

15 – Cylinder Head, Valve Gear

15-1 Removing and installing cylinder head

Summary of components

Removing and installing toothed belt ⇒ Chap. 13-2

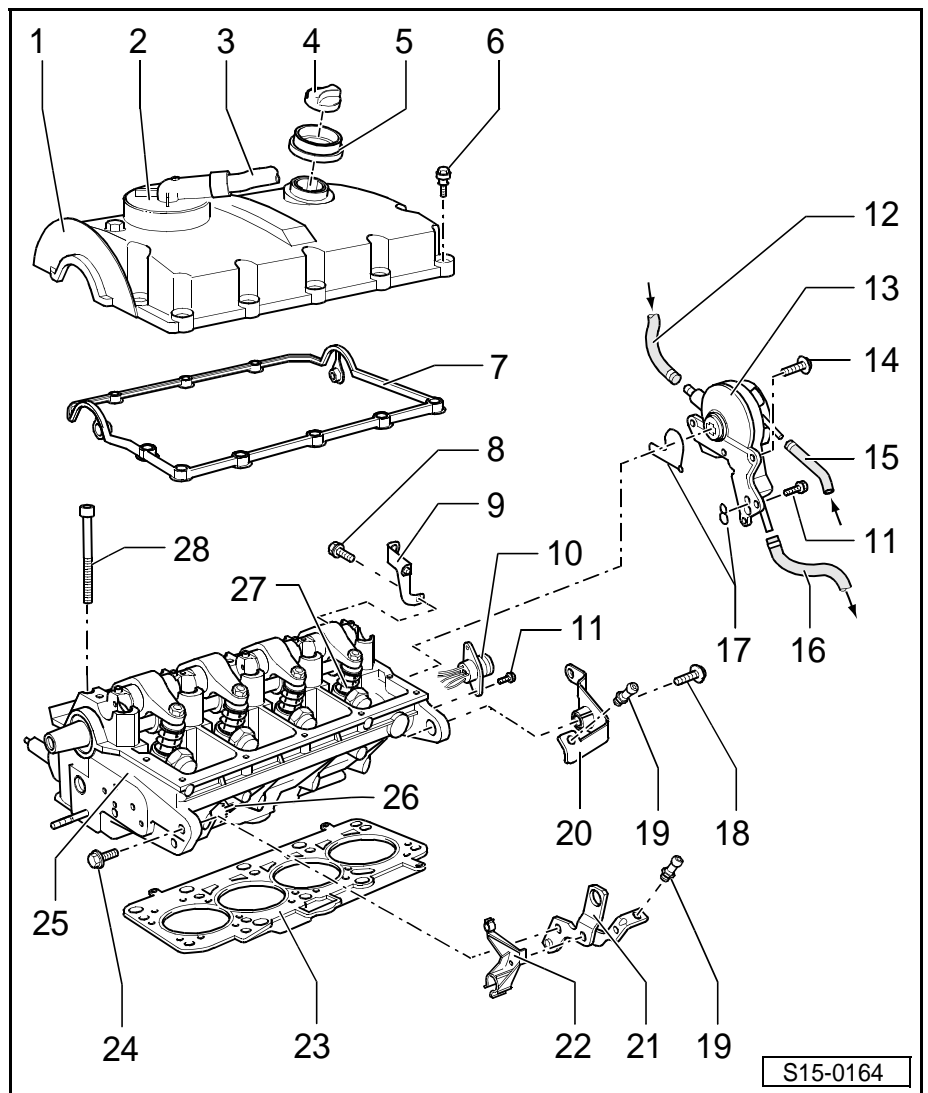
Testing compression pressure ⇒ **15-1** page 6.



Note

- ◆ When installing a replacement cylinder head with fitted crankshaft moisten the contact surfaces between the bucket tappet and the cam slide with engine oil.
- ◆ Factory-fitted plastic washers intended to protect the open valves must only be removed shortly before inserting the cylinder head.
- ◆ If the cylinder head is replaced, the system must be completely filled with fresh coolant.
- ◆ Reworking of cylinder heads on diesel engines is not allowed.

- 1 - Cylinder head cover**
 - before inserting thoroughly clean the contact surface of the cylinder head with a clean cloth.
- 2 - Pressure control valve**
 - for crankcase ventilation
- 3 - to exhaust turbocharger**
- 4 - Closing cover**
 - replace seal if damaged
- 5 - Sealing cup**
 - replace if damaged
- 6 - Hexagon collar bolt with guide bushing, 10 Nm**
 - first tighten all screws by hand
- 7 - Gasket for cylinder head cover**
 - replace if damaged
- 8 - 20 Nm**
 -
- 9 - Lifting eye**
- 10 - Central socket connector**
 - for pump-nozzle unit
- 11 - 10 Nm**
- 12 - from brake servo unit**
- 13 - Tandem pump**
 - for fuel and vacuum supply
 - removing and installing ⇒ Chap. 20-2
 - inspecting ⇒ 20-2
- 14 - 25 Nm**
- 15 - intake hose**
 - from fuel filter ⇒ Chap. 20-1
 - white marking



S15-0164

- check tightness
 - secure with spring band clamps
- 16 - Return-flow hose**
- to fuel filter ⇒ Chap. 20-1
 - blue marking
 - check tightness
 - secure with spring band clamps
- 17 - Gasket**
- replace
- 18 - 20 Nm**
- 19 - Ball knob screw, 8 Nm**
- 20 - Bracket**
- for engine cover
- 21 - Lifting eye**
- with bracket for engine cover
- 22 - Bracket**
- for coolant hose
- 23 - Cylinder head gasket**
- replace
 - Pay attention to identification ⇒ Fig. 2 in **15-1** page 3
- 24 - 20 Nm**
- 25 - Cylinder head**
- check for distortion ⇒ Fig. 1 in **15-1** page 2
 - removing and installing ⇒ **15-1** page 3
 - after replacing, fill entire system with fresh coolant
- 26 - Glow plug**
- 15 Nm
 - inspecting ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 28
- 27 - pump-nozzle unit**
- removing and installing ⇒ 1.9/74 TDI engine, Fuel Injection; Rep. Gr. 23
- 28 - Cylinder head bolt**
- replace
 - Sequence for loosening and tightening ⇒ **15-1** page 3
 - with the camshaft bearing caps removed insert the special washers in the cylinder block before fitting the cylinder head screws ⇒ Chap. 15-2

Fig. 1: Inspecting cylinder head for distortion

Special tools, test and measuring equipment and auxiliary items required

- ◆ Feeler gauge
- ◆ Knife-edge straightedge

Max. permissible distortion: 0.1 mm

Note

Reworking of cylinder heads on diesel engines is not allowed.

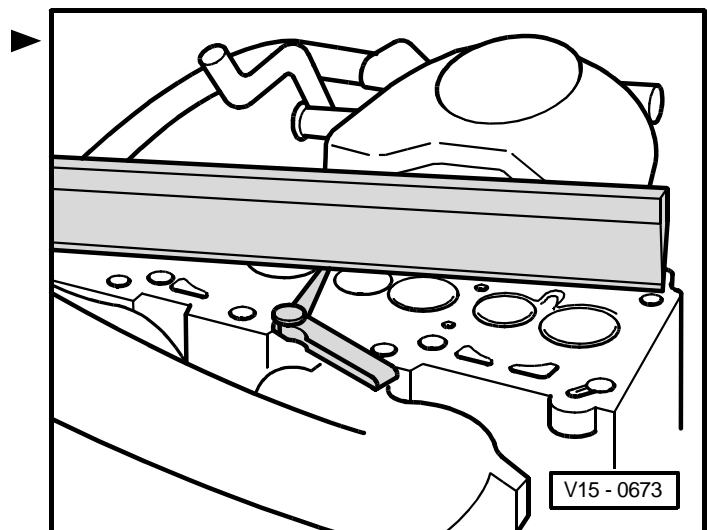
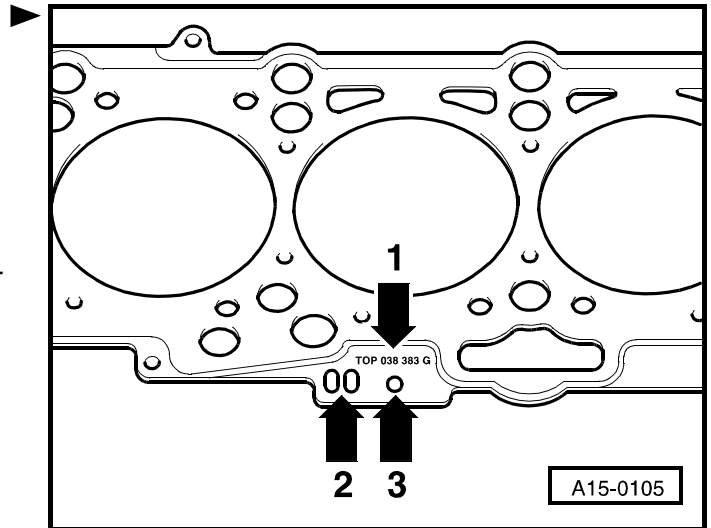


Fig. 2: Cylinder head seal identification

- ◆ Spare part No. = -arrow 1-
- ◆ Control code = -arrow 2- (disregard!)
- ◆ Orifices = -arrow 3-

Note

Cylinder head seals of different thicknesses are fitted depending on the piston projection from the cylinder block. If only the seal is replaced the new seal must bear the same identification.



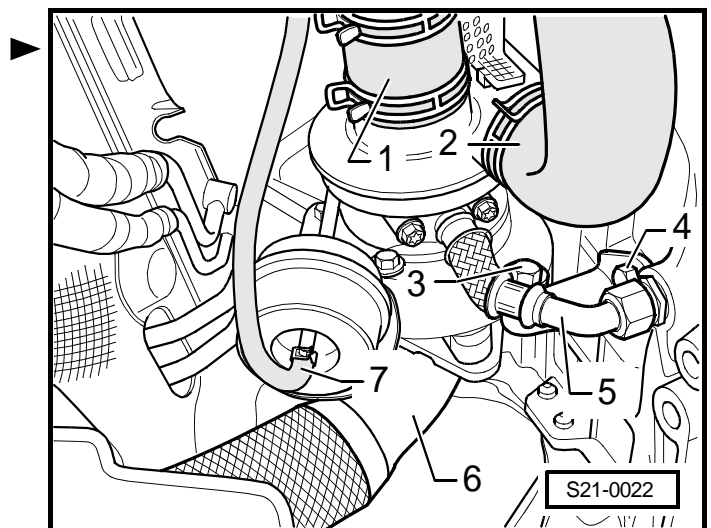
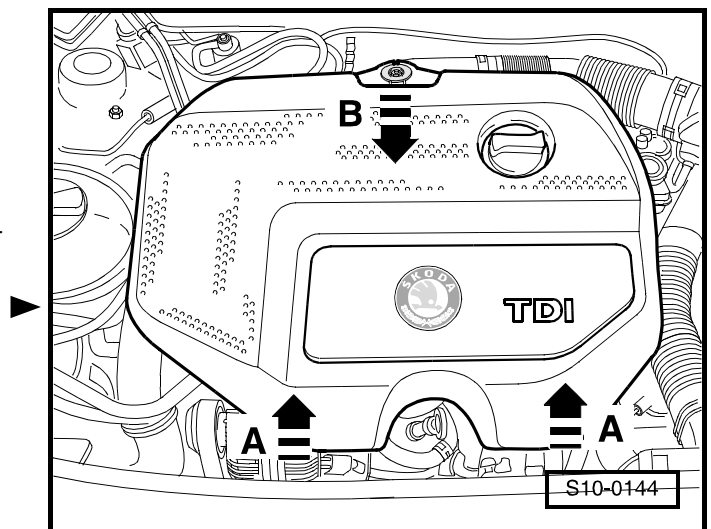
Removing and installing cylinder head

Special tools, test and measuring equipment and auxiliary items required

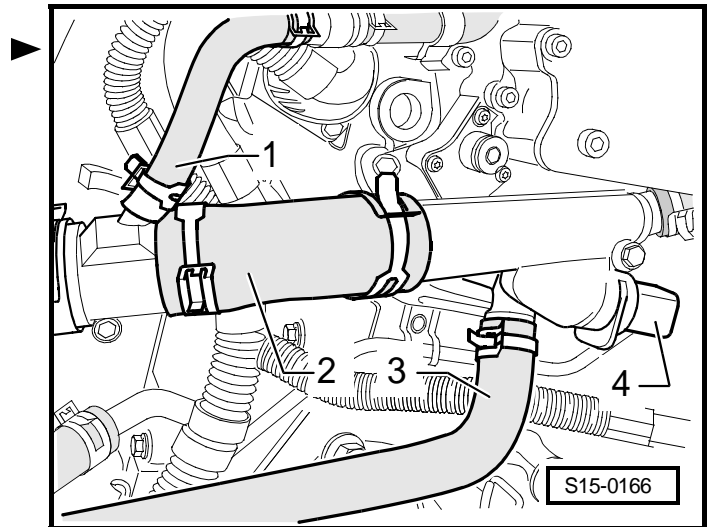
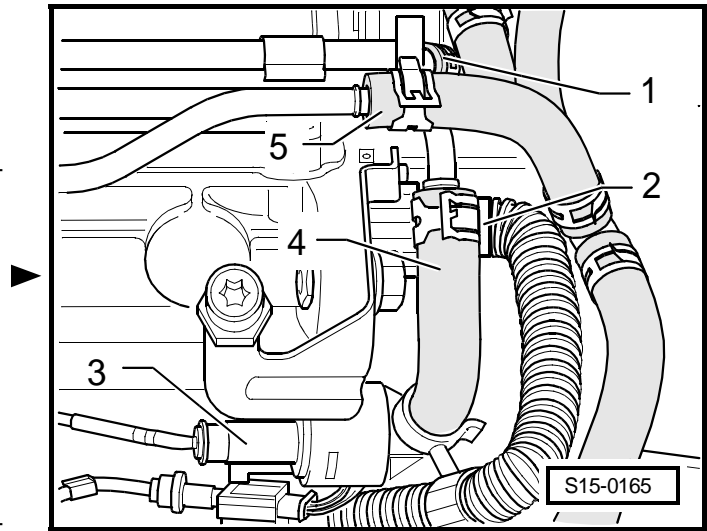
- ◆ Catch pan (e.g. -V.A.G 1306-)
- ◆ Lifting device -MP 9-200-
- ◆ Bracket -T10014-
- ◆ Torque wrench 5...50 Nm (e.g. -V.A.G 1331-)
- ◆ Torque wrench 40...200 Nm (e.g. -V.A.G 1332-)
- ◆ Pliers for spring strap clips
- ◆ Snap hook
- ◆ Workshop crane

Removing

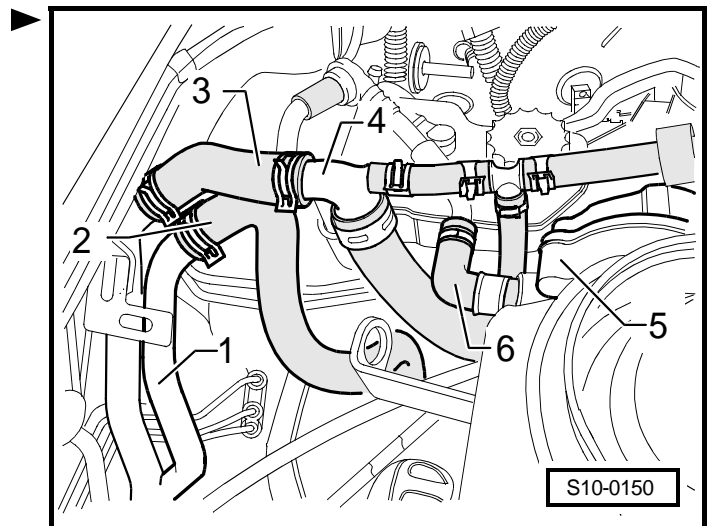
- On models fitted with a coded radio set, pay attention to the coding; determine if necessary.
- Disconnect the earth strap from the battery with the ignition off.
- Removing engine cover ⇒ Chap. 10-1.
- Remove air filter with intake hose ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 23.
- Remove battery and battery tray ⇒ Electrical System; Rep. Gr. 27.
- Removing charge air pipe at the rear ⇒ Chap. 21-1.
- Unplug connector with glow plugs.
- Remove front exhaust pipe with catalyst -6-.
- Remove hoses -1- and -2- from the exhaust turbo-charger. First unscrew the charge air pipe at the bottom of the engine bracket - risk of fracture!
- Unscrew the oil return-flow line -5- on the cylinder block ⇒ Chap. 21-1.
- Release screw -3- of the support, release screw -4- and swivel the support down.
- Remove the vacuum hose -7- from the vacuum unit for boost-pressure control.
- Drain coolant ⇒ Chap. 19-1.



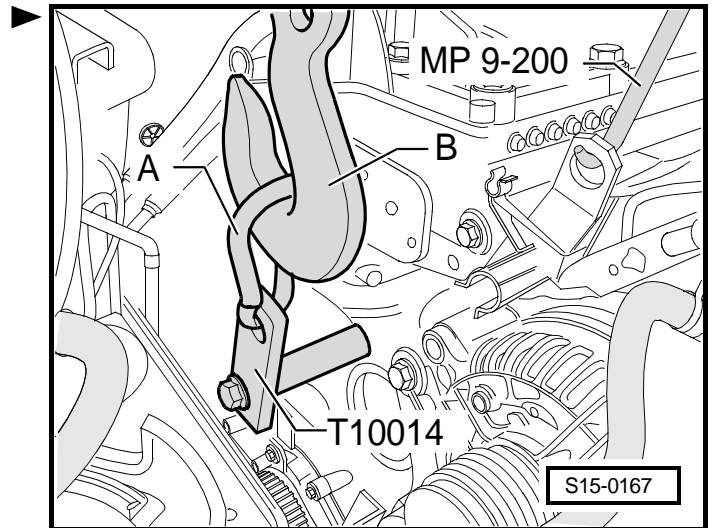
- Unscrew the induction pipe from the intake manifold and lay aside with the hoses connected ⇒ 1.9/74 TDI Engine - Fuel Injection; Rep. Gr. 23.
- Release screws from the cylinder head cover.
- Extract the fuel with a manual vacuum pump and ventilation reservoir from the return hose of the tandem pump ⇒ Chap. 20-2.
- Remove fuel hoses -1- and -4-.
- Remove coolant hose -5-.
- Remove plug -2- for the central socket connector for the pump-nozzle unit.
- Disconnect plug -3- from the fuel temperature sender -G81-.
- Unscrew the oil feed line on the oil filter holder, the exhaust turbocharger and brackets.
- Disconnect coolant hose -1- from T-piece and the coolant hoses -2- and -3- from the connection fittings.
- Disconnect plug -4- from the coolant temperature sender -G62-.



- Remove the coolant hose -3- from the supports -4-.
- Pull off vacuum hose -6- from tandem pump -5-.
- Removing the toothed belt ⇒ Chap. 13-2.
- Turn the crankshaft slightly back from the TDC position.
- Remove the camshaft timing gear and the hub ⇒ Chap. 15-3.
- Removing coolant pump ⇒ Chap. 19-2.
- Removing camshaft position sensor -G40- and toothed belt guard at rear ⇒ Chap. 13-2.



- Screw holder -T10014- with snap hook -A- into the front threaded bore of the removed engine support bracket above the coolant pump and take up engine weight with workshop crane -B-.
- Dismantle supporting device -MP 9-200-.



- Release the cylinder head bolts in the given sequence and remove.
- Carefully remove the cylinder head.



Note

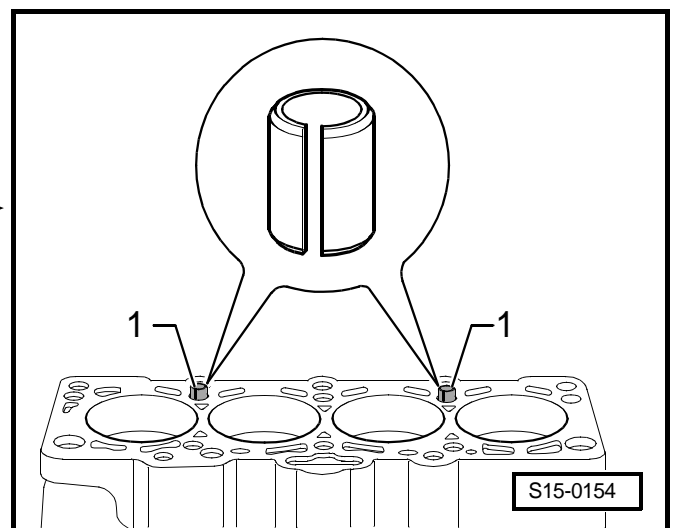
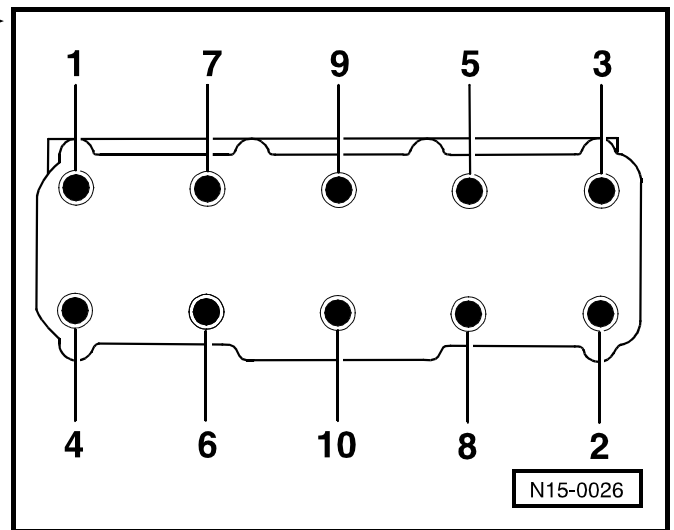
The assistance of a second mechanic is required to remove and install the cylinder head.

Installing



Note

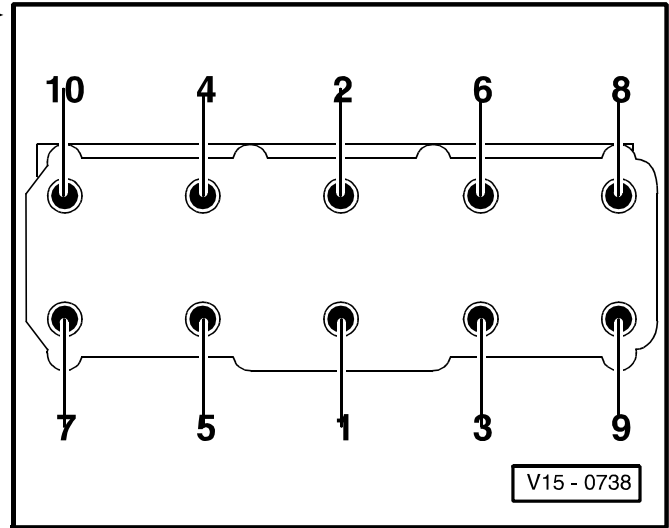
- ◆ Always replace the cylinder head bolts.
 - ◆ There must be no oil or coolant in the blind holes of the cylinder head bolts in the cylinder block.
 - ◆ Remove the new cylinder head seal from its wrapping immediately before fitting.
 - ◆ In the event of repairs carefully remove residual sealant from the cylinder head and cylinder block. Make sure this does not cause any extended scoring or scratching. When using emery paper the grain must not be less than 100.
 - ◆ Carefully remove lubrication and grinding residues.
 - ◆ Treat the new seal with the utmost care. Any damage will result in leaks.
- Before fitting the cylinder head position the crankshaft on TDC marking.
 - Turn crankshaft back against the running direction of the engine until all pistons are almost evenly at TDC.
 - Check whether the 2 dowel sleeves -1- that guide the cylinder head are located in the cylinder block, if necessary insert.
 - Position the new cylinder heads. The legend (spare part No.) must be legible.
 - Position cylinder head, insert new cylinder head bolts and tighten by hand.



- Screw down the cylinder head in four stages in the indicated tightening sequence:
 1. Pre-tighten with torque wrench:
 - Stage I = 40 Nm
 - stage II = 60 Nm
 2. Tighten further with a rigid wrench:
 - Stage III = $\frac{1}{4}$ turn (90°)
 - Stage IV = $\frac{1}{4}$ turn (90°)
- After securing the cylinder head or the camshaft timing gear turn the camshaft in such a way that the cams for cylinder 1 point upwards evenly.

The further assembly is carried out in reverse order to disassembly.

- Installing the toothed belt, tightening ⇒ Chap. 13-2.
- Top up coolant ⇒ Chap. 19-1.
- Interrogate fault memory and erase ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 01.



Testing compression

Test condition

- Engine oil temperature min. 30 °C

Special tools, test and measuring equipment and auxiliary items required

- ♦ Torque wrench 5...50 Nm (e.g. -V.A.G 1331-)
- ♦ Compression pressure gauge, (e.g. -V.A.G 1763-)
- ♦ Adapter (e.g. -V.A.G 1381/12-)
- ♦ Flexible-head wrench for glow plugs

Test sequence

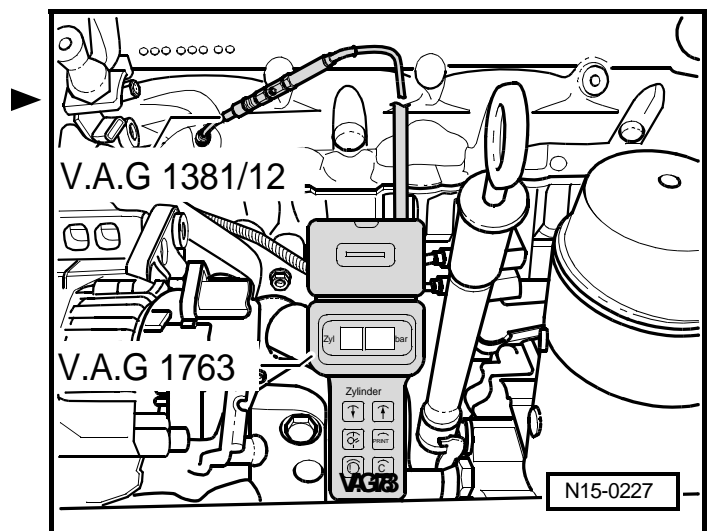
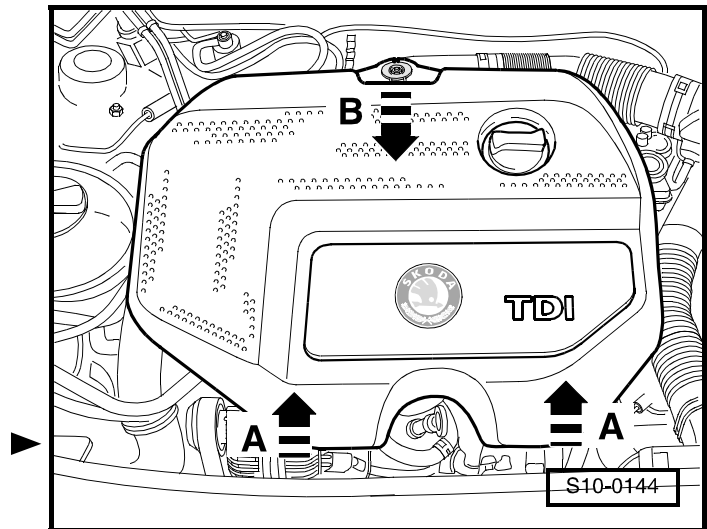
- Removing engine cover ⇒ Chap. 10-1.
- Remove central socket connector for pump-nozzle unit.
- Remove all glow plugs with the flexible-head wrench for glow plugs.
- Screw in adapter instead of the glow plugs.
- Check compression pressure with the compression gauge.

Note

Use of tester ⇒ Operating Instructions.

- Operate starter until the tester no longer indicates a pressure rise.

Compression readings:



new engine	Wear limit	Pressure difference between cylinders
2,5...3.1 MPa	1.9 MPa	max. 0.5 MPa

- Screw in glow plugs with flexible-head wrench.
Tightening torque: 15 Nm
- Interrogate fault memory and erase: ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 01

**Note**

Faults are stored when the plug connection is separated from the pump-nozzle unit.

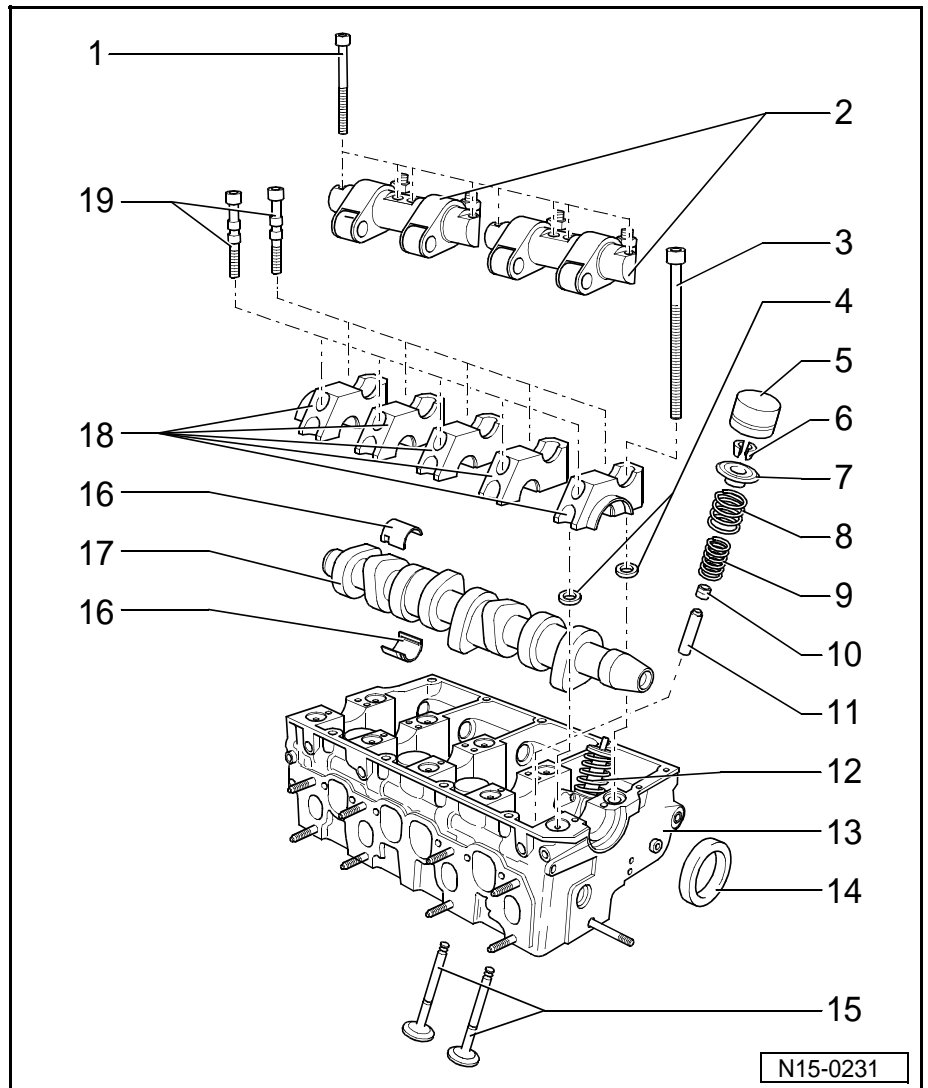
15-2 Repairing Valve Gear



Note

Cylinder heads with cracks between the valve seats may continue to be used without any reduction in life provided these are slight incipient cracks which are not more than 0.5 mm wide.

- 1 - 20 Nm + torque a further 1/4 turn (90°)**
 - replace
 - Pay attention to tightening and release sequence ⇒ Chapter 15-3
- 2 - Valve-lever shaft**
 - do not interchange
- 3 - Cylinder head bolt**
 - Pay attention to tightening and release sequence ⇒ Chapter 15-1
 - before fitting insert washers ⇒ item 4 in the cylinder head
- 4 - Washer**
 - for cylinder head screws
 - insert in cylinder head before fitting the bearing cap
- 5 - Bucket tappets**
 - do not interchange
 - with hydraulic valve clearance compensation
 - lay aside with contact surface facing down
 - before installing check axial play of the camshaft ⇒ Fig. 1 in **15-2** page 2
 - oil contact surface
 - before removing remove the camshaft bearing shells
- 6 - Collets**
- 7 - Valve spring retainer**
- 8 - Valve spring outside**
 - removing and installing:
 - ◆ Cylinder head removed: with - MP 1-218-, - MP 1-211-, -MP 1-213-
 - ◆ Cylinder head fitted: ⇒ Chapter 15-4
- 9 - Valve spring inside**
 - removing and installing:
 - ◆ Cylinder head removed: with - MP 1-218-, - MP 1-211-, -MP 1-213-
 - ◆ Cylinder head fitted: ⇒ Chapter 15-4
- 10 - Valve stem seal**
 - replacing ⇒ Chapter 15-4
- 11 - Valve guide**
 - inspect ⇒ Chapter 15-4
 - if the wear limit is exceed, replace cylinder head
- 12 - Unit injector**
 - removing and installing ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 23



13 - Cylinder head

- pay attention to note ⇒ **15-2** page 1

14 - PTFE gasket ring

- Do not additionally lubricate or grease the sealing lips of the PTFE gasket ring
- before fitting remove oil residues on the camshaft studs with a clean cloth
- to fit cover slot on the camshaft cone with commercially available adhesive tape (e.g. with Sellotape)
- removing and installing ⇒ Chapter 15-3

15 - Valves

- Valve dimensions ⇒ Fig. 3 in **15-2** page 3

16 - Bearing shell

- do not mix up used bearing shells (mark)
- check correct fit of the retaining lugs in the bearing caps and cylinder head

17 - Camshaft

- inspecting axial play ⇒ Fig. 1 in **15-2** page 2
- removing and installing ⇒ Chapter 15-3
- check radial clearance with Plastigage
 - ◆ Wear limit: 0.11 mm
- Slack: max. 0.04 mm
- Identification, timing ⇒ Fig. 4 in **15-2** page 3

18 - Bearing caps

- Fitting sequence ⇒ Chap. 15-3
- seal contact surface of bearing caps 1 and 5 with sealant -AMV 174 004 01- ⇒ Fig. 2 in **15-2** page 3

19 - 8 Nm + torque a further 1/4 turn (90°)

- replace

Fig. 1: inspect camshaft, axial play**Special tools, test and measuring equipment and auxiliary items required**

- ◆ Universal dial gauge holder -MP 3-447-
- ◆ Dial gauge

Perform measurement with the bucket tappets removed and the first, third and last bearing cap fitted.

Wear limit: max. 0.15 mm

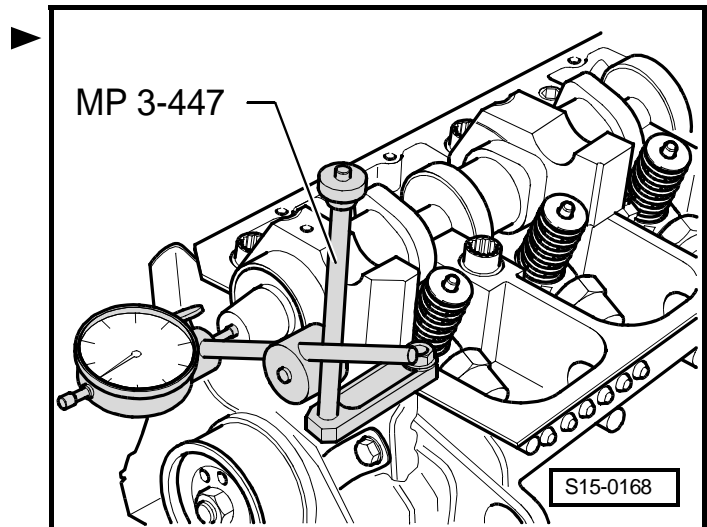


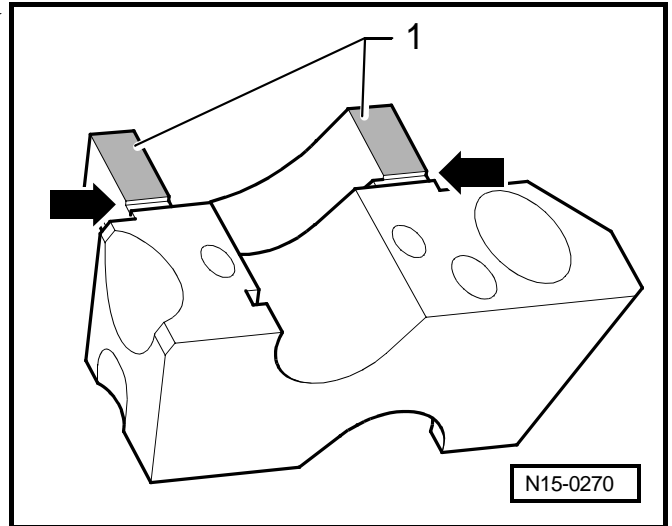
Fig. 2: Seal contact surface of bearing caps 1 and 5 with sealant -AMV 174 004 01-

– Apply a thin layer of sealant -AMV 174 004 01- evenly to the sealing surfaces -1-.



Note

Make sure no sealant penetrates into the slots -arrows-.



N15-0270

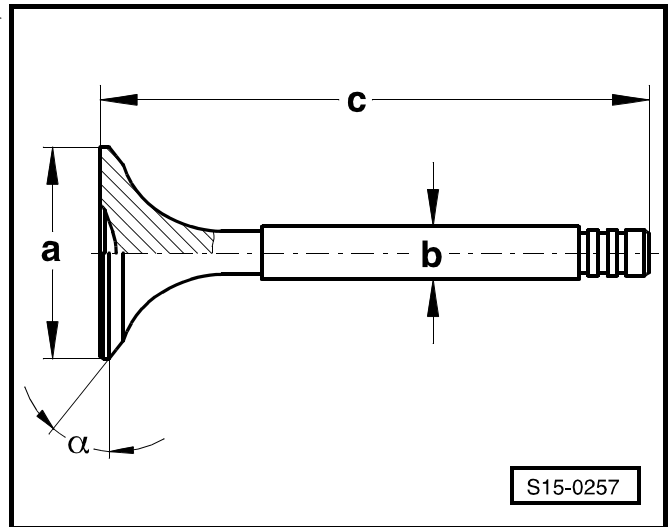
Fig. 3: Valve dimensions



Note

Valves must not be reworked. Only grinding in is permissible.

Di- men- sion	Inlet valve	Exhaust valve
∅ a mm	35,95	31,45
∅ b mm	6,980	6,956
c mm	89,95	89,95
α ∠°	45	45



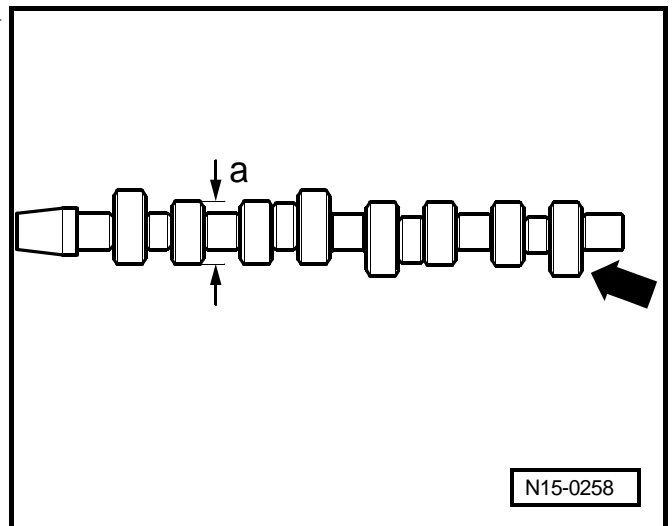
S15-0257

Fig. 4: Camshaft identification, timing

Camshaft identification

- ◆ Base circle of the valve cams: a = ∅ 52.8 mm
- ◆ Identification with digits and characters stamped in on the end face of the cam for outlet valve on 4th cylinder.

Cylinder 4 -arrow-	038 R or 858 R
--------------------	----------------------



N15-0258

15-3 Camshaft

Removing and installing camshaft

Special tools, test and measuring equipment and auxiliary items required

- ◆ Pressure pad -T10051-
- ◆ Extractor -T10052-
- ◆ Torque wrench
- ◆ Sealant -AMV 174 004 01-

Removing

- Remove the timing belt ⇒ Chapter 13-2.
- Unscrew fixing screws -1- for camshaft sprocket.
- Pull camshaft sprocket off the hub.
- Loosen fixing screw -1- of the hub.

Use counterholder -T10051-.

- Turn bolt attaching the hub out about 2 turns.
- Position extractor -T10052- and align it with the hub bores.
- Put the hub under tension by uniformly tightening the extractor until the hub is released from the camshaft cone.



Note

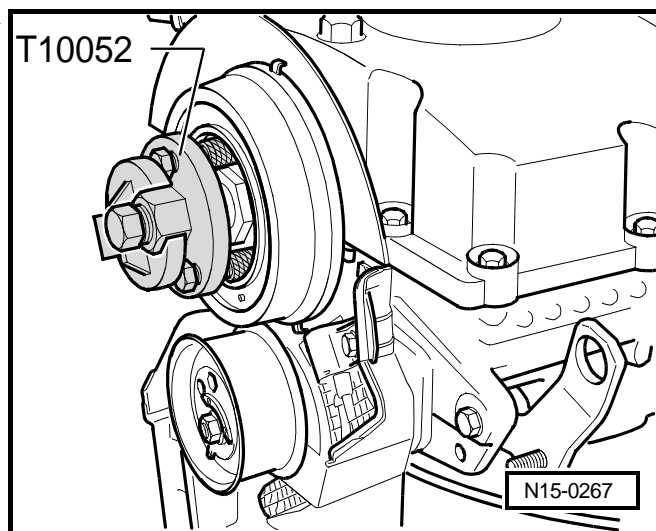
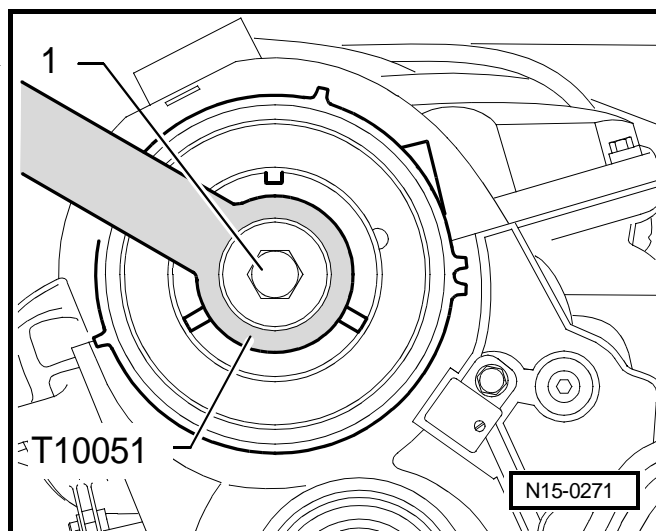
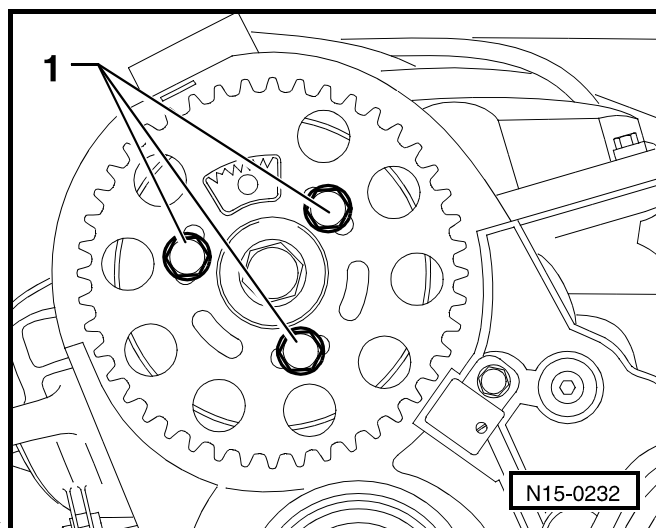
Hold the extractor firmly using a wrench SW 30.

- Remove the hub from the cone of the camshaft.
- Remove cylinder head cover.
- Remove the valve-lever shafts.



Note

- ◆ First release the two outer and then the inner fixing screws.
- ◆ Mark the valve-lever shafts to avoid mixing them up and to avoid having to perform a basic setting of the pump-nozzle units.
- Remove tandem pump ⇒ Chap. 20-2.



- First remove bearing caps 5, 1 and 3. Detach bearing caps 2 and 4 alternately (diagonally across).

Installing

Note

- ◆ When fitting the camshaft the cams of cylinder 1 must point upwards.
 - ◆ Do not mix up used bearing shells (mark)
 - ◆ When installing the camshaft, ensure it is correctly located in the retaining lugs of the bearing shells in the bearing caps and the cylinder head.
 - ◆ Before installing the bearing caps make sure the washers for the cylinder head screws have been inserted in the cylinder head.
- Oil the contact surfaces of the bearing shells.
 - Tighten bearing caps 2 and 4 alternately crosswise and tighten to 8 Nm and torque a further $\frac{1}{4}$ turn (90°) (replace screws).
 - Install bearing caps 5, 1 and 3 and likewise tighten to 8 Nm and torque a further $\frac{1}{4}$ turn (90°) (replace screws).

Note

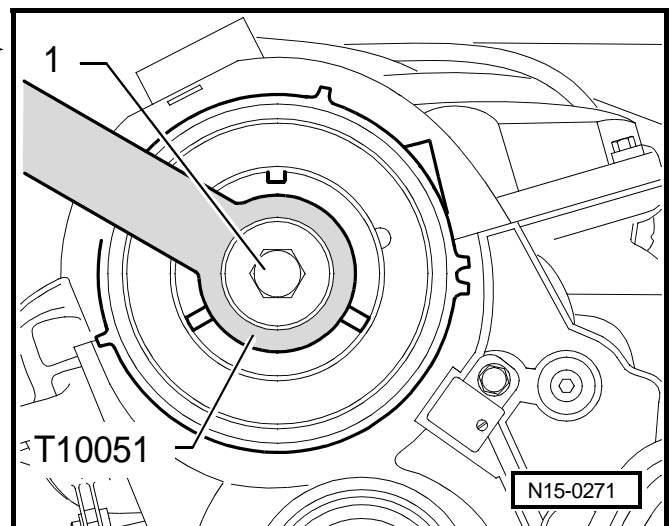
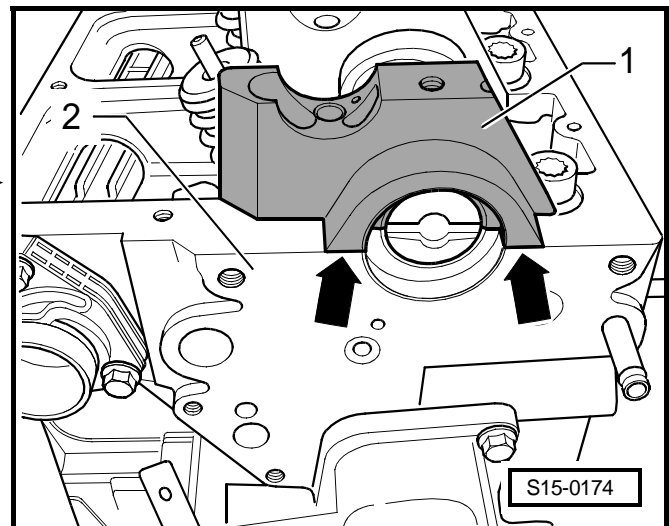
- ◆ Seal the separator surfaces of bearing caps 1 and 5 with sealant -AMV 174 004 01- ⇒ Chap. 15-2
 - ◆ Bearing cap 5 -1- must fit flush -arrows- with the outer side of the cylinder head -2-, as this may otherwise cause leaks on the tandem pump.
- Install camshaft seal ⇒ **15-3** page 3.
 - Install valve-lever shafts and first tighten the inside and then the outside fixing screws evenly and crosswise.

Tightening torque: 20 Nm + torque a further $\frac{1}{4}$ turn (90°)

- Position hub onto camshaft.
- Tighten fixing screw -1- of the hub.

Tightening torque: 100 Nm

Use counterholder -T10051-.



- Push camshaft sprocket onto the hub.



Note

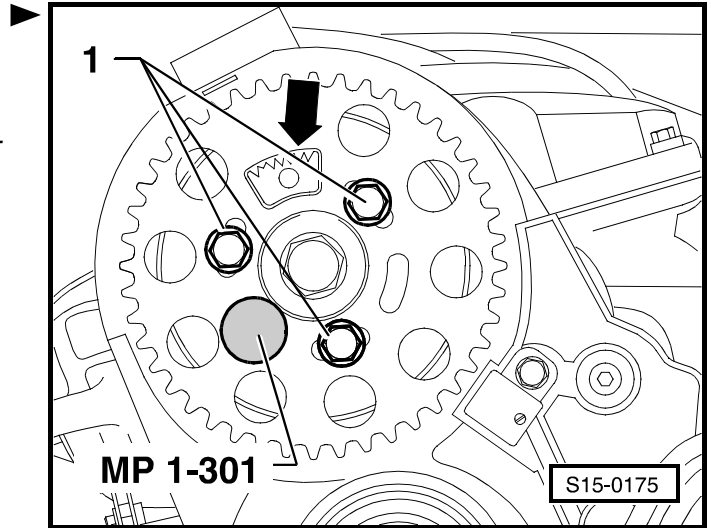
Tooth segment -arrow- of camshaft sprocket must be facing up.

- Align the camshaft timing gear in middle position in the elongated holes.
- Insert the fixing screws -1- by hand and clearance free relatively to the camshaft timing gear.
- Lock hub with locking pin - MP 1-301-.
- Installing the timing belt, tightening ⇒ Chapter 13-2.
- Install tandem pump ⇒ Chap. 20-2.



Note

After installing new bucket tappets, the engine must not be started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise valves would strike the pistons).



Removing and installing gasket ring for camshaft

Special tools, test and measuring equipment and auxiliary items required

- ◆ Inserting device - MP 1-214-
- ◆ Gasket ring extractor -T30003-
- ◆ Torque wrench
- ◆ Screw -M12x65-

Removing

- Remove the timing belt ⇒ Chapter 13-2.
- Remove camshaft sprocket and hub ⇒ **15-3** page 1.
- Turn inner part of gasket ring extractor -T30003- two turns (approx. 3 mm) out of the outer part and lock with knurled screw.
- Oil the thread head of the gasket ring extractor, position and forcefully screw into the gasket ring as far as possible.
- Slacken knurled screw and turn inner part of seal extractor against the camshaft until the seal is pulled out.

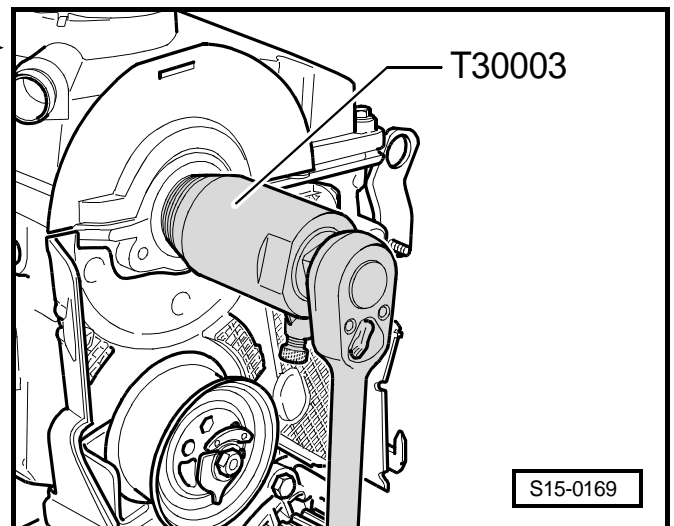
Installing



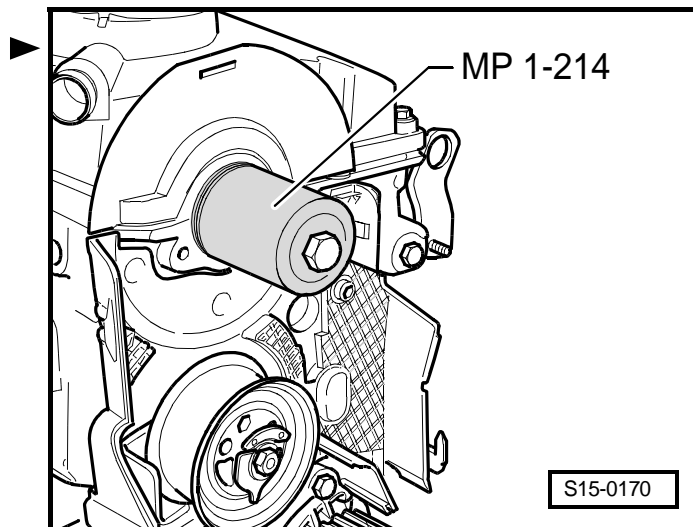
Note

The sealing lips of the PTFE gasket ring must neither be oiled nor greased.

- Remove oil residue on the camshaft stud with a clean cloth.



- Cover the slot on the camshaft cone with commercially available adhesive tape (e.g. with sellotape).
- Carefully fit seal onto camshaft.
- Press in the gasket ring with inserting device -MP 1-214- and screw -M12x65- up to the stop.
- Installing the timing belt, tightening ⇒ Chapter 13-2.



15-4 Valve Seats/Valves Guide/Valve Stem Seal

Reworking valve seats



Note

- ◆ Do not remill valve. Only grinding in of valves is permissible.
- ◆ inspecting valve guides ⇒ **15-4** page 2. If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceed, replace cylinder head.
- ◆ Calculating max. permissible reworking dimension ⇒ **15-4** page 1. If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceed, replace cylinder head.

Calculating max. permissible reworking dimension

- Insert valve and press firmly against the valve seat.



Note

If the valve is replaced when carrying out repair work, use a new valve for the measurement.

- Measure distance -a- between the end of the valve stem and the upper face of the cylinder head.
- Calculate max. permissible reworking dimension from the distance -a- measured and the minimum dimension.

Minimum dimension:

- ◆ Inlet valve: 43.4 mm
- ◆ Exhaust valve: 43.2 mm

Measured distance less minimum dimension = max. permissible reworking dimension.

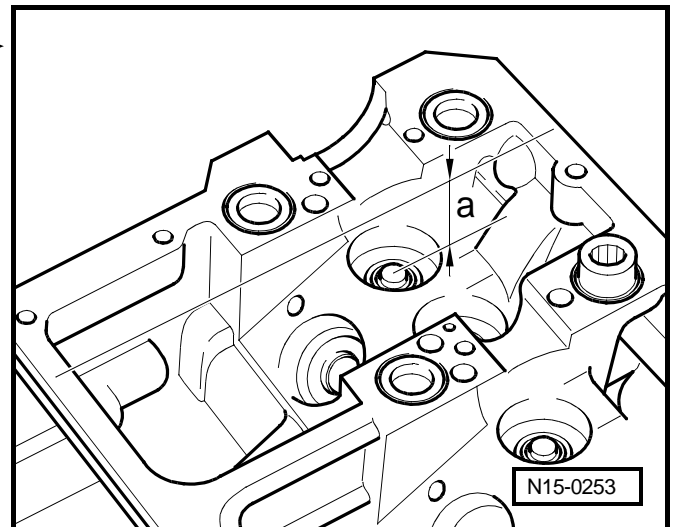
Example:

	Measured distance	44.1 mm
-	Minimum dimension	43.4 mm
=	Max. permissible reworking dimension	0.7 mm



Note

If the max. permissible reworking dimension is 0 mm, repeat the measurement with a new valve. If the max. permissible reworking dimension is once again 0 mm, replace cylinder head.



Inspecting valve guides

Special tools, test and measuring equipment and auxiliary items required

- ◆ Universal dial gauge holder -MP 3-447-
- ◆ Dial gauge

Work sequence

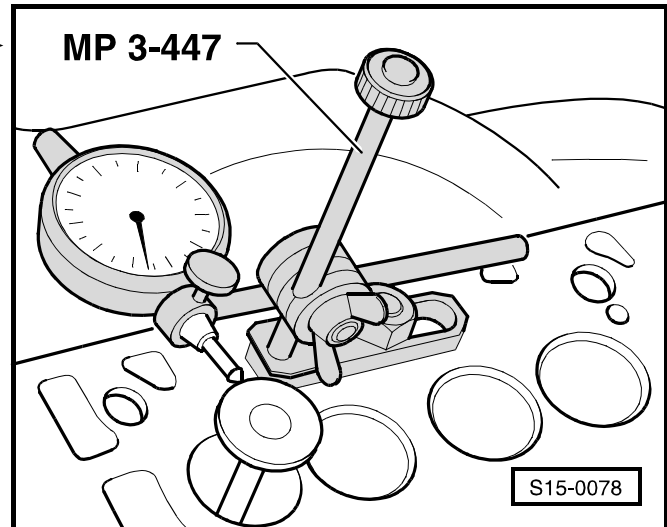
- Insert valve into guide. End of valve stem must be flush with guide. ►

Because of the different stem diameters only use inlet valve in inlet guide or outlet valve in outlet guide.

Valve rock: max. 1.3 mm

Note

- ◆ If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head.
- ◆ If the valve is replaced when carrying out repair work, use a new valve for the measurement.



Replacing valve stem seals

- Cylinder head fitted

Special tools, test and measuring equipment and auxiliary items required

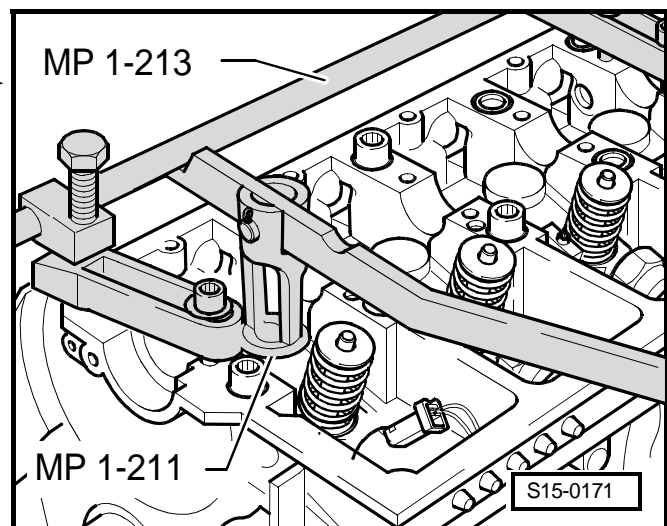
- ◆ Assembly lever with pressure plate -MP 1-211-
- ◆ Assembly device -MP 1-213-
- ◆ Extractor -MP 1-206-
- ◆ Insertion tool -MP 1-306-

Removing

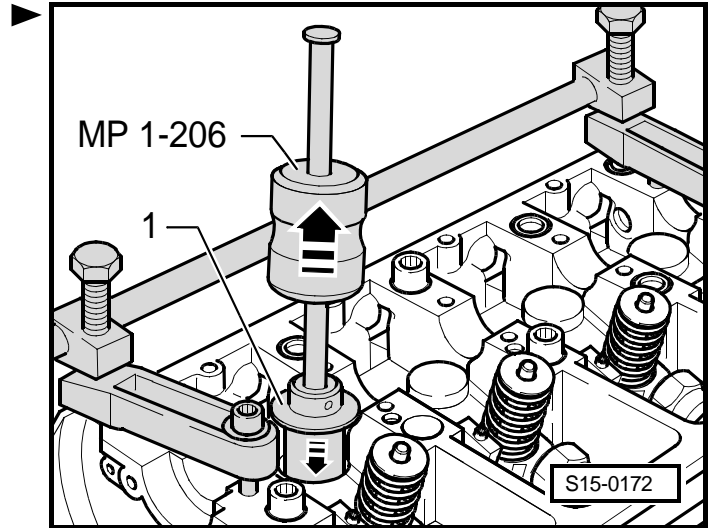
- Removing camshaft ⇒ Chap. 15-3.
- Remove bucket tappets (do not interchange) and lay aside with the contact surface facing down.
- Put the piston of the relevant cylinder in top dead centre (TDC).
- Insert assembly device -MP 1-213- and adjust bearing to stay bolt height. ►
- Remove valve springs with assembly lever and pressure plate -MP 1-211-.

Note

The valves rest on the piston crown.

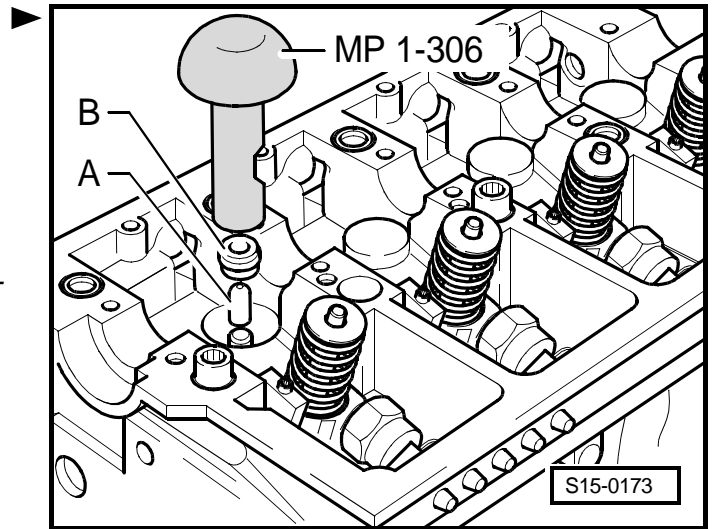


- Pull off valve stem seals with -MP 1-206-.
- To do so press bushing -1- slightly downwards.



Installing

- To avoid damaging the new valve stem seals insert plastic bushing -A- on the valve stem.
- Insert valve stem seal -B- in the insertion tool -MP 1-306-, oil sealing lip and carefully push onto the valve guide.



Note

- ◆ After working on the valve gear carefully rotate the engine at least 2 turns to ensure no valve strikes when the engine is started.
- ◆ After installing the camshaft, the engine must not be started for about 30 minutes. The hydraulic clearance compensation elements must settle (otherwise valves would strike the pistons).

17 – Lubrication

17-1 Removing and installing parts of the lubrication system

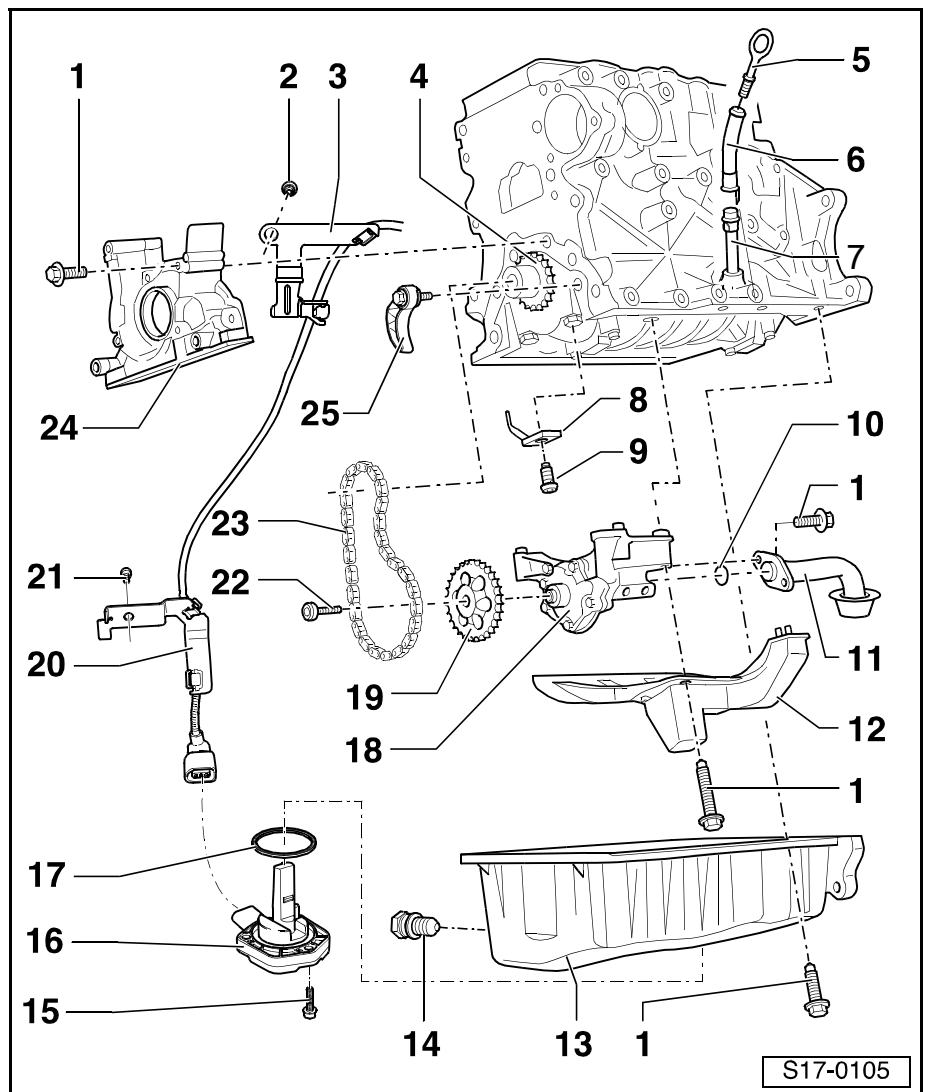


Note

- ◆ If considerable quantities of metal swarf or abrasion is found in the engine oil when carrying out engine repairs, carefully clean the oil galleries in order to avoid consequential damage and additionally replace the oil cooler.
- ◆ Testing oil pressure and oil pressure switch ⇒ Chapter 17-3.
- ◆ The oil level must never exceed the „max“ marking - risk of damage to catalytic converter!

Check oil specifications, capacity and oil level ⇒ Inspection and Maintenance; Chap. 02-3

- 1 - 15 Nm
- 2 - 15 Nm
- 3 - Bracket at top
 - For cable to oil level/oil temperature sender
- 4 - Sprocket
- 5 - Dipstick
 - the oil level must not be above the „max“ marking!
 - Inspecting engine oil level
- 6 - Filler funnel
 - Remove for extracting oil
- 7 - Guide tube
- 8 - Oil injection nozzle
 - For piston cooling
 - Pay attention to SP No. (right-angle bend)
- 9 - Pressure relief valve, 27 Nm
 - opens at 0.25 to 0.32 MPa overpressure
 - replace without sealant
- 10 - O-ring
 - replace
- 11 - Suction line
 - Clean strainer if dirty
- 12 - Baffle
- 13 - Oil pan
 - Before installing, coat with silicone sealant
 - D 176 404 A2 - ⇒ Chapter 17-2
- 14 - Oil drain plug, 30 Nm
 - with gasket
 - replace
- 15 - 10 Nm
- 16 - Oil level/oil temperature sensor -G266-
 - check ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations
- 17 - Gasket ring
 - replace



18 - Oil pump

- With pressure relief valve 1.2 MPa
- Before installing, check whether both dowel sleeves for centering oil pump/cylinder block are present
- If there is any scoring on contact surfaces and gears, replace

19 - Oil pump sprocket

- Check fitting position
- Fits onto oil pump shaft in one position only

20 - Bracket at bottom

- For cable to oil level/oil temperature sender

21 - 15 Nm**22 - 25 Nm****23 - Oil pump chain****24 - Sealing flange**

- Before installing, coat with silicone sealant - D 176 404 A2 - ⇒ Chapter 13-3
- Replacing crankshaft seal ⇒ Chapter 13-3

25 - Chain tensioner, 15 Nm

- When installing, pretension spring and attach

Disassembling and assembling oil filter holder**1 - Screw plug, 25 Nm****2 - Gasket**

- replace

3 - Oil cooler

- when installing, move up against anti-twist lock up to the stop (in direction of tightening)

4 - Gasket

- replace
- Insert into lugs on oil cooler

5 - Screw plug, 10 Nm

- with gasket
- do not slacken, otherwise replace

6 - 0.07 MPa Oil pressure switch - F1-

- Brown
- Tighten to 20 Nm
- Cut open gasket ring if leaking and replace
- inspect ⇒ Chapter 17-3

7 - Oil filter holder

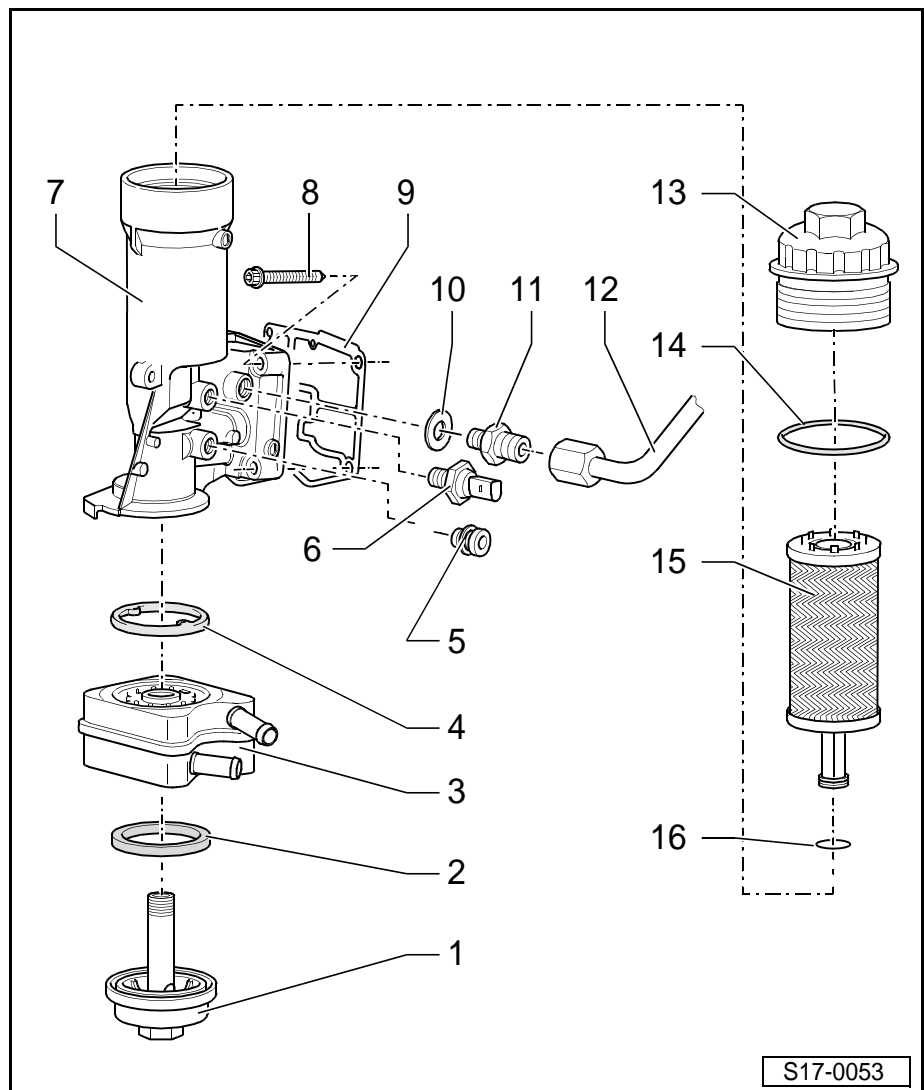
- with integrated pressure relief valve (0.5 MPa)

8 - 15 Nm + torque a further 1/4 turn (90°)

- replace
- Before tightening, turn in by hand first

9 - Gasket

- replace



10 - Gasket ring

- replace

11 - Connection fitting, 30 Nm**12 - Oil feed line**

- For exhaust turbocharger
- Tighten to 22 Nm

13 - Screw plug, 25 Nm**14 - O-ring**

- replace

15 - Oil filter element

- if oil filter changed, replace O-rings ⇒ item 14 and ⇒ item 16

16 - O-ring

- replace

17-2 Removing and Installing Oil Pan

Special tools, test and measuring equipment and auxiliary items required

- ◆ Hinged wrench -3185-
- ◆ Socket insert -3249-
- ◆ Hand drill with plastic brush attachment
- ◆ Flat scraper
- ◆ Torque wrench 5...50 Nm (e.g. -V.A.G 1331-)
- ◆ Silicone sealant D 176 404 A2

Removing

- Remove noise insulation -arrows-.
- Drain engine oil.
- Unbolt oil pan.



Note

Slacken oil pan bolts at flywheel side with hinged wrench -3185- and unscrew with wrench socket -3249-.

- Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer.
- Use a flat scraper to remove sealant residues on the cylinder block.
- Use a rotating plastic brush to remove sealant residues on the oil pan (wear protective goggles).
- Clean sealing surfaces. They must be free of oil and grease.

Installing



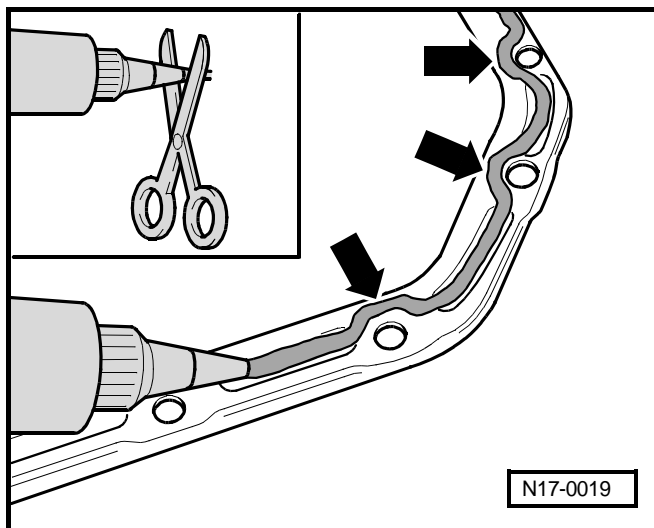
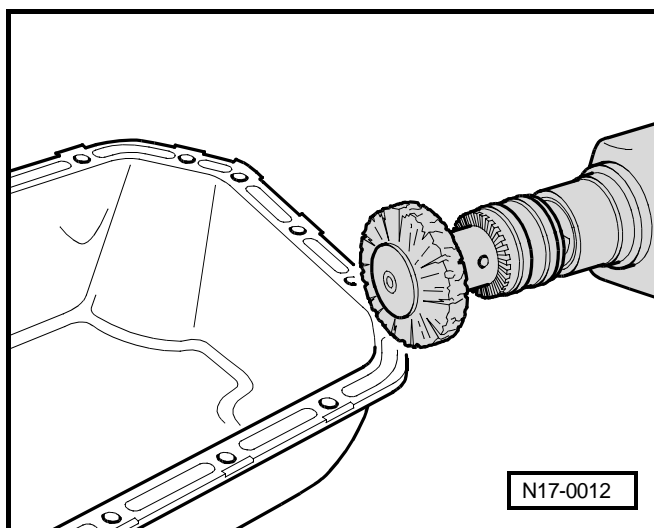
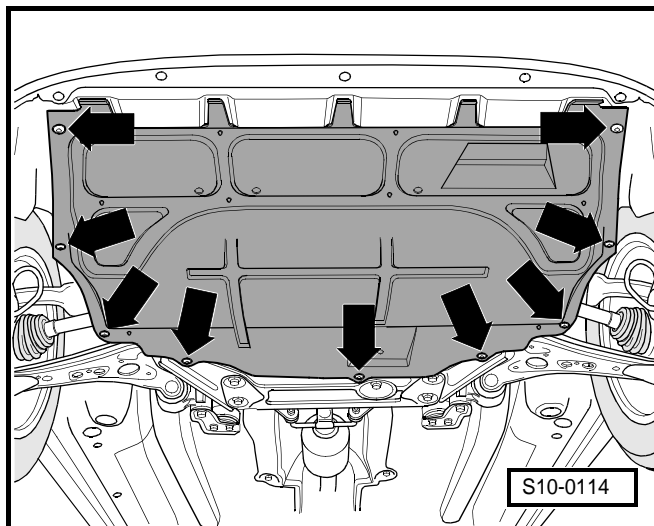
Note

- ◆ The oil pan must be installed within 5 minutes after applying the silicone sealant.
- ◆ Use wrench socket -3249- to insert the oil pan bolts at flywheel side and tighten with hinged wrench -3185-.
- Cut off nozzle tube of the silicone sealant D 176 404 A2 at the front marking (Ø of nozzle approx. 3 mm).
- ◆ Thickness of sealant bead: 2...3 mm
- ◆ Run past the area around the bolt holes on the inside -arrows-.



Note

The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.

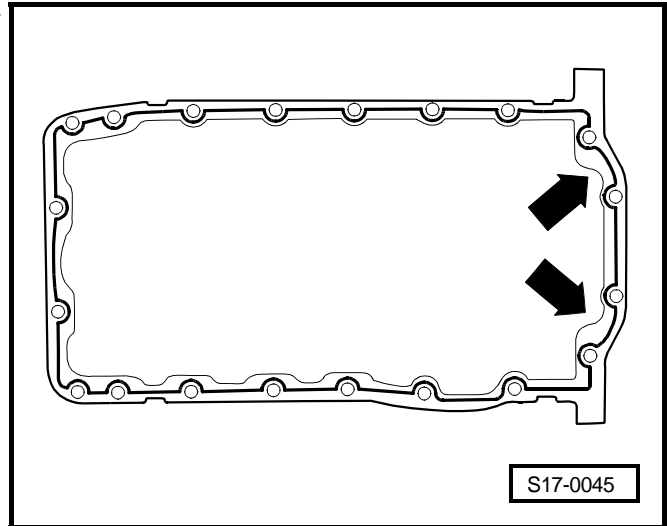


- Apply silicone sealant to the clean sealing surface of the oil pan, as shown in the illustration. ▶

i Note

Take particular care when applying sealant bead in the area of the sealing flange at the rear -arrows-.

- Fit on oil pan immediately and tighten the bolts as follows:
 - 1 - Tighten all the bolts of oil pan/cylinder block slightly.
 - 2 - Tighten the three bolts of oil pan/cylinder block slightly.
 - 3 - Tighten all the bolts of oil pan/cylinder block slightly diagonally across.
 - 4 - Tighten the three bolts of the oil pan/gearbox fully to 45 Nm.
 - 5 - Tighten all the bolts of the oil pan/cylinder block fully to 15 Nm diagonally across.



i Note

- ♦ *When installing the oil pan with the engine removed, ensure that the oil pan is flush with the cylinder block at the flywheel side.*
- ♦ *After installing the oil pan, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.*

17-3 Testing oil pressure and oil pressure switch

Special tools, test and measuring equipment and auxiliary items required

- ◆ Oil pressure tester (e. g. -V.A.G 1342-)
- ◆ Diode test lamp (e.g. -V.A.G 1527 B-)
- ◆ Adapter cable set (e.g. -V.A.G 1594 A-)
- ◆ Current flow diagram

Function of dynamic oil pressure warning system

The oil pressure switch is opened when pressureless and closed when the switching pressure is reached.

The oil pressure warning is activated for about 10 s after the ignition is switched on („terminal 15 on“). Activation delay of oil pressure warning: approx. 3 s Off delay of oil pressure warning: approx. 5 s

Check warning lamp

After the ignition is switched on and engine not running, the oil pressure warning lamp in the dash panel insert must light up for about 3 s and then go out. The check is ended when the engine is started.

Warning criteria

The visual oil pressure warning (oil pressure warning lamp flashes) is activated and the audible warning buzzer sounds 3 times if one of the following conditions exists:

- „Ignition on“, engine not running, oil pressure switch closed
- Engine speed greater than 1500 rpm, oil pressure switch open
- At an engine speed above 5000 rpm, the oil pressure warning is not cancelled; not even if the oil pressure switch is closed. Oil pressure switch cancelled below 5000 rpm⁻¹.
- If the oil pressure switch is open for only 0.5...3 s at an engine speed above 1500 rpm, this is stored in the combination processor of the dash panel insert. If this condition occurs 3 times when the engine is running, the oil pressure warning is immediately activated and is not cancelled below 1500 rpm. The oil pressure warning is cancelled if the oil pressure switch is closed for more than 5 s at a speed of more than 1500 rpm, or at „Ignition off“.

Test conditions

- Engine oil at correct level, inspecting ⇒ Chap. 17-1
- Oil pressure warning lamp (-K3-) must light up for about 3 s when ignition is switched on.
- Engine oil temperature at least 80 °C (radiator fan must have cut in once).

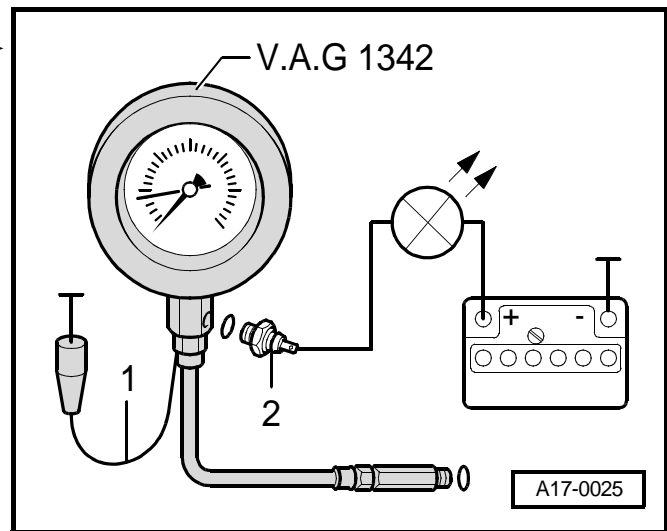
Test sequence

- Unplug connector from oil pressure switch.
- Unscrew oil pressure switch and screw in oil pressure tester (e.g. -V.A.G 1342-). ►
- Screw oil pressure switch -2- into -V.A.G 1342-.
- Connect brown cable -1- of tester to earth (-).
- Connect diode test lamp (e. g. -V.A.G 1527 B-) to oil pressure switch -2- and battery positive (+).

The LED must not light up.

- If the LED lights up, replace the oil pressure switch.
- Start engine and slowly increase engine speed.
- The LED must light up at 0.055...0.085 MPa over-pressure, if not, replace oil pressure switch.
- Increase engine speed further. At 2000 rpm and an oil temperature of 80 °C the oil pressure should be at least 0.2 MPa.

At higher engine speeds the oil pressure must not be lower than 0.7 MPa. If necessary, replace oil filter holder together with pressure relief valve.



19 – Cooling

19-1 Parts of cooling system - Summary of components



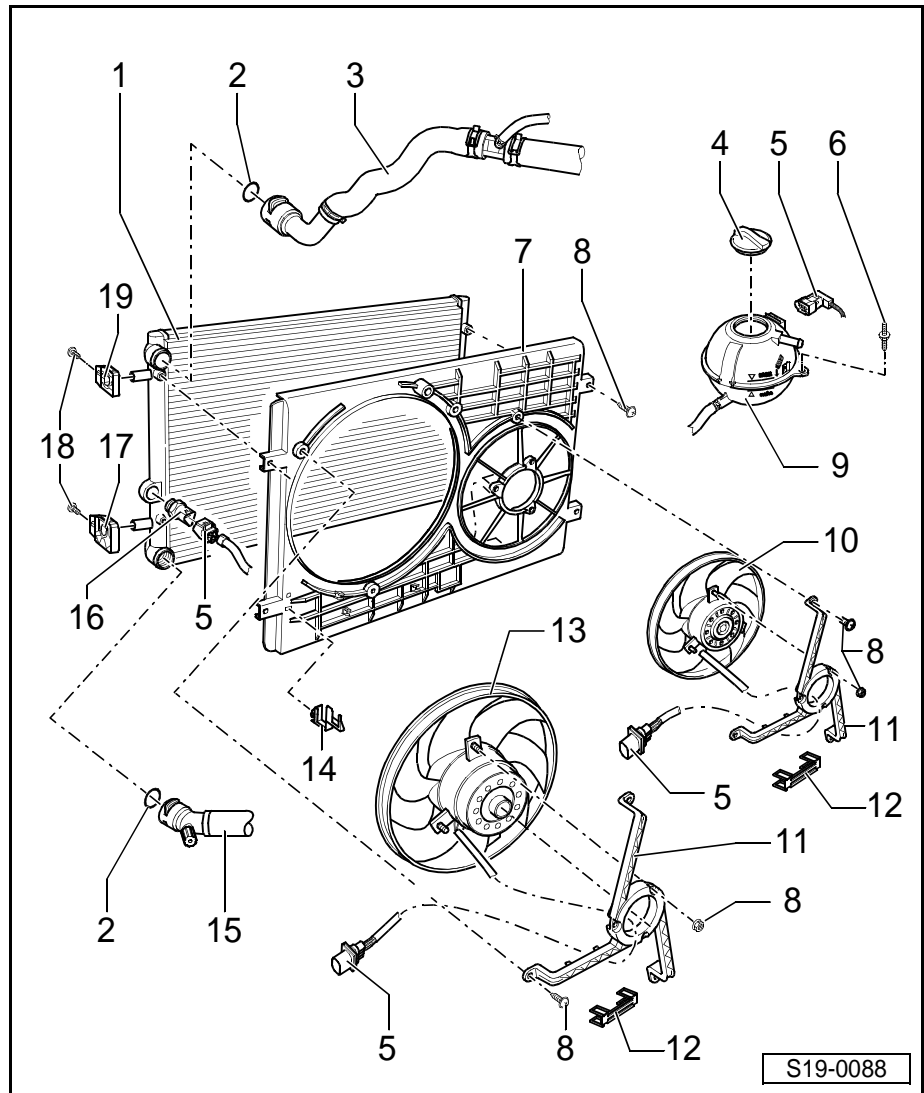
Note

- ◆ *When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.*
- ◆ *The hose connections are secured with spring-type clips. In the event of repairs only use spring-type clips.*
- ◆ *Use pliers for spring strap clips to remove and fit the spring strap clips.*
- ◆ *Always replace seals and gasket rings.*
- ◆ *When installing fit the coolant hoses free of stress, without them touching any other components (pay attention to the marking on the coolant connection and hose).*

Information concerning the mixture ratios ⇒ **19-1** page 5

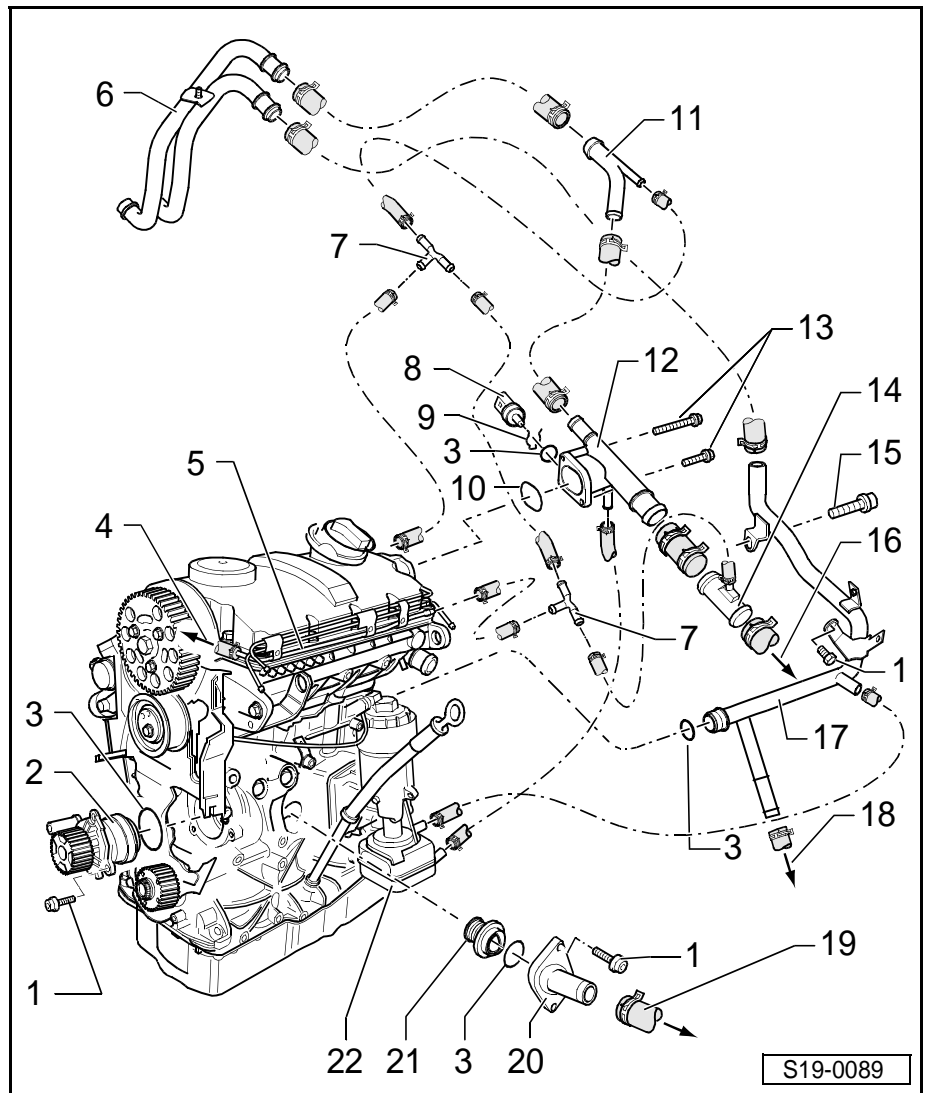
Parts of the cooling system fitted to body

- 1 - Radiator**
- removing and installing
⇒ Chapter 19-2
 - after replacing fill entire system with fresh coolant
- 2 - O-ring**
- replace
- 3 - Top coolant hose**
- attached to radiator by retaining clips
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 4 - Cap**
- check pressure ⇒ **19-1** page 6
- 5 - Connector**
- 6 - Double screw, 2 Nm**
- 7 - Air duct scoop**
- 8 - 5 Nm**
- 9 - Expansion bottle**
- check the coolant system for tightness ⇒ **19-1** page 6
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 10 - Auxiliary fan**
- for vehicles with air conditioning system or additional equipment
- 11 - Fan holder**
- 12 - Retaining clip**
- for fan cable
 - check tightness
- 13 - Fan for radiator**
- 14 - Bracket**
- for fan connector
- 15 - Bottom coolant hose**
- attached to radiator by retaining clips
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 16 - Thermostwitch for radiator fan -F18-, 35 Nm**
- for fan
 - switching temperatures:
 1. Stage
 - ◆ on: 91...97 °C
 - ◆ off: 84...91 °C
 2. Stage
 - ◆ on: 99...105 °C
 - ◆ off: 91...98 °C
- 17 - Bottom radiator bearing**
- black
- 18 - 5 Nm**
- 19 - Top radiator bearing**
- white



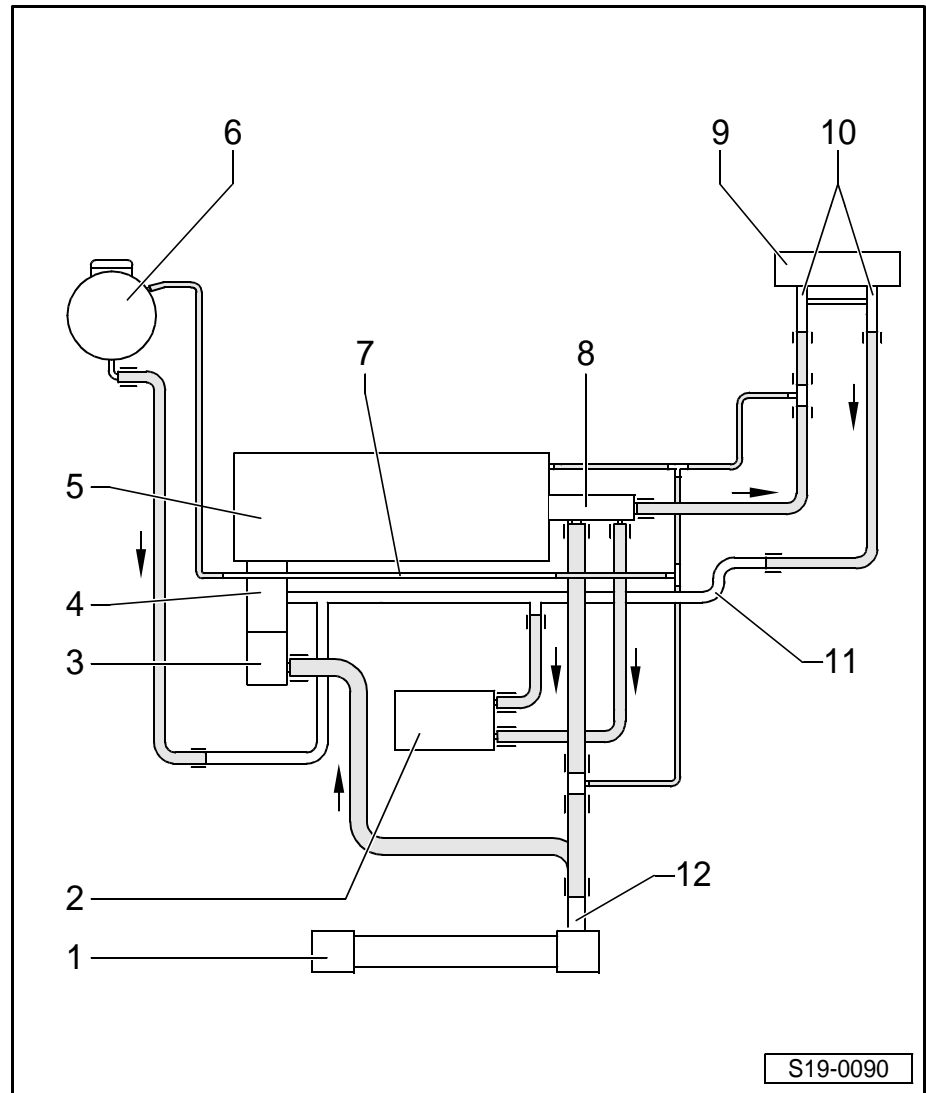
Parts of cooling system engine side

- 1 - 15 Nm
- 2 - **Coolant pump**
 - check smooth operation
 - Check fitting position
 - removing and installing ⇒ Chapter 19-2
- 3 - **O-ring**
 - replace
- 4 - **To expansion reservoir (top)**
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 5 - **Top coolant pipe**
 - screwed onto the cylinder head cover
- 6 - **Connection fittings**
 - for heat exchanger
- 7 - **Distributor part**
- 8 - **Sender for the coolant temperature -G62-**
 - inspect ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 28
- 9 - **Retaining clip**
 - check for firm seating
- 10 - **Gasket ring**
 - check tightness
 - replace
- 11 - **Distributor part**
- 12 - **Connection fittings**
 - on cylinder head
- 13 - 10 Nm
- 14 - **Distributor part**
- 15 - 40 Nm
- 16 - **towards top radiator**
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 17 - **Coolant pipe**
- 18 - **To the expansion bottle (bottom)**
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 19 - **to bottom radiator**
 - connection diagram for coolant hoses ⇒ **19-1** page 4
- 20 - **Connection fittings**
 - for coolant regulator
- 21 - **Coolant regulator**
 - removing and installing ⇒ Chapter 19-2
- 22 - **Oil cooler**
 - removing and installing ⇒ Chapter 17-1



Connection diagram for coolant hoses

- 1 - Radiator
- 2 - Oil cooler
- 3 - Coolant regulator
- 4 - Coolant pump
- 5 - Cylinder block
- 6 - Expansion bottle
- 7 - Top coolant pipe
 - at cylinder head cover, with screw thread
- 8 - Connection fittings
 - on cylinder head
- 9 - Heat exchanger for heating
- 10 - Connection fittings
 - for heat exchanger
- 11 - Coolant pipe
- 12 - Quick coupling



Draining and filling up coolant

Coolant capacity approx. 6.0 litres

Special tools, test and measuring equipment and auxiliary items required

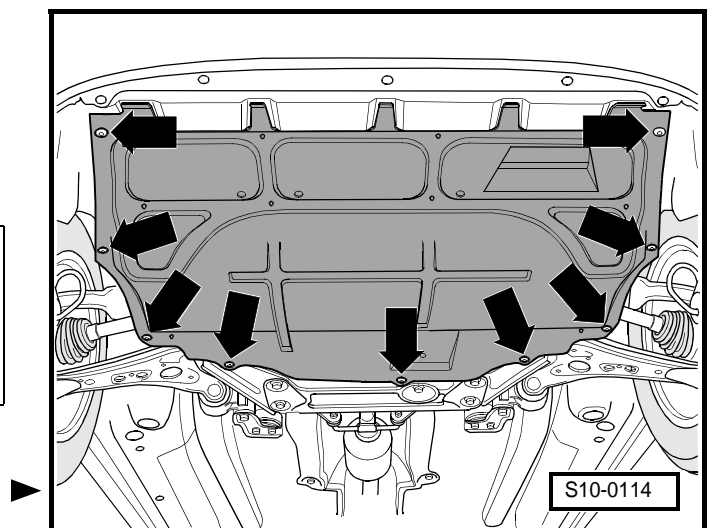
- ◆ Catch pan (e.g. -V.A.G 1306 -)
- ◆ antifreeze tester

Draining

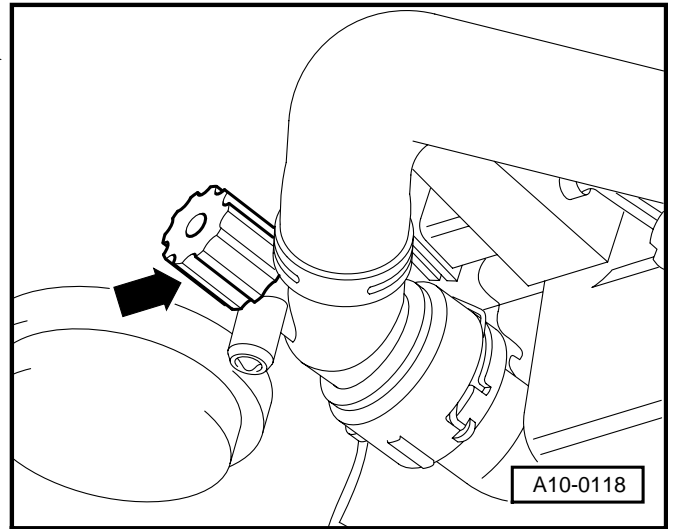
! WARNING!

Hot steam may escape when the expansion reservoir is opened. Cover the cap with a cloth and open carefully.

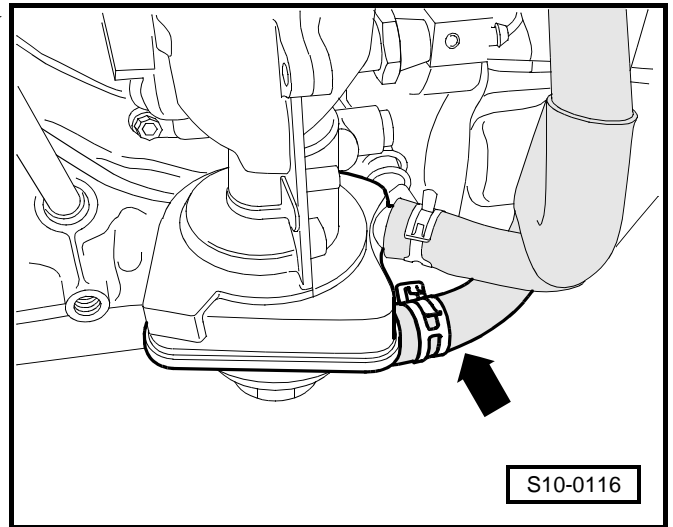
- Open the cap of the expansion reservoir.
- Remove noise insulation -arrows-.



- Place a catch pan under the engine.
- Turn the drain plug -arrow- on the radiator to the left and draw backwards, if necessary fit auxiliary hose onto connection. ▶



- Also detach the front coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to drain off. ▶



Note

Observe the disposal instructions for coolant.

Filling up

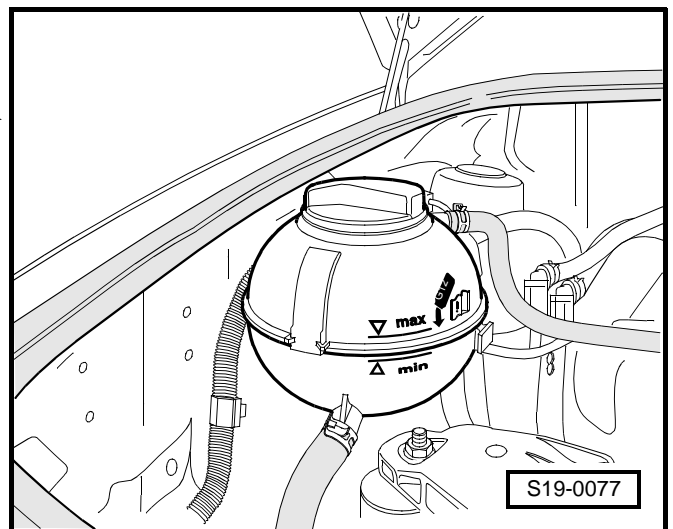
Select the appropriate coolant additive from the original spare parts catalogue Škoda or from the list of allowed coolant additives ⇒ Inspection and Maintenance; Rep. Gr. 02.

Recommended mixture ratios:

Antifreeze protection down to	Antifreeze concentration ¹⁾²⁾	Drinking water ²⁾
-25 °C	40 % (2.7 litres)	60 % (4.1 litres)
-35 °C	50 % (3.4 litres)	50 % (3.4 litres)

1) The antifreeze concentration must not exceed 60 %; the antifreeze protection and cooling efficiency are reduced as the concentration increases.
 2) The coolant amount may differ according to the version of the vehicle.

- Fit coolant hose onto oil cooler.
- Insert and tighten the coolant drain plug.
- Fill up coolant up to „max“ marking on the expansion reservoir. ▶
- Close expansion bottle.
- Run engine until fan starts.



WARNING!

Hot steam may escape when the expansion reservoir is opened. Cover the cap with a cloth and open carefully.

- Check the level of coolant and top up if necessary. When engine is at operating temperature the coolant level must be at the „max“ marking, when engine is cold between the „min“ and „max“ markings.

Checking the coolant system for tightness

Special tools, test and measuring equipment and auxiliary items required

- ◆ Coolant system tester, e.g. -V.A.G 1274-
- ◆ Adapter (e.g. -V.A.G 1274/8-)
- ◆ Adapter (e.g. -V.A.G 1274/9 -)

Test condition

- Engine must be warm

Test sequence



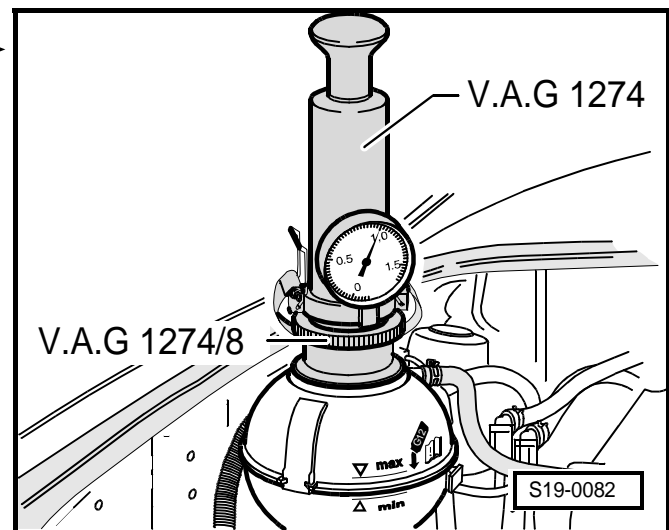
WARNING!

Hot steam may escape when the expansion reservoir is opened. Cover the cap with a cloth and open carefully.

- Open the cap of the expansion reservoir.
- Position coolant system tester (e. g. -V.A.G 1274-) with adapter (e. g. - V.A.G 1274/8-) on the expansion reservoir.
- Using the hand pump of the tester generate an overpressure of approx. 1 bar (0.1 MPa).
- If the pressure drops determine positions of the leak and repair.

Testing the pressure relief valve in the cap

- Screw cap onto tester with adapter (e.g. -V.A.G 1274/9 -).
- Using the hand pump of the tester generate an overpressure of approx. 1.5 bar (0.15 MPa).
- The pressure relief valve must open for an overpressure of 1.2...1.5 bar (0.12...0.15 MPa).



19-2 Removing and Installing Radiator, Coolant Pump, Coolant Regulator

Removing and installing radiator

Special tools, test and measuring equipment and auxiliary items required

- ◆ Catch pan (e.g. -V.A.G 1306 -)
- ◆ Torque wrench

Removing

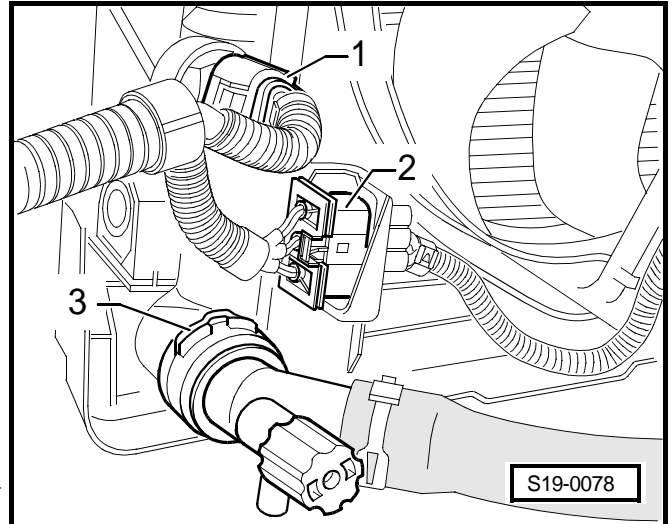
- Drain coolant ⇒ Chapter 19-1.
- Remove connector -1- from thermo-switch for the coolant radiator -F18- and disconnect plug connection -2- on the holder of the air duct scoop. ▶

To do so press the latch clips.

There are 2 plug connections on vehicles fitted with air conditioning.

- Separate the coolant hose from the radiator at the top and bottom of the connection fittings.

To do so pull the retaining clip -3- up to the stop and remove the quick coupling towards the rear.



Vehicles without air conditioning

- Unbolt cable clip -1- from the starter -arrow-. ▶

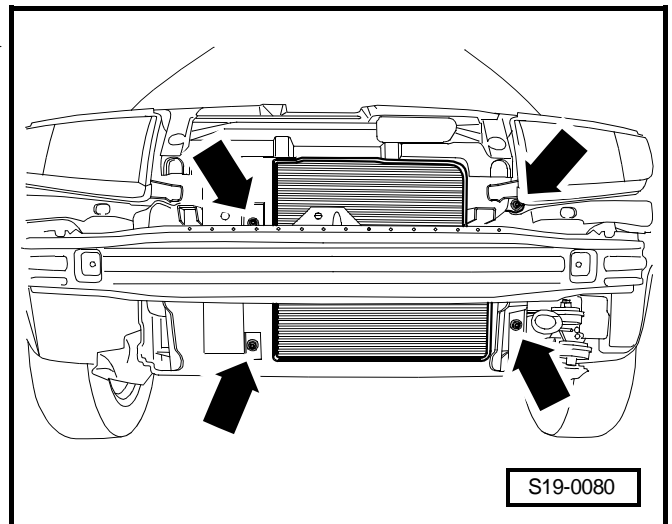
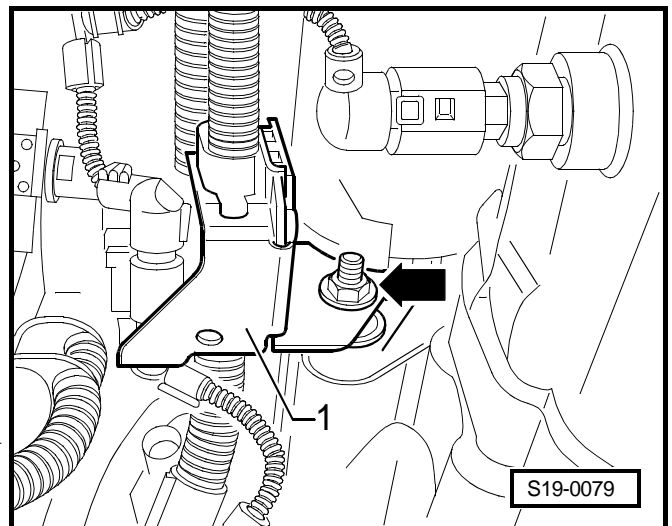
Lay cable with clip towards the rear.

- Remove front bumper ⇒ Body Work; Rep. Gr. 63.

- Unscrew bolts for radiator bearing -arrows-. ▶

Tightening torque: 5 Nm

- Pull radiator with fan backwards and remove downwards.



Vehicles with air conditioning

! WARNING!
 Do not open the refrigerant circuit of the air conditioning system.

- Unscrew bolts for radiator bearing -arrows-.

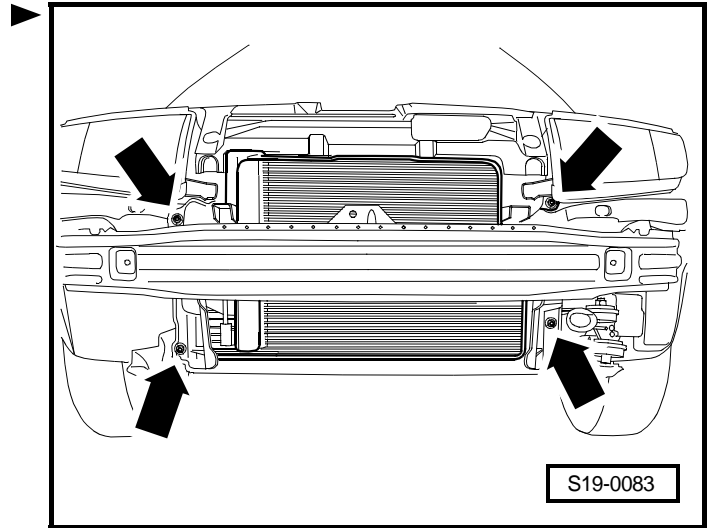
Tightening torque: 5 Nm

- Remove the lock carrier with component parts
⇒ Body Work; Rep. Gr. 50.

Attach the condenser with the radiator to the engine or support.

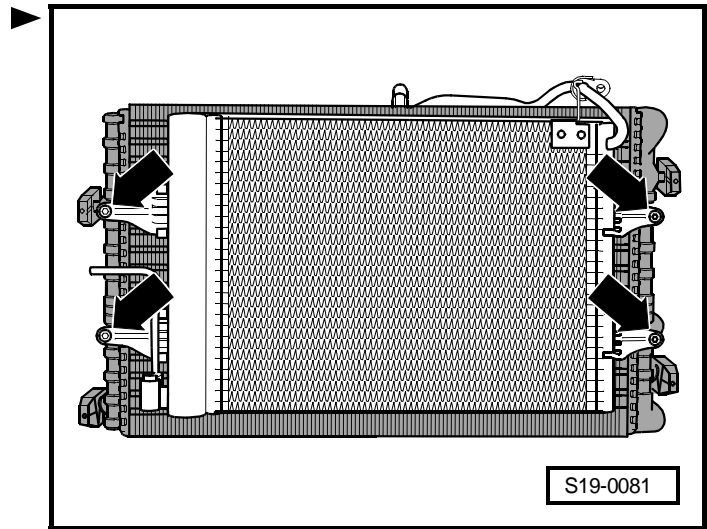
Note

- ◆ Do not suspend the condenser to the wires.
- ◆ Do not fold the condenser wires.



- Release the bolts securing the condenser -arrows- and remove radiator with fan.

Tightening torque: 5 Nm



Installing

Installation is carried out in the reverse order. Pay attention to the following:

- Top up coolant ⇒ Chapter 19-1.
- Re-adjust headlights on vehicles fitted with air conditioning.

Removing and installing coolant pump

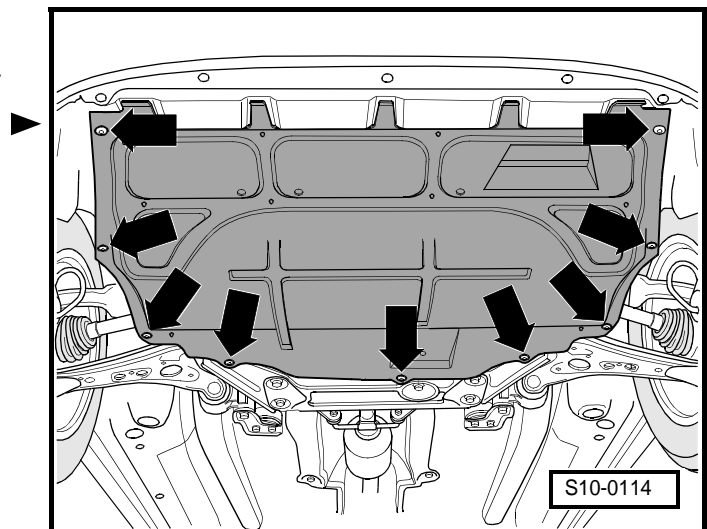
Special tools, test and measuring equipment and auxiliary items required

- ◆ Catch pan (e.g. -V.A.G 1306 -)
- ◆ Torque wrench 5 through 50 Nm

Removing

Note

- ◆ Always replace seals and gasket rings.
- ◆ Cover the toothed belt with a cloth before removing the coolant pump in order to protect it from the coolant.
- Remove noise insulation -arrows-.
- Drain coolant ⇒ Chapter 19-1.
- Remove the timing belt ⇒ Chapter 13-2.



- Unscrew the fixing screws -1- of the coolant pump -2- and carefully remove the coolant pump. ►

Installing

Installation is performed in the reverse order. Pay attention to the following points:

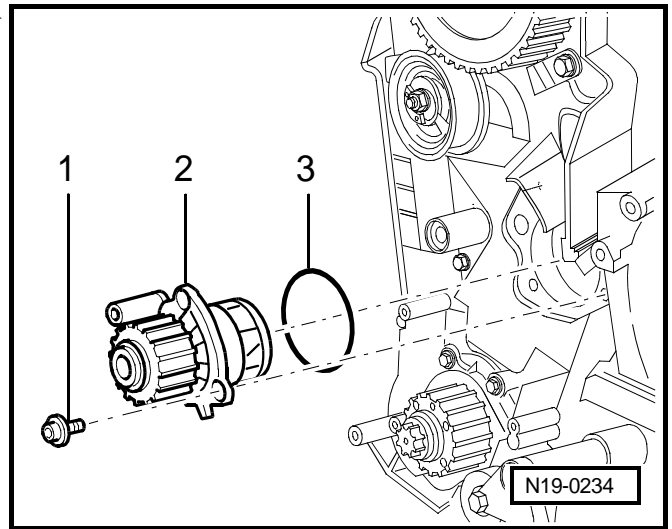
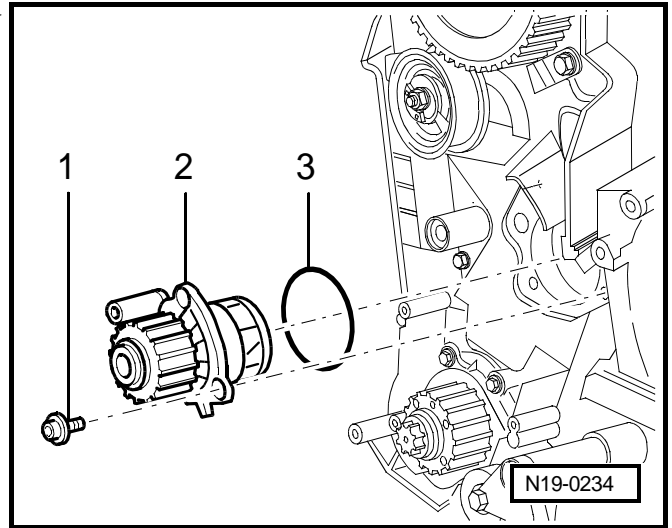
- Clean sealing surface for O-ring.
- Moisten new O-ring -3- with coolant and insert onto coolant pump. ►
- Position the coolant pump -2- in the cylinder block and tighten the fixing screws -1-.

Tightening torque: 15 Nm

i Note

Plugs of coolant pump point down.

- Installing the timing belt, tightening ⇒ Chapter 13-2.
- Top up coolant ⇒ Chapter 19-1.



Removing and installing coolant regulator

Special tools, test and measuring equipment and auxiliary items required

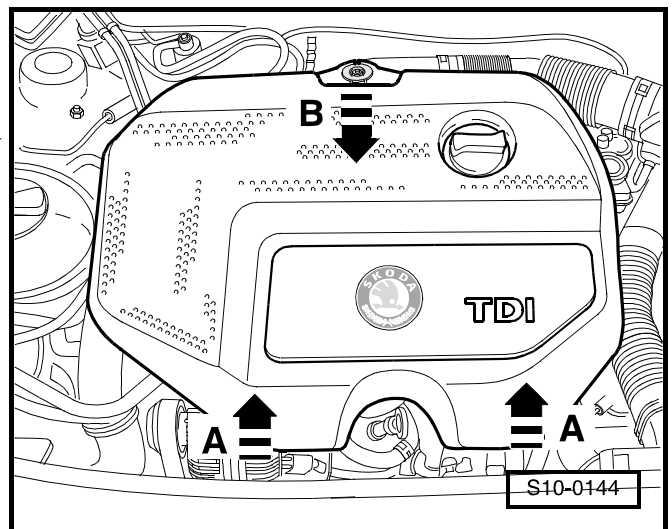
- ◆ Catch pan (e.g. -V.A.G 1306 -)
- ◆ Torque wrench 5 through 50 Nm
- ◆ Pliers for spring strap clips

Removing

i Note

Always replace seals and gasket rings.

- Removing engine cover ⇒ Chapter 10-1. ►
- Drain coolant ⇒ Chapter 19-1.



- Remove coolant hose from connection fittings -2-.
- Unscrew bolts -1- attaching connection and remove connections -2- together with coolant thermostat -4-.
- Turn coolant thermostat -4- $1/4$ turn (90°) to the left and remove from connection fittings -2-.

Installing

Installation is carried out in the reverse order. Pay attention to the following:

- Clean sealing surface for O-ring.
- Moisten new O-ring -3- with coolant and insert on connection fitting -2-.
- Fit coolant regulator -4- in the connection fitting -2- and turn $1/4$ turn (90°) to the right.

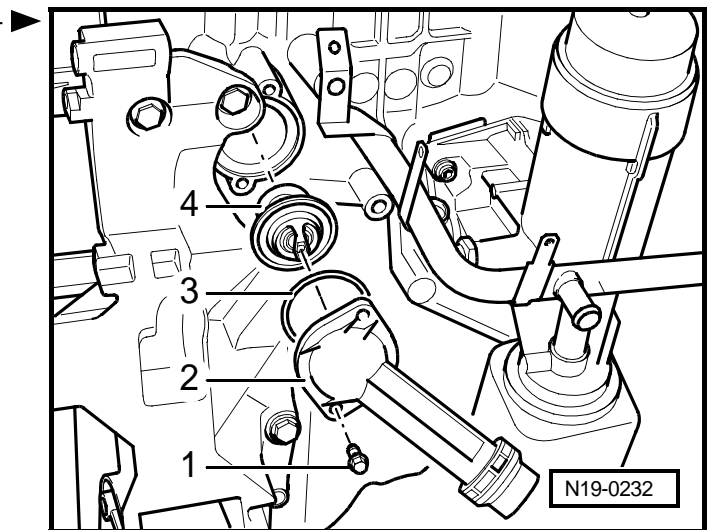
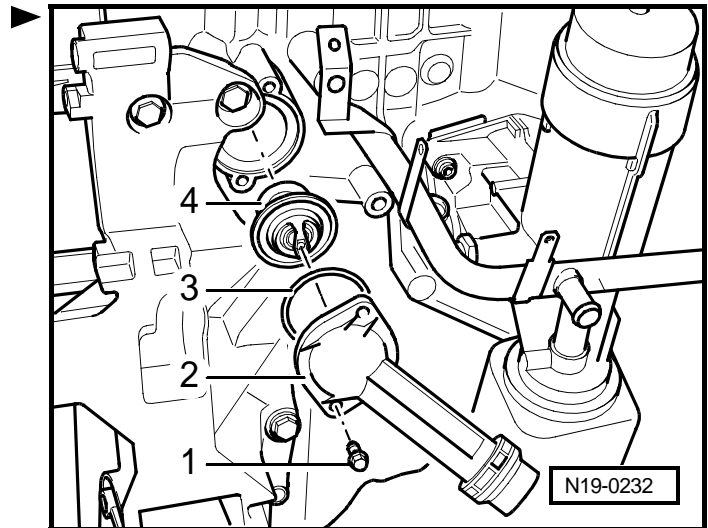
Note

The coolant regulator clamps must be virtually vertical.

- Insert the connection fitting -2- with coolant regulator -4- in the cylinder block.
- Tighten fixing screws -1-.

Tightening torque: 15 Nm

- Top up coolant ⇒ Chapter 19-1.



20 – Fuel Supply

20-1 Removing and installing parts of the fuel supply - Part 1

Fuel tank with component parts - Summary of components

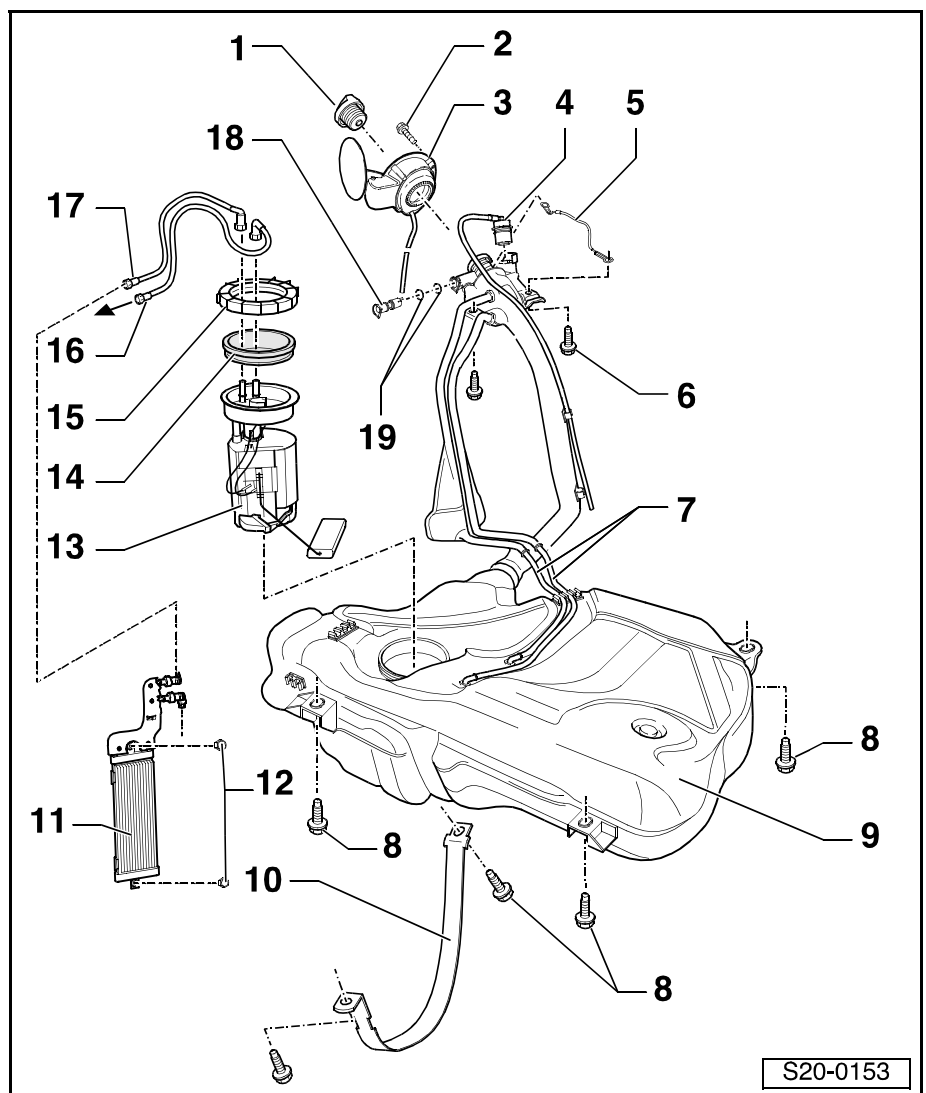


Note

- ◆ Fuel lines are secured by plug connectors.
- ◆ Fuel hoses in the engine and fuel filter must only be secured with spring strap clamps. The use of clamp-type or screw-type clips is not allowed.
- ◆ Observe safety measures ⇒ **20-1** page 2.
- ◆ Observe rules for cleanliness ⇒ **20-1** page 3.

Repairing the accelerator control ⇒ Chapter 20-3

- 1 - Cap**
- 2 - 1.5 Nm**
- 3 - Fuel tank lid unit**
 - with rubber bowl
- 4 - Gravity valve**
 - to remove, unclip valve at top and lift out of filler neck.
 - inspect valve for blockage:
 - ◆ valve vertical: Valve open
 - ◆ valve tilted 45°: Valve closed
- 5 - Earth connection**
- 6 - 10 Nm**
- 7 - Vent lines**
 - clipped in place on fuel tank
- 8 - 25 Nm**
- 9 - Fuel tank**
 - when removing support, for example with the engine/gearbox jack -V.A.G 1383 A -
 - removing and installing ⇒ Chapter 20-2
- 10 - Tensioning strap**
- 11 - Fuel cooler**
 - removing and installing ⇒ Chapter 20-2
- 12 - 20 Nm**
- 13 - Fuel pump/sender unit for fuel gauge display**
 - for vehicles > 04.00: Sender for fuel gauge
 - for vehicles 05.00 ▶+ Fuel pump with sender unit for fuel gauge display
 - removing and installing ⇒ **20-1** page 5
 - removing and installing fuel gauge sensor ⇒ **20-1** page 6
- 14 - Gasket ring**
 - replace if damaged
 - moisten with fuel before installing



S20-0153

15 - Union nut

- use wrench -MP 1-227- for removing and installing

16 - Feed line

- to fuel filter ⇒ **20-1** page 4
- on connection with identification -V- (flange)
- black
- to remove from connecting flange press release button
- check for firm seating
- clipped in place on fuel tank

17 - Return-flow line

- from fuel cooler ⇒ Chapter 20-2
- on connection with identification -R- (flange)
- blue
- to remove from connecting flange press release button
- check for firm seating
- clipped in place on fuel tank

18 - Vent valve

- to remove, unclip valve at side and take out of filler neck.
- before installing, unscrew cap
- check ⇒ Fig. 2 in **20-1** page 2

19 - O-ring

- replace

Fig. 1: Fitting position of the flange of the fuel delivery unit/fuel gauge sender unit

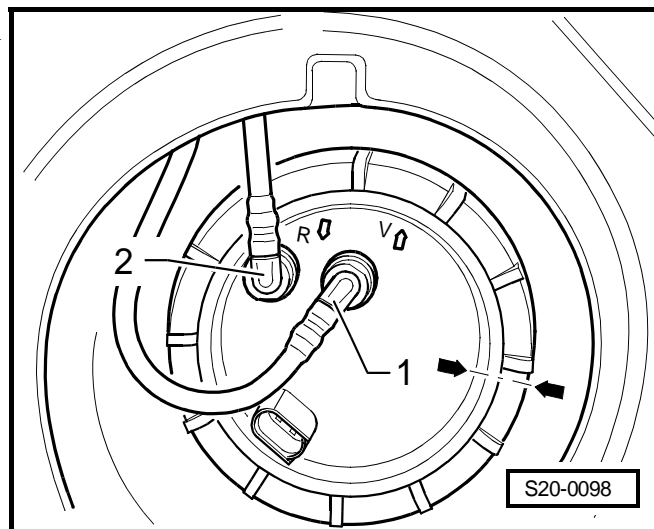
Marking on the flange must be aligned with marking on the fuel tank -arrows-.

(Black) feed line -1- to connection marked -V-.

(Blue) return-flow line -2- to connection marked -R-.

Note

After installing the fuel delivery unit/fuel gauge sender unit check whether the feed and return-flow line is secured to the fuel tank with retaining clips.

**Fig. 2: Inspect vent valve**

Lever in off position: Valve closed

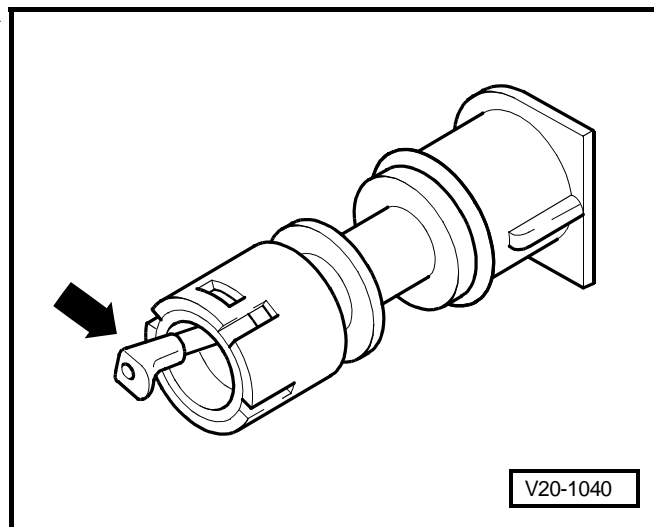
Lever pushed in direction of arrow: Valve open

Note

Before installing the vent valve, unscrew cap of fuel tank.

Safety precautions when working on the fuel supply system

Pay attention to the following points when removing and installing the fuel delivery unit/ fuel gauge sender on a fuel tank that is filled or partially filled:



- ◆ The extraction hose of an exhaust extraction system which is switched on, must be positioned close to the assembly opening of the fuel tank in order to extract the released fuel gases, even before the work is commenced. If no exhaust extraction system is available, a radial fan (motor not in air flow of fan) with a delivery volume of more than 15 m³/h must be used.
- ◆ Avoid skin contact with fuel! Wear fuel-resistant gloves!

Rules of cleanliness

Carefully observe the following 6 rules for cleanliness when working on the fuel supply or injection system.

- ◆ Thoroughly clean the connection points and their surroundings before releasing.
- ◆ Place removed parts on a clean surface and cover. Do not use fuzzy cloths!
- ◆ Carefully cover or close opened components if the repair is not completed immediately.
- ◆ Only install clean parts. Remove spare parts from their wrapping immediately before fitting. Do not use any parts which have been stored unwrapped (e.g. in tool boxes).
- ◆ When the system is open: Avoid using compressed air. Avoid moving the vehicle.
- ◆ Also make sure no diesel fuel runs onto the coolant hoses. If this is the case clean the hoses immediately. Replace immediately any hoses which have suffered damage.

Repairing the fuel filter

The fuel flow direction is indicated with arrows on the hoses, on the glow valve and the fuel filter.

- 1 - Return-flow hose**
 - from the tandem pump
 - blue marking
- 2 - Intake hose**
 - to the tandem pump
 - white marking
- 3 - Retaining clip**
 - replace if damaged
- 4 - Preheating valve**
 - Fitting position: Arrow points to fuel tank
 - if the filter is replaced remove retaining clip and preheating valve with the fuel lines connected
 - Temperature less than + 15°C: access to filter open
 - Temperature above + 31°C: access to filter closed
- 5 - Return-flow hose**
 - to fuel cooler ⇒ Chapter 20-2
 - blue marking
- 6 - Fuel hose**
- 7 - Fuel temperature sender -G81-**
- 8 - Intake hose**
 - from fuel tank
 - white marking
- 9 - Fuel filter**
 - fill up with diesel fuel before fitting
 - do not interchange connections
 - replace if damaged
 - removing and installing ⇒ Fig. 3 in **20-1** page 5
- 10 - Gasket**
 - replace if damaged
- 11 - Drain plug**
 - to ventilate remove the retaining clip of the preheating valve and remove preheating valve with the fuel lines connected
 - release and drain approx. 0.1 litre fluid (catch)
- 12 - 25 Nm**
- 13 - Bracket**
- 14 - Plastic insert**
 - with holder ⇒ item 13 a spare part

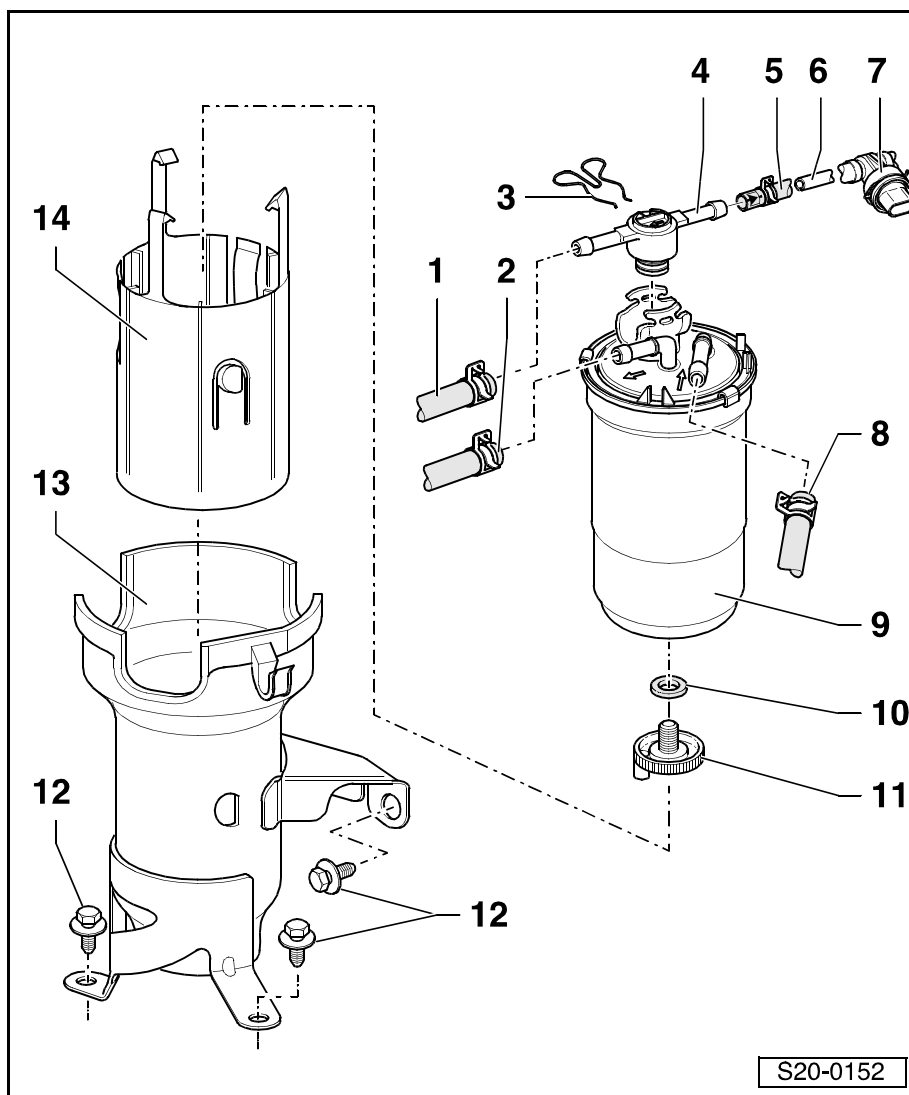


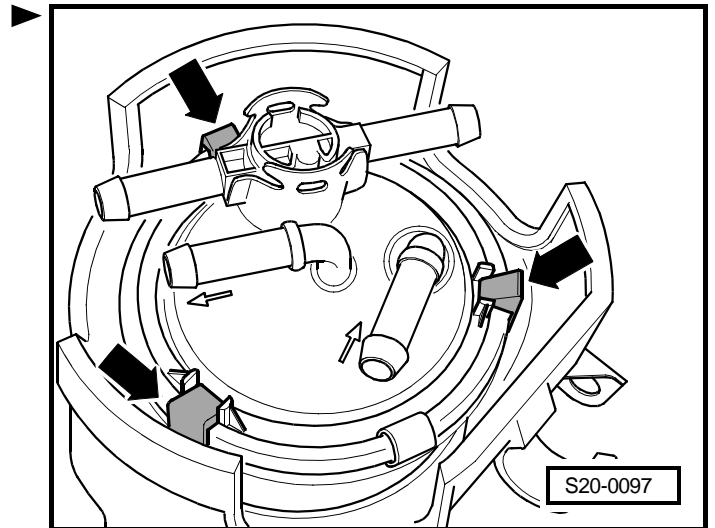
Fig. 3: Removing and installing fuel filter

- Remove the preheating valve with the fuel hoses fitted (pull out retaining clip).
- Remove fuel feed line.
- Push the retaining lugs -arrows- of the plastic insert outwards.
- Remove fuel filter from the top.



Note

Fuel filter can be removed in one position only.



Removing and installing the fuel delivery unit/fuel gauge sender unit

Observe safety measures ⇒ **20-1** page 2.

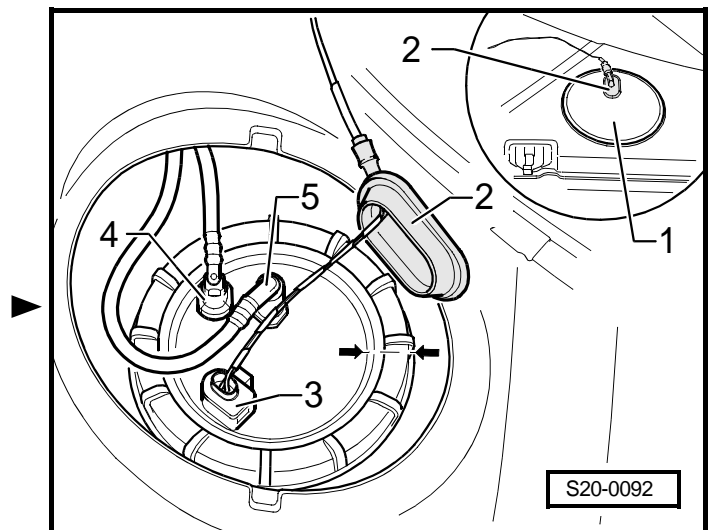
Observe rules for cleanliness ⇒ **20-1** page 3.

Special tools, test and measuring equipment and auxiliary items required

- ◆ Wrench for union nut -MP 1-227-

Removing

- Press off cover -1- (below rear seat).
The rubber grommet -2- may remain fitted.
- Remove feed line (black) -5- and return-flow line (blue) -4- from the flange of the sender unit. To do so press the release buttons.
- Unlock connector -3- and pull off from flange of fuel delivery unit/sender unit.
- Unscrew union nut with wrench -MP 1-227 -.
- Pull out the fuel delivery unit/fuel gauge sender unit and the gasket ring of the opening of the fuel tank.



Note

If the fuel delivery unit is still filled with fuel, empty it before replacing.

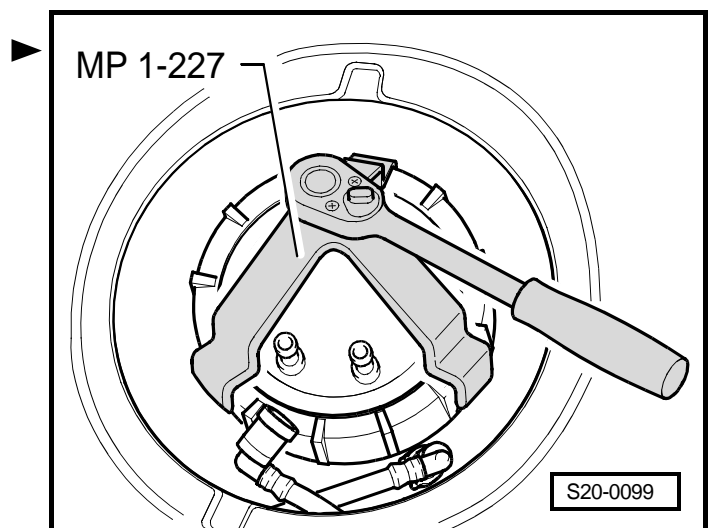
Installing

Installation occurs in reverse order. Pay attention to the following:



Note

- ◆ *When inserting the fuel delivery unit/fuel gauge sender unit make sure the sender is not bent.*
- ◆ *Moisten the gasket ring of the flange with fuel before fitting.*
- ◆ *Make sure the fuel hoses fit tightly.*



check fitting position:

- ◆ Marking on the flange must be aligned with marking on the fuel tank -arrows-.
 - ◆ (Black) feed line -1- to connection marked -V-.
 - ◆ (Blue) return-flow line -2- to connection marked -R-.
- Interrogate fault memory and erase ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 01.

Removing and installing the fuel gauge sender from the fuel delivery unit

Removing

- Removing the feeder pump/fuel gauge sender unit ⇒ **20-1** page 5.
- Unlatch and disconnect the line contact studs -3- and -4-.
- Raise catches -1- and -2- with a screwdriver and remove the fuel gauge sender towards the bottom -arrow-.

Installing

- Insert the fuel gauge sender in the sender unit guides and press upwards until they latch into position.
- Installing the feeder pump/fuel gauge sender unit ⇒ **20-1** page 5.

Testing fuel pump

Special tools, test and measuring equipment and auxiliary items required

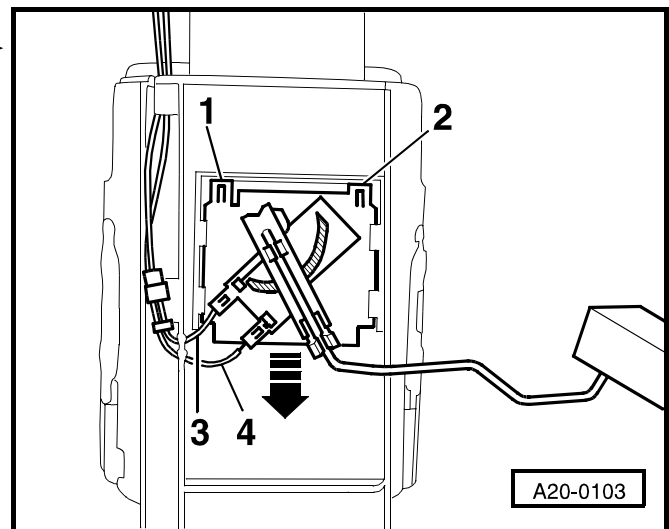
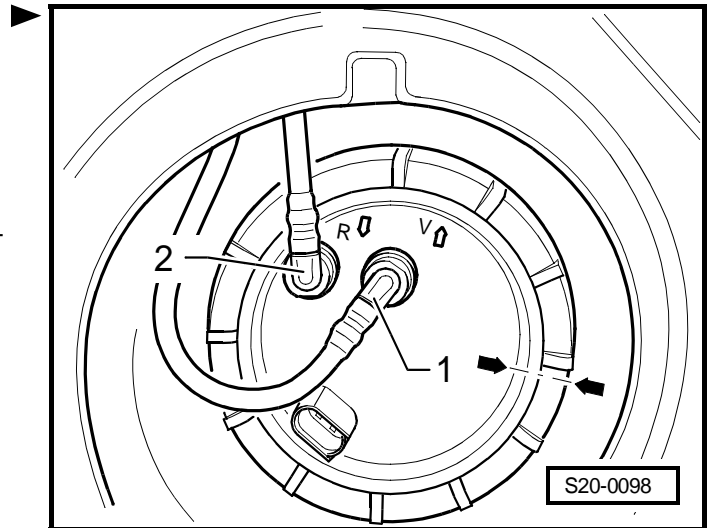
- ◆ Multimeter, e.g. -V.A.G 1715-
- ◆ Remote control, e.g. -V.A.G 1348/3A-
- ◆ Adapter cable set, e.g. -V.A.G 1594 A- or -V.A.G 1594 C -
- ◆ Wrench for union nut -MP 1-227-
- ◆ Pressure gauge appliance, e.g. -V.A.G 1318-
- ◆ Adapter, e.g. -V.A.G 1318/1-
- ◆ Adapter, e.g. -V.A.G 1318/11-
- ◆ Adapter, e.g. -V.A.G 1318/17-
- ◆ Adapter, e.g. -V.A.G 1318/23-
- ◆ Measuring vessel

Test conditions

- Battery voltage at least 11.5 volts
- Fuses o.k.

Inspecting proper operation and power supply

- Removing fuel delivery unit guard.



- Switch on ignition. The fuel pump must be heard to start running.
- Switch off ignition.

If the fuel pump does not run:

- Remove cover from the fuse holder.
- Remove fuse No. 61 from the fuse holder.
- Connect remote control -V.A.G 1348/3A- with the adapter cable combination from the adapter cable set in fuse holder 61 and to positive terminal of battery (+).
- Activate remote control.

If the fuel pump starts running:

- Test fuel pump relay ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.

If the fuel pump does not run:

- Disconnect the 4-pin plug from the fuel pump flange.
- Connect the multimeter for voltage measurement to contacts 1 and 4.
- Activate remote control.

Specified value: approx. battery voltage.

If the specified voltage value is not reached:

- Establish and remove an open circuit in the wiring according to the current flow diagram ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

If the specified voltage value is reached:

- Unscrew union nut with wrench -MP 1-227-.
- Remove fuel pump and check whether the electric wiring between the flange and fuel pump is connected.

If no open circuit was detected:

- Replace fuel pump.

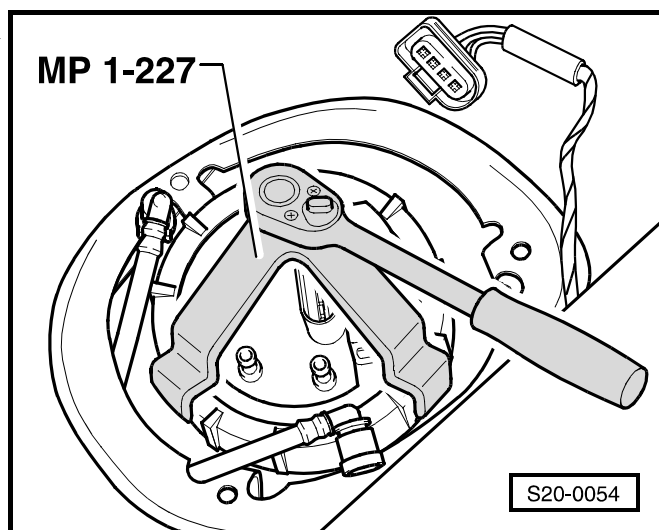
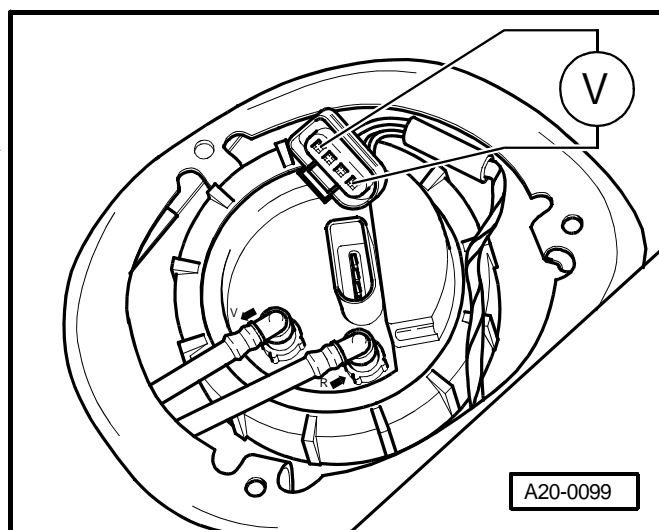
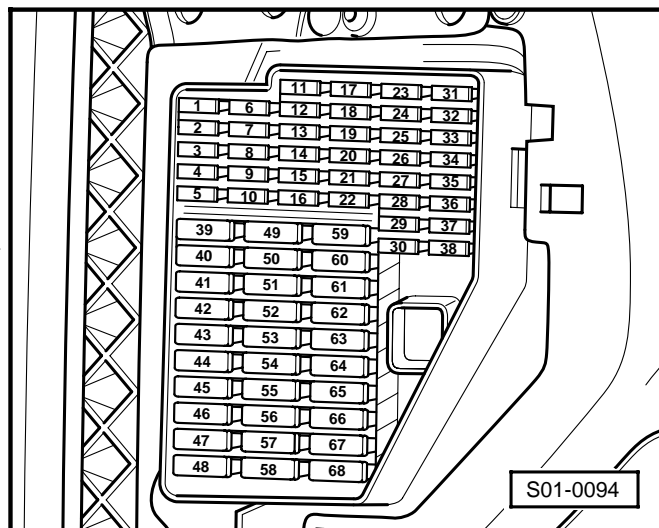
Inspecting fuel flow rate

Test conditions

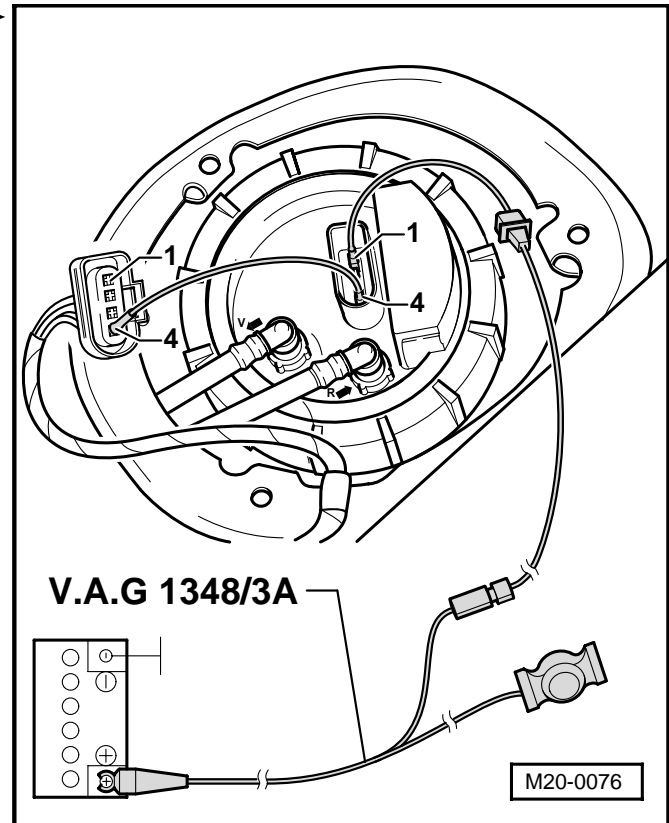
- Supply voltage OK
- Battery voltage at least 11.5 V.
- Fuel temperature 15...30 °C.
- Fuel tank at least 1/4 full.

Test sequence

- Unscrew cap from fuel filler neck.
- Remove cover of fuel delivery unit/fuel gauge sender under rear seat.
- Unplug 4-pin plug from fuel delivery unit.



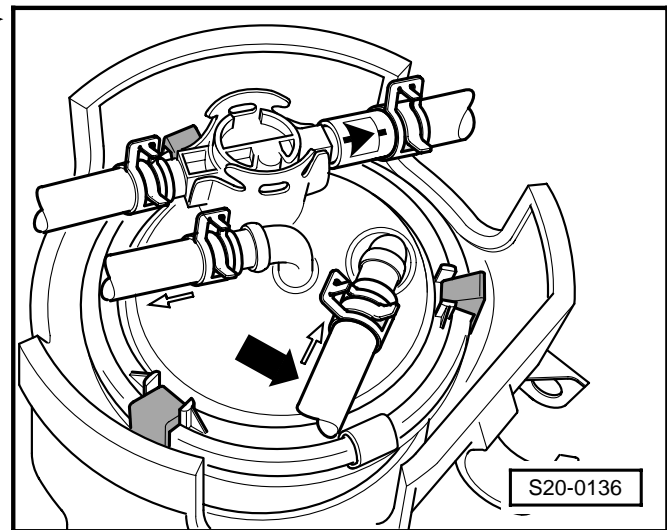
- Connect remote control -V.A.G 1348/3A- with connection lines from measuring tool set to contact -1- of the fuel pump and to battery +.
- Use connection lines from the measuring tool set to connect the contacts -4- to the plug and to the fuel pump.



- Pull off the fuel feed line -arrow- and gather residual fuel in a cloth.

**WARNING!**

The fuel feed line is pressurized! Place a clean cleaning cloth around the connection point before detaching hose connections. Reduce pressure by carefully releasing the connection point.



- Connect pressure gauge -V.A.G 1318- with the adapt-
ers -V.A.G 1318/23 - and -V.A.G 1318/17 - to the fuel
feed line. ►
- Connect hose -V.A.G 1318/1- to adapter
-V.A.G 1318/11- of the pressure gauge and hold in the
measuring vessel.
- Open shut-off cock of the pressure gauge appliance.
The lever points in the direction of flow -A-.
- Activate remote control -V.A.G 1348/3A-. Slowly
close the shut-off cock until the manometer displays
0.35 bar overpressure (3.5 MPa). Now do not change
the position of the shut-off cock.
- Drain the measuring vessel.
- Activate remote control for 30 seconds.

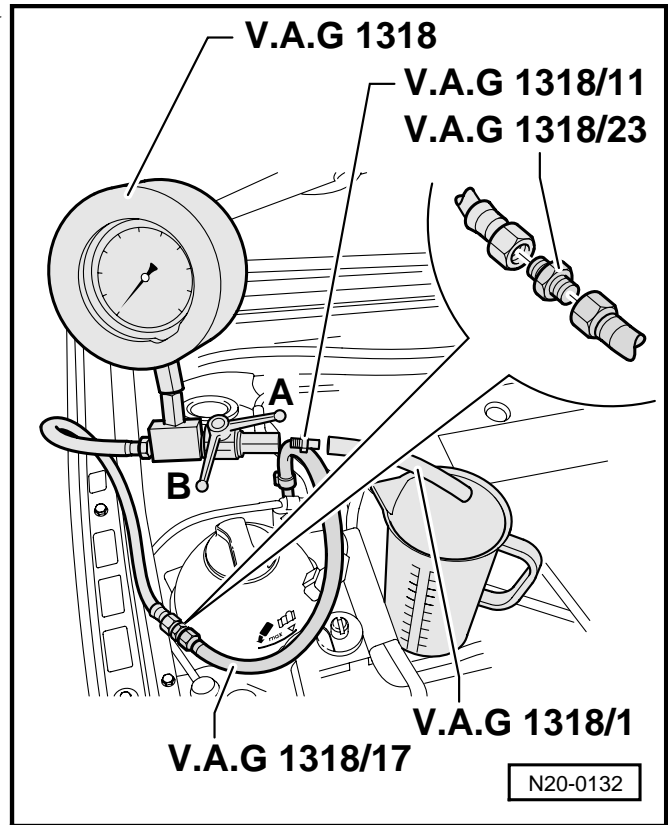
Minimum specified volume: 660 ml/30 s

If the minimum flow rate is not reached:

- Check the fuel lines for possible diameter restrictions
(kinks) or blocking.
- Remove the fuel delivery unit and check whether the
pump strainer is not clogged up.

If no fault was detected until now:

- Replace fuel pump.



20-2 Removing and installing parts of the fuel supply - Part 2

Removing and installing the fuel tank

Observe the safety precautions ⇒ Chap. 20-1.

Observe the rules for cleanliness ⇒ Chap. 20-1.

Special tools, test and measuring equipment and auxiliary items required

- ◆ Torque wrench 5 through 50 Nm (e.g. -V.A.G 1331-)
- ◆ Engine/gearbox jack (e.g. -V.A.G 1383 A-)
- ◆ Fuel extraction device (e.g. - V.A.G 1433 A-)

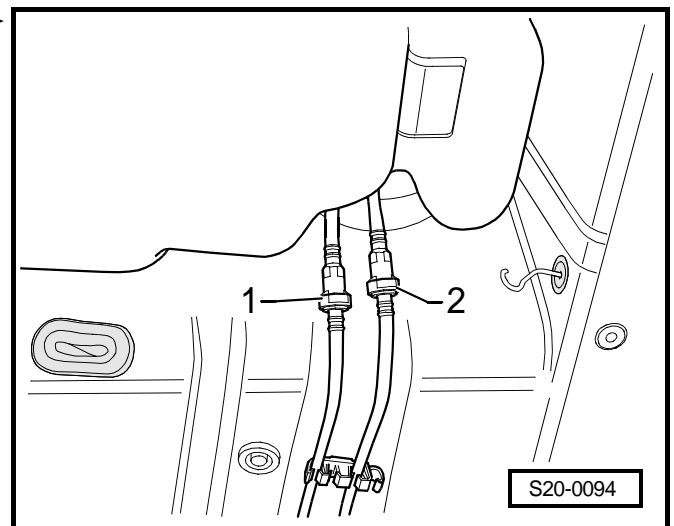
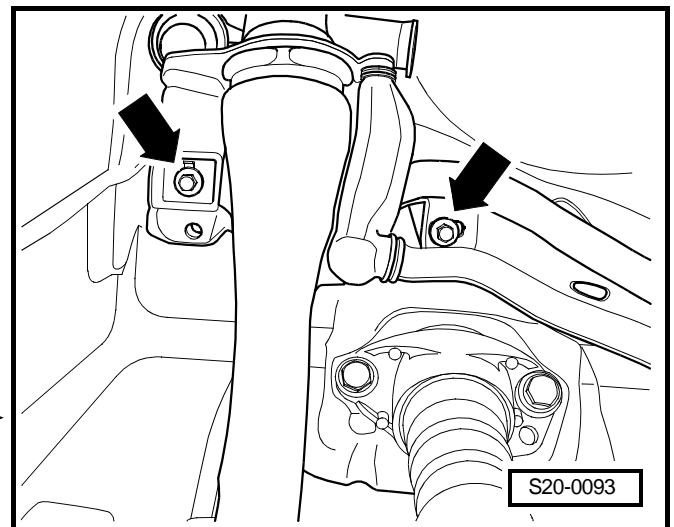
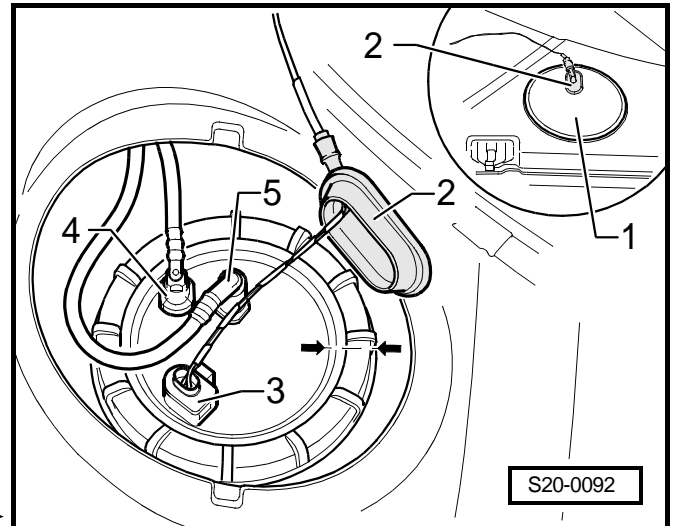
Removing

- On models fitted with a coded radio set, pay attention to the coding; determine if necessary.
- Disconnect the earth strap from the battery with the ignition off.
- Press off cover -1- (below rear seat).

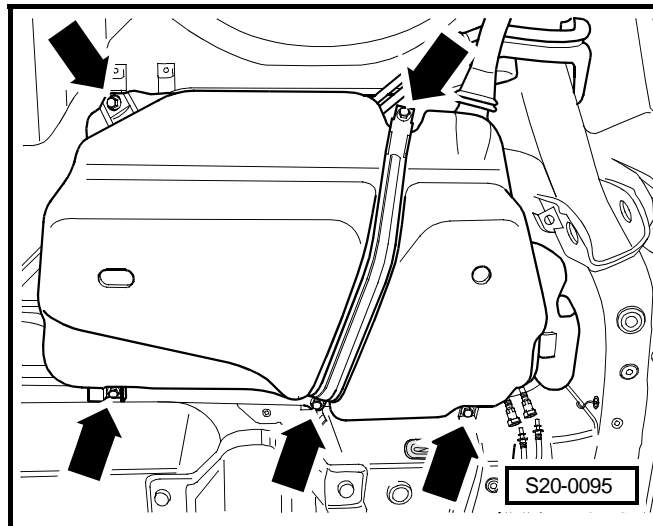
The rubber grommet -2- may remain fitted.

- Unlock connector -3- and pull off from flange of fuel delivery unit/sender unit.
- Drain fuel tank using the fuel extraction device. Screw cap remains off.
- Removing rear axle ⇒ Running Gear; Rep. Gr. 42.
- Removing front and rear silencer ⇒ Chap. 26-1.
- Remove left heat shield next to the fuel tank.
- Remove rear right wheelhouse liner.
- Unscrew bolts on tank filler neck -arrows-.

- Disconnect feed line (black) -1- and return-flow line (blue) -2- from the fuel tank (press release buttons).
- Position the engine/gearbox jack under the fuel tank for support.



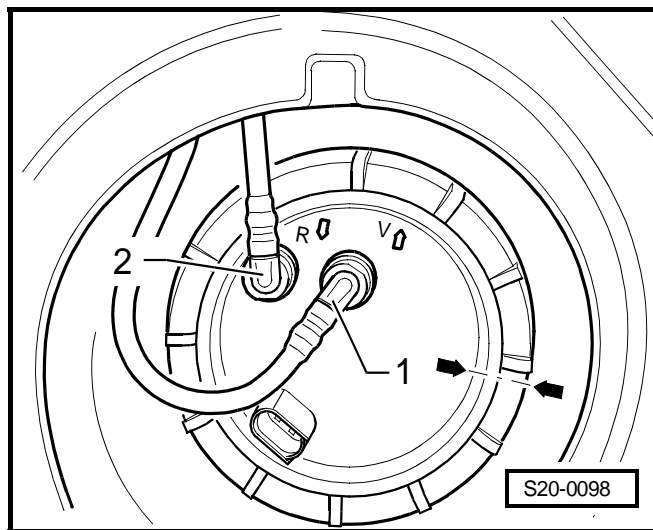
- Release the securing bolts -arrows- of the fuel tank. ▶
- Draw the filler neck from the rubber bowl of the tank lid unit and lower fuel tank.



Installing

Installation occurs in reverse order. Pay attention to the following:

- Connect the fuel lines to the flange of the feeder pump/of the fuel gauge sender unit:
 - ◆ (Black) feed line -1- to connection marked -V-.
 - ◆ (Blue) return-flow line -2- to connection marked -R-.
- Interrogate fault memory and erase ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 01.



Removing and installing fuel cooler

Special tools, test and measuring equipment and auxiliary items required

- ◆ Torque wrench 5 through 50 Nm (e.g. -V.A.G 1551-)

Removing

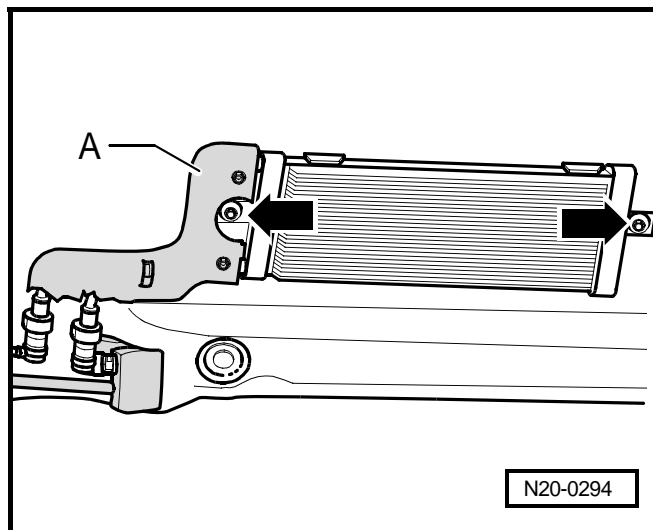
Observe the rules for cleanliness ⇒ Chap. 20-1.



Note

Fuel cooler is located at the return-flow line to the fuel tank. It is attached to the underfloor of the vehicle body.

- Removing cover -A-.
- Separate fuel line at fuel cooler.
- Unscrew fixing nuts -arrows-.



Installing

Carry out the installation in the same way in reverse order. Pay attention to the following:

- ◆ Tighten nuts of the fuel cooler to 15 Nm.

Inspecting tandem pump

Special tools, test and measuring equipment and auxiliary items required

- ◆ Vehicle system tester -V.A.G 1552-
- ◆ Diagnostic cable -V.A.G 1551/3, 3A, 3B oder 3C-

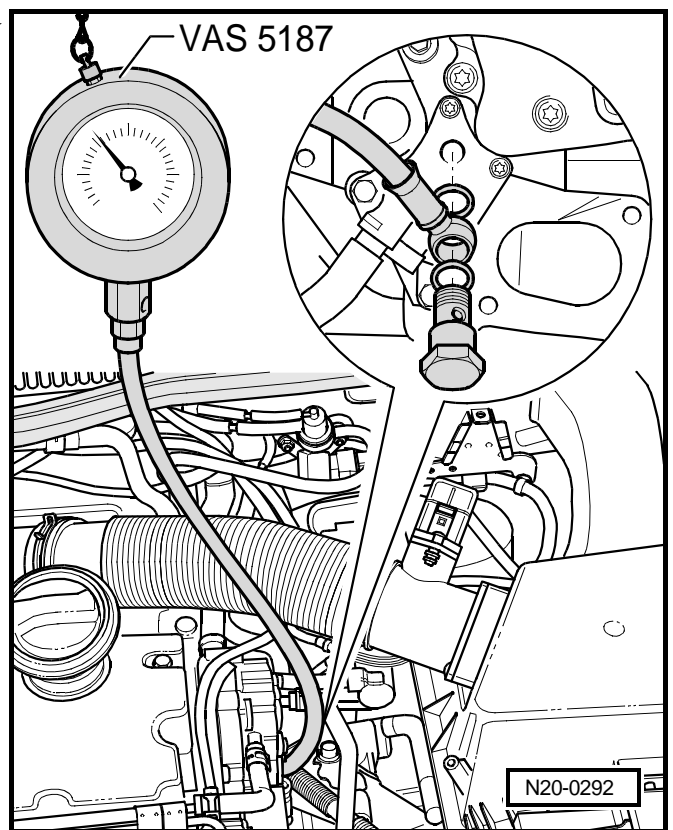
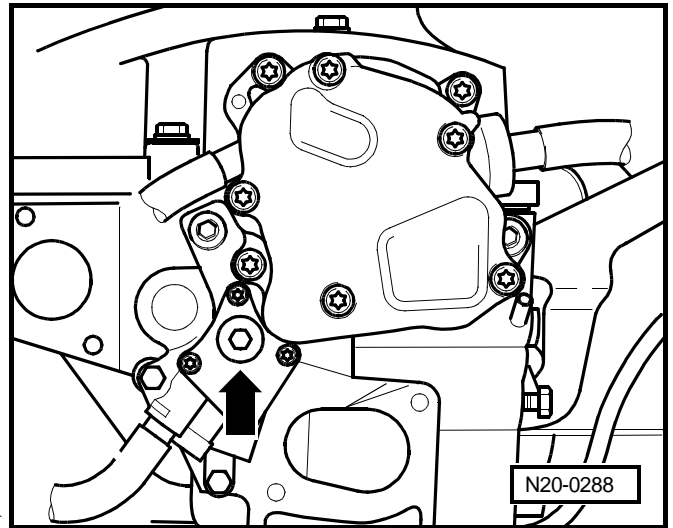
- ◆ Torque wrench 5 through 50 Nm (e.g. -V.A.G 1331-)
- ◆ Pressure gauge (e.g. -VAS 5187 -)

Test conditions

- The coolant temperature must be at least 85 °C.
- The pump/nozzle units must be O.K.
- Fuel filter and fuel line must not be blocked.
- The non-return valve in the fuel-intake hose must be O.K.
- Fuel gauge sender must be O.K.

Procedure

- Unscrew screw plug -arrow-.
- Connect Pressure gauge (e.g. -VAS 5187-) as shown.
- Connect vehicle system tester -V.A.G 1552- and select engine electronics „address word“ 01. The engine must be running in idle ⇒ 1.9/74 TDI Engine, Fuel Injection; Rep. Gr. 01.



Readout on display:

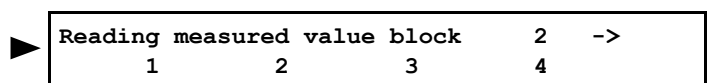
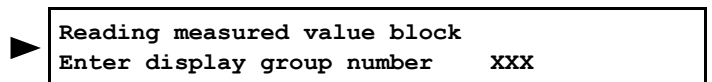
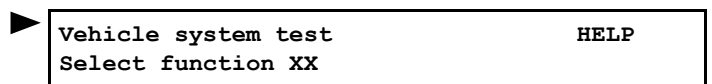
- Select function **0** and **8** for „Read measured value block“ and confirm the entry with the key **Q**.

Readout on display:

- Select display group number **0 0 2** and confirm entry with **Q**.

Readout in display (1...4 = display blocks):

- Read off idle speed value in display block 1.
- The engine speed must increase to more than 1500 rpm.
- Observe pressure displayed on pressure gauge.



Specified value: at least 3.5 bar (0.35 MPa)

If the specified value is not reached:

- Replace tandem pump ⇒ **20-2** page 4.

Note


After removing the pressure gauge tighten screw plug to 25 Nm. Always replace the gasket ring.

Removing and installing the tandem pump


Special tools, test and measuring equipment and auxiliary items required

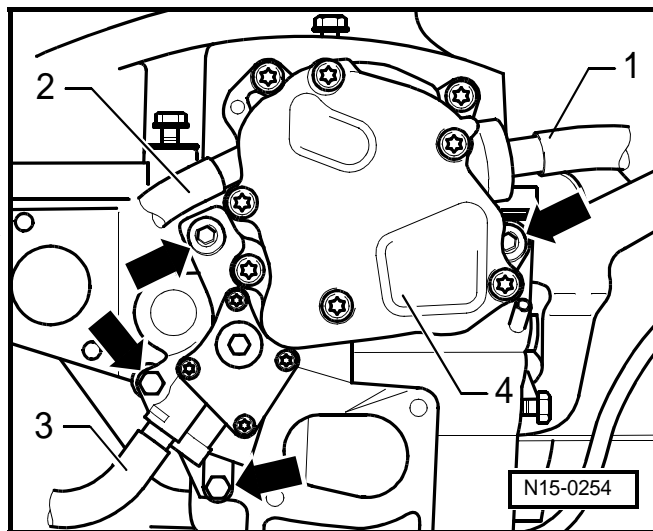
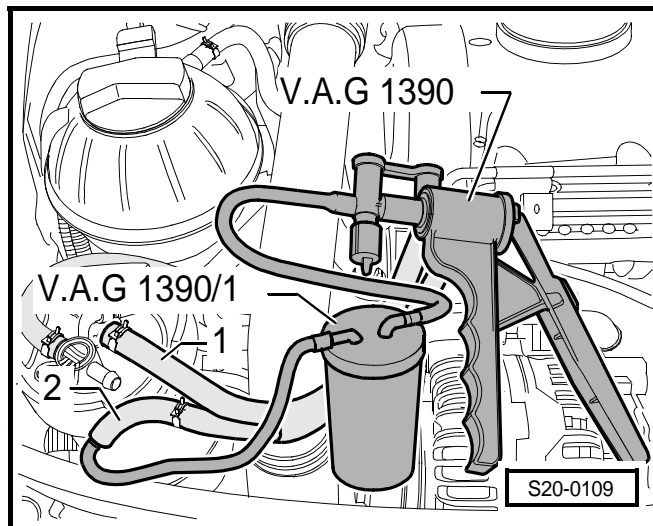
- ◆ Torque wrench 5 through 50 Nm (e.g. -V.A.G 1331-)
- ◆ Hand vacuum pump (e.g. -V.A.G 1390 -)
- ◆ Water drain reservoir (e.g. - V.A.G 1390/1-)

Removing

- Separate feed hose -1- (marked in white) and return-flow hose -2- (marked in blue) from the fuel filter. 
- Connect hand vacuum pump e.g. -V.A.G 1390- with Water drain reservoir e.g. -V.A.G 1390/1- to return-flow hose.
- Operate the hand vacuum pump, until there is no more fuel from the return-flow hose.

Ensure that no fuel is drawn into the hand vacuum pump.


- Disconnect vacuum hose -1- for brake servo unit from tandem pump -4-. 
- Remove feed hose -2- (marked in white) at the tandem pump -4-.
- Unscrew securing bolts -arrows-.
- Remove tandem pump -4- from cylinder head.
- Pull tandem pump -4- upwards, separate return-flow hose -3- (marked in blue) and remove tandem pump -4-.

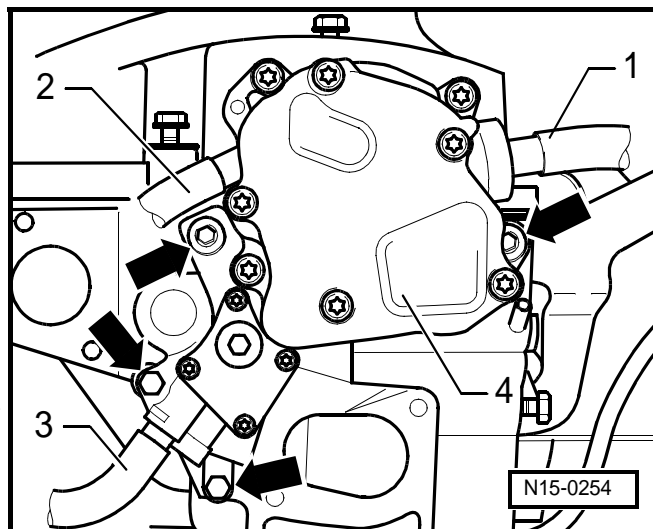


Installing

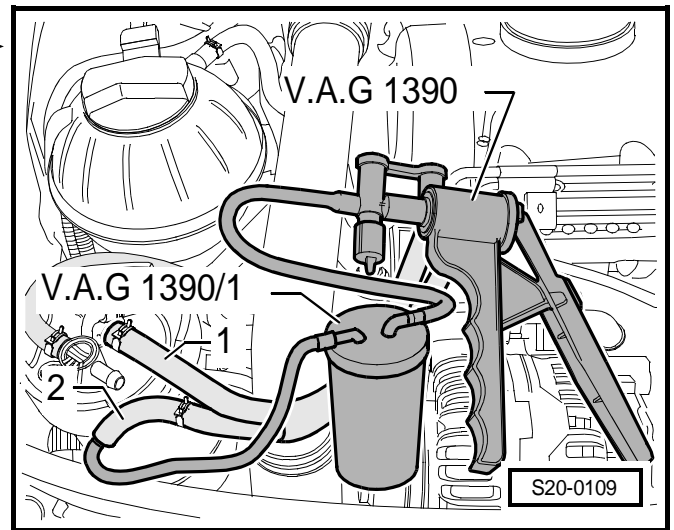
Installation is performed in the reverse order. Pay attention to the following points:

Note

- ◆ Ensure the tandem pump coupling is correctly inserted into the camshaft.
- ◆ Always replace the tandem pump seals.
- Connect return-flow hose -3- (marked in blue) to the return-flow coupling of the tandem pump. 



- Install tandem pump and tighten the bolts attaching it to the top to 20 Nm.
 - Tighten the bolts attaching it to the bottom to 10 Nm.
 - Connect the feed hose -2- (marked in white) to the feed connection and the vacuum hose -1- of the brake servo unit to the tandem pump -4-.
 - Connect feed hose -1- (marked in white) to fuel filter. ►
 - Connect hand vacuum pump (e.g. -V.A.G 1390-) together with water drain reservoir (e.g. -V.A.G 1390/1-) to return-flow hose -2- (marked in blue) of fuel filter.
 - Operate the hand vacuum pump, until fuel flows from the return-flow hose.
- Ensure that no fuel is drawn into the hand vacuum pump.
- Connect return-flow hose -2- (marked in blue) to fuel filter.



20-3 Repairing the accelerator control

Summary of components

1 - Bracket

- ❑ removing and installing
⇒ Running Gear;
Rep. Gr. 46

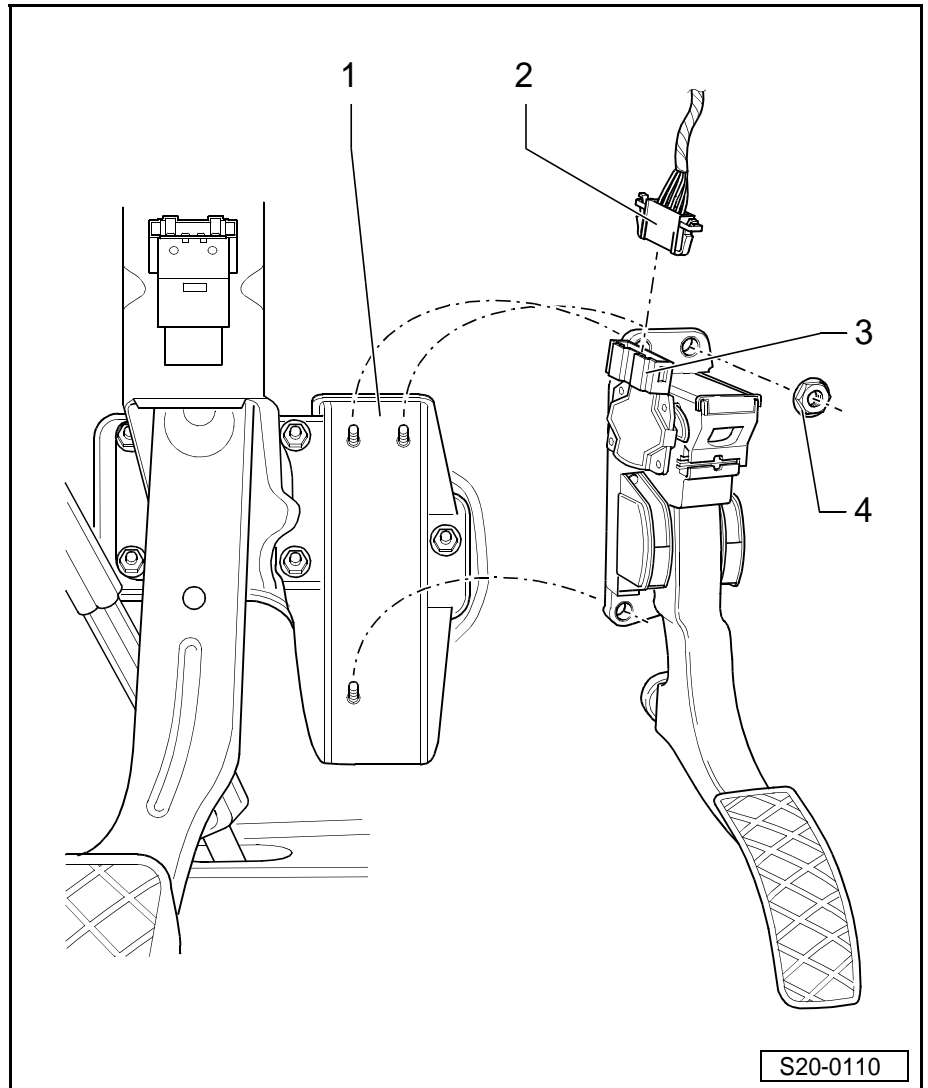
2 - Connector

- ❑ black, 6 pins

3 - Sender for accelerator pedal position -G79-

- ❑ not adjustable
- ❑ the accelerator pedal sender transmits the driver's instructions to the engine control unit
- ❑ to remove the sender remove the bottom part of the dash panel insert on the driver's side
- ❑ inspecting ⇒ 1.9/74 TDI Engine, Fuel Injection;
Rep. Gr. 23

4 - 10 Nm



S20-0110

