List of Workshop Manual Repair Groups

Repair Group

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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.

00 – Technical data

1 Safety information

(VRL015294; Edition 02.2021)

⇒ r1.1 egulations for working on fuel supply", page 1

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1.1 Safety regulations for working on fuel supply

When working on the fuel system please note the following:

WARNING

Danger of scalding from very hot fuel.

- *In extreme cases, the temperature of the fuel and the fuel lines can reach 100°C after the engine is switched off. Allow the fuel to cool down before disconnecting the lines – risk of scalding.*
- *Wear protective gloves.*
- *Wear safety goggles.*

Risk of injury from highly pressurised fuel.

The fuel system is pressurised. Injury from fuel spray possible.

Before opening the fuel system:

– Wear safety goggles.

– Wear protective gloves.

– To release pressure, wrap a clean cloth around the connection and carefully loosen the connection.

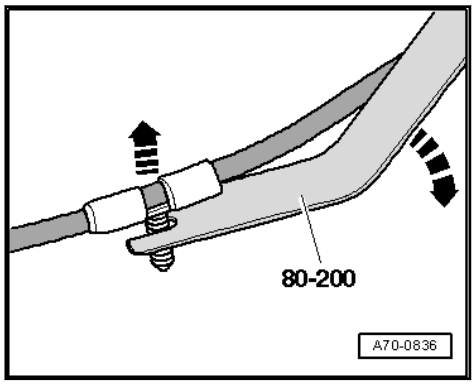
Danger of fire caused by escaping fuel

When the battery is connected and the driver door opens, the door contact switch activates the fuel pump. Escaping fuel can ignite and cause a fire.

– Disconnect voltage supply to fuel pump before opening the fuel system.

Note

For the work steps below use removal lever -80 - 200- to unclip the binding clips.



– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Assembly overview - noise insulation.

Vehicles with manual gearbox

– Detach lines from starter ⇒ Electrical system; Rep. gr. 27; Starter; Assembly overview - starter.

– Release and pull off electrical connectors on gearbox ⇒ Rep. gr. 34; Removing and installing gearbox.

– Detach clutch slave cylinder with clutch line connected ⇒ Rep. gr. 30; Clutch mechanism; Removing and installing clutch slave cylinder. Do not open hydraulic system.

– Lay clutch slave cylinder with clutch line connected to one side.

– Remove selector mechanism from gearbox ⇒ Rep. gr. 34; Selector mechanism; Removing and installing selector mechanism.

– If fitted, detach earth wire from gearbox ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes.

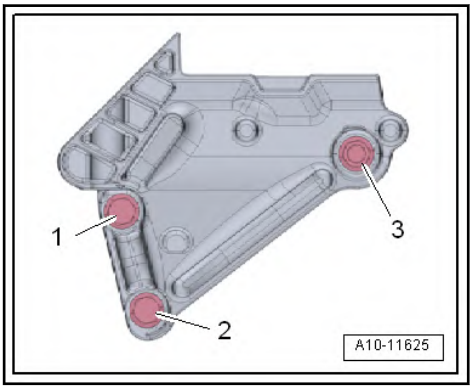
Vehicles with dual clutch gearbox:

– Release and pull off connector for mechatronic unit for dual clutch gearbox -J743- ⇒ Rep. gr. 34; Mechatronic unit.

– Detach lines from starter ⇒ Electrical system; Rep. gr. 27; Starter; Assembly overview - starter.

– Remove selector mechanism from gearbox ⇒ Rep. gr. 34; Selector mechanism; Removing and installing selector mechanism.

– If fitted, release electrical connector for auxiliary hydraulic pump 1 for gearbox oil -V475- -a-, and pull off connector -b-.



Note

Renew bolts that are tightened with turning further angle after each removal.

– Tighten bolts step-by-step in the sequence shown in -1- to -3-:

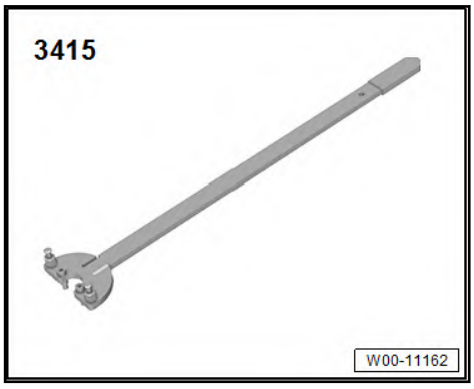
Specified torques

Stage	Bolts	Specified torque/turning further angle
1	-1- to -3-	7 Nm
2	-1- to -3-	40 Nm
3	-1- to -3-	Turn 180° further

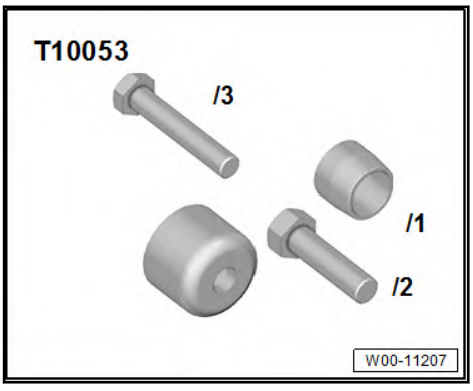
1.8 Removing and installing sealing flange on pulley end

Special tools and workshop equipment required

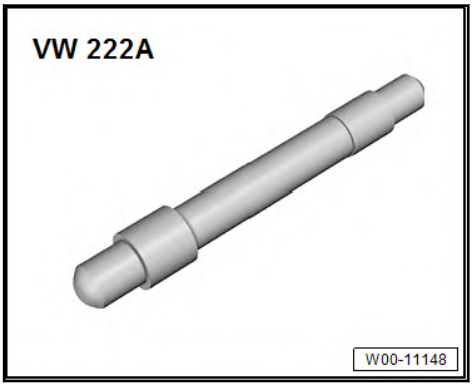
♦ Counterhold tool -3415-



♦ Assembly tool -T10053-



◆ Pin -VW 222 A-



◆ Piston ring clamp, commercially available

Removing

– Remove cylinder head ⇒ page 124 .

– Remove oil pump ⇒ page 223 .

– Mark installation position and allocation of conrod bearing caps to cylinder and conrods as an aid for reinstalling ⇒ Item 2 (page 108) .

– Unscrew conrod bearing cap.

– Withdraw piston upwards together with conrod.

Note

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

– Remove retaining ring from piston pin eye.

– Drive out piston pin using drift -VW 222 A-.

Installing

Install in reverse order of removal, observing the following:

Note

Renew bolts that are tightened with turning further angle.

– Oil running surfaces of bearing shells.

– Install piston with piston ring clamp.

Installation position:

• Piston ⇒ page 109 .

• Bearing shells in conrods ⇒ page 109 .

– Install conrod bearing cap in accordance with marking.

– Install oil pump ⇒ page 223 .

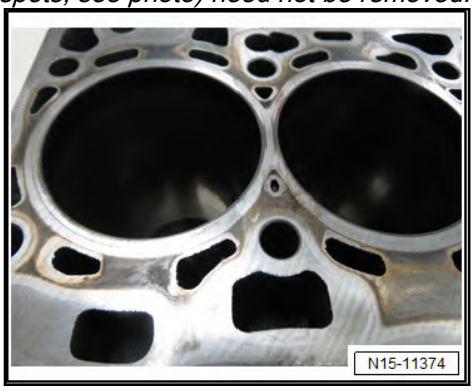
– Install cylinder head ⇒ page 124 .

Specified torques

◆ ⇒ o4.1 verview - pistons and conrods", page 107

Note

- *Do not use sandpaper, grinding wheels, abrasive or scour pads or any other sanding or abrasive media.*
- *Sealing surface (see photo) must not project.*
- *Discolouration (dark spots, see photo) need not be removed.*



- *When removing the sealant residue, make sure no loose particles get into the open channels of the engine.*
- *Ensure that all adjacent workspaces are clean, and that none of the above mentioned sanding or abrasive media are used.*
- *Using unauthorised sanding or abrasive media may lead to secondary damage such as, for example, damage to the turbocharger or the conrod bearings.*

– Only remove sealant residue from cylinder head and cylinder block using scraper -VAS 852 005- or a commercially available ceramic glass scraper.

- The sealing surfaces must not be damaged.
- There must be no oil or coolant in the bolt pockets.
- Do not remove new cylinder head gasket from packaging until it is ready to be fitted.
- If a new cylinder head is installed, contact surfaces between roller rocker fingers and running surface of cam must be oiled.
- Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.
- Turn the crankshaft carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.
- When the cylinder head or cylinder head gasket is renewed, the entire coolant and the engine oil must be changed.

– Remove any loose remains using a lint-free cloth.

– Before fitting cylinder head, remove crankshaft stop -T10490- and turn crankshaft against normal direction of rotation until all pistons are positioned approximately equally below “TDC”.

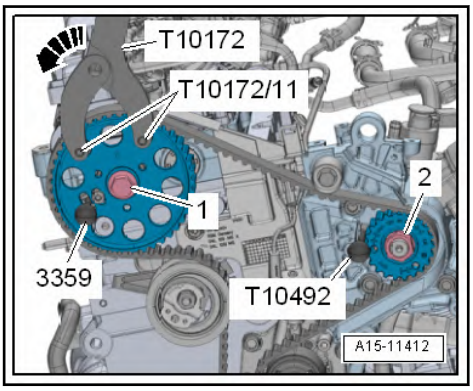
– If no dowel sleeves for centring cylinder block and cylinder head are fitted, install dowel sleeves.

– Note cylinder head gasket identification:

Caution

The torque for loosening and tightening the centre bolts on camshaft and high-pressure pump must not be transferred to the respective locking pin. Otherwise the »follower« may be damaged even if a counterhold is used. These defects may not be noticed and may result in damage to the engine. Therefore, pull out locking pin for loosening and tightening the central bolt and reinsert the locking afterwards if necessary.

– If camshaft hub can now be locked, tighten bolt -1- for camshaft toothed belt pulley to final torque using counterhold -T10172- with adapters -T10172/11- ⇒ Item 10 (page 148) .



– Tighten bolts -2- for high-pressure pump toothed belt pulley to final torque ⇒ Item 4 (page 519) (4) using counter-hold tool -T10051-.

– Check valve timing again ⇒ page 166 .

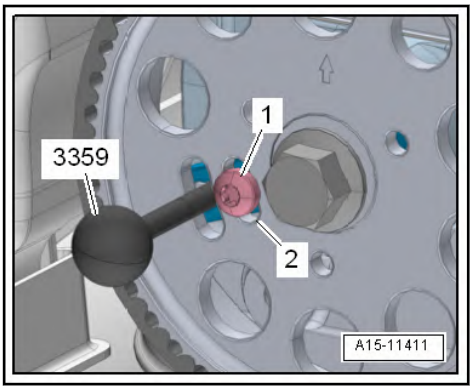
Installing

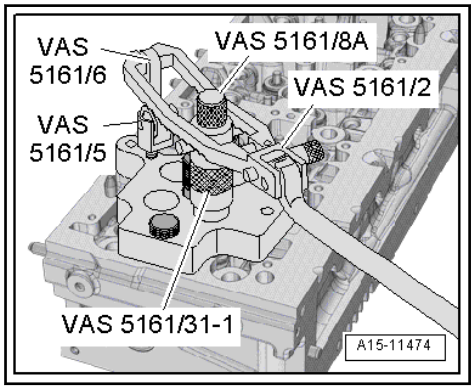
Further installation is carried out in the reverse order of removal; note the following:

Note

- *Renew seals.*
- *Secure all hose connections with hose clips corresponding to the series equipment ⇒ Electronic parts catalogue.*

– Tighten locking pin -1-.



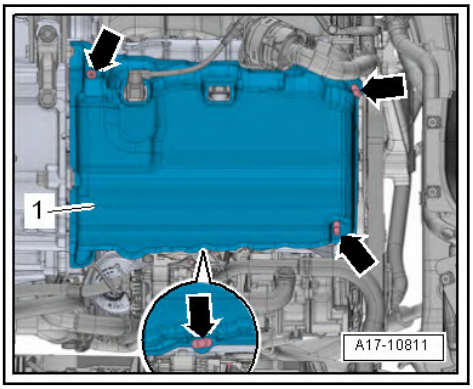


– Press pressure fork downwards and pull knurled screw upwards, turning it clockwise and anticlockwise. This inserts the valve cotters.
– Reduce pressure on pressure fork whilst pulling on knurled screw.
– Repeat procedure on each valve.

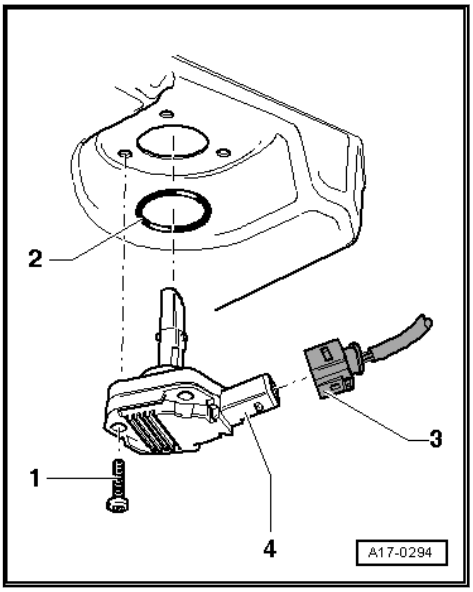
Installing

Assembly is carried out in reverse sequence; note the following:

– Ensure that all roller rocker fingers contact valve stem ends correctly and are clipped into relevant hydraulic compensation elements.
– Install camshaft housing ⇒ page 139 .



– To do this, pull pins out of spreader rivets.
– Unscrew bolts -1- and remove oil level and oil temperature sender -G266- -item 4-.



Installing

Install in reverse order of removal, observing the following:

• Specified torque ⇒ o1.1 verview - sump/oil pump", page 203

Note

Renew seal -2- and self-locking bolts -1-.

– Replenish engine oil, and check oil level ⇒ Maintenance; Booklet .

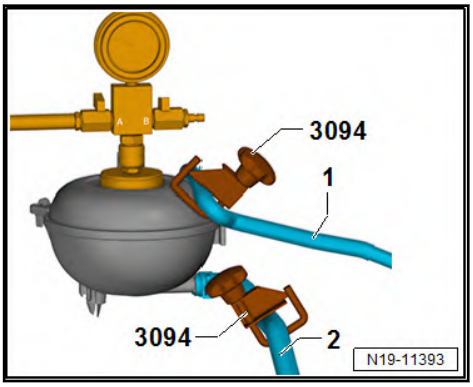
1.7.2 Removing and installing oil level and oil temperature sender -G266-, vehicles with two-piece sump

Removing

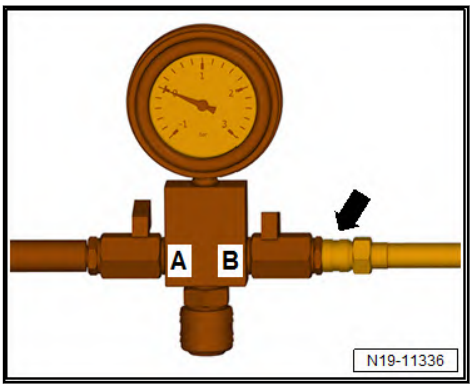
– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Assembly overview - noise insulation.
• Engine oil drained ⇒ Maintenance; Booklet .
– Detach noise insulation for sump ⇒ page 209 .

– If conditions are met, cooling system can be filled ⇒ page 265 .

If water separator in electric vacuum pump fills with coolant, coolant expansion tank must be purged:

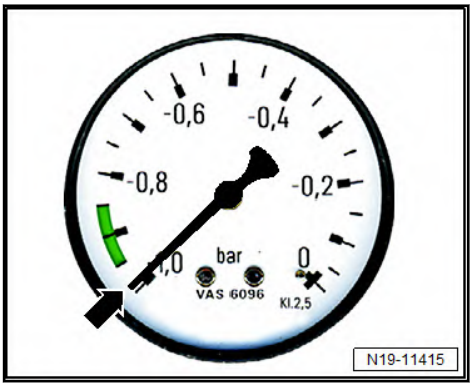


– Close shut-off valve -B- and switch off electric vacuum pump.
– Seal supply hose -2- and return hose -1- of coolant expansion tank with hose clamps up to 25 mm -3094-.
– Pull off plug-in connector -arrow- and open shut-off tap -B- so that coolant expansion tank is vented.

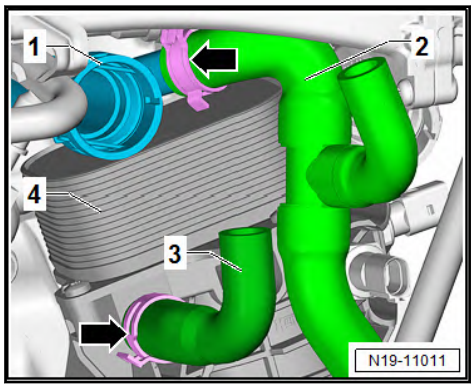


– Remove cooling system charge unit -VAS 6096- and test adapter -VAS 691 005/5-.
– Extract coolant from coolant expansion tank.
– Re-assembly cooling system charge unit and test adapter and remove hose clips.
– Switch on electric vacuum pump and generate vacuum again.

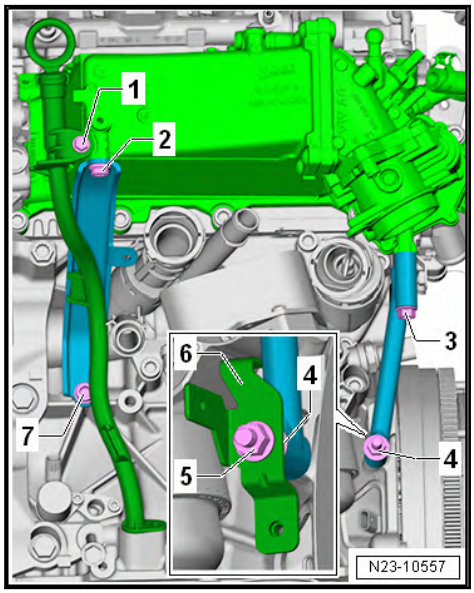
Fill cooling system:



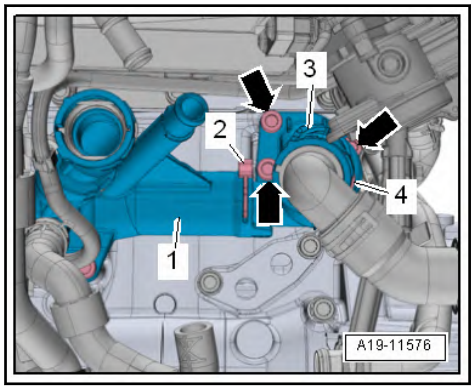
– Remove front coolant connection ⇒ page 295 .
– Remove front coolant pipes ⇒ page 335 .
– Loosen hose clip at top -arrow-.



– Pull coolant hose -2- off thermostat housing -1-.
– Unscrew nut -5- and remove bracket -6- from centre hex stud -4-.



– Unscrew bolts -3- and -4-.
– Remove support, and push wiring harness to one side.
– Lift retaining clip -4- and disconnect coolant hose.



– Unscrew bolts -arrows-.

Note

The radiator mounting will be reused when reinstalling the radiator. It will then be bolted to lock carrier. For bolts, refer to ⇒ Electronic parts catalogue (ETKA).

– Pull charge air cooling circuit radiator upwards out of mountings.

– Remove radiator for charge air cooling circuit downwards.

Installing

Install in reverse order of removal. Observe the following:

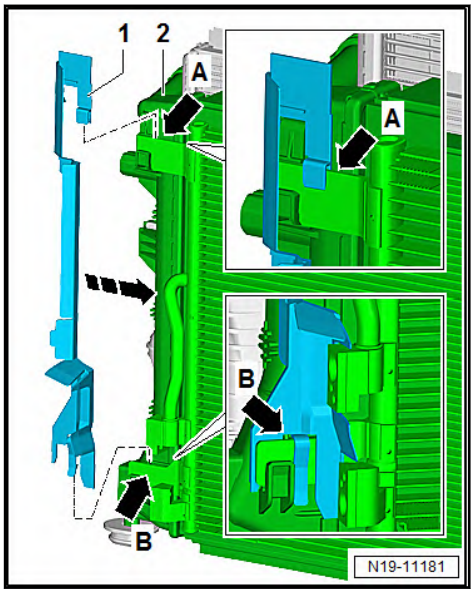
Note

If there are minor dents in the fins, refer to ⇒ page 9 .

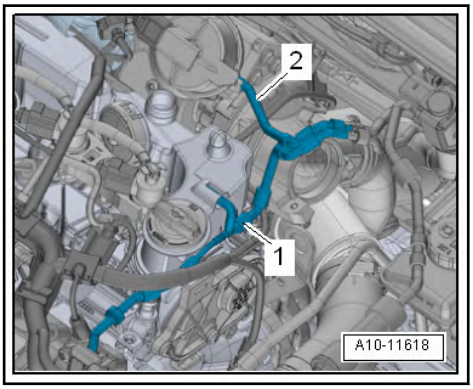
– Renew O-rings if damaged.

– Swing radiator for charge air cooling circuit into lock carrier. Ensure proper seating of radiator mountings in lock carrier.

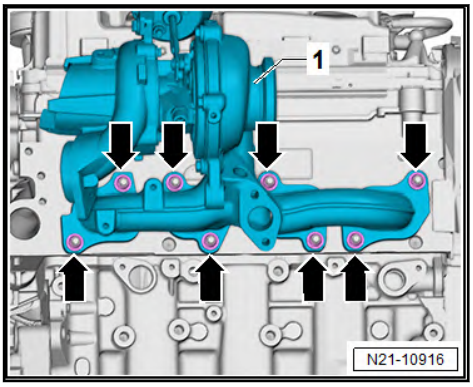
– Install sealing strip -1- on right between radiator and condenser -2- as shown -arrow A- and -arrow B-.



– Install sealing strip -1- on left between radiator and condenser -2- as shown -arrow A- and -arrow B-.



– Unscrew nuts -arrows-, detach turbocharger with exhaust manifold -1- from cylinder head, and remove it upwards.



Installing

Install in reverse order of removal, observing the following:

Note

- *Renew seals, gaskets, O-rings and self-locking nuts after removal.*
- *Fill turbocharger with engine oil at connection for oil supply line.*
- *Hose unions and air intake pipes and hoses must be free of oil and grease before installation.*
- *Secure all hose connections with hose clips corresponding to the series equipment ⇒ Electronic parts catalogue.*
- *After installing turbocharger, run engine for about 1 minute at idling speed to ensure that oil is supplied to turbocharger. Do not rev engine immediately.*

– Observe 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 rear coolant pipe ⇒ page 344 .

– Install bracket for exhaust gas recirculation cooler ⇒ page 639 .

– Install exhaust gas recirculation cooler ⇒ page 640 .

– Install catalytic converter or particulate filter ⇒ page 553 .

♦ ⇒ r3.6 eturn flow rate of injectors at starter speed", page 454

3.5 Checking return flow rate of injectors with engine running

A - Checking return flow rate of all injectors

Special tools and workshop equipment required

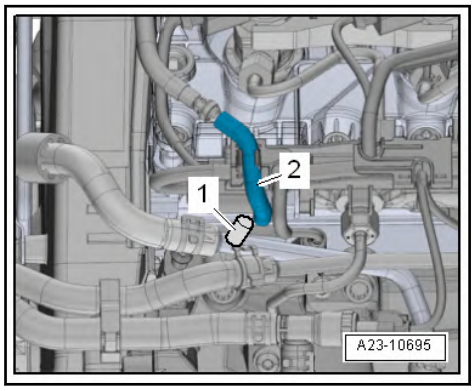
♦ Measuring container, fuel-resistant

Procedure

– Observe rules for cleanliness ⇒ page 8 .

– Remove engine cover panel ⇒ page 58 .

– Disconnect hose connection -2- at fuel return line.



– Seal open return connection with a blanking plug -1-.

– Hold fuel return hose -2- (added an extension to it if necessary) in measuring vessel to measure total return flow.

– Start engine, and run it at idling speed for 2 minutes.

• Specified amount in 2 minutes: 0 ml to 50 ml

– If specification is achieved, increase engine speed to between 2,000 and 2,500 rpm for approx. 2 minutes, and check return flow rate again.

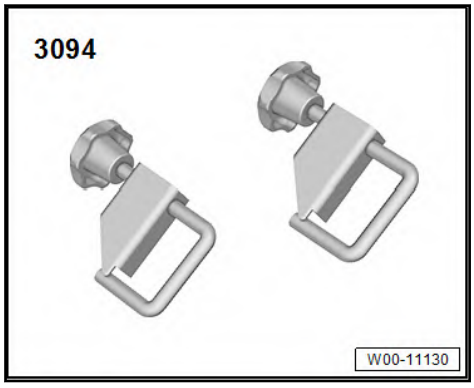
• Specified amount in 2 minutes: less than 250 ml

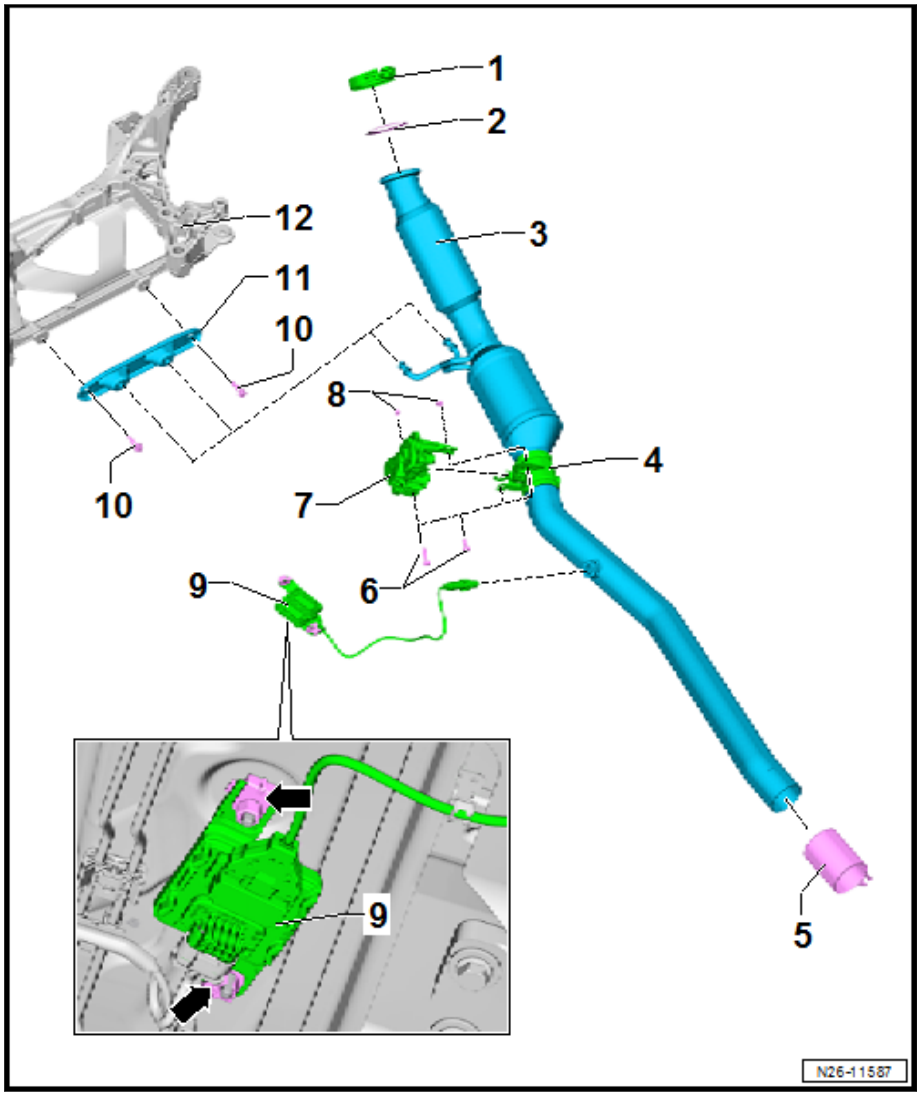
If more fuel is returned than the specified amount, one or more injectors are defective. Checking return flow rate of each individual injector.

B - Checking return flow rate of individual injectors

Special tools and workshop equipment required

♦ Hose clamps to 25 mm -3094-





1 - Screw-type clamp

- ❑ Renew after removal
- ❑ Observe installation position. Clamp should not be in contact with components
- ❑ 7 Nm
- ❑ For allocation, refer to ⇒ Electronic Parts Catalogue

2 - Seal

- ❑ Renew after removal
- ❑ Note installation position ⇒ page 539

3 - Front exhaust pipe

- ❑ Removing and installing ⇒ page 539

4 - Exhaust flap

- ❑ Not fitted in all vehicles

5 - Clamping sleeve

- ❑ Align exhaust system free of tension before tightening ⇒ page 544 .
- ❑ Fitting position ⇒ page 545
- ❑ Specified torque ⇒ page 546
- ❑ Tighten threaded connections evenly.

6 - Bolt

- ❑ 10 Nm
- ❑ Not fitted in all vehicles

7 - Exhaust flap control unit -J883-

- ❑ Removing and installing ⇒ page 567
- ❑ Not fitted in all vehicles

8 - Nut

- ❑ Not fitted in all vehicles

9 - NOx sender 2 -G687-/control unit for NOx sender 2 -J881-

- ❑ Removing and installing ⇒ page 497
- ❑ Not fitted in all vehicles
- ❑ Renew bracket -arrows- after each removal
- ❑ NOx sender 2 -G687- to front exhaust pipe: 52 Nm

10 - Bolt

- ❑ 20 Nm

11 - Bracket

- ❑ Renew if damaged

12 - Subframe

- ❑ ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Assembly overview - subframe