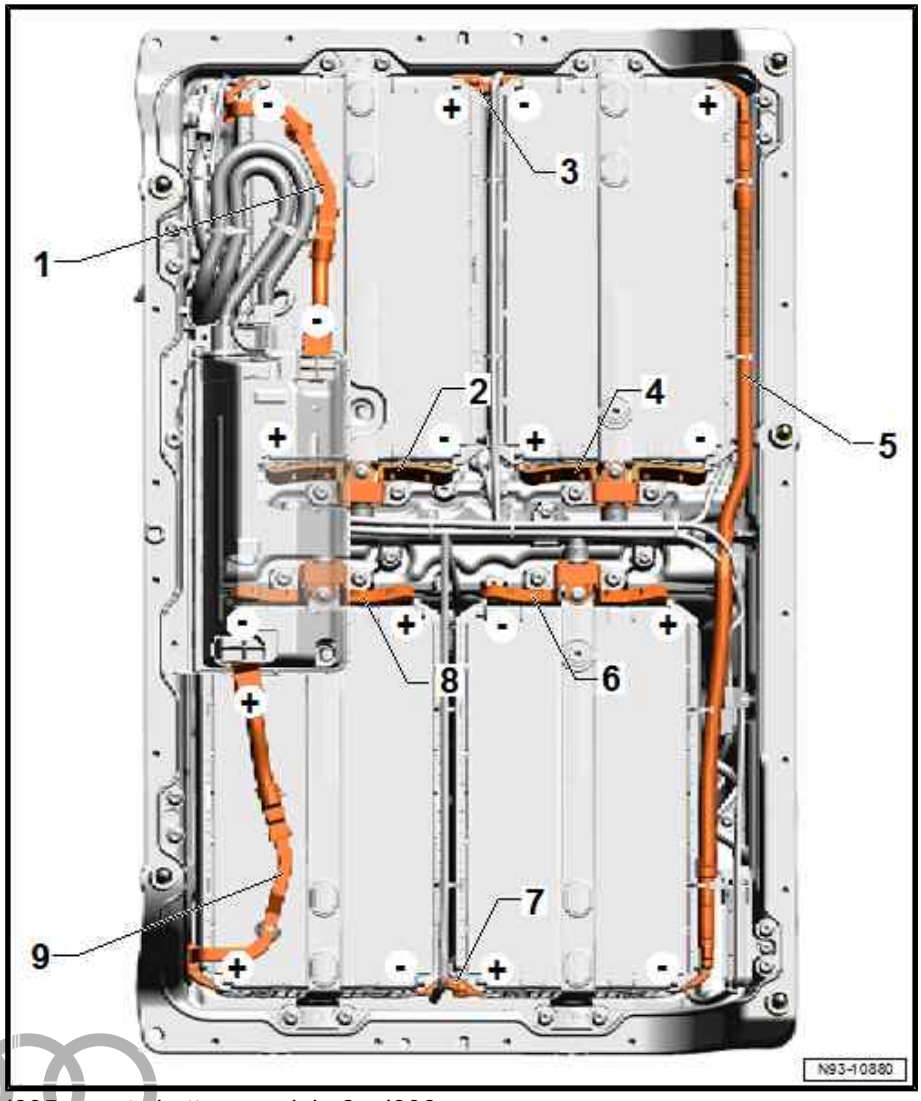
4.3 Overview of fitting locations - high-voltage connecting brackets

⚠ DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.



1 - Connecting cable 1 for battery module - P26-

- ❑ Switching unit for high-voltage battery - SX6- »–« to battery module 1 - J991- »–«
- ❑ 8 Nm

2 - Connecting cable 2 for battery module - P27-

- ❑ From battery module 1 - J991- »+« to battery module 2 - J992- »–«
- ❑ 8 Nm

3 - Connecting cable 3 for battery module - P28-

- ❑ From battery module 2 - J992- »+« to battery module 3 - J993- »–«
- ❑ 8 Nm

4 - Connecting cable 4 for battery module - P29-

- ❑ From battery module 3 - J993- »+« to battery module 4 - J994- »–«
- ❑ 8 Nm

5 - Connecting cable 5 for battery module - P30-

- ❑ From battery module 4 - J994- »+« to battery module 5 - J995- »–«
- ❑ 8 Nm

6 - Connecting cable 6 for battery module - P31-

- ❑ From battery module 5 - J995- »+« to battery module 6 - J996- »–«
- ❑ 8 Nm

7 - Connecting cable 7 for battery module - P32-

- ❑ From battery module 6 - J996- »+« to battery module 7 - J997- »–«
- ❑ 8 Nm

8 - Connecting cable 8 for battery module - P33-

- ❑ From battery module 7 - J997- »+« to battery module 8 - J998- »–«
- ❑ 8 Nm

9 - Connecting cable 9 for battery module - P34-

- ❑ From battery module 8 - J998- »+« to switching unit for high-voltage battery - SX6- »+«
- ❑ 8 Nm

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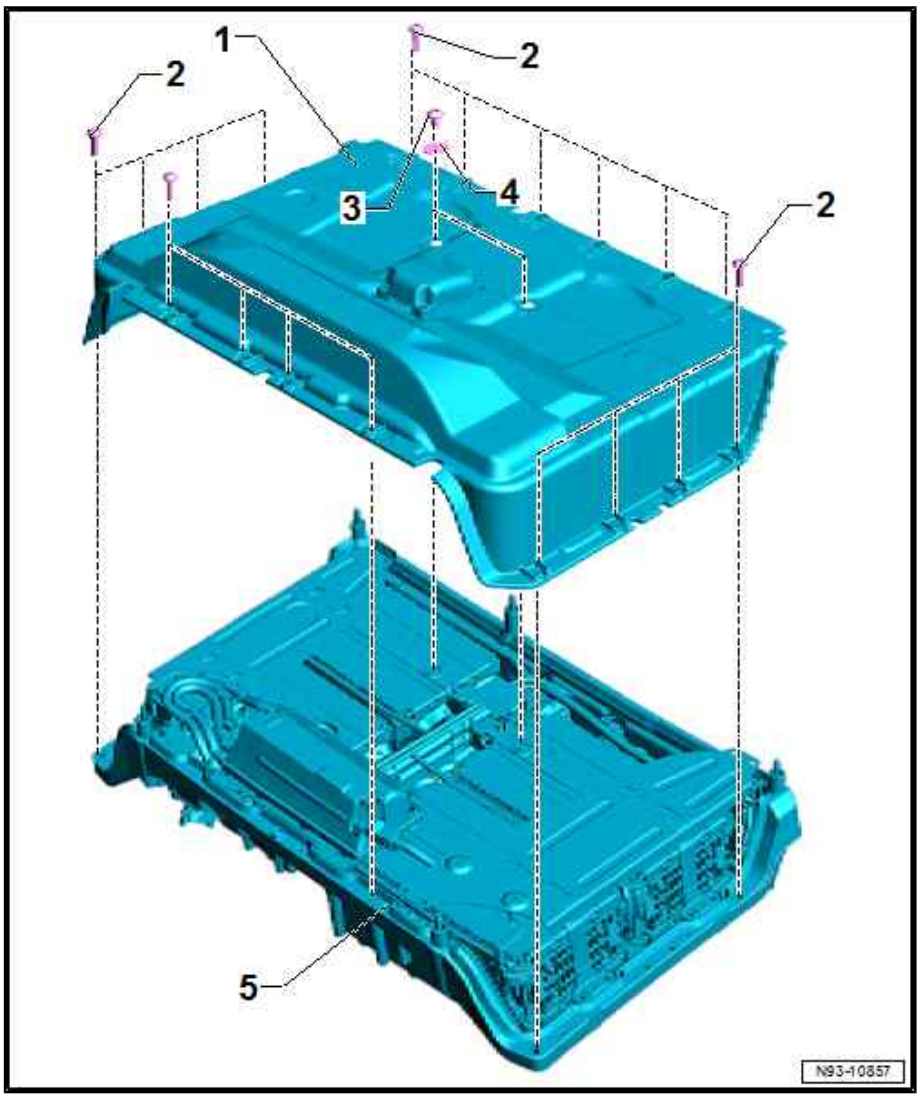
4.4 Exploded view - battery housing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**



1 - Battery housing (top section)

- ❑ With shield
- ❑ Renew after removing ⇒ “4.17 Bonding hybrid battery unit AX1 ”, page 613
- ❑ Removing ⇒ “4.12 Opening hybrid battery unit AX1 ”, page 597

2 - Bolt

- ❑ Battery housing (top section)
- ❑ 18x
- ❑ M6 x 25
- ❑ Coat lightly with wax after installation (⇒ Electronic parts catalogue “ETKA”)
- ❑ 8 Nm

3 - Bolt

Battery housing (top section)

- ❑ 2x
- ❑ M6 x 12
- ❑ Coat lightly with wax after installation (⇒ Electronic parts catalogue “ETKA”)
- ❑ 8 Nm

4 - Window glass

- ❑ 2x
- ❑ 30 x 1.5

5 - Battery housing (bottom section)

- ❑ With battery module assembly ⇒ “4.6 Exploded view - battery module assembly”, page 591
- ❑ With switching unit for high-voltage battery - SX6- ⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590

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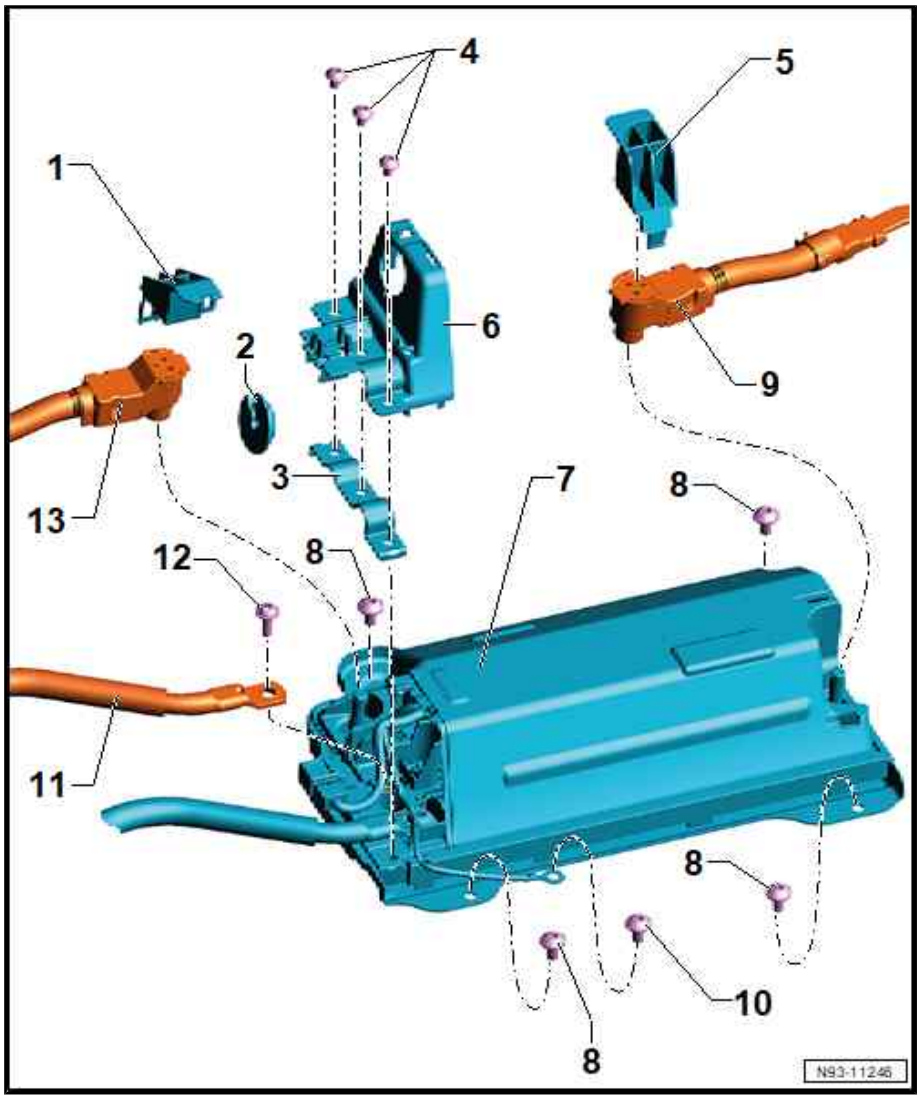
4.5 Exploded view - switching unit for high-voltage battery - SX6-

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**



1 - Cover

For connecting cable 1 for battery module - P26-

2 - Rubber grommet

3 - Bracket

4 - Bolts

- ❑ 3x
- ❑ M5 x 8
- ❑ 4 Nm

5 - Cover

For connecting cable 9 for battery module - P34-

6 - Cover

7 - Switching unit for high-voltage battery - SX6-

- ❑ Removing and installing ⇒ “4.13 Removing and installing switching unit for high-voltage battery SX6 ”, page 599

8 - Bolt

- ❑ 4x
- ❑ M6 x 12
- ❑ 8 Nm

9 - Connecting cable 9 for battery module - P34-

- ❑ From battery module 8 - J998-

10 - Bolt

- ❑ M6 x 12
- ❑ 8 Nm

11 - High-voltage wire

- ❑ To traction network connector mounting “-”

12 - Bolt

- ❑ M6 x 16
- ❑ 8 Nm

13 - Connecting cable 1 for battery module - P26-

- ❑ To battery module 1 - J991-

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4.6 Exploded view - battery module assembly

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**

1 - Cross member

- ❑ Must be removed from battery housing (bottom section) together with battery module assembly

2 - Bolt

- ❑ 16x
- ❑ M8 x 30
- ❑ 20 Nm

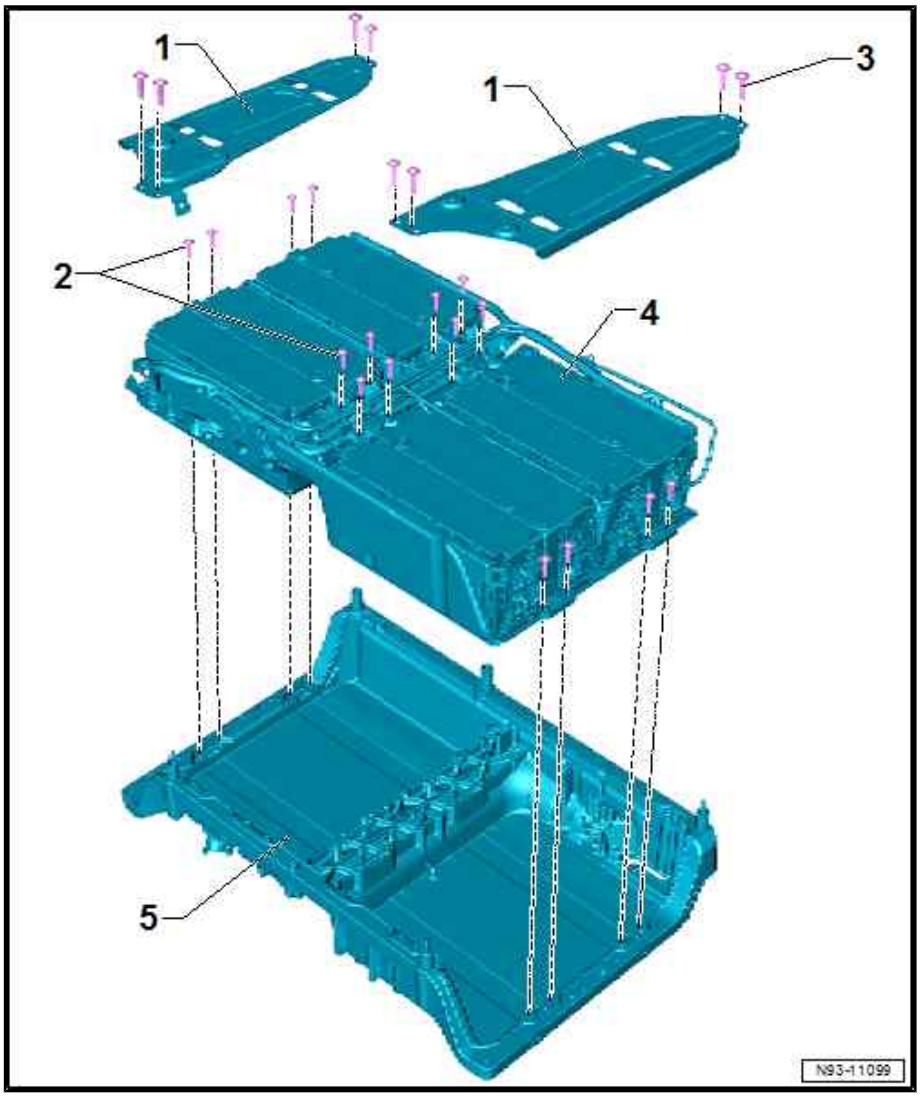
3 - Bolt

- ❑ 8x
- ❑ M8 x 30
- ❑ 22 Nm

4 - Battery module assembly

- ❑ Removing and installing ⇒ page 603

5 - Battery housing (bottom section)



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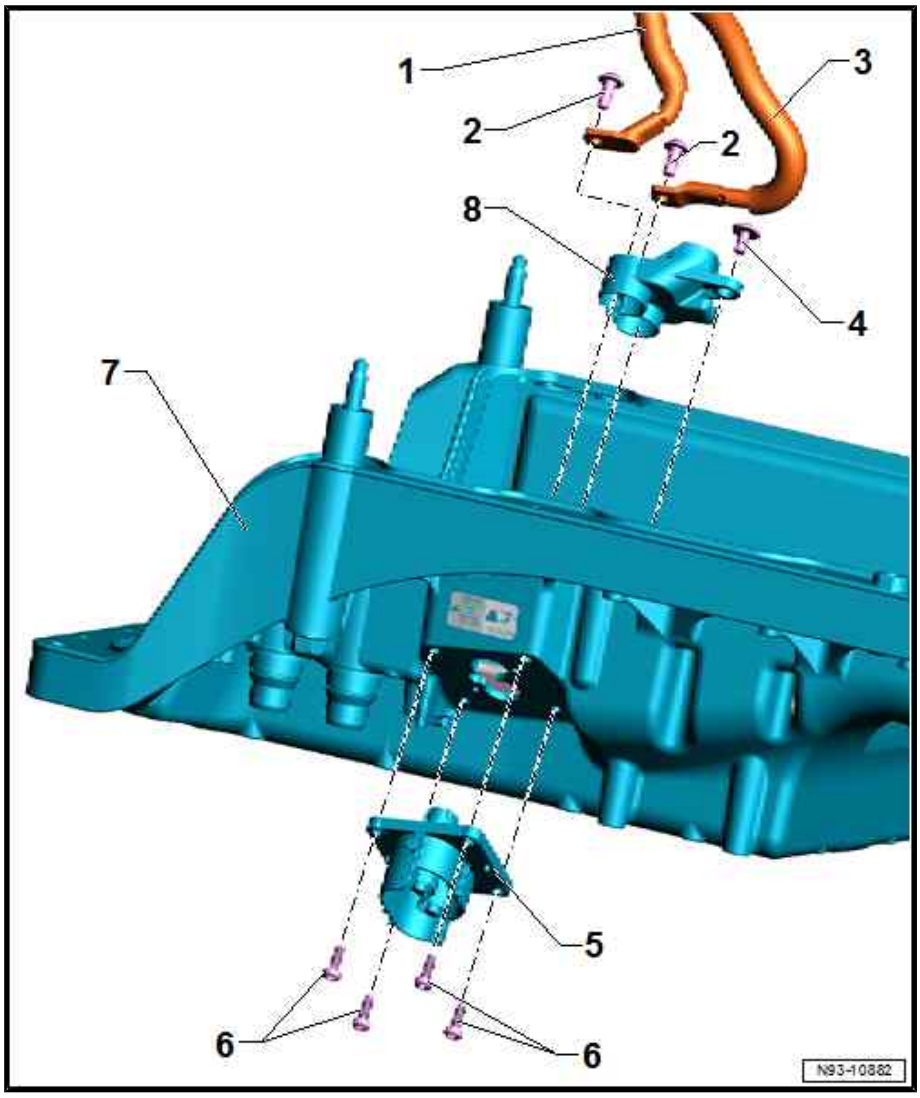
4.7 Exploded view - traction network connector mounting

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**



1 - High-voltage wire (-)

- ❑ To switching unit for high-voltage battery - SX6-

2 - Bolt

- ❑ M6 × 16
- ❑ 8 Nm

3 - High-voltage wire (+)

- ❑ To switching unit for high-voltage battery - SX6-
- ❑ Must not be disconnected from switching unit for high-voltage battery - SX6-

4 - Bolt

- ❑ M6 × 12
- ❑ 8 Nm

5 - Traction network connector mounting

- ❑ With pilot wire
- ❑ Pilot wire cannot be disconnected from connector mounting
- ❑ Removing and installing ⇒ “4.15 Removing and installing traction network connector mounting”, page 611

6 - Bolt

- ❑ 4x
- ❑ M5 × 16
- ❑ 6 Nm

7 - Battery housing (bottom section)

8 - Housing

- ❑ Serves as insulation for battery housing (bottom section)

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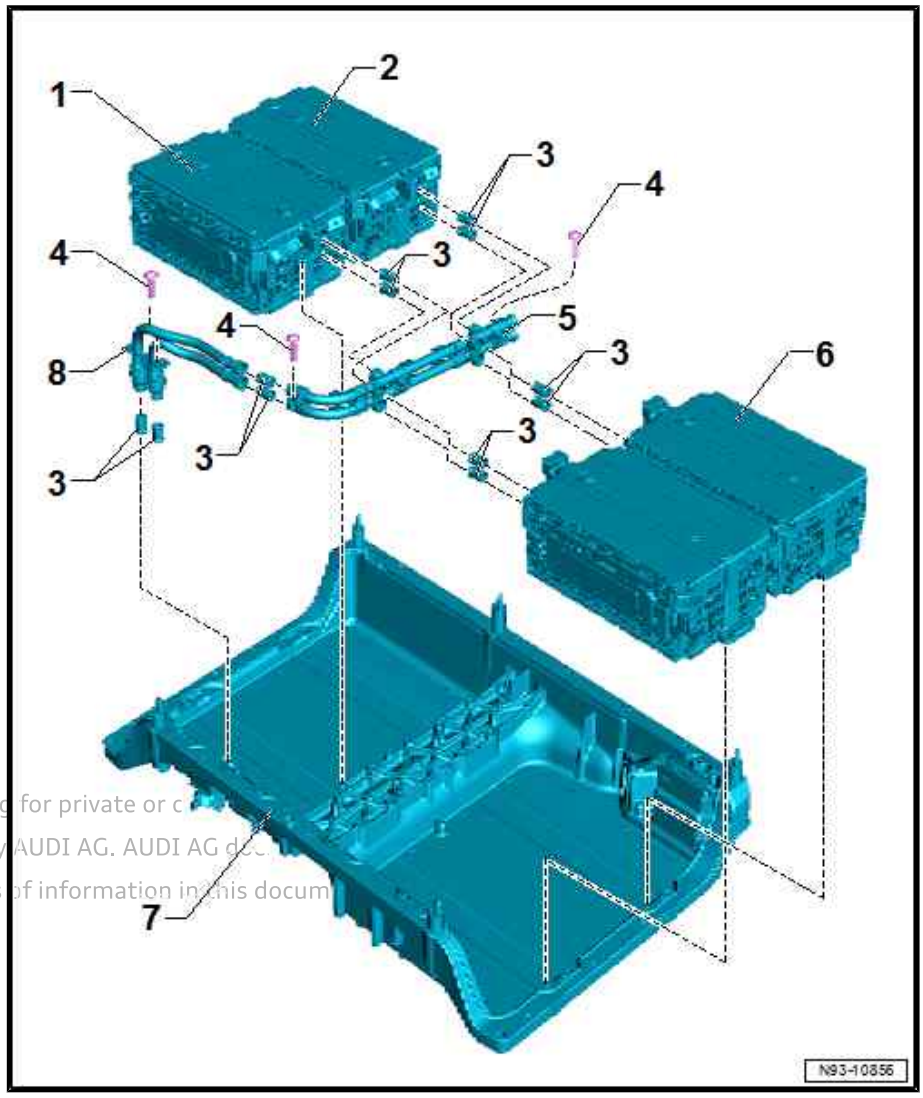
4.8 Exploded view - high-voltage battery cooling system

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**



1 - Battery module 1 - J991- / battery module 2 - J992-

2 - Battery module 3 - J993- / battery module 4 - J994-

3 - Connecting piece

- ❑ 12x
- ❑ Coat lightly with lithium grease before installation (⇒ Electronic parts catalogue “ETKA”)

4 - Bolt

- ❑ 7x
- ❑ M6 × 25
- ❑ 8 Nm

5 - Coolant pipe

- ❑ Must be removed from battery housing (bottom section) together with battery module assembly

6 - Battery module 5 - J995- / battery module 6 - J996-

7 - Battery housing (bottom section)

8 - Coolant pipe

- ❑ With coolant temperature sender 1 for high-voltage battery - G898- and coolant temperature sender 2 for high-voltage battery - G899-
- ❑ Must be removed from battery housing (bottom section) together with battery module assembly

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- ❑ Removing and installing coolant temperature sender 1 for high-voltage battery - G898- and coolant temperature sender 2 for high-voltage battery - G899-
⇒ “4.16 Removing and installing coolant temperature sender 1 for high-voltage battery G898 and coolant temperature sender 2 for high-voltage battery G899 ”, page 612

4.9 Performing leak test on cooling system for hybrid battery unit - AX1-

Special tools and workshop equipment required

- Cooling system tester - V.A.G 1274 B-
- Turbocharger tester - V.A.G 1397-
- Testing set - VAS 691 005-

Test requirements

Cooling system for hybrid battery unit - AX1- must be empty

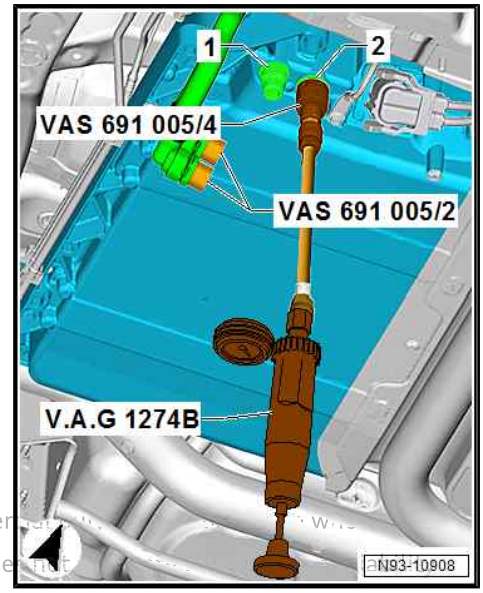
– Draining cooling system - hybrid battery unit
⇒ “1.3.3 Draining cooling system - hybrid battery unit”, page 325

– Fit connecting piece -VAS 691 005/4- onto coolant connection -2- on hybrid battery unit - AX1- so that it engages audibly.

– Connect hand pump with pressure hose -V.A.G 1274 B- to connecting piece -VAS 691 005/4- .

– Using hand pump -V.A.G 1274 B- , carefully pump coolant out of hybrid battery unit - AX1- via connection -1-.

– Disconnect hand pump with pressure hose -V.A.G 1274 B- from connecting piece -VAS 691 005/4- .



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Performing self-test for testing set - VAS 691 005-

– After leak test has been completed, clean Y-connector -VAS 691 005/1- as follows:

– Attach cleaning nozzle to connection “A” for turbocharger tester - V.A.G 1397A- .

– Connect pressure hose to connection “C” on Y-connector - VAS 691 005/1- .

– Open cut-off valves “A” and “C” on Y-connector -VAS 691 005/1- .

– Clean Y-connector -VAS 691 005/1- with compressed air.

– Disconnect cleaning nozzle from connection “A” on Y-connector -VAS 691 005/1- .

– Attach connection “A” of Y-connector -VAS 691 005/1- to connection 2 on turbocharger tester - V.A.G 1397A- .

– Connect hand pump with pressure hose -V.A.G 1274 B- to connection “C” of Y-connector -VAS 691 005/1- .

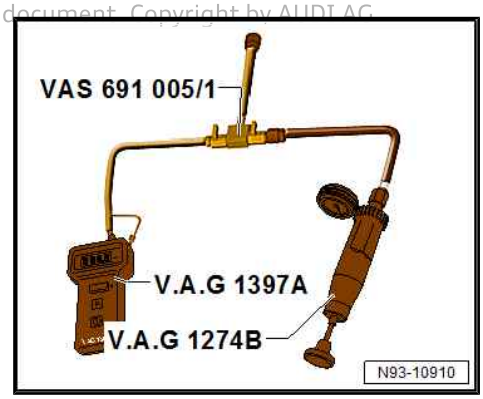
– Open cut-off valves “A” and “C” on Y-connector -VAS 691 005/1- .

– Switch on turbocharger tester - V.A.G 1397A- and select setting “II”.

– Using hand pump -V.A.G 1274 B- , build up pressure until turbocharger tester - V.A.G 1397A- shows approx. 2.5 bar.

– Wait approx. one minute (settling time), then check drop in pressure on turbocharger tester - V.A.G 1397A- .

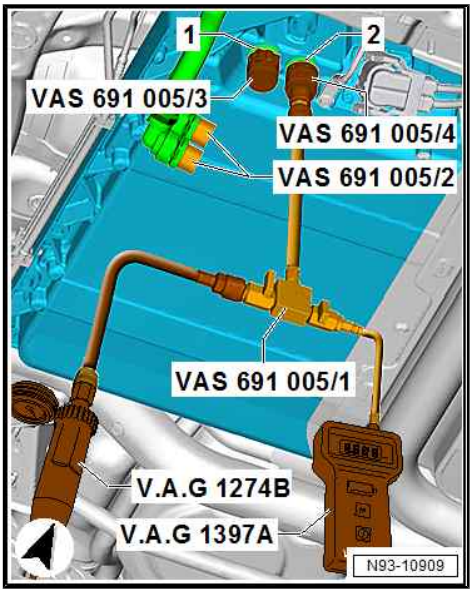
If no loss of pressure is detected on turbocharger tester - V.A.G 1397A- , then testing set - VAS 691 005- is OK.



Checking cooling system of hybrid battery unit - AX1- for leaks

– Seal off coolant connection -1- on hybrid battery unit - AX1- using sealing plug -VAS 691 005/3- .

– Attach connection “B” of Y-connector -VAS 691 005/1- to connecting piece -VAS 691 005/4- on hybrid battery unit - AX1- .



NOTICE

Risk of irreparable damage to turbocharger tester if coolant flows into it.

– **Make sure that turbocharger tester is positioned higher than Y-connector -VAS 691 005/1- at all times.**

– Attach connection “A” of Y-connector -VAS 691 005/1- to connection 2 on turbocharger tester - V.A.G 1397A- .

– Connect hand pump with pressure hose -V.A.G 1274 B- to connection “C” on Y-connector -VAS 691 005/1- .

– Open cut-off valves “A” and “C” on Y-connector -VAS 691 005/1- .

– Switch on turbocharger tester - V.A.G 1397A- and select setting “II”.

– Using hand pump -V.A.G 1274 B- , build up pressure until turbocharger tester - V.A.G 1397A- shows approx. 2.5 bar.

– Close cut-off valve “C” on Y-connector -VAS 691 005/1- .

– Wait one minute (settling time), then note down measurement from turbocharger tester - V.A.G 1397A- .

– Wait 10 minutes, then check drop in pressure on turbocharger tester - V.A.G 1397A- . The pressure must not have dropped more than 0.020 bar.

4.10 Determining mean cell voltage

Special tools and workshop equipment required

♦ Vehicle diagnostic tester

Procedure

The mean cell voltage must be determined before a battery module is renewed:

Note:

With high-voltage battery removed, use high-voltage diagnostics box - VAS 5581- with adapter cable - VAS 5581/1A- . CAN bus terminal resistor of high-voltage diagnostics box - VAS 5581- is pre-set to 120 ohms and must not be changed.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

♦ `High-voltage`

♦ `AX1 - Repair of hybrid battery unit`

♦ `8C - Determine mean cell voltage`

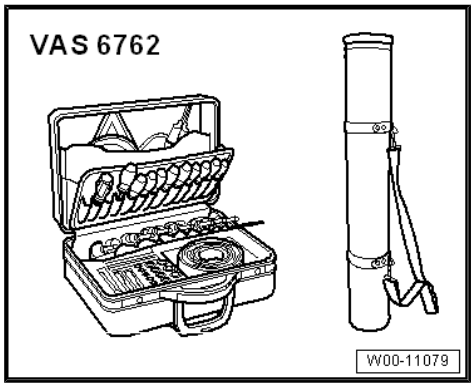
– Start selected program and follow instructions on display of vehicle diagnostic tester.

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4.11 Charging and discharging battery modules

Special tools and workshop equipment required

- Vehicle diagnostic tester
- High-voltage tool set - VAS 6762-



- Autonomous software - VAS 6910/5-
- Module balancing device - VAS 6910-
- Connecting cable for HV positive with ring cable lug and knurled screw - VAS 6910/12A-1-
- Connecting cable for HV negative with ring cable lug and knurled screw - VAS 6910/12A-2-
- CMC CAN connecting cable (group modules) - VAS 6910/12A-3-

Procedure

Put on protective equipment before performing the following work steps:

- Protective gloves
- Safety goggles
- Safety shoes with ESD protection

A new battery module must be charged or discharged according to the result of the mean cell voltage calculation ⇒ page 595 .

Note

If a new battery module is being installed, it is essential to adjust the charge level using the module balancing device - VAS 6910- and the autonomous software - VAS 6910/5- .

- Corresponding battery module has been removed.
- Battery module 1 - J991- / battery module 2 - J992-
  ⇒ “4.18 Removing and installing battery module 1 J991 / battery module 2 J992 ”, page 618
- Battery module 3 - J993- / battery module 4 - J994-
  ⇒ “4.19 Removing and installing battery module 3 J993 / battery module 4 J994 ”, page 621
- Battery module 5 - J995- / battery module 6 - J996-
  ⇒ “4.20 Removing and installing battery module 5 J995 / battery module 6 J996 ”, page 624

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- Battery module 7 - J997- / battery module 8 - J998-
⇒ “4.21 Removing and installing battery module 7 J997 / battery module 8 J998 ”, page 627

– Connect module balancing device - VAS 6910- ⇒ manual for -VAS 6910- .

– Start autonomous software - VAS 6910/5- on ⇒ Vehicle diagnostic tester.

Note

- *The user is shown the further procedure for performing the charging/discharging procedure with the module balancing device - VAS 6910- by the autonomous software - VAS 6910/5- .*
- *All steps of the procedure MUST be performed as described in the autonomous software - VAS 6910/5- .*

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– Re-install corresponding battery module.

- Battery module 1 - J991- / battery module 2 - J992-
⇒ “4.18 Removing and installing battery module 1 J991 / battery module 2 J992 ”, page 618
- Battery module 3 - J993- / battery module 4 - J994-
⇒ “4.19 Removing and installing battery module 3 J993 / battery module 4 J994 ”, page 621
- Battery module 5 - J995- / battery module 6 - J996-
⇒ “4.20 Removing and installing battery module 5 J995 / battery module 6 J996 ”, page 624
- Battery module 7 - J997- / battery module 8 - J998-
⇒ “4.21 Removing and installing battery module 7 J997 / battery module 8 J998 ”, page 627

4.12 Opening hybrid battery unit - AX1-

DANGER

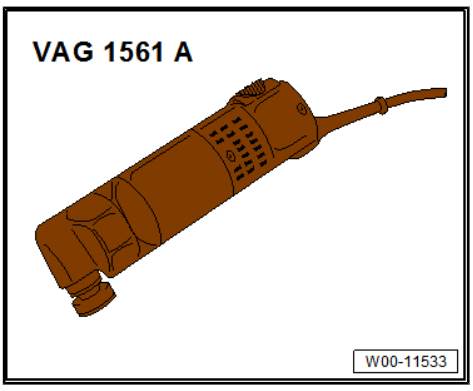
High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.

Special tools and workshop equipment required

- Electric cutter - V.A.G 1561A-



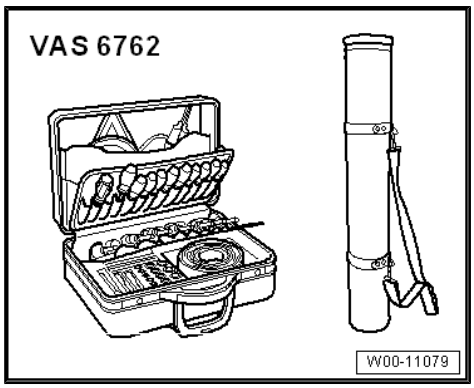
- Blade (27 mm) - VAS 6900/1-

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- Drip tray for workshop hoist - VAS 6208-



- High-voltage tool set - VAS 6762-



- Blade - VAS 6900/1-
- Scraper (25 mm) - VAS 6900/2-
- Scraper (12mm) - VAS 6900/3-
- Removal wedge - 3409-
- Lever - VAS 6900/6-
- High-voltage tool set, Torx, 3/8 inch - VAS 691 003-
- Torque wrench - VAS 6883/1-
- Vacuum cleaner with plastic nozzle (commercially available)

Procedure

Put on protective equipment before performing the following work steps:

- Protective gloves
- Safety goggles
- Safety shoes with ESD protection

Note

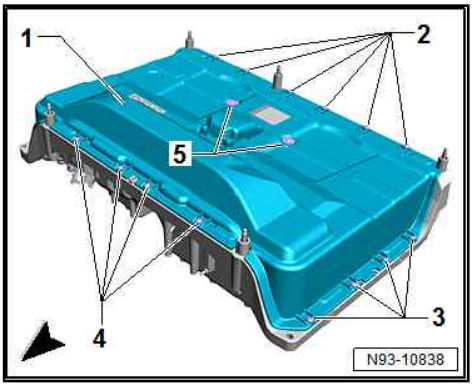
Please comply with the reporting obligation before opening the hybrid battery unit - AX1- . Do not perform work on the battery yourself.

– Remove hybrid battery unit - AX1-
⇒ “3.3 Removing and installing hybrid battery unit AX1 ”, page 568 .

– Carry out leak test for hybrid battery unit - AX1- ⇒ page 574 .

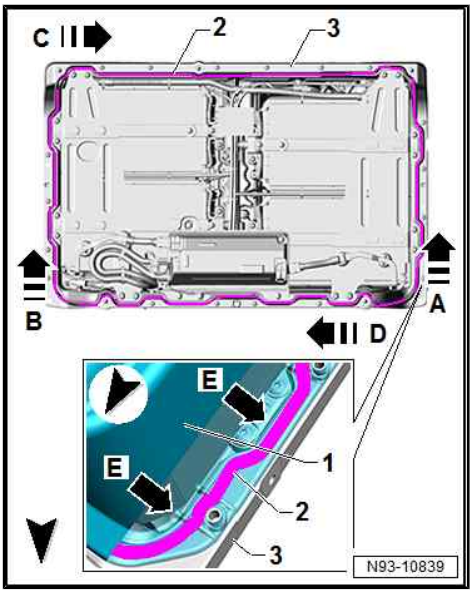
– Extract coolant from hybrid battery unit - AX1- as follows:

– Connect wet/dry vacuum cleaner (commercially available) to a connection for coolant lines on hybrid battery unit - AX1- .
– Extract coolant using wet/dry vacuum cleaner (commercially available).
– Remove bolts -2- on battery housing (top section) -1-.
– Remove bolts -3- (both sides) on battery housing (top section) -1-.
– Remove bolts -4- on battery housing (top section) -1-.
– Remove bolts -5- on battery housing (top section) -1-.
– Fit blade, 27 mm - VAS 6900/1- to electric cutter - V.A.G 1561A- .
– Adjust speed on electric cutter - V.A.G 1561A- to 4.



Note

- *Wear protective gloves and safety goggles!*
- *Hold electric cutter - V.A.G 1561A- at bottom and with both hands.*
- *Always guide electric cutter - V.A.G 1561A- along edge -arrows E- of battery housing (bottom section) -3-.*



– Cut open bonded seam -2- between battery housing (top section) -1- and battery housing (bottom section) -3- in direction of arrow -A-.
– Cut open bonded seam -2- in direction of arrow -B-.
– Cut open bonded seam -2- in direction of arrow -C-.
– Cut open bonded seam -2- in direction of arrow -D-.
– Detach battery housing (top section) -1- from battery housing (bottom section) -3-.
– If necessary, use lever - VAS 6900/6- to carefully prise battery housing (top section) -1- off battery housing (bottom section) -3- and apply removal wedge - 3409- .
– After removing lid, clean flange using wet/dry vacuum cleaner (commercially available).

4.13 Removing and installing switching unit for high-voltage battery - SX6-

DANGER

High voltage can cause fatal injury.

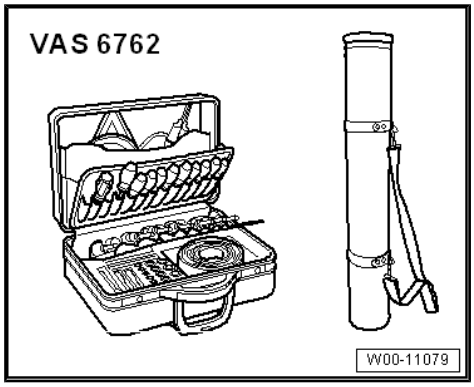
Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.

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Special tools and workshop equipment required

- High-voltage tool set - VAS 6762-



- Torque wrench - VAS 6883/1-
- High-voltage tool set, Torx, 3/8 inch - VAS 691 003-

Removing

– Open hybrid battery unit - AX1-
⇒ “4.12 Opening hybrid battery unit AX1 ”, page 597 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **Wear clothing approved for working with electric arcs.**
- **Wear a helmet with a protective mask.**
- **Wear insulating protective gloves.**
- **Wear safety shoes with ESD protection.**
- **The protective clothing and components must be dry.**

DANGER

High voltage can cause fatal injury.

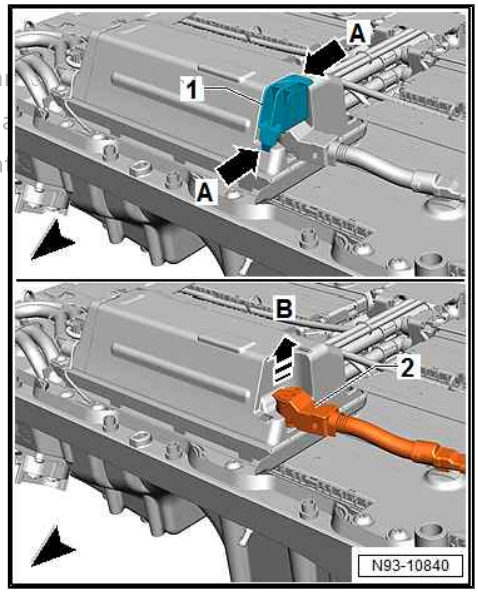
Danger of severe or fatal injury from electric shock or electric arcs.

- **The following steps require a second suitably qualified person to be present to supervise.**
- **The second person may only assist the high-voltage expert where required to the extent of his/her qualification.**
- **Persons without the appropriate qualification are not permitted to work actively on an open battery.**
- **Always follow country-specific laws and regulations (e.g. first aid training).**

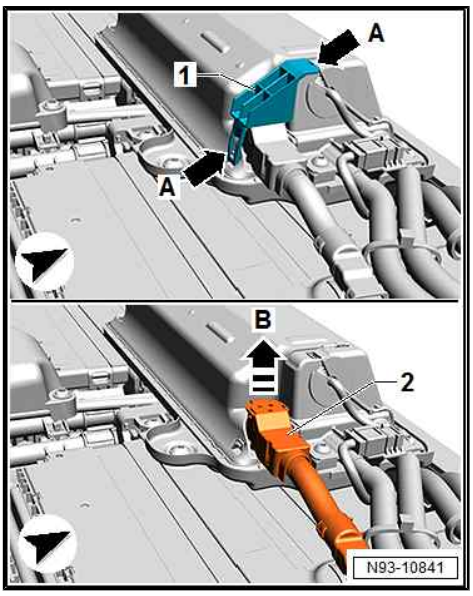
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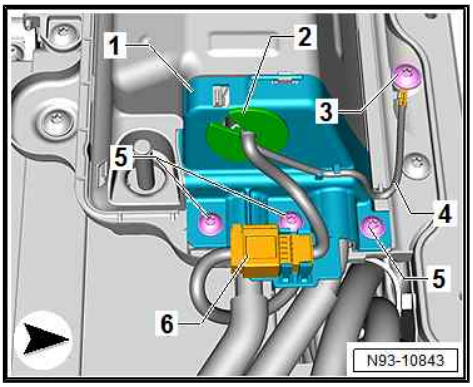
– Release cover -1- -arrows A- and detach.
– Disconnect connecting cable 9 for battery module - P34- -2- from connection on switching unit for high-voltage battery - SX6- in direction of arrow -B-.
– Push end caps - VAS 6762/48- onto connecting cable 9 for battery module - P34- .



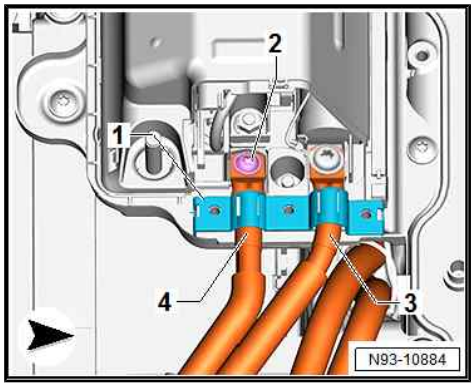
– Release cover -1- -arrows A- and detach.
– Disconnect connecting cable 1 for battery module - P26- -2- from connection on switching unit for high-voltage battery - SX6- in direction of arrow -B-.
– Push end caps - VAS 6762/48- onto connecting cable 9 for battery module - P34- .



– Release and unplug connector -6-.
– Unclip connector -6- from bracket on cover -1-.
– Remove bolt -3- for earth wire -4-.
– Remove bolts -5- for cover -1-.
– Remove rubber grommet -2- from cover -1-, guide out electrical wiring and detach rubber grommet -2-.
– Detach cover -1- from switching unit for high-voltage battery - SX6- (guide electrical wiring out).



– Unclip bracket -1- and detach it from switching unit for high-voltage battery - SX6- .



NOTICE

Risk of damage to switching unit for high-voltage battery - SX6- if high-voltage wire -3- is removed.

– Do not remove high-voltage wire -3-.

– Unscrew bolt -2- for high-voltage wire -4-.

– Disconnect high-voltage wire -4- from switching unit for high-voltage battery - SX6- .

– Remove bolts -arrows-.

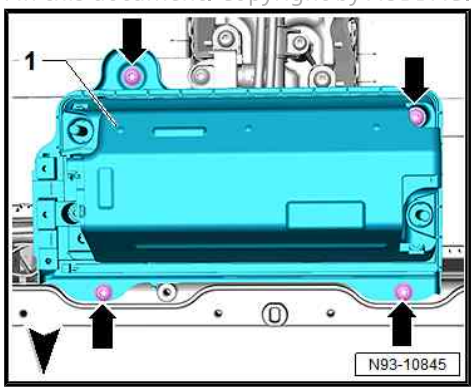
On batteries with index H - P, the bolts are fitted in the battery housing (bottom section) using locking fluid. If these are removed, new bolts coated in locking fluid must be fitted in their place (⇒ Electronic parts catalogue "ETKA").

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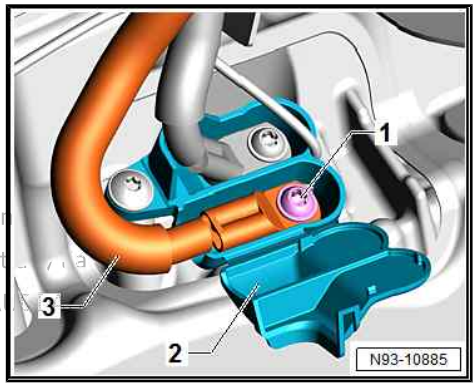
– Clean locking fluid off threads in battery housing (bottom section).

– Swivel switching unit for high-voltage battery - SX6- -1- to one side with high-voltage wire connected.

– Remove battery module assembly ⇒ "4.14 Removing and installing battery module assembly", page 603 .



– Open cover -2- on housing.
– Unscrew bolt -1- for high-voltage wire -3-.
– Detach switching unit for high-voltage battery - SX6- together with high-voltage wire -3-.



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Installing

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

Tightening torques

♦ ⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590

– Connect high-voltage diagnostics box - VAS 5581- with adapter cable - VAS 5581/1A- . CAN bus terminal resistor of high-voltage diagnostics box - VAS 5581- is pre-set to 120 ohms and must not be changed.
– Connect vehicle diagnostic tester .
– Select and start `ODIS-Service` mode.
– Select `Special functions` tab.
– Select the following:

♦ `High-voltage`
♦ `AX1 - Repair of hybrid battery unit`
♦ `8C - Documentation, HV battery repair and part commissioning`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

4.14 Removing and installing battery module assembly

DANGER

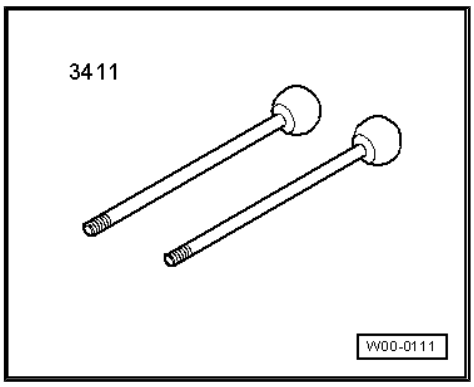
High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.

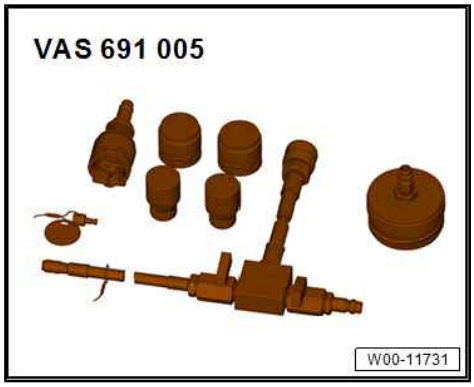
Special tools and workshop equipment required

♦ Guide pins - 3411- (2 sets)



♦ Support tool - T10543-
♦ Retaining strap - T40155- (2x)

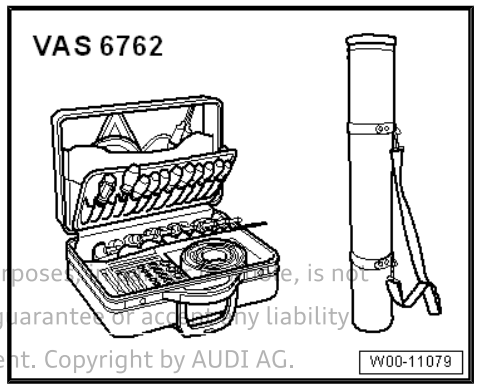
- Cooling system testing set for high-voltage batteries - VAS 691 005-



- Workshop hoist - VAS 6100-



- High-voltage tool set - VAS 6762-



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- Torque wrench - VAS 6883/1-
- High-voltage tool set, Torx, 3/8 inch - VAS 691 003-
- Vacuum cleaner with plastic nozzle (commercially available)

Removing

– Open hybrid battery unit - AX1-
⇒ “4.12 Opening hybrid battery unit AX1 ”, page 597 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **Wear clothing approved for working with electric arcs.**
- **Wear a helmet with a protective mask.**
- **Wear insulating protective gloves.**
- **Wear safety shoes with ESD protection.**
- **The protective clothing and components must be dry.**

DANGER

High voltage can cause fatal injury.

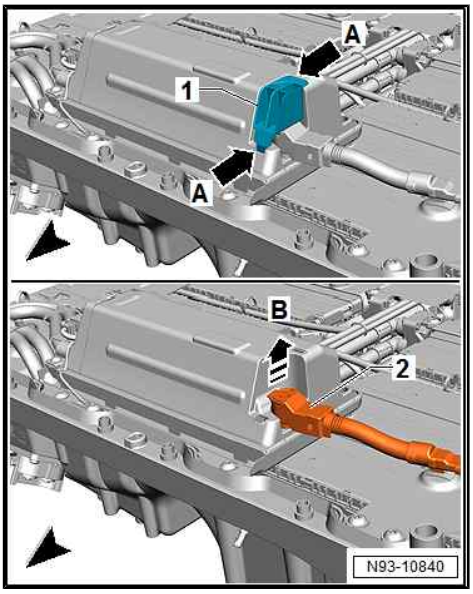
Danger of severe or fatal injury from electric shock or electric arcs.

- **The following steps require a second suitably qualified person to be present to supervise.**
- **The second person may only assist the high-voltage expert where required to the extent of his/her qualification.**
- **Persons without the appropriate qualification are not permitted to work actively on an open battery.**
- **Always follow country-specific laws and regulations (e.g. first aid training).**

Note

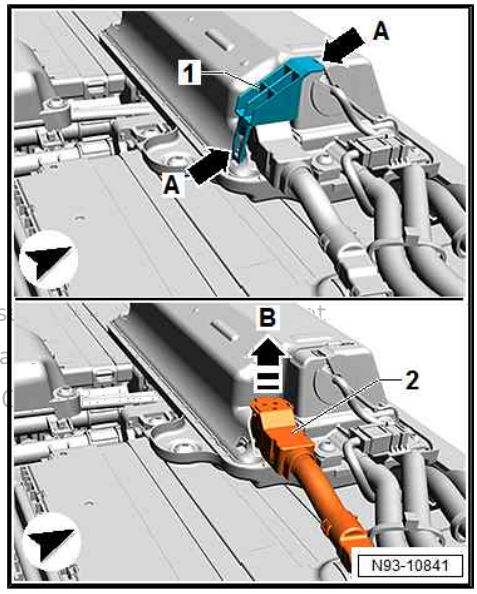
It can be helpful to make sketches or take photographs of the electrical wiring and the installation position of electrical connectors and cable ties. This helps to ensure that components are reinstalled in their original positions.

- Release cover -1- -arrows A- and detach.
- Disconnect connecting cable 9 for battery module - P34- -2- in direction of arrow -B- from connection on switching unit for high-voltage battery - SX6- and fit end caps - VAS 6762/48- .



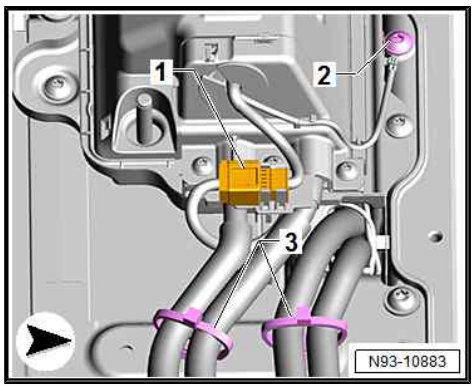
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– Release cover -1- -arrows A- and detach.
– Disconnect connecting cable 1 for battery module - P26- -2- in direction of arrow -B- from connection on switching unit for high-voltage battery - SX6- and fit end caps - VAS 6762/48- .

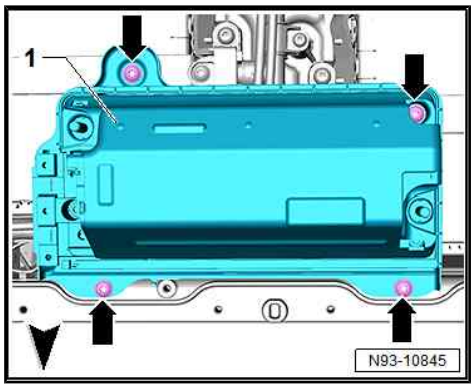


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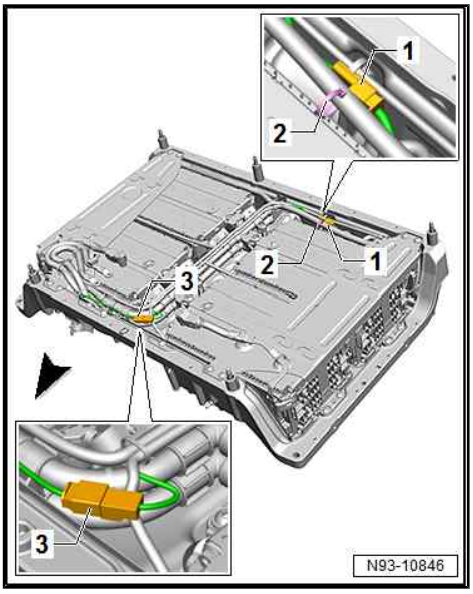
– Release and unplug connector -1-.
– Remove bolt -2- for earth wire.
– Cut open cable tie -3-.



– Remove bolts -arrows-.
– Swivel switching unit for high-voltage battery - SX6- -1- to one side with high-voltage wires connected.

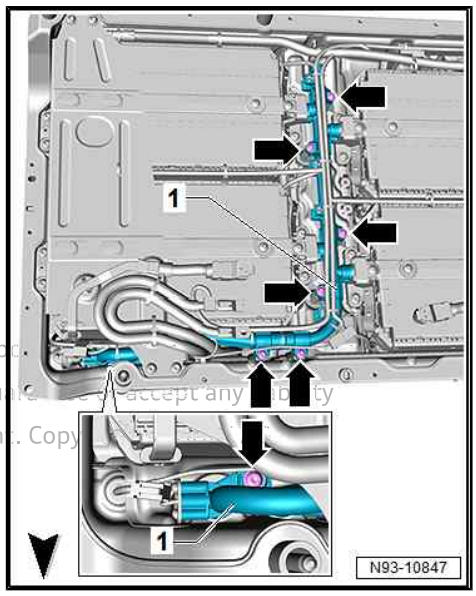


– Release and unplug electrical connector -1-.
– Cut through all cable ties -2-.
– Release and unplug electrical connector -3- for pilot wire.

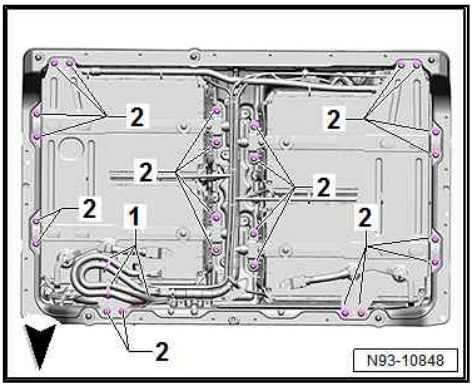


– Remove bolts -arrows- for coolant pipes -1-.
– Loosen coolant pipes -1- from connections on battery housing (bottom section), as shown in magnified view in illustration.

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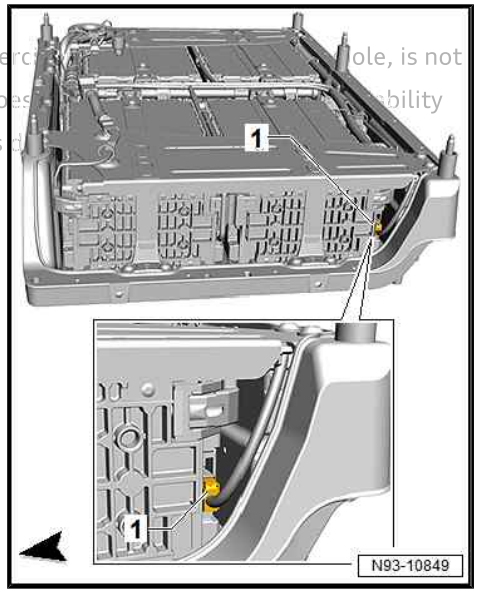


– If you have not yet done so, cut through cable tie -1-.
– Remove bolts -2-.
– After removing bolts -2-, remove any metal shavings using a vacuum cleaner with plastic nozzle (commercially available).

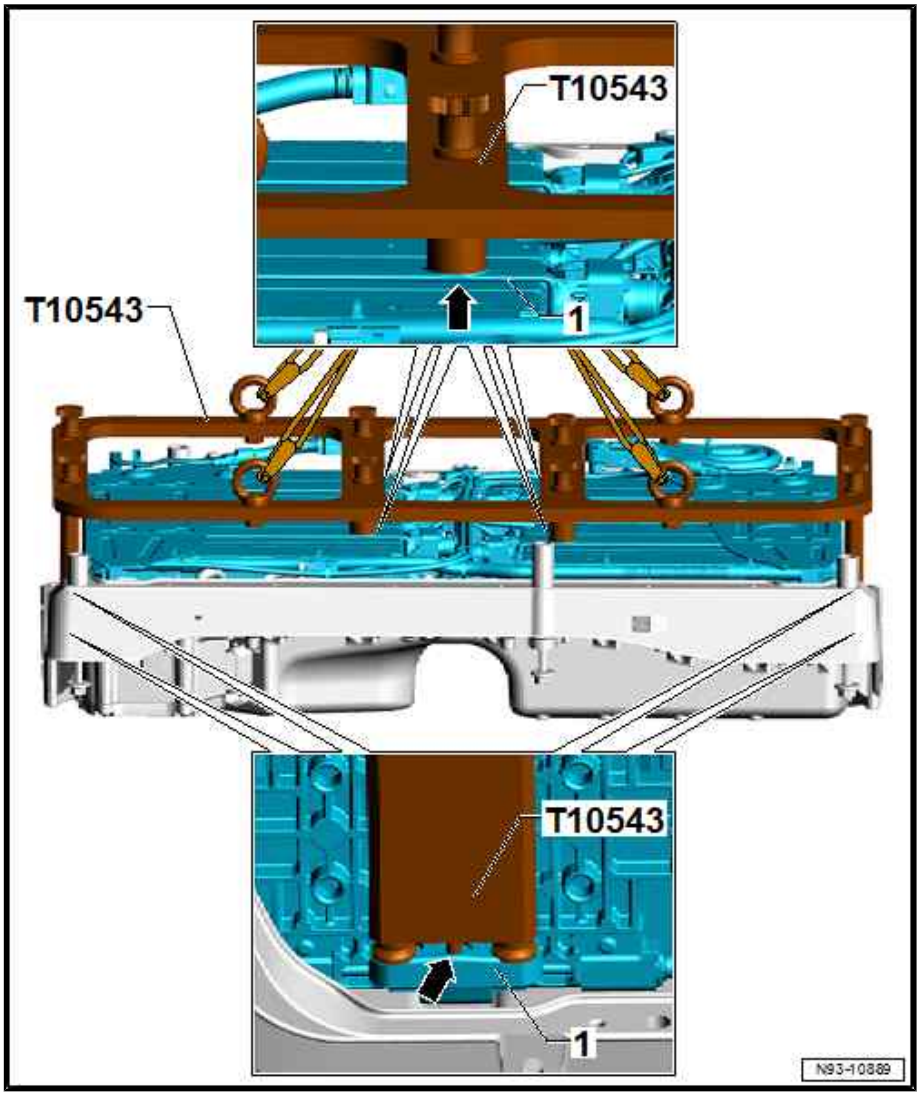


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– Release and unplug electrical connector -1- at battery module 5 - J995- .



– Secure support tool - T10543- with shackle - VAS 691 009- to workshop hoist - VAS 6100- .
– Position support tool - T10543- with workshop hoist - VAS 6100- centrally above battery module assembly so that battery module assembly remains level when it is lifted out of battery housing (bottom section).

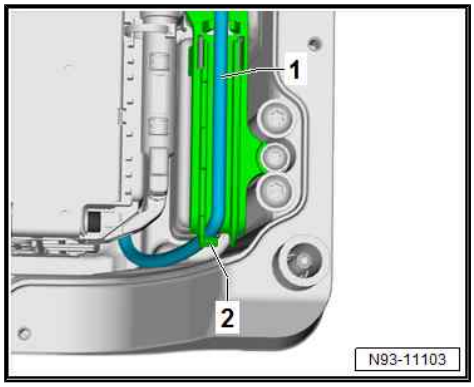


– Secure support tool - T10543- to mounting points -arrow- on battery module assembly -1-.
– Carefully lift battery module assembly -1- by approx. 5 cm using workshop hoist - VAS 6100- .

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– Unhook electrical wire -1- at bracket for battery regulation control unit - J840- -2-.

– Lever coolant pipes carefully out of coolant connection on battery housing (bottom section).



Note

It can be helpful to make sketches or take photographs of the electrical wiring and the installation position of electrical connectors and cable ties. This helps to ensure that components are reinstalled in their original positions.

– Lift battery module assembly -1- carefully out of battery housing (bottom section) using workshop hoist - VAS 6100- .

– Place battery module assembly on insulating mat from high-voltage tool set - VAS 6762- .

– Detach support tool - T10543- from battery module assembly if it is required for any further work.

– Place switching unit for high-voltage battery - SX6- in battery housing (bottom section).

Installing

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

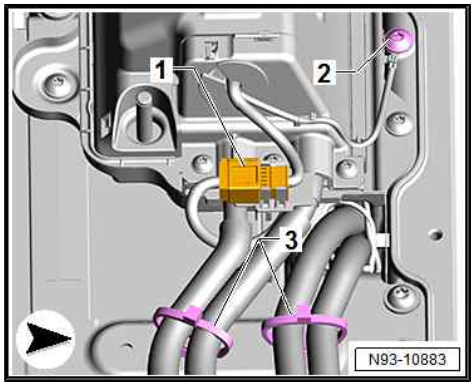
• Use new battery housing (bottom section) ⇒ Electronic parts catalogue (ETKA) .

• Prepare new battery housing (bottom section) for bonding ⇒ “4.17 Bonding hybrid battery unit AX1”, page 613 .

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– Remove any dirt from battery housing (bottom section) using a vacuum cleaner with plastic nozzle (commercially available).

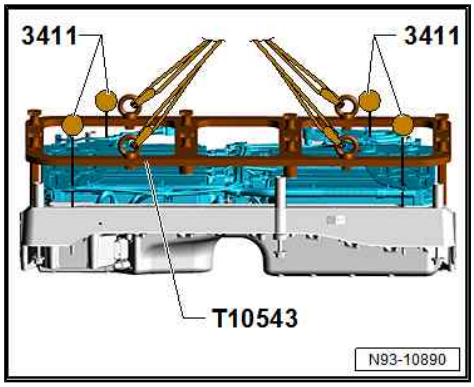
– Renew cable ties -3- (cross member must have been removed).



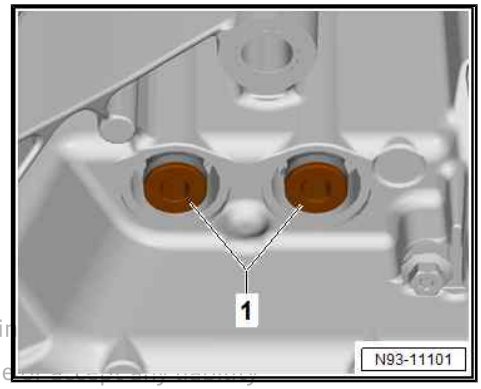
– Lower battery module assembly until it is just above battery housing (bottom section); to do so, use workshop hoist - VAS 6100- and support tool - T10543- .

– To guide battery module assembly into position, screw guide pins - 3411- through cross members into corresponding holes on battery housing (bottom section).

– Fix coolant connections in battery housing (bottom section) in position using guide sleeves - VAS691005/9- to prevent them from turning.



– Insert guide sleeves - VAS691005/9- -1- in coolant connections on battery housing (bottom section) and seal coolant connections using sealing plugs from cooling system tester for high-voltage batteries - VAS 691 005 -.



– Guide battery module assembly carefully into battery housing (bottom section), paying attention to electrical wiring and coolant pipes.

– Approx. 3 cm before battery module assembly reaches its final position in battery housing (bottom section), first connect coolant pipes of battery module assembly to connections in battery housing (bottom section).

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– Lower battery housing (bottom section) to end position.

– Remove guide sleeves - VAS691005/9- from coolant connections on battery housing (bottom section).

– Screw in bolts -2- and -3-.

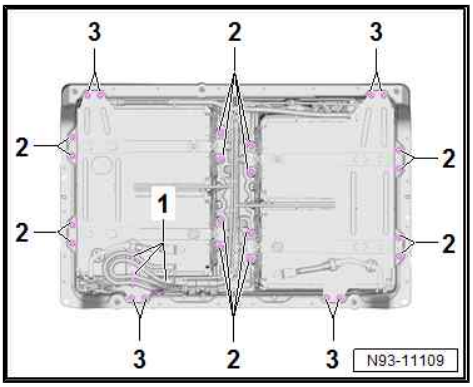
– Tighten bolts -2- to specified torque.

– Tighten bolts -3- to specified torque.

– Loosen bolts -2- and -3- by half a turn.

– Tighten bolts -2- to specified torque.

– Tighten bolts -3- to specified torque.



Tightening torques

- ⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590
- ⇒ “4.6 Exploded view - battery module assembly”, page 591
- ⇒ “4.8 Exploded view - high-voltage battery cooling system”, page 593

– Perform leak test on cooling system for high-voltage battery ⇒ “4.9 Performing leak test on cooling system for hybrid battery unit AX1 ”, page 593 .

– Connect high-voltage diagnostics box - VAS 5581- with adapter cable - VAS 5581/1A- . CAN bus terminal resistor of high-voltage diagnostics box - VAS 5581- is pre-set to 120 ohms and must not be changed.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

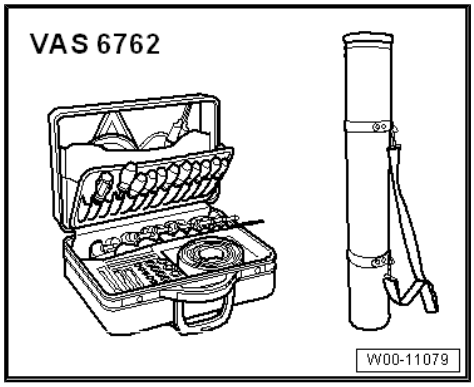
- `High-voltage`
- `AX1 - Repair of hybrid battery unit`
- `8C - Documentation, HV battery repair and part commissioning`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

4.15 Removing and installing traction network connector mounting

Special tools and workshop equipment required

- High-voltage tool set - VAS 6762-



- High-voltage tool set - VAS 6883-
- Torque wrench - VAS 6883/1-

Removing

– Remove battery module assembly ⇒ “4.14 Removing and installing battery module assembly”, page 603 .

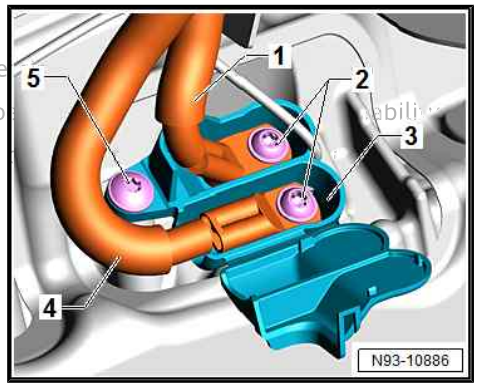
– Open cover on housing -3-.

– Remove bolts -2- for high-voltage wires -1- and -4-.

– Detach high-voltage wires -1- and -4- from connector mounting.

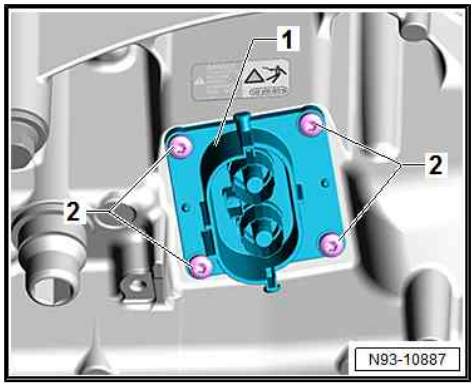
– Remove bolt -5- for housing -3-.

– Detach housing -3-.



– Remove bolts -2- for connector mounting -1-.

– Pull connector mounting -1- with pilot wire out of battery housing (bottom section).



Installing

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

– Renew seal on traction network connector mounting.

Tightening torques

- ⇒ “4.7 Exploded view - traction network connector mounting”, page 592

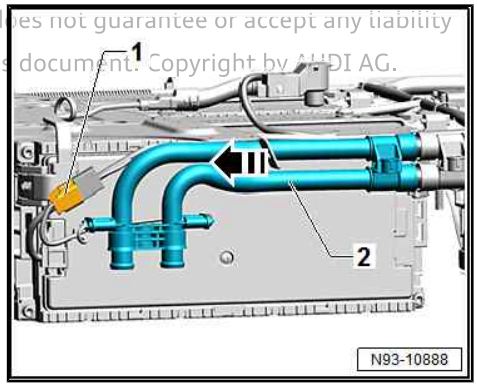
4.16 Removing and installing coolant temperature sender 1 for high-voltage battery - G898- and coolant temperature sender 2 for high-voltage battery - G899-

The coolant temperature senders for high-voltage battery -G898- / -G899- cannot be renewed separately. The coolant pipes must be renewed together with the coolant temperature senders for high-voltage battery -G898- / -G899- .

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Removing

– Remove battery module assembly ⇒ “4.14 Removing and installing battery module assembly”, page 603 .
– Release and unplug electrical connector -1-.
– Pull off coolant pipes -2- with coolant temperature senders for high-voltage battery -G898- / -G899- in direction of -arrow- and remove.



Installing

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

– Coat coolant pipe connections lightly with lithium grease before installation (⇒ Electronic parts catalogue “ETKA”).

4.17 Bonding hybrid battery unit - AX1-

DANGER

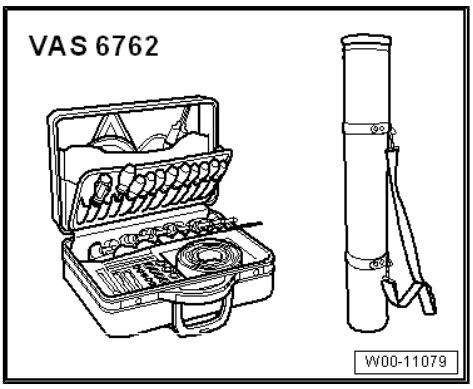
High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.

Special tools and workshop equipment required

♦ High-voltage tool set - VAS 6762-



♦ Pneumatic gun, 18 bar - VAS 6648-
♦ Torque wrench - VAS 6883/1-
♦ Vacuum cleaner with plastic nozzle (commercially available)

Materials

♦ For part numbers of materials, refer to ⇒ Electronic parts catalogue “ETKA” .
♦ Repair kit for battery housing 1)
♦ Adhesive 1)
♦ Primer for battery housing (bottom section) 1)
♦ Primer for battery housing (top section) 1)
♦ Primer for battery housing (bottom section) 1)
♦ Cleaning solution 1)

- Primer applicator [1)]

[1)] Follow the manufacturer's instructions supplied with the product.

Procedure

- Use new battery housing (bottom section) ⇒ Electronic parts catalogue (ETKA) .

– Position new battery housing (bottom section) on scissor-type assembly platform - VAS 6131 B- .

– Mask off coolant pipe connections in battery housing (bottom section) and electrical connectors.

Note

Do not use sandpaper.

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– Sand entire flange (area of adhesive bead) and approx. 2 cm above edge of flange of battery housing (bottom section) with non-woven sanding pad until bare metal surface is free of all residue.

– Remove any dirt from battery housing (bottom section) using a vacuum cleaner with plastic nozzle.

– Position battery housing (top section) on battery housing (bottom section) and fix in position with four bolts.

– Mark outlines of battery housing (top section) on battery housing (bottom section) using a scriber.

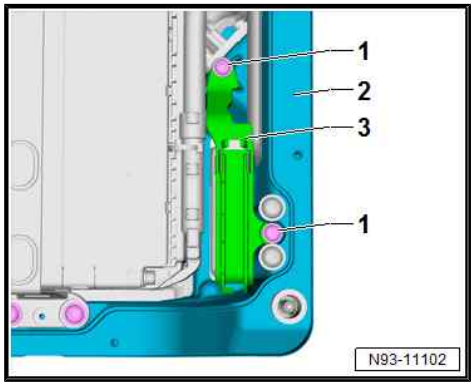
– Take battery housing (top section) off again.

– Install battery regulation control unit - J840-
⇒ “3.8 Removing and installing battery regulation control unit J840 ”, page 582 .

– Insert bracket for battery regulation control unit - J840- -3- in battery housing (bottom section) -2-.

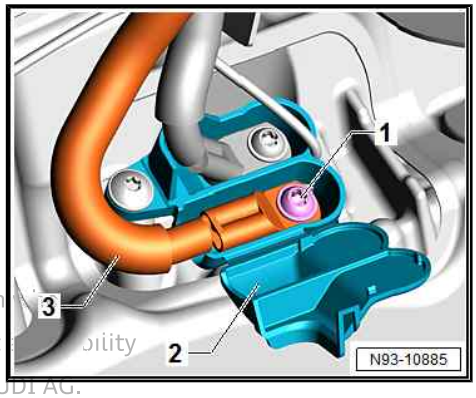
– Tighten bolts -1- for bracket for battery regulation control unit - J840- -3- to 10 Nm.

– Fit heat insulation in battery housing (bottom section).



– Open cover -2- on high-voltage system connector housing.

– Secure high-voltage wire -3- leading from switching unit for high-voltage battery - SX6- to high-voltage system connector with bolt -1-.



– Swivel high-voltage wire and switching unit for high-voltage battery - SX6- to side (with high-voltage wire attached).

– Install battery module assembly
⇒ “4.14 Removing and installing battery module assembly”, page 603 .

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– Install switching unit for high-voltage battery - SX6-
⇒ “4.13 Removing and installing switching unit for high-voltage battery SX6 ”, page 599 .

– Perform the following steps before starting bonding work:

– Perform leak test on cooling system for high-voltage battery
⇒ “4.9 Performing leak test on cooling system for hybrid battery unit AX1 ”, page 593 .

– Connect high-voltage diagnostics box - VAS 5581- with adapter cable - VAS 5581/1A- . CAN bus terminal resistor of high-voltage diagnostics box - VAS 5581- is pre-set to 120 ohms and must not be changed.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

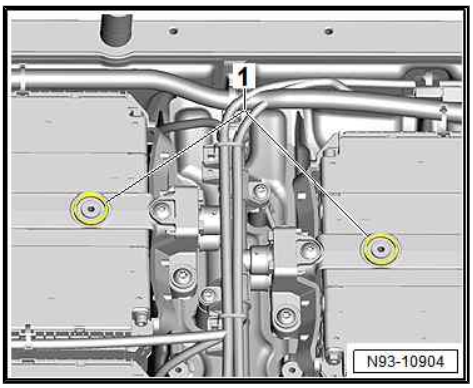
– Select `Special functions` tab.

– Select the following:

- `High-voltage`
- `AX1 - Repair of hybrid battery unit`
- `8C - Documentation, HV battery repair and part commissioning`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

– Check that seals -1- are present in the correct installation position, and adjust if necessary.



NOTICE

Bonding surfaces are sensitive to dust and grease.

The adhesive will not be effective if there is any dust or grease.

– Keep bonding surface clean and free from grease.

– Clean battery housing (bottom section) with cleaning solution and lint-free cloth thoroughly in area of adhesive bead.

– Apply primer along entire flange of battery housing (bottom section) and approx. 2 cm above edge of flange.

– Allow primer to flash off for the specified time until it is dry.

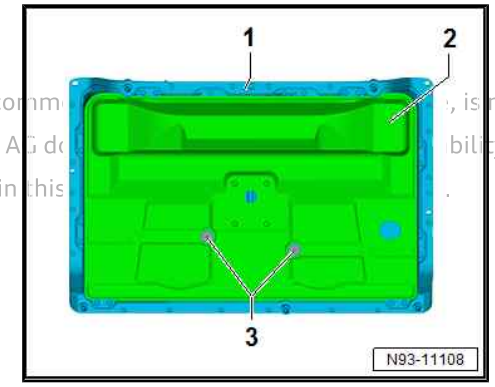
– Use applicator to apply primer for battery housing (bottom section) evenly and in one movement to flange on battery housing (bottom section) and approx. 2 cm over edge of flange; make sure there are no air bubbles.

– Allow primer to flash off for the specified time until it is dry.

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for the correctness of information in this .

Note

- *Ensure that heat insulation mat -2- is correctly seated in battery housing (top section) -1-.*
- *The sealing/bonding surface must not be covered by the heat insulation mat.*
- *Holes -3- must have sufficient clearance to heat insulation mat -2-.*
- *Rework heat insulation mat -2- with workshop equipment if necessary.*



– Clean battery housing (top section) with cleaning solution and lint-free cloth thoroughly in area of adhesive bead.

– Use applicator to apply primer for battery housing (top section) evenly and in one movement around adhesive bead and approx. 5 mm over edge of flange on battery housing (top section); make sure there are no air bubbles.

– Allow primer to flash off for the specified time until it is dry.

NOTICE

The battery housing (top section) must be fitted within 20 minutes, otherwise the adhesive properties of the bond will be impaired.

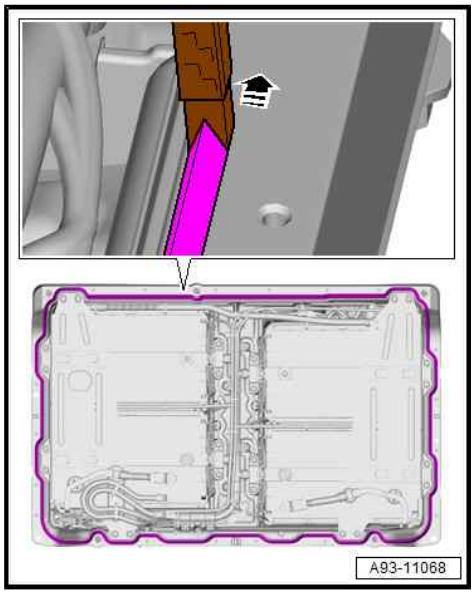
– Prepare pneumatic gun, 18 bar - VAS 6648- and adhesive and set required operating pressure.

– Cut the nozzle provided down to the marked position 3.

– Apply adhesive bead around entire circumference at a right angle to battery housing (bottom section) so that ridge is vertical -arrow-. When doing so, keep a distance of 2 mm from rib all the way around.

– Start adhesive bead on long side of battery housing (bottom section).

– Apply adhesive bead so that start and end of bead overlap.

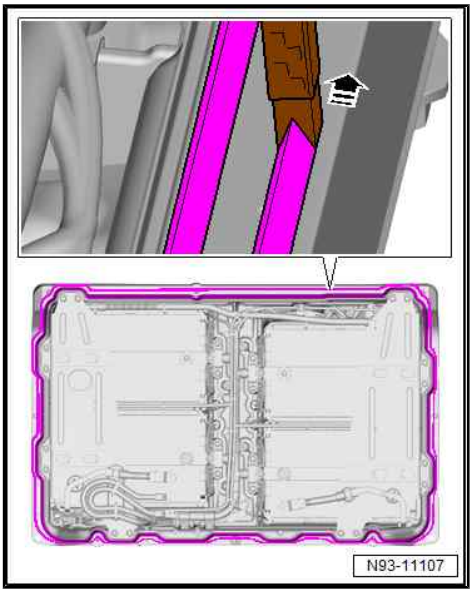


– Apply a second adhesive bead next to the first adhesive bead -arrow-, using outlines of battery housing (top section) on battery housing (bottom section) for orientation. Adhesive bead may be applied over bolt holes.

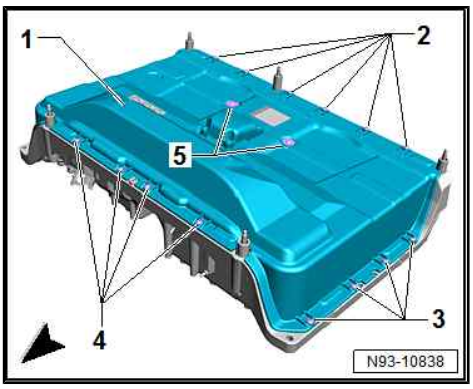
• Apply adhesive bead in sufficient quantity (1.5 – 2 cartridges of adhesive).

• Adhesive bead must emerge all around after battery housing (top section) has been bolted on.

– Fit battery housing (top section) on battery housing (bottom section) with the aid of a second mechanic.



– Screw bolts -2 ... 5- hand-tight into battery housing (bottom section) through battery housing (top section) -1-.



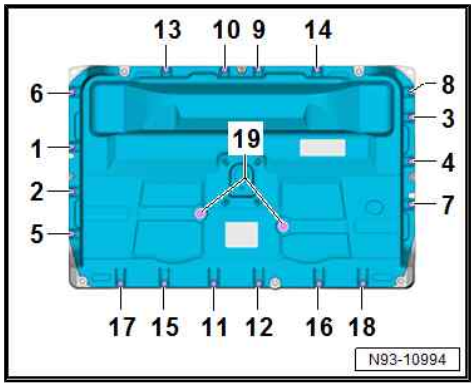
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– Tighten bolts to 8 Nm in the sequence -1 … 19-.

– Use a suitable paintbrush to spread any adhesive that comes out and fill gaps between top and bottom sections of battery housing.

The sealed gap between the top and bottom sections of the battery housing must be covered completely with adhesive.

– Lightly coat bolts -1 ... 19- with wax after installation ⇒ Electronic parts catalogue (ETKA) .



Note

- *The bonded joint may need up to four hours to harden, depending on the adhesive used.*
- *The minimum drying time for the adhesive is two hours.*
- *During the minimum drying time (i.e. the time between the bonding procedure and performing further work), the hybrid battery unit - AX1- must be on the scissor-type assembly platform at room temperature (at least 15 °C).*

– After minimum drying time has elapsed, perform leak test for hybrid battery unit - AX1- ⇒ page 574 .

– Attach warning sticker ⇒ page 560 .

Tightening torques

- ⇒ “4.4 Exploded view - battery housing”, page 589
- ⇒ “4.7 Exploded view - traction network connector mounting”, page 592
- ⇒ “4.5 Exploded view - switching unit for high-voltage battery SX6 ”, page 590

4.18 Removing and installing battery module 1 - J991- / battery module 2 - J992-

DANGER

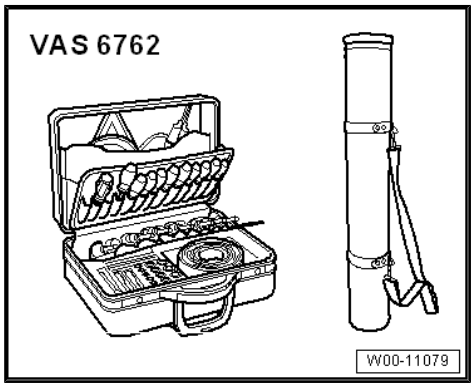
High voltage can cause fatal injury.
Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**

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Special tools and workshop equipment required

- High-voltage tool set - VAS 6762-



- High-voltage tool set, Torx, 3/8 inch - VAS 691 003-

- ♦ Torque wrench - VAS 6883/1-
- ♦ Contact protection cap - T10544-

Removing

- New battery modules must be charged or discharged to the mean cell voltage level determined previously
  ⇒ “4.11 Charging and discharging battery modules”, page 596 .

– Remove battery module assembly
  ⇒ “4.14 Removing and installing battery module assembly”, page 603 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **The following steps require a second suitably qualified person to be present to supervise.**
- **The second person may only assist the high-voltage expert where required to the extent of his/her qualification.**
- **Persons without the appropriate qualification are not permitted to work actively on an open battery.**
- **Always follow country-specific laws and regulations (e.g. first aid training).**

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **Wear clothing approved for working with electric arcs.**
- **Wear a helmet with a protective mask.**
- **Wear insulating protective gloves.**
- **Wear safety shoes with ESD protection.**
- **The protective clothing and components must be dry.**

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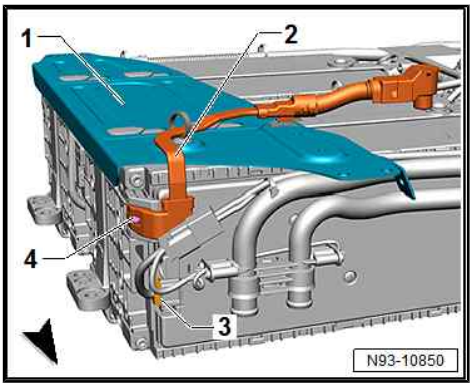
– Release and unplug electrical connector -3- at battery module 1 - J991- .

– Remove bolt -4- for connecting cable 1 for battery module - P26- -2- at battery module 1 - J991- .

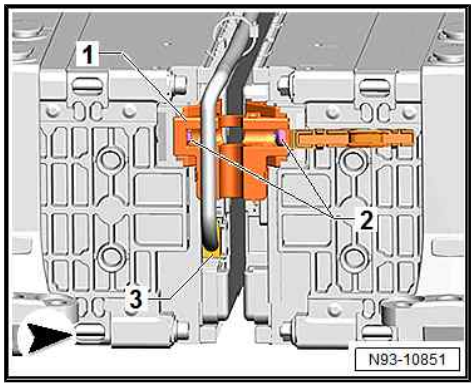
– Disconnect connecting cable 1 for battery module - P26- -2- from battery module 1 - J991- ; do not unfasten cable tie.

– Detach cross member -1- outwards from battery modules.

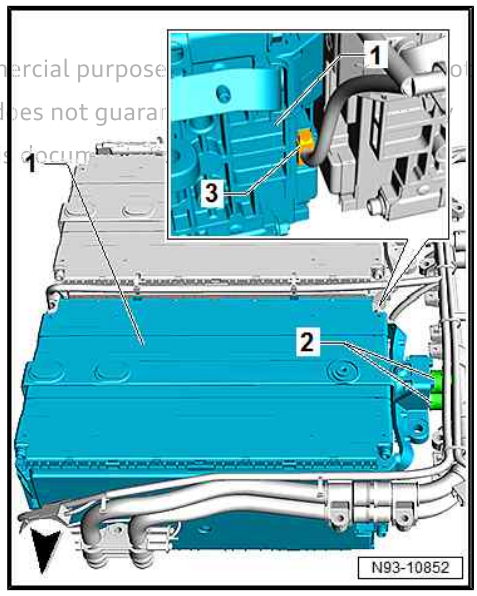
– Fit contact protection cap - T10544- on high-voltage connection at battery module 1 - J991- .



– Release and unplug electrical connector -3- at battery module 3 - J993- .
– Open flap at connecting cable 3 for battery module - P28- -1- between battery module 2 - J992- and battery module 3 - J993- .
– Remove bolts -2- for connecting cable 3 for battery module - P28- -1-.
– Disconnect connecting cable 3 for battery module - P28- -1- from battery modules.
– Fit contact protection caps -T10544- on high-voltage connections at battery module 2 - J992- and battery module 3 - J993- .



– Release all cable ties and move electrical wiring clear at battery module 1 - J991- / battery module 2 - J992- -1-.
– Place a sufficient number of cloths underneath coolant connections -2- to catch escaping coolant.
– Carefully pull battery module 1 - J991- / battery module 2 - J992- -1- outwards off coolant connections -2- until electrical connector -3- is accessible.
– Release and unplug electrical connector -3- at battery module 2 - J992- .
– Remove battery module 1 - J991- / battery module 2 - J992- -1-.
– Remove connecting cable 2 for battery module - P27- ⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587 .



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Installing

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

Note

If a new battery module is being installed, it is essential to adjust the charge level using the module balancing device - VAS 6910- and the autonomous software - VAS 6910/5- .

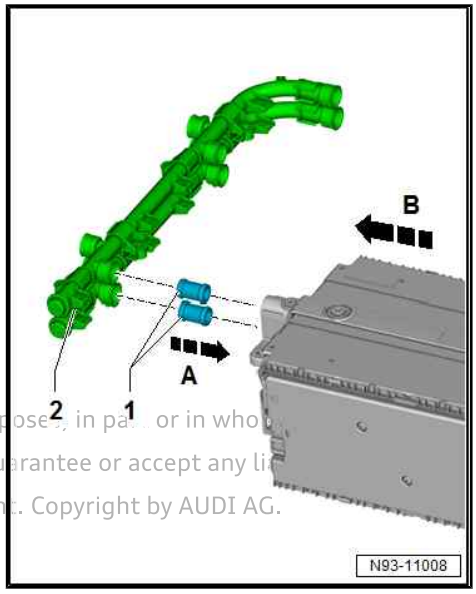
– Charge/discharge battery module 1 - J991- / battery module 2 - J992- ⇒ “4.11 Charging and discharging battery modules”, page 596 .
– Coat coolant pipe connections lightly with lithium grease before installation (⇒ Electronic parts catalogue “ETKA”).
– Insert connecting pieces -1- in module in direction of arrow -A-. Make sure that connecting pieces are fitted in parallel in module.
– Guide module carefully onto coolant pipe connections in direction of arrow -B-. Position connecting pieces centrally in tapered guide on coolant pipes.

– Slide module in direction of arrow -B-. Connect module and coolant pipe.

– After fitting a connecting cable for battery module, measure it against housing to check for short-circuits.

Tightening torques

♦ ⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587



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4.19 Removing and installing battery module 3 - J993- / battery module 4 - J994-

DANGER

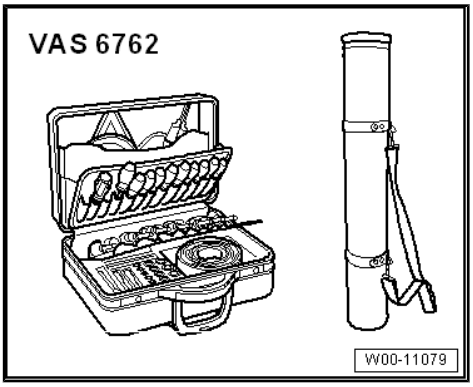
High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**

Special tools and workshop equipment required

♦ High-voltage tool set - VAS 6762-



♦ High-voltage tool set, Torx, 3/8 inch - VAS 691 003-

♦ Torque wrench - VAS 6883/1-

♦ Contact protection cap - T10544-

Removing

• New battery modules must be charged or discharged to the mean cell voltage level determined previously ⇒ “4.11 Charging and discharging battery modules”, page 596 .

– Remove battery module assembly ⇒ “4.14 Removing and installing battery module assembly”, page 603 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **The following steps require a second suitably qualified person to be present to supervise.**
- **The second person may only assist the high-voltage expert where required to the extent of his/her qualification.**
- **Persons without the appropriate qualification are not permitted to work actively on an open battery.**
- **Always follow country-specific laws and regulations (e.g. first aid training).**

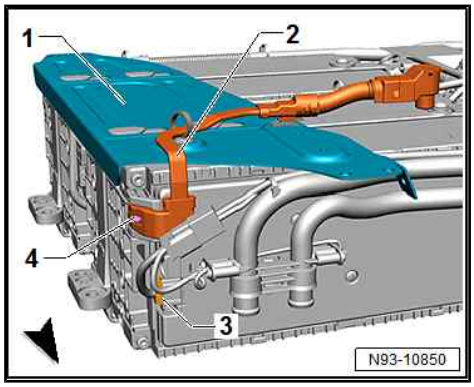
DANGER

High voltage can cause fatal injury.

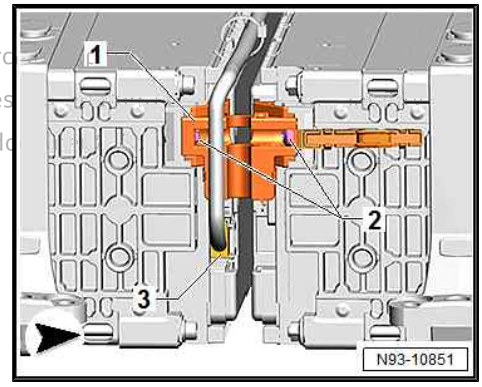
Danger of severe or fatal injury from electric shock or electric arcs.

- **Wear clothing approved for working with electric arcs.**
- **Wear a helmet with a protective mask.**
- **Wear insulating protective gloves.**
- **Wear safety shoes with ESD protection.**
- **The protective clothing and components must be dry.**

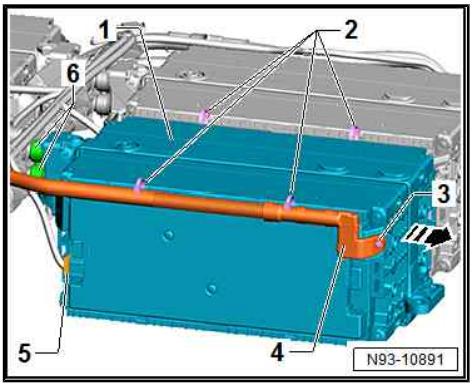
- Remove bolt -4- for connecting cable 1 for battery module - P26- -2- at battery module 1 - J991- .
- Disconnect connecting cable 1 for battery module - P26- -2- from battery module 1 - J991- ; do not unfasten cable tie.
- Detach cross member -1- outwards from battery modules.
- Fit contact protection cap - T10544- on high-voltage connection at battery module 1 - J991- .



- Release and unplug electrical connector -3- at battery module 3 - J993- .
- Open flap at connecting cable 3 for battery module - P28- -1- between battery module 2 - J992- and battery module 3 - J993- .
- Remove bolts -2- for connecting cable 3 for battery module - P28- -1-.
- Disconnect connecting cable 3 for battery module - P28- -1- from battery modules.
- Fit contact protection caps -T10544- on high-voltage connections at battery module 2 - J992- and battery module 3 - J993- .



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- Remove bolt -3- for connecting cable 5 for battery module - P30- -4- on battery module 3 - J993- / battery module 4 - J994- -1-.
- Disconnect connecting cable 5 for battery module - P30- -4- from battery module 3 - J993- / battery module 4 - J994- -1-.
- Fit contact protection cap - T10544- on high-voltage connection at battery module 3 - J993- / battery module 4 - J994- -1-.
- Cut open cable tie -2-.
- Release and unplug electrical connector -5- at battery module 3 - J993- / battery module 4 - J994- -1-.
- Place a sufficient number of cloths underneath coolant connections -6- to catch escaping coolant.
- Carefully pull battery module 3 - J993- / battery module 4 - J994- -1- outwards -arrow- off coolant connections -6- and remove.
- Remove connecting cable 4 for battery module - P29-
⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587 .

Installing

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

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Note

If a new battery module is being installed, it is essential to adjust the charge level using the module balancing device - VAS 6910- and the autonomous software - VAS 6910/5- .

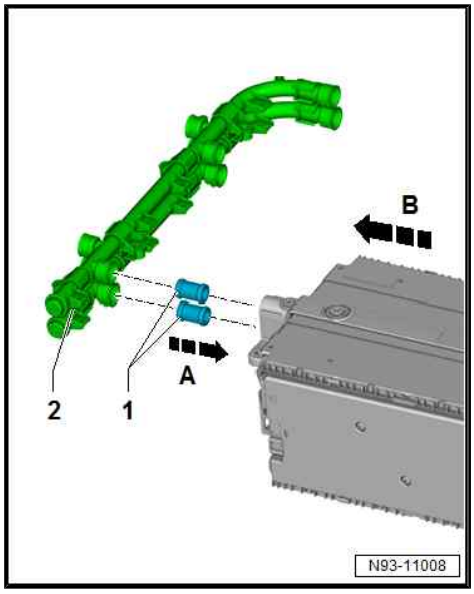
- Charge/discharge battery module 3 - J993- / battery module 4 - J994-
⇒ “4.11 Charging and discharging battery modules”, page 596 .
- Coat coolant pipe connections lightly with lithium grease before installation (⇒ Electronic parts catalogue “ETKA”).
- Insert connecting pieces -1- in module in direction of arrow -A-. Make sure that connecting pieces are fitted in parallel in module.
- Guide module carefully onto coolant pipe connections in direction of arrow -B-. Position connecting pieces centrally in tapered guide on coolant pipes.

– Slide module in direction of arrow -B-. Connect module and coolant pipe.

– After fitting a connecting cable for battery module, measure it against housing to check for short-circuits.

Tightening torques

♦ ⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587



4.20 Removing and installing battery module 5 - J995- / battery module 6 - J996-

DANGER

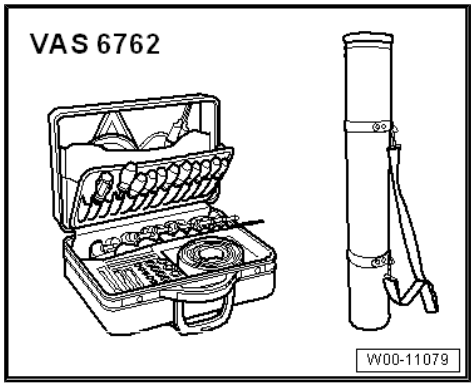
High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

– Repair work on the high-voltage battery must only be performed by a suitably qualified technician.

Special tools and workshop equipment required

♦ High-voltage tool set - VAS 6762-



♦ High-voltage tool set, Torx, 3/8 inch - VAS 691 003-

♦ Torque wrench - VAS 6883/1-

♦ Contact protection cap - T10544-

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Removing

• New battery modules must be charged or discharged to the mean cell voltage level determined previously ⇒ “4.11 Charging and discharging battery modules”, page 596 .

– Remove battery module assembly ⇒ “4.14 Removing and installing battery module assembly”, page 603 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **The following steps require a second suitably qualified person to be present to supervise.**
- **The second person may only assist the high-voltage expert where required to the extent of his/her qualification.**
- **Persons without the appropriate qualification are not permitted to work actively on an open battery.**
- **Always follow country-specific laws and regulations (e.g. first aid training).**

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

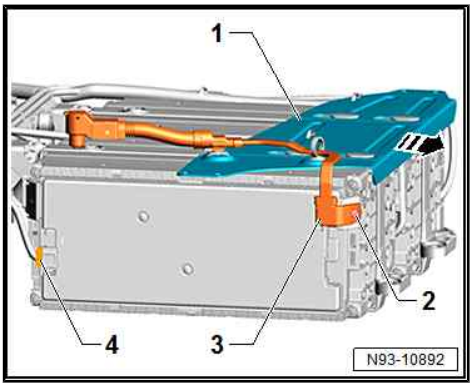
- **Wear clothing approved for working with electric arcs.**
- **Wear a helmet with a protective mask.**
- **Wear insulating protective gloves.**
- **Wear safety shoes with ESD protection.**
- **The protective clothing and components must be dry.**

– Remove bolt -2- for connecting cable 9 for battery module - P34- -3- at battery module 8 - J998- .

– Disconnect connecting cable 9 for battery module - P34- -3- from battery module 8 - J998- ; do not unfasten cable tie.

– Detach cross member -1- outwards -arrow- from battery modules.

– Fit contact protection cap - T10544- on high-voltage connection at battery module 8 - J998- .



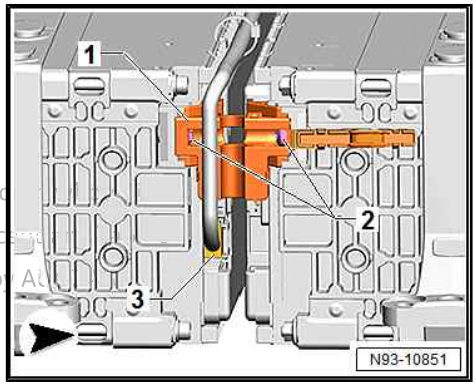
– Release and unplug electrical connector -3- at battery module 7 - J997- .

– Open flap at connecting cable 7 for battery module - P32- -1- between battery module 6 - J996- and battery module 7 - J997- .

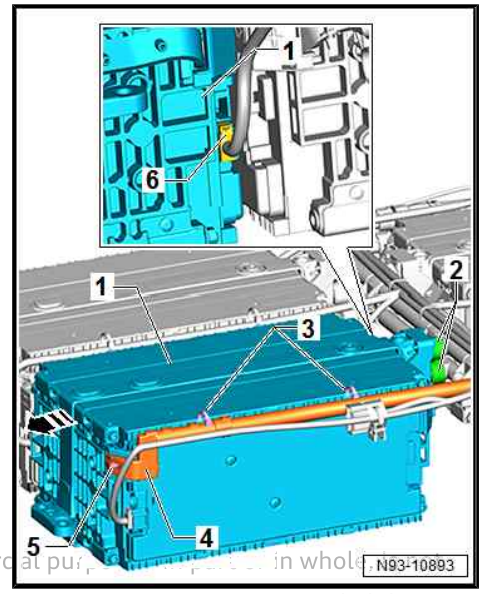
– Remove bolts -2- for connecting cable 7 for battery module - P32- -1-.

– Disconnect connecting cable 7 for battery module - P32- -1- from battery modules.

– Fit contact protection caps -T10544- on high-voltage connections at battery module 6 - J996- and battery module 7 - J997- .



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- Remove bolt -5- for connecting cable 5 for battery module - P30- -4- on battery module 5 - J995- / battery module 6 - J996- -1-.
- Disconnect connecting cable 5 for battery module - P30- -4- from battery module 5 - J995- / battery module 6 - J996- -1-.
- Fit contact protection cap - T10544- on high-voltage connection at battery module 5 - J995- / battery module 6 - J996- -1-.
- Release and unplug electrical connector at battery module 5 - J995- .
- Cut open cable tie -3-.
- Place a sufficient number of cloths underneath coolant connections -2- to catch escaping coolant.
- Carefully pull battery module 5 - J995- / battery module 6 - J996- -1- outwards -arrow- off coolant connections -2- until electrical connector -6- is accessible.
- Release and unplug electrical connector -6- at battery module 6 - J996- .
- Remove battery module 5 - J995- / battery module 6 - J996- -1-.
- Remove connecting cable 6 for battery module - P31-
⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587 .

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Installing

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

Note

If a new battery module is being installed, it is essential to adjust the charge level using the module balancing device - VAS 6910- and the autonomous software - VAS 6910/5- .

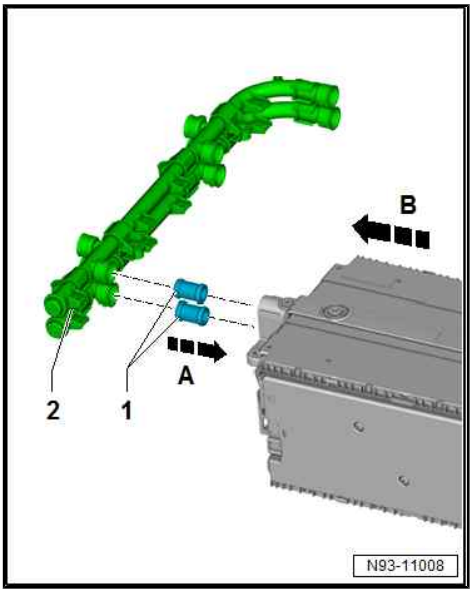
- Charge/discharge battery module 5 - J995- / battery module 6 - J996-
⇒ “4.11 Charging and discharging battery modules”, page 596 .
- Coat coolant pipe connections lightly with lithium grease before installation (⇒ Electronic parts catalogue “ETKA”).
- Insert connecting pieces -1- in module in direction of arrow -A-. Make sure that connecting pieces are fitted in parallel in module.
- Guide module carefully onto coolant pipe connections in direction of arrow -B-. Position connecting pieces centrally in tapered guide on coolant pipes.

– Slide module in direction of arrow -B-. Connect module and coolant pipe.

– After fitting a connecting cable for battery module, measure it against housing to check for short-circuits.

Tightening torques

♦ ⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587



4.21 Removing and installing battery module 7 - J997- / battery module 8 - J998-

DANGER

High voltage can cause fatal injury.

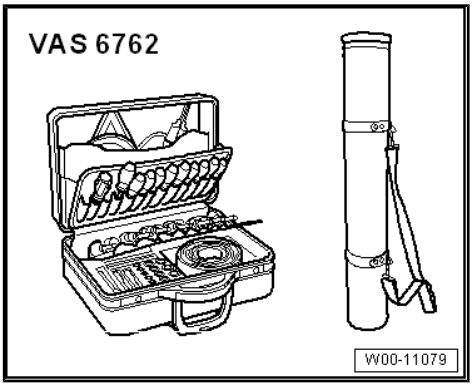
Danger of severe or fatal injury from electric shock or electric arcs.

– **Repair work on the high-voltage battery must only be performed by a suitably qualified technician.**

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Special tools and workshop equipment required

♦ High-voltage tool set - VAS 6762-



♦ High-voltage tool set, Torx, 3/8 inch - VAS 691 003-

♦ Torque wrench - VAS 6883/1-

♦ Contact protection cap - T10544-

Removing

• New battery modules must be charged or discharged to the mean cell voltage level determined previously ⇒ “4.11 Charging and discharging battery modules”, page 596 .

– Remove battery module assembly ⇒ “4.14 Removing and installing battery module assembly”, page 603 .

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **The following steps require a second suitably qualified person to be present to supervise.**
- **The second person may only assist the high-voltage expert where required to the extent of his/her qualification.**
- **Persons without the appropriate qualification are not permitted to work actively on an open battery.**
- **Always follow country-specific laws and regulations (e.g. first aid training).**

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injury from electric shock or electric arcs.

- **Wear clothing approved for working with electric arcs.**
- **Wear a helmet with a protective mask.**
- **Wear insulating protective gloves.**
- **Wear safety shoes with ESD protection.**
- **The protective clothing and components must be dry.**

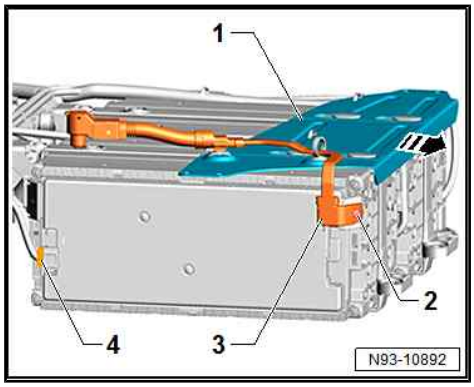
– Remove bolt -2- for connecting cable 9 for battery module - P34- -3- at battery module 8 - J998- .

– Disconnect connecting cable 9 for battery module - P34- -3- from battery module 8 - J998- ; do not unfasten cable tie.

– Detach cross member -1- outwards -arrow- from battery modules.

– Fit contact protection cap - T10544- on high-voltage connection at battery module 8 - J998- .

– Release and unplug electrical connector -4- at battery module 8 - J998- .



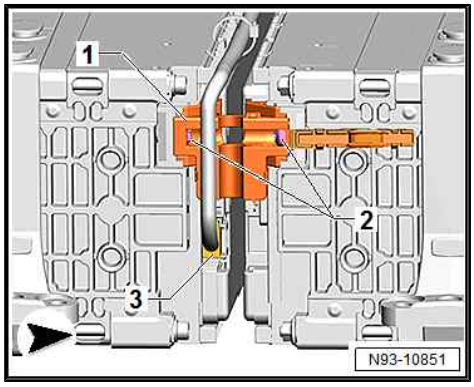
– Release and unplug electrical connector -3- at battery module 7 - J997- .

– Open flap at connecting cable 7 for battery module - P32- -1- between battery module 6 - J996- and battery module 7 - J997- .

– Remove bolts -2- for connecting cable 7 for battery module - P32- -1-.

– Disconnect connecting cable 7 for battery module - P32- -1- from battery modules.

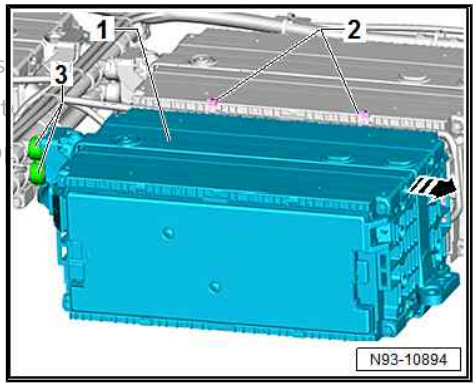
– Fit contact protection caps -T10544- on high-voltage connections at battery module 6 - J996- and battery module 7 - J997- .



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– Cut open cable tie -2-.
– Place a sufficient number of cloths underneath coolant connections -3- to catch escaping coolant.
– Carefully pull battery module 7 - J997- / battery module 8 - J998- -1- outwards -arrow- off coolant connections -2- and remove.
– Remove connecting cable 8 for battery module - P33- ⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587 .



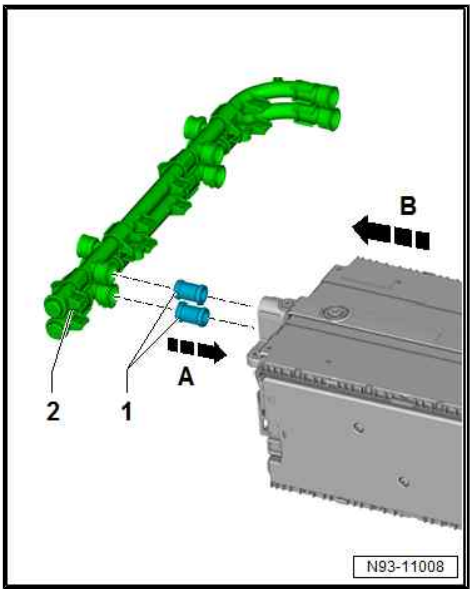
Installing

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

Note

If a new battery module is being installed, it is essential to adjust the charge level using the module balancing device - VAS 6910- and the autonomous software - VAS 6910/5- .

– Charge/discharge battery module 7 - J997- / battery module 8 - J998- ⇒ “4.11 Charging and discharging battery modules”, page 596 .
– Coat coolant pipe connections lightly with lithium grease before installation (⇒ Electronic parts catalogue “ETKA”).
– Insert connecting pieces -1- in module in direction of arrow -A-. Make sure that connecting pieces are fitted in parallel in module.
– Guide module carefully onto coolant pipe connections in direction of arrow -B-. Position connecting pieces centrally in tapered guide on coolant pipes.
– Slide module in direction of arrow -B-. Connect module and coolant pipe.
– After fitting a connecting cable for battery module, measure it against housing to check for short-circuits.



Tightening torques

♦ ⇒ “4.3 Overview of fitting locations - high-voltage connecting brackets”, page 587

5 Power and control electronics for electric drive

⇒ “5.1 Exploded view - power and control electronics for electric drive”, page 630

⇒ “5.2 Exploded view - bracket for power and control electronics for electric drive”, page 635

⇒ “5.3 Removing and installing power and control electronics for electric drive”, page 638

⇒ “5.4 Removing and installing bracket for power and control electronics for electric drive JX1 ”, page 650

⇒ “5.5 Removing and installing high-voltage system fuse 3 S353 ”, page 651

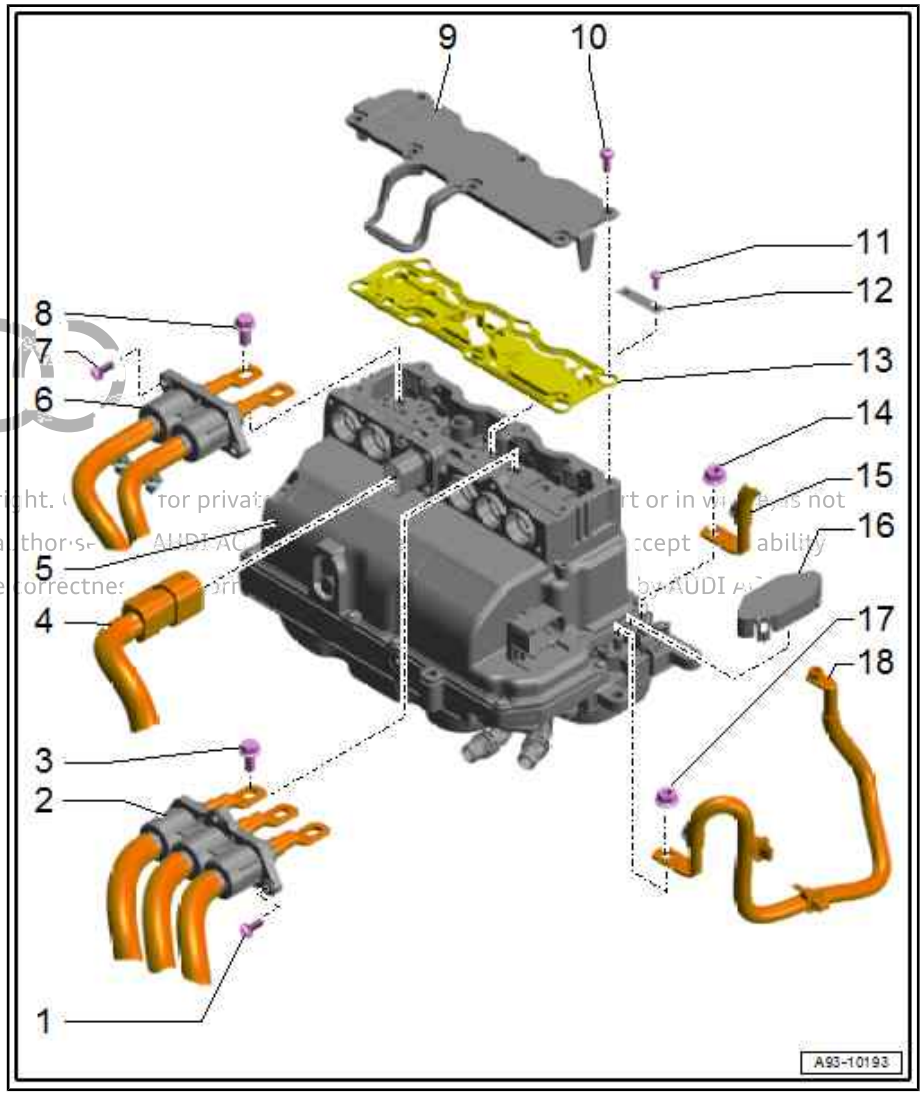
5.1 Exploded view - power and control electronics for electric drive

⇒ “5.1.1 Exploded view - power and control electronics for electric drive, vehicles up to model year 2016”, page 630

⇒ “5.1.2 Exploded view - power and control electronics for electric drive, vehicles from model year 2017 onwards”, page 633

5.1.1 Exploded view - power and control electronics for electric drive, vehicles up to model year 2016

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1 - Bolt

- ❑ 3x
- ❑ Tightening torque and sequence ⇒ Item 8 (page 666)

2 - High-voltage wiring harness for drive motor - PX2-

- ❑ Leading to electric drive motor - V141-
- ❑ Overview of fitting locations ⇒ “8.1.3 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, drive motor”, page 666

3 - Bolt

- ❑ 3x
- ❑ Tightening torque ⇒ Item 9 (page 666)

4 - High-voltage wire for high-voltage battery charging unit - P25-

- ❑ To charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-
- ❑ Overview of fitting locations ⇒ “8.1.1 Overview of fitting locations - high-voltage wires, charging unit”, page 663

5 - Power and control electronics for electric drive - JX1-

- ❑ Removing and installing ⇒ “5.3.1 Removing and installing power and control electronics for electric drive - vehicles up to model year 2016”, page 638

6 - High-voltage wiring harness for high-voltage battery - PX1-

- ❑ To hybrid battery unit - AX1-
- ❑ Overview of fitting locations ⇒ “8.1.2 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, high-voltage battery”, page 665

7 - Bolt

- ❑ 2x
- ❑ Tightening torque ⇒ Item 3 (page 665)

8 - Bolt

- ❑ 2x
- ❑ Tightening torque ⇒ Item 4 (page 665)

9 - Cover

10 - Bolt

- ❑ Renew after removing
- ❑ 7x
- ❑ Observe tightening torque and sequence ⇒ Fig. ““Lid - tightening torque and sequence”“ , page 632

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11 - Bolt

- ❑ 2x
- ❑ 2.7 Nm

12 - High-voltage system fuse 3 - S353-

- ❑ Removing and installing
  ⇒ “5.5.1 Removing and installing high-voltage system fuse 3 S353 - vehicles up to model year 2016”, page 651

13 - Contact protection

- ❑ With gasket
- ❑ Renew after removing

14 - Nut

- ❑ 20 Nm

15 - B- wire

16 - Cover

17 - Nut

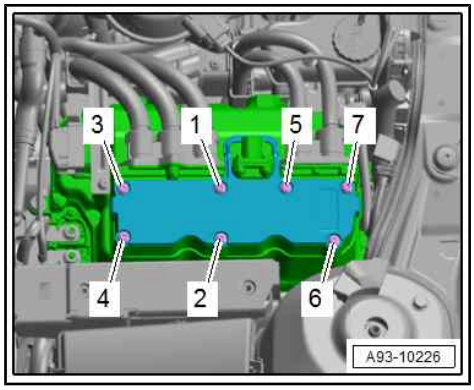
- ❑ 20 Nm

18 - B+ wire

- ❑ Tighten nut to 6 Nm

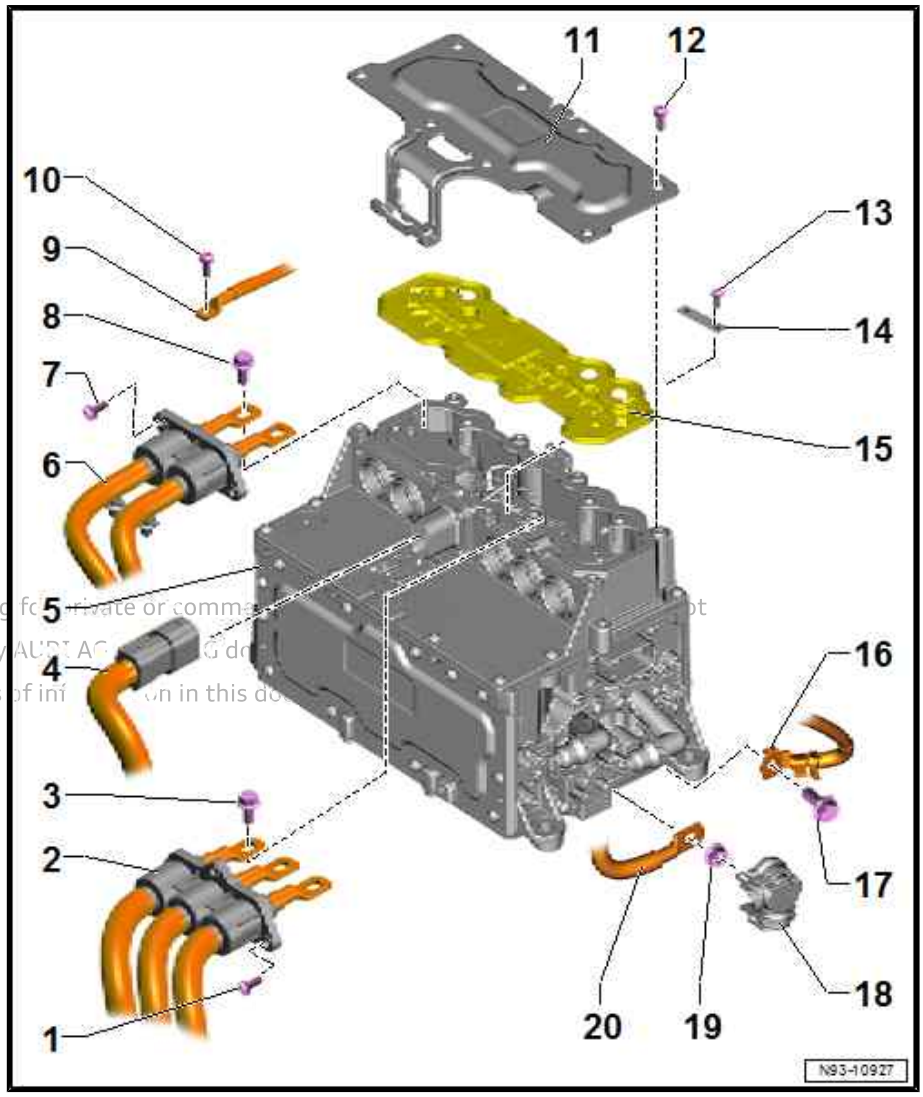
Lid - tightening torque and sequence

– Tighten bolts to 7 Nm in the sequence shown.



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5.1.2 Exploded view - power and control electronics for electric drive, vehicles from model year 2017 onwards



1 - Bolt

- ❑ 3x
- ❑ Tightening torque and sequence ⇒ Item 8 (page 666)

2 - High-voltage wiring harness for drive motor - PX2-

- ❑ Leading to electric drive motor - V141-
- ❑ Overview of fitting locations ⇒ “8.1.3 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, drive motor”, page 666

3 - Bolt

- ❑ 3x
- ❑ Tightening torque ⇒ Item 9 (page 666)

4 - High-voltage wire for high-voltage battery charging unit - P25-

- ❑ To charging unit 1 for high-voltage battery - AX4-
- ❑ Overview of fitting locations ⇒ “8.1.1 Overview of fitting locations - high-voltage wires, charging unit”, page 663

5 - Power and control electronics for electric drive - JX1-

- ❑ Removing and installing ⇒ “5.3.2 Removing and installing power and control electronics for electric drive - vehicles from model year 2017 onwards”, page 643

6 - High-voltage wiring harness for high-voltage battery - PX1-

- ❑ To hybrid battery unit - AX1-
- ❑ Overview of fitting locations ⇒ “8.1.2 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, high-voltage battery”, page 665

7 - Bolt

- ❑ 2x
- ❑ Tightening torque ⇒ Item 3 (page 665)

8 - Bolt

- ❑ 2x
- ❑ Tightening torque ⇒ Item 4 (page 665)

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9 - Not fitted

10 - Not fitted

11 - Cover

12 - Bolt

- ❑ Renew after removing
- ❑ 8x
- ❑ Observe tightening torque and sequence ⇒ Fig. ""Lid - tightening torque and sequence"" , page 634

13 - Bolt

- ❑ 2x
- ❑ 2.7 Nm

14 - High-voltage system fuse 3 - S353-

- ❑ Removing and installing
  ⇒ "5.5.2 Removing and installing high-voltage system fuse 3 S353 - vehicles from model year 2017 onwards)", page 653

15 - Contact protection

- ❑ With gasket
- ❑ Renew after removing

16 - B- wire

17 - Bolt

- ❑ 20 Nm

18 - Cover

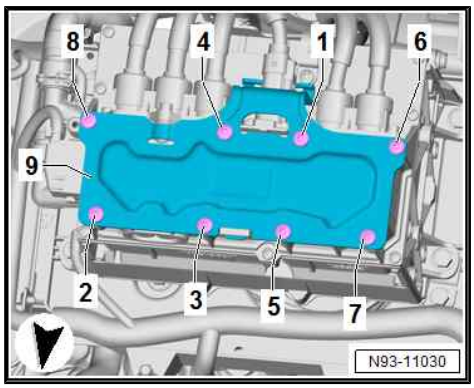
19 - Nut

- ❑ 20 Nm

20 - B+ wire

Lid - tightening torque and sequence

– Tighten bolts to 6 Nm in the sequence shown.



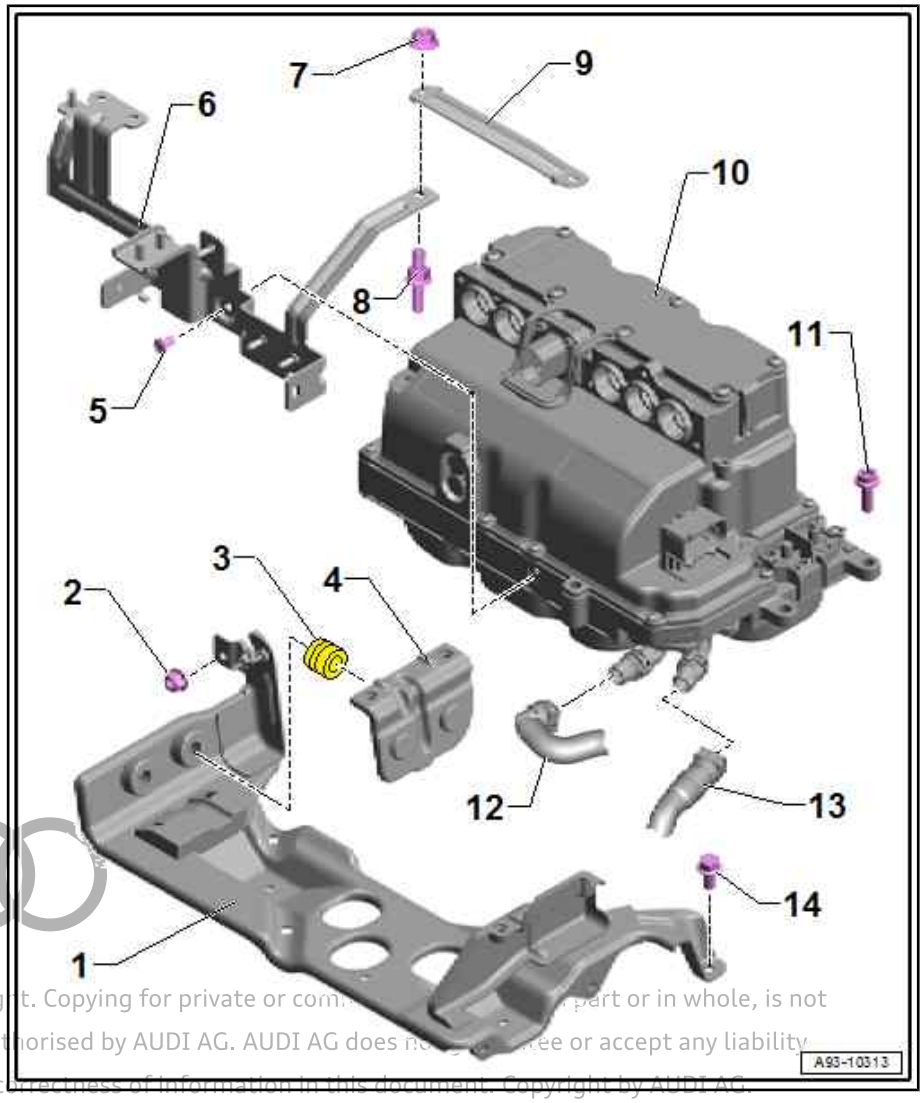
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5.2 Exploded view - bracket for power and control electronics for electric drive

⇒ “5.2.1 Exploded view - bracket for power and control electronics for electric drive, vehicles up to model year 2016”, page 635

⇒ “5.2.2 Exploded view - bracket for power and control electronics for electric drive, vehicles from model year 2017 onwards”, page 637

5.2.1 Exploded view - bracket for power and control electronics for electric drive, vehicles up to model year 2016



1 - Bracket

- For power and control electronics for electric drive - JX1-
- Removing and installing ⇒ “5.4.1 Removing and installing bracket for power and control electronics for electric drive JX1 - vehicles up to model year 2016”, page 650

2 - Nut

- Observe tightening torque and sequence ⇒ Fig. ““Bracket for power and control electronics for electric drive - tightening torque and sequence”“ , page 636

3 - Grommet

- 2x

4 - Bracket

5 - Bolt

- 2x
- 8 Nm

6 - Bracket

- For attachments

7 - Nut

- 8 Nm

8 - Centre hex stud

- 8 Nm

9 - Support

10 - Power and control electronics for electric drive - JX1-

- Removing and installing ⇒ “5.3.1 Removing and installing power and control electronics for electric drive - vehicles up to model year 2016”, page 638

11 - Bolt

- 4x
- 20 Nm

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12 - Coolant pipe

13 - Coolant pipe

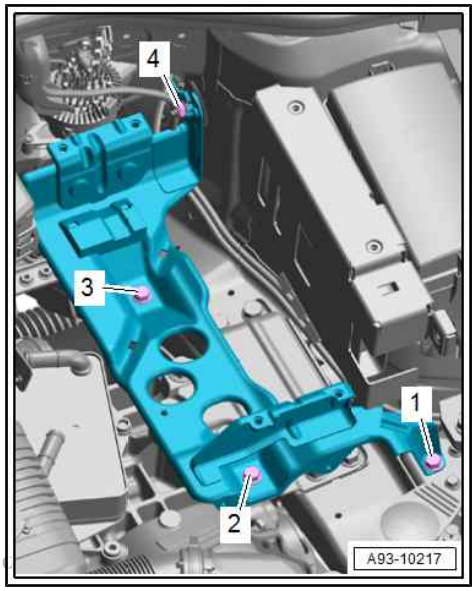
14 - Bolt

- ❑ 3x
- ❑ Observe tightening torque and sequence
  ⇒ Fig. ““Bracket for power and control electronics for electric drive - tightening torque and sequence”“ , page 636

Bracket for power and control electronics for electric drive - tightening torque and sequence

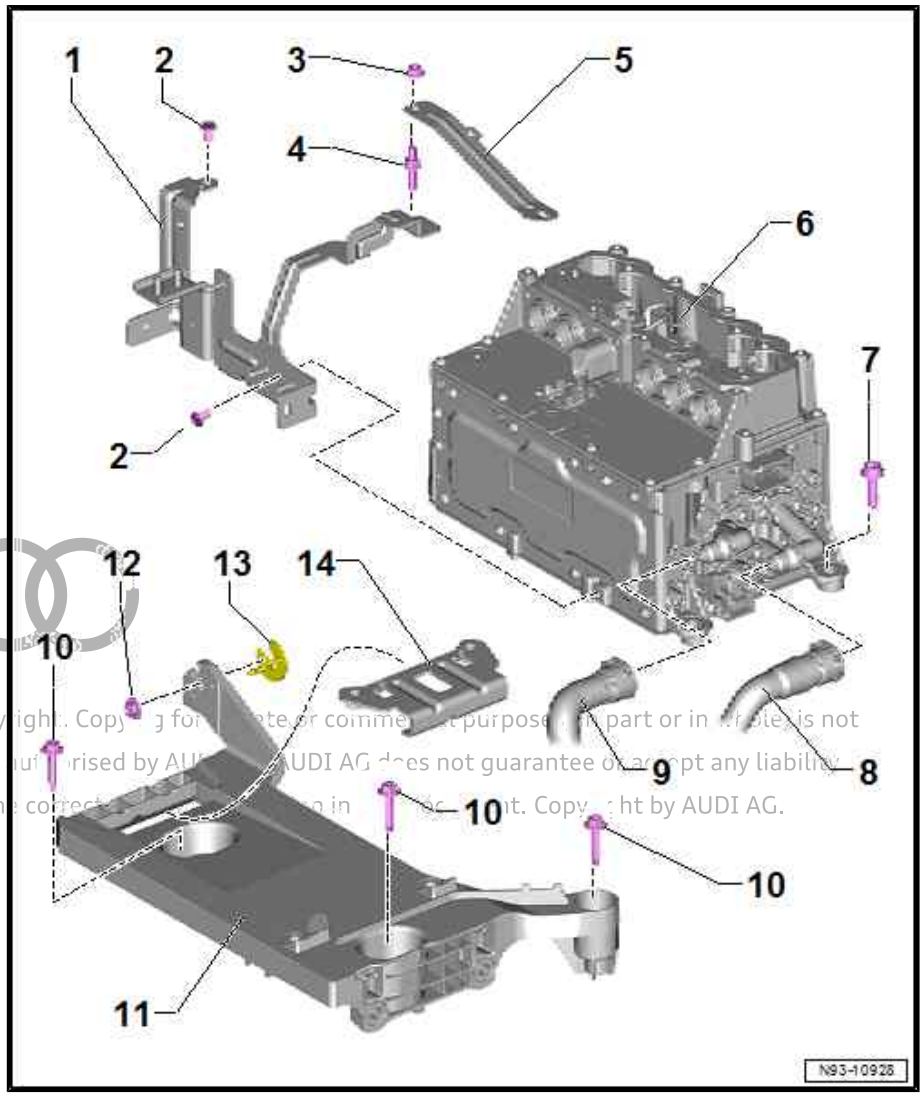
– Tighten bolts in stages in the sequence shown:

Stage	Bolts/nuts	Tightening torque
1.	-4-	Screw in by hand until contact is made
2.	-1 … 4-	9 Nm



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5.2.2 Exploded view - bracket for power and control electronics for electric drive, vehicles from model year 2017 onwards



1 - Bracket

- ❑ For attachments

2 - Bolt

- ❑ 2x
- ❑ 8 Nm

3 - Nut

- ❑ 8 Nm

4 - Centre hex stud

- ❑ 8 Nm

5 - Support

6 - Power and control electronics for electric drive - JX1-

- ❑ Removing and installing ⇒ “5.3.2 Removing and installing power and control electronics for electric drive - vehicles from model year 2017 onwards”, page 643

7 - Bolt

- ❑ 4x
- ❑ 20 Nm

8 - Coolant pipe

9 - Coolant pipe

10 - Bolt

- ❑ 3x
- ❑ Observe tightening torque and sequence ⇒ Fig. ““Bracket for power and control electronics for electric drive - tightening torque and sequence”“ , page 638

11 - Base bracket

- ❑ For power and control electronics for electric drive - JX1-
- ❑ Removing and installing ⇒ “5.4.2 Removing and installing bracket for power and control electronics for electric drive JX1 - vehicles from model year 2017 onwards”, page 650

12 - Nut

- ❑ Observe tightening torque and sequence ⇒ Fig. ““Bracket for power and control electronics for electric drive - tightening torque and sequence”“ , page 638

13 - Grommet

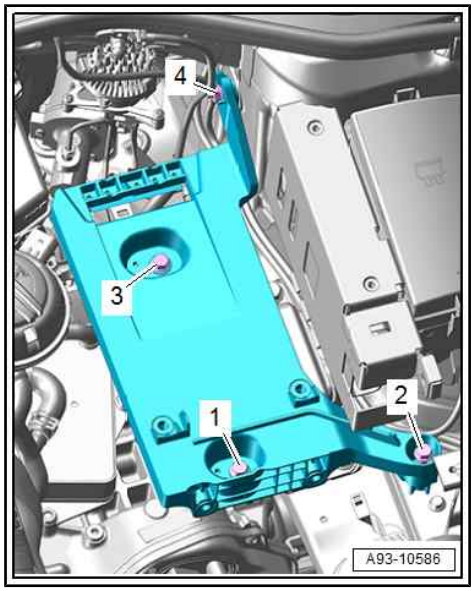
14 - Bracket

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Bracket for power and control electronics for electric drive - tightening torque and sequence

– Tighten bolts in stages in the sequence shown:

Stage	Bolts/nuts	Tightening torque
1.	-4-	Screw in by hand until contact is made
2.	-1 … 4-	9 Nm



5.3 Removing and installing power and control electronics for electric drive

⇒ “5.3.1 Removing and installing power and control electronics for electric drive - vehicles up to model year 2016”, page 638

⇒ “5.3.2 Removing and installing power and control electronics for electric drive - vehicles from model year 2017 onwards”, page 643

5.3.1 Removing and installing power and control electronics for electric drive - vehicles up to model year 2016

– If renewing the control unit, select the “Replace control unit” function for the appropriate control unit ⇒ Vehicle diagnostic tester.

Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– **Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.**

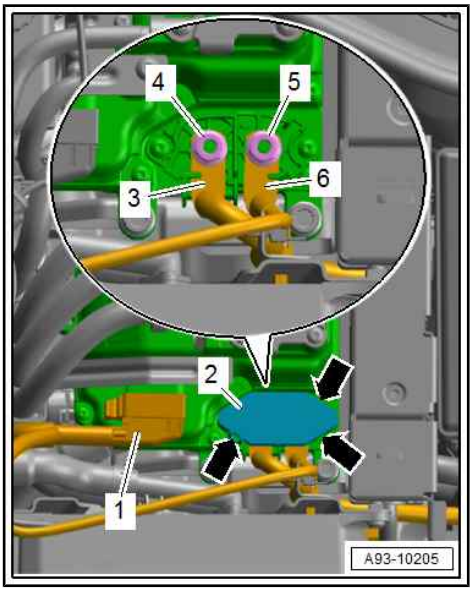
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– De-energise high-voltage system ⇒ “10 De-energising high-voltage system”, page 689 .

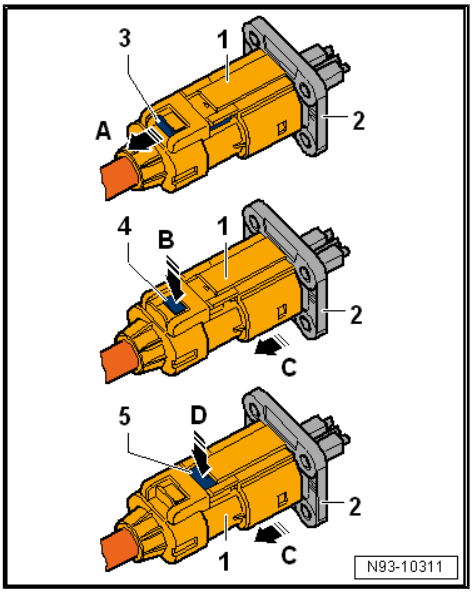
– With ignition switched off, disconnect earth cable at 12 Volt battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

– Drain cooling system (cooling components for high-voltage system, front) ⇒ “1.3.2 Draining cooling system - cooling components for high-voltage system (front)”, page 323 .

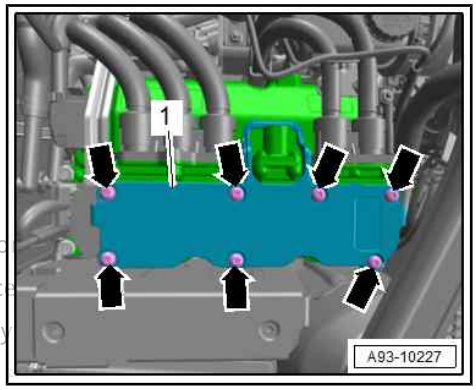
– Release fasteners -arrows- and detach cover -2-.
– Remove nuts -4, 5- and detach earth cable -6- and positive cable -3-.
– Unplug electrical connector -1-.



– Pull out locking element -3- -arrow A- to disconnect high-voltage wire.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.

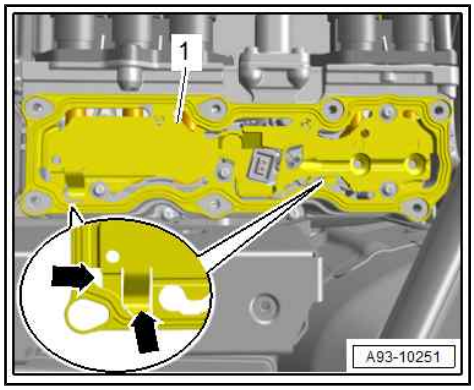


– Remove bolts -arrows-.
– Detach cover -1-.

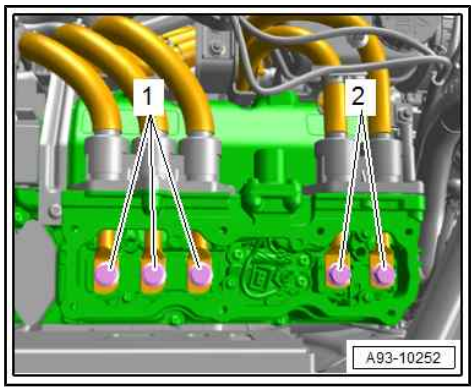


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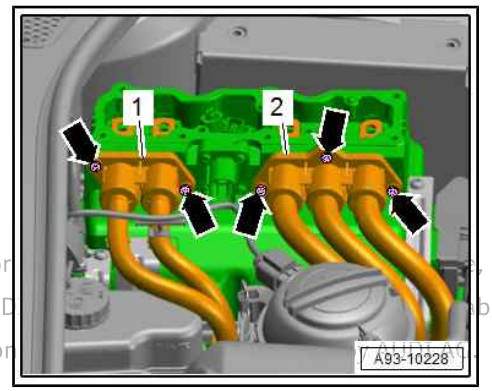
– Release fasteners -arrows- and unclip and detach contact protection -1-.



– Remove bolts -1, 2-.

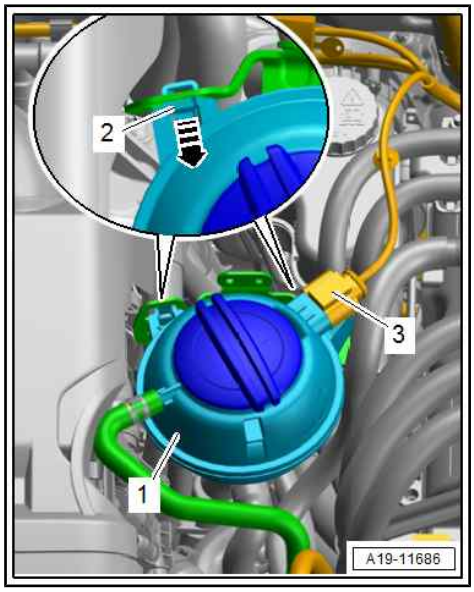


– Remove bolts -arrows-.
– Pull out high-voltage wiring harness for high-voltage battery - PX1- -item 1- and high-voltage wiring harness for drive motor - PX2- -item 2- and move them clear.
– Put cover back on power and control electronics for electric drive - JX1- and secure with two bolts.

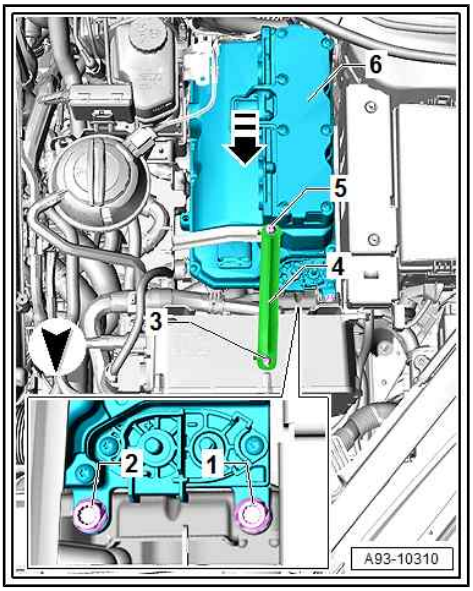


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– Unplug electrical connector -3-.
– Release fasteners -2- with a small screwdriver -arrow- and disengage coolant expansion tank -1- from bracket.



– If fitted, remove support -4-. To do so, unscrew bolt -3- and nut -5-.
– Remove bolts -1, 2-.
– Raise power and control electronics for electric drive -6- slightly at front and pull out of grommets at rear -arrow-.
– Take power and control electronics for electric drive out as far as necessary until coolant lines are accessible.
– Press retaining clips on coolant lines down using a small screwdriver.
– Detach coolant lines from power and control electronics for electric drive -6- and remove power and control electronics for electric drive.



Installing

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

Note

♦ *Renew contact protection with gasket if removed.*

♦ *Clean sealing surface for cover on power and control electronics for electric drive - JX1- with silicon-free cleaning solution (⇒ Electronic parts catalogue (ETKA), Chemical Materials).*

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♦ *Take care not to damage sealing surface for cover on power and control electronics for electric drive - JX1- when doing so.*

– When renewing power and control electronics for electric drive - JX1- , renew coolant connections supplied with it before fitting.

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .
– Select and start `ODIS-Service` mode.
– Select `Special functions` tab.
– Select the following:

♦ `High-voltage`

♦ `Potential equalisation measurement on high-voltage components`

♦ `51 - Potential equalisation measurement electric drive control unit -J841`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

- **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
- **If the warning lamps for "low coolant" and "fault in high-voltage battery" light up, move the vehicle into the dedicated separate storage area outside.**
- **Inform a high-voltage expert at the importer.**

- The high-voltage battery cannot detect coolant leaking into the battery.
- The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.
- The notice on the filler cap provides an additional warning of the danger involved.
- The components of the power and control electronics for electric drive, charging unit for high-voltage battery, high-voltage heater and electric drive motor are also connected into the engine cooling system.

– Fill up with coolant
⇒ "1.3 Draining and filling cooling system", page 315 .

– If the power and control electronics for electric drive - JX1- have been renewed, they must be adapted to the immobiliser ⇒ Vehicle diagnostic tester.

– Attach sealing tag to filler cap on coolant expansion tank
⇒ page 332 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

- **Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.**

– Re-energise high-voltage system
⇒ "11 Re-energising high-voltage system", page 691 .

Tightening torques

- ⇒ "5.1.1 Exploded view - power and control electronics for electric drive, vehicles up to model year 2016", page 630
- ⇒ "5.2.1 Exploded view - bracket for power and control electronics for electric drive, vehicles up to model year 2016", page 635
- ⇒ "8.1 Overview of fitting locations - high-voltage wires", page 663
- ⇒ "12.2 Overview of fitting locations - potential equalisation lines", page 692

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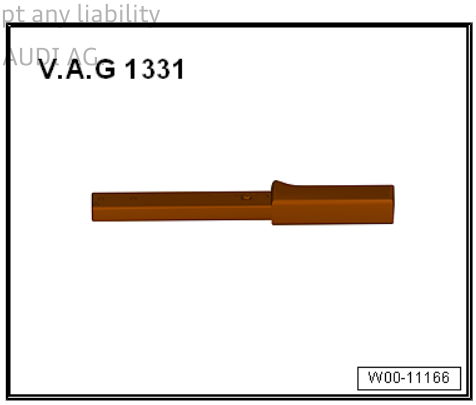
Component	Tightening torque
Coolant connection for power and control electronics for electric drive - JX1-	8.5 Nm

5.3.2 Removing and installing power and control electronics for electric drive - vehicles from model year 2017 onwards

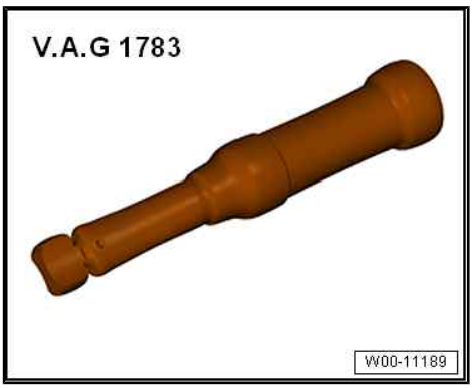
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Special tools and workshop equipment required

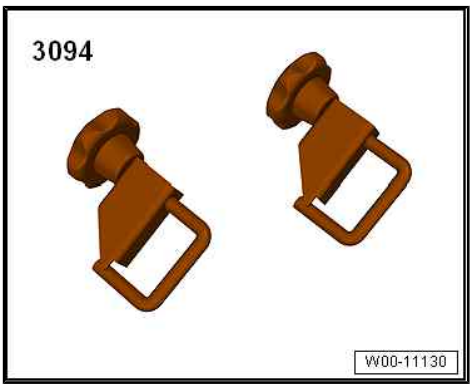
- Torque wrench - V.A.G 1331-



- Torque wrench - V.A.G 1783-



- Hose clamps up to 25 mm - 3094-



Note

If renewing the control unit, select the "Replace control unit" function for the appropriate control unit ⇒ Vehicle diagnostic tester.

Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

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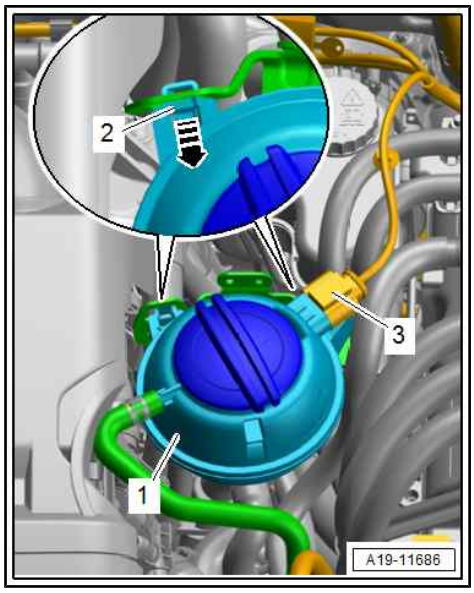
– De-energise high-voltage system ⇒ “10 De-energising high-voltage system”, page 689 .

– With ignition switched off, disconnect earth cable at battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

– Drain cooling system (cooling components for high-voltage system, front) ⇒ “1.3.2 Draining cooling system - cooling components for high-voltage system (front)”, page 323 .

– Unplug electrical connector -3- and unclip electrical wiring from high-voltage cable.

– Release fasteners -2- with a small screwdriver -arrow- and disengage coolant expansion tank -1- from bracket.

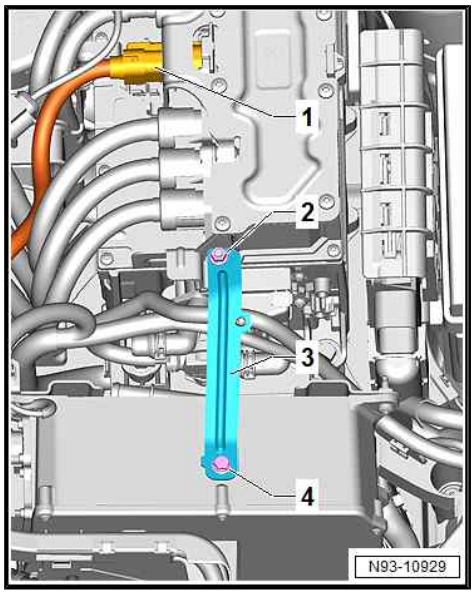


– Remove nut -2- and bolt -4-.

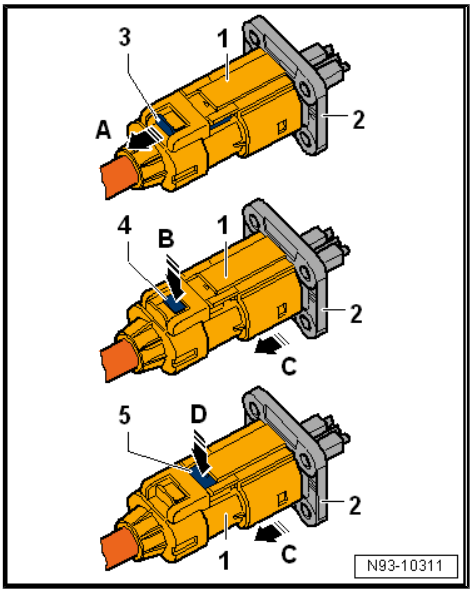
– Detach electrical wiring from support -3-.

– Remove support -3-.

– Disconnect high-voltage wire for high-voltage battery charging unit - P25- -1- from power and control electronics for electric drive - JX1- .



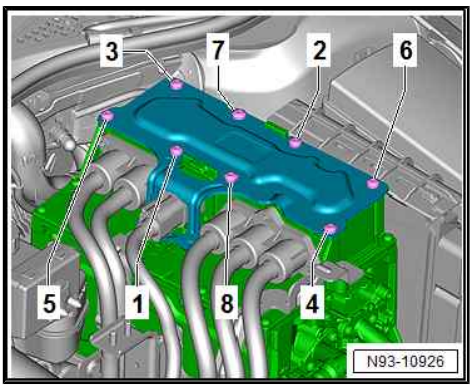
– To do so, pull out connector locking element -3- -arrow A-.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.
– Detach high-voltage wire for high-voltage battery charging unit - P25- from bracket on power and control electronics for electric drive - JX1- .



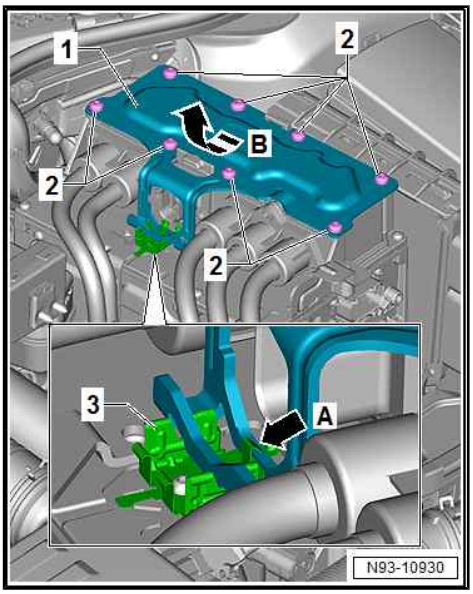
Note

The following work is required to ensure that the bolt -3- is readily accessible.

– Loosen plenum chamber cover in area of bolt -3- but do not remove completely ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

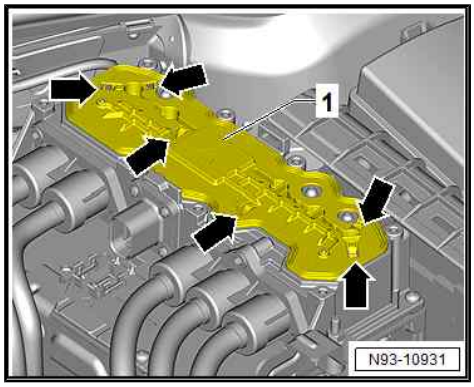


– Remove bolts -2-.
– Release fastener -arrow A-.
– Remove cover -1- from power and control electronics for electric drive - JX1- in direction of arrow -B-.

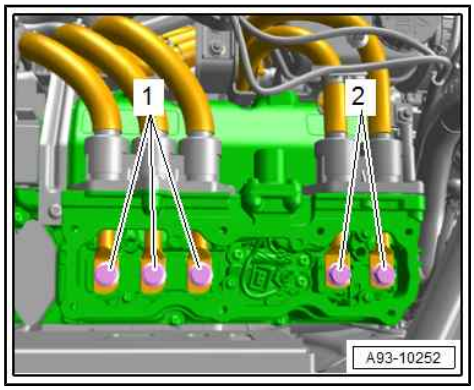


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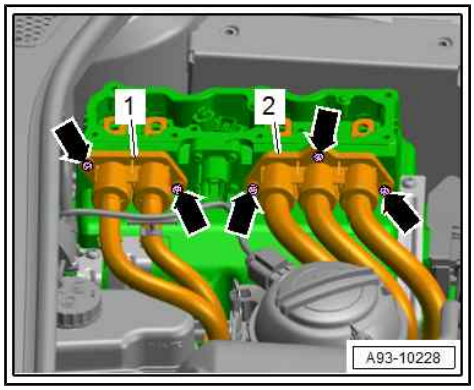
– Release fasteners -arrows-.
– Remove contact protection -1-.



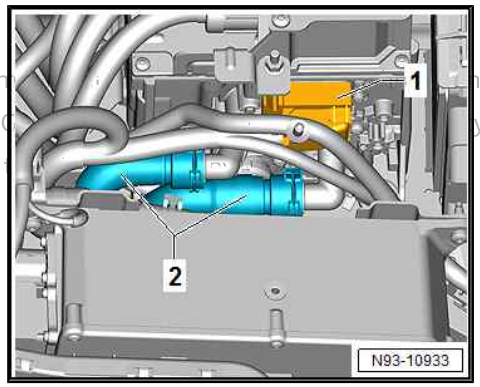
– Remove bolts -1, 2-.



– Remove bolts -arrows-.
– Pull out high-voltage wiring harness for high-voltage battery - PX1- -item 1- and high-voltage wiring harness for drive motor - PX2- -item 2- and move them clear.
– Detach high-voltage wiring harness for high-voltage battery - PX1- and high-voltage wiring harness for drive motor - PX2- from bracket on power and control electronics for electric drive - JX1- .
– Put cover back on power and control electronics for electric drive - JX1- and secure with two bolts.

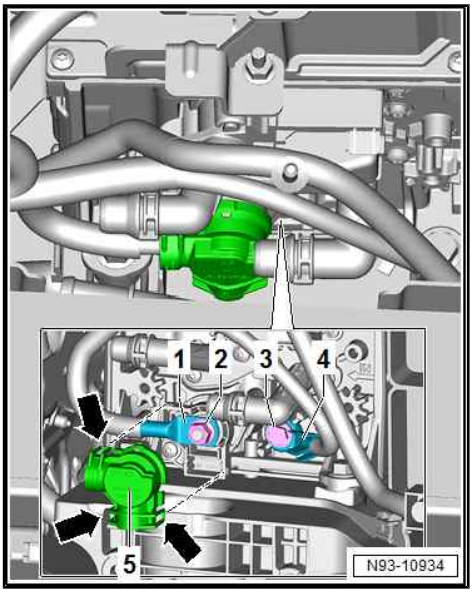


– Unplug electrical connector -1-.
– Lift retaining clips and disconnect coolant hoses -2- from power and control electronics for electric drive - JX1-.



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– Release fasteners -arrows-.
– Detach cover -5-.
– Remove nut -2-.
– Detach positive cable -1-.
– Remove bolt -3-.
– Detach earth cable -4-.

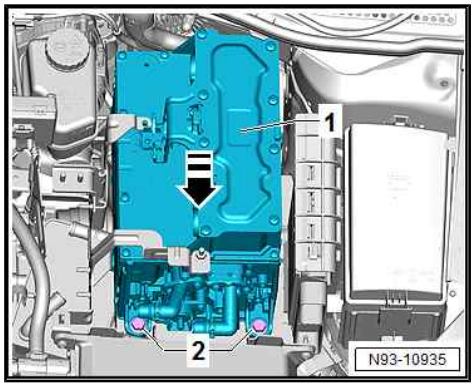


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– Remove bolts -2-.

– Lift front end of power and control electronics for electric drive - JX1- -1- slightly.

– Pull power and control electronics for electric drive - JX1- -1- out of base bracket in direction of -arrow- and remove.



Installing

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

Note

- *Renew contact protection with gasket if removed.*
- *Clean sealing surface for cover on power and control electronics for electric drive - JX1- with silicon-free cleaning solution (⇒ Electronic parts catalogue (ETKA), Chemical Materials).*
- *Take care not to damage sealing surface for cover on power and control electronics for electric drive - JX1- when doing so.*

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

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– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

- `High-voltage`
- `Potential equalisation measurement on high-voltage components`
- `51 - Potential equalisation measurement electric drive control unit -J841`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

DANGER

Danger of explosion caused by cooling system leaks in the high-voltage battery. Explosive gas mixtures can form in the battery housing.

Danger of severe injuries in the event of an explosion.

- **If the coolant level in the coolant expansion tank has dropped, do not add any coolant until the cause of the leak has been eliminated.**
- **If the warning lamps for “low coolant” and “fault in high-voltage battery” light up, move the vehicle into the dedicated separate storage area outside.**
- **Inform a high-voltage expert at the importer.**

- The high-voltage battery cannot detect coolant leaking into the battery.
- The sealing tag on the filler cap of the coolant expansion tank prevents the customer from adding coolant to the high-voltage cooling circuit independently.

- The notice on the filler cap provides an additional warning of the danger involved.
- The components of the power and control electronics for electric drive, charging unit for high-voltage battery, high-voltage heater and electric drive motor are also connected into the engine cooling system.

– Fill up with coolant
⇒ “1.3 Draining and filling cooling system”, page 315 .

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– If the power and control electronics for electric drive - JX1- have been renewed, they must be adapted to the immobiliser
⇒ Vehicle diagnostic tester.

– Attach sealing tag to filler cap on coolant expansion tank
⇒ page 332 .

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

- ⇒ “5.1.2 Exploded view - power and control electronics for electric drive, vehicles from model year 2017 onwards”, page 633
- ⇒ “5.2.2 Exploded view - bracket for power and control electronics for electric drive, vehicles from model year 2017 onwards”, page 637
- ⇒ “8.1 Overview of fitting locations - high-voltage wires”, page 663
- ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

5.4 Removing and installing bracket for power and control electronics for electric drive - JX1-

⇒ “5.4.1 Removing and installing bracket for power and control electronics for electric drive JX1 - vehicles up to model year 2016”, page 650

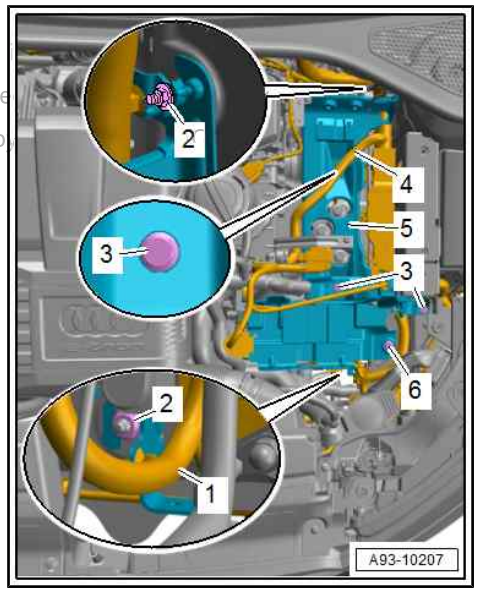
⇒ “5.4.2 Removing and installing bracket for power and control electronics for electric drive JX1 - vehicles from model year 2017 onwards”, page 650

5.4.1 Removing and installing bracket for power and control electronics for electric drive - JX1- - vehicles up to model year 2016

Removing

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– Remove charging unit for high-voltage battery ⇒ “6.2 Removing and installing charging unit 1 for high-voltage battery AX4 ”, page 658 .
– Remove power and control electronics for electric drive ⇒ “5.3.1 Removing and installing power and control electronics for electric drive - vehicles up to model year 2016”, page 638 .
– Move wiring harness -1, 4- clear.
– Remove bolts -3, 6- and nuts -2-.
– Remove bracket -5-.



If renewing bracket:

♦ Remove bracket for charging unit for high-voltage battery ⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661 .

Installing

Installation is carried out in reverse sequence.

Tightening torques

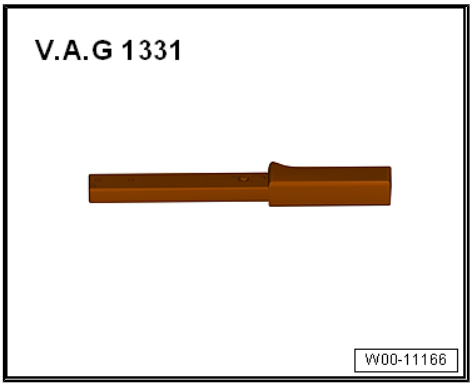
♦ ⇒ “5.2.1 Exploded view - bracket for power and control electronics for electric drive, vehicles up to model year 2016”, page 635

♦ ⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

5.4.2 Removing and installing bracket for power and control electronics for electric drive - JX1- - vehicles from model year 2017 onwards

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-



Removing

– Remove mounting bracket for charging unit 1 for high-voltage battery - AX4-
⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661 .

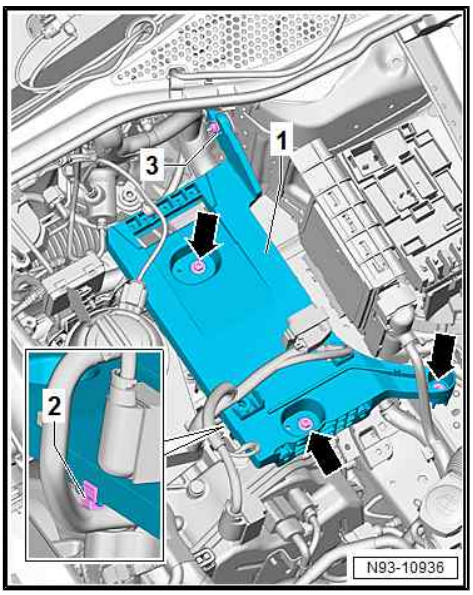
– Remove power and control electronics for electric drive
⇒ “5.3.2 Removing and installing power and control electronics for electric drive - vehicles from model year 2017 onwards”, page 643 .

– Detach bracket -2- for electrical wiring from base bracket -1-.

– Remove nut -3-.

– Remove bolts -arrows-.

– Remove base bracket -1-.



Installing

Installation is carried out in reverse sequence.

Tightening torques

- ⇒ “5.2.2 Exploded view - bracket for power and control electronics for electric drive, vehicles from model year 2017 onwards”, page 637
- ⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

5.5 Removing and installing high-voltage system fuse 3 - S353-

⇒ “5.5.1 Removing and installing high-voltage system fuse 3 S353 - vehicles up to model year 2016”, page 651

⇒ “5.5.2 Removing and installing high-voltage system fuse 3 S353 - vehicles from model year 2017 onwards)”, page 653

5.5.1 Removing and installing high-voltage system fuse 3 - S353- - vehicles up to model year 2016

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Note:

High-voltage system fuse 3 - S353- is also used by high-voltage heater (PTC) - Z115- and charging unit 1 for high-voltage battery - AX4- .

Removing

DANGER

High voltage can cause fatal injury.

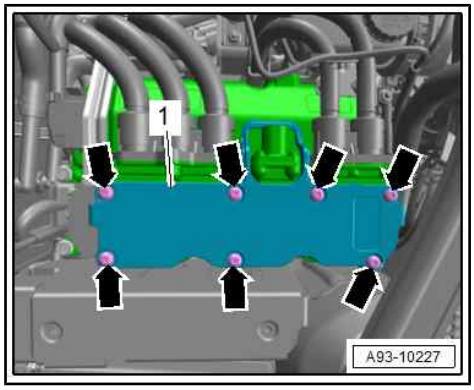
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

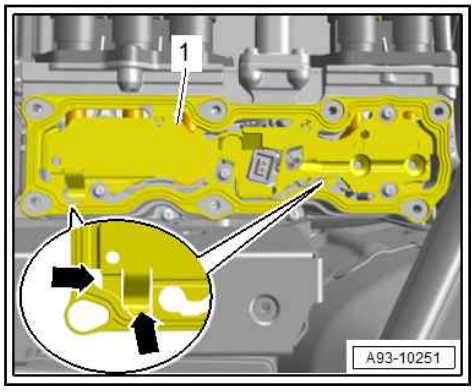
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove bolts -arrows-.

– Detach cover -1-.

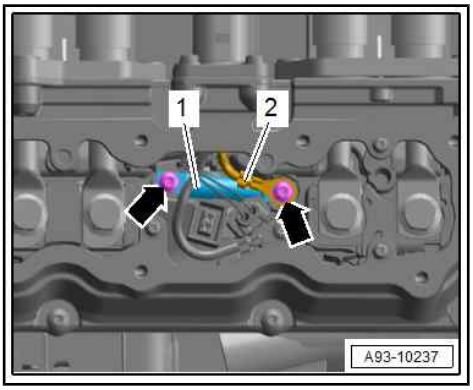


– Release fasteners -arrows- and unclip and detach contact protection -1-.



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– Remove bolts -arrows-.
– Move electrical wiring -2- to one side.
– Remove fuse -1-.



Installing

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

Note

- *Renew contact protection with gasket if removed.*
- *Clean sealing surface for cover on power and control electronics for electric drive - JX1- with silicon-free cleaning solution (⇒ Electronic parts catalogue (ETKA), Chemical Materials).*
- *Take care not to damage sealing surface for cover on power and control electronics for electric drive - JX1- when doing so.*

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

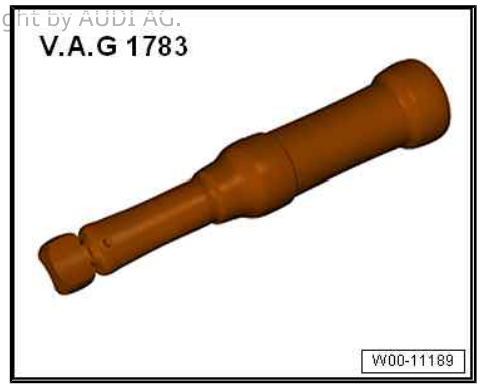
- ⇒ “5.1.1 Exploded view - power and control electronics for electric drive, vehicles up to model year 2016”, page 630
- ⇒ Fig. ““Lid - tightening torque and sequence”“ , page 632

5.5.2 Removing and installing high-voltage system fuse 3 - S353- - vehicles from model year 2017 onwards)

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Special tools and workshop equipment required

- Torque wrench - V.A.G 1783-



Note

High-voltage system fuse 3 - S353- is also used by high-voltage heater (PTC) - Z115- , electrical air conditioner compressor - V470- and charging unit 1 for high-voltage battery - AX4- .

Removing

DANGER

High voltage can cause fatal injury.

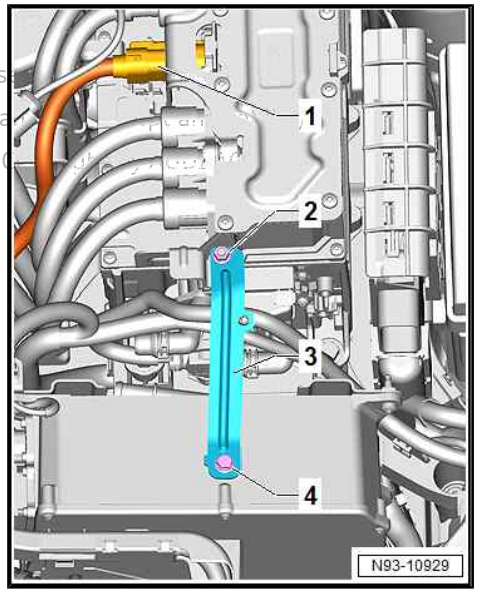
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Disconnect high-voltage wire for high-voltage battery charging unit - P25- -1- from power and control electronics for electric drive - JX1- .

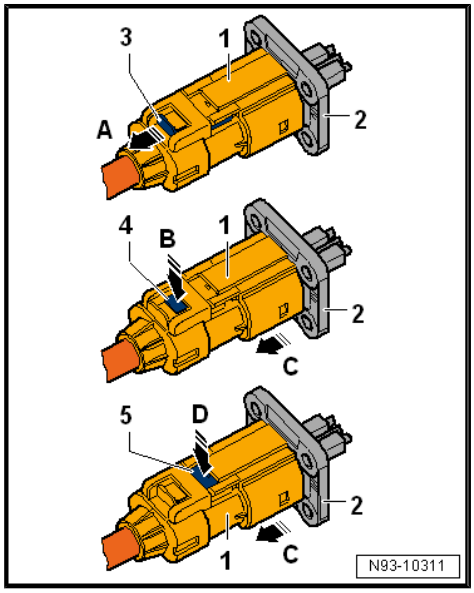
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– To do so, pull out connector locking element -3- -arrow A-.

– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.

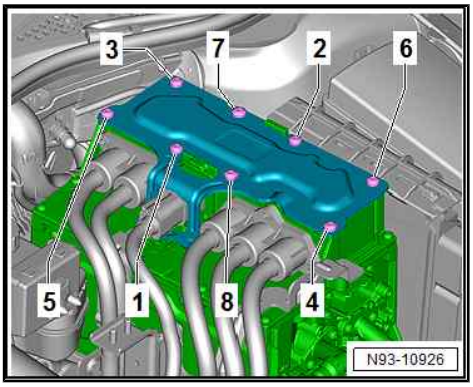
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.



Note

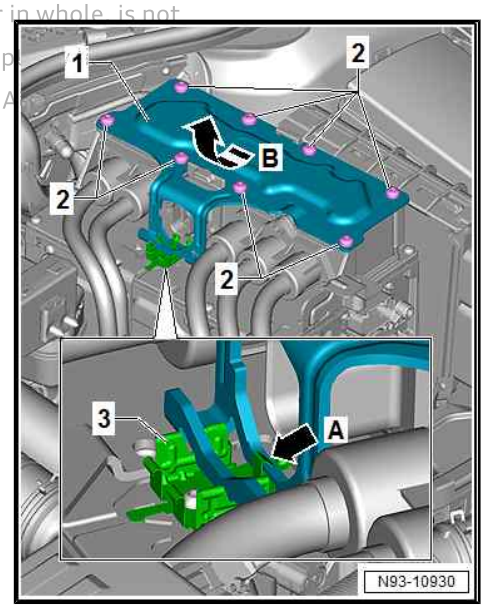
The following work is required to ensure that the bolt -3- is readily accessible.

– Loosen plenum chamber cover in area of bolt -3- but do not remove completely ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

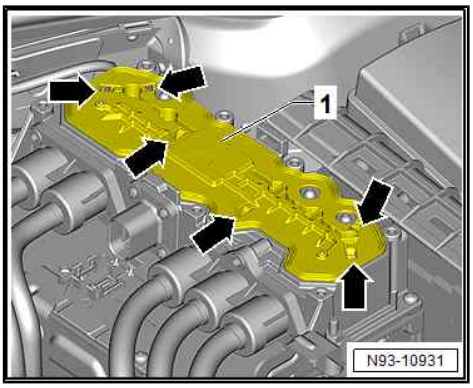


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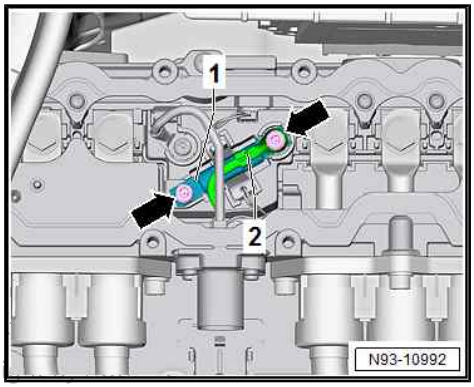
– Remove bolts -2-.
– Release fastener -arrow A-.
– Remove cover -1- from power and control electronics for electric drive - JX1- in direction of arrow -B-.



– Release fasteners -arrows-.
– Remove contact protection -1-.



– Make sketches or take photos of wire routing. This will ensure that the original wire routing can be restored during installation.
– Remove bolts -arrows-.
– Move electrical wiring -2- to one side.
– Guide out high-voltage system fuse 3 - S353- -1-.



Installing

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

– Check that electrical wiring is routed correctly (refer to sketches made/photos taken during removal).

Note

- *Renew contact protection with gasket if removed.*
- *Clean sealing surface for cover on power and control electronics for electric drive - JX1- with silicon-free cleaning solution (⇒ Electronic parts catalogue (ETKA), Chemical Materials).*
- *Take care not to damage sealing surface for cover on power and control electronics for electric drive - JX1- when doing so.*

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

- ⇒ “5.1.2 Exploded view - power and control electronics for electric drive, vehicles from model year 2017 onwards”, page 633
- ⇒ Fig. ““Lid - tightening torque and sequence”“ , page 634

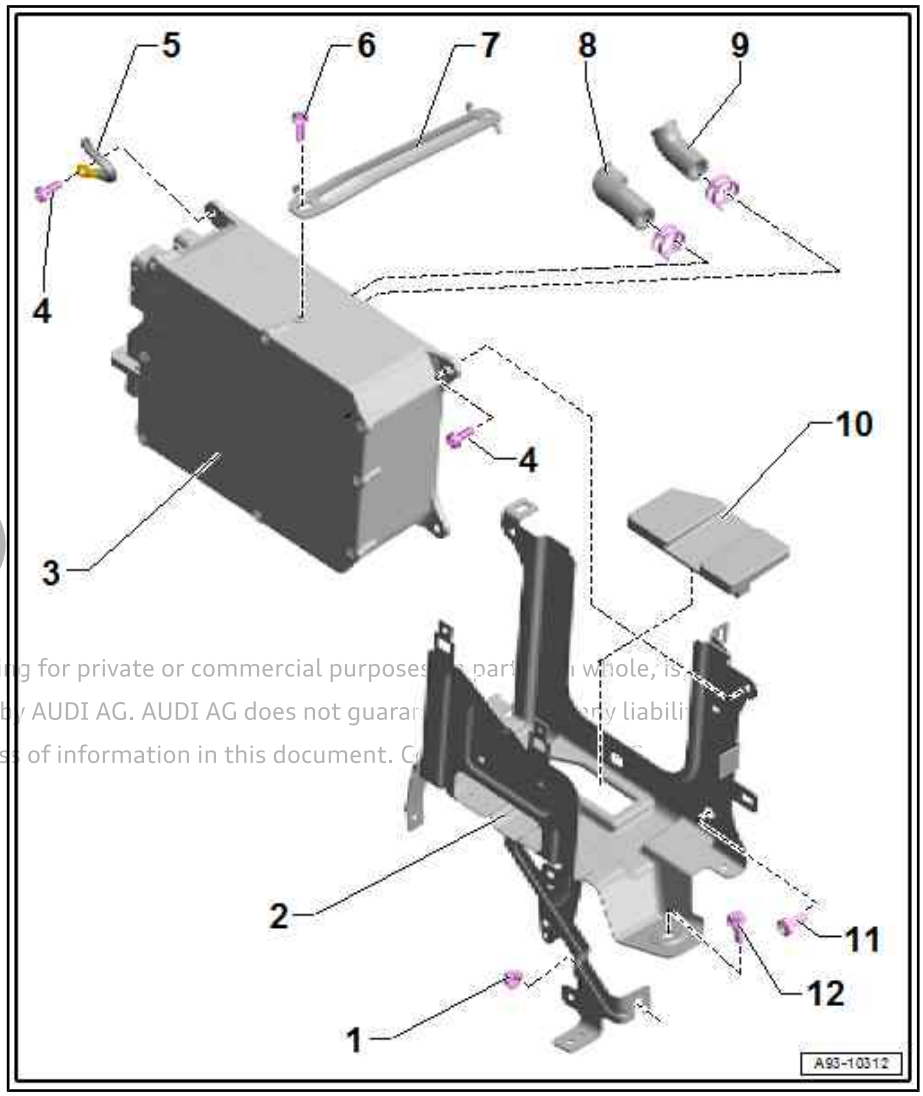
6 Charging unit for high-voltage battery

⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

⇒ “6.2 Removing and installing charging unit 1 for high-voltage battery AX4 ”, page 658

⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661

6.1 Exploded view - charging unit for high-voltage battery



1 - Nut

- ❑ Observe tightening torque and sequence ⇒ Fig. ““Bracket for charging unit 1 for high-voltage battery -AX4- - tightening torque and sequence”“ , page 658

2 - Bracket

- ❑ Removing and installing ⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661

3 - Charging unit 1 for high-voltage battery - AX4-

- ❑ With control unit for high-voltage battery charging unit - J1050-
- ❑ Removing and installing ⇒ “6.2 Removing and installing charging unit 1 for high-voltage battery AX4 ”, page 658

4 - Bolt

- ❑ 3x
- ❑ 8 Nm

5 - Potential equalisation line

- ❑ Overview of fitting locations ⇒ “12.2.1 Overview of fitting locations - potential equalisation lines, part 1”, page 692

6 - Bolt

- ❑ 8 Nm

7 - Support

8 - Coolant hose

9 - Coolant hose

10 - Filler piece

11 - Bolt

- ❑ 2x

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❑ Observe tightening torque and sequence
⇒ Fig. ""Bracket for charging unit 1 for high-voltage battery -AX4- - tightening torque and sequence"" , page 658

12 - Bolt

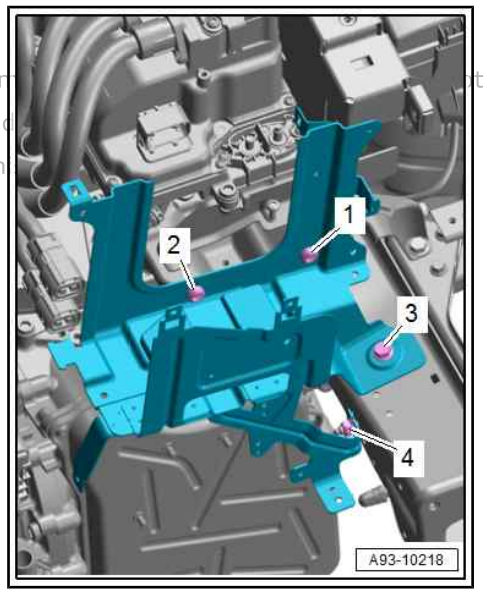
❑ Observe tightening torque and sequence
⇒ Fig. ""Bracket for charging unit 1 for high-voltage battery -AX4- - tightening torque and sequence"" , page 658

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Bracket for charging unit 1 for high-voltage battery - AX4- - tightening torque and sequence

– Tighten bolts in stages in the sequence shown:

Stage	Bolts/nuts	Tightening torque
1.	-1, 2, 4-	Screw in by hand until contact is made
2.	-1 … 4-	20 Nm



6.2 Removing and installing charging unit 1 for high-voltage battery - AX4-

Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

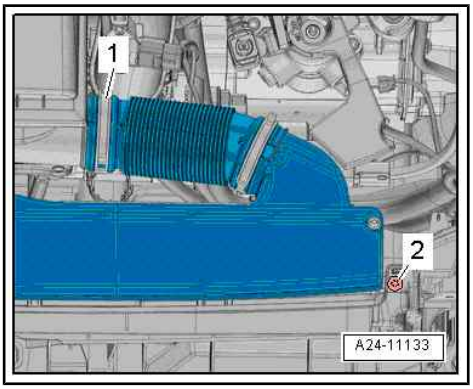
– De-energise high-voltage system
⇒ "10 De-energising high-voltage system", page 689 .

• If renewing the control unit, select the "Replace control unit" function for the appropriate control unit ⇒ Vehicle diagnostic tester.

– Drain coolant
⇒ "1.3 Draining and filling cooling system", page 315 .

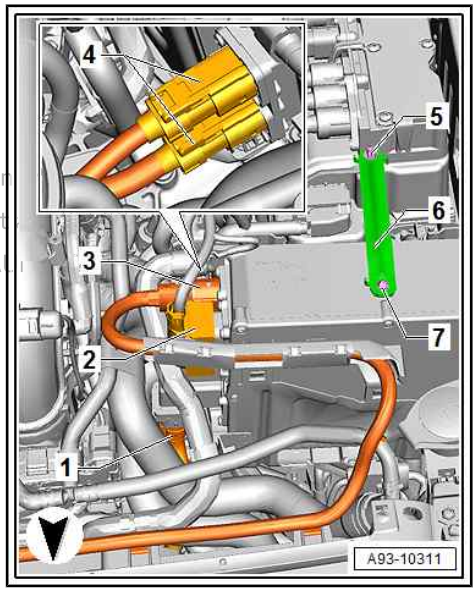
– Remove engine cover panel
⇒ "3.1.2 Removing and installing engine cover panel - e-tron", page 79 .

– Release hose clip -1- and detach air hose.
– Remove bolt -2- on both sides.
– Unclip air duct at lock carrier and detach.

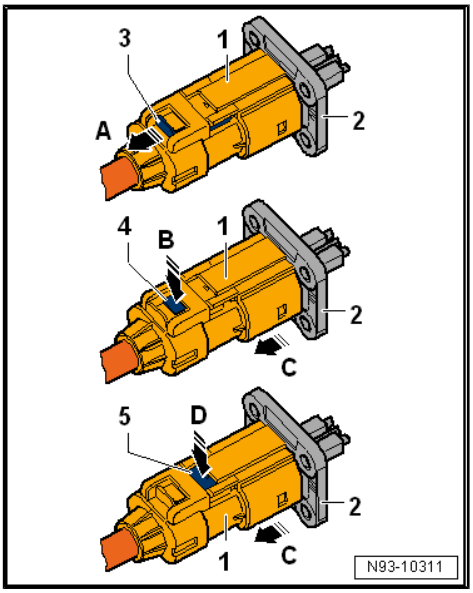


– If fitted, remove support -6-. To do so, unscrew nut -5- and bolt -7-.
– Unplug electrical connector -2-.
– Disconnect high-voltage wires -1, 3, 4-.

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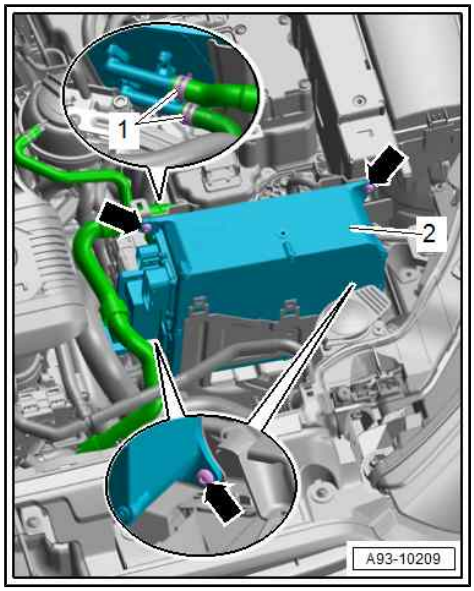


– Pull out locking element -3- -arrow A- to unplug electrical connector.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.
– Move wiring clear.



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

– Remove bolts -arrows-.



Note:

The bolt (bottom right) on the charging unit for high-voltage battery is not fitted on all vehicles.

– Lift out charging unit for high-voltage battery -2-.

Installing

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

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

♦ `High-voltage`

♦ `Potential equalisation measurement on high-voltage components`

♦ `C6 - Potential equalisation measurement high-voltage battery charger control unit -J1050`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Fill up with coolant
⇒ “1.3 Draining and filling cooling system”, page 315 .

– Attach sealing tag to filler cap on coolant expansion tank
⇒ page 332 .

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

♦ ⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

♦ ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

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6.3 Removing and installing bracket for charging unit 1 for high-voltage battery - AX4-

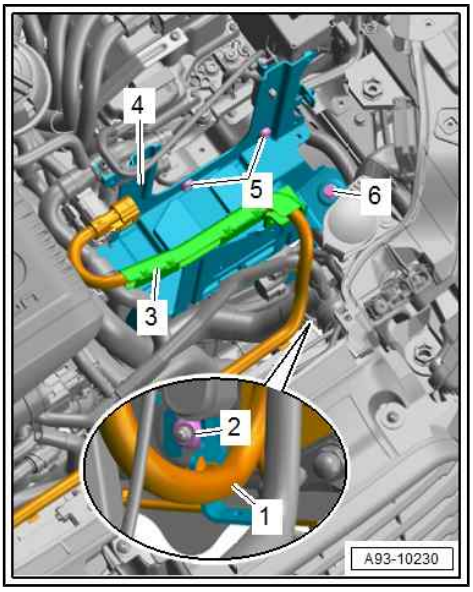
Removing

– Remove charging unit for high-voltage battery ⇒ “6.2 Removing and installing charging unit 1 for high-voltage battery AX4 ”, page 658 .

– Move electrical wiring harness -1- and wiring retainer -3- clear.

– Remove bolts -5, 6- and nut -2-.

– Remove bracket -4-.



Installing

Installation is carried out in reverse sequence.

Tightening torques

◆ ⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

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7 Electric drive motor

⇒ “7.1 Removing and installing three-phase current drive VX54 ”, page 662

⇒ “7.2 Removing and installing drive motor temperature sender G712 ”, page 662

⇒ “7.3 Removing and installing drive motor rotor position sender 1 G713 ”, page 662

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7.1 Removing and installing three-phase current drive - VX54-

Removing and installing three-phase current drive - VX54- :

⇒ 6-speed dual clutch gearbox 0DD; Rep. gr. 34 ; Dismantling and assembling gearbox

7.2 Removing and installing drive motor temperature sender - G712-

Removing and installing drive motor temperature sender - G712- :

⇒ 6-speed dual clutch gearbox 0DD; Rep. gr. 34 ; Dismantling and assembling gearbox

7.3 Removing and installing drive motor rotor position sender 1 - G713-

Removing and installing drive motor rotor position sender 1 - G713- :

⇒ 6-speed dual clutch gearbox 0DD; Rep. gr. 34 ; Dismantling and assembling gearbox

8 High-voltage wiring

⇒ “8.1 Overview of fitting locations - high-voltage wires”, page 663

⇒ “8.2 Removing and installing high-voltage wiring harness for high-voltage battery”, page 666

⇒ “8.3 Removing and installing high-voltage wiring harness for drive motor”, page 673

⇒ “8.4 Removing and installing high-voltage wire for power and control electronics for electric drive”, page 677

⇒ “8.5 Removing and installing high-voltage wire for high-voltage heater (PTC)”, page 679

⇒ “8.6 Removing and installing high-voltage wire for electrical air conditioner compressor”, page 681

8.1 Overview of fitting locations - high-voltage wires

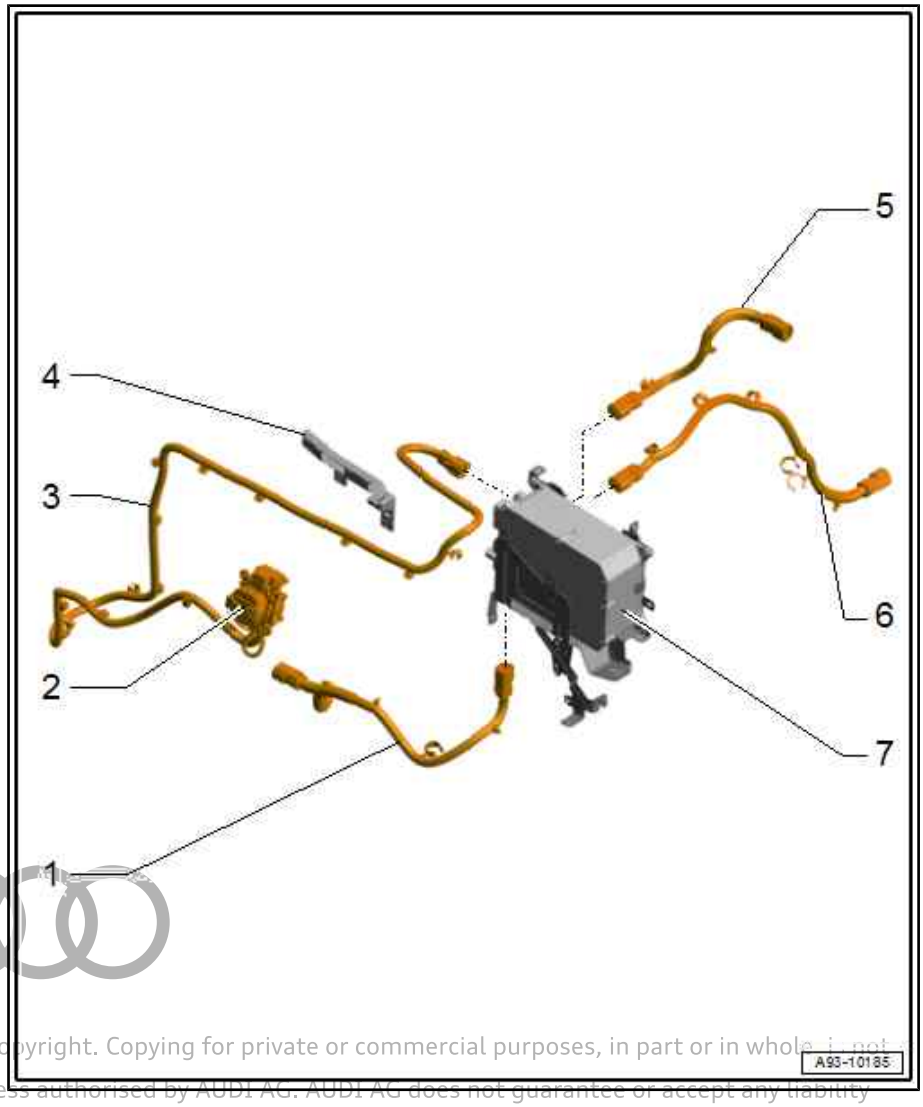
⇒ “8.1.1 Overview of fitting locations - high-voltage wires, charging unit”, page 663

⇒ “8.1.2 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, high-voltage battery”, page 665

⇒ “8.1.3 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, drive motor”, page 666

8.1.1 Overview of fitting locations - high-voltage wires, charging unit

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1 - High-voltage wire for electrical air conditioner compressor - P3-

- ❑ Removing and installing ⇒ “8.6 Removing and installing high-voltage wire for electrical air conditioner compressor”, page 681

2 - High-voltage battery charging socket 1 - UX4-

- ❑ Exploded view ⇒ “9.1 Exploded view - charging socket”, page 683

3 - High-voltage wire for charging socket

- ❑ To charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-
- ❑ Removing and installing ⇒ “9.4.1 Removing and installing charging socket”, page 685

4 - Guide

- ❑ For high-voltage wire

5 - High-voltage wire for high-voltage battery charging unit - P25-

- ❑ Leading to power and control electronics for electric drive - JX1-
- ❑ Removing and installing ⇒ “8.4 Removing and installing high-voltage wire for power and control electronics for electric drive”, page 677

6 - High-voltage wire for high-voltage heater (PTC) - P11-

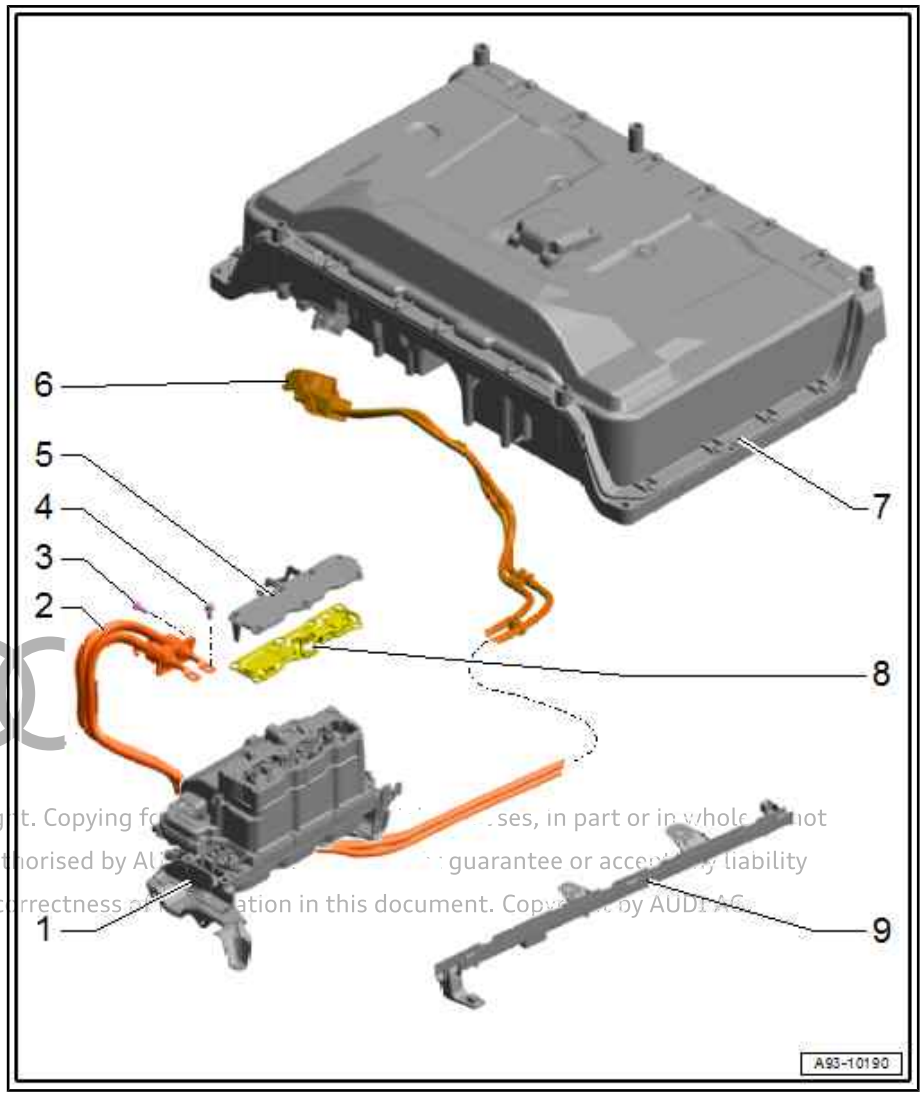
- ❑ Removing and installing ⇒ “8.5 Removing and installing high-voltage wire for high-voltage heater (PTC)”, page 679

7 - Charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-

- ❑ Exploded view ⇒ “6.1 Exploded view - charging unit for high-voltage battery”, page 657

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8.1.2 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, high-voltage battery



1 - Power and control electronics for electric drive - JX1-

- ❑ Exploded view
  ⇒ “5.1 Exploded view - power and control electronics for electric drive”, page 630

2 - High-voltage wiring harness for high-voltage battery - PX1-

- ❑ To hybrid battery unit - AX1-
- ❑ Removing and installing
  ⇒ “8.2 Removing and installing high-voltage wiring harness for high-voltage battery”, page 666

3 - Bolt

- ❑ 2x
- ❑ 5 Nm

4 - Bolt

- ❑ 2x
- ❑ 20 Nm

5 - Cover

6 - Connector housing

- ❑ For high-voltage wiring harness for high-voltage battery - PX1- to hybrid battery unit - AX1-

7 - Hybrid battery unit - AX1-

- ❑ Exploded view
  ⇒ “3.1 Exploded view - high-voltage battery”, page 566

8 - Contact protection

- ❑ With gasket
- ❑ Renew after removing

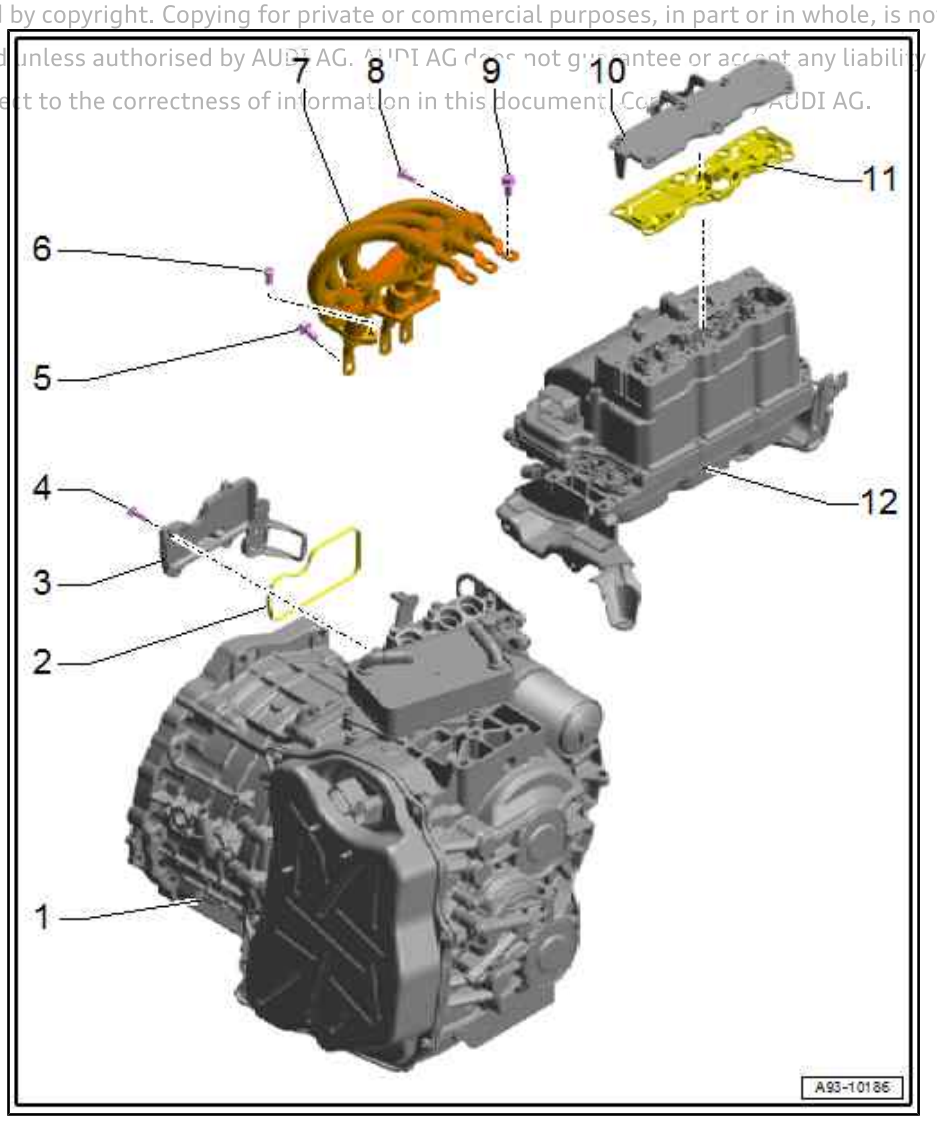
9 - Guide

- ❑ For high-voltage wiring harness for high-voltage battery - PX1-

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8.1.3 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, drive motor

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1 - Electric drive motor - V141-

- ❑ Removing and installing ⇒ “7.1 Removing and installing three-phase current drive VX54 ”, page 662

2 - Gasket

- ❑ Renew after removing

3 - Cover

4 - Bolt

- ❑ 5x
- ❑ 8 Nm

5 - Bolt

- ❑ 3x
- ❑ 22 Nm

6 - Bolt

- ❑ 4x
- ❑ 5 Nm

7 - High-voltage wiring harness for drive motor - PX2-

- ❑ Removing and installing ⇒ “8.3 Removing and installing high-voltage wiring harness for drive motor”, page 673

8 - Bolt

- ❑ 3x
- ❑ 5 Nm
- ❑ Tightening sequence: first the centre bolt, then the two outer bolts

9 - Bolt

- ❑ 3x
- ❑ 20 Nm

10 - Cover

11 - Contact protection

- ❑ With gasket
- ❑ Renew after removing

12 - Power and control electronics for electric drive - JX1-

- ❑ Exploded view ⇒ “5.1 Exploded view - power and control electronics for electric drive”, page 630

8.2 Removing and installing high-voltage wiring harness for high-voltage battery

Special tools and workshop equipment required

♦ Engine and gearbox jack - VAS 6931-



Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

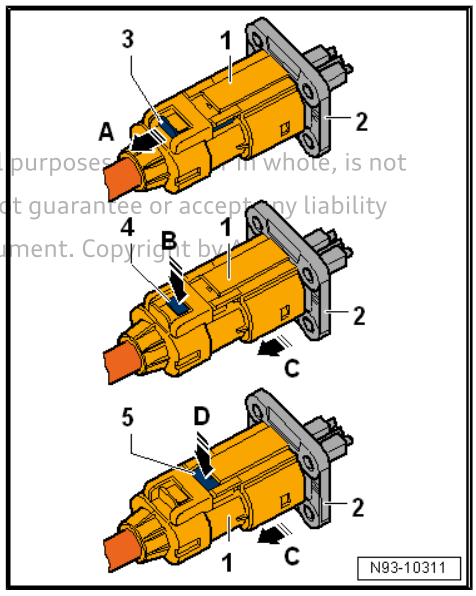
Vehicles up to model year 2016

– Pull out connector locking element -3- -arrow A- and disconnect high-voltage wire for high-voltage battery charging unit - P25- from power and control electronics for electric drive - JX1- .

– Press release catch -4- in direction of -arrow B-. Pull connector -1- approx. 5 mm as far as next catch.

– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.

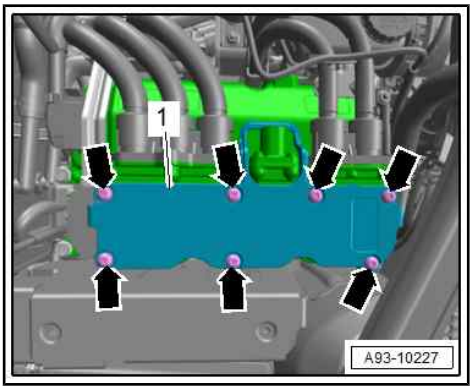
– Detach high-voltage wire for high-voltage battery charging unit - P25- from bracket on power and control electronics for electric drive - JX1- .



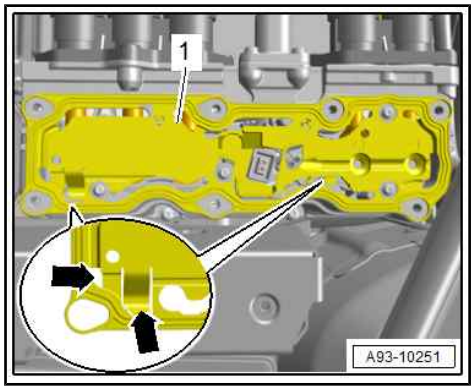
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– Remove bolts -arrows-.

– Detach cover -1-.



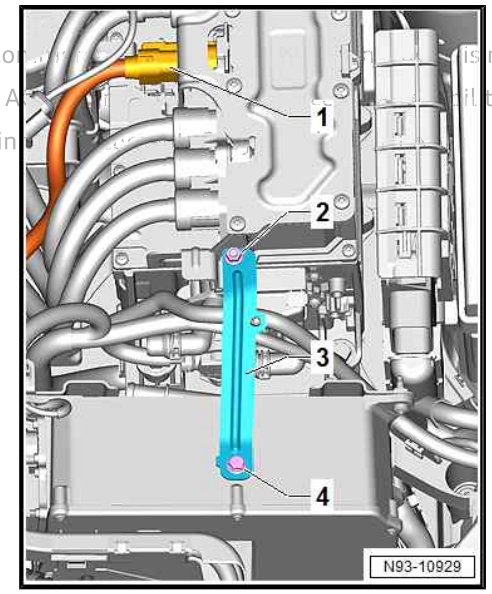
– Release fasteners -arrows- and unclip and detach contact protection -1-.



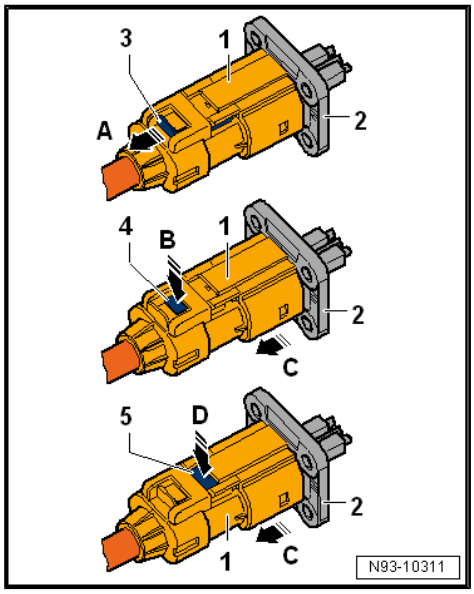
Vehicles from model year 2017 onwards

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– Disconnect high-voltage wire for high-voltage battery charging unit - P25- -1- from power and control electronics for electric drive - JX1- .



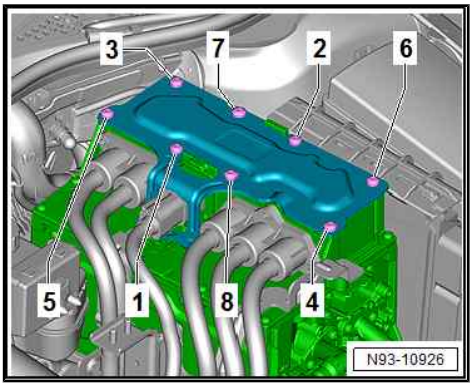
– To do so, pull out connector locking element -3- -arrow A-.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.



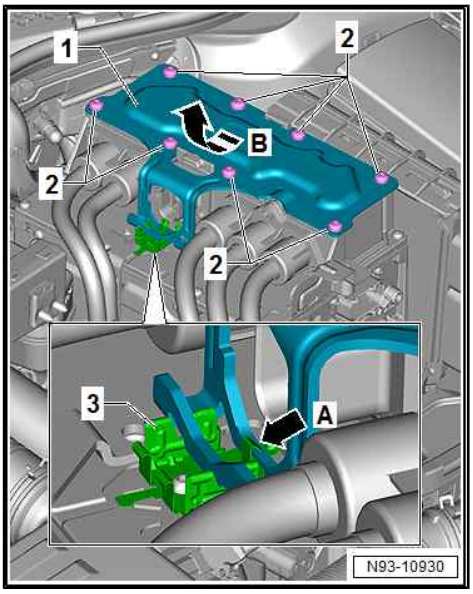
Note

The following work is required to ensure that the bolt -3- is readily accessible.

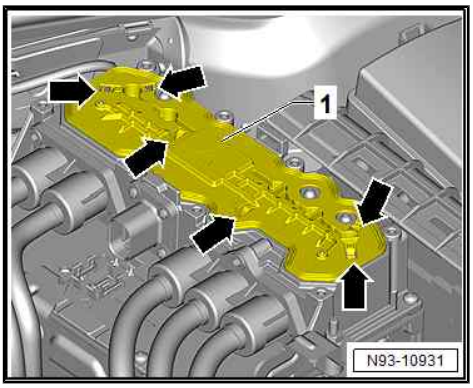
– Loosen plenum chamber cover in area of bolt -3- but do not remove completely ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



– Remove bolts -2-.
– Release fastener -arrow A-.
– Remove cover -1- from power and control electronics for electric drive - JX1- in direction of arrow -B-.

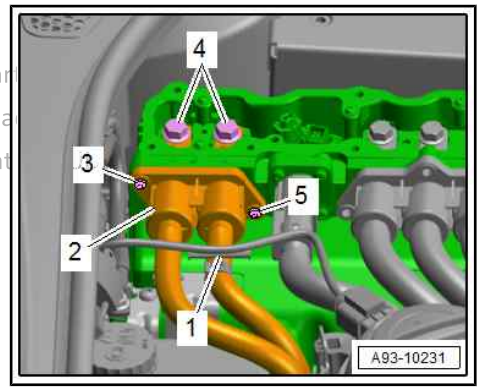


– Release fasteners -arrows-.
– Remove contact protection -1-.



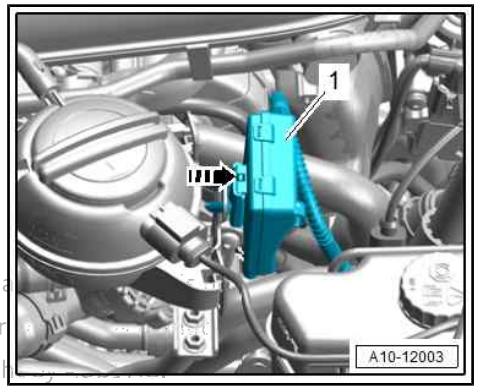
All vehicles

– Remove bolts -3, 4, 5-.
– Move wiring harness -1- clear.
– Pull out high-voltage wiring harness for high-voltage battery - PX1- -item 2- and move harness clear.
– Put cover back on power and control electronics for electric drive - JX1- and secure with two bolts.



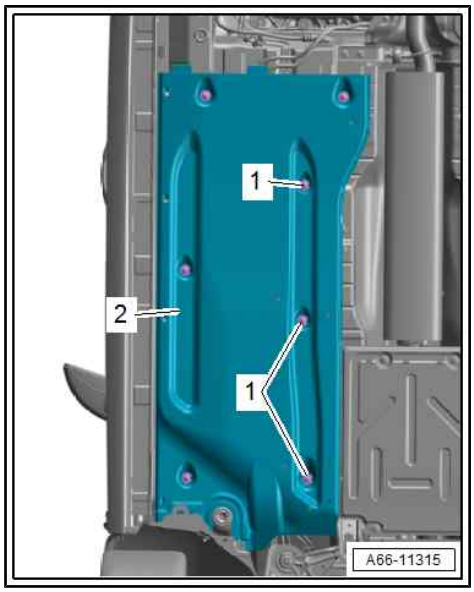
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– Version with gearbox breather: Release catch -arrow- and push gearbox breather to one side.

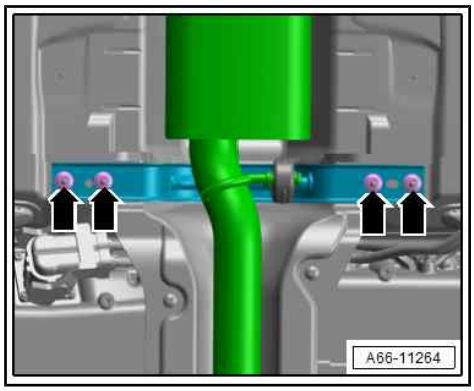


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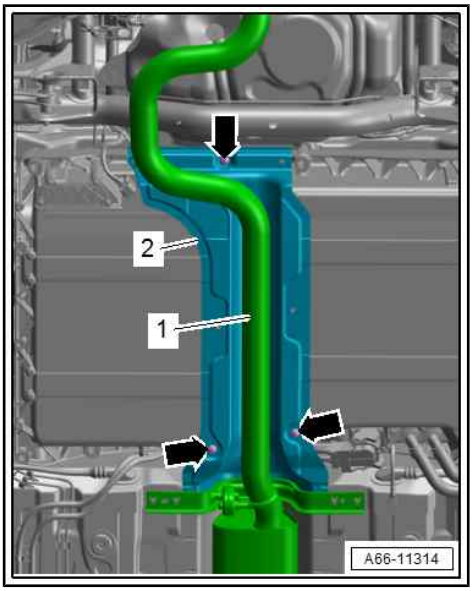
– Remove underbody trim (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Removing and installing underbody trim .
– Remove nuts -1- and release underbody trim (front) -2- at inside on left.



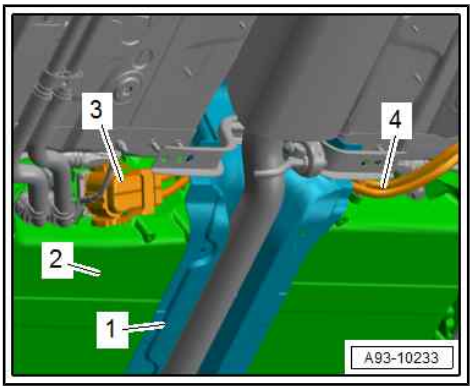
– Remove nuts -arrows-.
– Lower rear silencer using engine and gearbox jack - VAS 6931-
⇒ “1.2.2 Removing and installing silencer - vehicles with multi-link suspension”, page 518 .



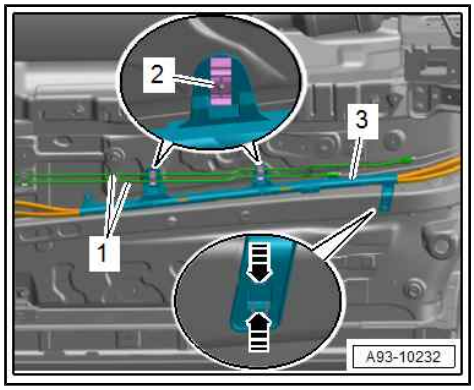
– Remove bolts -arrows- and place heat shield -2- for high-voltage battery on exhaust system -1-.



– Unplug electrical connector -3-.
– Move high-voltage wire -4- clear.
– Guide high-voltage wire out between high-voltage battery -2- and heat shield -1- for high-voltage battery.



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– Move brake lines -1- clear.
– Detach clip -2-.
– Release fasteners -arrows- and move guide -3- clear.
– Lower subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Lowering subframe .
– Remove high-voltage wire downwards.

Installing

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

Note

- *Renew contact protection with gasket if removed.*
- *Clean sealing surface for cover on power and control electronics for electric drive - JX1- with silicon-free cleaning solution (⇒ Electronic parts catalogue (ETKA), Chemical Materials).*
- *Take care not to damage sealing surface for cover on power and control electronics for electric drive - JX1- when doing so.*

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .
– Select and start `ODIS-Service` mode.
– Select `Special functions` tab.
– Select the following:
- `High-voltage`
- `Potential equalisation measurement on high-voltage components`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system ⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

- ⇒ “8.1.2 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, high-voltage battery”, page 665
- ⇒ “5.1 Exploded view - power and control electronics for electric drive”, page 630
- ⇒ “1.1.3 Exploded view - silencers, e-tron”, page 516
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

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♦ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

8.3 Removing and installing high-voltage wiring harness for drive motor

Removing

– Remove bracket for high-voltage battery charging unit ⇒ “6.3 Removing and installing bracket for charging unit 1 for high-voltage battery AX4 ”, page 661 .

– Remove coolant pipes (left-side) ⇒ “5.2.3 Removing and installing coolant pipes (left-side) - e-tron”, page 393 .

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

– Remove selector lever cable ⇒ Rep. gr. 34 ; Selector mechanism; Removing and installing selector lever cable .

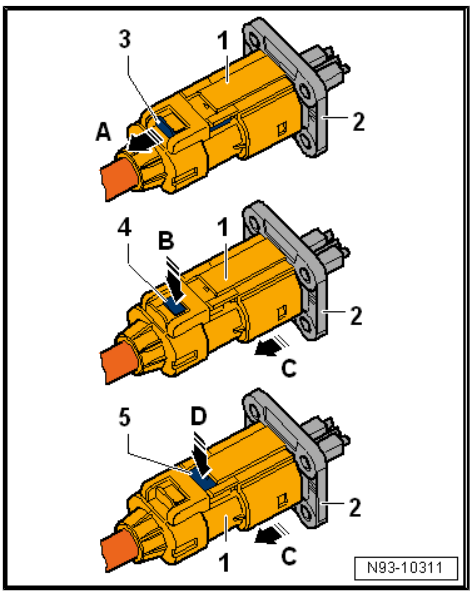
Vehicles up to model year 2016

– Pull out connector locking element -3- -arrow A- and disconnect high-voltage wire for high-voltage battery charging unit - P25- from power and control electronics for electric drive - JX1- .

– Press release catch -4- in direction of -arrow B-. Pull connector -1- approx. 5 mm as far as next catch.

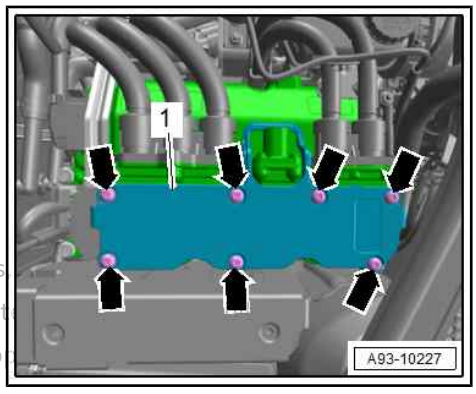
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.

– Detach high-voltage wire for high-voltage battery charging unit - P25- from bracket on power and control electronics for electric drive - JX1- .



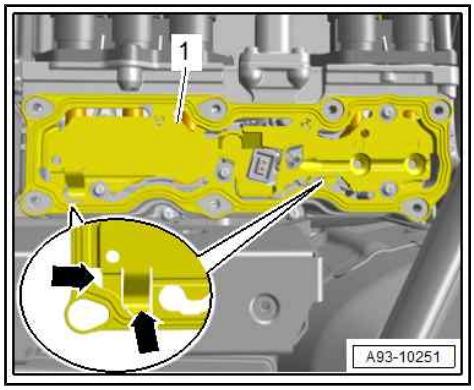
– Remove bolts -arrows-.

– Detach cover -1-.



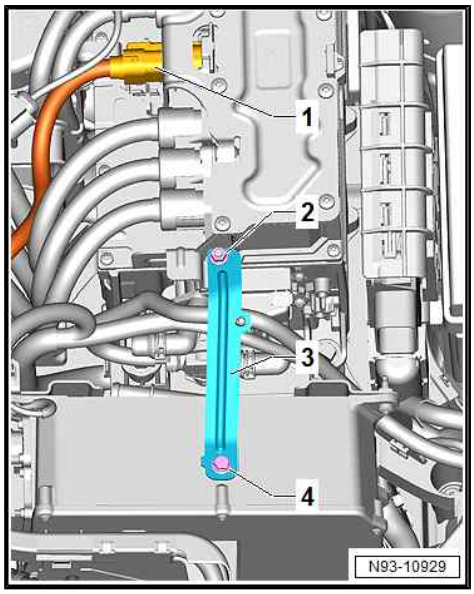
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– Release fasteners -arrows- and unclip and detach contact protection -1-.

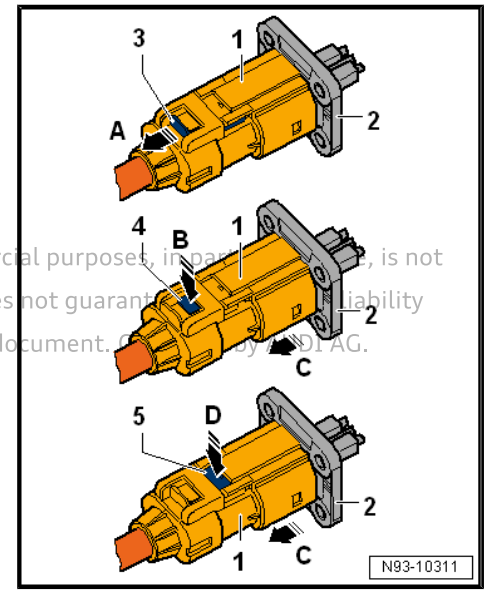


Vehicles from model year 2017 onwards

– Disconnect high-voltage wire for high-voltage battery charging unit - P25- -1- from power and control electronics for electric drive - JX1- .



– To do so, pull out connector locking element -3- -arrow A-.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.

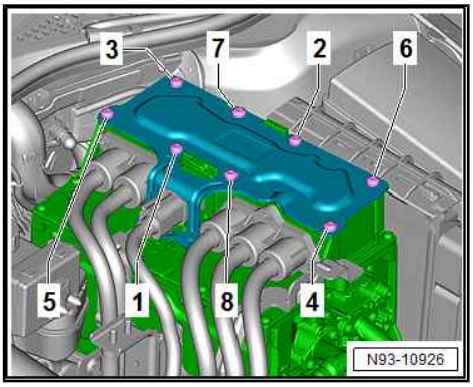


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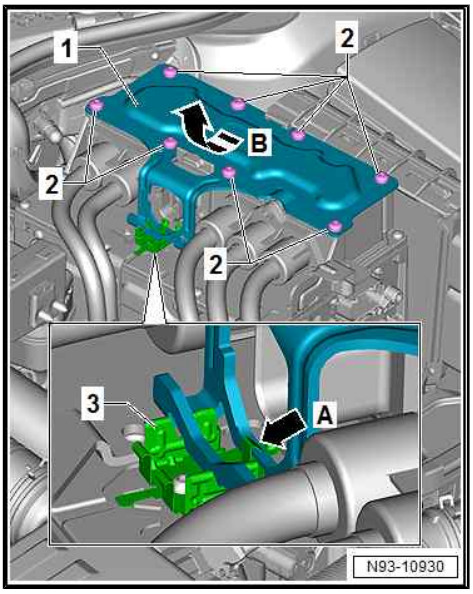
Note

The following work is required to ensure that the bolt -3- is readily accessible.

– Loosen plenum chamber cover in area of bolt -3- but do not remove completely ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



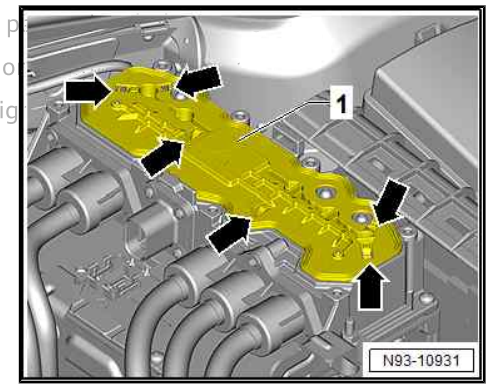
– Remove bolts -2-.
– Release fastener -arrow A-.
– Remove cover -1- from power and control electronics for electric drive - JX1- in direction of arrow -B-.



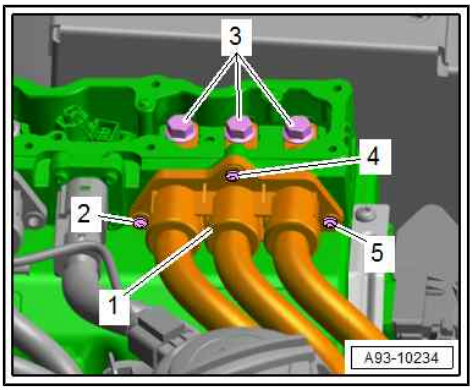
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– Release fasteners -arrows-.
– Remove contact protection -1-.

All vehicles

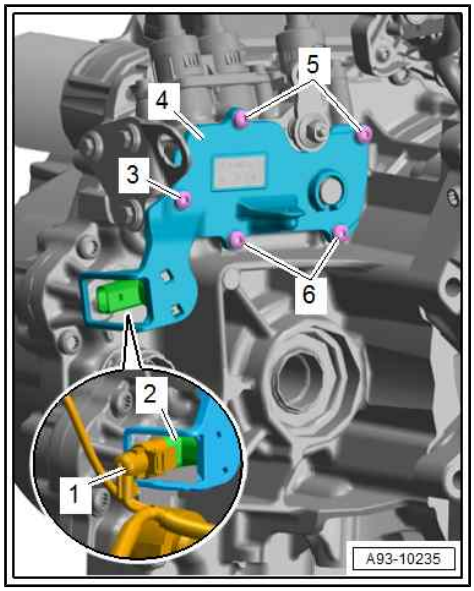


– Remove bolts -2 ... 5-.
– Pull out high-voltage wiring harness for drive motor - PX2- -item 1- and move harness clear.
– Put cover back on power and control electronics for electric drive - JX1- and secure with two bolts.



– Unplug electrical connector -1-.
– Remove bolts -3, 5, 6-.
– Remove cover -4-; this will disconnect 2-pin connector - T2vx- -item 2-.

• The cover must be detached straight to avoid damaging the 2-pin connector - T2vx- .

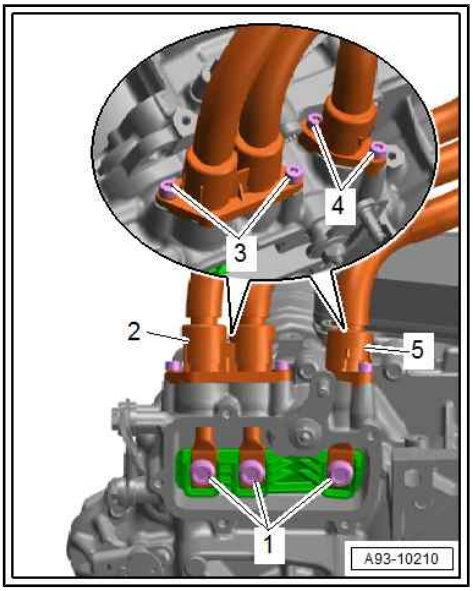


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– Remove bolts -1, 3, 4-.

– Pull out high-voltage wiring harness for drive motor - PX2- -items 2 and 5- and move harness clear.

– Move high-voltage wiring harness clear and lift it out.



Installing

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

Note

- *Renew contact protection with gasket if removed.*
- *Clean sealing surface for cover on power and control electronics for electric drive - JX1- with silicon-free cleaning solution (⇒ Electronic parts catalogue (ETKA), Chemical Materials).*
- *Take care not to damage sealing surface for cover on power and control electronics for electric drive - JX1- when doing so.*

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

- `High-voltage`
- `Potential equalisation measurement on high-voltage components`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

Tightening torques

- ⇒ “8.1.3 Overview of fitting locations - high-voltage wires, power and control electronics for electric drive, drive motor”, page 666
- ⇒ “5.1 Exploded view - power and control electronics for electric drive”, page 630

8.4 Removing and installing high-voltage wire for power and control electronics for electric drive

Removing

DANGER

High voltage can cause fatal injury.

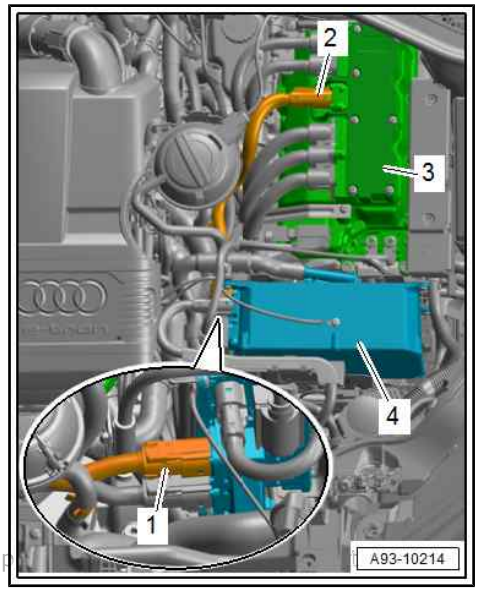
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

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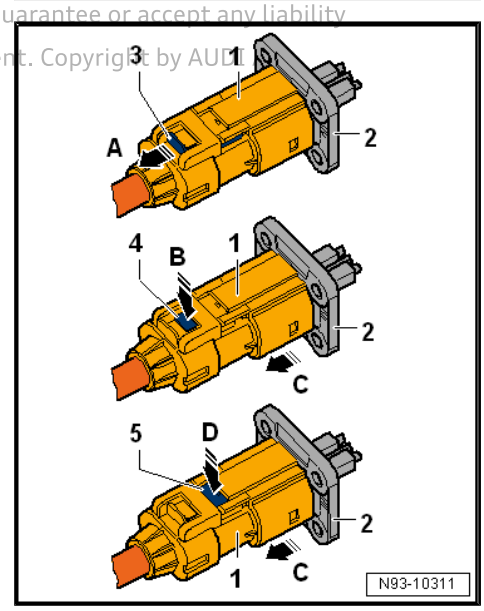
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Disconnect high-voltage wire -2- from power and control electronics for electric drive - JX1- -item 3- and high-voltage wire -1- from charging unit 1 for high-voltage battery - AX4- -item 4-.



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– Pull out locking element -3- -arrow A- to unplug electrical connector.



– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.

– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.

– Remove high-voltage wire.

Installing

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

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

◆ `High-voltage`

◆ `Potential equalisation measurement on high-voltage components`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

8.5 Removing and installing high-voltage wire for high-voltage heater (PTC)

Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

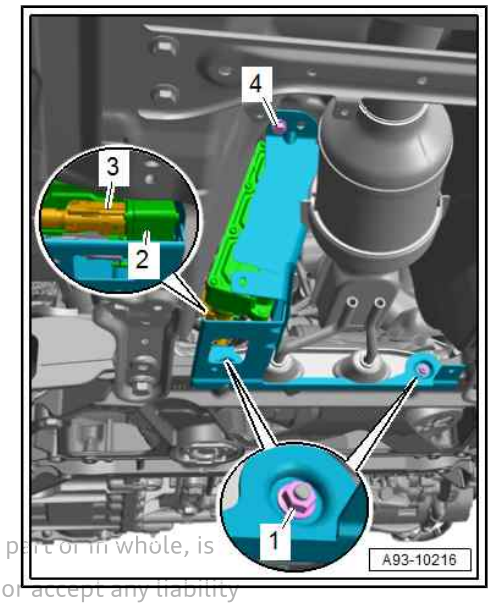
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

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

– Remove bolt -4- and nuts -1-.

– Move high-voltage heater (PTC) to one side (coolant hoses remain connected).

– Disconnect high-voltage wire -3- from high-voltage heater (PTC) -2-.

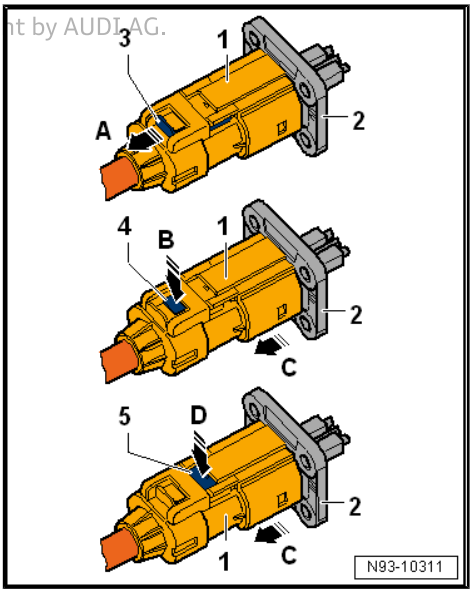


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– Pull out locking element -3- -arrow A- to unplug electrical connector.

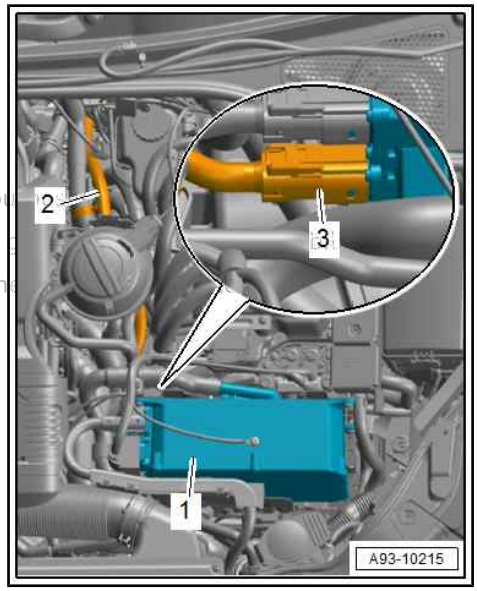
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.

– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.

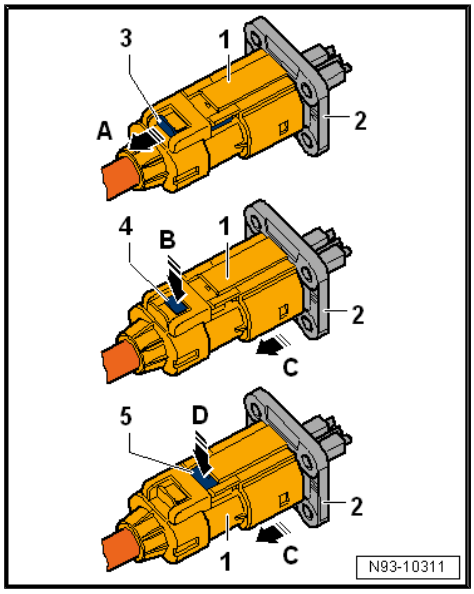


– Move high-voltage wire -3- clear.
– Disconnect high-voltage wire -2- from charging unit 1 for high-voltage battery - AX4- -item 1-.

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– Pull out locking element -3- -arrow A- to unplug electrical connector.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.
– Remove high-voltage wire.



Installing

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

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

♦ Refer to: Removing and installing high-voltage heater (PTC) - Z115- / high-voltage heater (PTC) control unit - J848- ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit .

8.6 Removing and installing high-voltage wire for electrical air conditioner compressor

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Removing

DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

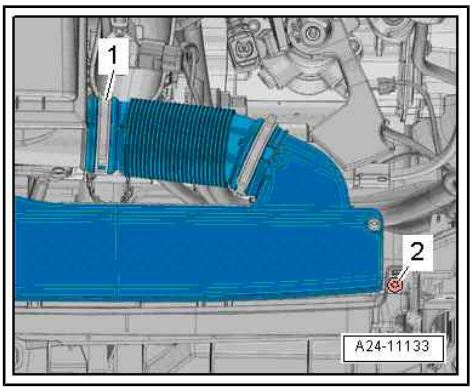
– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove engine cover panel
⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

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

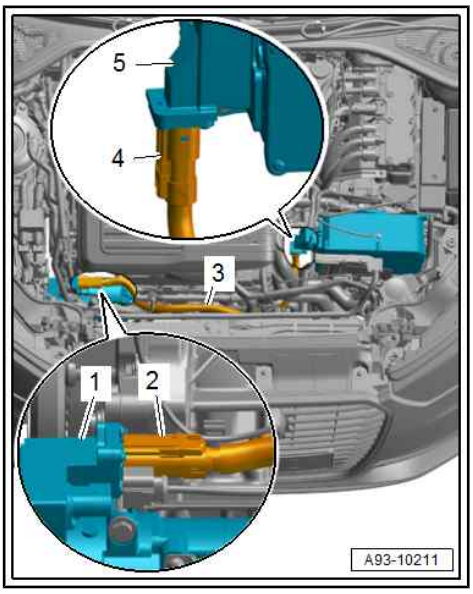
– Remove bolt -2- on both sides.

– Unclip air duct at lock carrier and detach.

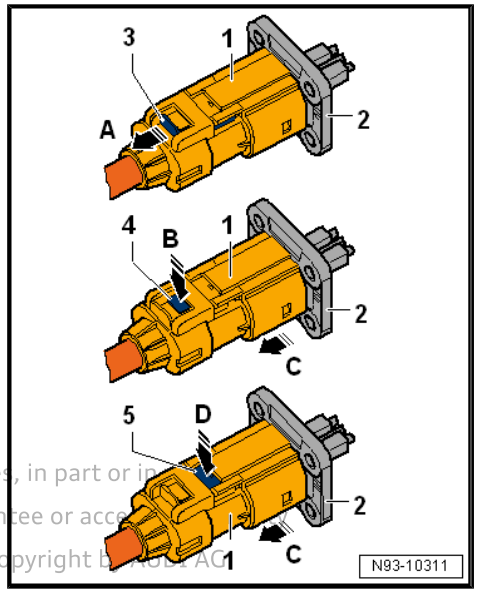


– Move high-voltage wire for electrical air conditioner compressor - P3- -item 3- clear.

– Disconnect high-voltage wire -4- from charging unit 1 for high-voltage battery - AX4- -item 5- and high-voltage wire -2- from air conditioner compressor -1-.



– Pull out locking element -3- -arrow A- to unplug electrical connector.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.
– Remove high-voltage wire.



Installing

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

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester.
– Select and start `ODIS-Service` mode.
– Select `Special functions` tab.
– Select the following:

◆ `High-voltage`
◆ `Potential equalisation measurement on high-voltage components`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

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9 Charging socket

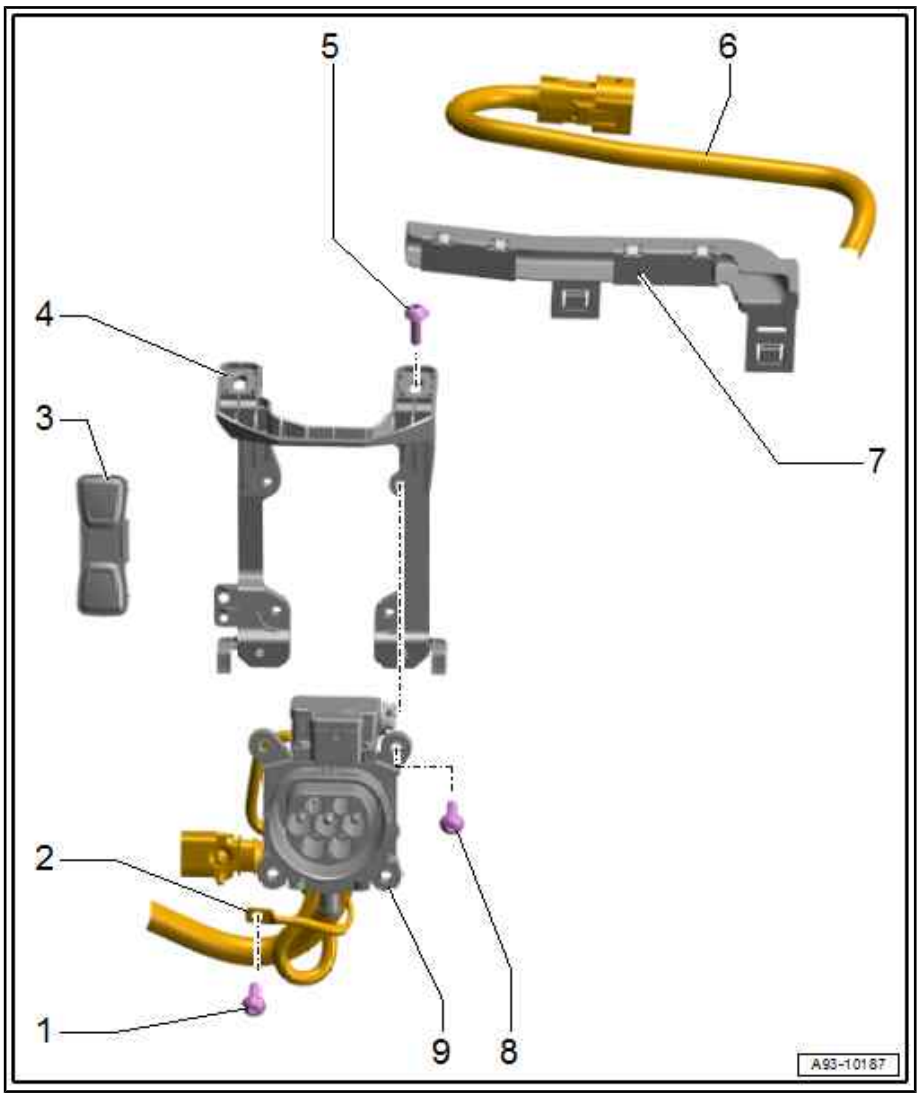
⇒ “9.1 Exploded view - charging socket”, page 683

⇒ “9.2 e-tron charging system”, page 684

⇒ “9.3 USB adapter for e-tron charging system”, page 684

⇒ “9.4 Removing and installing high-voltage battery charging socket 1 UX4 ”, page 685

9.1 Exploded view - charging socket



1 - Bolt

- ❑ 2x
- ❑ 8 Nm

2 - Potential equalisation line

- ❑ Overview of fitting locations ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

3 - Module for battery charge selector buttons - EX32-

- ❑ With LED module for charging socket 1 - L263- , immediate charge button - E766- , charge profile selector button - E808-
- ❑ Removing and installing ⇒ “9.4.3 Removing and installing module for battery charge selector buttons EX32 ”, page 688

4 - Mounting

- ❑ Removing and installing ⇒ “9.4.2 Removing and installing mounting for charging socket”, page 687

5 - Bolt

- ❑ 2x
- ❑ 8 Nm

6 - High-voltage wire

- ❑ To charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-

7 - Guide

- ❑ For high-voltage wire

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8 - Bolt

- ❑ 4x
- ❑ 8 Nm

9 - High-voltage battery charging socket 1 - UX4-

- ❑ With actuator for high-voltage charging socket lock 1 - F498- and temperature sender for charging socket 1 - G853-

❑ Removing and installing ⇒ “9.4.1 Removing and installing charging socket”, page 685

9.2 e-tron charging system

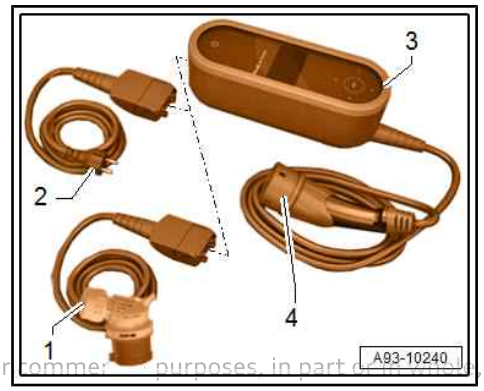
The e-tron charging system comprises the following components:

-1- = Charging cable with connector for industrial power sockets

-2- = Charging cable with connector for domestic power sockets

-3- = Display and operating unit

-4- = Charging cable with vehicle connector

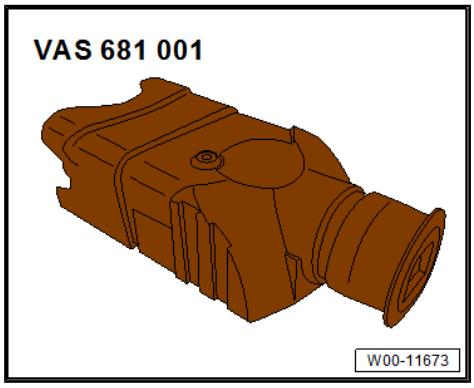


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9.3 USB adapter for e-tron charging system

Special tools and workshop equipment required

♦ USB adapter for e-tron charging system - VAS 681 001-



♦ USB cable (USB 2.0 type A/B), e.g. -VAS 611 001-

Starting diagnosis, Audi CSI (Charging System Interface)

– Disconnect display and operating unit from power outlet.

– Disconnect charging cable (vehicle end).

– Connect USB adapter for e-tron charging system - VAS 681 001- .

– Connect display and operating unit to PC using a USB cable (USB 2.0 type A/B), e.g. -VAS 611 001- .

– Re-connect display and operating unit to power outlet.

– The software is made available by the importer and can be downloaded e.g. from the ServiceNet or the Partner Portal.

– Start application on PC.

– Connect display and operating unit to PC by pressing Con-nect button.

• Connection status = green

Possible functions

♦ Resetting PIN

♦ Updating software

- Reading out, displaying and (if applicable) deleting event memory

Keyboard commands

- F8 key = “Start/run command”
- F11 key = “Back”
- F12 key = “Next”
- Esc key = “End application”

Ending diagnosis, Audi CSI (Charging System Interface)

– End communication between display and operating unit and PC by pressing Disconnect button.

• Connection status = red

– End application by pressing Esc key.

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– Disconnect display and operating unit from power outlet.

– Disconnect USB cable (USB 2.0 type A/B) (e.g. -VAS 611 001-) from PC.

– Disconnect USB adapter for e-tron charging system - VAS 681 001- .

– Connect charging cable (vehicle end).

– Re-connect display and operating unit to power outlet.

9.4 Removing and installing high-voltage battery charging socket 1 - UX4-

⇒ “9.4.1 Removing and installing charging socket”, page 685

⇒ “9.4.2 Removing and installing mounting for charging socket”, page 687

⇒ “9.4.3 Removing and installing module for battery charge selector buttons EX32 ”, page 688

9.4.1 Removing and installing charging socket

Removing

DANGER

High voltage can cause fatal injury.

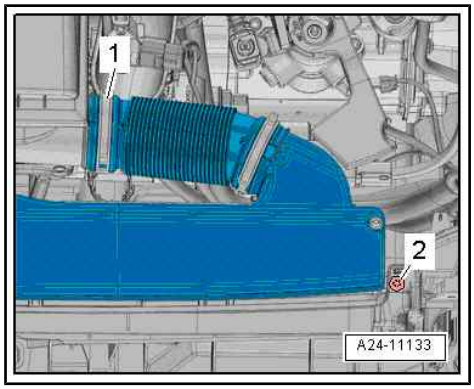
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

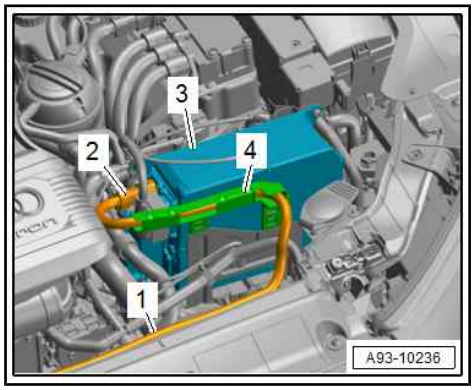
– De-energise high-voltage system ⇒ “10 De-energising high-voltage system”, page 689 .

– Remove engine cover panel ⇒ “3.1.2 Removing and installing engine cover panel - e-tron”, page 79 .

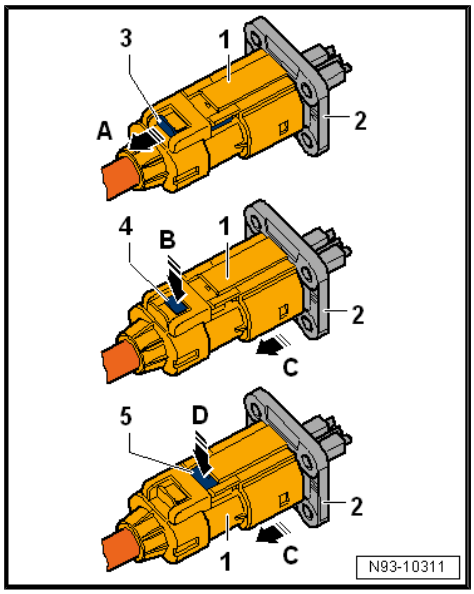
– Release hose clip -1- and detach air hose.
– Remove bolt -2- on both sides.
– Unclip air duct at lock carrier and detach.
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .



– Release fasteners and detach guide -4-.
– Move wiring harness -1- clear at lock carrier.
– Disconnect high-voltage wire -2- from charging unit 1 for high-voltage battery - AX4- -item 3-.

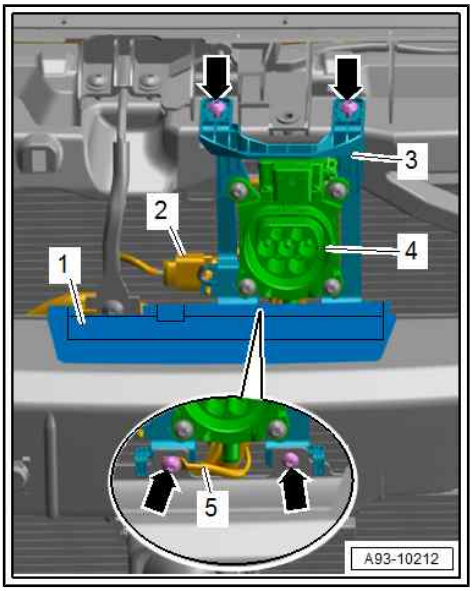


– Pull out locking element -3- -arrow A- to unplug electrical connector.
– Press release catch -4- in direction of -arrow B- and pull connector -1- approx. 5 mm to next release level.
– Press release catch -5- in direction of -arrow D- and pull connector off connector mounting -2- -arrow C-.



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– Unplug electrical connector -2-.
– Fold cover -1- to one side.
– Remove bolts -arrows-.
– Move potential equalisation line -5- to one side.
– Detach mounting -3- with socket -4- and guide wiring harness out between radiator and impact bar.



Installing

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

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

♦ ⇒ “9.1 Exploded view - charging socket”, page 683

9.4.2 Removing and installing mounting for charging socket

Removing

DANGER

High voltage can cause fatal injury.

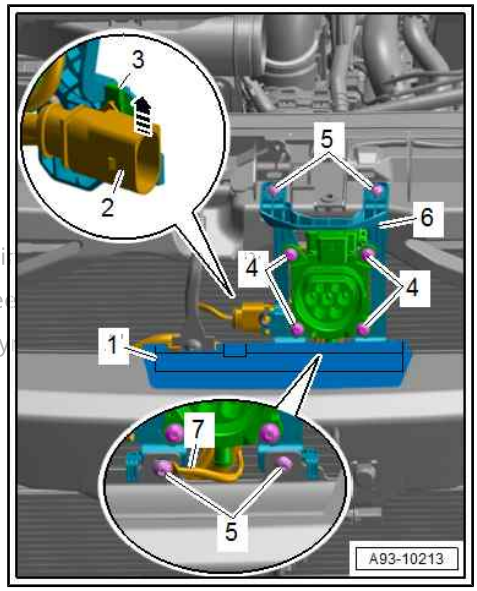
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover.

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– Release fastener -2-, press connector housing -3- out in direction of -arrow- and move connector housing clear.
– Fold rubber cover -1- forwards (as seen in direction of travel).
– Remove bolts -4, 5-.
– Move potential equalisation line -7- to one side.
– Detach mounting -3-.



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Installing

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

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

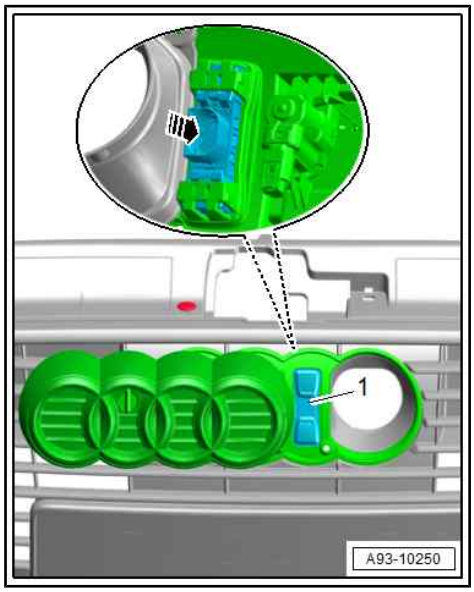
Tightening torques

◆ ⇒ “9.1 Exploded view - charging socket”, page 683

9.4.3 Removing and installing module for battery charge selector buttons - EX32-

Removing

– Open flap for charging socket.
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
– Press button module -1- out of mounting in radiator grille -arrow-.

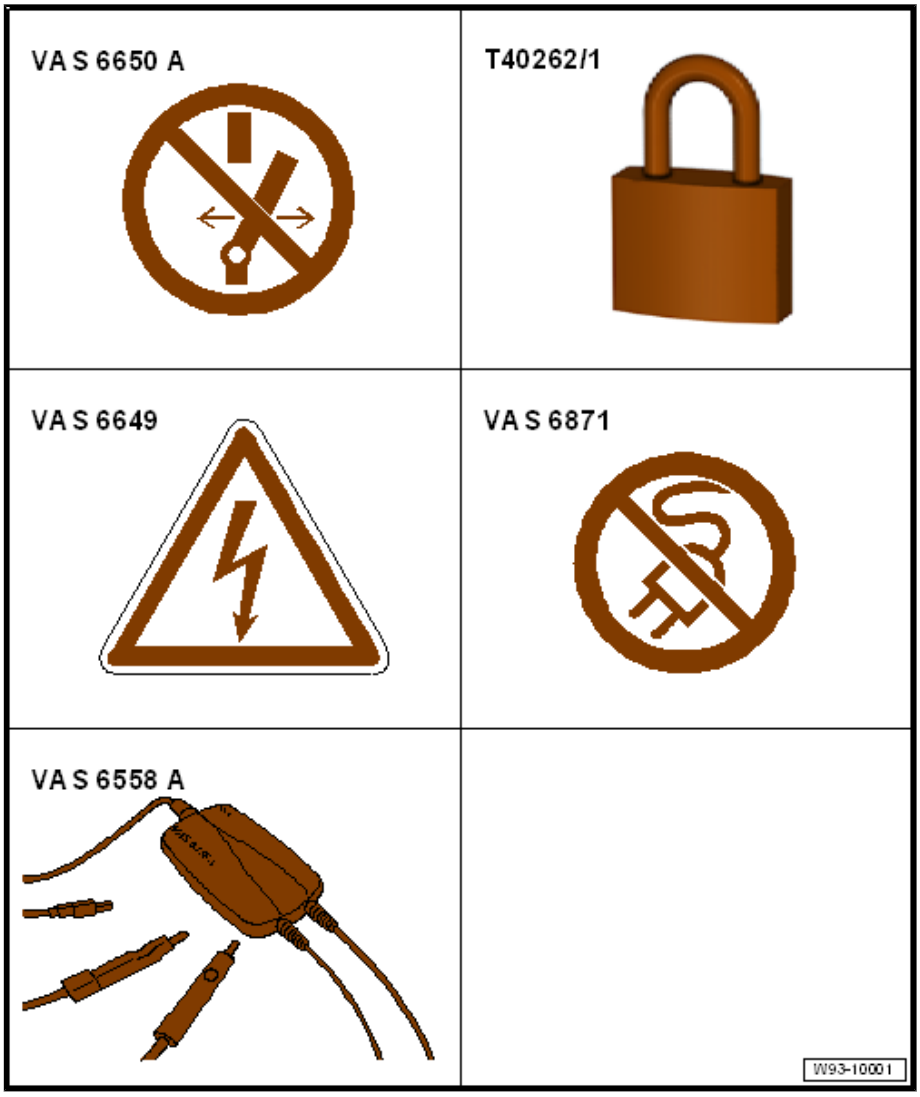


Installing

Installation is carried out in reverse sequence.

10 De-energising high-voltage system

Special tools and workshop equipment required



- Warning sign (do not turn on high-voltage system) - VAS 6650 A-
- Padlock - T40262/1-
- Hybrid vehicle warning notice (voltage) - VAS 6649-
- Warning notice (charging prohibited) - VAS 6871-
- Hybrid test module - VAS 6558 A-
- Crocodile clips - V.A.G 1594/14-
- High-voltage barrier tape - VAS 6884-

The high-voltage system must be de-energised according to the “Guided Fault Finding” routine in ⇒ Vehicle diagnostic tester, and ONLY by this method.

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DANGER

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

Procedure

De-energising high-voltage system:

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

◆ `High-voltage`

◆ `51 - High-voltage power disconnect`

– You will be requested to unplug maintenance connector for high-voltage system -TW- while running through programme.

The maintenance connector for high-voltage system - TW- is an electrical bridge between the contactors and the hybrid battery unit - AX1- and is always unplugged if the high-voltage system needs to be de-energised.

Unplugging maintenance connector for high-voltage system - TW-:

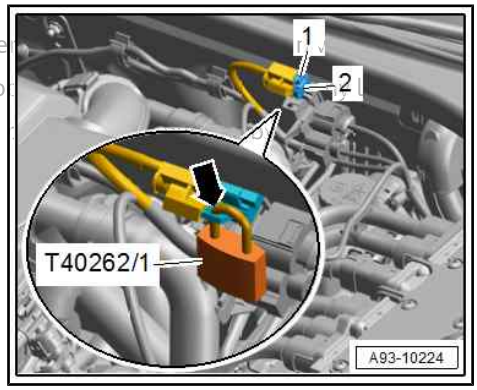
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– Press release mechanism -1- and pull out maintenance connector for high-voltage system - TW- -item 2- as far as stop.

– A suitably qualified person confirms that the system is de-energised and uses the padlock - T40262/1- -arrow- to ensure that the system cannot be re-energised.

– As an additional precaution, the ignition key and the key to the padlock - T40262/1- are then stored in a safe place by the suitably qualified person.

– The suitably qualified person marks the vehicle by attaching the appropriate warning signs.



11 Re-energising high-voltage system

The high-voltage system must be re-energised according to the “Guided Fault Finding” routine in ⇒ Vehicle diagnostic tester, and ONLY by this method.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

Procedure

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

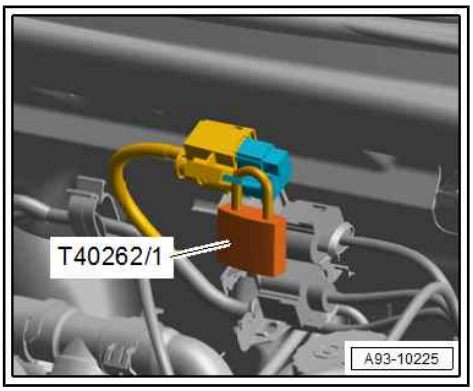
♦ `High-voltage`

♦ `51 - High-volt restart`

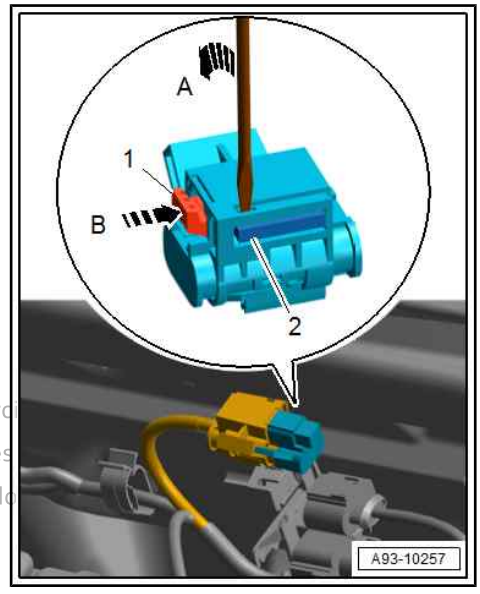
– You will be requested to plug in maintenance connector for high-voltage system -TW- while running through programme.

Plugging in maintenance connector for high-voltage system -TW-:

– Remove padlock - T40262/1- .



– Release locking element -2- using a small screwdriver -arrow A- and push maintenance connector for high-voltage system - TW- -item 1- in until it engages -arrow B-.



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12 Potential equalisation lines

⇒ “12.1 General notes - potential equalisation lines”, page 692

⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

⇒ “12.3 Removing and installing potential equalisation lines”, page 695

12.1 General notes - potential equalisation lines

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- The contact surfaces of the potential equalisation lines must be checked prior to installation.
- The contact surfaces must be clean and free of rust and grease.
- Otherwise, clean the contact surfaces using the contact surface cleaning set - VAS 6410- ⇒ Electrical system; General information; Rep. gr. 97 ; Contact surface cleaning set - VAS 6410- .

12.2 Overview of fitting locations - potential equalisation lines

⇒ “12.2.1 Overview of fitting locations - potential equalisation lines, part 1”, page 692

⇒ “12.2.2 Overview of fitting locations - potential equalisation lines, part 2”, page 694

12.2.1 Overview of fitting locations - potential equalisation lines, part 1

1 - Screen earth wire

- ❑ For charging socket

2 - Bolt

- ❑ Tightening torque ⇒ “9.1 Exploded view - charging socket”, page 683

3 - High-voltage battery charging socket 1 - UX4-

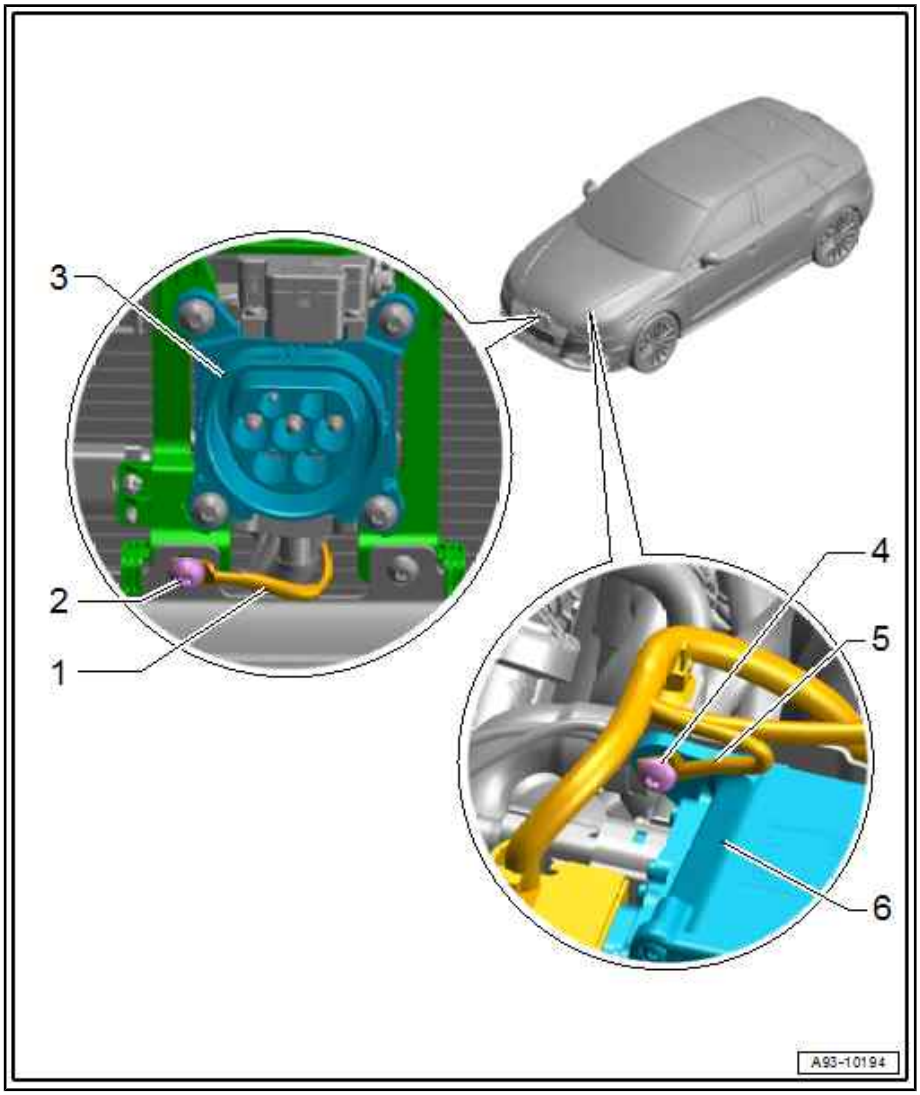
4 - Bolt

- ❑ 8 Nm

5 - Potential equalisation line

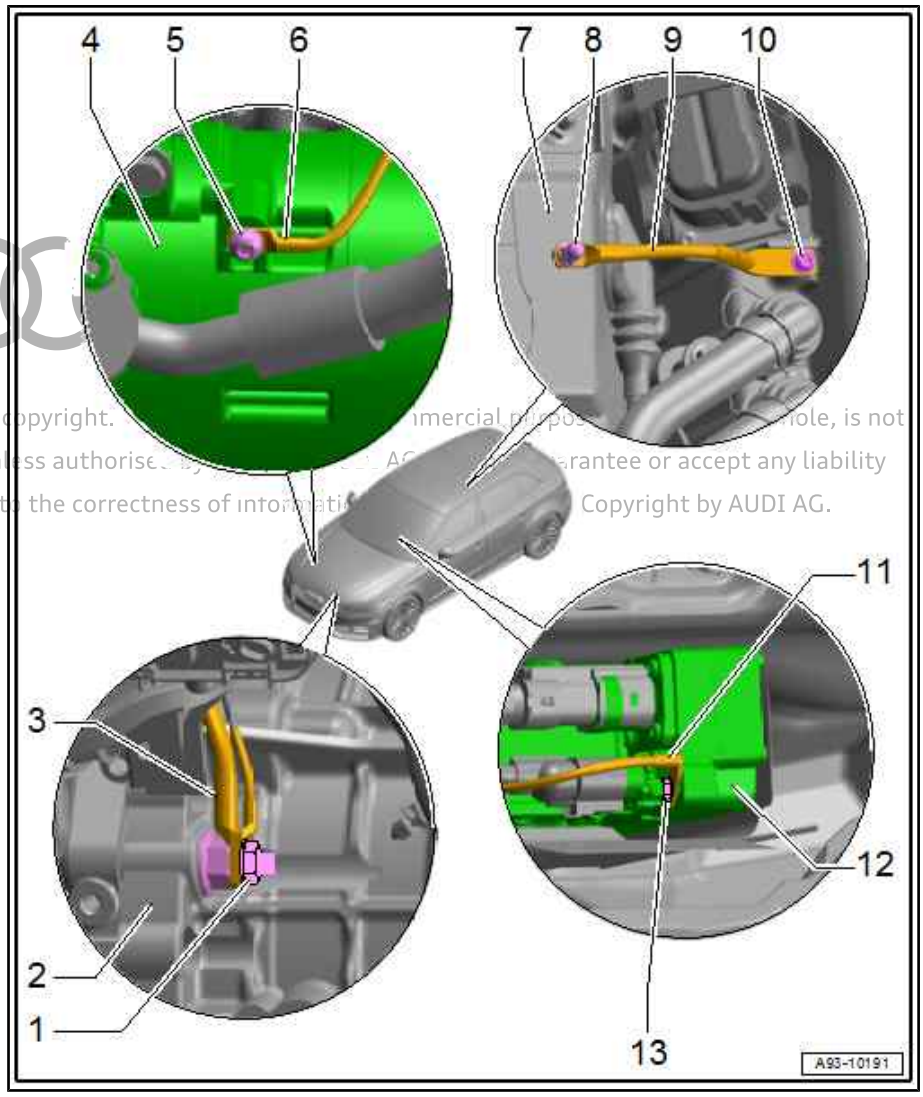
- ❑ For charging unit for high-voltage battery
- ❑ Integrated in wiring harness; cannot be renewed separately

6 - Charging unit 1 for high-voltage battery - AX4- with control unit for high-voltage battery charging unit - J1050-



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12.2.2 Overview of fitting locations - potential equalisation lines, part 2



1 - Nut
- ❑ 20 Nm

2 - Three-phase current drive - VX54-
- ❑ With electric drive motor - V141-

3 - Potential equalisation line
- ❑ For three-phase current drive with electric drive motor
- ❑ Integrated in wiring harness; cannot be renewed separately

4 - Electrical air conditioner compressor - V470-

5 - Bolt
- ❑ 9 Nm

6 - Potential equalisation line
- ❑ For air conditioner compressor
- ❑ Integrated in wiring harness; cannot be renewed separately

7 - Hybrid battery unit - AX1-

8 - Nut
- ❑ 9 Nm

9 - Potential equalisation line
- ❑ For hybrid battery unit
- ❑ Removing and installing ⇒ “12.3 Removing and installing potential equalisation lines”, page 695

10 - Bolt
- ❑ 9 Nm

11 - Potential equalisation line
- ❑ For high-voltage heater (PTC)
- ❑ Integrated in wiring harness; cannot be renewed separately

12 - High-voltage heater (PTC) - Z115-

13 - Nut
- ❑ 9 Nm

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12.3 Removing and installing potential equalisation lines

Removing

DANGER

High voltage can cause fatal injury.

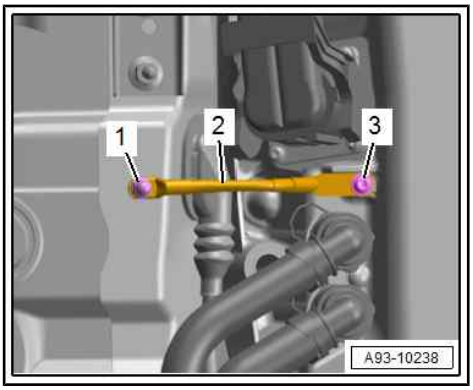
Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) de-energise the high-voltage system.

– De-energise high-voltage system
⇒ “10 De-energising high-voltage system”, page 689 .

– Remove bolt -3- and nut -1-.

– Remove potential equalisation line -2-.



Installing

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

A potential equalisation measurement must be performed on the high-voltage components affected after installation of high-voltage components or potential equalisation lines.

– Connect vehicle diagnostic tester .

– Select and start `ODIS-Service` mode.

– Select `Special functions` tab.

– Select the following:

♦ `High-voltage`

♦ `Potential equalisation measurement on high-voltage components`

♦ `8C - Potential equalisation measurement hybrid battery unit AX1`

– Start selected program and follow instructions on display of vehicle diagnostic tester.

WARNING

High voltage can cause fatal injury.

Danger of severe or fatal injuries from electric shock or electric arcs.

– Have an Audi high-voltage technician (HVT) or an Audi high-voltage expert (HVE) re-energise the high-voltage system.

– Re-energise high-voltage system
⇒ “11 Re-energising high-voltage system”, page 691 .

Tightening torques

♦ ⇒ “12.2 Overview of fitting locations - potential equalisation lines”, page 692

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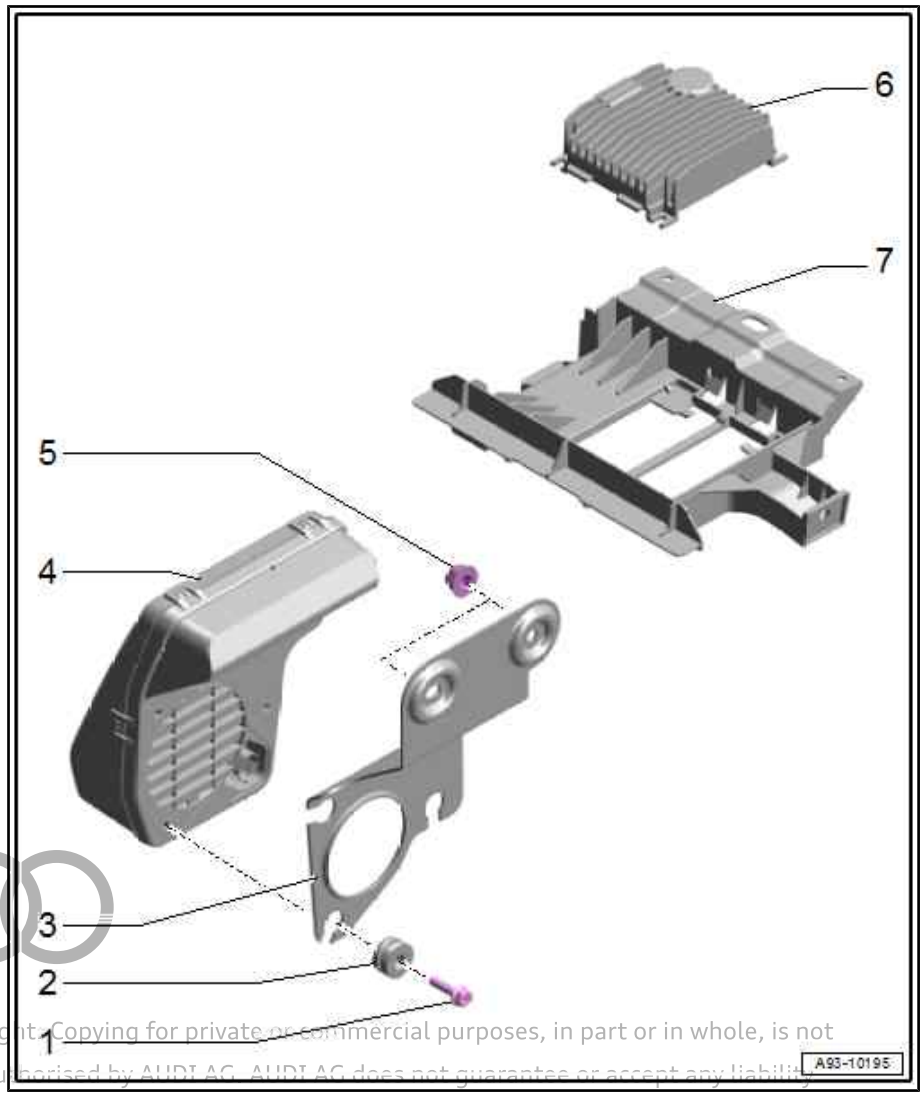
13 Engine sound generation

⇒ “13.1 Overview of fitting locations - engine sound generation”, page 696

⇒ “13.2 Removing and installing engine sound generator control unit J943 ”, page 697

⇒ “13.3 Removing and installing actuator 1 for engine sound generator R257 ”, page 697

13.1 Overview of fitting locations - engine sound generation



1 - Bolt

- ❑ 3x
- ❑ 8 Nm

2 - Rubber mounting

- ❑ 3x

3 - Bracket

- ❑ For actuator 1 for engine sound generator - R257-
- ❑ Removing and installing ⇒ “13.3 Removing and installing actuator 1 for engine sound generator R257 ”, page 697

4 - Actuator 1 for engine sound generator - R257-

- ❑ Fitting location: on longitudinal member (right-side)
- ❑ Removing and installing ⇒ “13.3 Removing and installing actuator 1 for engine sound generator R257 ”, page 697

5 - Nut

- ❑ 2x
- ❑ 20 Nm

6 - Engine sound generator control unit - J943-

- ❑ Fitting location: beneath front passenger's seat
- ❑ Removing and installing ⇒ “13.2 Removing and installing engine sound generator control unit J943 ”, page 697

7 - Bracket

- ❑ For engine sound generator control unit - J943-

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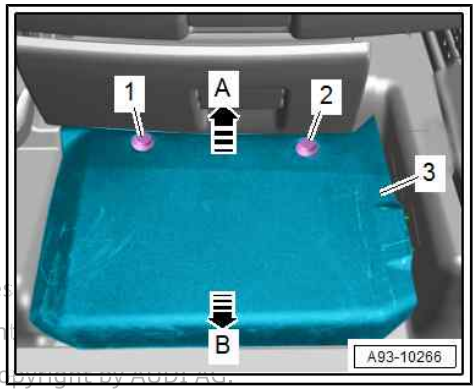
13.2 Removing and installing engine sound generator control unit - J943-

Removing

– Move front passenger's seat to the highest, rearmost position.

– Remove spreader rivets -1, 2-.

– Lift up cover -3- slightly at rear -arrow A- and slide it forwards out of mounting -arrow B-.

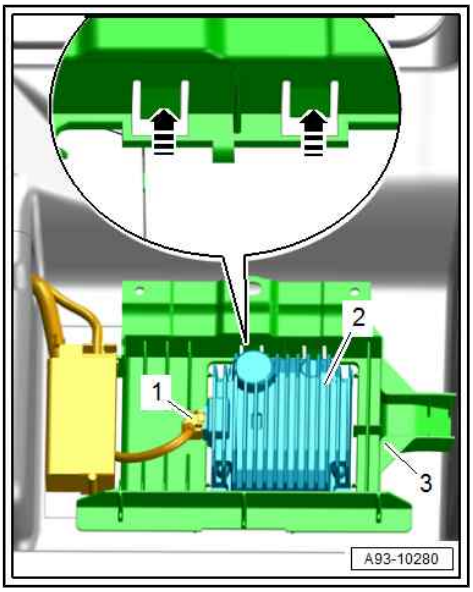


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– Release fasteners -arrows-.

– Take engine sound generator control unit - J943- -item 2- out of bracket -3-.

– Unplug electrical connector -1-.



Installing

Installation is carried out in reverse sequence.

13.3 Removing and installing actuator 1 for engine sound generator - R257-

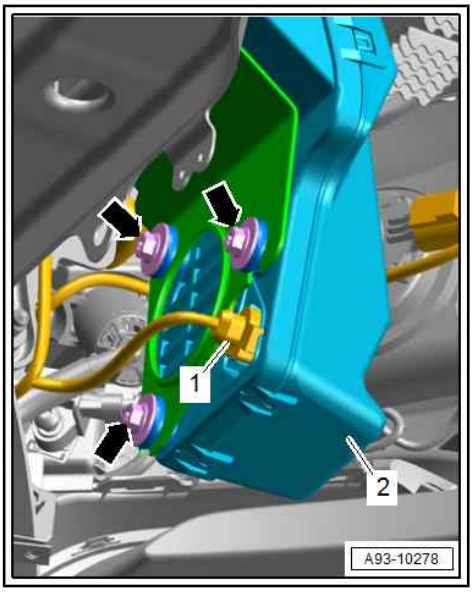
Removing

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

– Unplug electrical connector -1-.

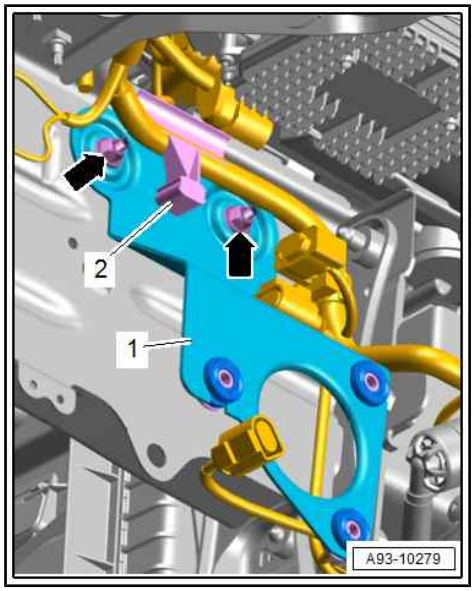
– Remove bolts -arrows-.

– Detach actuator 1 for engine sound generator - R257- -item 2-.



Removing bracket:

– Detach wheel housing liner in area of bumper.
– Move wiring bracket -2- clear.
– Remove nuts -arrows-.
– Detach bracket -1-.



Installing

Installation is carried out in reverse sequence.

Tightening torques

◆ ⇒ “13.1 Overview of fitting locations - engine sound generation”, page 696

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