

Workshop Manual OCTAVIA

**1.9 ltr. / 50 kW Engine,
Mechanical Components**



List of Supplements to Workshop Manual **OCTAVIA**

Edition: 11.03

1.9 I/50 kW (SDI) Engine, Mechanical Components

Replaces List of Supplements - Edition: 05.01

Supplement	Edition	Subject	Article Number
	08.96	Basic Edition Workshop Manual	S00.5112.50.20
1	08.97	Supplement to Basic Edition	S00.5112.51.20
2	05.01	Modifications to Vehicles MY01	S00.5112.52.20
3	11.03	Modifications to Repair Groups 00, 10, 13, 15, 19 and 26	S00.5112.53.20
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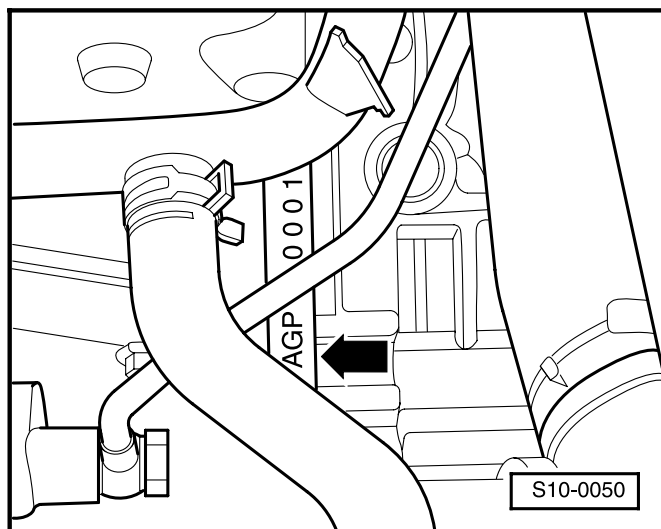
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* Repair procedures ⇒ 1.9-ltr./66 kW (TDI) Engine, Mechanical Components



Technical data

Engine number

- ◀ The engine number ("engine code" and "serial number") is located at the front at the connection of the engine/gearbox.

In addition, a sticker with "engine code" and "serial number" is affixed to the toothed belt guard.

The engine code is also indicated on the vehicle data stickers.

Engine features

Engine code		AGP	AQM
Manufactured		04.97 ► 07.00	08.00 ►
Displacement	l	1.896	1.896
Power output	kW at rpm	50/4200	50/4200
Torque	Nm at rpm	133/2200 - 2600	130/2200 - 2600
Bore	Ø mm	79.5	79.5
Stroke	mm	95.5	95.5
Compression ratio		19.5	19.5
Injection order		1-3-4-2	1-3-4-2
min. CN		49	49
Catalytic converter		yes	yes
Exhaust gas recirculation		yes	yes
Turbocharging		no	no
Charge air cooling		no	no
Complies with emission limits		EU2	EU3

Removing and installing engine

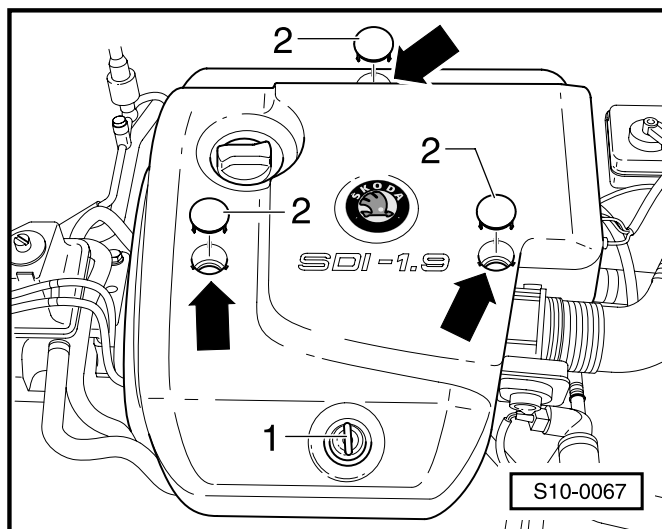
Special tools, testers and aids required

- ◆ Workshop crane, (e.g. V.A.G 1202 A)
- ◆ Drip tray, (e.g. V.A.G 1306)
- ◆ Torque wrench
- ◆ Pliers for spring strap clips
- ◆ Engine holder MP 1-202
- ◆ Engine holder T 10012
- ◆ Ladder, (e.g. V.A.S 5085)
- ◆ Engine/gearbox lifter, (e.g. V.A.G 1383 A)
- ◆ Grease G 000 100
- ◆ Cable straps
- ◆ Wire
- ◆ Adhesive tape

Removing engine

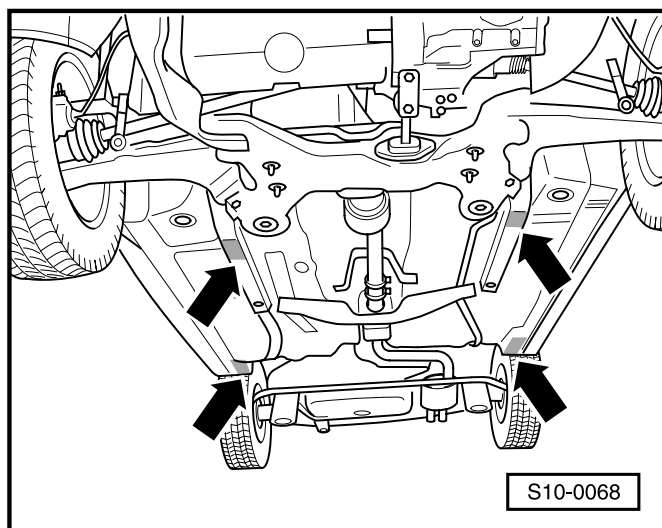
Notes:

- ◆ *The engine is removed downward together with the gearbox.*
- ◆ *All the cable straps which are detached or cut open when removing the engine, should be fitted on at the original point when installing the engine.*
- ◆ *Hose connections are secured with screw-type, spring strap or collar-type clamps.*
- ◆ *Always replace collar-type clamps with screw-type or spring strap clamps.*
- ◆ *Fuel lines at the engine must always be secured with spring strap clamps. It is not permissible to use collar-type or screw-type clamps.*
- ◆ *It is recommended to use the pliers for spring strap clamps for removing and installing such clamps.*
- ◆ *Ensure that the connectors are correctly plugged in, mark if necessary.*



Procedure

- On models fitted with a coded radio set, determine the code and note.
- Switch off ignition and disconnect the earth cable of the battery.
- ◀ Remove engine trim panel:
 - Take off dipstick -1-.
 - Take off plugs -2- and slacken nut -arrows-.

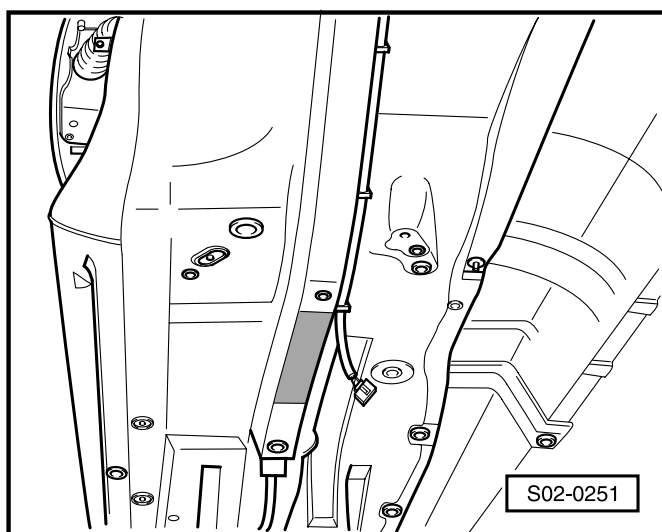


- Raise vehicle with a lift platform; pay attention to the following points during this step:

◀ The arms of the lift platform must be positioned only below the side members.

Important!

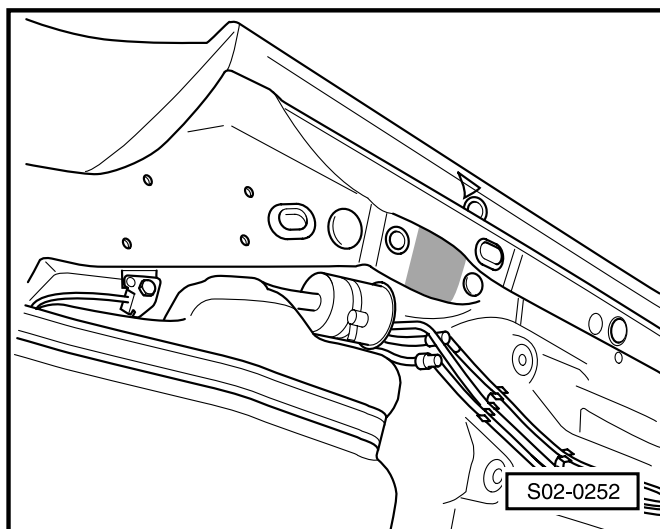
On no account may the arms of the lift platform be positioned below the sill of the front or rear suspension.



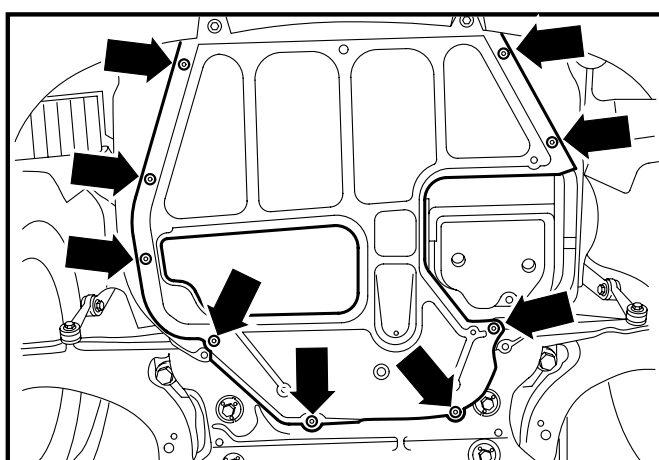
◀ The two jacking points are located at the front of the two side members at the level of the marking on the sill.

Important!

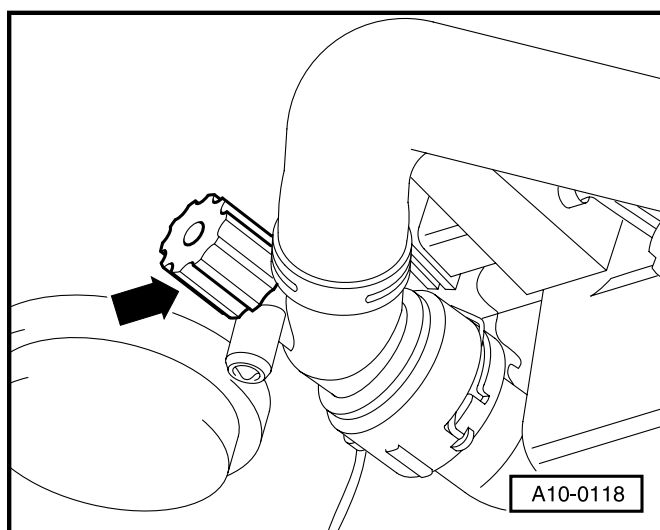
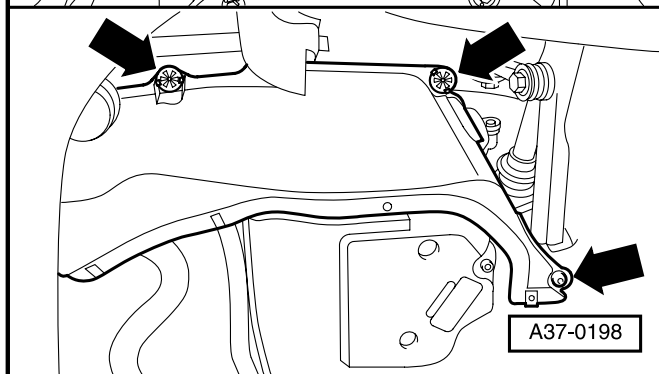
Never start the engine and engage a gear when the vehicle is raised so long as only even one driving wheel is touching the ground.



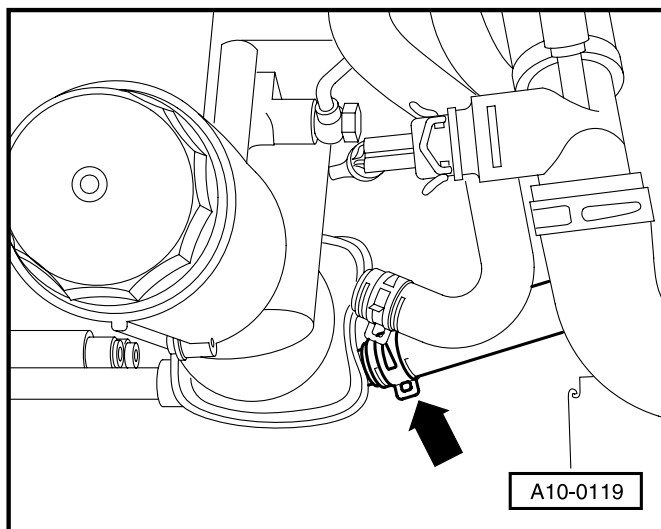
- ◀ The two rear jacking points are located at the rear of the side members at the level of the marking on the sill.



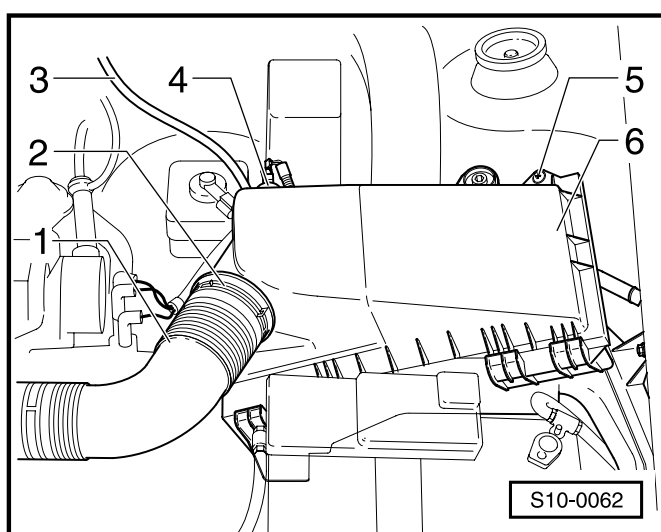
- ◀ - Take off noise insulation panel in the middle, on left and right -arrows-.



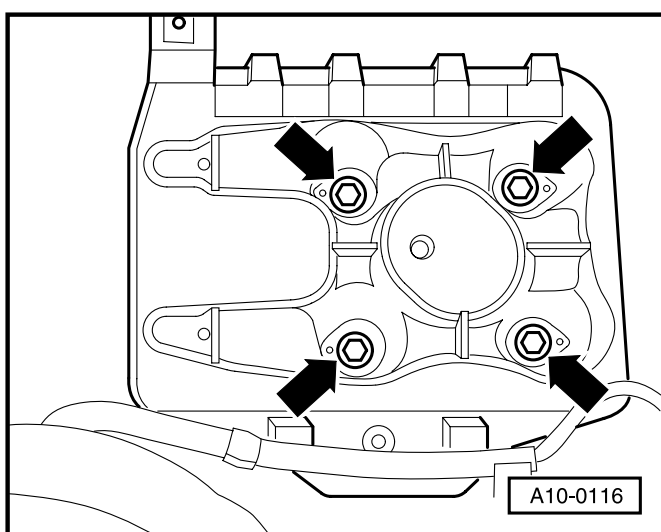
- Open cap of coolant expansion reservoir.
- ◀ - Turn drain plug -arrow- on the radiator to the left and pull to the rear; fit auxiliary hose onto connection if necessary.



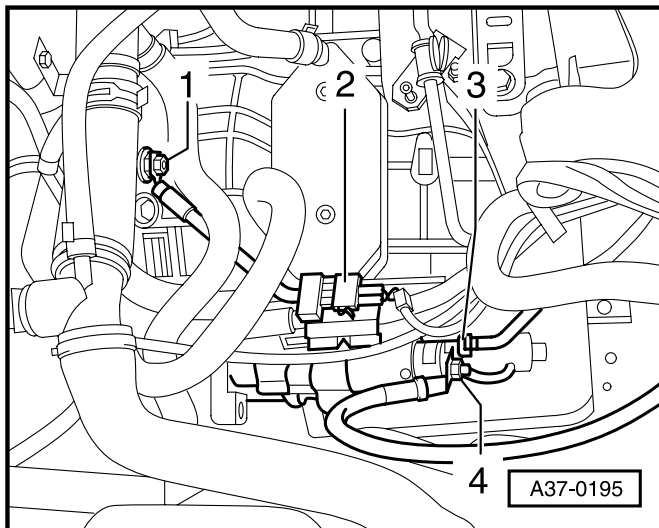
- ◀ - In addition, detach coolant hose at bottom of oil cooler -arrow- and allow the remaining coolant to drain out.



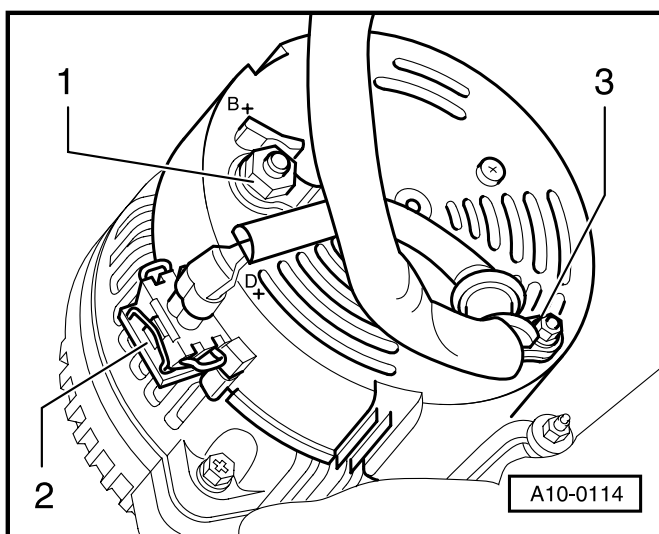
- ◀ - Slacken hose clip -2- and take off air guide hose -1-.
- Detach vent hose -3- and unplug connector for air mass meter -4-.
 - Slacken screws -5- and take off air filter cover -6-.



- ◀ - Remove battery and battery carrier -arrows-.



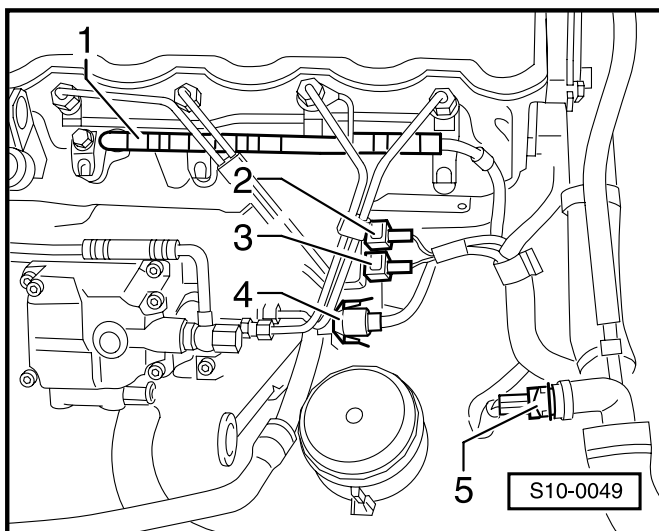
- ◀ - Disconnect ground cable -1-.
- Disconnect cables -3- and -4- at the starter.
- Separate plug connection -2- and pull out of the holder.
- Take cables out of the holder at the starter, place to the side and unbolt holder.



- ◀ - Unbolt cable -1- from terminal 30/B+ of the alternator.
- Unplug connector -2- from terminal D+.
- Unscrew cable clamp -3-.

Models with air conditioning

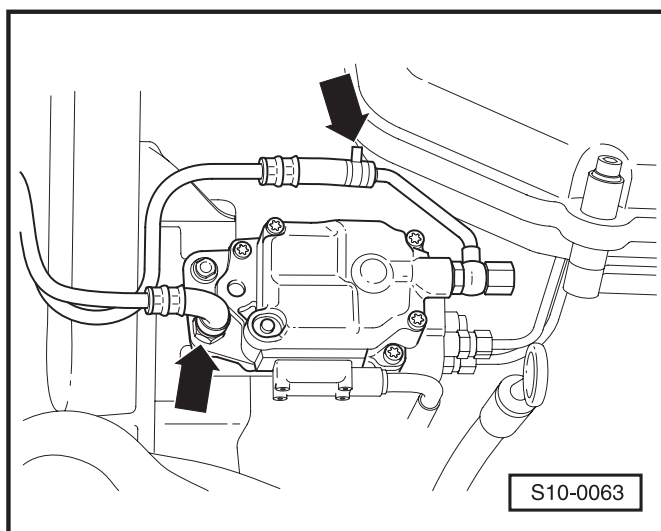
- Separate plug connection at the AC compressor.



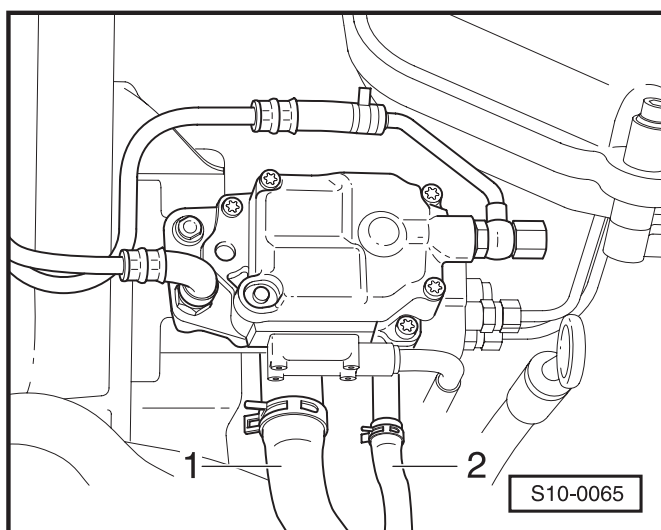
All models

- ◀ - Unplug the following cables/connectors:
 - 1 - Connector strip for glow plugs
 - 2 - Plug connection for needle lift sender -G80- (brown, black connector)
 - 3 - Plug connection for engine speed sender -G28- (black)
 - 4 - Plug connection for injection pump
 - 5 - Connector for electronic thermoswitch -F14- (black; only with AC)
- Unplug connector for coolant temperature sender -G62- (black) at cylinder head.
- Unplug connector for oil pressure switch -F1- at oil filter housing.
- Take cable set off fixture and place to the side.

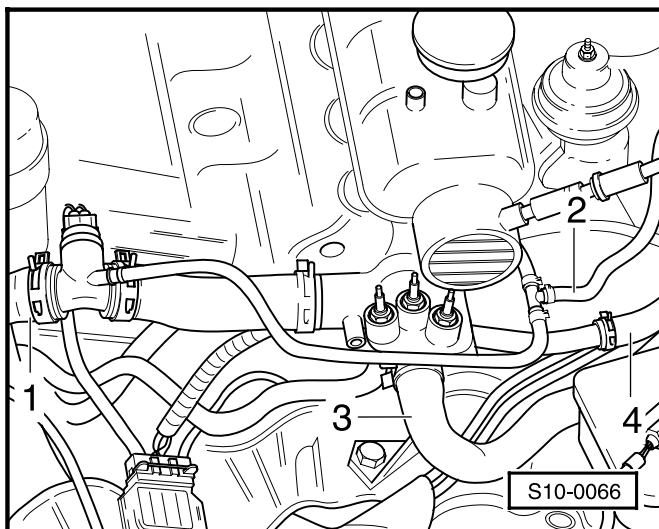
- Unplug connector from throttle valve positioner.
- Remove shift mechanism:
⇒ 5-speed Manual Gearbox 02K; Repair Group 34; Shift Mechanism/Housing.
- Remove clutch slave cylinder
⇒ 5-speed Manual Gearbox 02K; Repair Group 34; Clutch.



- ◀ - Detach fuel hoses -arrows- at the injection pump, seal with a clean plug and place to the side.



- ◀ - Use pliers for spring strap clips to detach the following coolant hoses.
- 1 - Bottom coolant hose at coolant thermostat housing and at radiator (remove hose).
 - 2 - Coolant hose to expansion reservoir.



- 1 - Coolant hose at top at branch
- 2 - Coolant hose to expansion reservoir and heat exchanger
- 3 - Coolant hose to heat exchanger
- 4 - Coolant hose from heat exchanger at coolant pipe

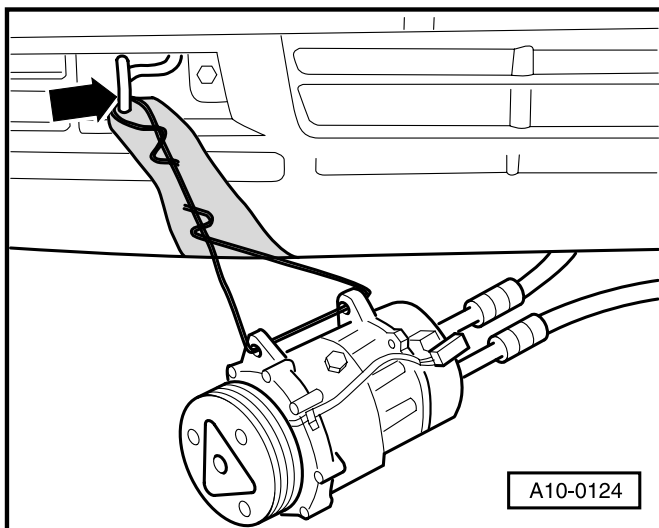
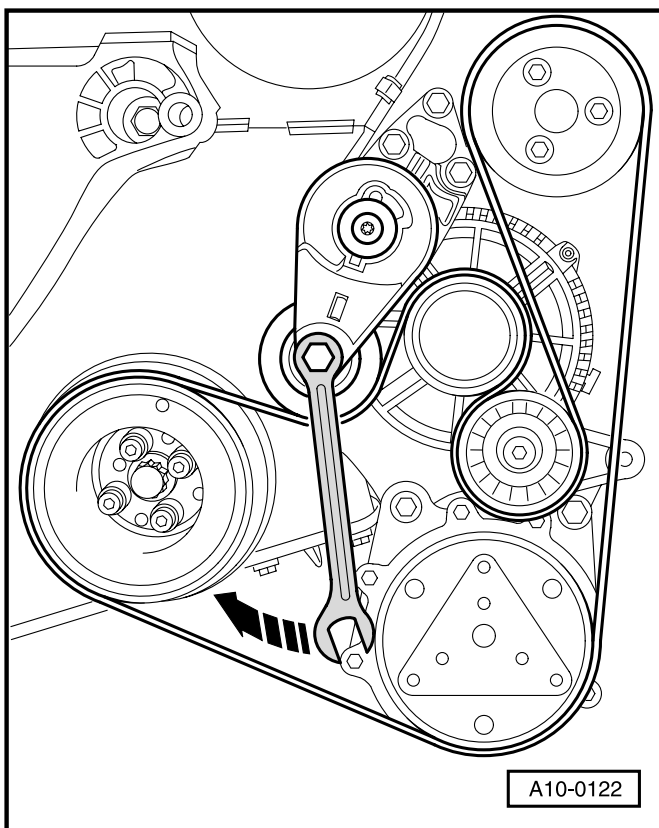
- Detach vacuum hoses:

- ◆ at the vacuum pump
- ◆ at mechanical EGR valve

Note:

Before removing the ribbed V-belt, mark the direction of running. If a used ribbed V-belt is fitted on to run in the opposite direction, it may be damaged. When installing, ensure the belt is correctly located in the belt pulleys.

- Position flat ring wrench, waf 16, at the hexagon of the tensioning pulley.
- ◀ - Slacken the ribbed V-belt by turning the tensioning pulley in direction of arrow.
- Take off ribbed V-belt.
- Remove belt pulley of vane pump for power steering.
- Unbolt vane pump for power steering.



Models with air conditioning

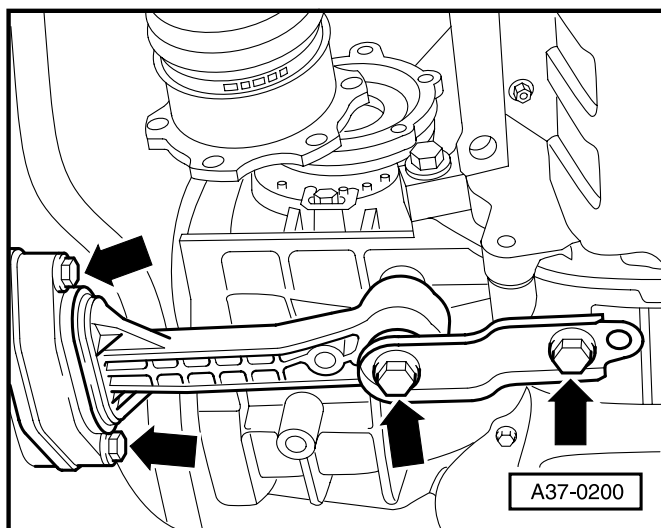
Important!

The refrigerant circuit of the air conditioning must not be opened.

- ◀ - Remove AC compressor, lower together with pipes connected and tie up at the towing eye with wire -arrow-.

Note:

Protect bumper against damage by means of adhesive tape.

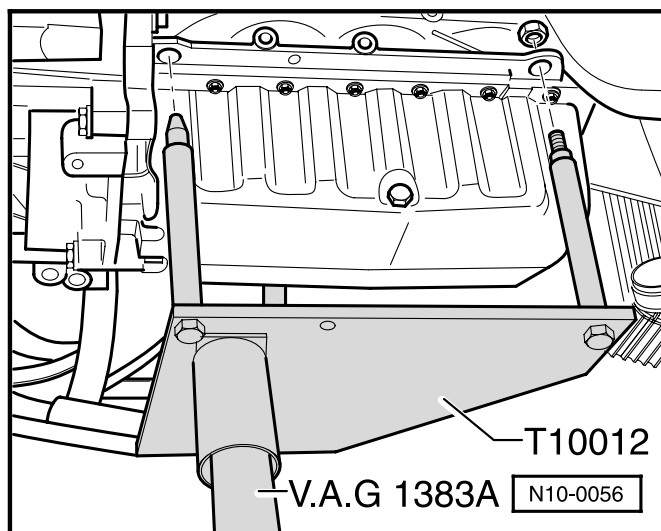


Continued for all models

- ◀ - Remove pendulum support -arrows-.
- Unbolt drive shafts from the flanges of the gearbox ⇒ Running Gear, Repair Group 40.
- Place both drive shafts to the rear and attach to body with wire.
- Remove front part of exhaust system ⇒ page 26-1.

Models with heavy-duty cooling system

- Remove right-hand electric fan (small fan wheel diameter).



Continued for all models

- ◀ - Attach engine holder T10012 to cylinder block with nut and M10 bolt, with a tightening torque of 40 Nm.
- Raise engine and gearbox slightly with engine/gearbox lifter.

Note:

Use ladder, e.g. V.A.S 5085 to remove the bolts attaching the engine and gearbox mounting brackets.

- Remove bolts of engine and gearbox mounts from above.
- Carefully lower engine and gearbox.

Note:

Engine and gearbox must be carefully guided out in order to avoid any damage.

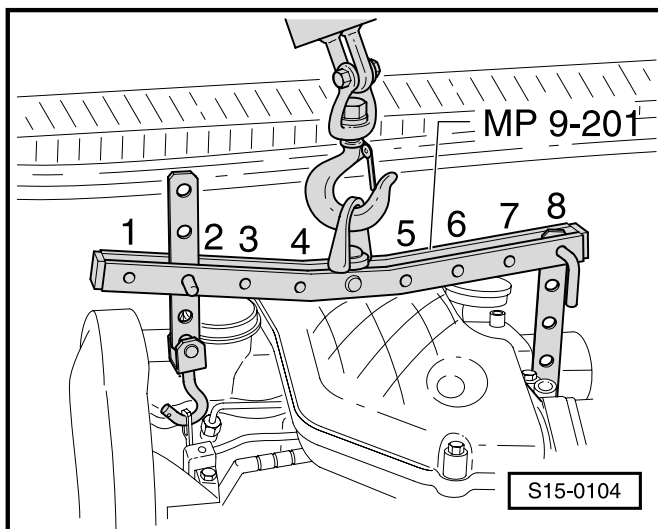
- Unscrew bolts connecting engine/gearbox.

Attaching engine to repair stand

The engine should be attached with the engine holder MP 1-202 to the repair stand for carrying out removal and installation operations.

Note:

The engine must not be attached to the repair stand when measuring the cylinder bore $\Rightarrow$ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 13.



- ◀ - Attach supporting device MP 9-201 to the plates at the engine, as shown, and take up weight of engine with workshop crane, e.g. V.A.G 1202 A:

- ♦ Belt pulley side:
2nd hole in rail - item 2
- ♦ Flywheel side:
2nd hole in rail - item 8

Warning!

Use locking pins at the hooks and rig pins to prevent them slipping out.

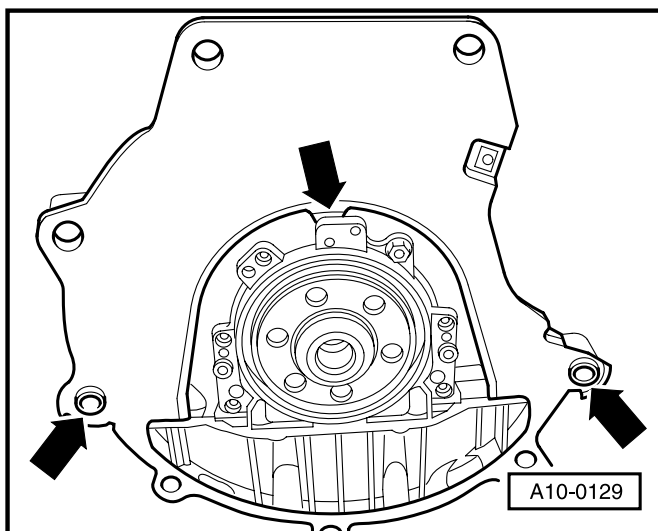
- Attach engine with engine holder MP 1-202 to the repair stand.

Installing engine

Notes:

- ♦ Always replace all seals and gaskets when carrying out removal and installation work.
- ♦ Always replace self-locking nuts.

Installation is carried out in the reverse order; pay attention to the following points:



- Check whether dowel sleeves for centering engine/gearbox are inserted in the cylinder block.
- ◀ - Attach intermediate plate to the sealing flange and push onto the dowel sleeves -arrows-.
- Inspect centering of the clutch driven plate.
- Inspect clutch release bearing for wear, replace if necessary.
- Apply a thin film of grease G 000 100 to the splines of the input shaft.
- Align engine/gearbox assembly so that it is free of stress $\Rightarrow$ page 10-12.
- Attach shift mechanism and adjust:
 $\Rightarrow$ 5-Speed Manual Gearbox 02K; Repair Group 34; Shift Mechanism, Housing

Models fitted with air conditioning

- Install AC compressor:
⇒ Heating and Air Conditioning; Repair Group 87; Detaching and attaching compressor at bracket.

Continued for all models

- Install power steering hydraulic pump:
⇒ Running Gear; Repair Group 48; Removing and installing hydraulic pump.
- Install ribbed V-belt ⇒ 1.9 l/66 kW (TDI) Engine; Repair Group 13; Removing and installing ribbed V-belt.
- Align exhaust system free of stress
⇒ 1.9 l/66 kW (TDI) Engine, Repair Group 26; Aligning exhaust system free of stress.
- Attach coolant hoses ⇒ page 19-1.

Note:

Do not re-use drained coolant if the cylinder block, cylinder head, radiator or heat exchanger, has been replaced.

- Fill system with coolant ⇒ page 19-3.
- Inspect engine oil level before starting engine.
- Connect hoses and lines for exhaust gas recirculation system ⇒ page 26-3.
- Electrical connections and routing of wiring:
⇒ Current Flow Diagrams, Electrical Fault Finding, Fitting Locations.

Note:

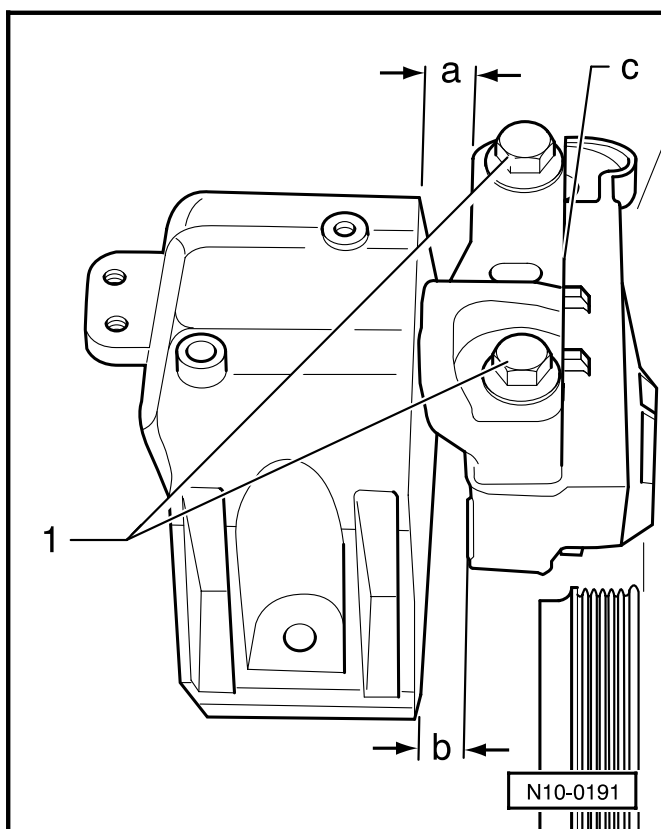
If the battery earth strap is disconnected and re-connected, it is necessary to carry out additional operations ⇒ Electrical System; Repair Group 27.

Tightening torques

Notes:

- ◆ *Tightening torques apply only to nuts and bolts which are lightly greased, oiled, phosphatized or blackened.*
- ◆ *Additional lubricants such as engine or gear oils are permissible, but not Molykote.*
- ◆ *Do not use parts which have been degreased.*
- ◆ *Unless otherwise stated, the following tightening torques apply:*

Component		Nm
Nuts/bolts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
In variation of this:		
Noise insulation panel for oil pan to cylinder block		20
Bolts connecting engine to gearbox ⇒ 5-Speed Manual Gearbox 02K; Repair Group 34		



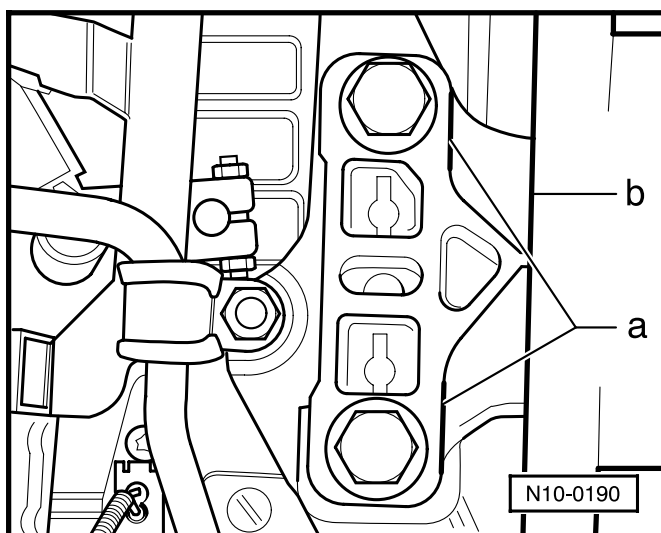
Aligning engine/gearbox mounting

◀ Engine mounting

$a = 14.0 \text{ mm}$

$b = \text{at least } 10.0 \text{ mm}$

Both bolt heads -1- must end flush with the edge -c-.

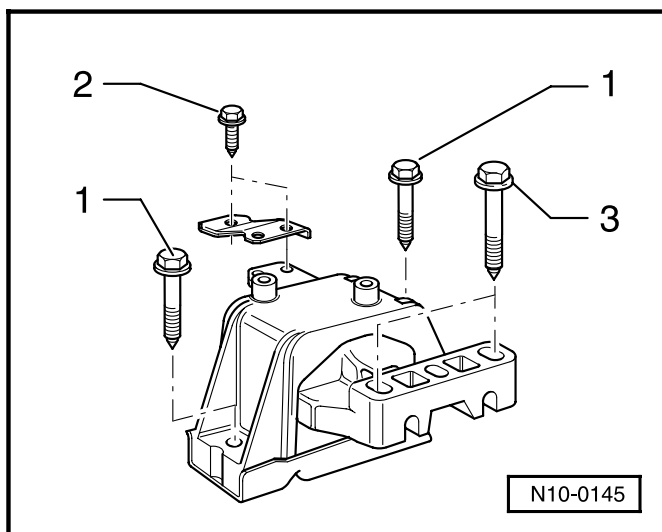


◀ Gearbox mounting

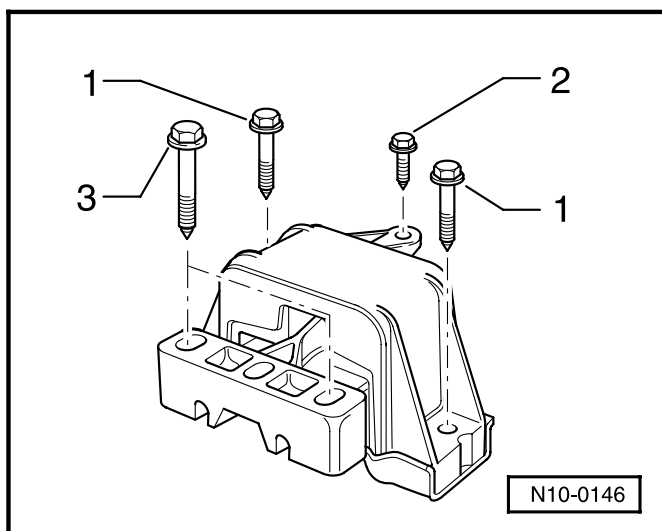
The edges -a- and -b- must be parallel to each other.

Engine/gearbox mounting**Tightening torques****◀ Engine mounting**

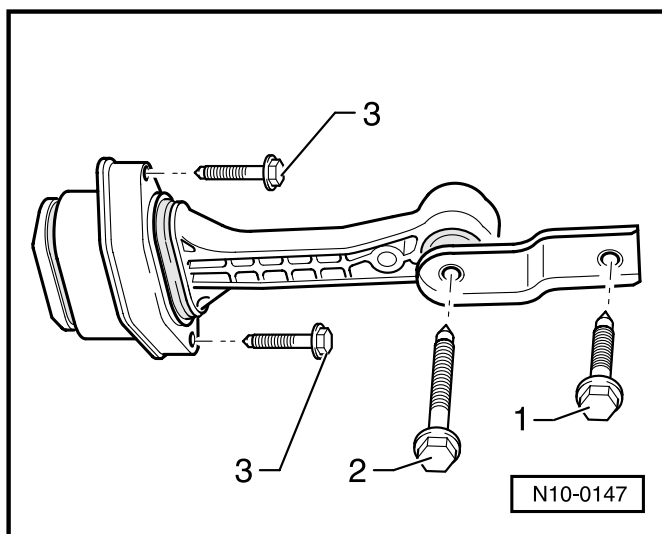
- 1 - 40 Nm + 90° (1/4 turn) - replace
- 2 - 25 Nm
- 3 - 100 Nm - replace

**◀ Gearbox mounting**

- 1 - 40 Nm + 90° (1/4 turn) - replace
- 2 - 25 Nm
- 3 - 100 Nm - replace

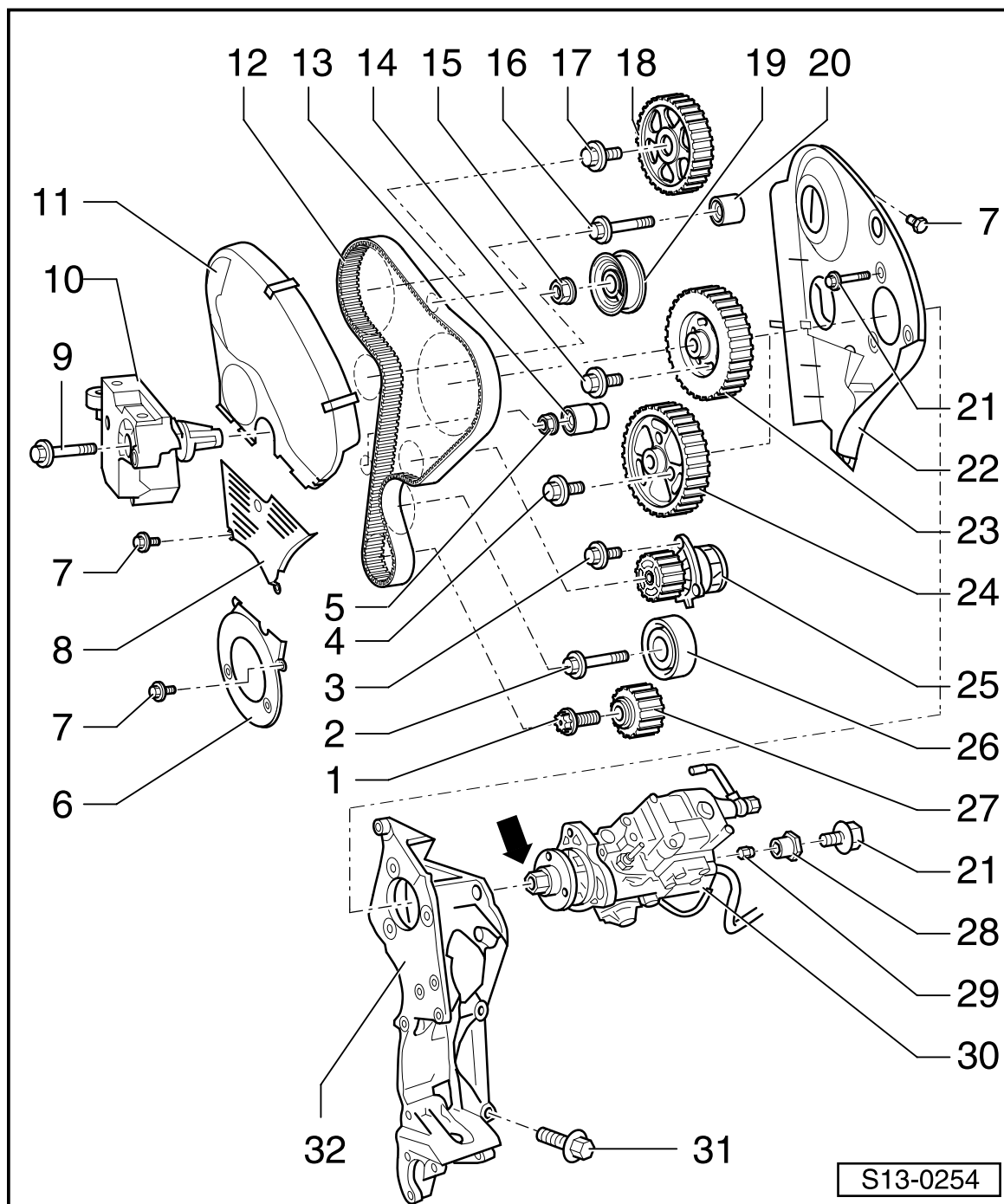
**◀ Pendulum support**

- 1 - 40 Nm + 45° (1/8 turn) - replace
- 2 - 40 Nm + 45° (1/8 turn) - replace
- 3 - 20 Nm + 90° (1/4 turn) - replace



Disassembling and assembling engine

Removing and installing toothed belt



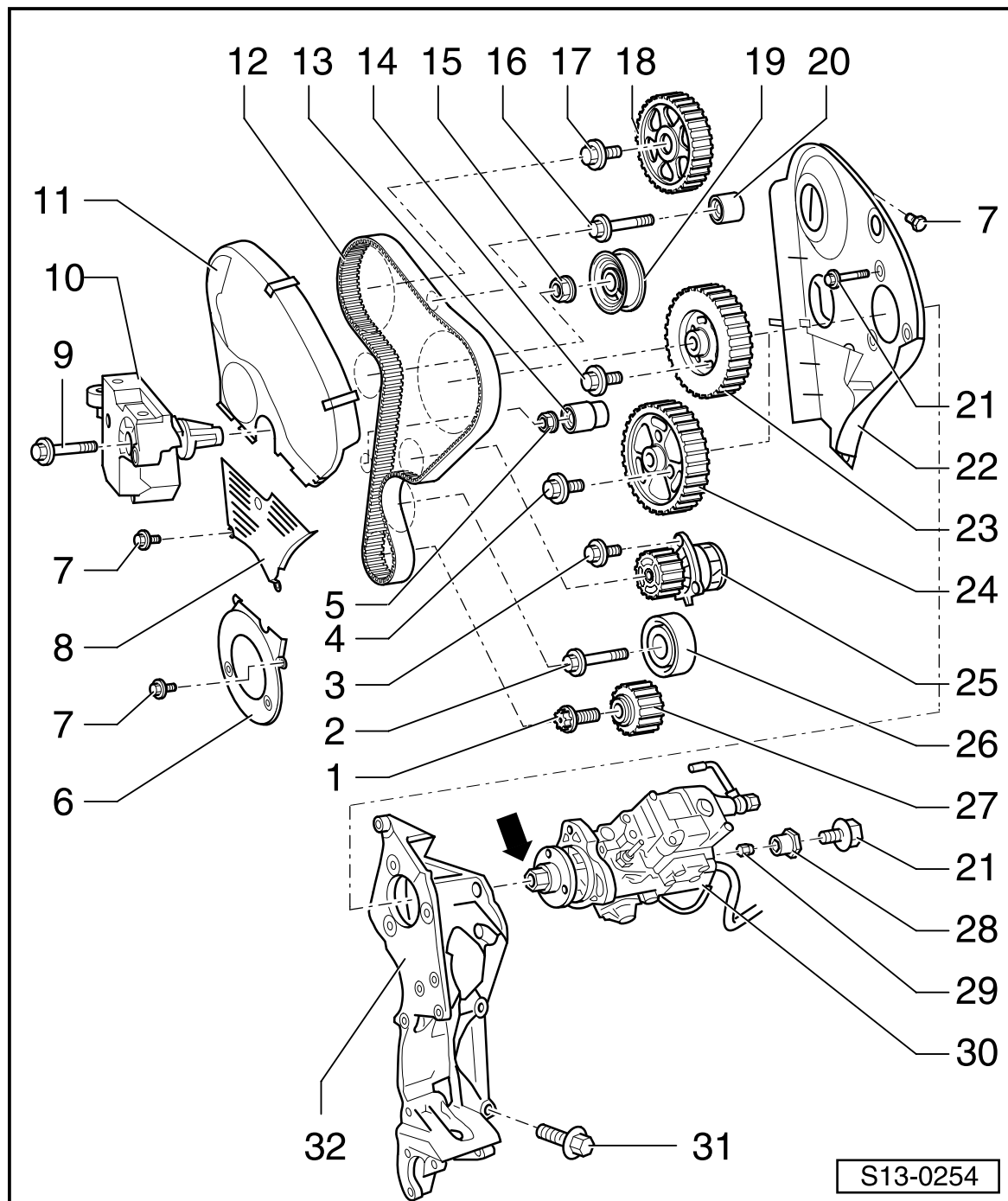
Note:

Mark the direction of running of the toothed belt before removing it. If an already used belt is fitted on to run in the opposite direction, it may be destroyed.

- ◆ Counterholder MP 1-216
- ◆ Locking pin 3359
- ◆ Setting straightedge MP 1-312

Special tools, testers and aids required

- ◆ Torque wrench



S13-0254

- ◆ Wrench for toothed belt tensioning pulley, (e.g. Matra V159, Hazet 2587 or Stahlwille 127-17)
- ◆ Supporting device MP 9-200
- ◆ Feeler gauges
- ◆ Puller T40001 with hook T40001/2 and T40001/3

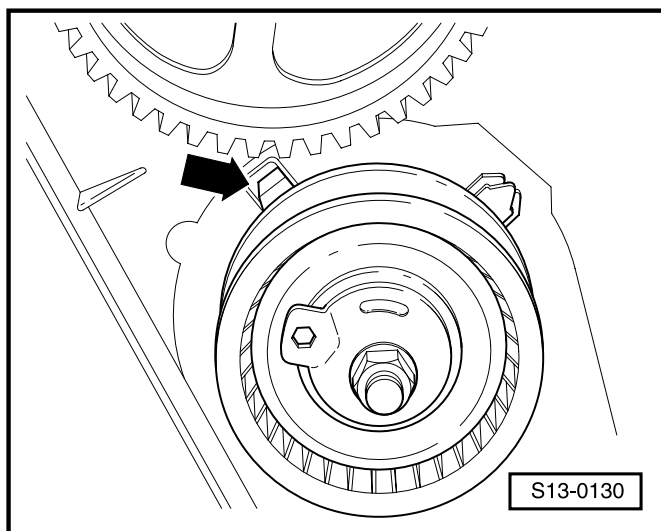
1 - 120 Nm + torque a further 1/4 turn (90°)

- ◆ use counterholder MP 1-310 or lever T30004 for slackening and tightening
- ◆ always replace
- ◆ thread and head contact surface must be free of oil and grease
- ◆ tightening further to 90° may be performed in several stages

2 - 40 Nm + torque a further 1/4 turn (90°)

- ◆ always replace
- ◆ torquing a further 90° may also be performed in several stages

- 3 - 15 Nm**
- 4 - 23 Nm**
- 5 - 22 Nm**
 - ◆ for models 03.00 ➤
- 6 - Bottom toothed belt guard**
- 7 - 10 Nm**
- 8 - Middle toothed belt guard**
- 9 - 45 Nm**
- 10 - Engine support**
- 11 - Top toothed belt guard**
- 12 - Toothed belt**
 - ◆ mark direction of running before removing
 - ◆ inspect for wear
 - ◆ do not kink
 - ◆ removing and installing ⇒ page 13-4
- 13 - Guide pulley**
 - ◆ for models 03.00 ➤
- 14 - 20 Nm + torque a further 1/4 turn (90°)**
 - ◆ replace
 - ◆ torquing a further 90° may also be performed in several stages
- 15 - 20 Nm**
- 16 - Bolt for guide pulley**
 - ◆ 17 Nm for support -item 32-; Part No. 038 903 143 E/F
 - ◆ 20 Nm for support -item 32-; Part No. 038 903 143 A/B
- 17 - 45 Nm**
 - ◆ hold camshaft sprocket with counter-holder MP 1-216 for slackening and tightening
- 18 - Camshaft sprocket**
 - ◆ use special tool T40001 for pulling off taper of camshaft
- 19 - Semi-automatic tensioning pulley**
 - ◆ inspecting semi-automatic toothed belt tensioning pulley ⇒ page 13-8
 - ◆ installation position ⇒ Fig. 1
- 20 - Guide pulley**
- 21 - 30 Nm**
- 22 - Rear toothed belt guard**
 - ◆ push in at bottom edge behind front sealing flange
- 23 - Injection pump gear**
 - ◆ for models 08.97 ➤
- 23 - Injection pump gear**
 - ◆ for models ➤ 07.97
- 25 - Coolant pump**
 - ◆ removing and installing ⇒ page 19-5
- 26 - Guide pulley**
 - ◆ to remove, take off coolant pump
- 27 - Crankshaft toothed belt sprocket**
 - ◆ there must not be any oil on contact surface between toothed belt sprocket and crankshaft
 - ◆ installation position: flats at toothed belt sprocket and crankshaft must be aligned
- 28 - Bush**
- 29 - Nut**
 - ◆ insert into bush -item 28-
- 30 - Injection pump**
 - ◆ on no account slacken central nut -arrow-
 - ◆ removing and installing
- ⇒ 1.9 l/66 kW (TDI) Engine - Fuel Injection and Glow Plug System; Repair Group 23
- 31 - 45 Nm**
- 32 - Mounting bracket**
 - ◆ for models not fitted with AC
 - ◆ for injection pump, alternator and hydraulic pump



◀ **Fig. 1** Installation position of semi-automatic tensioning pulley

Retaining claw -arrow- must engage in the recess of the rear toothed belt cover.

Removing toothed belt

Engine installed

- Remove engine trim panel ⇒ page 10-2.
- Detach washer fluid reservoir and place down to the side.
- Detach coolant reservoir and place down to the side.
- Detach power steering expansion reservoir and place down to the side.
- Detach fuel filter and place down to the side.

Continued for all models

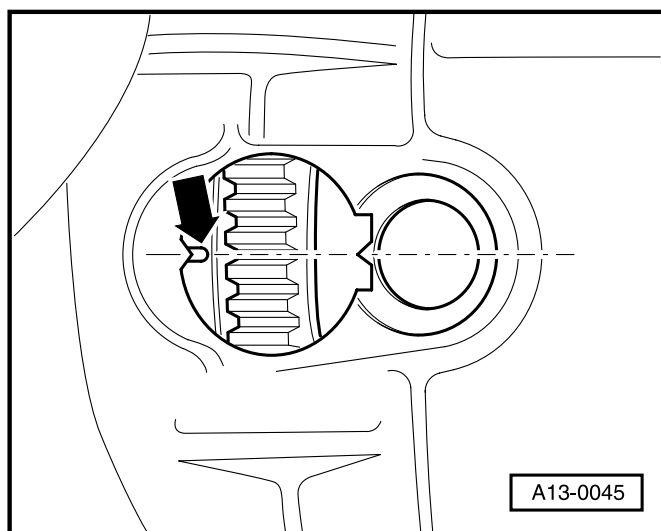
- Remove top toothed belt guard and cylinder head cover.
- Remove vacuum pump for brake servo unit ⇒ page 15-1.
- Remove ribbed V-belt ⇒ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 13; Removing and installing ribbed V-belt.

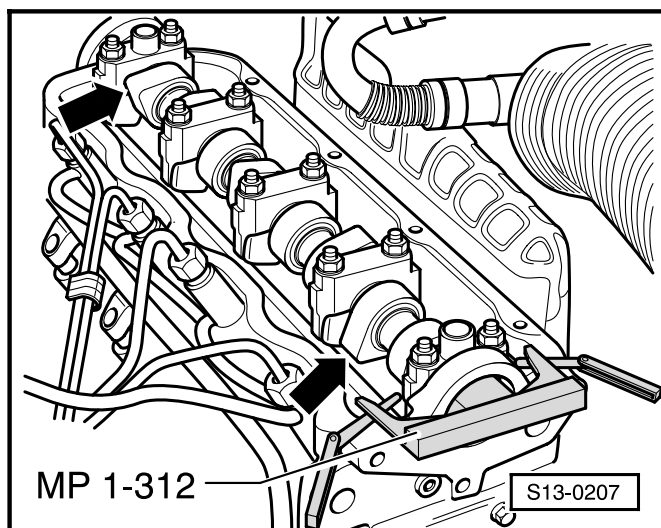
Engine installed

- Remove cover for inspection hole of flywheel.
- ◀ - Position crankshaft to TDC of cylinder 1 -arrow- (models fitted with manual gearbox).

Note:

Position crankshaft to TDC of cylinder 1 with engine removed ⇒ page 13-7.



**Continued for all models**

- ◀ Lock camshaft position with setting straightedge MP 1-312.

Note:

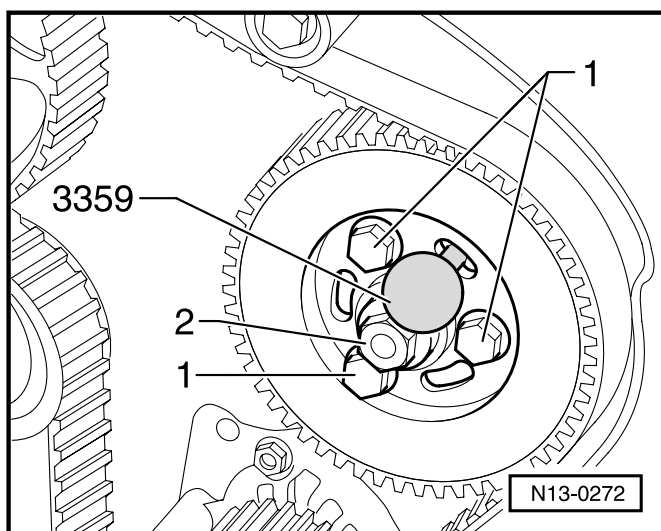
The valves of cylinder 1 must be closed and the valves of cylinder 4 at overlap.

- Centre setting straightedge as follows:
Turn locked camshaft until one end of the setting straightedge strikes the cylinder head. Measure the gap produced at the other end of the setting straightedge with feeler gauge. Insert a feeler gauge of half the value between straightedge and cylinder head. Now, rotate camshaft until the straightedge is resting on the feeler gauge. Insert the second feeler gauge with the same value between straightedge and cylinder head.

- Lock injection pump gear with locking pin 3359.

Note:

Always moisten locking pin with oil. It is recommended to use a mirror in order to facilitate inserting the pin.

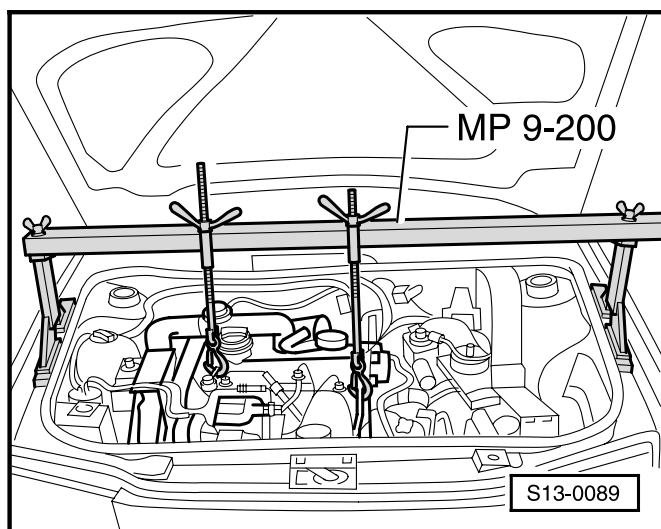


- ◀ - Slacken bolts -1- attaching injection pump gear and replace with new ones.
- Tighten bolts slightly so that gear can still be rotated.

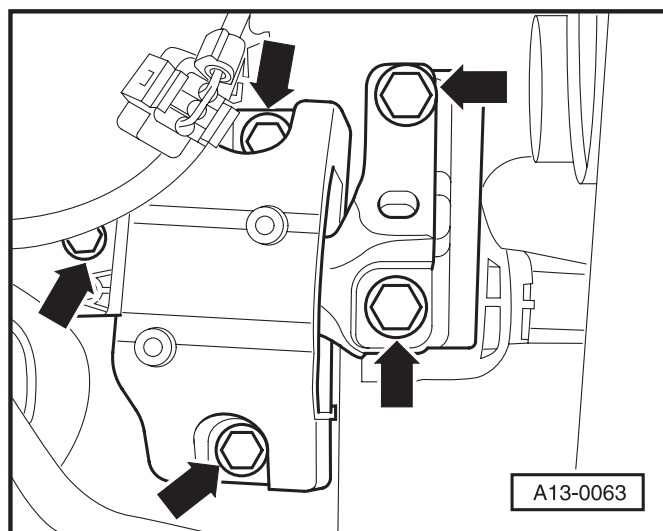
Note:

On no account slacken central nut -2- of the injection pump gear otherwise the basic setting of the injection pump will be altered and it can no longer be set with workshop tools.

- Slacken nut of toothed belt tensioning pulley.
- Remove vibration damper/belt pulley.



- ◀ Insert supporting device MP 9-200 and support engine and gearbox in this position.



- ◀ - Unscrew engine bracket from engine support and engine support from body -arrows-.
- Unscrew engine bracket from engine.

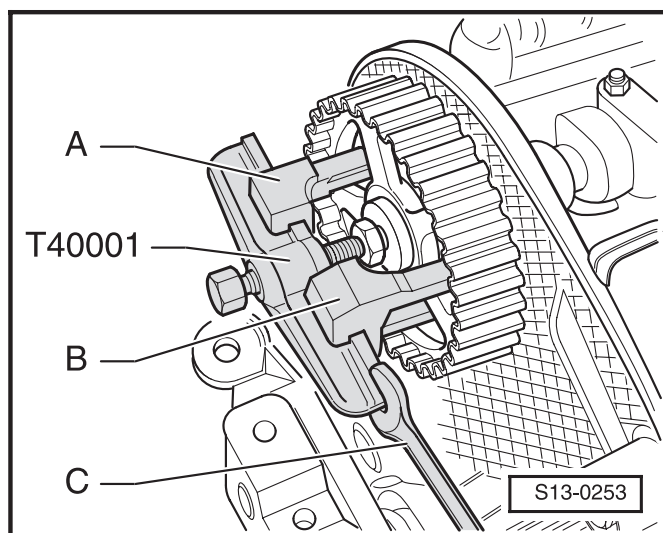
Note:

To slacken the front bolt of the engine bracket, raise engine slightly with spindle of supporting device MP 9-200.

- Remove ribbed V-belt from crankshaft.
- Remove bottom and middle toothed belt guard.
- Mark the rotation direction of the toothed belt.
- Remove toothed belt.

Installing toothed belt

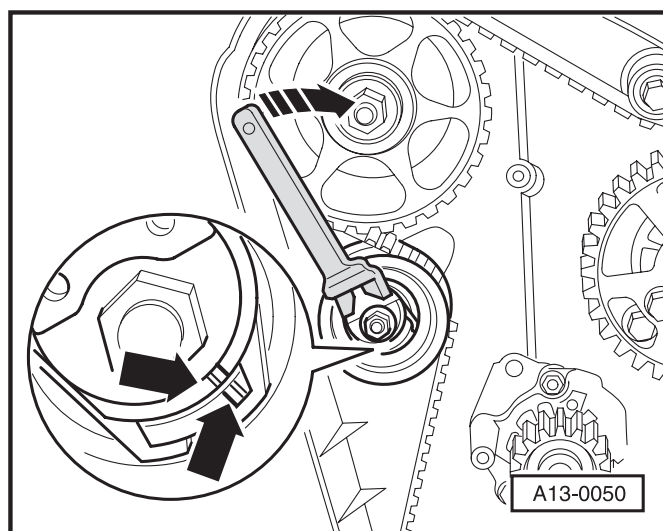
- Check whether the TDC marking on the fly-wheel and the reference mark correspond.
- Slacken the fixing bolt of the camshaft sprocket by 1/2 turn. Counterhold camshaft sprocket with device MP 1-216.

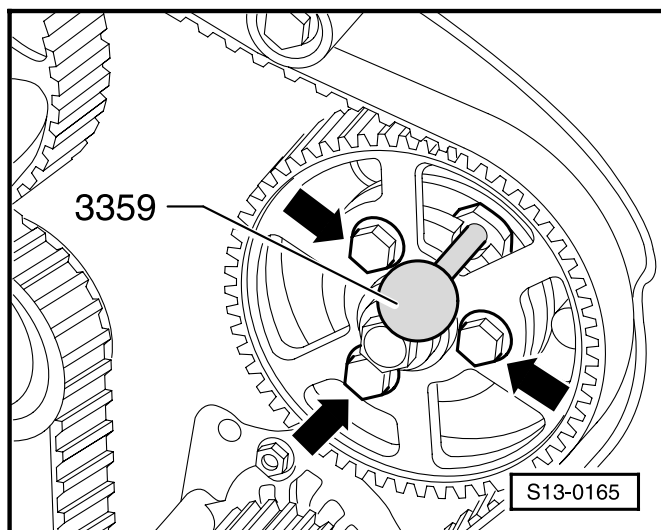


Caution!

Never use an adjusting straightedge as a counterholder when slackening and fitting on camshaft sprocket! Counterhold camshaft sprocket with device MP 1-216.

- ◀ - Position extractor T40001 with hooks T40001/2 -A- and T40001/3 -B- on the belt pulley. Use open-end wrench -C- as counterholder and detach belt pulley from taper of camshaft.
- Tighten fixing bolt for camshaft sprocket lightly so that the camshaft sprocket can be turned.
- Adjust the injection pump gear so that the bolts are in the middle of the slots.
- Fit toothed belt onto crankshaft sprocket, guide pulley, injection pump gear and tensioning pulley (pay attention to rotation direction).
- ◀ - Turn the tensioning pulley with the wrench (e.g. Matra V159) to the right until notch and lobe -arrows- are opposite one another.





- Tighten nut at the tensioning pulley to 20 Nm.
- Once again check whether the TDC marking on flywheel is aligned with the reference mark.
- Tighten bolt attaching camshaft sprocket to 45 Nm. Use special tool MP 1-216 to counterhold camshaft sprocket.

- ◀ Tighten bolts attaching injection pump gear -arrows- to 20 Nm.
- Take off setting straightedge.
- Take out locking pin 3359.
- Rotate crankshaft two revolutions in direction of rotation of engine and position again to TDC of cylinder 1.
- After this, check whether it is possible to lock injection pump gear with locking pin MP 3359.

If it is not possible to lock the injection pump gear:

- Rotate crankshaft to enable the locking pin 3359 to be inserted into the hub.
- Lock injection pump gear with locking pin.
- Slacken bolts attaching injection pump gear.
- Rotate crankshaft so that the TDC marking on the flywheel is positioned opposite reference mark.
- Tighten bolts attaching injection pump gear to 20 Nm and then torque a further 1/4 turn (90°).
- Remove locking pin 3359.

If it is possible to lock the injection pump gear:

- Tighten bolts attaching the injection pump gear 1/4 turn (90°).
- Install centre part and bottom part of toothed belt guard.

- Install engine mount ⇒ page 13-1.
- Install engine bracket, tightening torque ⇒ page 10-13.
- Remove supporting device MP 9-200.
- Install vacuum pump for brake servo unit ⇒ page 15-1, Removing and installing cylinder head.
- Install top toothed belt guard and cylinder head cover.
- Install tensioning pulley for ribbed V-belt.
- Install ribbed V-belt ⇒ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 13.
- Attach expansion reservoir for coolant, power steering and fuel filter.
- Install top engine cover.
- Dynamically test and set commencement of injection:
⇒ 1.9 l/50 kW (SDI); Repair Group 23; Dynamically test and set commencement of injection

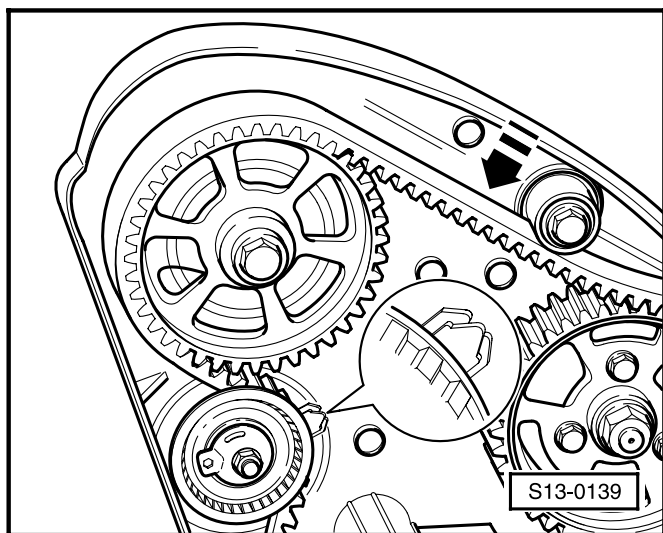
Inspecting semi-automatic toothed belt-tensioning pulley

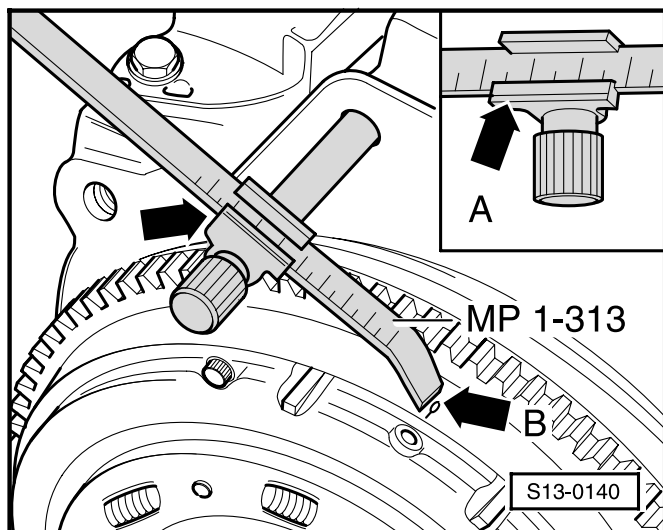
Test condition

- Engine oil temperature at least 40 °C

Test procedure

- Position engine to top TDC of cylinder 1.
- ◀ - Use your thumbs to forcefully press on the toothed belt. The markings on the tensioning pulley must move.
- Relieve the toothed belt and turn the crankshaft two turns in the running direction of the engine. Until engine is again positioned at TDC of cylinder 1. When doing this, it is important that the last 45° ($\frac{1}{8}$ turn) are rotated without any interruption.
- The tensioning pulley must return to its initial position.





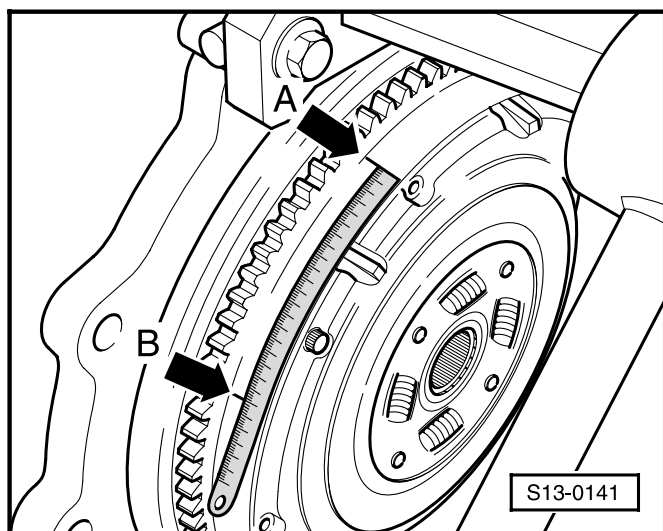
Setting crankshaft to TDC of cylinder 1 when engine removed

Special tools, testers and aids required

- ◆ Setting device for TDC MP 1-313

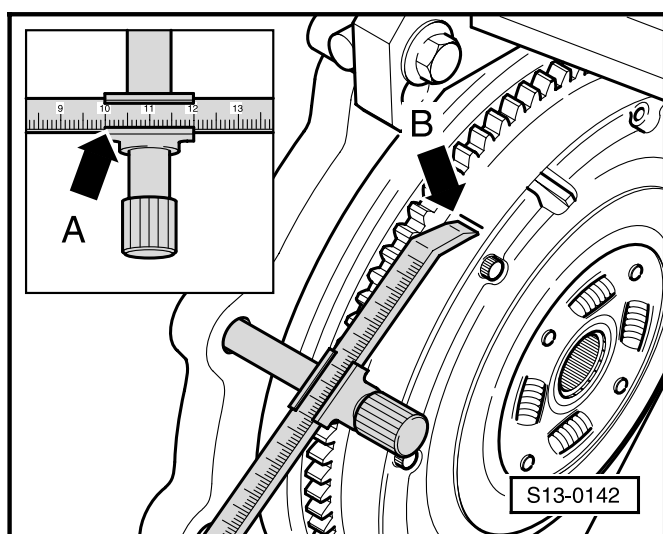
Engine placed on work area

- ◀ - Screw in setting device for TDC MP 1-313, as shown in illustration.
- Position setting device to 90 mm (left notch of vernier -arrow A- is the reference point).
- Rotate crankshaft sufficiently until the TDC marking -arrow B- on the flywheel is aligned with the edge of the setting device.

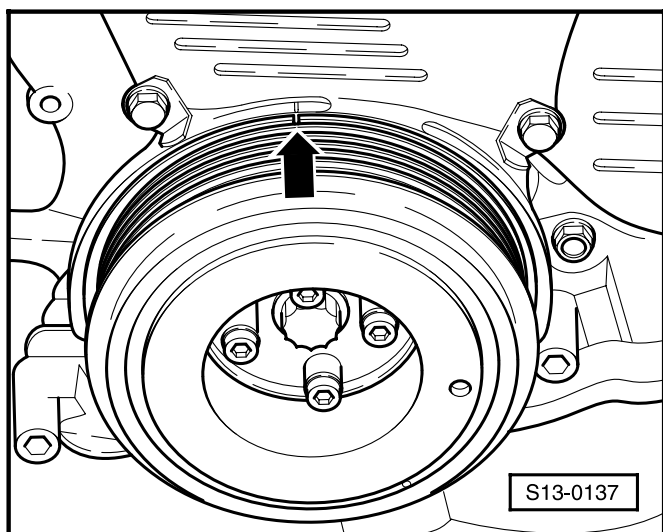


Engine attached to engine holder MP 1-202

- ◀ - Position flexible steel straightedge (marking tool) on the circumference of the flywheel.
- Measure exactly 100 mm from the TDC marking -arrow A- and make an auxiliary marking -arrow B- with the marking tip.

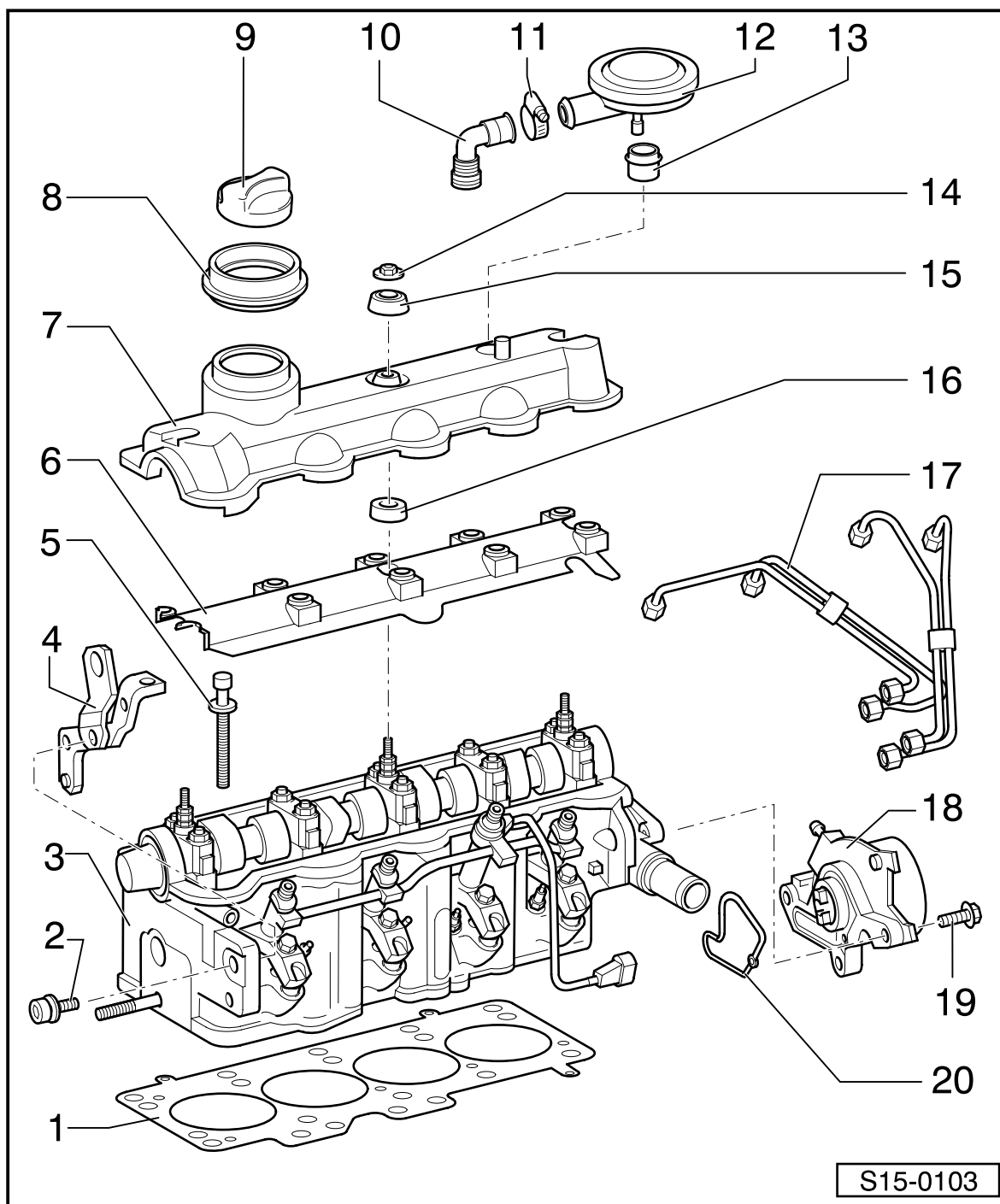


- ◀ - Screw in setting device MP 1-313, as shown in illustration.
- Position setting device to 104 mm (left notch or vernier -arrow A- is the reference point).
- Rotate crankshaft until the TDC marking on the flywheel is aligned with the edge of the setting device -arrow B-.

**With crankshaft ribbed V-belt pulley installed**

- ◀ - Align TDC marking on ribbed V-belt pulley of crankshaft with marking on bottom toothed belt cover.

Removing and installing cylinder head



Removing and installing toothed belt
⇒ page 13-3.

Testing compression pressure ⇒ page 15-9.

Notes:

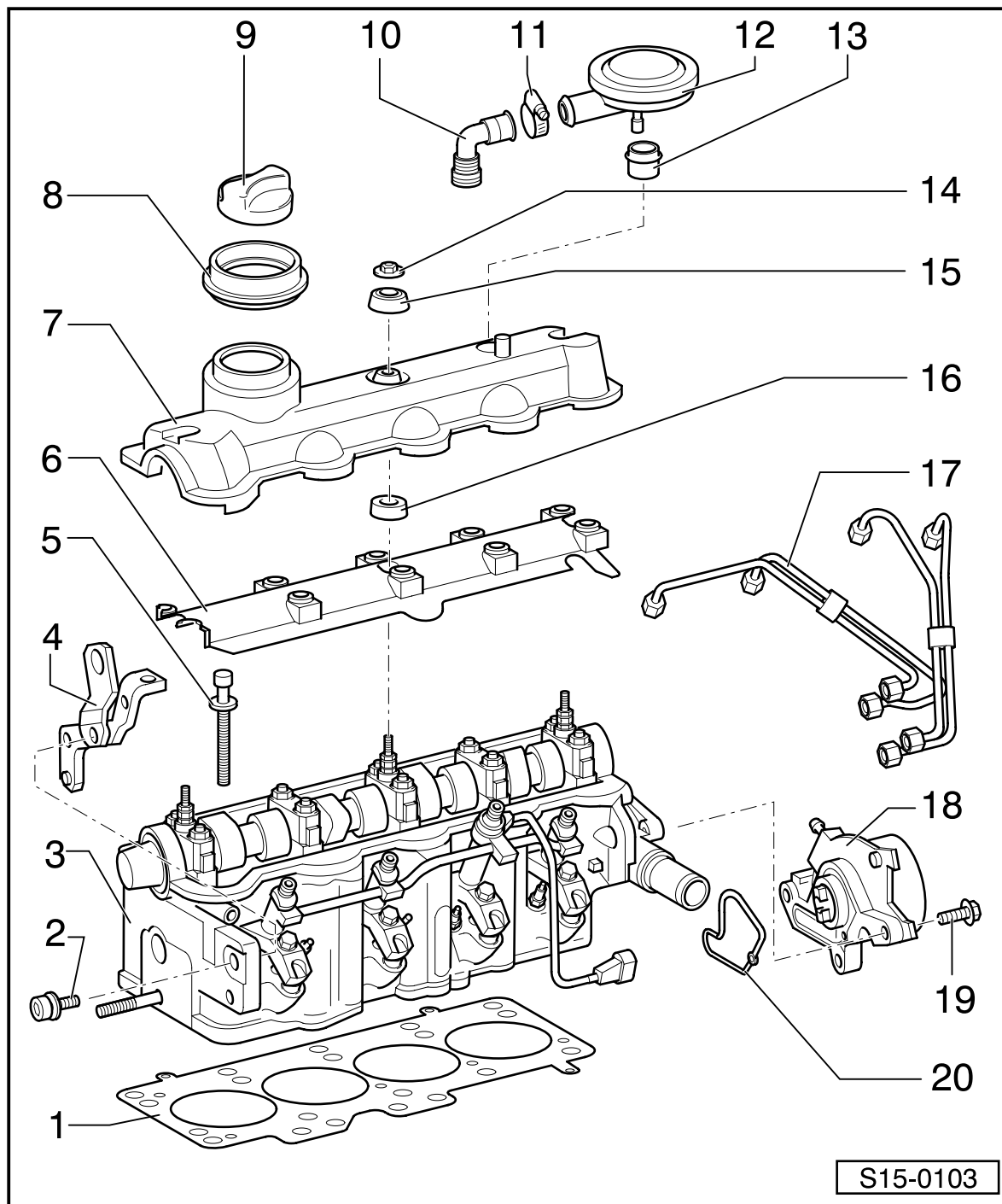
- ◆ When installing a replacement cylinder head with the camshaft fitted, the contact surfaces between bucket tappets and cam track have to be moistened with engine oil.
- ◆ Do not remove the factory-fitted plastic covers for protecting the opened valves until just before fitting on the cylinder head.

- ◆ The entire cooling system has to be filled with fresh coolant when replacing the cylinder head.
- ◆ It is not permitted to rework the cylinder head of diesel engines.

1 - Cylinder head gasket

- ◆ Replace
- ◆ Pay attention to marking ⇒ Fig. 2

2 - 20 Nm



S15-0103

3 - Cylinder head

- ◆ Inspecting for distortion ⇒ Fig. 1
- ◆ Installing cylinder head ⇒ page 15-7
- ◆ Fill system with fresh coolant after replacing cylinder head

4 - Lifting eye**5 - Cylinder head bolt**

- ◆ Replace
- ◆ Pay attention to order for slackening the bolts ⇒ page 15-4; Removing cylinder head
- ◆ Pay attention to order for tightening the bolts ⇒ page 15-7; Installing cylinder head

6 - Oil deflector**7 - Cylinder head cover**

- ◆ With vulcanized gasket
- ◆ Handle gasket with care
- ◆ If gasket is damaged, replace cylinder head cover

8 - Cup seal**9 - Cover**

- ◆ Replace if seal is damaged

10 - Breather pipe

- ◆ To air guide pipe

11 - Hose clip**12 - Pressure regulating valve**

- ◆ To crankcase breather

13 - Seal

- ◆ Replace if damaged

14 - Collar nut, 10 Nm**15 - Top seal**

- ◆ Replace if damaged

16 - Bottom sealing cone**17 - Injection pipes**

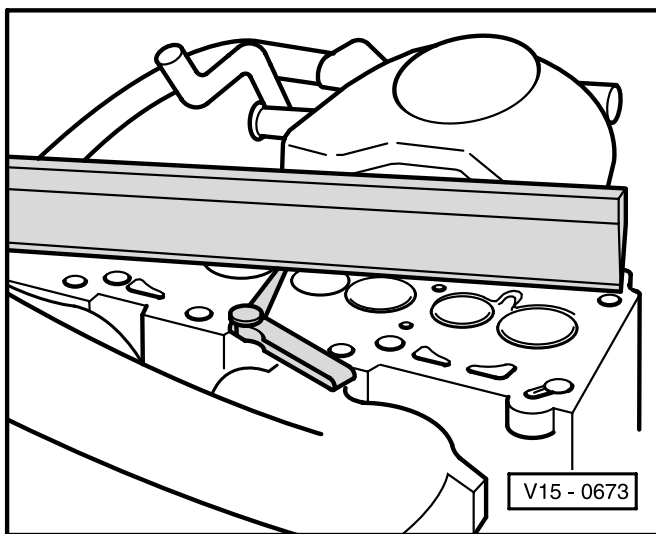
- ◆ Tightening: 25 Nm
- ◆ Use ring wrench for unscrewing
- ◆ Always replace as a set
- ◆ Do not alter shape

18 - Vacuum pump

- ◆ For brake servo unit

19 - 20 Nm**20 - Gasket**

- ◆ Replace



◀ **Fig.1** Inspecting cylinder head for distortion

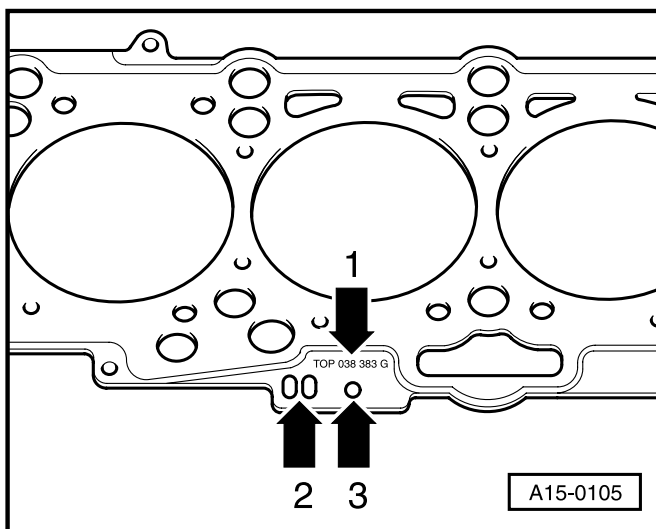
Special tools, testers and aids required

- ◆ Feeler gauge
- ◆ Knife-edge straightedge

Max. permissible distortion: 0.1 mm

Note:

It is not permitted to rework the cylinder heads of diesel engines.



◀ **Fig. 2** Identification of cylinder head gasket

- ◆ Part No. = -arrow 1-
- ◆ Control code = -arrow 2- (ignore!)
- ◆ Openings = -arrow 3-

Note:

Cylinder head gaskets of different thicknesses are fitted depending on the piston projection to the cylinder head.

If only the gasket is replaced, a new gasket with the same identification should then be fitted.

Removing and installing cylinder head

Note:

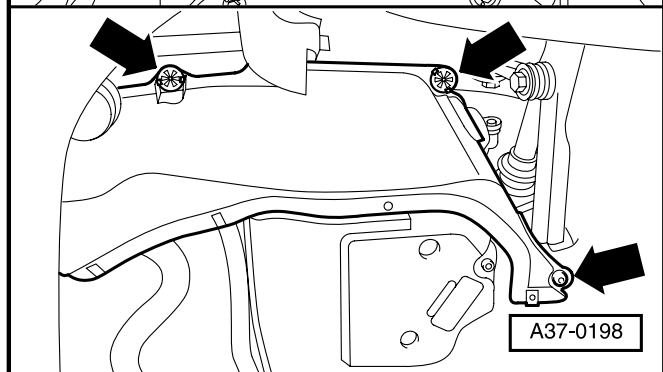
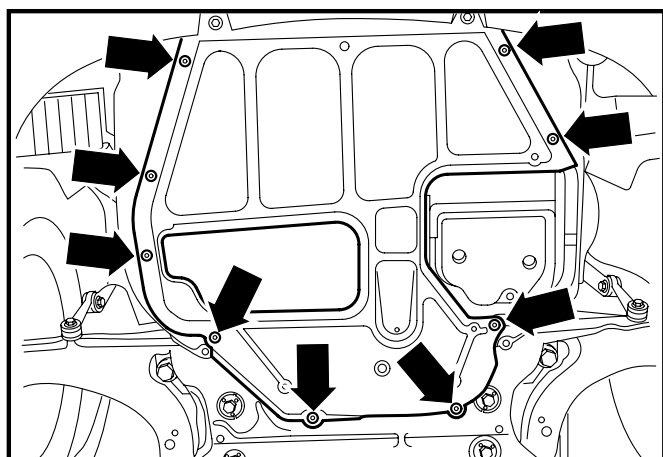
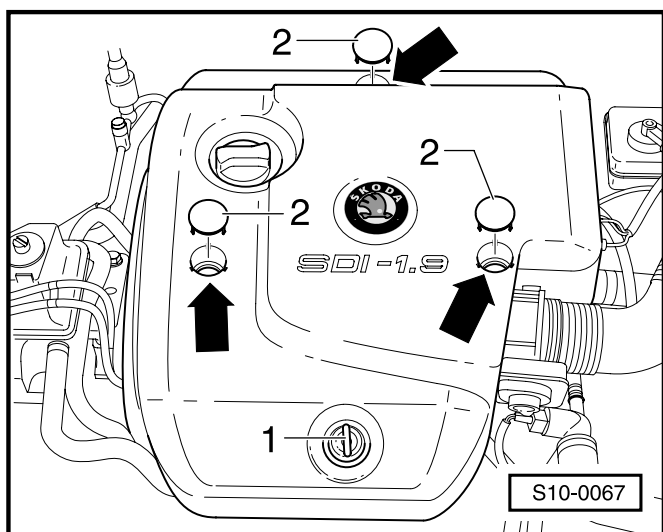
All the cable fixtures and cable straps which are detached or removed when taking off cylinder head, should be fitted on again at the same point when installing.

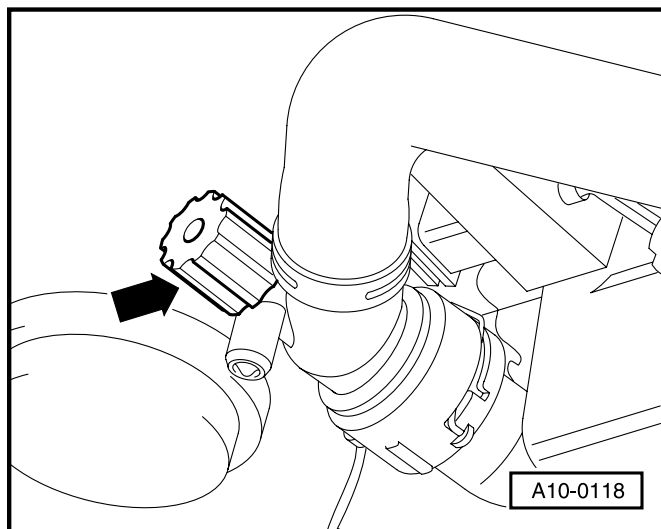
Special tools, testers and aids required

- ♦ Workshop crane, (e.g. V.A.G 1202 A)
- ♦ Drip tray, (e.g. V.A.G 1306)
- ♦ Pliers for spring strap clips
- ♦ Wrench for cylinder head bolts, (e.g. 3452)
- ♦ Supporting device MP 9-201
- ♦ Ring wrench for injection lines

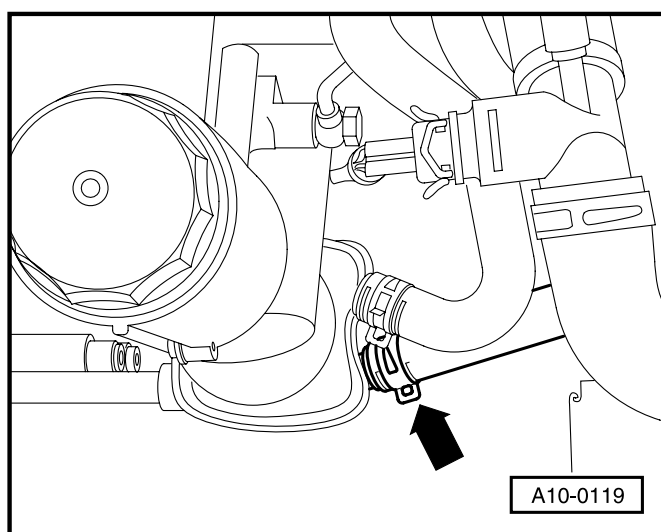
Procedure

- On vehicles fitted with coded radio set, determine code.
- Switch off ignition (if not already off) and disconnect earth cable on battery.
- ◀ - Remove engine trim panel.
- Pull out dipstick -1-.
- Take off plug -2- and slacken securing nuts -arrows-.
- ◀ - Take off noise insulation in the middle and on left -arrows-.
- Remove front exhaust pipe from exhaust manifold ⇒ page 26-1.
- Remove ribbed V-belt ⇒ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 13.
- Open cap of coolant expansion reservoir.

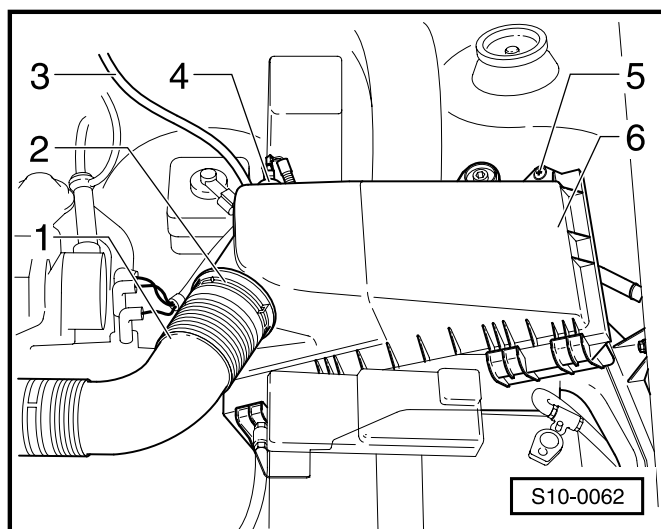




- ◀ - Turn drain plug -arrow- at radiator to the left and fit on drain hose, respectively.



- ◀ - After this, detach coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to drain out.

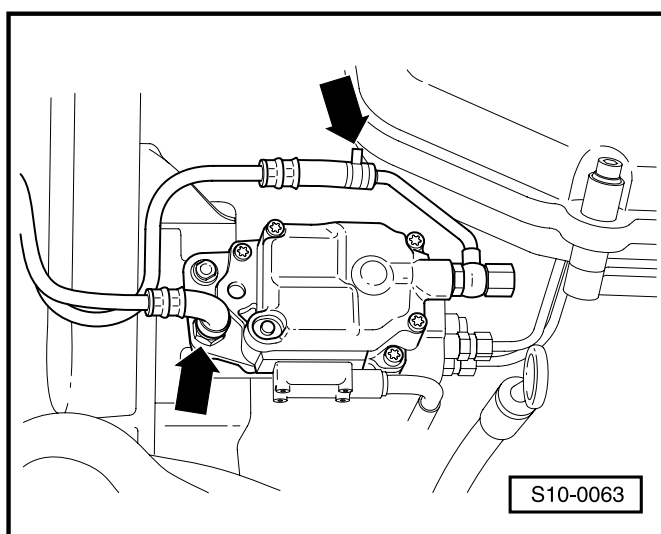


- ◀ - Detach air guide hose -1-; take off hose clip -2- for this step.
- Detach vent hose -3- and unplug connector for air mass meter -4-.
- Remove screw -5- and take off cover -6-.
- Remove air intake manifold:
⇒ 1.9-ltr./50 kW (SDI) Fuel Injection and Glow Plug System; Repair Group 23
- Remove injection pipes.

Note:

Always replace injection pipes as a set. Use special wrench for injection pipes.

- Detach return-flow pipe from injectors to the injection pump.
- Remove glow plug connector strip.
- Pull out cable at needle lift sender and take connector out of fixture.
- Detach coolant hose on left of cylinder head.
- Unbolt coolant flange on left of cylinder head.
- Detach coolant pipe from fixtures and take off to the left.



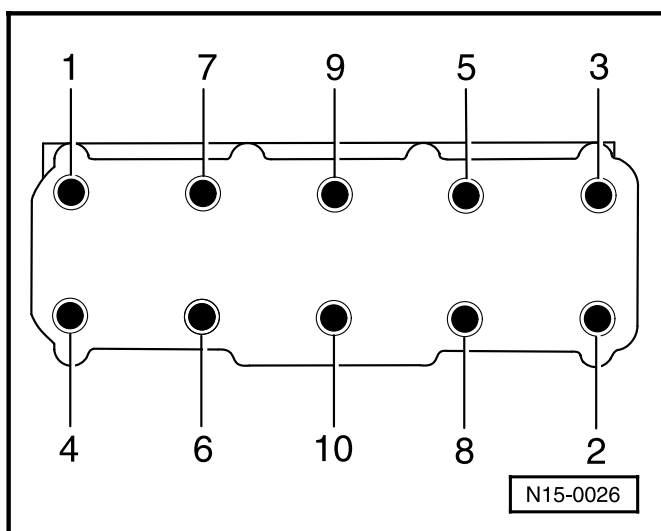
- ◀ Detach fuel pipes -arrow- from injection pump, seal with a clean plug and place to the side.
- Take off top toothed belt cover.
- Unscrew 2 bolts for toothed belt cover at the rear on both sides of the cylinder head.
- Position engine to TDC of cylinder 1, take toothed belt off camshaft sprocket and remove camshaft sprocket ⇒ page 13-3.

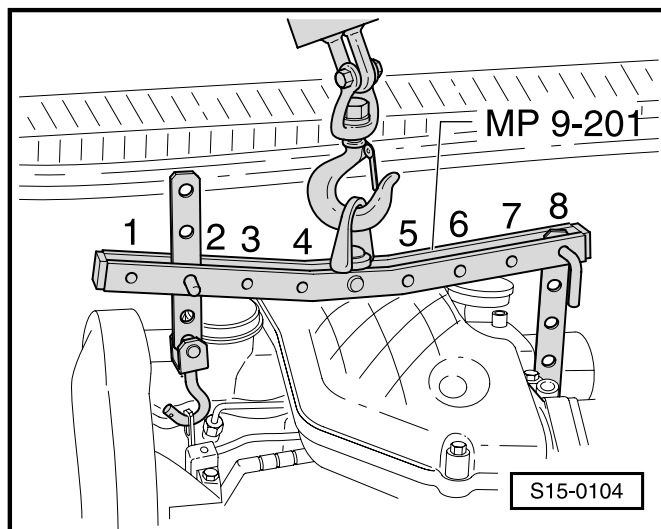
Notes:

- ♦ Ribbed V-belt pulley of the crankshaft, the centre and bottom parts of the toothed belt covers can remain installed.
- ♦ Toothed belt remains fitted to crankshaft toothed belt sprocket.
- ♦ Pay attention to all the notes regarding removal and installation of the toothed belt ⇒ page 13-3.

- Remove toothed belt tensioning pulley.

- ◀ - Slacken cylinder head bolts in the order 1 ... 10.





- ◀ - Attach supporting device MP 9-201 to cylinder head.

Note:

Attach the intake manifold with a wire to the supporting device in order to achieve a stable centre of gravity for the cylinder head.

- Raise cylinder head slightly with the workshop crane.
- Swivel out cylinder head to the left from the toothed belt cover and at the same time remove tensioning pulley.

Installing cylinder head

Notes:

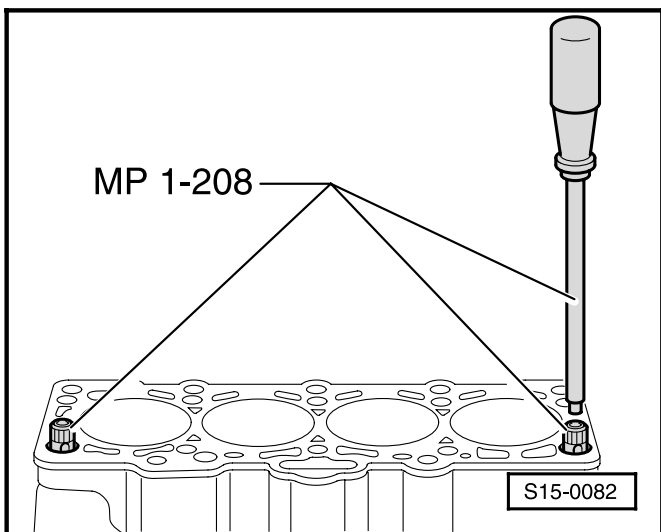
- ◆ *Always replace cylinder head bolts.*
- ◆ *In the case of repairs the cylinder head contact surface and the engine block should be rendered clean of sealant residues using a chemical device.*
- ◆ *Remove the new cylinder head seal from its wrapping immediately before fitting.*
- ◆ *Treat the new gasket with the utmost care. Damage to the silicone layer and in the area of the bead results in leakage.*
- ◆ *There must be no oil or coolant residue in the cylinder head bolts.*

Special tools, testers and aids required

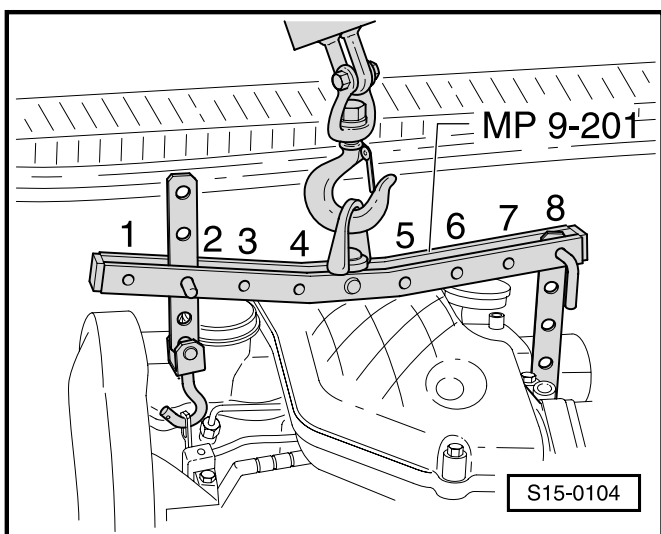
- ◆ Workshop crane (e.g. V.A.G 1202 A)
- ◆ Torque wrench
- ◆ Pliers for spring strap clips
- ◆ Guide bolts -MP 1-208-
- ◆ Adjusting straightedge -MP 1-312-
- ◆ Supporting device -MP 9-201-
- ◆ Wrench for cylinder head bolts (e.g. 3452)

- ◆ Ring wrench for injection pipes
- ◆ Cable straps
- ◆ Wire

Procedure



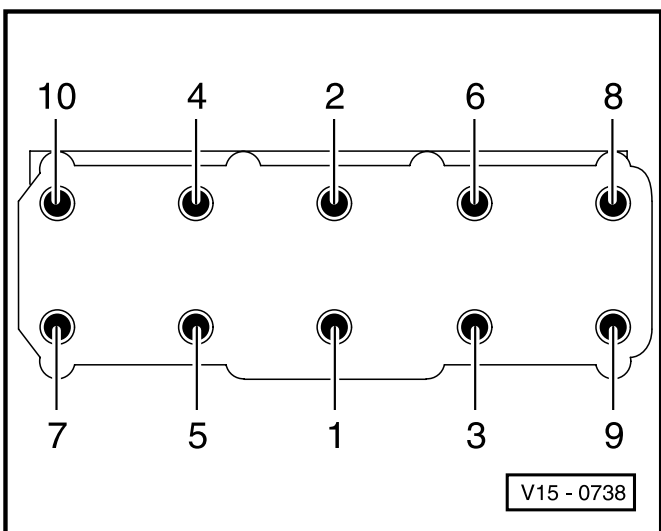
- Before installing the cylinder head, position crankshaft to TDC of cylinder 1 ⇒ page 13-3. It should be possible to insert the setting gauge MP 1-312 into the camshaft.
- Fit on cylinder head gasket.
- ◀ - Screw guide bolts MP 1-208 into the outer holes on the intake side for centering.



- ◀ - Attach suspension device MP 9-201 to the cylinder head.

Note:

Attach the air intake manifold to the suspension device with a wire for achieving a stable centre of gravity for the cylinder head.



- Swivel cylinder head into the rear toothed belt cover.
- Insert 8 new cylinder head bolts and tighten by hand.
- Unscrew guide bolts with bolt turner from the tool MP 1-208 through the bolt holes and screw in the remaining cylinder head bolts slightly.
- ◀ - Tighten cylinder head bolts in four stages - see illustration:
 - 1. Tighten initially with torque wrench:
Stage I = 35 Nm
Stage II = 60 Nm
 - 2. Tighten finally with rigid wrench:
Stage III = ¼ turn (90°)
Stage IV = ¼ turn (90°)

Note:

It is not necessary to retighten the cylinder head bolts after completing repairs.

- Install toothed belt tensioning pulley.
- Install toothed belt ⇒ page 13-5.

Testing compression pressure**Test condition**

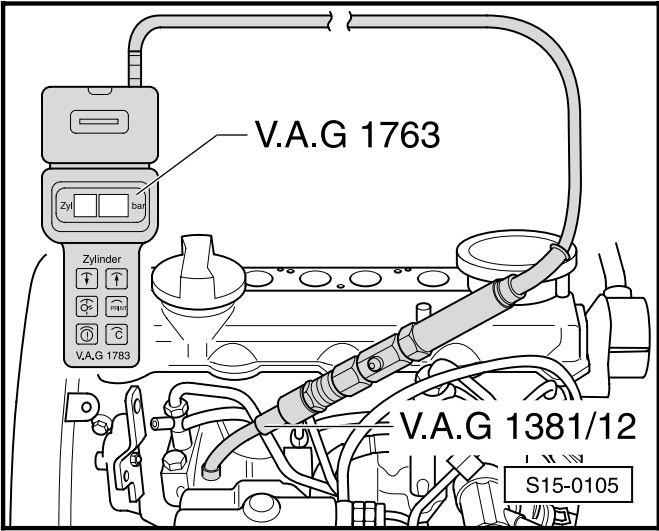
- Engine oil temperature at least 30 °C

Special tools, testers and aids required

- ◆ Torque wrench 5 ... 50 Nm
(e.g. V.A.G 1331)
- ◆ Compression tester
(e.g. V.A.G 1381, or V.A.G 1763)
- ◆ Adapter (e.g. V.A.G 1381/12)
- ◆ Hinged wrench for glow plugs

Test procedure

- Take off engine cover panel ⇒ page 15-4.
- Detach air intake manifold:
⇒ 1.9-ltr./50 kW (SDI) Fuel Injection and Glow Plug System; Repair Group 23
- Unplug connector for fuel shut-off valve at the injection pump.
- Separate plug connection to the fuel metering control of the injection pump.
- Use hinged wrench for glow plugs to remove all the glow plugs.



- ◀ - Screw in adapter (e.g. V.A.G 1381/12) in place of the glow plugs.
- Test compression pressure with the compression tester (e.g. V.A.G 1381, or V.A.G 1763).

Important!
Ensure that no foreign bodies get into the air intake manifold.

Note:
*Using the compression tester
⇒ Operating Instructions.*

- Continue cranking engine until no further rise in pressure is indicated by the tester.

Compression pressure reference values:

New engine	Wear limit	Difference in pressure between cylinders
2.5 ... 3.1 MPa	1.9 MPa	max. 0.5 MPa

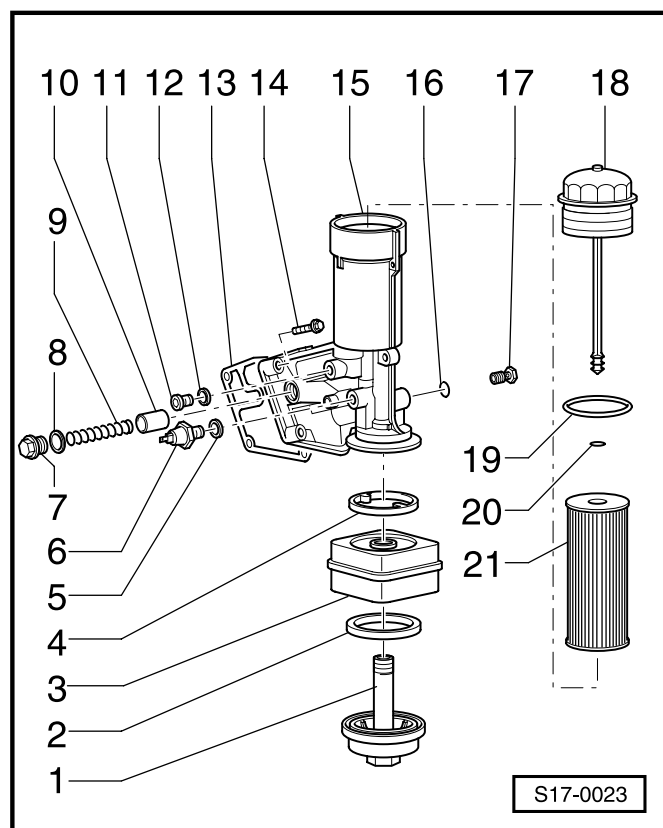
- Screw in glow plugs with hinged wrench.
Tightening torque: 15 Nm
- Read fault memory:
⇒ 1.9-ltr./50 kW (SDI) Fuel Injection and Glow Plug System; Repair Group 01; Self-Diagnosis

Note:
Faults are stored when the plug connection to the injection pump is separated. After completing the test, read fault memory and erase any faults.

Removing and installing parts of the lubrication system

⇒ 1.9 I/66 kW (TDI) Engine, Mechanical Components; Repair Group 17

Disassembling and assembling oil filter holder



1 - Screw plug, 25 Nm

2 - Gasket
♦ replace

3 - Oil cooler
♦ ensure clearance to surrounding components

4 - Gasket
♦ replace
♦ insert into lugs at oil cooler

5 - Seal
♦ if leaking, cut open and replace

6 - 0.09 MPa oil pressure switch -F1, 25 Nm
♦ grey

7 - Screw plug
♦ must not be opened

8 - Seal

9 - Spring
♦ for 0.5 MPa pressure relief valve

10 - Piston

♦ for pressure relief valve

11 - Screw plug, 10 Nm

12 - Seal
♦ if leaking, cut open and replace

13 - Gasket
♦ replace

14 - 15 Nm + torque a further 1/4 turn (90°)
♦ replace

15 - Oil filter holder

16 - Seal
♦ replace

17 - Banjo bolt, 20 Nm

18 - Cap, 25 Nm
♦ use oil filter wrench waf 36 to slacken and tighten

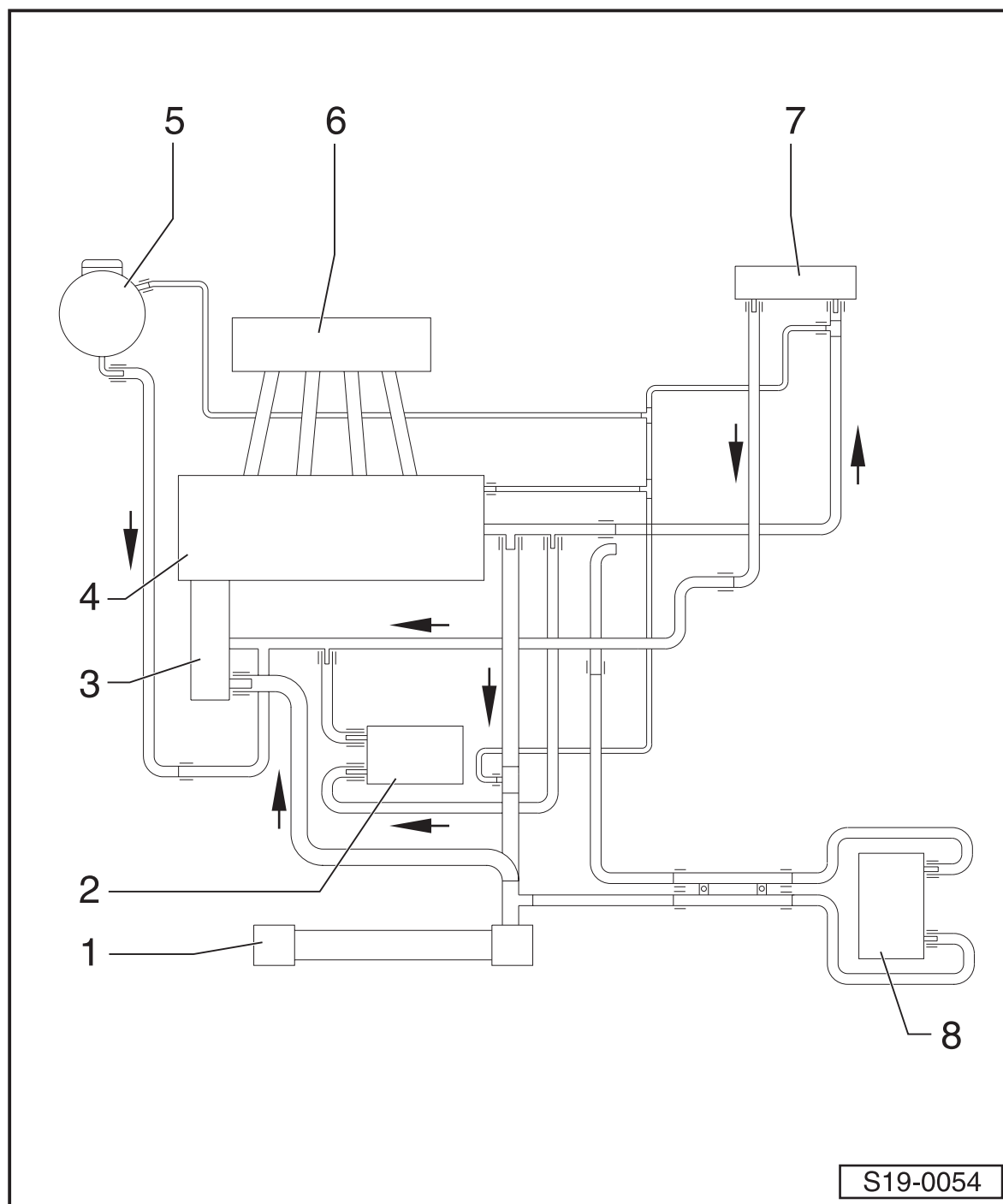
19 - O-ring
♦ replace

20 - O-ring
♦ replace

21 - Oil filter element
♦ pull off cap -item 18-
♦ if oil filter changed, replace O-rings -item 19 and 20-

Removing and installing parts of the cooling system

Parts of the cooling system

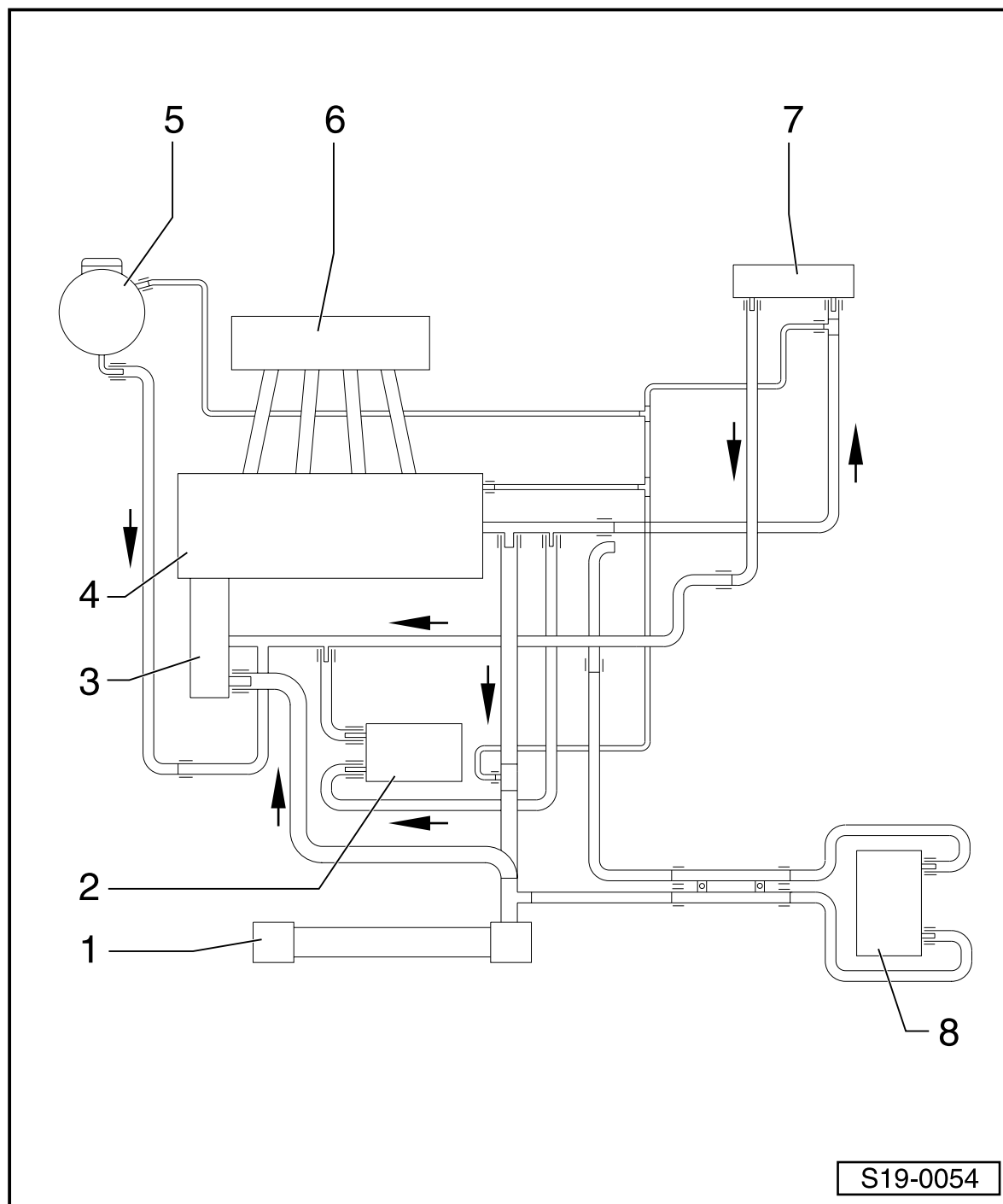


Notes:

- ◆ When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.
- ◆ The hose connections are secured with spring strap clips. In the event of repairs only use spring strap clips.
- ◆ Use pliers for spring strap clips to fit the spring strap clips.
- ◆ Always replace seals and gasket rings.
- ◆ The arrows which are on the coolant pipes and the coolant hoses must stand opposite to each other.

Draining and filling up coolant ⇒ page 19-3.

Coolant mixing ratio ⇒ page 19-5.

**1 - Radiator**

- ◆ When replacing the radiator, fill the complete coolant circuit with fresh coolant

2 - Oil cooler

- ◆ Removing and installing
⇒ page 17-1, item 3

3 - Coolant pump, thermostat

- ◆ Removing and installing coolant pump
⇒ page 19-6
- ◆ Inspect for ease of operation
- ◆ Testing, data:
⇒ 1.9-ltr./66 kW (TDI) Engine, Mechanical Components; Repair Group 19; Removing and installing parts of cooling system

- ◆ Removing and installing thermostat

⇒ 1.9-ltr./66 kW (TDI) Engine, Mechanical Components; Repair Group 19; Removing and installing parts of cooling system

4 - Cylinder block**5 - Expansion reservoir****6 - Intake pipe****7 - Heating system heat exchanger****8 - Auxiliary heater (if fitted)**

Draining and filling up coolant

Special tools, testers and aids required

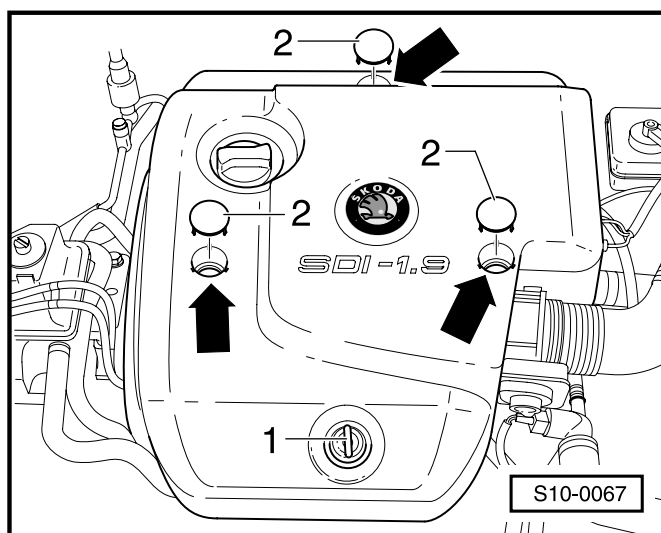
- ◆ Catch pan (e.g. V.A.G 1306)
- ◆ Pliers for spring strap clips

Draining

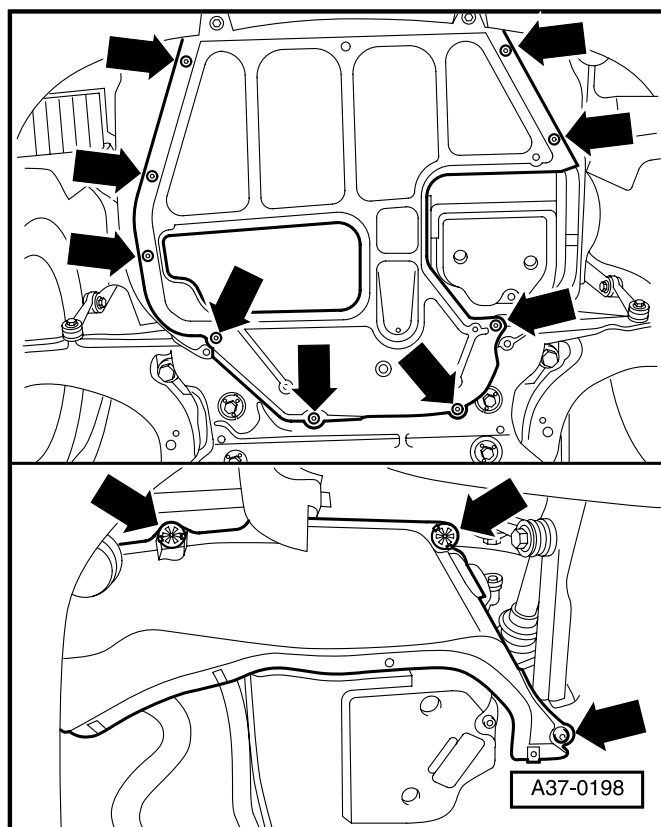
- Open the cap on the coolant expansion reservoir.

Caution!

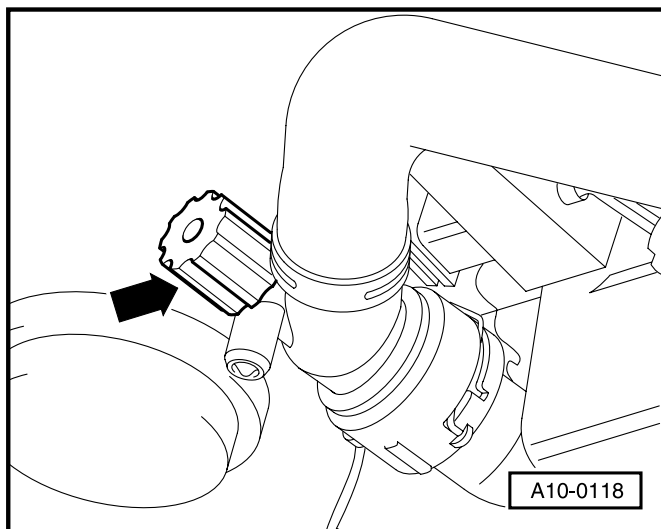
Hot steam may escape when the expansion reservoir is opened. Cover the cap with a cloth and open carefully.



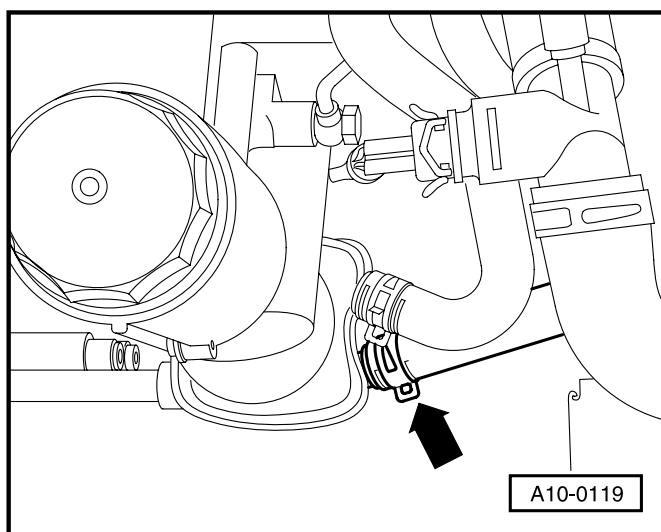
- ◀ - Remove engine cover.
- Pull out oil dipstick -1-.
- Remove plug -2- and loosen nut -arrows-.



- ◀ - Remove noise insulation in middle -arrows in top half of Fig-.



- ◀ - Turn the drain plug -arrow- on the radiator to the left, if necessary fit auxiliary hose onto connection.



- ◀ - Detach additional coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to drain.

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.

Recommended mixture ratios:

Antifreeze protection down to	Antifreeze concentration ¹⁾²⁾	Drinking water ²⁾
-25 °C	40 % (2.0 l)	60 % (3.0 l)
-35 °C	50 % (2.5 l)	50 % (2.5 l)

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.

- Fill with coolant gradually up to “max” marking on the expansion reservoir.
- Start engine and run for max. 2 minutes at approx. 1500 rpm; fill up coolant to overflow opening of expansion reservoir.
- Run engine until the fan starts.

Caution!

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

- Inspect coolant level. If the engine is warm the coolant level must be on the “max” marking, if the engine is cold the level must lie between the “min” and “max” marking.

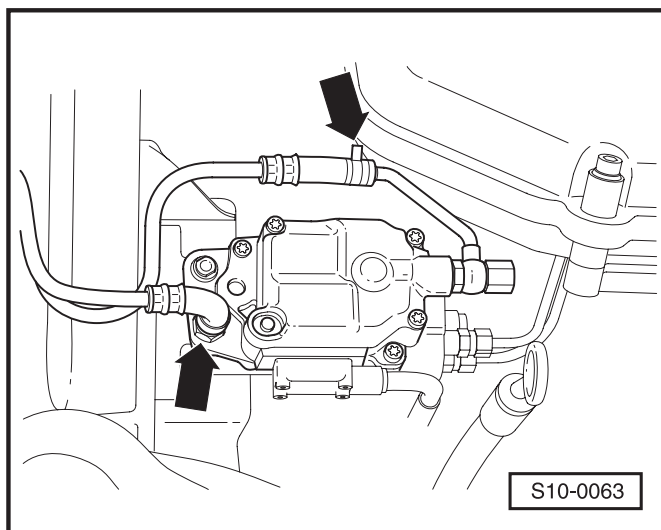
Removing and installing coolant pump

Special tools, testers and aids required

- ◆ Torque wrench

Removing

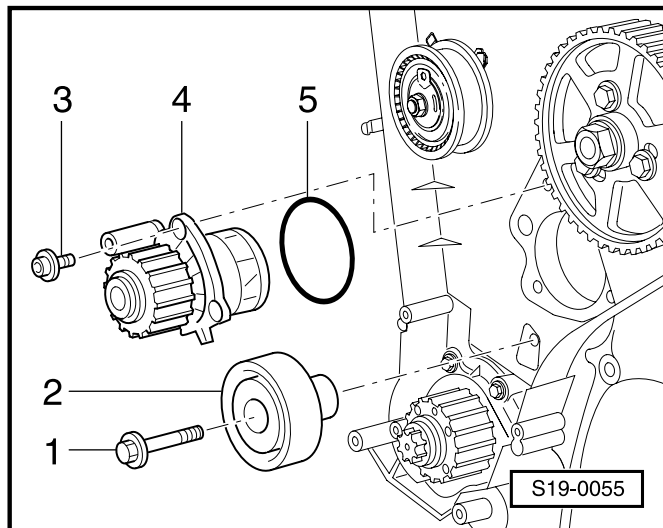
- Drain coolant ⇒ page 19-3.
- Remove right noise insulation.



- ◀ - Detach fuel hoses -arrows- to the injection pump, seal with a clean plug and place to the side.
- Remove toothed belt ⇒ page 13-3.

Notes:

- ◆ Ribbed V-belt pulley of crankshaft and bottom toothed belt cover can remain installed.
- ◆ Toothed belt remains fitted to the crankshaft toothed belt sprocket.
- ◆ Pay attention to all the instructions for removing and installing toothed belt ⇒ page 13-3.

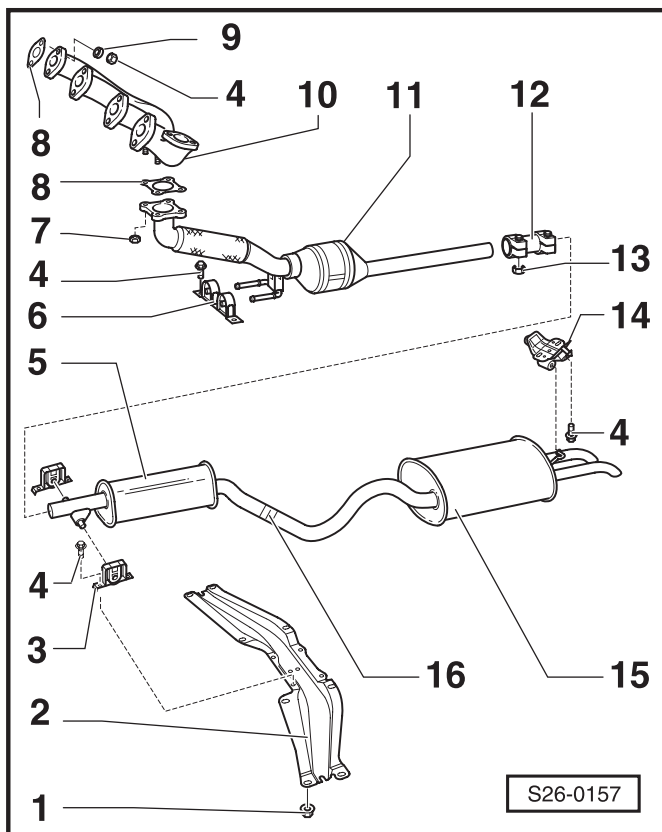


- ◀ - Unbolt guide pulley -2-.
- Pull out bolt of guide pulley -1- and press the guide pulley down about 30 mm.
- Unbolt coolant pump -4- and carefully lift up and out between engine strut and top toothed belt cover.

Installing

- Clean sealing surface for O-ring, smooth if necessary.
- Replace O-ring -5- and moisten with coolant.
- Insert coolant pump. Fitting position: covers face down.
- Tighten bolts -3-: 15 Nm.
- Insert new bolt for guide pulley -1- and tighten: 40 Nm, then torque a further ¼ turn (90°).
- Install toothed belt ⇒ page 13-5.
- Fill system with coolant ⇒ page 19-3.

Removing and installing parts of the exhaust system



Note:

- ◆ Always replace gaskets and self-locking nuts.

1 - 20 Nm

2 - Tunnel bridge

- ◆ with hole for aligning exhaust system
⇒ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 26

3 - Hanger

- ◆ installation position ⇒ Fig. 2

4 - 25 Nm

5 - Front silencer

- ◆ the front and rear silencer are installed as standard as a single part, in the event of repairs the front and rear silencer are delivered separately; to be connected together with a double clamp
- ◆ align exhaust pipe free of stress
⇒ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 26
- ◆ replace middle or rear silencer ⇒ page 26-2

6 - Hanger

7 - 40 Nm

- ◆ replace

8 - Gasket

- ◆ replace

9 - Washer

10 - Exhaust manifold

- ◆ coat stud bolts with hot bolt paste
G 052 112 A3

11 - Front exhaust pipe

- ◆ with oxidation catalytic converter
- ◆ avoid a large deflection, max. deflection 10°

12 - Clamping sleeve

- ◆ align exhaust system pipe free of stress
- ◆ installation position: parallel to vehicle floor, bolted connection pointing to left
- ◆ tighten bolted connections evenly

13 - 40 Nm

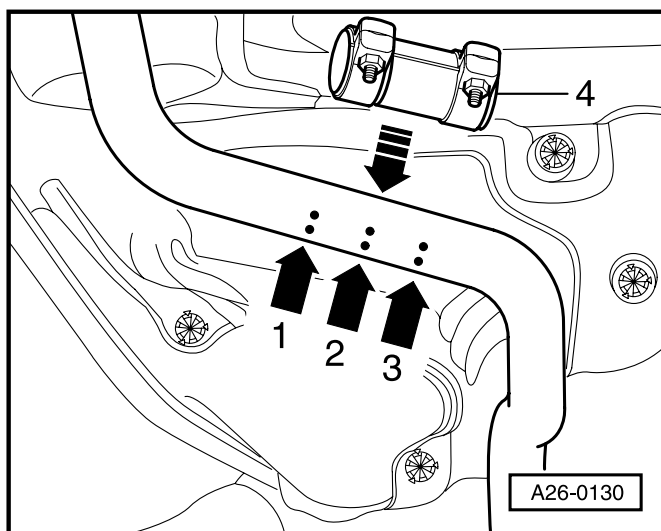
14 - Hanger

15 - Rear silencer

- ◆ the front and rear silencer are installed as standard as a single part, in the event of repairs the front and rear silencer are delivered separately; to be connected together with a double clamp.
- ◆ align exhaust pipe free of stress
⇒ 1.9 l/66 kW (TDI) Engine, Mechanical Components; Repair Group 26
- ◆ replace middle or rear silencer ⇒ page 26-2

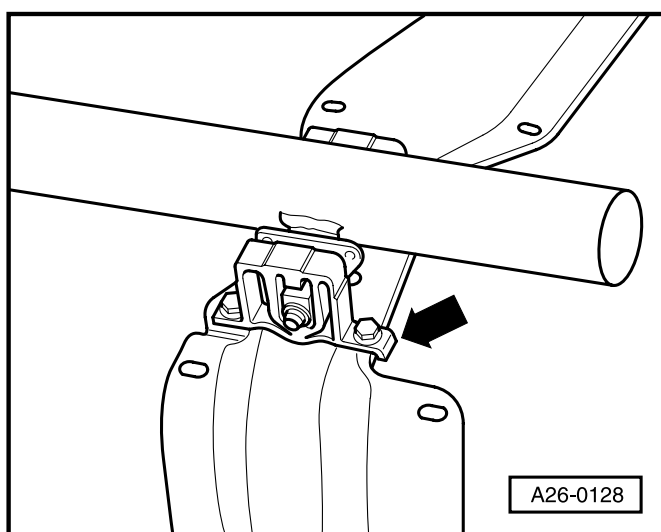
16 - Separation point

- ◆ in case of repair
- ◆ marked by three recesses around circumference of exhaust pipe
- ◆ replace middle or rear silencer ⇒ page 26-2



◀ Fig. 1 Separation point

- ◆ when replacing centre silencer or rear silencer
- ◆ marked by three indentations around circumference of exhaust pipe



◀ Fig. 2 Installation position of hanger

The angled side -arrow- at the base of the hanger points in direction of travel.

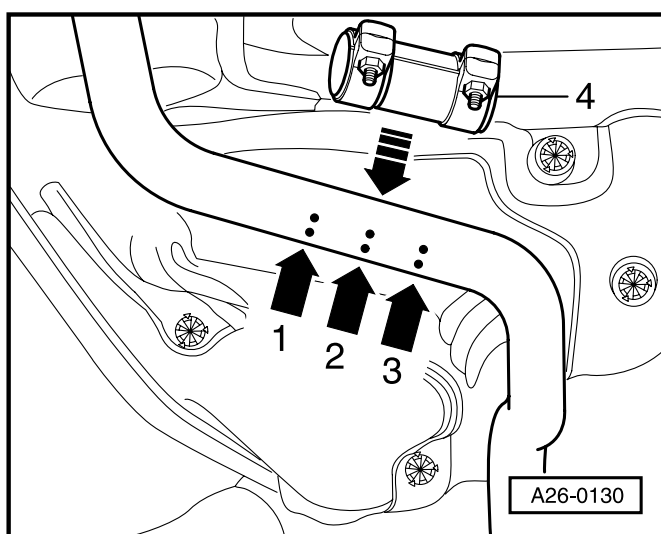
Replacing centre silencer or rear silencer

Special tools, testers and aids required

- ◆ Torque wrench
- ◆ Body saw, (e.g. V.A.G 1523)

Procedure

- ◀ - Cut exhaust pipe at the separation point -arrow 2- at right angles with the body saw, (e.g. V.A.G 1523).
- Position double clamp -4- at the side markings -arrows 1 and 3- when installing.
- Align exhaust system free of stress $\Rightarrow$ 1.9 l/ 66 kW (TDI) Engine, Mechanical Components; Repair Group 26.
- Align rear silencer horizontally.
- Tighten bolted connections of clamping sleeve evenly to 40 Nm.
- Installation position of clamping sleeve: horizontally in vehicle, bolted connections pointing forward.



Exhaust gas recirculation system

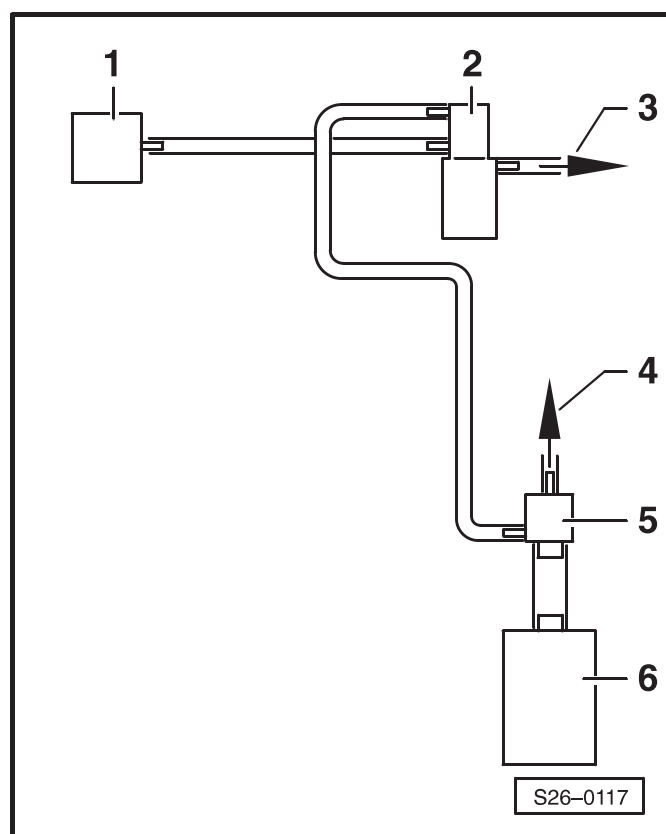
Notes:

- ◆ The exhaust gas recirculation system is actuated by the diesel direct injection system control unit -J248 through the EGR valve -N18 to the mechanical exhaust gas recirculation valve.

- ◆ Testing exhaust gas recirculation valve:
⇒ 1.9 l/50 kW (SDI) Engine - Fuel Injection and Glow Plug System; Repair Group 01; Final control diagnosis.

- ◆ The mechanical exhaust gas recirculation valve with the conically shaped valve tappets permits different opening cross-sections with different valve stroke.
- ◆ Any desired valve position is possible as a result of the pulsed actuation.
- ◆ Always replace self-locking nuts.

Connection diagram for control of exhaust gas recirculation system



1 - Mechanical exhaust gas recirculation valve

- ◆ test with V.A.G 1390

2 - EGR valve -N18

3 - To air filter

4 - To brake servo unit

5 - Non-return valve

6 - Vacuum pump

