



Workshop Manual

Golf 2004 ➤

Golf Plus 2005 ➤

Passat 2006 ➤

Touran 2003 ➤

4-cylinder diesel engine (2.0 l engine, 4 valve)

Engine ID	AZV	BKD	BMN	BKP	BMA	BVE	BMR	BUZ	BWV
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Edition 02.2011



List of Workshop Manual Repair Groups

Repair Group

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



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00 – Technical data

1 Technical data

Engine number ➤ [page 1](#)

Engine data ➤ [page 1](#)

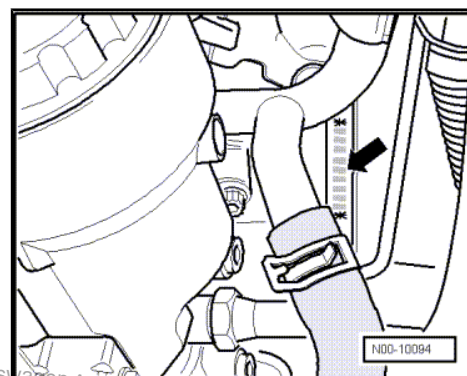
1.1 Engine number

The engine number („code letters“ and „serial number“) can be found on the joint between engine and gearbox.

In addition, there is a sticker on the toothed belt guard with „engine code“ and „serial number“.

The engine code can also be found on the vehicle data sticker.

The engine number consists of up to nine characters (alphanumeric). The first part (maximum 3 characters) makes up the „engine code“, and the second part (6 characters), the „serial number“. If more than 999,999 engines with the same engine code are produced, the first of the six characters is replaced with a letter.



1.2 Engine data

Edition 02.2011 version 24.0

Engine code		AZV	BKD	BMN	BKP	BMA	BVE	BMR	BUZ	BWV
Manufactured										
	Golf/ Golf Plus	10.03 ➤	10.03 ➤	01.06 ➤	---	---	---	---	---	---
	Touran	11.02 ➤	03.04 ➤	01.06 ➤	---	---	---	---	---	---
	Passat	---	---	---	03.05 ➤	03.05 ➤	05.05 ➤	09.05 ➤	09.05 ➤	01.06 ➤
Emissions fulfil		EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard
Capacity	l	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Output	kW at rpm	100/4000	103/4000	125/4200	103/4000	100/4000	90/4000	125/4200	120/4200	88/4000
Torque	Nm at rpm	320/1750..2500	320/1750..2500	350/1800	320/1750..2500	320/1750	320/1750	350/1800	350/1800	300/1750
Bore	Ø mm	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0	81.0
Stroke	mm	95.5	95.5	95.5	95.5	95.5	95.5	95.5	95.5	95.5
Valves per cylinder		4	4	4	4	4	4	4	4	4
Compression ratio		18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5	18.5
Fuel	according to	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590
Firing order		1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Catalytic converter		yes	yes	yes	yes	yes	yes	yes	yes	yes
Exhaust gas recirculation		yes	yes	yes	yes	yes	yes	yes	yes	yes



Engine code	AZV	BKD	BMN	BKP	BMA	BVE	BMR	BUZ	BWV
Turbo-charging/ supercharg- ing	yes	yes	yes	yes	yes	yes	yes	yes	yes
Charge air cooling	yes	yes	yes	yes	yes	yes	yes	yes	yes
Particulate filter	no	no	yes	no	no	no	yes	yes	no



10 – Removing and installing engine

1 Removing and installing engine

Removing engine ⇒ [page 4](#) .

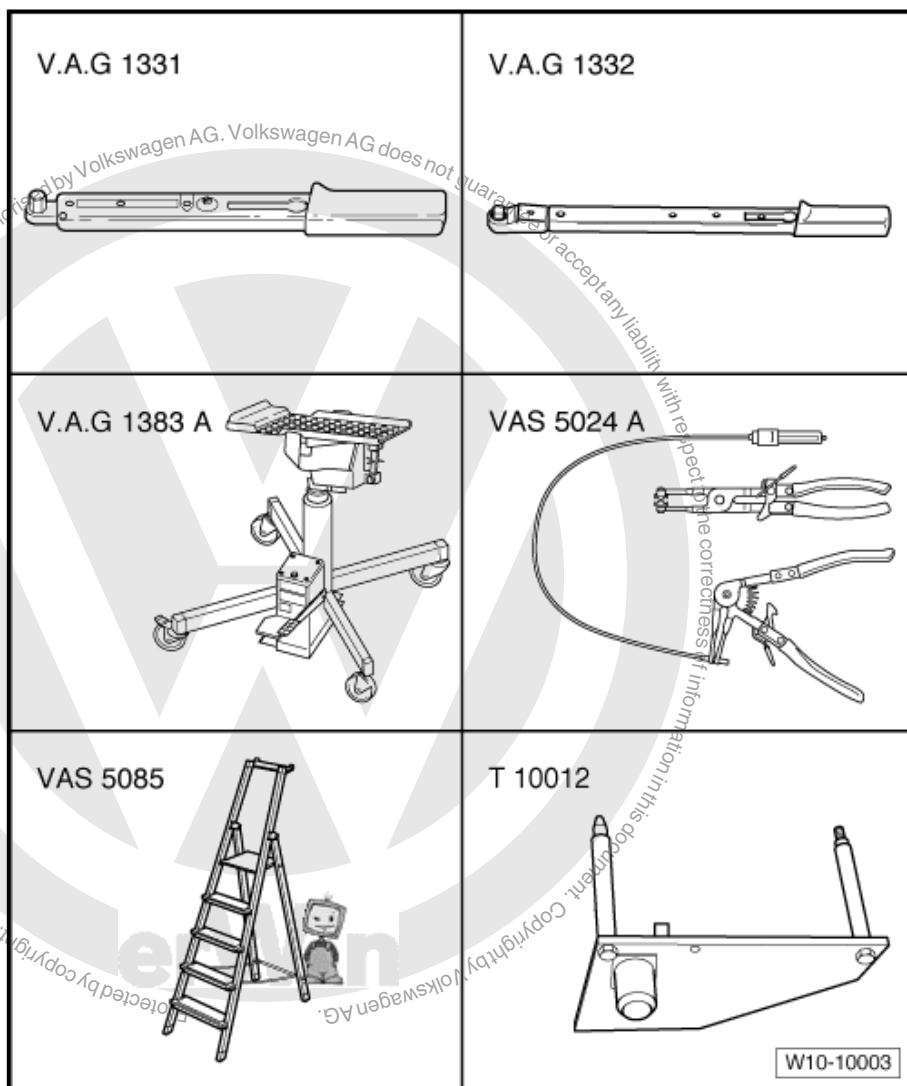
Securing engine to assembly stand ⇒ [page 11](#) .

Notes on installing ⇒ [page 13](#) .

Assembly mountings ⇒ [page 14](#) .

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-
- ◆ Torque wrench -V.A.G 1332-
- ◆ Engine and gearbox jack -V.A.G 1383 A-
- ◆ Spring-type clip pliers -VAS 5024 A-
- ◆ Stepladder -VAS 5085-
- ◆ Engine bracket -T10012-





1.1 Removing engine



Note

- ◆ Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.
- ◆ The engine is removed downwards together with the gearbox.
- ◆ All cable ties which are opened or cut through when engine is removed must be replaced in the same position when engine is installed.



WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ◆ Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.
- ◆ Ensure that there is sufficient clearance to all moving or hot components.

Procedures for Golf, Golf Plus, Touran ➔ [page 4](#)

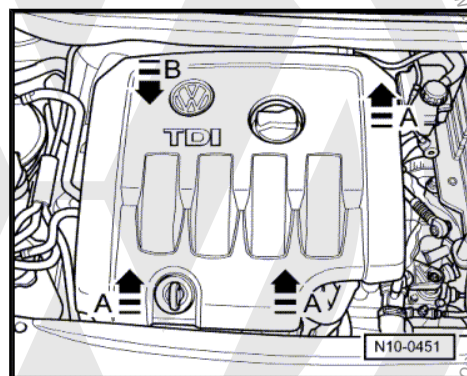
Procedures for Passat ➔ [page 7](#)

1.1.1 Procedures for Golf, Golf Plus, Touran

- Read fault memories of all control units before removal ➔ Diagnosis tester VAS 5051; Guided fault finding; Vehicle system test or VAS 5052; Vehicle self-diagnosis.
- With ignition switched off, disconnect earth strap from battery. ➔ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting batteries .
- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

- Remove plenum chamber bulkhead. ➔ General body repairs, exterior; Rep. gr. 50 ; Body - front, plenum chamber bulkhead .

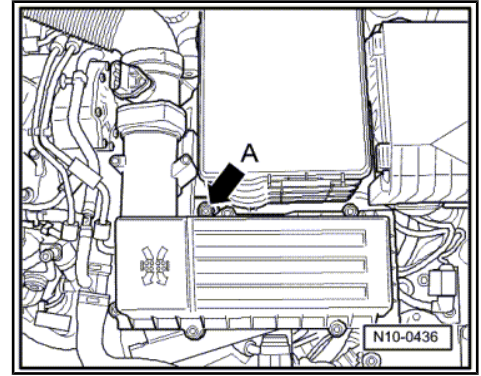




- Remove air filter housing with air mass meter and connecting pipe.

Remove bolt -arrow A- and pull air filter housing upwards out of mounting.

- Remove battery and battery tray.
- Remove insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Bring lock carrier into service position ⇒ General body repairs; Rep. gr. 50 ; Body - front; Lock carrier service position .
- Drain coolant ⇒ [page 134](#)



WARNING

- ◆ ***The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!***
- ◆ ***The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!***
- ◆ ***Wear eye and hand protection when performing any type of repair work on the fuel system!***

- Disconnect fuel supply and return lines as well as coolant line on cylinder head.
- Pull fuel filter module upwards out of bracket and lay it with hoses to side.

Vehicles with air conditioner



Note

To prevent damage to condenser and also to refrigerant lines/ hoses, ensure that the lines and hoses are not stretched, kinked or bent.

To facilitate removing and installing engine without opening refrigerant circuit:

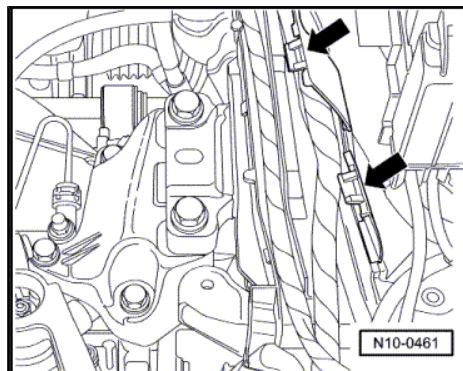
- Remove poly V-belt ⇒ [page 16](#) .
- Separate air conditioner compressor from compact bracket. ⇒ Heating, air conditioning; Rep. gr. 87 ; Removing and installing compressor bracket .
- Secure air conditioner compressor to lock carrier so that refrigerant lines are relieved.

Continuation for all vehicles

- Remove exhaust pipe and coolant hoses from supplementary heater.
- Remove connecting pipes between charge air cooler and engine.
- Pull retainer for wiring harness of oil level and oil temperature sender -G266- off subframe.
- Remove right drive shaft and unscrew left drive shaft from gearbox ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shaft .
- Remove left wheel housing liner.

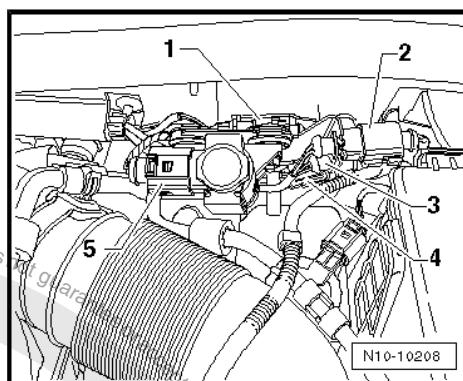


- Disconnect front exhaust pipe from turbocharger, loosen double clamp and slide exhaust pipe back ➔ [page 273](#) .
- Pull engine wiring harness connector off control unit:
Golf ➔ [page 260](#)
Golf Plus, Touran ➔ [page 264](#)
- Open cable guide catches on longitudinal member -arrows-.
- Remove wiring harness from cable guide and lay to side on engine.



For engine code BMN:

- Separate connections at engine bulkhead for:
 - ◆ -1- Exhaust gas temperature sender 2 -G448-
 - ◆ -2- Temperature sender after particulate filter -G527-
 - ◆ -3- Exhaust gas temperature sender 1 -G235-
 - ◆ -4- Lambda probe -G39-
 - ◆ -5- Charge pressure control solenoid valve -N75-



Continuation for all vehicles

- Pull off or disconnect all other electrical connections from engine and gearbox as necessary and lay to side.
- Separate all connecting, coolant, vacuum and intake hoses from engine.

For engine code BMN:

- Release connecting clamp for front exhaust pipe/front silencer.
- Remove subframe and steering ➔ Running gear, axles, steering; Rep. gr. 40 .



Note

The engine is lowered downwards with particulate filter fitted.

Engine codes AZV, BKD:

- Disconnect front exhaust pipe from turbocharger, loosen double clamp and slide exhaust pipe back ➔ [page 273](#) .

Continuation for all vehicles:

- Disconnect selector mechanism from gearbox ➔ 6-speed manual gearbox 02Q; Rep. gr. 34 .
- Separate pressure line for hydraulic clutch control.
- Remove pendulum support.

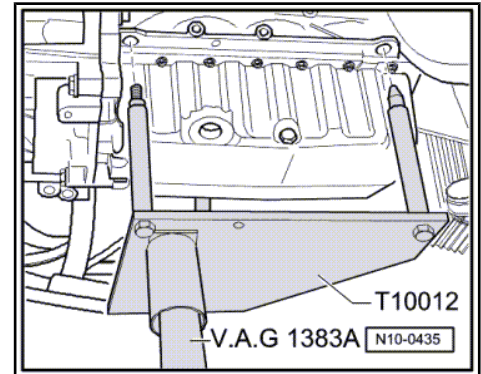


- Insert engine bracket -T10012- in engine and gearbox jack - V.A.G 1383/A- .

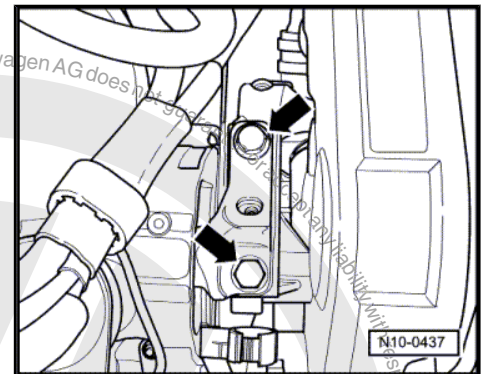
i Note

Support pins must be secured to engine bracket -T10012- as shown. The threaded support pin must be on the gearbox side.

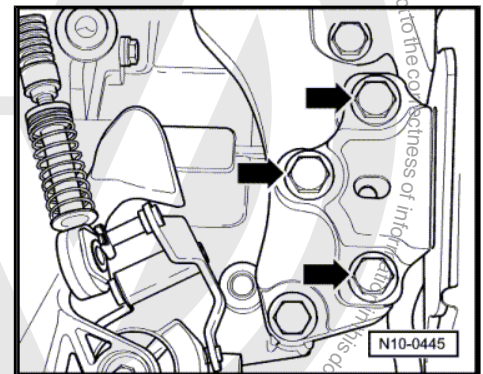
- Fit engine bracket -T10012- to cylinder block with M10 x 25/ 8.8 bolt and tighten to approx. 40 Nm.
- Lift engine and gearbox lightly using engine and gearbox jack -V.A.G 1383/A- .



- Unbolt engine side of assembly mounting from engine support from above -arrows-.



- Unbolt gearbox side of assembly mounting from gearbox bracket from above -arrows-.



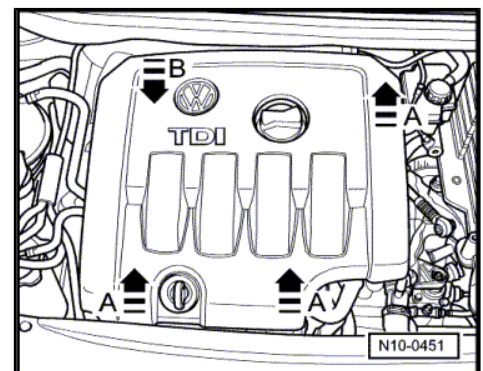
i Note

- ◆ To remove securing bolts, use stepladder VAS 5085.
- ◆ Engine with gearbox must be guided carefully when lowered to prevent damage to bodywork.
- Carefully lower engine with gearbox.

1.1.2 Procedures for Passat

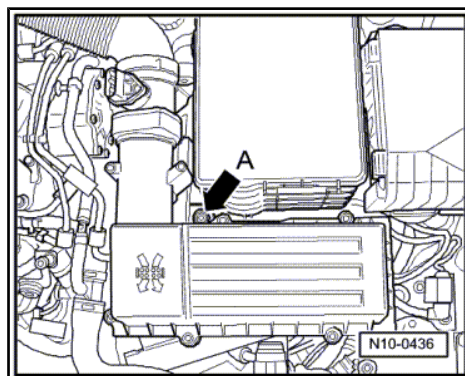
- Read fault memories of all control units before removal ⇒ Diagnosis tester VAS 5051; Guided fault finding; Vehicle system test or VAS 5052; Vehicle self-diagnosis .
- With ignition switched off, disconnect earth strap from battery ⇒ Rep. gr. 27 .
- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.





- Remove bolt -arrow A- and pull air filter housing upwards out of mounting.
- Remove air filter housing together with air mass meter and connecting pipe.
- Disconnect all necessary vacuum lines or, when fitted, connectors on solenoid block ⇒ [page 240](#) .
- Remove battery and battery tray.
- Remove wiper arms ⇒ Rep. gr. 92 .
- Remove plenum chamber cover ⇒ Rep. gr. 64 .



Vehicles without anti-theft alarm system

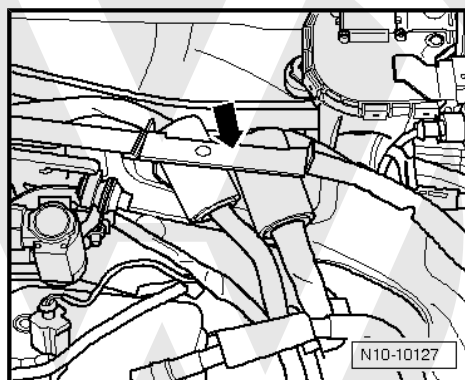
- Release connector on engine control unit and pull it off ⇒ [page 268](#) .

Vehicles with anti-theft alarm system

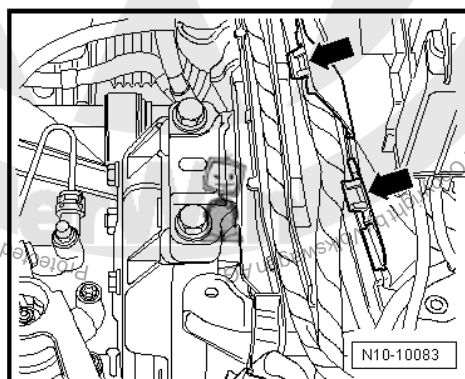
- Release connector on engine control unit and pull it off ⇒ [page 269](#) .

Continuation for all vehicles

- Remove feed-through for engine control unit wiring harness -arrow-.



- Open cable guide fasteners -arrows-.
- Remove wiring harness from cable guide on longitudinal member and lay to side on engine.



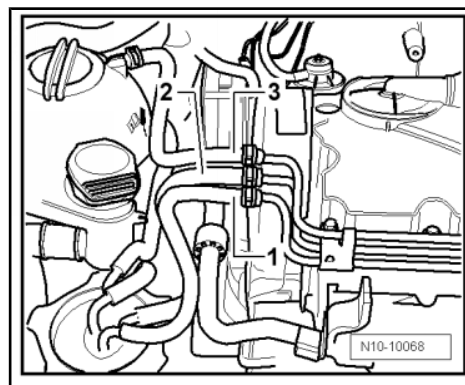


- Pull off fuel supply hose -2-, fuel return hose -1- and coolant hose -3-.

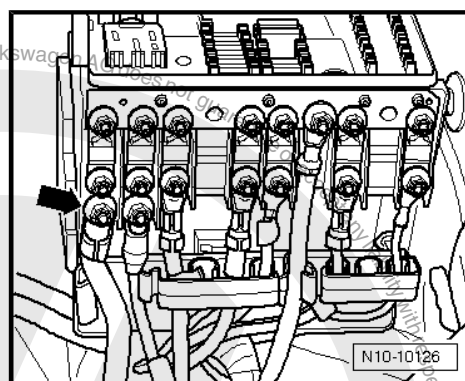


WARNING

- ◆ *The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!*
- ◆ *The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!*
- ◆ *Wear eye and hand protection when performing any type of repair work on the fuel system!*



- Remove wire from central electrics -arrow-.

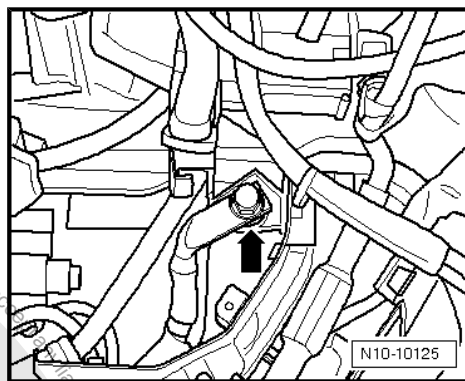




- Unscrew earth cable -arrow- from longitudinal member.
- Move wiring clear.
- Pull off or disconnect all other electrical connections from engine and gearbox as necessary and lay to side.
- Separate all connecting, vacuum and intake hoses from engine.

Vehicles with front-wheel drive

- Disconnect gear selector mechanism from gearbox ⇒ 6-speed manual gearbox 02Q; Rep. gr. 34 ; Repairing gear selector mechanism .



Vehicles with four-wheel drive:

- Disconnect gear selector mechanism from gearbox ⇒ 6-speed manual gearbox 02Q, four-wheel drive; Rep. gr. 34 ; Repairing gear selector mechanism .

Continuation for all vehicles:

- Remove slave cylinder for hydraulic clutch or, disconnect line at slave cylinder ⇒ Rep. gr. 30 .
- Remove noise insulation tray ⇒ Rep. gr. 50 .
- Pull connector off oil level and oil temperature sender -G266- .
- Pull retainer for oil level and oil temperature sender -G266- wiring harness off subframe.
- Drain coolant ⇒ [page 134](#) .
- Bring lock carrier into service position ⇒ Rep. gr. 50 .
- Completely remove exhaust pipes from supplementary heater ⇒ Rep. gr. 82 .
- Pull coolant hoses off supplementary heater.
- Separate all other coolant hoses from engine.
- Remove right drive shaft and disconnect left drive shaft from gearbox ⇒ Rep. gr. 40 .

Vehicles with four-wheel drive:

- Remove front propshaft ⇒ Final drive 02D, 0AV; Rep. gr. 39 ; Assembly overview - repairing propshaft .

Vehicles with particulate filter:

- Release connecting clamp for front exhaust pipe/front silencer.
- Remove subframe and steering ⇒ Running gear, axles, steering; Rep. gr. 40 .



Note

The engine is lowered downwards with particulate filter fitted.

Vehicles with no particulate filter:

- Disconnect front exhaust pipe from turbocharger, loosen double clamp and remove exhaust pipe ⇒ [Item 1 \(page 273\)](#) .

Continuation for all vehicles:



- Unbolt pendulum support -arrows-.

To facilitate removing and installing engine without opening refrigerant circuit:

- Remove poly V-belt ➔ [page 16](#) .
- Separate air conditioner compressor from compact bracket ➔ Rep. gr. 87 .
- Secure air conditioner compressor to lock carrier so that refrigerant lines are free of stress.



Note

To prevent damage to condenser or to refrigerant lines/hoses, ensure that the lines and hoses are not stretched, kinked or bent.

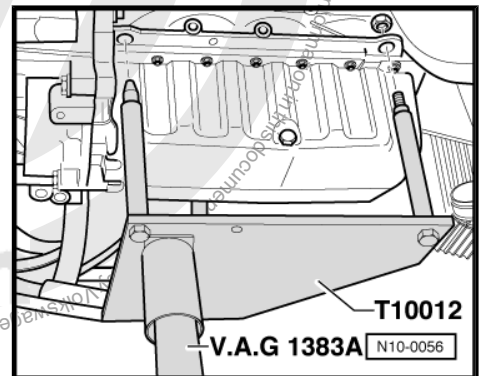
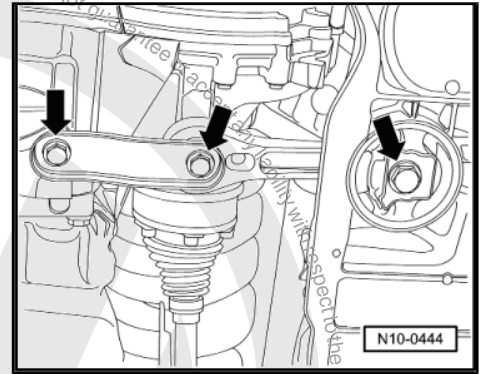
- Fit engine bracket -T10012- onto cylinder block with securing nut and M10×25/ 8.8 bolt and tighten to approx. 40 Nm.
- Insert engine bracket -T10012- in engine and gearbox jack -V.A.G 1383/A- .
- Lift engine and gearbox lightly using engine and gearbox jack -V.A.G 1383/A- .



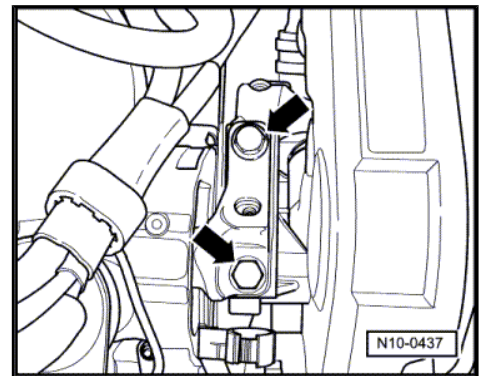
Note

To remove securing bolts, use stepladder -VAS 5085- .

- Unbolt engine side of assembly mounting from engine support from above -arrows-.

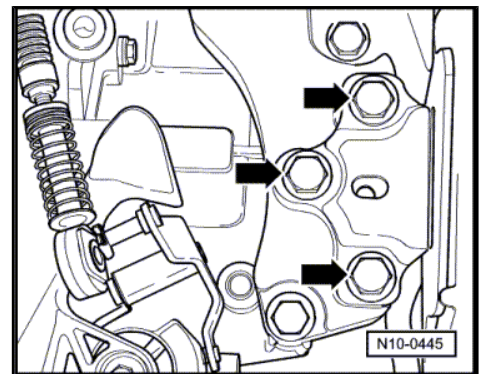


- Unbolt gearbox side of assembly mounting from gearbox bracket from above -arrows-.
- Carefully lower engine with gearbox.



Note

Engine with gearbox must be guided carefully when lowering to prevent damage to bodywork.



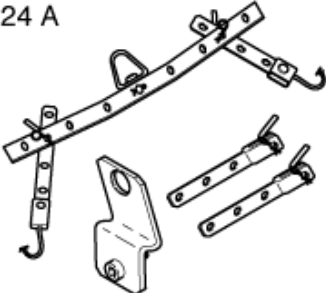
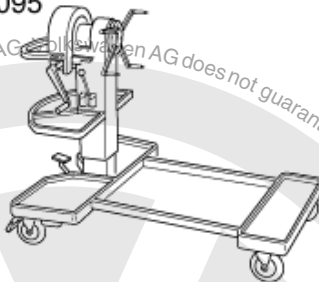
1.2 Securing engine to assembly stand

Before carrying out repair work, secure engine on engine and gearbox support -VAS 6095/1- using universal mounting -VAS 6095- .



Special tools and workshop equipment required

- ◆ Lifting tackle -2024 A-
- ◆ Workshop hoist -VAS 6100-
- ◆ Engine and gearbox support -VAS 6095-

2024 A 	VAS 6100 
VAS 6095 	
	W10-10006

Procedure

- Unbolt gearbox.



- Attach lifting tackle -VAS 2024A- as follows and lift from engine and gearbox jack -V.A.G 1383/A- using workshop crane.

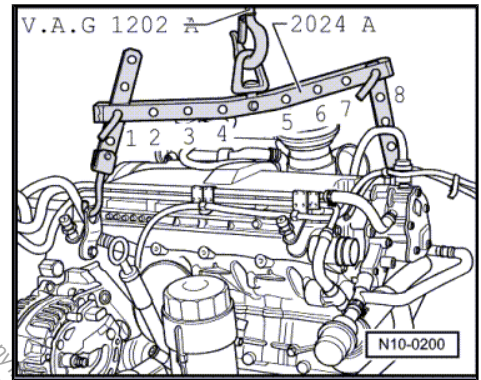
Belt pulley end: 1st hole in hook rail at position 1

Flywheel end: 4th hole in hook rail at position 8



WARNING

The hooks and locating pins must be secured with locking pins.



Note

- ◆ *The positions marked 1...4 on the bar must be towards the pulley end.*
- ◆ *The holes in the hook rails are counted up from the hook.*

- Secure engine on engine and gearbox support -VAS 6095/1- using universal mounting -VAS 6095- .

1.3 Notes on installing

Installation is carried out in the reverse order. When installing, note the following:

- Check clutch release bearing for wear and renew if necessary.
- Lightly grease input shaft splines with G 000 100 grease.
- Check whether dowel sleeves for centring engine and gearbox are in cylinder block and install if necessary.
- Rock engine to align engine mountings stress-free.



Note

- ◆ *Specified torques for engine and gearbox mountings*
⇒ [page 14](#) .
- ◆ *Electrical connections and routing* ⇒ *Electrical system; Rep. gr. 97* .
- On vehicles with particulate filter install subframe and steering
⇒ Running gear, axles, steering; Rep. gr. 40 .
- Install pendulum support.
- Install drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shafts .
- Vehicles with no particulate filter, install front exhaust pipe
⇒ [page 277](#) .
- Install poly V-belt ⇒ [page 16](#) .
- Install hydraulic line for hydraulic clutch ⇒ 6-speed manual gearbox 02Q; Repair group 30; Repairing clutch mechanism; Assembly overview - hydraulic system .
- Install selector mechanism and, if necessary, adjust gear selector cables ⇒ 6-speed manual gearbox 02Q; Rep. Gr. 34; Repairing selector mechanism .
- Replenish coolant ⇒ [page 134](#) .



- Install insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Carry out road test and read fault memories ⇒ Vehicle diagnostic tester.

Specified torques

Threaded connection		Specified torque
Bolts, nuts	M6	10 Nm
	M8	20 Nm
	M10	45 Nm
	M12	60 Nm

1.4 Assembly mountings

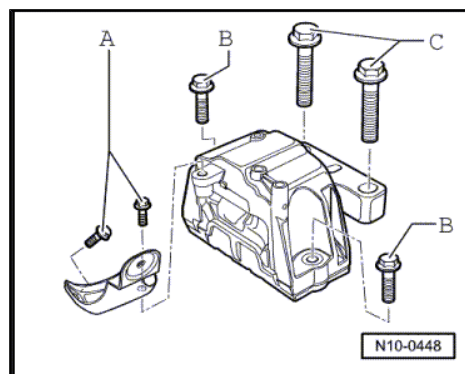
Engine assembly mounting

A = 20 Nm + 90° (1/4 turn) further ¹⁾

B = 40 Nm + 90° (1/4 turn) further ¹⁾

C = 60 Nm + 90° (1/4 turn) further ¹⁾

¹⁾ Renew.

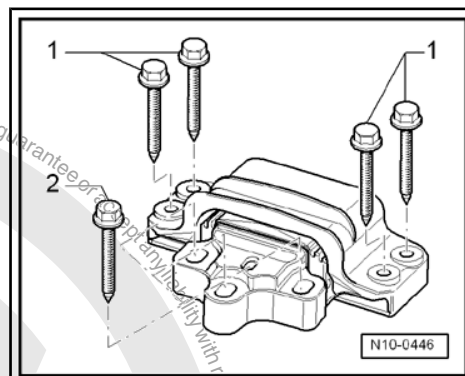


Gearbox assembly mounting

1 = 40 Nm + 90° (1/4 turn) further ¹⁾

2 = 60 Nm + 90° (1/4 turn) further ¹⁾

¹⁾ Renew.

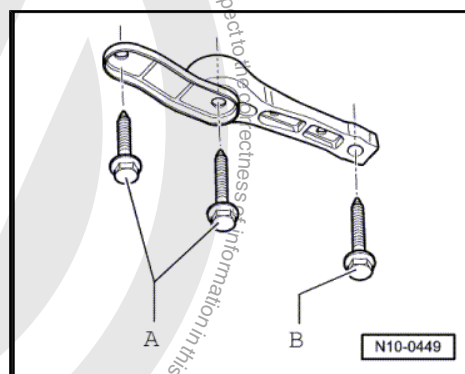


Pendulum support

A = 40 Nm + 90° (1/4 turn) further ¹⁾

B = 100 Nm + 90° (1/4 turn) further ¹⁾

¹⁾ Renew.





13 – Crankshaft group

1 Dismantling and assembling engine



Note

If large quantities of swarf or metal particles (caused, for example, by partial seizure of the crankshaft or conrod bearings) are found in the engine oil when performing repairs, clean the oil passages thoroughly and renew the oil cooler in order to prevent subsequent damage.

Assembly overview - poly V-belt drive ➔ [page 15](#) .

Removing and installing poly V-belt ➔ [page 16](#) .

Assembly overview - toothed belt drive ➔ [page 18](#) .

Assembly overview - crankcase ➔ [page 23](#)

1.1 Assembly overview - poly V-belt drive

1 - Belt pulley and vibration damper

- ☐ Can only be installed in one position, holes are offset.

2 - 25 Nm

3 - Alternator

4 - Retainer

5 - Poly V-belt tensioning element

- ☐ Swivel with open-end spanner to slacken poly V-belt ➔ [page 16](#) .

6 - 25 Nm

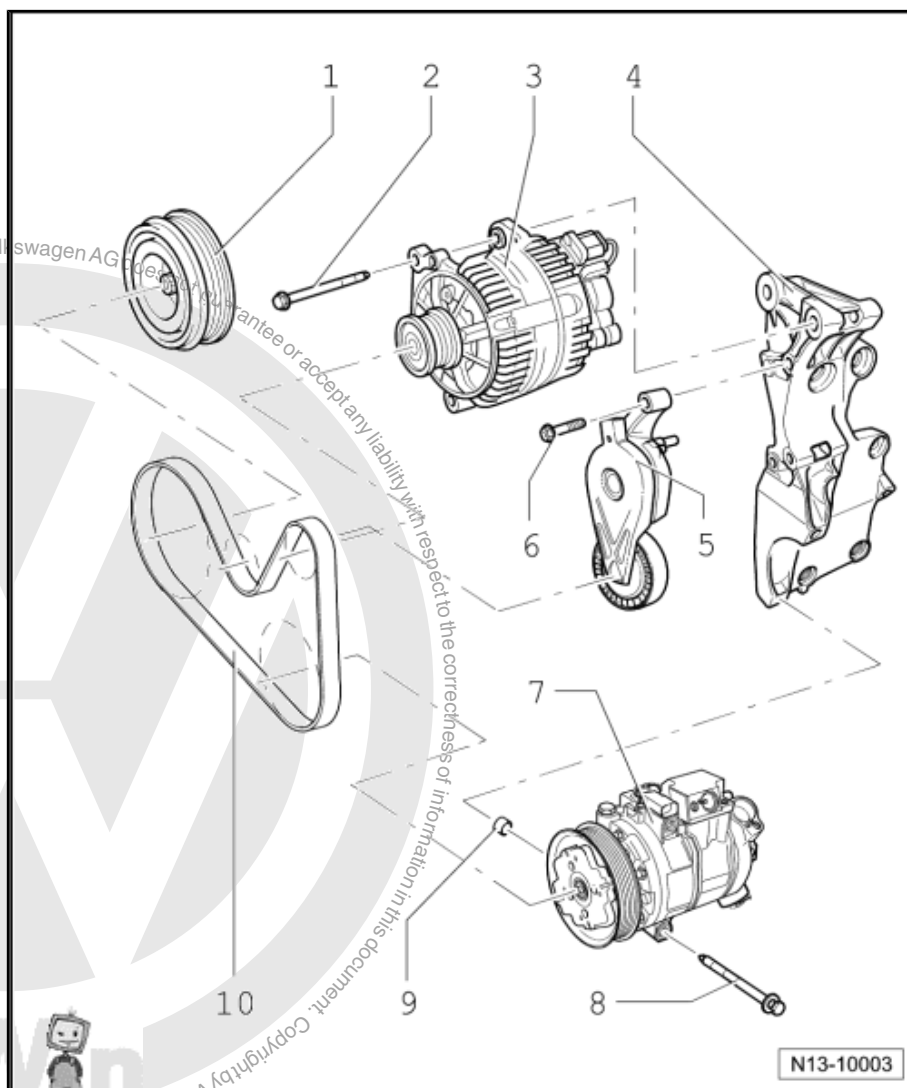
7 - Air conditioner compressor

8 - 45 Nm

9 - Dowel sleeves

10 - Poly V-belt

- ☐ Mark direction of rotation before removing.
- ☐ Check for wear.
- ☐ Do not kink.
- ☐ Removing and installing ➔ [page 16](#) .

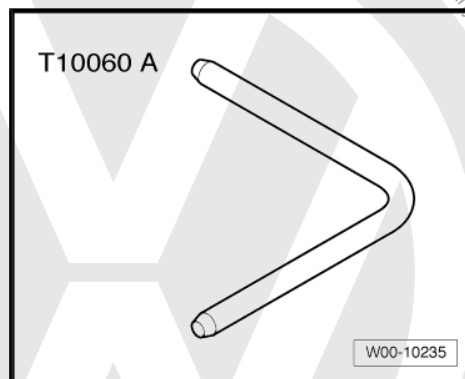




1.2 Removing and installing poly V-belt

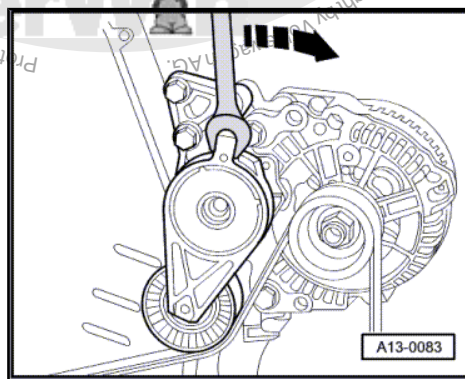
Special tools and workshop equipment required

- ◆ Locking pin -T10060 A-



Removing

- Remove insulation tray. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Pull fuel filter out of bracket and lay it with hoses to side.
- Mark direction of rotation of poly V-belt.
- Swing tensioning element in direction of arrow to remove tension from poly V-belt.



- Lock tensioning element using locking pin -T10060 A- .
- Remove poly V-belt.

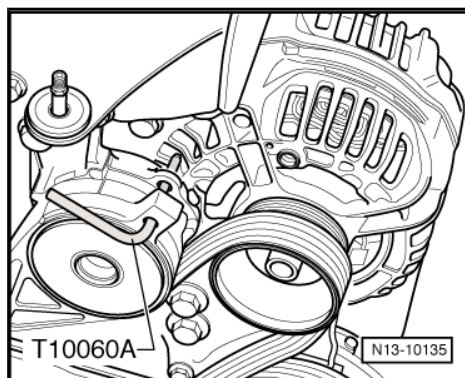
Installing

- Install in reverse order.



Note

- ◆ Before installing poly V-belt, ensure that all ancillaries (alternator, air conditioner compressor) are secured tightly.
- ◆ When installing poly V-belt, check direction of belt rotation and proper seating of belt in pulleys.
- ◆ For vehicles without air conditioning, fit poly V-belt on alternator last.
- ◆ For vehicles with air conditioning, fit poly V-belt over air conditioner compressor last.

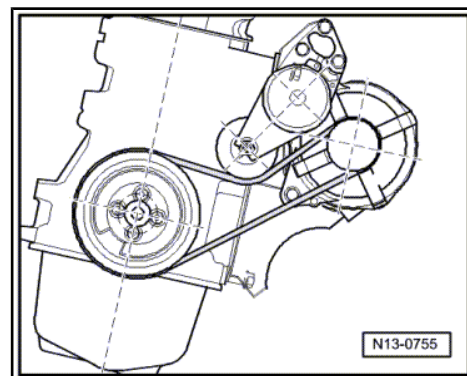


After completing repairs always:

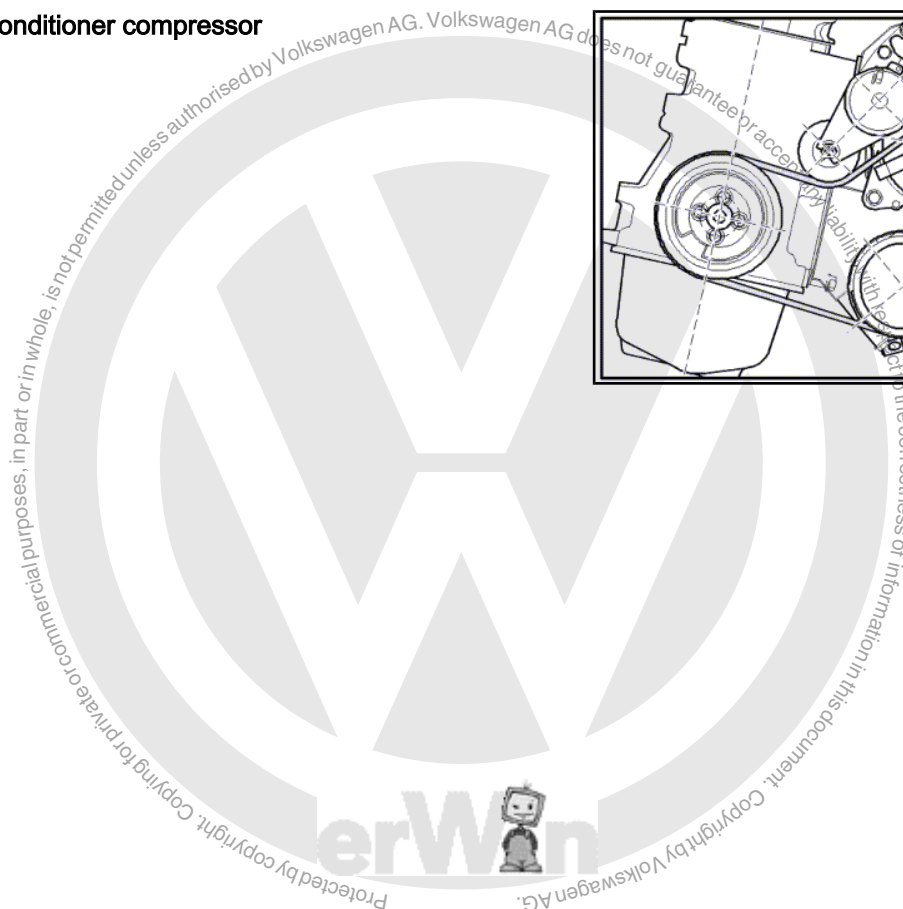
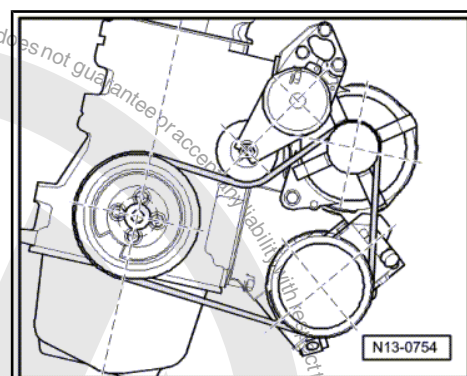
- Start engine and check belt running.



Belt drive without air conditioner compressor



Belt drive with air conditioner compressor





1.3 Assembly overview - toothed belt drive

1 - Toothed belt guard upper part

2 - Toothed belt

- ☐ Mark direction of rotation before removing.
- ☐ Check for wear.
- ☐ Do not kink.
- ☐ Removing, installing and tensioning
⇒ [page 51](#) .

3 - Guide roller

4 - 100 Nm

5 - 25 Nm

6 - Camshaft pulley

7 - Hub

- ☐ Use counterhold tool - T10051- to loosen and tighten.
- ☐ To remove, use puller - T10052- .
- ☐ Removing and installing
⇒ [page 79](#) .

8 - Camshaft pulley

9 - Hub

- ☐ With sender wheel
- ☐ Use counterhold tool - T10051- to loosen and tighten.
- ☐ To remove, use puller - T10052- .
- ☐ Removing and installing
⇒ [page 79](#) .

10 - 10 Nm

11 - Rear toothed belt guard

12 - Tensioning roller

- ☐ Remove engine support in order to remove and install ⇒ [page 19](#) .

13 - 20 Nm + 1/8 turn (45°) further

14 - Guide roller

15 - 20 Nm

16 - Coolant pump

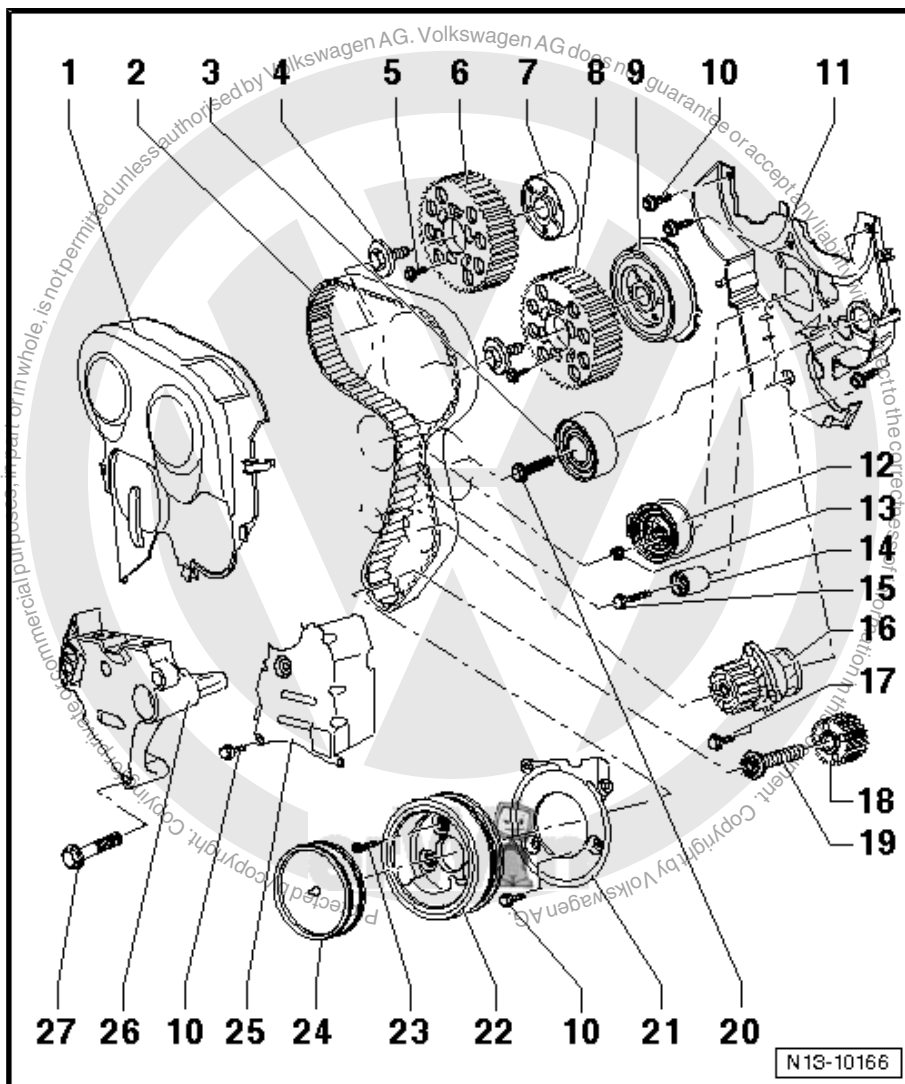
- ☐ Removing and installing ⇒ [page 142](#) .

17 - 15 Nm

18 - Crankshaft toothed belt pulley

19 - 120 Nm + 1/4 turn (90°) further

- ☐ Renew.
- ☐ Use counterhold tool -3415- to loosen and tighten.





- ☐ Do not additionally oil or grease thread and shoulder.
- ☐ Turning further can be done in several stages.

20 - Bolt

- ☐ M10 = 40 Nm + 90° further
- ☐ M12 = 90 Nm + 90° further
- ☐ Renew.

21 - Toothed belt guard lower part

22 - Belt pulley and vibration damper

- ☐ Can only be installed in one position. Holes are offset.

23 - 10 Nm + 1/4 turn (90°) further

- ☐ Renew.

24 - Cover

25 - Toothed belt guard centre part

26 - Engine support

- ☐ Removing and installing ⇒ [page 19](#) .

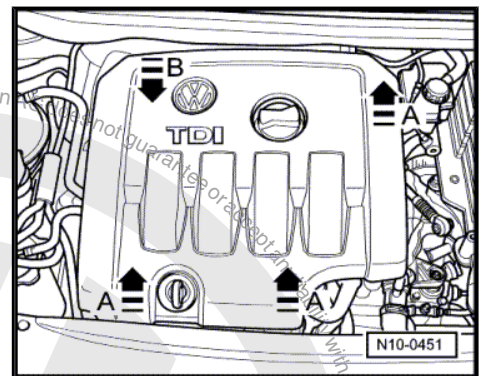
27 - 40 Nm + 1/2 turn (180°) further

- ☐ Renew.

1.3.1 Removing and installing engine support

Special tools and workshop equipment required

- ◆ Support bracket -10 - 222 A-
- ◆ Torque wrench -V.A.G 1331-
- Remove engine cover.
- To do this, pull engine cover upwards abruptly at front and right
-arrows A- and then pull forwards out of rear fastening
-arrow B-.





- Separate push-on connectors of fuel lines -arrows-.



Note

- ◆ *Do this by pressing in catch of push-on connectors.*
- ◆ *Ensure that no fuel escapes (use a cloth).*
- Lay fuel filter with hoses to side.
- Disconnect coolant hose from top of expansion tank.
- Remove expansion tank and lay it to side.
- Remove charge air pipe between charge air cooler and turbo-charger.
- Carefully cover or seal open ends.

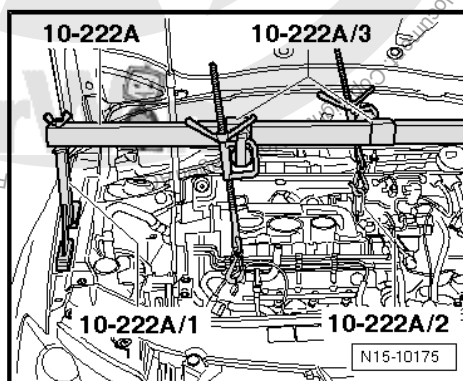
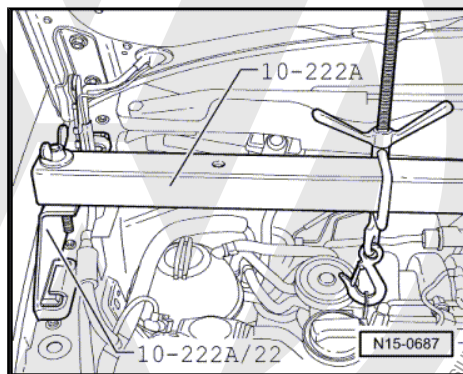
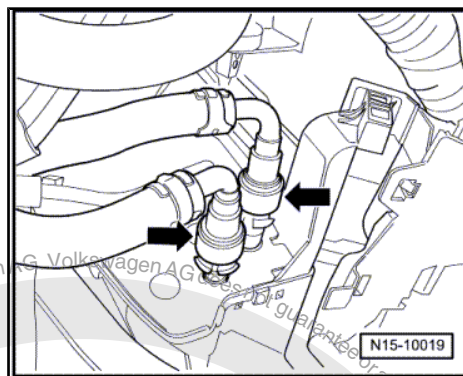
Golf, Golf Plus and Touran:

- Fit engine support bracket -10-222A- with adapters -10-222A/22- and take up weight of engine in installation position.

Passat:

- Set up support bracket -10-222A- with legs -10-222A/1- and support engine in installation position, as shown.

Continuation for all vehicle types:





- Remove securing bolts from assembly mounting/engine support -arrows- and remove complete assembly mounting.



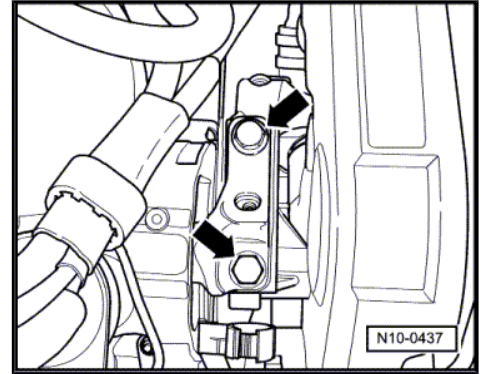
Note

- ◆ *The assembly mounting may only be removed if the engine is supported with support bracket 10-222A!*
- ◆ *The engine support must only be loosened when the assembly mounting has been removed.*



WARNING

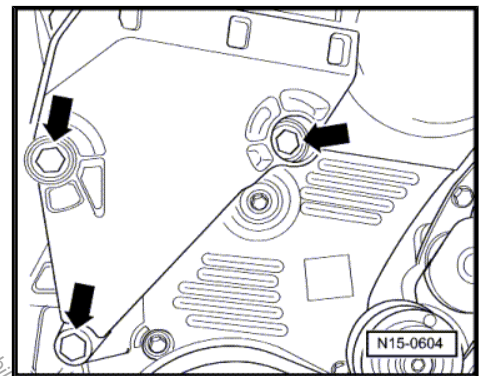
When raising and lowering engine using support bracket -10-222A-, ensure that no components or hoses are damaged or torn off.



- Remove noise insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Remove front right wheel housing liner.
- Raise engine with support bracket -10-222A- until both upper bolts of engine support can be loosened and removed.
- Lower engine with support bracket -10-222A- until lower bolt can be loosened and removed.
- Remove engine support upwards.

Installing

- Position engine support from above to engine block.
- Insert new bolts and tighten hand-tight.



Caution

The tightening sequence and specified torques for the engine support securing bolts must always be followed. Otherwise the engine support can be stressed and it can break.



- Tighten bolts for engine support in the sequence shown -1...3- to 40 Nm + $\frac{1}{2}$ turn (180 °) further. To do this, raise or lower engine using support bracket -10 - 222 A- .

I : Engine support with less clearance to engine

II: Engine support with greater clearance to engine



Note

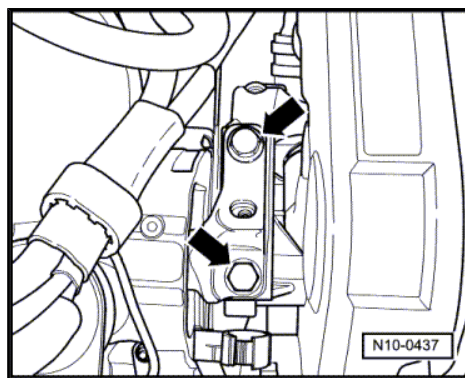
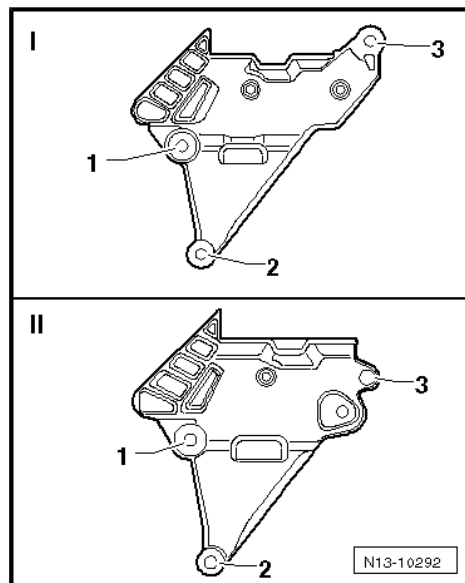
Before installing assembly mounting, tighten all engine support bolts to prescribed torque.

- Install assembly mounting between engine and body (renew securing bolts) ⇒ [page 14](#) .

- Bolt engine assembly mounting to engine support -arrows- by bringing contact surfaces together using support bracket -10-222A- . Specified torque: 60 Nm + 90° (1/4 turn) further

Further assembly is basically the reverse of the dismantling sequence. In the process, note the following:

- ◆ Ensure that fuel hose connections are tight.
- ◆ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ◆ When installing charge air pipes, ensure that locking lugs engage correctly.
- Install wheel housing liner.
- Install noise insulation tray. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .





1.4 Assembly overview - crankcase

1 - Cylinder block

- ☐ Removing and installing sealing flange and fly-wheel ➔ [page 24](#) .
- ☐ Removing and installing crankshaft ➔ [page 44](#) .
- ☐ Dismantling and assembling pistons and con-rods ➔ [page 39](#) .

2 - Seal

- ☐ Renew.

3 - Oil filter bracket

- ☐ Dismantling and assembling ➔ [page 120](#) .

4 - 15 Nm + 1/4 turn (90°) further

- ☐ Renew.
- ☐ First fit upper left and lower right bolts and then tighten all four bolts diagonally.

5 - Retainer

6 - 20 Nm

7 - Connection

- ☐ For thermostat.

8 - 15 Nm

9 - O-ring

- ☐ Renew.

10 - Thermostat

- ☐ Observe installation position, Removing and installing thermostat ➔ [page 144](#) .
- ☐ Checking: heat thermostat in water.
- ☐ Opening begins at approx. 85 °C.
- ☐ Ends at approx. 105 °C.
- ☐ Opening lift at least 7 mm.

11 - 45 Nm

12 - Retainer

- ☐ For alternator and, if fitted, air conditioner compressor.

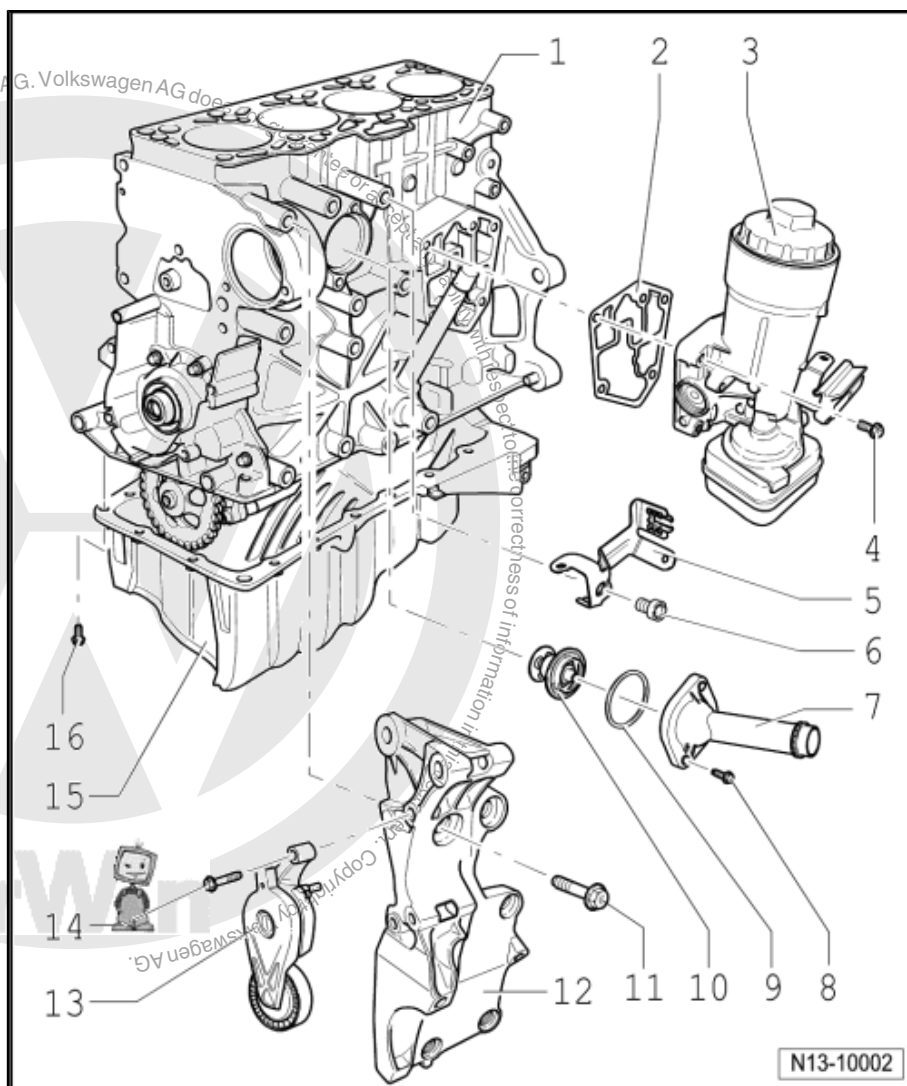
13 - Poly V-belt tensioning element

14 - 25 Nm

15 - Oil sump

- ☐ Clean sealing surface before fitting.
- ☐ Install with silicone sealant -D 176 404 A2- .

16 - 15 Nm





2 Removing and installing sealing flange and flywheel



Note

Repairing clutch: ➔ 6-speed manual gearbox 02Q; Rep. gr. 30 ;
Repairing clutch .

Renewing crankshaft sealing flange - flywheel end ➔ [page 25](#) .

Renewing crankshaft oil seal - belt pulley end ➔ [page 33](#) .

Removing and installing sealing flange - pulley end
➔ [page 35](#) .

Removing and installing engine speed sender -G28-
➔ [page 37](#)

1 - Seal

- ☐ Do not additionally oil or grease the oil seal sealing lip.
- ☐ Before installing, remove oil residue from crankshaft journal using a clean cloth.
- ☐ Renewing crankshaft oil seal - belt pulley end ➔ [page 33](#) .

2 - Sealing flange

- ☐ Must be positioned on dowel sleeves.
- ☐ Removing and installing ➔ [page 35](#) .
- ☐ Install with silicone sealant -D 176 404 A2- ➔ [page 35](#) .

3 - Cylinder block

- ☐ Removing and installing crankshaft ➔ [page 44](#) .
- ☐ Dismantling and assembling pistons and con-rods ➔ [page 39](#) .

4 - 60 Nm + 1/4 turn (90°) further

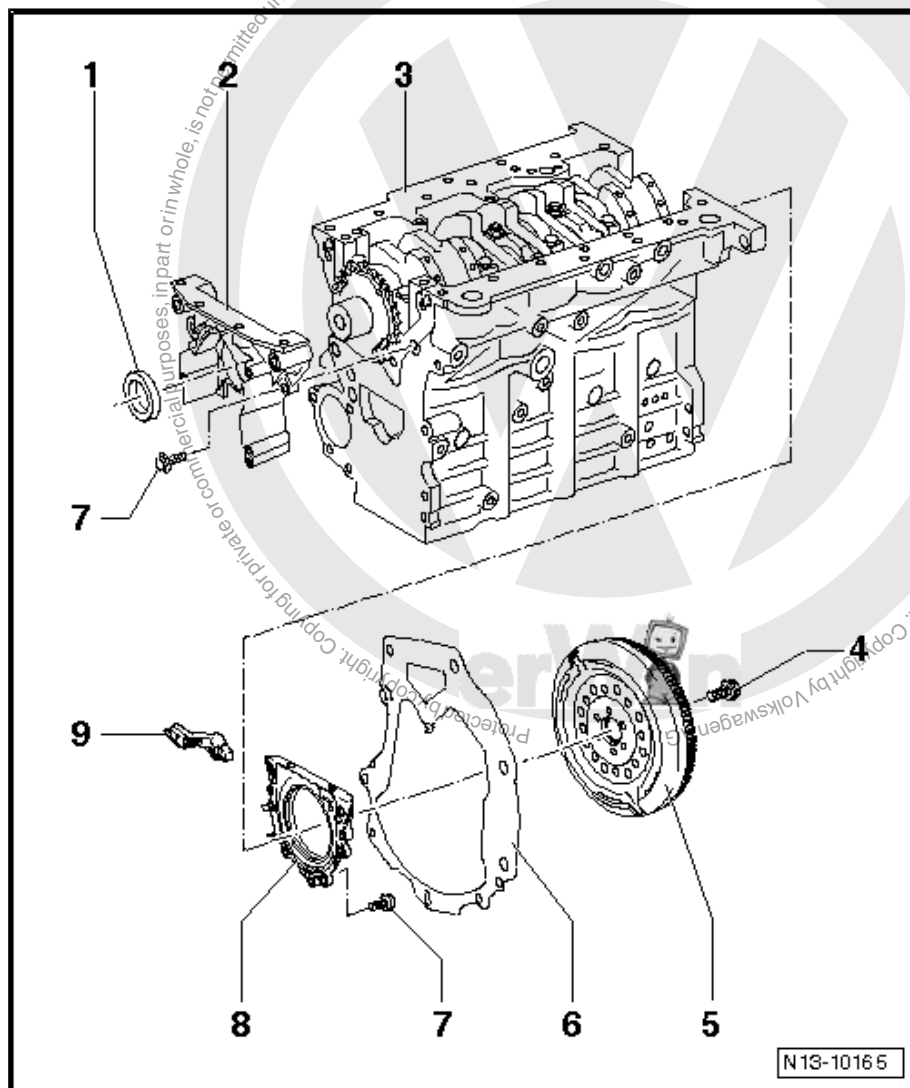
- ☐ Renew.

5 - Flywheel

- ☐ To loosen securing bolts, lock using counterhold -3067- .

6 - Intermediate plate

- ☐ Must be positioned on dowel sleeves.
- ☐ Do not damage or bend when assembling.





7 - 15 Nm

8 - Sealing flange with oil seal

- ☐ Removing and installing ⇒ [page 25](#) .
- ☐ With sender wheel for engine speed.
- ☐ Renew complete only.
- ☐ Do not additionally oil or grease the oil seal sealing lip.
- ☐ Before installing, remove oil residue from crankshaft journal using a clean cloth.
- ☐ Use support sleeve supplied when installing.

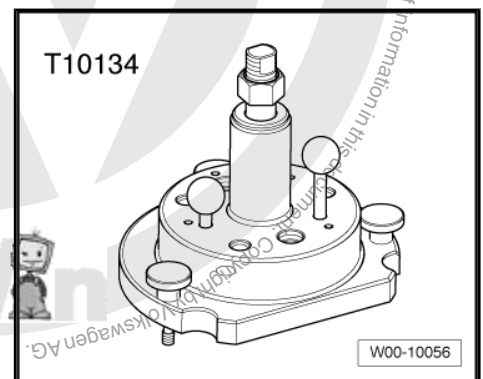
9 - Engine speed sender -G28-

- ☐ Removing and installing ⇒ [page 37](#) .

2.1 Renewing crankshaft sealing flange - flywheel end

Special tools and workshop equipment required

- ◆ Assembly tool -T10134-



- ◆ Torque wrench -V.A.G 1331-
- ◆ 24 mm tool insert -V.A.G 1332/11-
- ◆ Vernier gauge
- ◆ Three hexagon bolts M6 x 35 mm
- ◆ Two hexagon bolts M7 x 35 mm

2.1.1 Pressing out sealing flange with sender wheel

- Remove flywheel. ⇒ Rep. gr. 34 ; Removing and installing gearbox
- Remove flywheel.
- Remove intermediate plate.



- Rotate crankshaft as shown to TDC No. 1 cylinder.
- Remove sump.

Golf, Golf Plus, Touran ⇒ [page 89](#)

Passat ⇒ [page 117](#)



Note

- ◆ For the sake of clarity, the work is performed with the engine removed.
- ◆ The procedure is identical whether the engine is installed or removed.

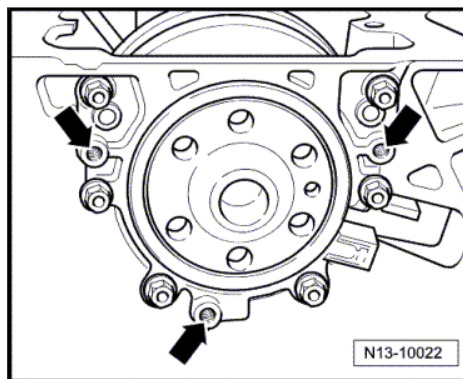
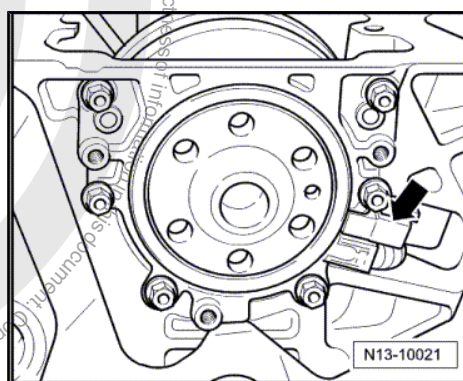
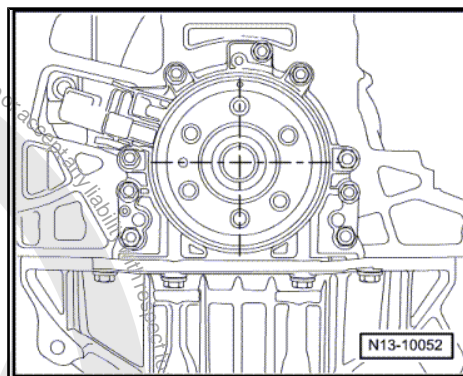
- Remove engine speed sender -G28- -arrow-.
- Unscrew sealing flange securing bolts.



Note

Sealing flange and sender wheel are pressed off the crankshaft together using three M6 x 35 mm bolts.

- Screw three M6 x 35 mm bolts into threaded holes -arrows- of sealing flange.
- Screw bolts alternately (max. $\frac{1}{2}$ turn (180°) for each bolt) into sealing flange and press sealing flange together with sender wheel off crankshaft.





2.1.2 Pressing in sealing flange with sender wheel



Note

- ◆ The sealing flange with a PTFE seal is equipped with a sealing lip support ring. This support ring serves as a fitting sleeve and must not be removed prior to installation.
- ◆ Sealing flange and sender wheel must not be separated or turned after removal from packaging.
- ◆ The sender wheel is held in its installation position on the assembly device -T10134- by a locating pin.
- ◆ Sealing flange and oil seal form one unit and must only be renewed together with the sender wheel.
- ◆ The assembly device -T10134- is held in its position relative to the crankshaft by a guide pin inserted into a hole in the crankshaft.

Assembly tool -T10134-

A - Clamping surface

B - Hexagon nut

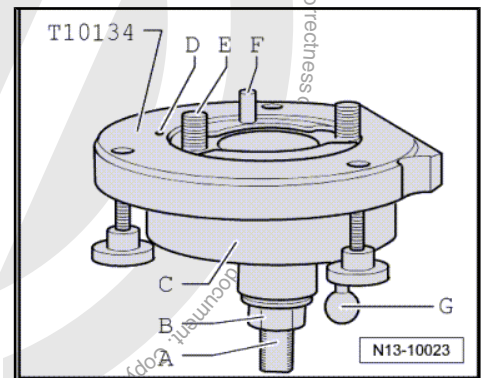
C - Assembly housing

D - Locating pin

E - Hexagon socket head bolt

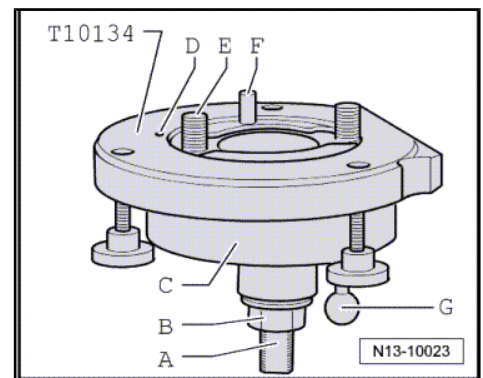
F - Guide pin for diesel engines (black knob)

G - Guide pin for petrol engines (red knob)



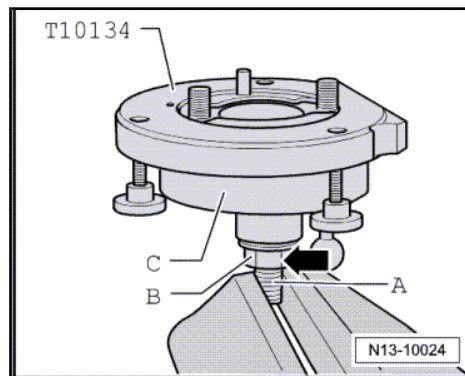
2.1.3 A - Assembling seal with sender wheel on assembly tool -T10134-

- Screw in hexagon nut -B- to just before clamping surface -A- of threaded spindle.





- Clamp assembly device -T10134- in a vice on clamping surface -A- of threaded spindle.
- Press assembly housing -C- downwards so that it lies on hexagon nut -B- -arrow-.
- Screw hexagon nut onto threaded spindle until inner part of assembly device and assembly housing are level.

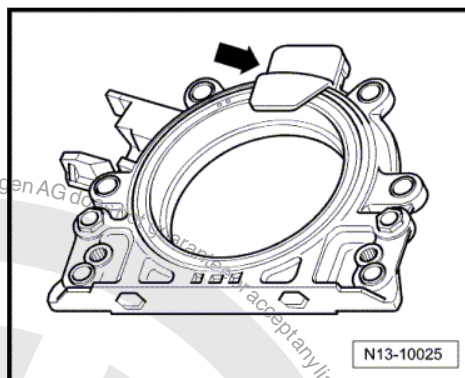


- Remove securing clip -arrow- from new sealing flange.

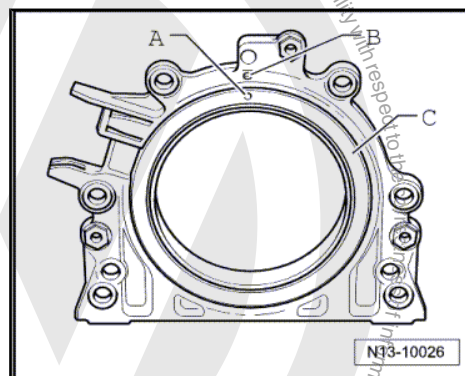


Note

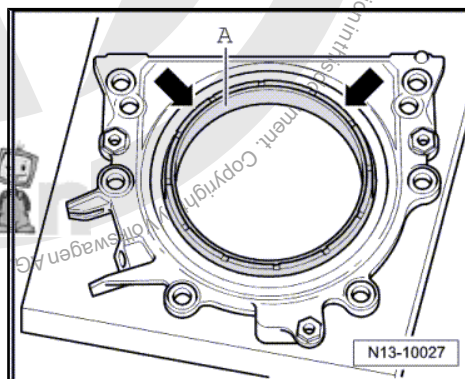
The sender wheel must not be taken out of the sealing flange or twisted.



- Locating hole -A- on sender wheel -C- must align with marking -B- on sealing flange.
- Place sealing flange with front side downwards on a clean flat surface.

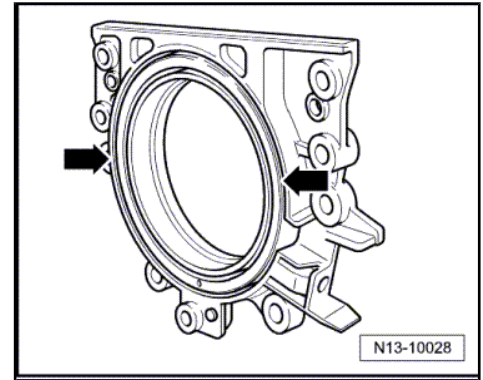


- Push sealing lip support ring -A- downwards in direction of arrow until it lies on flat surface.





- Upper edge of sender wheel and front edge of sealing flange must align -arrows-.

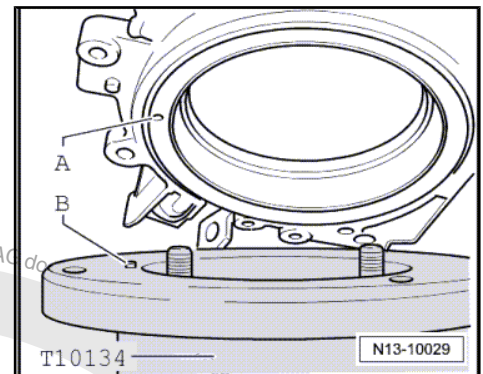


- Place sealing flange with front side on assembly tool -T10134- so that locating pin -B- can be inserted in sender wheel hole -A-.



Note

Ensure sealing flange lies flat on assembly device.

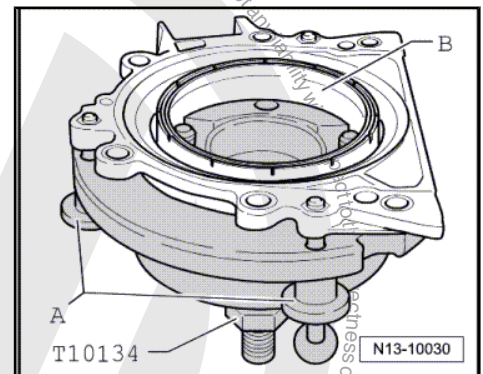


- Push sealing flange and support ring for sealing lip -B- against surface of assembly tool -T10134- whilst tightening the three knurled screws -A- so that locating pin cannot slide out of sender wheel hole.



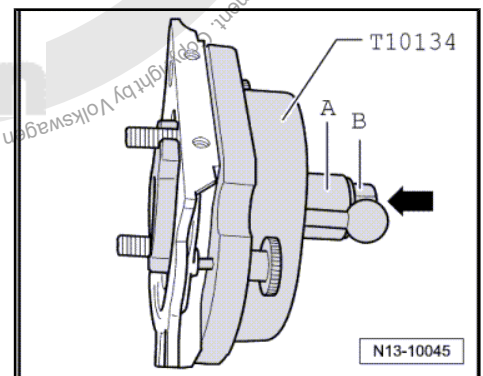
Note

When installing sealing flange, ensure that sender wheel remains fixed in assembly device.



2.1.4 B - Attaching assembling tool -T10134- with sealing flange on crankshaft flange

- Crankshaft flange must be free of oil and grease.
- Engine positioned at TDC No. 1 cylinder.
- Screw hexagon nut -B- to end of threaded spindle.
- Press threaded spindle of assembly tool -T10134- in direction of arrow, until hexagon nut -B- lies against assembly housing -A-.
- Align flat side of assembly housing on sump side of crankcase sealing surface.



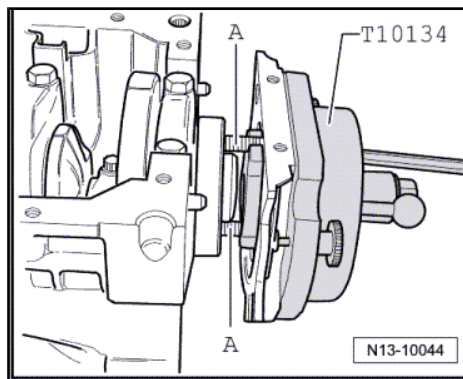


- Secure assembly tool -T10134- to crankshaft flange using hexagon socket head bolts -A-.

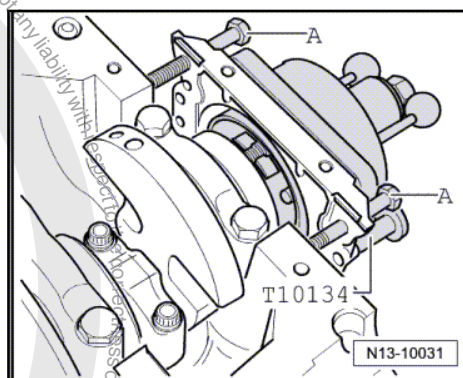


Note

Screw hexagon socket head bolts -A- into crankshaft flange (approx. 5 full turns).



- To guide sealing flange, screw two M7 × 35 mm bolts -A- into cylinder block.



2.1.5 C - Bolting assembly tool -T10134- onto crankshaft flange

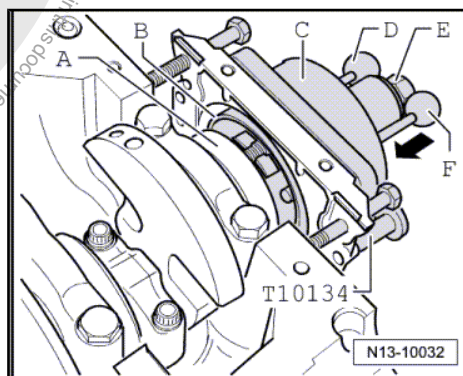
- Push assembly housing -C- by hand in direction of arrow until sealing lip support ring -B- contacts crankshaft flange -A-.
- Push guide pin for diesel engines (black knob) -D- into hole in crankshaft. This ensures that the sender wheel reaches its final installation position.



Note

The guide pin for petrol engines (red knob) -F- must not be inserted in threaded hole of crankshaft.

- Hand-tighten both hexagon socket head bolts of assembly tool.
- Screw hexagon nut -E- onto threaded spindle by hand until it lies on assembly housing -C-.





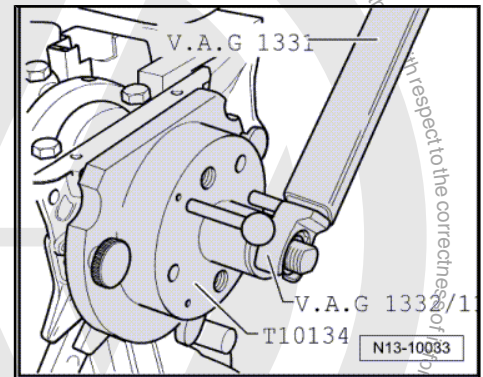
2.1.6 D - Pressing sender wheel onto crankshaft flange using assembly tool - T10134-

- Tighten hexagon nut of assembly tool -T10134- to 35 Nm using torque wrench -V.A.G 1331- and tool insert, 24 mm -V.A.G 1332/11- .



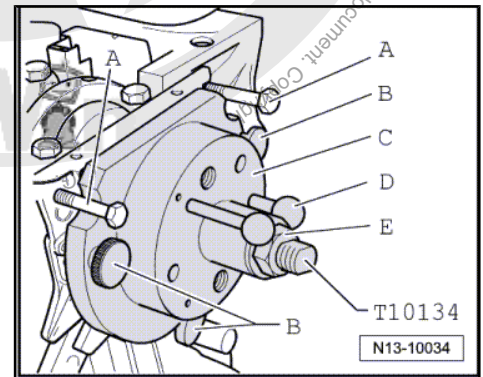
Note

After hexagon nut is tightened to 35 Nm, a small air gap must be present between cylinder block and sealing flange.

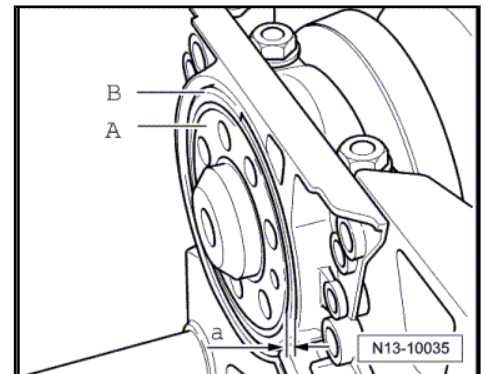


2.1.7 E - Checking sender wheel installation position on crankshaft

- Screw hexagon nut -E- to end of threaded spindle.
- Remove the two bolts -A- from cylinder block.
- Screw the three knurled screws -B- out of sealing flange.
- Remove assembly tool -T10134- .
- Remove sealing lip support ring.



- The sender wheel is in the correct installation position on the crankshaft if a gap -a- = 0.5 mm exists between crankshaft flange -A- and sender wheel -B-.



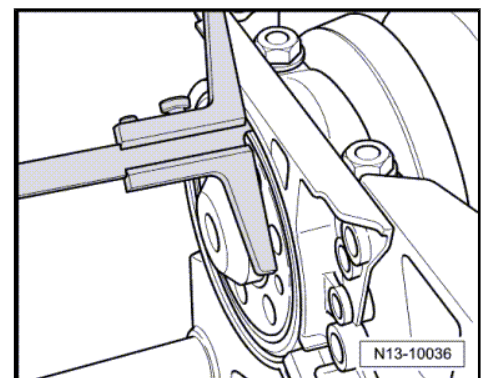
- Set vernier gauge on crankshaft flange.
- Measure distance -a- between crankshaft flange and sender wheel.

If measurement -a- is too small:

- Press sender wheel further. ➤ [page 32](#)

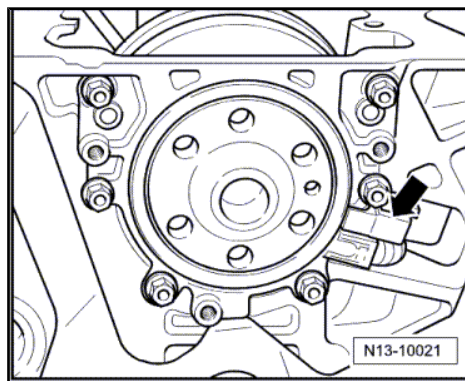
If dimension -a- is attained:

- Tighten new securing bolts for sealing flange to 15 Nm using alternate and diagonal sequence.



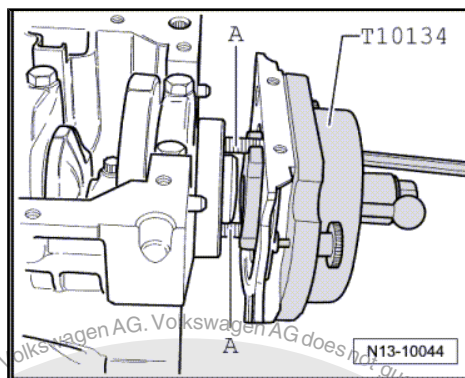


- Install engine speed sender -G28- -arrow- and tighten securing bolt to 5 Nm.
- Installing sump:
Golf, Golf Plus, Touran ➤ [page 89](#)
Passat ➤ [page 117](#)
- Install intermediate plate.
- Install flywheel using new bolts. Tighten securing bolts to 60 Nm +1/4 turn (90°).

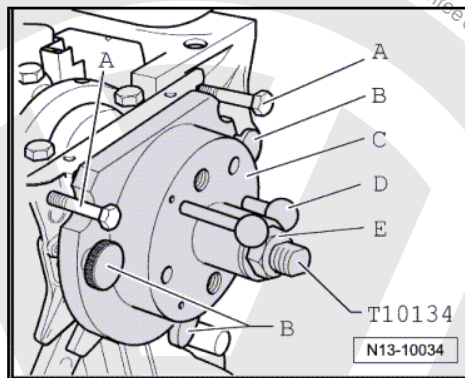


2.1.8 F - Re-pressing sender wheel

- Secure assembly tool -T10134- to crankshaft flange using hexagon socket head bolts -A-.
- Hand tighten both hexagon socket head bolts.
- Push assembly tool -T10134- by hand to sealing flange.



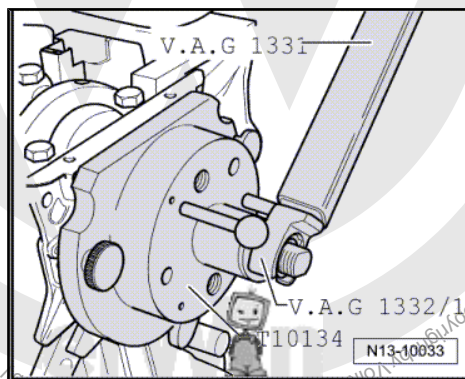
- Screw hexagon nut -E- onto threaded spindle by hand until it lies on assembly housing -C-.



- Tighten hexagon nut of assembly tool -T10134- to 40 Nm using torque wrench -V.A.G 1331- and tool insert, 24 mm -V.A.G 1332/11- .
- Check installation position of sender wheel on crankshaft again. ➤ [page 31](#)

If dimension -a- is too small again:

- Tighten hexagon nut for assembly tool -T10134- to 45 Nm.
- Check installation position of sender wheel on crankshaft again. ➤ [page 31](#)

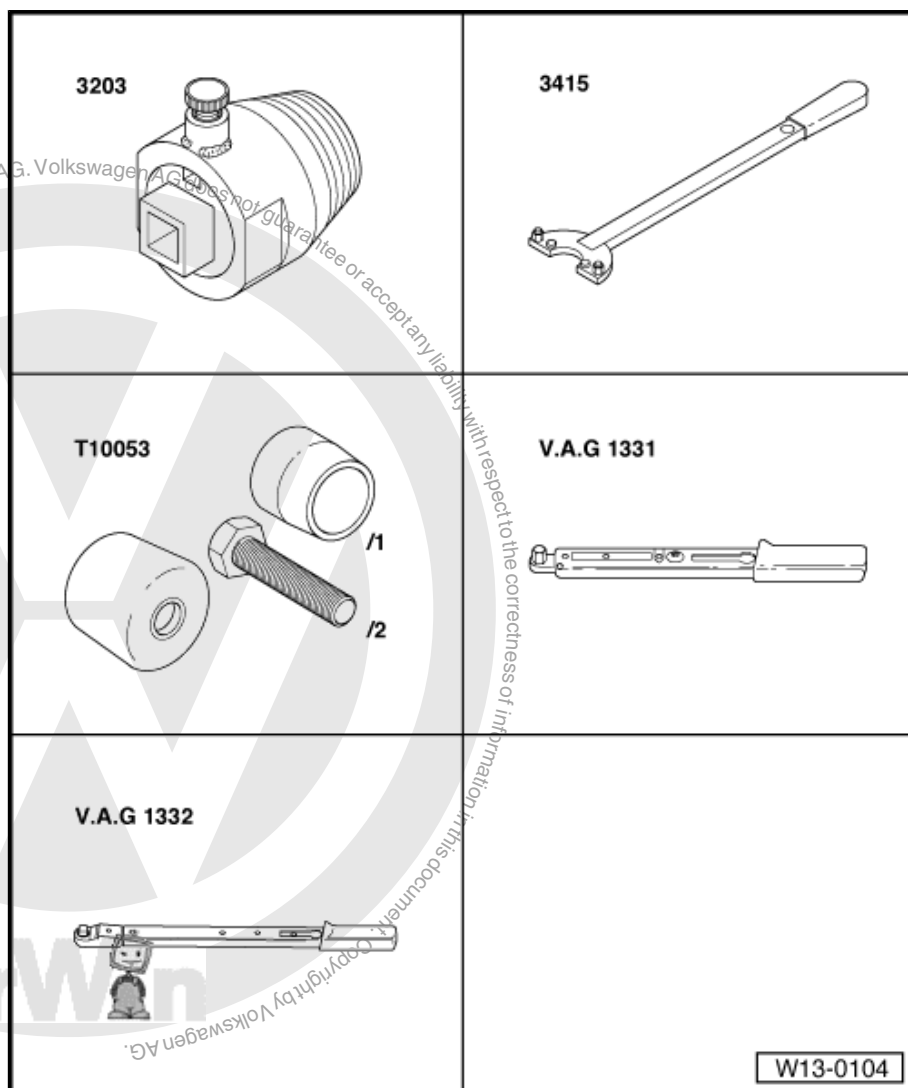




2.2 Renewing crankshaft oil seal - pulley end

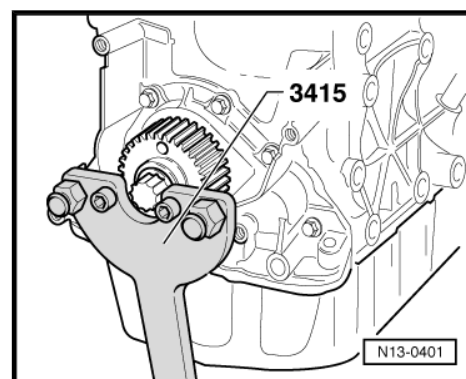
Special tools and workshop equipment required

- ◆ Oil seal extractor -3203-
- ◆ Counterhold tool -3415-
- ◆ Assembly tool -T10053-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



Removing

- Remove poly V-belt ➔ [page 16](#) .
- Remove toothed belt ➔ [page 51](#) .
- Remove crankshaft toothed belt pulley. To do this, lock toothed belt pulley using counterhold -3415- .
- To guide oil seal extractor -3203- , screw central bolt by hand into crankshaft to stop.
- Unscrew inner part of oil seal extractor two turns (approx. 3 mm) out of outer part and lock with knurled screw.
- Oil threaded head of oil seal extractor.





- Using great pressure, screw oil seal extractor as far as possible into seal.
- Loosen knurled screw and turn inner part against crankshaft until oil seal is pulled out.

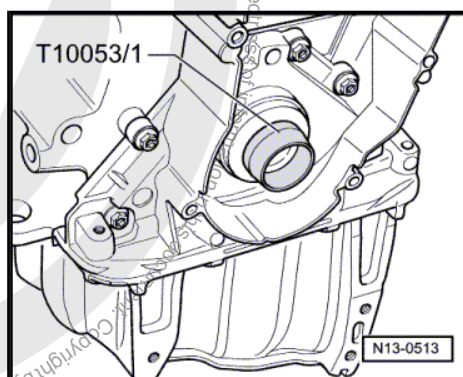
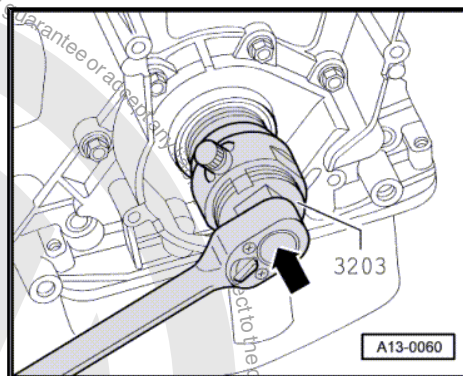
Installing



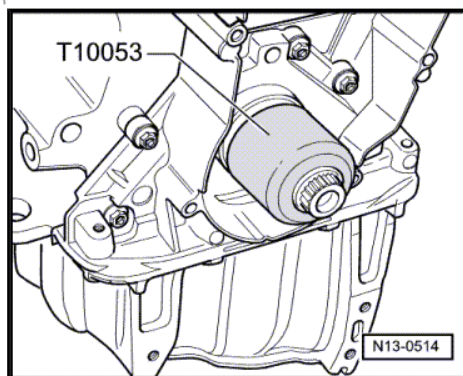
Note

The oil seal sealing lip must not be additionally oiled or greased.

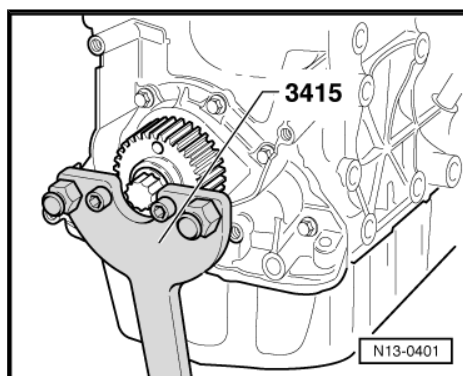
- Remove oil residue from crankshaft journal using clean cloth.
- Place guide sleeve -T10053/1- onto crankshaft journal.
- Slide oil seal over guide sleeve onto crankshaft journal.



- Press oil seal in to stop using assembly tool -T10053- and centre bolt.



- Install crankshaft toothed belt pulley. To do this, lock toothed belt pulley using counterhold -3415-.
- Specified torque of new centre bolt ⇒ [Item 19 \(page 18\)](#).
- Install toothed belt ⇒ [page 51](#).
- Install poly V-belt ⇒ [page 16](#).

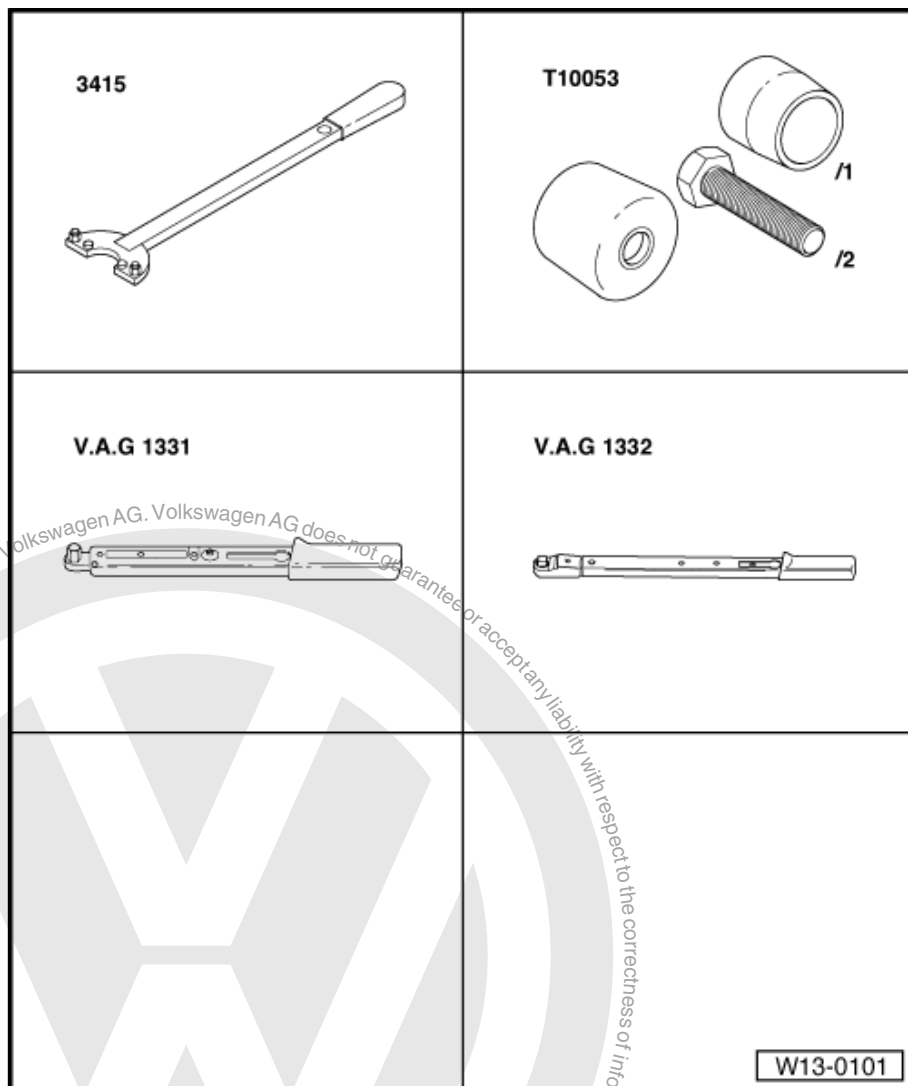




2.3 Removing and installing sealing flange - pulley end

Special tools and workshop equipment required

- ◆ Counterhold tool -3415-
- ◆ Assembly tool -T10053-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



Not illustrated:

Used oil collection and extraction unit -V.A.G 1782-

Silicone sealant -D 176 404 A-

Hand drill with plastic brush attachment

Flat scraper

Eye protection

Removing

- Remove poly V-belt ➔ [page 16](#) .
- Remove toothed belt ➔ [page 51](#) .



- Remove crankshaft toothed belt pulley. To do this, lock toothed belt pulley using counterhold -3415- .
- Disconnect right drive shaft at gearbox ➔ Rep. gr. 40 .
- Unscrew securing bolts on engine block for water pipe from supplementary heater.
- Remove sump.
Golf, Golf Plus, Touran ➔ [page 89](#)
Passat ➔ [page 117](#)
- Pull off front sealing flange.
- Remove sealing flange; if necessary, loosen by applying light blows with a rubber-headed hammer.
- Remove sealant residue from cylinder block using a flat scraper.



WARNING

Wear eye protection.

- Remove residual sealant from sealing flange using a plastic rotary brush.
- Clean sealing surfaces. They must be free of oil and grease.

Installing



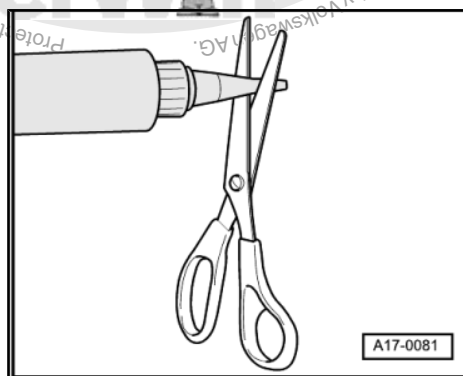
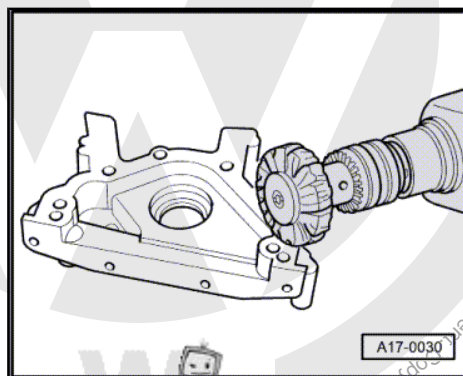
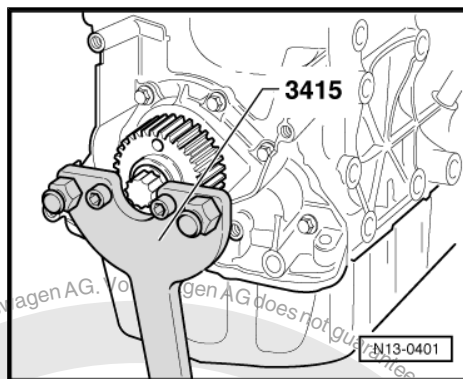
Note

- ♦ *Observe expiry date of sealing compound.*
- ♦ *The sealing flange must be installed within 5 minutes of applying the silicone sealant.*
- Cut off tube nozzle at forward marking (Ø of nozzle approx. 3 mm).



Note

- ♦ *The sealant bead must not be thicker than 2...3 mm, otherwise excess sealant could enter the sump. Excess sealant could drop onto the sealing surface of the crankshaft oil seal or block the strainer in the suction line of the oil pump.*
- ♦ *Before applying sealant bead, cover sealing surface of oil seal with a clean cloth.*





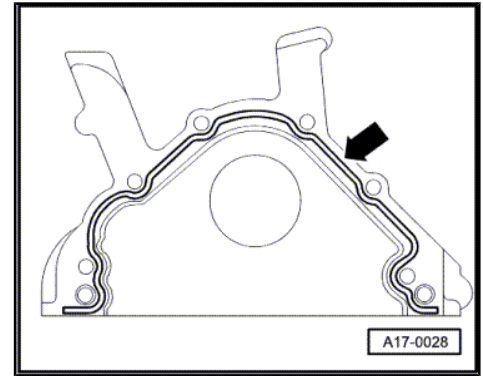
- Apply silicone sealant bead as shown to the clean sealing surface of sealing flange.
- Install sealing flange immediately and tighten all bolts lightly.



Note

When fitting sealing flange with oil seal installed use guide sleeve -T10053/1-.

- Tighten securing bolts for sealing flange to 15 Nm using alternate and diagonal sequence.
- Install crankshaft toothed belt pulley.
- Specified torque of new centre bolt ➔ [Item 19 \(page 18\)](#).
- Installing sump:
Golf, Golf Plus, Touran ➔ [page 89](#)
Passat ➔ [page 117](#)
- Install toothed belt ➔ [page 51](#).
- Install poly V-belt ➔ [page 16](#).



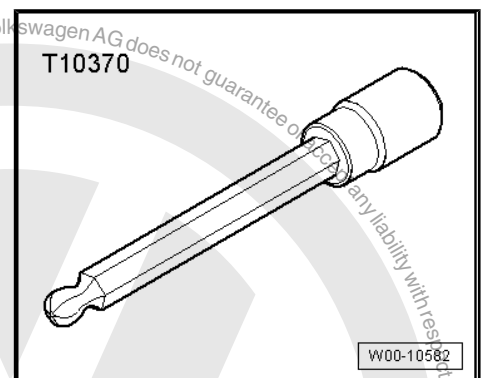
Note

Sealing compound must dry for approx. 30 minutes after installation. Only then fill with engine oil.

2.4 Removing and installing engine speed sender -G28-

Special tools and workshop equipment required

- ◆ Hexagon key extension, 4 mm -T10370-



- Remove insulation tray. ➔ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation.
- Clamp off coolant hoses at oil cooler using hose clamp and pull off hoses.
- Remove oil filter bracket.

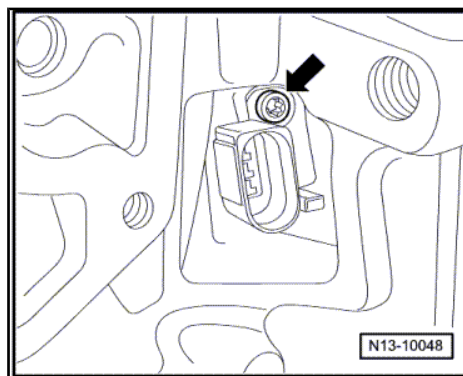


Note

If the securing bolt is a 5 mm Allen bolt (old version) use a commercially available 5 mm key with ball end. If necessary reduce key to a suitable length.

- Loosen securing bolt -arrow- using 4 mm socket -T10370- and pull out speed sender.

Installation is performed in the reverse order. Observe the following: specified torque for engine speed sender securing bolt is 5 Nm.





3 Pistons and conrods

Assembly overview - pistons and conrods ➔ [page 39](#) .

Piston and cylinder dimensions ➔ [page 40](#) .

Checking piston projection at TDC ➔ [page 40](#) .

Piston rings, cylinder bore and piston installation position
➔ [page 42](#)

3.1 Assembly overview - pistons and conrods

1 - Piston rings

- ☐ Offset gaps by 120°.
- ☐ Use piston ring pliers to remove and install.
- ☐ „TOP“ faces towards piston crown.
- ☐ Checking ring gap ➔ [page 42](#) .
- ☐ Checking ring-to-groove clearance ➔ [page 42](#) .

2 - Piston

- ☐ With combustion chamber.
- ☐ Mark installation position and cylinder number.
- ☐ Installation position and allocation of piston to cylinder ➔ [page 43](#) .
- ☐ Arrow on piston crown points to belt pulley end.
- ☐ Install using piston ring clamp.
- ☐ Cracks on piston skirt, renew piston.
- ☐ Checking piston projection at TDC ➔ [page 40](#) .

3 - Piston pin

- ☐ If difficult to remove, heat piston to 60 °C.
- ☐ Remove and install using drift -VW 222- .

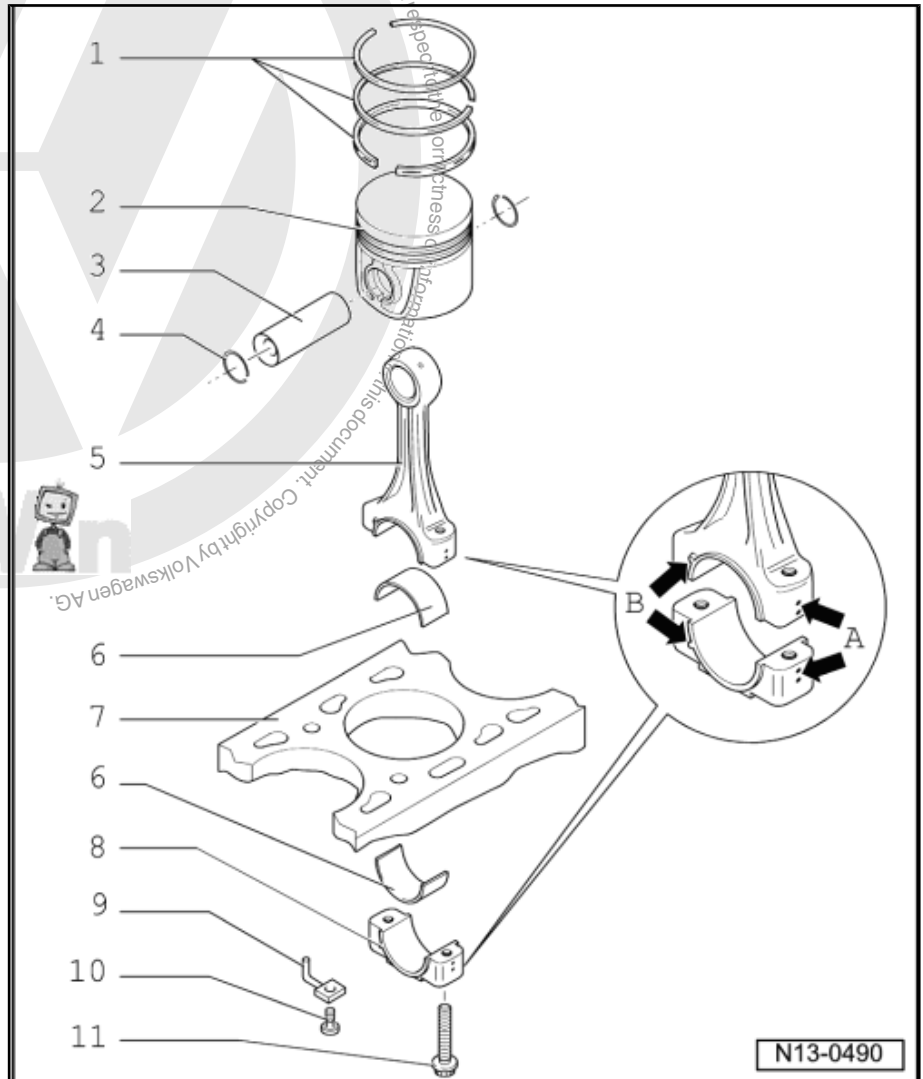
4 - Circlip

5 - Conrod

- ☐ Mark cylinder allocation -A- with coloured pen.
- ☐ Installation position: Marking -B- faces towards pulley end.
- ☐ With industrially cracked conrod cap.

6 - Bearing shell

- ☐ Note installation position.
- ☐ Note version: Upper bearing shell (towards piston) is made of a more wear resistant material. Identification: Black line on bearing surface in area of joint.
- ☐ Do not interchange used bearing shells.





- ☐ Insert bearing shells centrally.
- ☐ Check for secure seating.
- ☐ Axial clearance, wear limit: 0.37 mm
- ☐ Check radial clearance with Plastigage: Wear limit: 0.08 mm, do not rotate crankshaft when checking radial clearance.

7 - Cylinder block

- ☐ Checking cylinder bores ➔ [page 42](#) .
- ☐ Piston and cylinder dimensions ➔ [page 40](#) .

8 - Conrod bearing cap

- ☐ Note installation position.
- ☐ Caps fit only in one position and only on the corresponding conrod due to breaking procedure (cracking) for separating cap from conrod.

9 - Oil spray jet

- ☐ For piston cooling.

10 - 25 Nm

- ☐ Insert without sealant.

11 - Conrod bolt, 30 Nm + 1/4 turn (90°) further

- ☐ Renew.
- ☐ Oil threads and contact surface.
- ☐ Use old bolt for measuring radial clearance.

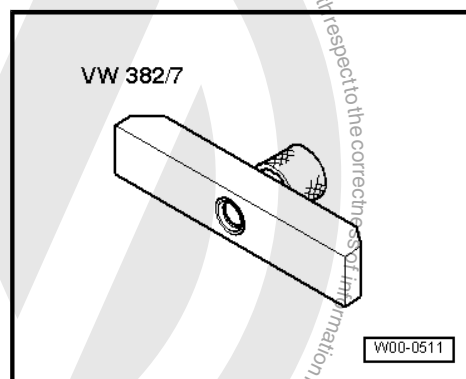
3.2 Piston and cylinder dimensions

		Piston Ø	Cylinder bore Ø
Basic dimension	mm	80.96	81.01

3.3 Checking piston projection at TDC

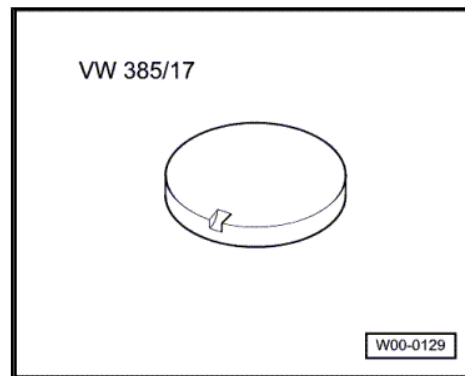
Special tools and workshop equipment required

- ◆ Measuring bridge -VW 382/7-





- ◆ End dimension plate -VW 385/17-



- ◆ Dial gauge

Test procedure

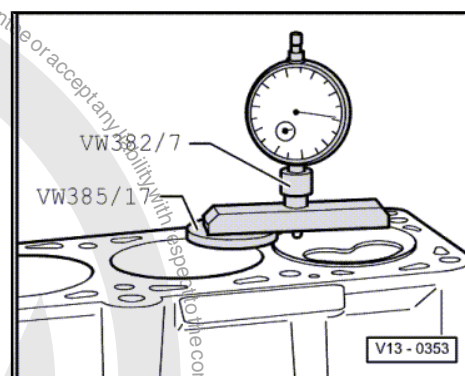
Piston projection at TDC must be measured when new pistons or a short engine is installed. Install the appropriate cylinder head gasket depending upon piston projection, according to following table:



Note

- ◆ Turn engine clockwise to measure piston projection at TDC.
- ◆ If different values are determined during the projection measurement, use the largest dimension for selecting the gasket.

Piston projection	Identification Holes/notches
0.91 mm ... 1.00 mm	1
1.01 mm ... 1.10 mm	2
1.11 mm ... 1.20 mm	3



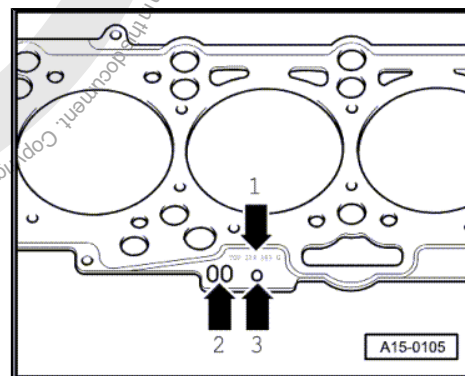
Cylinder head gasket identification

- ◆ Part No. = -arrow 1-
- ◆ Production control code = -arrow 2- (disregard)
- ◆ Holes = -arrow 3-
- ◆ Installation position: identification faces upwards.



Note

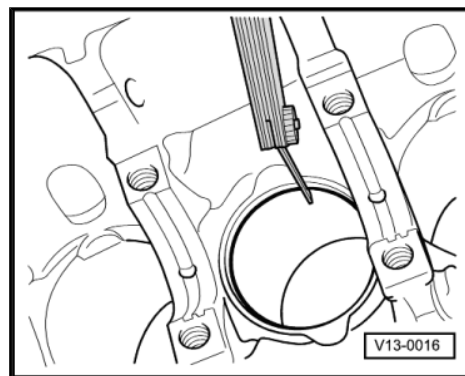
Different thicknesses of cylinder head gasket are fitted depending on the piston projection. When replacing cylinder head gasket, install a new gasket with same identification -arrow 3-.





3.4 Piston rings, cylinder bore and piston installation position

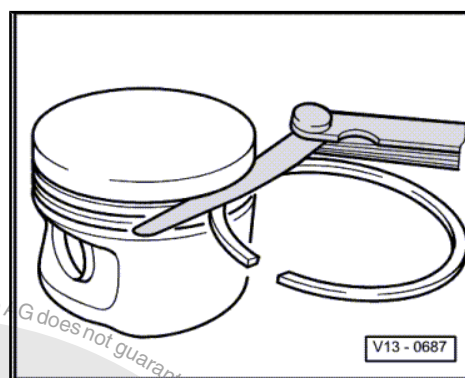
Checking piston ring gap



Special tools and workshop equipment required

- ◆ Feeler gauges
- Push piston ring squarely from above down to approx. 15 mm from bottom end of cylinder.

Piston ring dimensions in mm	New	Wear limit
1. compression ring	0.20...0.40	1.0
2. compression ring	0.20...0.40	1.0
Oil scraper ring	0.25...0.50	1.0

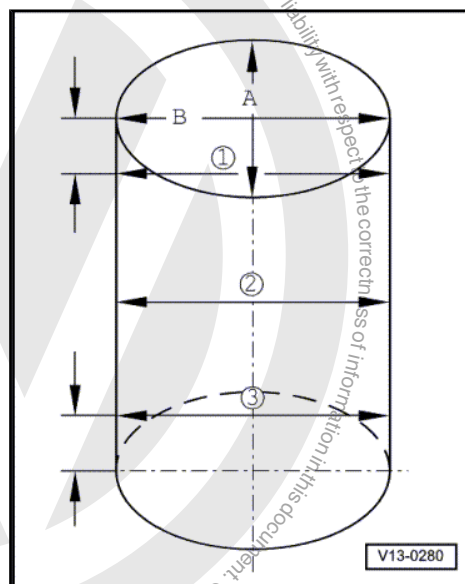


Checking ring-to-groove clearance

Special tools and workshop equipment required

- ◆ Feeler gauges
- Clean ring groove before checking.

Piston ring dimensions in mm	New	Wear limit
1. compression ring	0.06...0.09	0.25
2. compression ring	0.05...0.08	0.25
Oil scraper ring	0.03...0.06	0.15



Checking cylinder bores

Special tools and workshop equipment required

- ◆ Internal dial test indicator 50...100 mm
- Take measurements at 3 positions in both transverse -A- and longitudinal -B- directions, as illustrated. Difference between actual and nominal diameter max. 0.10 mm.

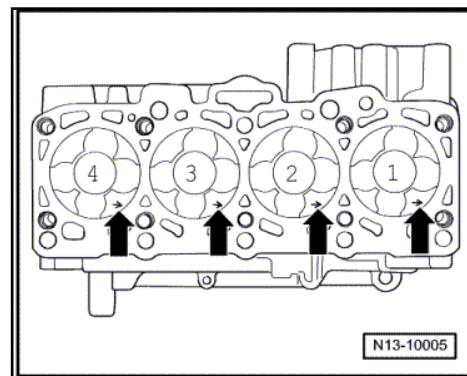


Note

Cylinder bores must not be measured when the cylinder block is secured to engine and gearbox support -VAS 6095/1- with universal mounting -VAS 6095- , as measurements may be incorrect.

Piston installation position and allocation of piston to cylinder

Arrow points towards No. 1 cylinder -arrows-.





4 Crankshaft

Assembly overview - crankshaft ➔ [page 44](#) .

Crankshaft dimensions ➔ [page 44](#) .

Pulling needle bearing out of and driving into crankshaft
➔ [page 45](#) .

4.1 Assembly overview - crankshaft

1 - Bearing shells 1, 2, 4 and 5

- ☐ For bearing cap without oil groove.
- ☐ For cylinder block with oil groove.
- ☐ Do not interchange used bearing shells (mark).

2 - 65 Nm + 1/4 turn (90°) further

- ☐ Renew.
- ☐ To measure radial clearance, tighten to 65 Nm but not further.

3 - Bearing cap

- ☐ Bearing cap 1: belt pulley end.
- ☐ Bearing cap 3 with recesses for thrust washers.
- ☐ Bearing shell retaining lugs in cylinder block and bearing caps must align.

4 - Bearing shell 3

- ☐ For bearing cap without oil groove.
- ☐ For cylinder block with oil groove.

5 - Thrust washer

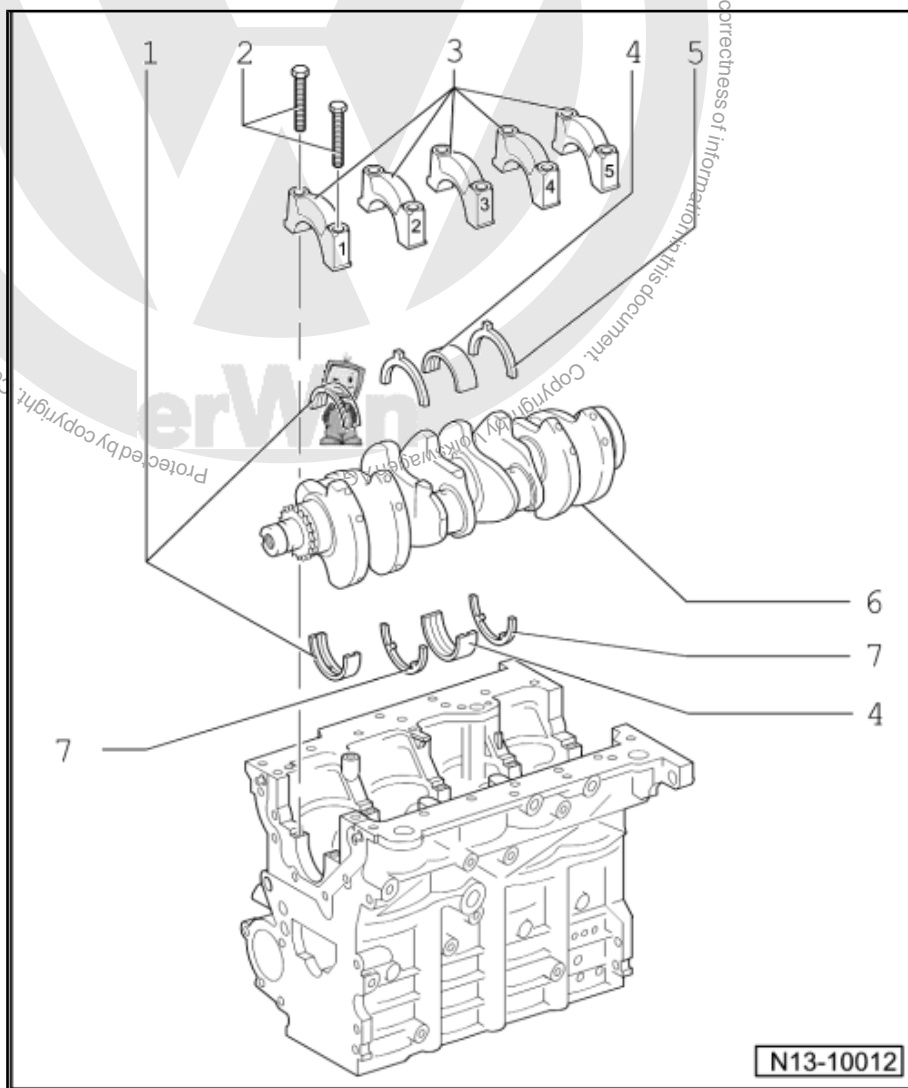
- ☐ For bearing cap 3.
- ☐ Note fixing arrangement.

6 - Crankshaft

- ☐ Axial clearance new: 0.07...0.17 mm, wear limit: 0.37 mm
- ☐ Check radial clearance with Plastigage new: 0.03...0.08 mm, wear limit: 0.17 mm
- ☐ Do not rotate crankshaft when checking radial clearance.
- ☐ Crankshaft dimensions ➔ [page 44](#) .

7 - Thrust washer

- ☐ For cylinder block, bearing 3



4.2 Crankshaft dimensions

(Dimensions in mm)



	Crankshaft main journal Ø		Conrod journal Ø	
Basic dimension	54.00	-0.022 -0.042	50.90	-0.022 -0.042

4.3 Pulling needle bearing out of and driving into crankshaft

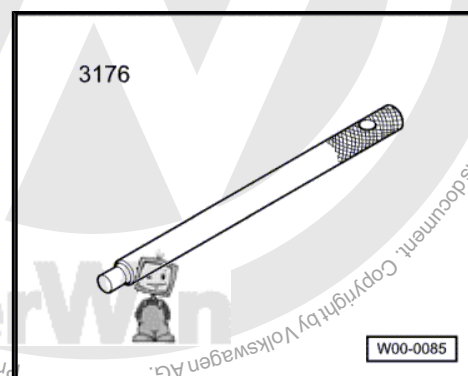
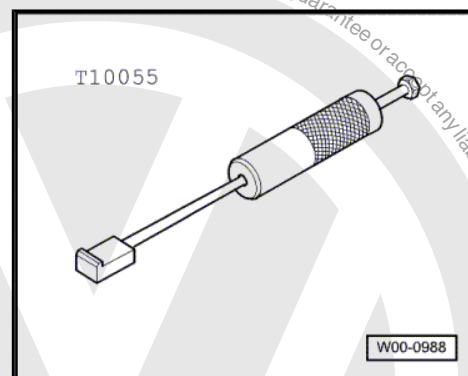
Vehicles with direct shift gearbox only

Special tools and workshop equipment required

◆ Puller -T10055-

◆ With adapter -T10055/3-

◆ Centring mandrel -3176-



◆ or drift -VW 207 C-

◆ Puller, e.g. Kukko -21/2-



Note

Vehicles with dual clutch gearbox, the needle bearing must be installed in rear end of crankshaft.



Removing

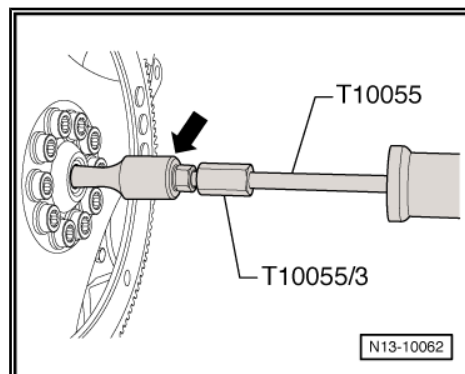
- Pull out using commercially available puller, e.g. Kukko 21/2 -arrow-, adapter -T10055/3- and puller -T10055- .

Installing

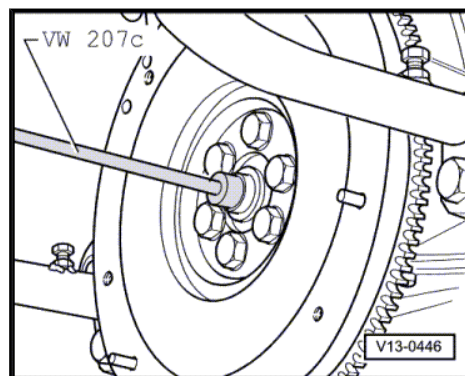


Note

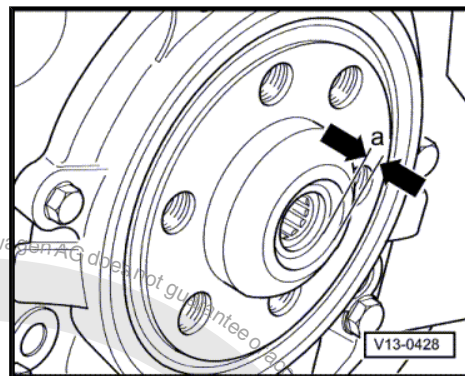
The lettering on the needle bearing must be visible when installed.



- Drive in with drift -VW 207 C- or centring mandrel -3176- .



Installation depth: dimension -a- = 2 mm.





15 – Cylinder head, valve gear

1 Cylinder head

Assembly overview - cylinder head ➔ [page 47](#) .

Removing and installing cylinder head cover ➔ [page 49](#)

Removing, installing and tensioning toothed belt ➔ [page 51](#) .

Removing and installing cylinder head ➔ [page 66](#) .

Checking compression ➔ [page 71](#)

1.1 Assembly overview - cylinder head



Note

- ◆ *The plastic protectors fitted to protect the open valves must be removed only immediately before the cylinder head is fitted.*
- ◆ *If the cylinder head is replaced, all the coolant in the system must also be renewed.*
- ◆ *Cracks between the unit injector holes and the valve seats are not critical and do not justify exchanging the cylinder head.*



1 - Toothed belt guard upper part

2 - Toothed belt

- ☐ Mark direction of rotation before removing.
- ☐ Check for wear.
- ☐ Do not kink.
- ☐ Removing and installing
⇒ [page 51](#) .

3 - 100 Nm

4 - 25 Nm

5 - Camshaft pulley

6 - Hub

- ☐ Use counterhold tool - T10051- to loosen and tighten.
- ☐ To remove, use puller - T10052- .
- ☐ Removing and installing
⇒ [page 79](#) .

7 - 10 Nm

8 - Cylinder head

- ☐ Removing and installing
⇒ [page 66](#) .
- ☐ After renewing, renew entire coolant.

9 - Cable channel

10 - 25 Nm

11 - Lifting eye

12 - Cylinder head cover gasket

- ☐ Renew if damaged.

13 - Cylinder head cover

- ☐ Before fitting, thoroughly clean sealing surface of cylinder head with clean cloth.
- ☐ Note sequence when tightening ⇒ [page 49](#) .

14 - Crankcase breather

15 - Seal

- ☐ Renew if damaged.

16 - Cap

- ☐ Renew seal if damaged.

17 - 10 Nm

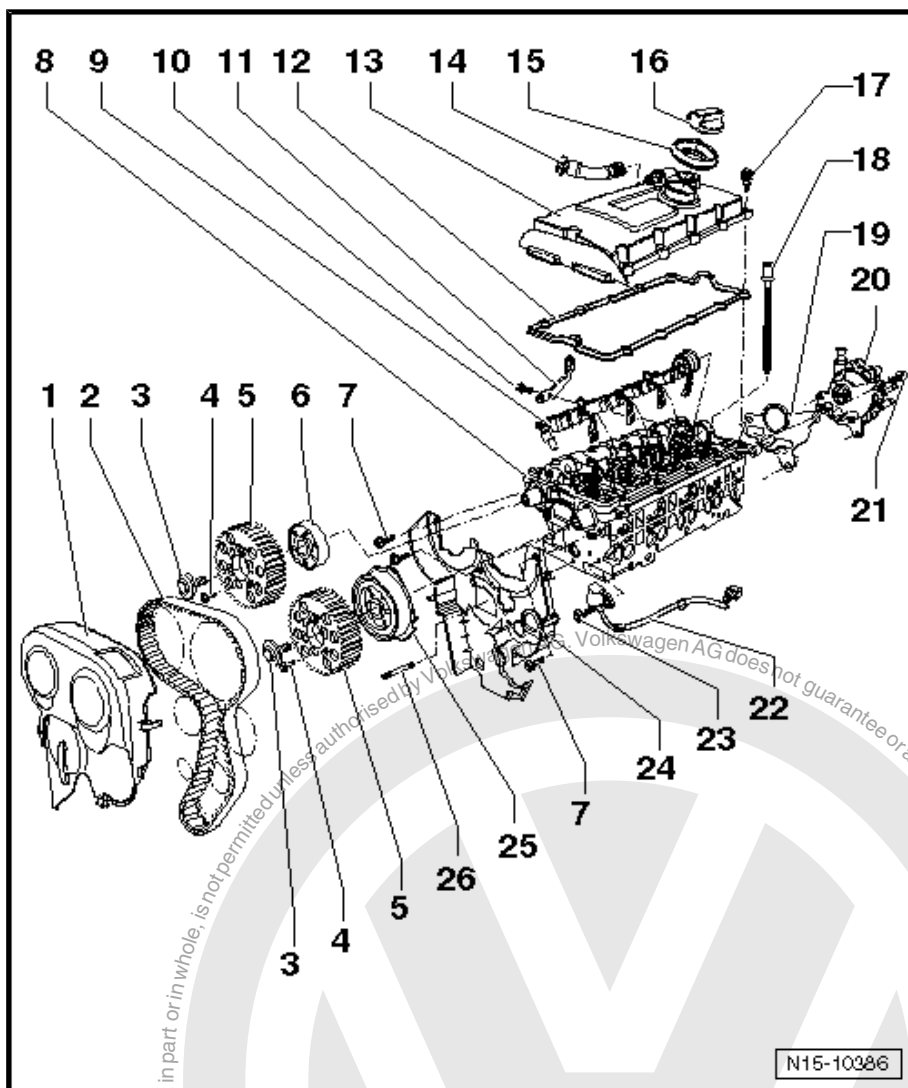
- ☐ Observe tightening sequence ⇒ [page 49](#) .

18 - Cylinder head bolt

- ☐ Observe sequence when loosening and tightening ⇒ [page 66](#) .
- ☐ Before installing, place washers in cylinder head ⇒ [Item 6 \(page 72\)](#) .

19 - Seal

- ☐ Renew.





20 - Tandem pump

- ☐ For fuel and vacuum supply.
- ☐ Check ⇒ [page 225](#) .
- ☐ Removing and installing ⇒ [page 227](#) .

21 - 20 Nm

22 - Hall sender -G40-

- ☐ For camshaft position.
- ☐ To remove and install, toothed belt must be removed from camshaft pulleys and idler roller must be released.

23 - 10 Nm

24 - Rear toothed belt guard

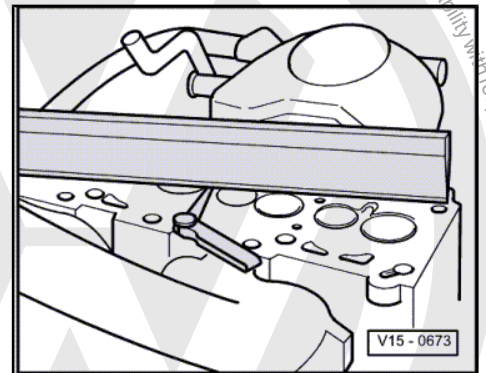
25 - Hub

- ☐ With sender wheel
- ☐ Use counterhold tool -T10051- to loosen and tighten.
- ☐ To remove, use puller -T10052- .
- ☐ Removing and installing ⇒ [page 79](#) .

26 - Stud, 10 Nm

- ☐ For tensioning roller.

Checking cylinder head for distortion



Special tools and workshop equipment required

- ◆ Straight edge
- ◆ Feeler gauges

Max. permissible distortion: 0.1 mm.



Note

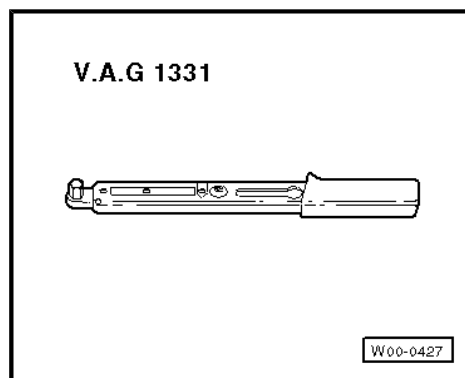
- ◆ *Reworking diesel cylinder heads is not permissible.*
- ◆ *Cracks between the unit injector holes and the valve seats are not critical and do not justify exchanging the cylinder head.*

1.2 Removing and installing cylinder head cover

Special tools and workshop equipment required



- ◆ Torque wrench -V.A.G 1331-

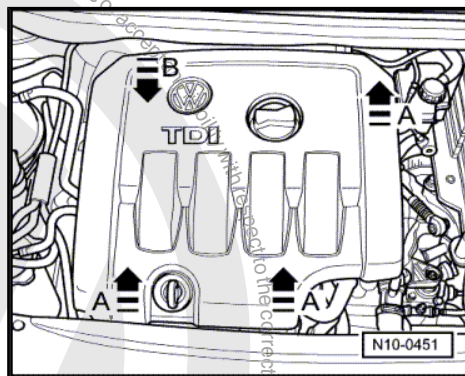


Removing

- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

- Remove upper toothed belt guard.
- Disconnect crankcase breather hose at union on rear of charge air pipe.
- Remove cylinder head cover.



Installing

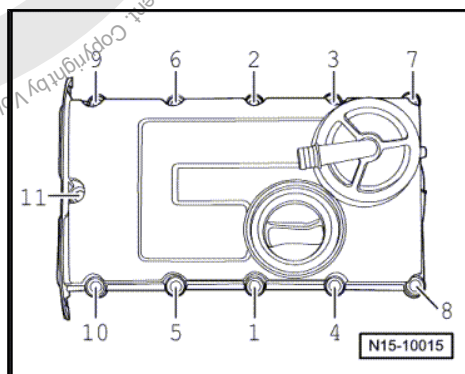
Install in reverse order. When doing this, note the following:



Note

Renew cylinder head cover gasket and bolts with seal if damaged.

- Screw on cylinder head cover hand-tight in the sequence 1 to 11.
- Tighten bolts to 10 Nm in the sequence 1 to 11.





1.3 Removing, installing and tensioning toothed belt



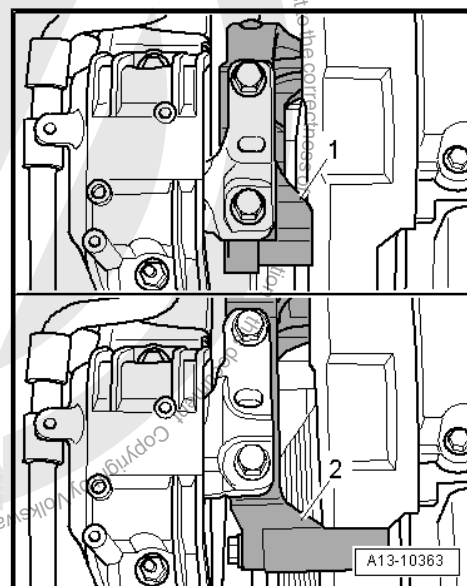
Note

From 05.06 a modified engine support (with less clearance to engine) has been introduced. For the procedure „removing, installing and tensioning toothed belt“ it is only necessary to remove the engine support and support the engine when changing the tensioning roller (e.g. type of service). The toothed belt can be removed and installed without removing the engine support.

- Determine which type of engine support is installed in the vehicle.

-1-: Engine support with less clearance to engine (removal necessary) ➔ [page 52](#) .

-2-: Engine support with greater clearance to engine (removal not necessary) ➔ [page 60](#)

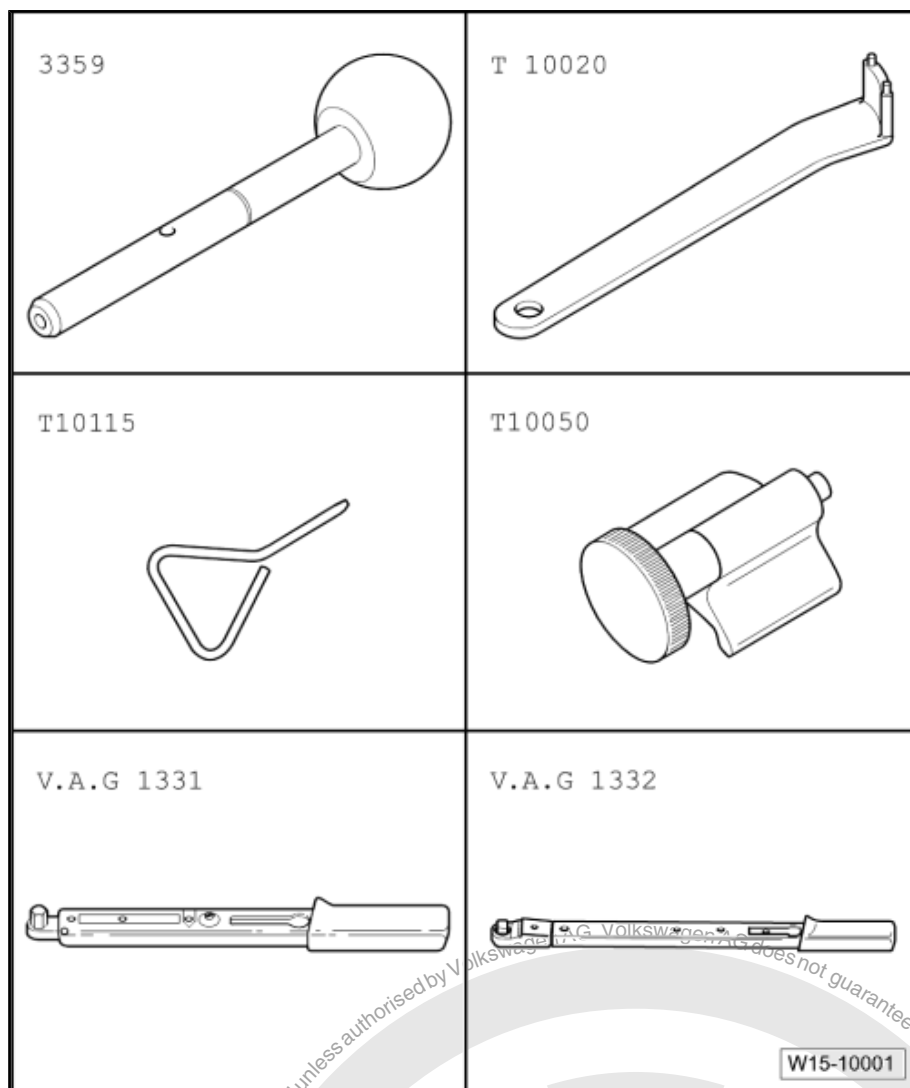




1.3.1 Removing and installing toothed belt (vehicles with engine support with less clearance to engine)

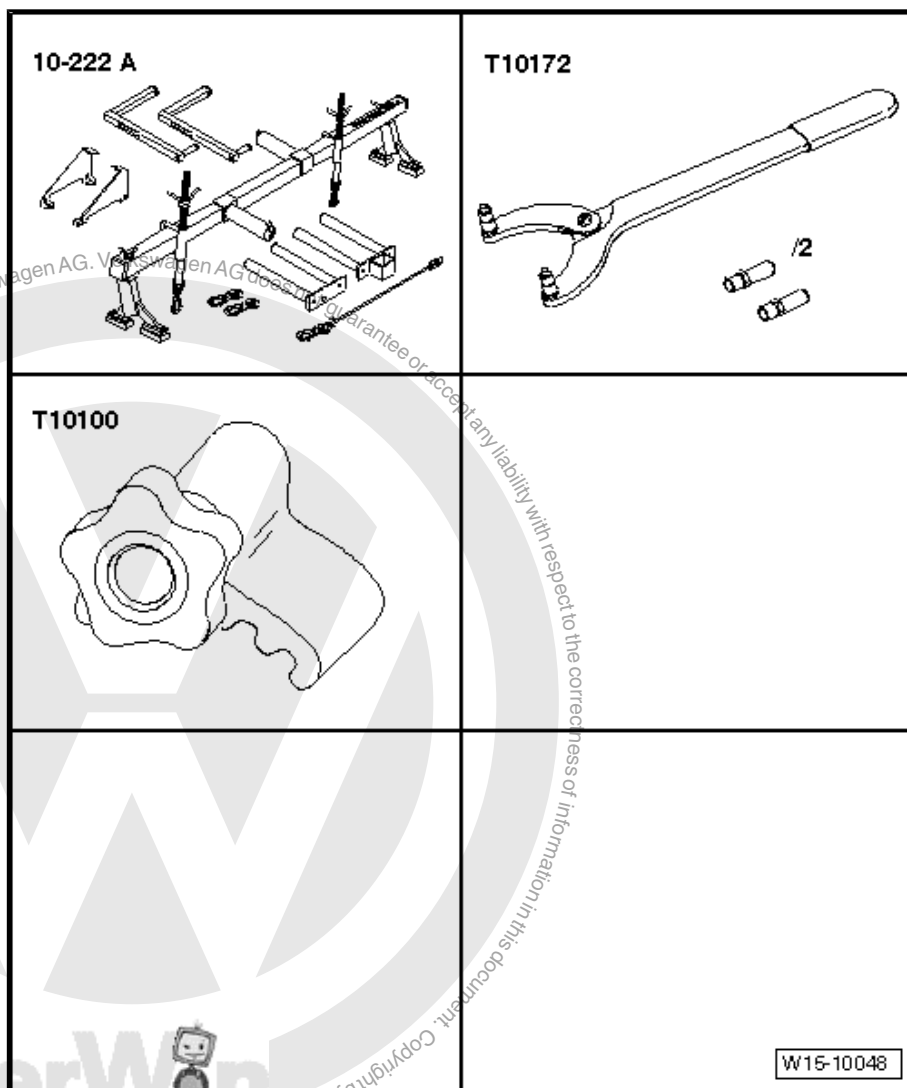
Special tools and workshop equipment required

- ◆ Locking pin -3359-
- ◆ 2-hole pin wrench -T10020-
- ◆ Locking pin -T10115-
- ◆ Crankshaft stop -T10050-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-





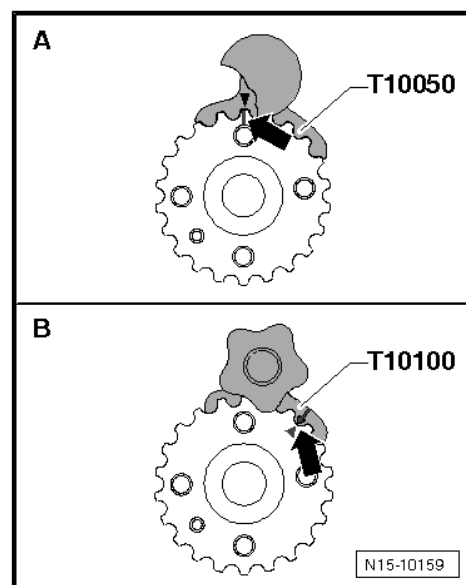
- ◆ Support bracket -10-222A- with adapters -10-222A/22- (for Golf, Golf Plus and Touran) or adapters -10-222A/1- (for Passat)
- ◆ Counterhold tool -T10172- with pins -T10172/4-
- ◆ Crankshaft stop -T10100- for vehicles with oval crankshaft belt pulley



Note

Gradual introduction of oval crankshaft toothed belt pulleys. When installing this toothed belt pulley, the crankshaft stop - T10100- must be installed to determine the TDC position.

Characteristics of crankshaft belt pulley





Note

From model year 2004, a new toothed belt tensioner is installed. The tensioner has an additional hexagon hole -arrow-. To tension and release toothed belt, use Allen key instead of pin wrench - T10020-. This does not alter the procedure.

Removing



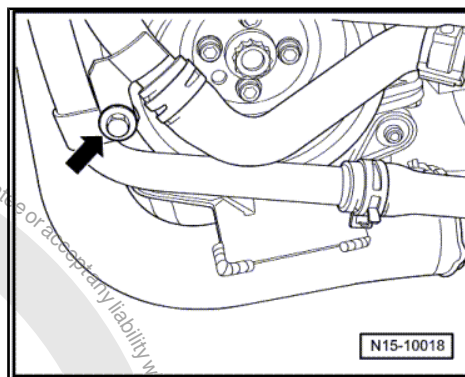
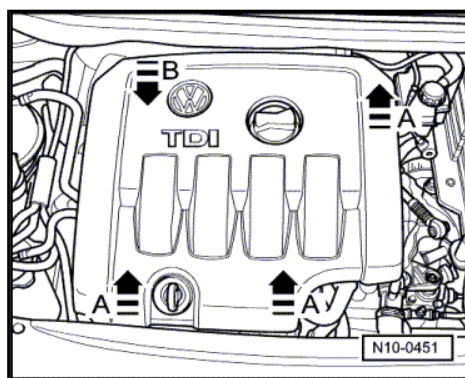
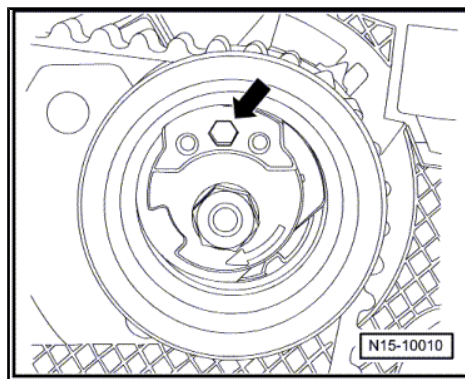
Note

Adjustment work on toothed belts must be performed only on cold engines, as the indicator position on the tensioning element varies depending on the engine temperature.

- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

- Remove poly V-belt ➔ [page 16](#) .
- Remove poly V-belt tensioning element.
- Remove upper toothed belt guard.
- Remove front right wheel housing liner.
- Remove exhaust pipe from auxiliary heater.
- Loosen connecting bolt for coolant pipe -arrow-.
- Remove charge air pipe between charge air cooler and turbo-charger.
- Carefully cover or seal open ends.
- Remove vibration damper/belt pulley.
- Remove lower and centre toothed belt guards
- Turn crankshaft to TDC No. 1 cylinder.





i Note

Turn crankshaft until marking on crankshaft pulley and tooth segments of camshaft pulleys are on top. Marking on toothed belt guard must align with camshaft sender wheel -arrows-.

- Lock crankshaft toothed belt pulley with crankshaft stop - T10050 bzw. T10100-. To do this, push crankshaft stop into teeth of belt pulley from face side.

i Note

The marks on the crankshaft toothed belt pulley and the crankshaft stop must align. When doing this, the pin of the crankshaft stop must insert in the drilling of the sealing flange.

- Separate push-on connectors of fuel lines -arrows-.

i Note

- ◆ Do this by pressing in catch of push-on connectors.
- ◆ Ensure that no fuel escapes (use a cloth).

- Lay fuel filter with hoses to side.
- Disconnect coolant hose from top of expansion tank.
- Remove expansion tank and lay it to side.

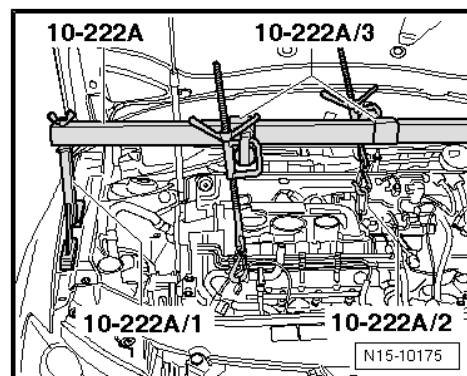
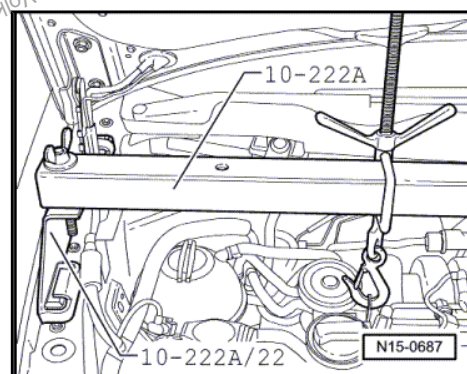
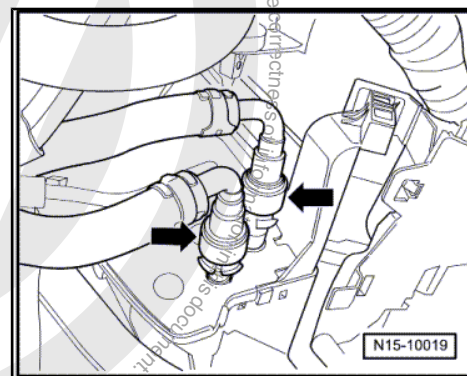
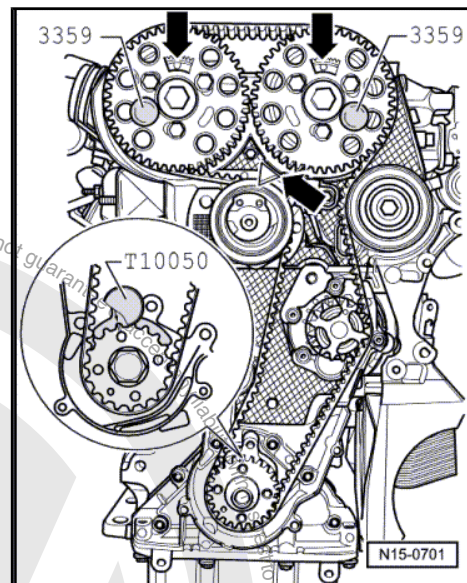
Golf, Golf Plus and Touran:

- Fit engine support bracket -10-222A- with adapters -10-222A/22- and take up weight of engine in installation position.

Passat:

- Set up support bracket -10-222A- with legs -10-222A/1- and support engine in installation position, as shown.

Continuation for all vehicle types:





- Remove securing bolts from assembly mounting/engine support -arrows- and remove complete assembly mounting.



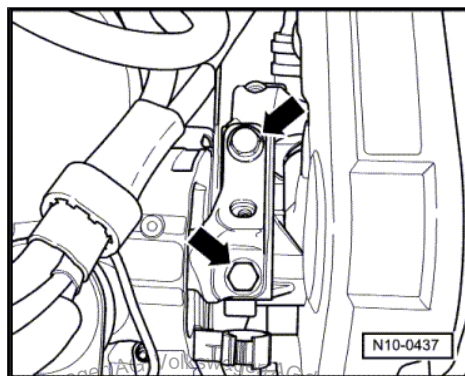
Note

- ♦ *The assembly mounting may only be removed if the engine is supported with support bracket 10-222A!*
- ♦ *The engine support must only be loosened when the assembly mounting has been removed.*



WARNING

When raising and lowering engine using support bracket -10-222A-, ensure that no components or hoses are damaged, strained or torn off.



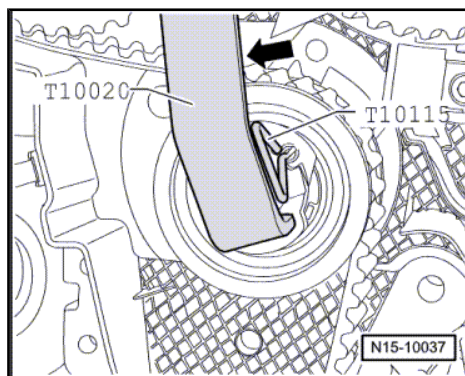
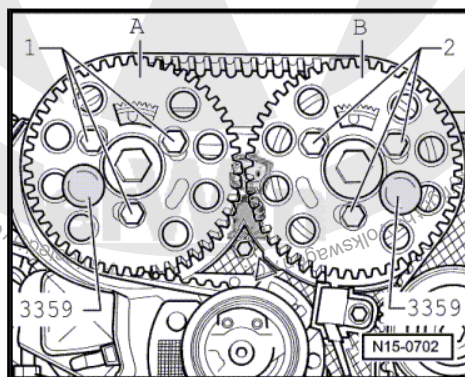
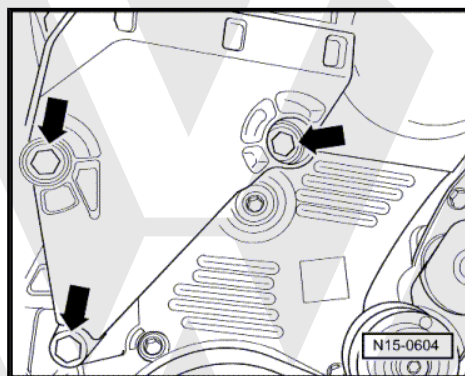
- Raise engine with support bracket -10-222A- until both upper bolts of engine support can be loosened and removed.
- Lower engine with support bracket -10-222A- until lower bolt can be loosened and removed.



Note

The engine support can be removed only when toothed belt is slack.

- Mark direction of rotation of toothed belt.
- Loosen camshaft pulley securing bolts -1 and 2- until camshaft pulleys can be turned in elongated holes.
- Lock hubs using locking pin -3359-. To do this, slide locking pins through outer free elongated holes into holes in cylinder head.
- Loosen tensioning roller securing nut.
- Turn pin wrench -T10020- anti-clockwise until toothed belt tensioning roller can be locked with locking pin -T10115-.





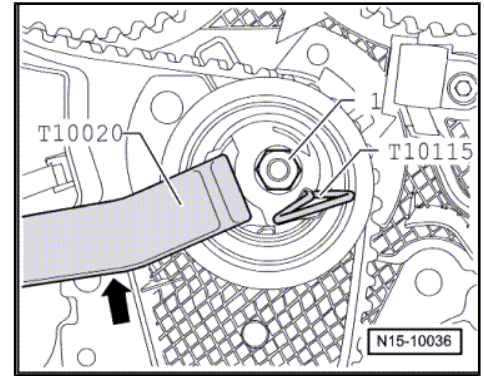
- Now turn pin-wrench clockwise to stop and tighten securing nut -1- hand-tight.
- Remove engine support downwards.
- Remove toothed belt first from coolant pump and then from remaining pulleys.

Installing



Caution

Strictly follow the procedure described here. If, for example, the final check is not performed and the locking tool is not fitted again, there is a danger that the timing is not correctly adjusted and the vehicle will exhibit engine running problems and rough idling.



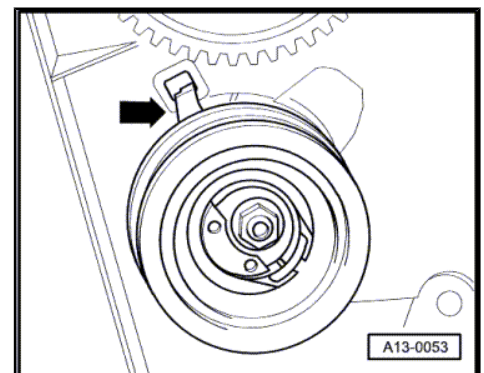
Note

- ♦ **Adjustment work on toothed belts must be performed only on cold engines, as the indicator position on the tensioning element varies depending on the engine temperature.**
- ♦ **Specified torques ➔ [page 18](#) .**
- Tensioning roller must be locked with locking pin -T10115- and secured to right stop.
- Camshafts are locked using diesel injection pump locking pin -3359- .
- Crankshaft is locked using crankshaft stop -T10050 bzw. T10100- .
- Turn camshaft pulleys in their elongated holes clockwise to stop.
- Fit toothed belt to crankshaft pulley, tensioning roller and camshaft pulley and idler roller.
- Then fit toothed belt on coolant pump toothed belt pulley.
- Install engine support from below and insert lower securing bolt.
- Raise engine with support bracket -10-222A- until indicator of tensioning roller can be seen.
- Loosen tensioning roller securing nut and pull out locking pin -T10115- .



Note

Ensure that tensioning roller seats correctly in rear toothed belt guard -arrow-.





- Now carefully turn tensioning roller clockwise using pin wrench until indicator is in middle of gap in base plate -arrow-.

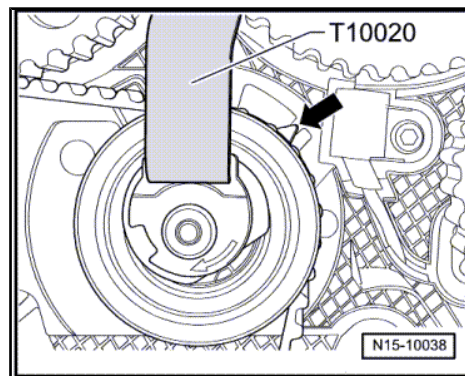
Ensure that securing nut does not turn as well.

- Hold tensioning roller in this position and tighten tensioning roller securing nut as follows: 20 Nm and 45° (1/8 turn) further.



Note

When securing nut is tightened, indicator will turn maximum 5 mm to right out of base plate notch. This setting must not be corrected because the toothed belt will settle after it has run a while.

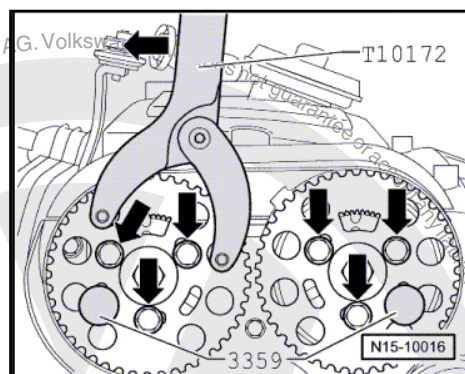


- Apply counterhold -T10172- as shown. Press counterhold -T10172- in direction of arrow keeping camshaft pulley under tension.

- In this position, tighten camshaft pulley securing bolts -arrows- to 25 Nm.

- Remove locking pins -3359- and crankshaft stop -T10050 bzw. T10100- .

- Turn crankshaft at least two rotations in engine direction of rotation and set again to just before TDC No. 1 cylinder.



- Lock hub -A- by turning in engine direction of rotation until locking pin -3359- engages whilst turning.

- Check whether:

- ◆ Hub -B- can be locked using locking pin -3359- .
- ◆ Crankshaft can be locked in position with crankshaft stop -T10050 bzw. T10100- .
- ◆ Tensioning roller indicator is centred or maximum 5 mm to right of base plate notch.

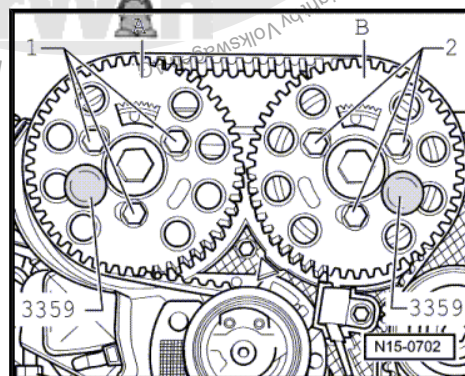
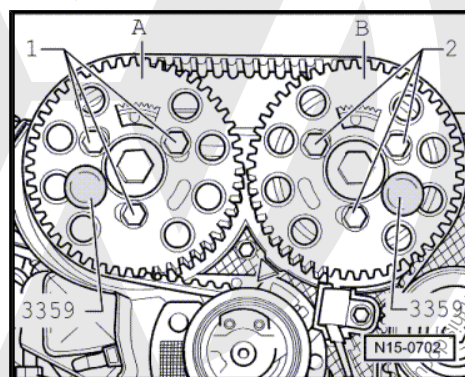
If the hub -B- cannot be locked:

- Loosen camshaft pulley -A- securing bolts -1-.

- Hub -A- must be locked using locking pin -3359-.

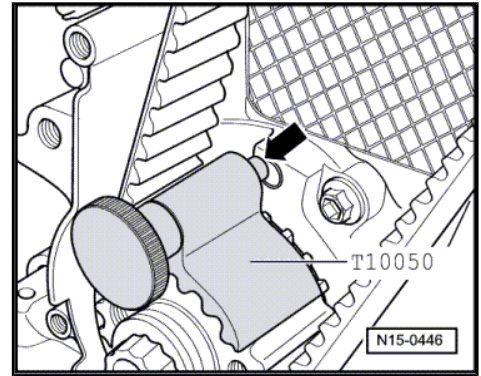
- Turn crankshaft until hub of camshaft pulley -B- can be locked using locking pin -3359- .

- Loosen camshaft pulley -B- securing bolts -2-.

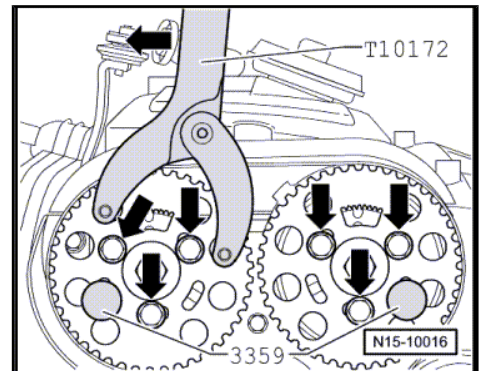




- Turn crankshaft slightly against engine direction of rotation until the pin of the crankshaft stop is positioned just before the hole in the sealing flange -arrow-.
- Now turn crankshaft in engine direction of rotation until crankshaft stop pin engages in sealing flange whilst turning.



- Apply counterhold -T10172- as shown. Press counterhold -T10172- in direction of arrow keeping camshaft pulley under tension.
- In this position, tighten camshaft pulley securing bolts -arrows- to 25 Nm.
- Remove locking pins -3359- and crankshaft stop -T10050 bzw. T10100- .
- Turn crankshaft at least two rotations in engine direction of rotation and set again to just before TDC No. 1 cylinder.
- Repeat check.



- Tighten bolts for engine support in the sequence shown -1...3- to 40 Nm + 1/2 turn (180 °) further. To do this, raise or lower engine using support bracket -10 - 222 A- .

I: Engine support with less clearance to engine

II: Engine support with greater clearance to engine

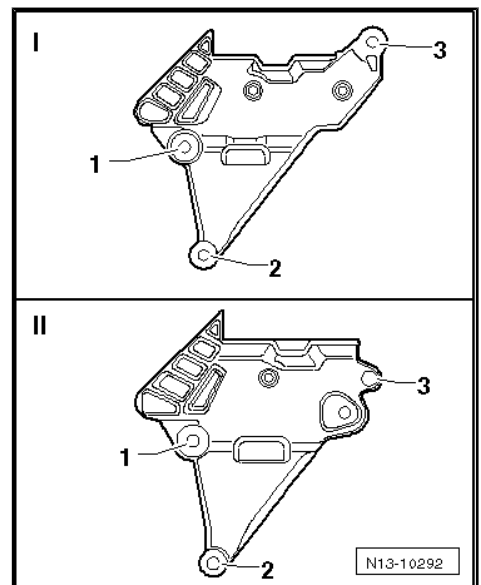
- Install centre and lower parts of toothed belt guard.
- Install belt pulley vibration damper: specified torque 10 Nm + 90° (1/4 turn) further.



Note

Before installing assembly mounting, tighten all engine support bolts to prescribed torque.

- Install assembly mounting between engine and body (renew securing bolts) ➔ [page 14](#) .

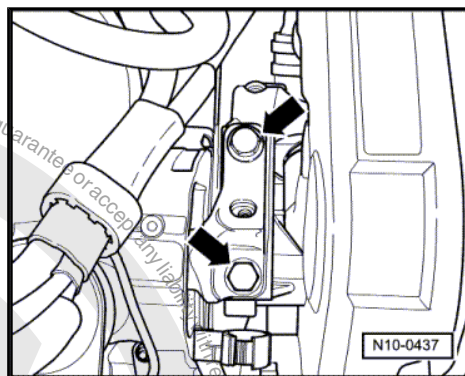




- Bolt engine assembly mounting to engine support -arrows- by bringing contact surfaces together using support bracket -10-222A-. Specified torque: 60 Nm + 90° (1/4 turn) further
- Install lower part of toothed belt guard.
- Install poly V-belt tensioning element: specified torque 25 Nm.
- Install poly V-belt ⇒ [page 16](#) .

Further assembly is basically the reverse of the dismantling sequence. In the process, note the following:

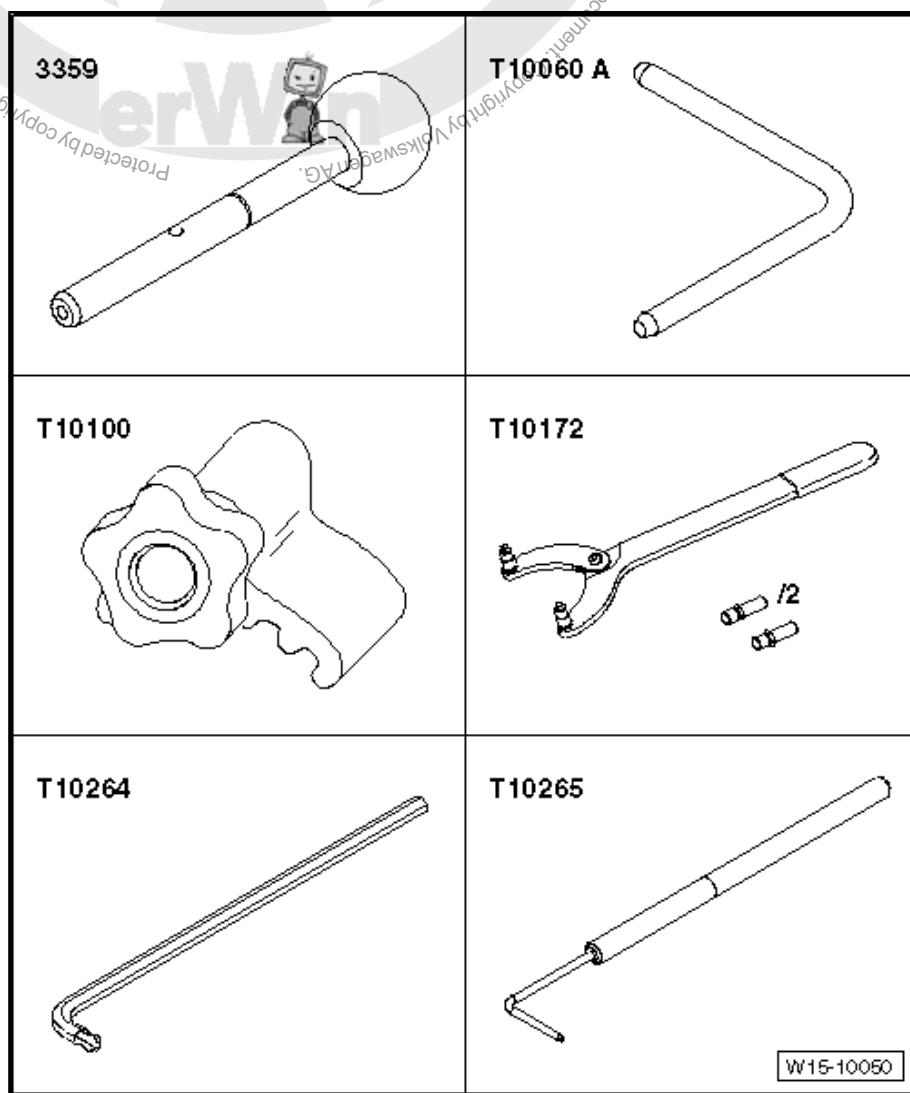
- ◆ Ensure that fuel hose connections are tight.
- ◆ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ◆ When installing charge air pipes, ensure that locking lugs engage correctly.
- Install wheel housing liner.
- Install noise insulation tray. ⇒ General body repairs, exterior; Rep. gr. 50; Body - front; Assembly overview - noise insulation .



1.3.2 Removing and installing toothed belt (vehicles with engine support with greater clearance to engine)

Special tools and workshop equipment required

- ◆ Diesel injection pump locking pin -3359-
- ◆ Locking pin -T10060 A-
- ◆ Crankshaft stop -T10100-
- ◆ Counterhold tool -T10172-
- ◆ Special wrench, long reach -T10264-





◆ Locking tool -T10265-

Removing



Note

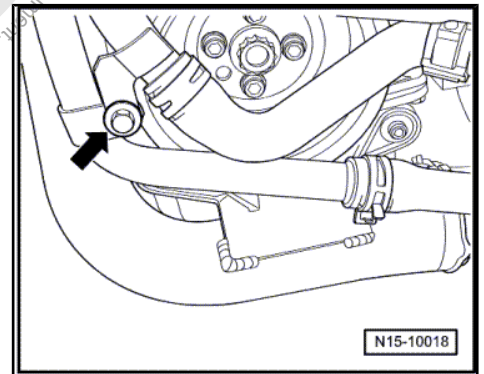
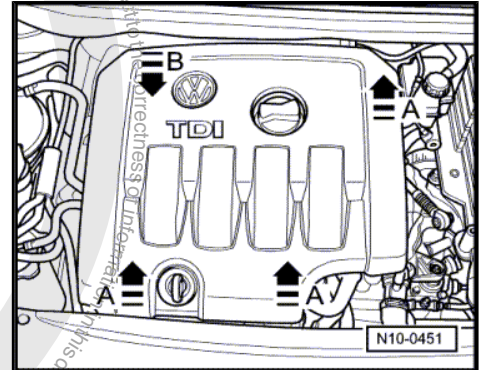
Adjustment work on toothed belts must be performed only on cold engines, as the indicator position on the tensioning element varies depending on the engine temperature.

- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

- Remove poly V-belt ➔ [page 16](#) .
- Remove poly V-belt tensioning element.
- Remove upper toothed belt guard.
- Remove front right wheel housing liner.
- Remove exhaust pipe from auxiliary heater.

- Loosen connecting bolt for coolant pipe -arrow-.
- Remove charge air pipe between charge air cooler and turbo-charger.
- Carefully cover or seal open ends.
- Remove vibration damper/belt pulley.
- Remove lower and centre toothed belt guards
- Turn crankshaft to TDC No. 1 cylinder.



Note

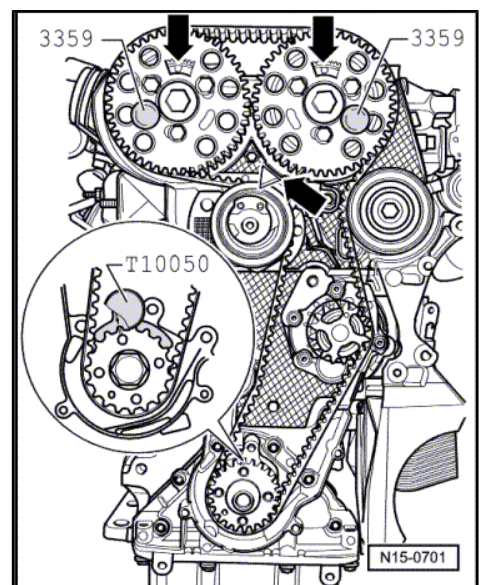
Turn crankshaft until marking on crankshaft pulley and tooth segments of camshaft pulleys are on top. Marking on toothed belt guard must align with camshaft sender wheel -arrows-.

- Lock crankshaft toothed belt pulley with crankshaft stop - T10050 bzw. T10100- . To do this, push crankshaft stop into teeth of belt pulley from face side.



Note

The marks on the crankshaft toothed belt pulley and the crankshaft stop must align. When doing this, the pin of the crankshaft stop must insert in the drilling of the sealing flange.



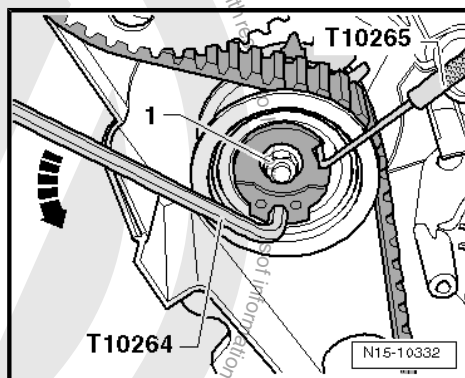
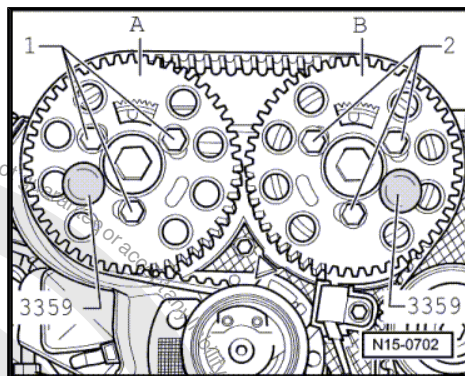
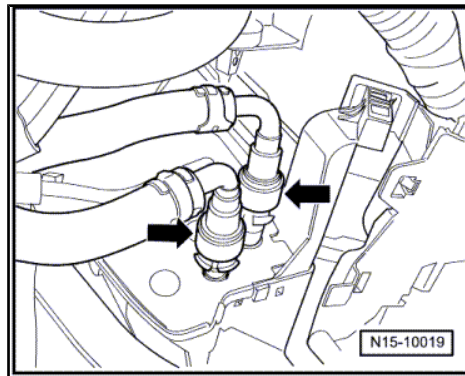


- Separate push-on connectors of fuel lines -arrows-.



Note

- ◆ *Do this by pressing in catch of push-on connectors.*
- ◆ *Ensure that no fuel escapes (use a cloth).*
- Lay fuel filter with hoses to side.
- Disconnect coolant hose from top of expansion tank.
- Remove expansion tank and lay it to side.
- Mark direction of rotation of toothed belt.
- Loosen camshaft pulley securing bolts -1 and 2- until camshaft pulleys can be turned in elongated holes.
- Lock hubs using locking pin -3359- . To do this, slide locking pins through outer free elongated holes into holes in cylinder head.
- Loosen tensioning roller securing nut.
- Turn eccentric of tensioning roller anti-clockwise -arrow- using socket -T10264- , until the tensioning roller can be locked with locking tool -T10265- .





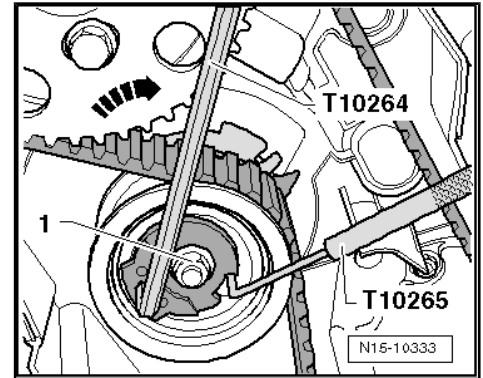
- Now turn tensioning roller eccentric clockwise -arrow- onto stop and tighten securing nut -1- hand-tight.
- Remove toothed belt first from coolant pump and then from remaining pulleys.

Installing



Caution

Strictly follow the procedure described here. If, for example, the final check is not performed and the locking tool is not fitted again, there is a danger that the timing is not correctly adjusted and the vehicle will exhibit engine running problems and rough idling.



Note

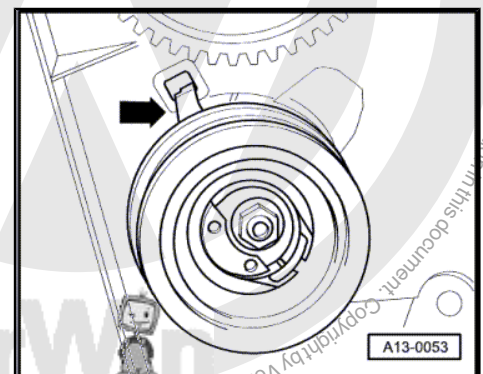
Adjustment work on toothed belts must be performed only on cold engines, as the indicator position on the tensioning element varies depending on the engine temperature.

- Tensioning roller must be locked with locking pin -T10265- and secured to right stop.
- Camshafts are locked using diesel injection pump locking pin -3359- .
- Crankshaft is locked using crankshaft stop -T10050 bzw. T10100- .
- Turn camshaft pulleys in their elongated holes clockwise to stop.
- Guide toothed belt through gap between engine support and engine.
- Fit toothed belt to crankshaft pulley, tensioning roller and camshaft pulley and idler roller.
- Then fit toothed belt on coolant pump toothed belt pulley.
- Loosen tensioning roller securing nut and pull out locking pin -T10265- .



Note

Ensure that tensioning roller seats correctly in rear toothed belt guard -arrow-.





- Turn eccentric of tensioning roller clockwise -arrow- using special wrench, long reach -T10264- until indicator -2- is in middle of gap in base plate.

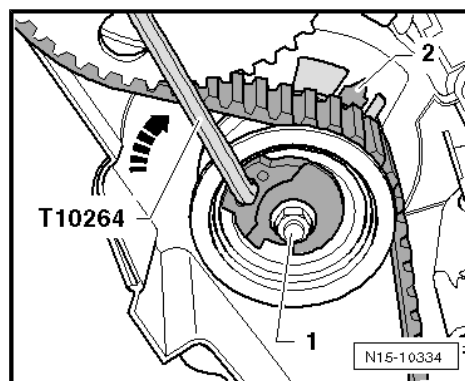
Ensure that securing nut does not turn as well.

- Hold tensioning roller in this position and tighten tensioning roller securing nut as follows: 20 Nm and 45° (1/8 turn) further.

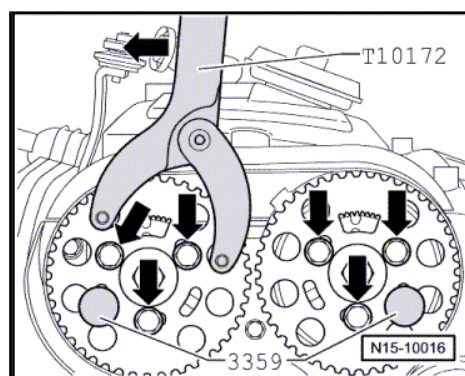


Note

When securing nut is tightened, indicator will turn maximum 5 mm to right out of base plate notch. This setting must not be corrected because the toothed belt will settle after it has run a while.



- Apply counterhold -T10172- as shown. Press counterhold -T10172- in direction of arrow keeping camshaft pulley under tension.
- In this position, tighten camshaft pulley securing bolts -arrows- to 25 Nm.
- Remove locking pins -3359- and crankshaft stop -T10050 bzw. T10100- .
- Turn crankshaft at least two rotations in engine direction of rotation and set again to just before TDC No. 1 cylinder.



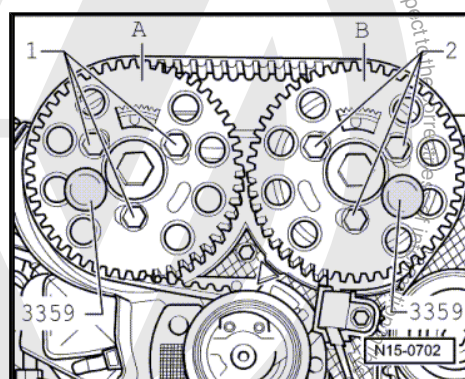
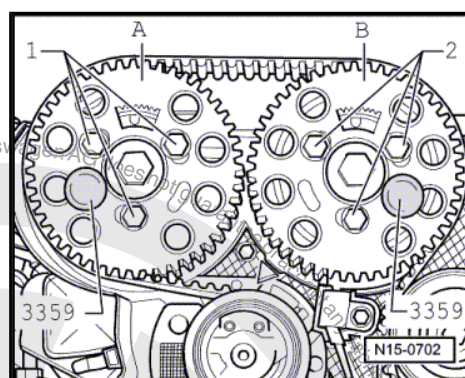
- Lock hub -A- by turning in engine direction of rotation until locking pin -3359- engages whilst turning.

– Check whether:

- ♦ Hub -B- can be locked using locking pin -3359- .
- ♦ Crankshaft can be locked in position with crankshaft stop -T10050 bzw. T10100- .
- ♦ Tensioning roller indicator is centred or maximum 5 mm to right of base plate notch.

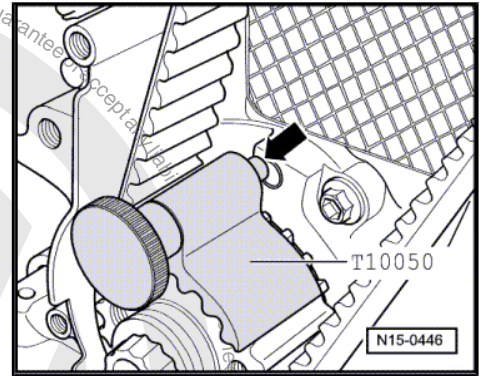
If the hub -B- cannot be locked:

- Loosen camshaft pulley -A- securing bolts -1-.
- Hub -A- must be locked using locking pin -3359- .
- Turn crankshaft until hub of camshaft pulley -B- can be locked using locking pin -3359- .
- Loosen camshaft pulley -B- securing bolts -2-.

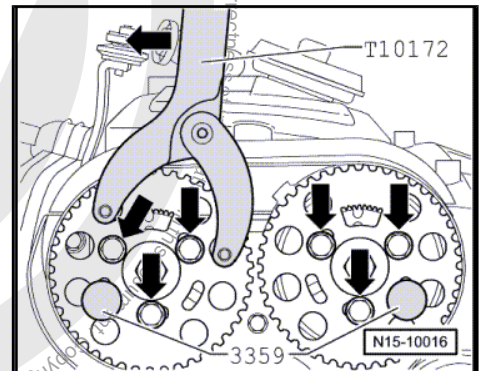




- Turn crankshaft slightly against engine direction of rotation until the pin of the crankshaft stop is positioned just before the hole in the sealing flange -arrow-.
- Now turn crankshaft in engine direction of rotation until crankshaft stop pin engages in sealing flange whilst turning.



- Apply counterhold -T10172- as shown. Press counterhold -T10172- in direction of arrow keeping camshaft pulley under tension.
- In this position, tighten camshaft pulley securing bolts -arrows- to 25 Nm.
- Remove locking pins -3359- and crankshaft stop -T10050 bzw. T10100-.
- Turn crankshaft at least two rotations in engine direction of rotation and set again to just before TDC No. 1 cylinder.
- Repeat check.
- Install centre and lower parts of toothed belt guard.
- Install belt pulley vibration damper: specified torque 10 Nm + 90° (1/4 turn) further.
- Install lower part of toothed belt guard.
- Install poly V-belt tensioning element: specified torque 25 Nm.
- Install poly V-belt ➔ [page 16](#) .



Further assembly is basically the reverse of the dismantling sequence. In the process, note the following:

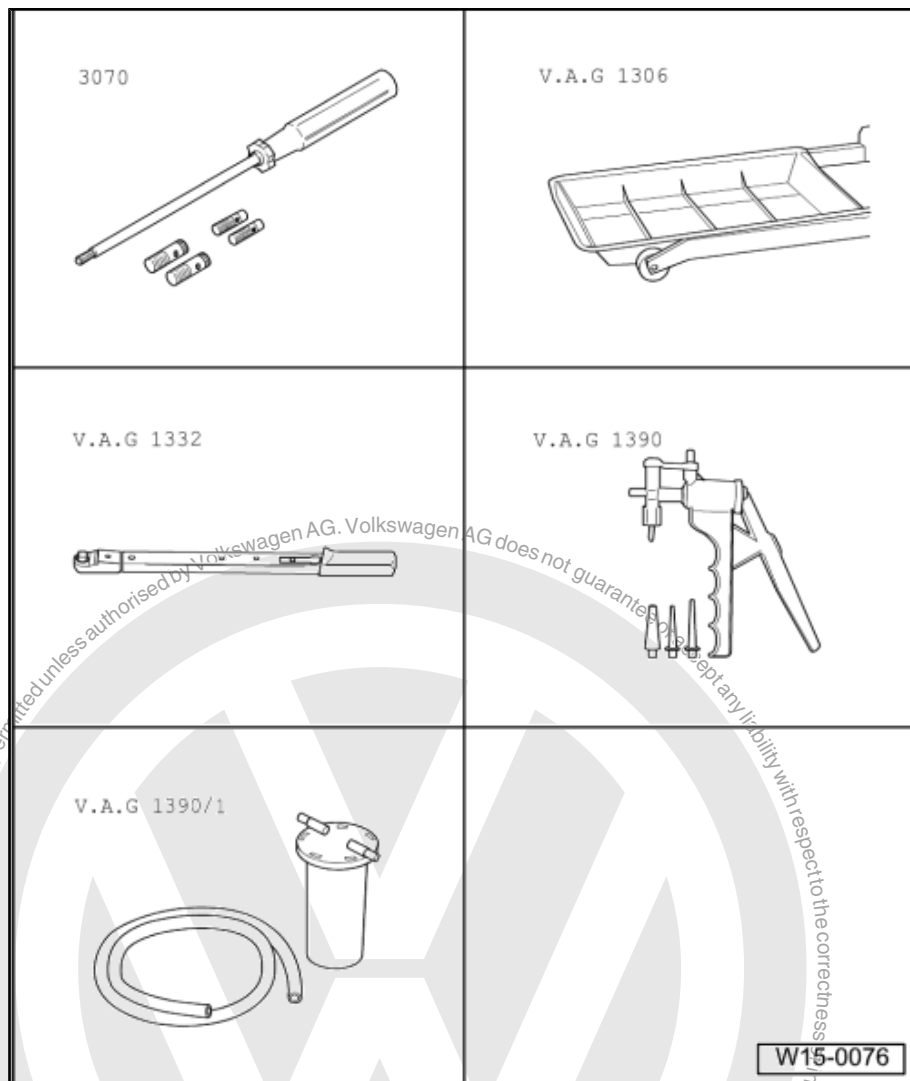
- ◆ Ensure that fuel hose connections are tight.
- ◆ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ◆ When installing charge air pipes, ensure that locking lugs engage correctly.
- Install wheel housing liner.
- Install noise insulation tray. ➔ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .



1.4 Removing and installing cylinder head

Special tools and workshop equipment required

- ◆ Guide pins -3070-
- ◆ Drip tray -V.A.G 1306-
- ◆ Torque wrench -V.A.G 1332-
- ◆ Hand vacuum pump with accessories -V.A.G 1390-
- ◆ Water drainage container - V.A.G 1390/1-





- ◆ Torque wrench -V.A.G 1331-



Note

- ◆ *Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.*
- ◆ *All cable ties which are opened or cut through when cylinder head is removed must be replaced in the same position when cylinder head is installed.*
- ◆ *Cracks between the unit injector holes and the valve seats are not critical and do not justify exchanging the cylinder head.*

V.A.G 1331



W00-0427



WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ◆ **Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.**
- ◆ **Ensure that there is sufficient clearance to all moving or hot components.**

1.4.1 Removing

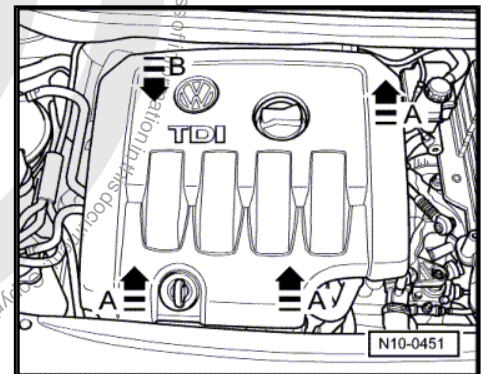
- With ignition switched off, disconnect earth strap from battery.
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting batteries .
- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

Golf Plus

- Remove plenum chamber bulkhead. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front, plenum chamber bulkhead .

Continuation for all vehicles

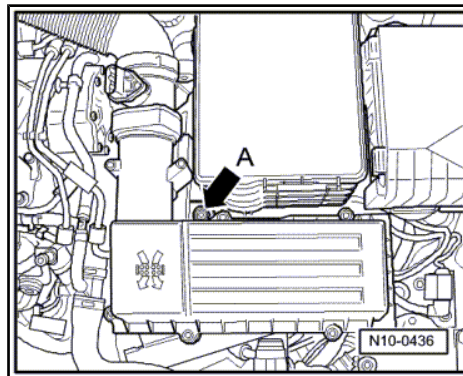




- Remove air filter housing with air mass meter and connecting pipe.

Remove bolt -arrow A- and pull air filter housing upwards out of mounting.

- Remove battery.
- Remove insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Drain coolant ⇒ [page 134](#)
- Disconnect fuel supply and return lines as well as coolant line on cylinder head.
- Before removing cylinder head, extract fuel from tandem pump using hand-operated vacuum pump -V.A.G 1390- and water drainage container -V.A.G 1390/1- ⇒ [page 228](#) .
- Pull fuel filter module upwards out of bracket and lay it with hoses to side.
- Remove poly V-belt ⇒ [page 16](#) .
- Remove connecting pipe between air charge cooler and turbocharger.





- Separate vibration damper and remove it from crankshaft. Lock crankshaft at TDC No. 1 cylinder using crankshaft stop - T10050 bzw. T10100- ➔ [page 52](#) .

Vehicles with no particulate filter:

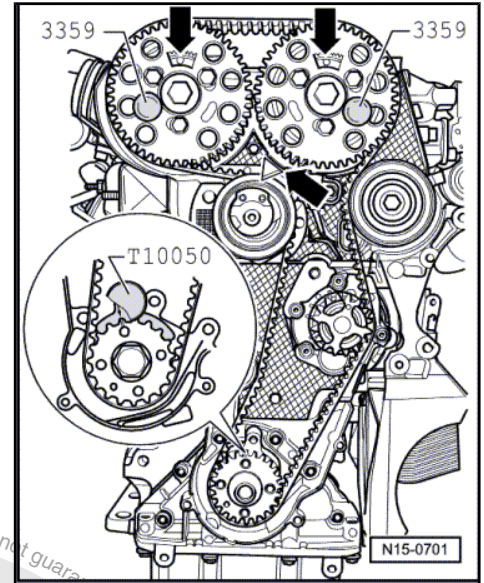
- Disconnect front exhaust pipe from turbocharger, loosen double clamp and slide exhaust pipe back ➔ [page 273](#) .

Vehicles with particulate filter:

- Unscrew mountings for particulate filter and clamp on turbocharger and push diesel particulate filter to side ➔ [page 274](#) .

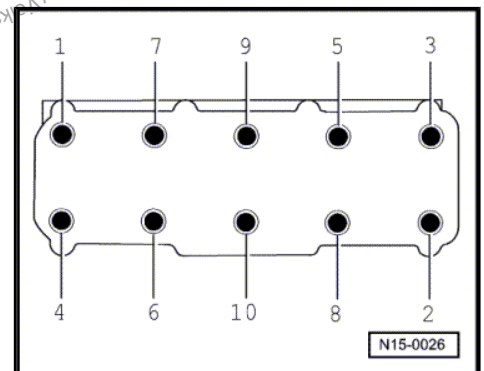
Continuation for all vehicles:

- On vehicles with four-wheel drive remove the bevel box to reach the threaded connection for turbocharger support ➔ 6-speed manual gearbox; Rep. gr. 34 ; Removing and installing bevel box .
- Remove turbocharger support and oil return from turbocharger.
- Loosen tensioning roller securing nut and release tension on toothed belt.
- Remove tensioning roller securing nut.
- Remove hubs for camshaft pulleys ➔ [page 79](#) .
- Separate Hall sender -G40- ➔ [Item 22 \(page 49\)](#) on cylinder head.
- Remove securing bolts between rear toothed belt guard and cylinder head.
- Unbolt bracket for vacuum reservoir and dipstick.
- Remove exhaust gas recirculation connecting pipe ➔ [Item 9 \(page 244\)](#) .
- Remove oil supply line for turbocharger ➔ [page 123](#) .
- Pull off or disconnect all other electrical connections as necessary from cylinder head and lay to one side.
- Separate all connection, coolant, vacuum and intake hoses from cylinder head.
- Remove cylinder head cover ➔ [page 49](#) .
- Remove rocker arm shaft and inner securing bolts for retaining frame ➔ [page 80](#) .
- Maintain sequence when loosening cylinder head bolts.
- Lift cylinder head slightly and remove from engine laterally past toothed belt guard.



Note

- ◆ The toothed belt tensioning roller remains on the engine support.
- ◆ The cylinder head must be guided carefully to prevent damage.





1.4.2 Installing



Note

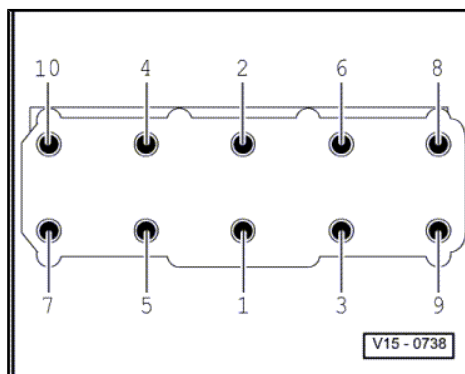
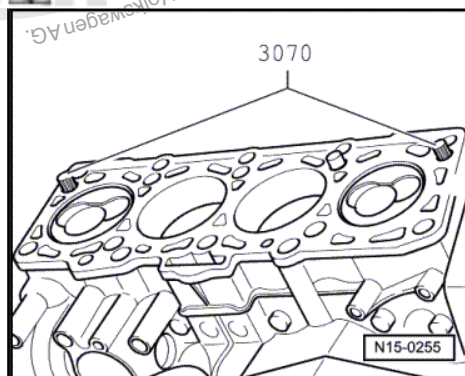
- ♦ *Always renew cylinder head bolts.*
- ♦ *In cases of repair carefully remove gasket remains from cylinder head and cylinder block. Ensure that no long scores or scratches are created. When using abrasive paper do not use a grade less than 100.*
- ♦ *Carefully remove emery and abrasive remains.*
- ♦ *Do not remove new cylinder head gasket from packaging until it is ready to be fitted.*
- ♦ *Handle gasket very carefully. Damage to the silicone coating or the indented area will lead to leaks.*
- Before fitting cylinder head, remove crankshaft stop -T10050 bzw. T10100- and turn crankshaft opposite direction of rotation until all pistons are nearly uniformly below TDC.
- Cylinder head gasket must lie with identification facing upwards.
- To centre, screw guide pins -3070- into outer threaded holes on intake side.



Note

Tensioning roller must be pushed onto studs when cylinder head is fitted.

- Fit cylinder head, screw in 8 remaining cylinder head bolts and tighten by hand.
- Remove guide pins through bolt holes using removal tool from 3070 and install cylinder head bolts.
- Tighten cylinder head in four stages in sequence shown as follows:
 - 1 - Tighten initially with torque wrench:
Stage I = 35 Nm
Stage II = 60 Nm
 - 2 - Turn further with rigid spanner:
Stage III = $\frac{1}{4}$ turn (90°)
Stage IV = $\frac{1}{4}$ turn (90°)
- Secure rear toothed belt guard to cylinder head.
- Install hubs and camshaft pulleys.
- Lock camshafts using locking pin for diesel injection pump -3359- .

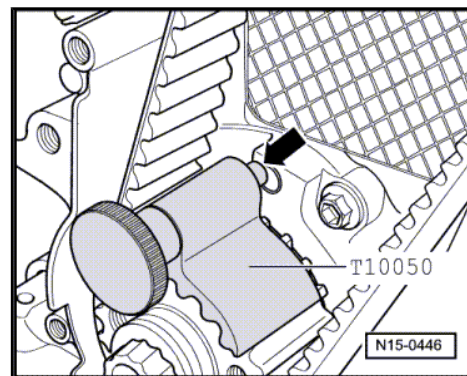




- Now rotate crankshaft in direction of rotation to TDC and lock crankshaft using crankshaft stop -T10050 bzw. T10100- .

Further installation is carried out in the reverse order. In the process, note the following:

- Install and tension toothed belt ➔ [page 51](#) .
- Install rocker arm shaft ➔ [page 81](#) .
- Install cylinder head cover ➔ [page 49](#) .
- Install oil supply line ➔ [page 123](#) .
- Install poly V-belt ➔ [page 16](#) .
- Fill with coolant ➔ [page 134](#) .
- Carry out road test and read fault memories ➔ Vehicle diagnostic tester.



1.5 Checking compression

A compression test is currently only possible on engines with piezo unit injectors ➔ Vehicle diagnostic tester.





2 Valve gear



Note

Cylinder heads with cracks between the valve seats may be used without reducing engine life, provided the cracks are small and not more than 0.5 mm wide.

Assembly overview - valve gear ➤ [page 72](#) .

Removing and installing roller rocker finger ➤ [page 74](#) .

Valves ➤ [page 76](#)

Removing and installing camshafts ➤ [page 79](#) .

Removing and installing camshaft seal ➤ [page 84](#) .

2.1 Assembly overview - valve gear

1 - Cable retainer 10 Nm

2 - 20 Nm

- ☐ Observe sequence when loosening and tightening ➤ [page 81](#) .

3 - Rocker arm shaft

4 - 20 Nm + 1/4 turn (90°) further

- ☐ Renew.
- ☐ Observe sequence when loosening and tightening ➤ [page 81](#) .

5 - Cylinder head bolt

- ☐ Observe sequence when loosening and tightening ➤ [page 66](#) .

6 - Washer

- ☐ For cylinder head bolts.
- ☐ Insert in cylinder head before installing retaining frame.

7 - Cotters

8 - Valve spring plate

9 - Valve spring

10 - Valve stem seal

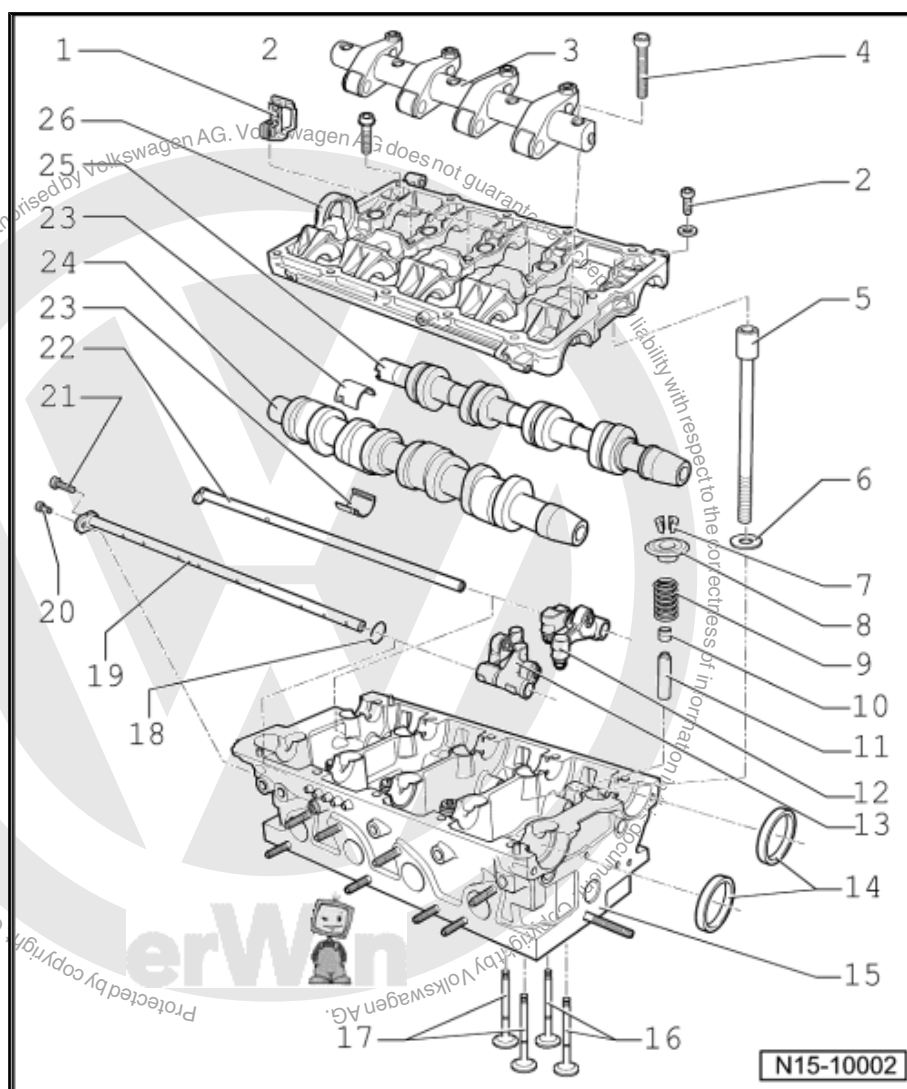
- ☐ Renewing ➤ [page 77](#) .

11 - Valve guide

- ☐ Check ➤ [page 76](#) .

12 - Inlet roller rocker fingers

- ☐ Do not interchange used roller rocker fingers (mark).
- ☐ With hydraulic valve clearance compensation.
- ☐ Check roller bearing.
- ☐ Removing and installing ➤ [page 75](#) .





13 - Exhaust roller rocker fingers

- ☐ Do not interchange used roller rocker fingers (mark).
- ☐ With hydraulic valve clearance compensation.
- ☐ Check roller bearing.
- ☐ Removing and installing ⇒ [page 75](#) .

14 - Seal

- ☐ Do not additionally oil or grease the oil seal sealing lip.
- ☐ Before installing, remove residual oil from camshaft journal using a clean cloth.
- ☐ To install, mask off groove on camshaft taper (e.g. using Sellotape).
- ☐ Removing and installing ⇒ [page 84](#) .

15 - Cylinder head

- ☐ See note ⇒ [page 47](#) .

16 - Inlet valves

- ☐ Valve dimensions ⇒ [page 76](#) .

17 - Exhaust valves

- ☐ Valve dimensions ⇒ [page 76](#) .

18 - O-ring

- ☐ Renew.

19 - Shaft

- ☐ For roller rocker fingers.
- ☐ Removing and installing ⇒ [page 75](#) .

20 - 10 Nm

21 - Sealing plug

- ☐ Renew.
- ☐ 10 Nm

22 - Shaft

- ☐ For roller rocker fingers.
- ☐ Removing and installing ⇒ [page 75](#) .

23 - Bearing shell

- ☐ Do not interchange used bearing shells (mark).
- ☐ Ensure that retaining lugs are correctly seated in bearing caps and cylinder head

24 - Exhaust camshaft

25 - Inlet camshaft

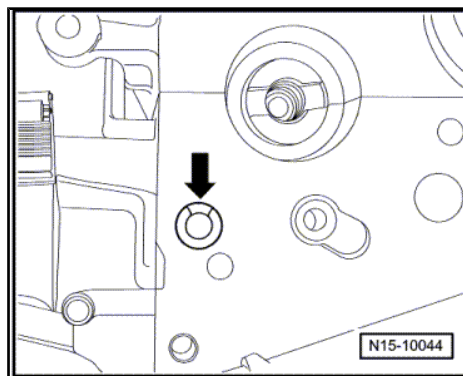
26 - Retaining frame

- ☐ Observe sequence when loosening and tightening ⇒ [page 79](#) .
- ☐ Seal using silicone adhesive sealant -D 176501 A1- .

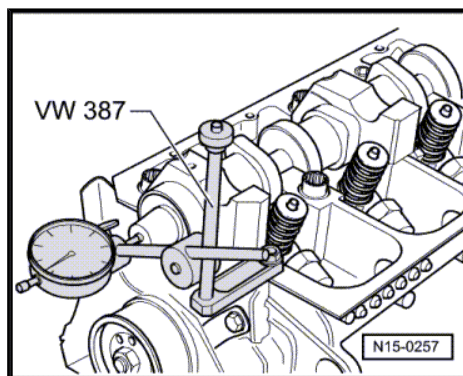


Installation position of mixture tube

Notch in mixture tube faces upwards -arrow-.



Checking camshaft axial clearance



Special tools and workshop equipment required

- ◆ Universal dial gauge bracket -VW 387-
- ◆ Dial gauge

Wear limit: max. 0.15 mm

2.2 Removing and installing roller rocker finger

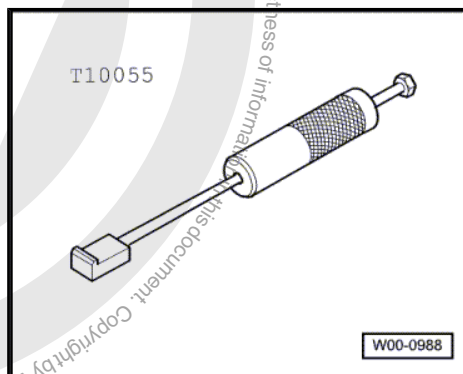


Caution

*When plug ➔ **Item 21 (page 73)** of roller rocker finger shaft is loosened, the shaft may turn relative to securing plate. If deformation of thread in shaft can be identified in a visual examination, the shaft must not be reinstalled because the oil supply holes for the roller rocker fingers will no longer fit. The result may be seizure.*

Special tools and workshop equipment required

- ◆ Puller -T10055-





2.2.1 Removing and installing exhaust roller rocker finger

- Remove camshafts ⇒ [page 79](#) .
- Drain coolant ⇒ [page 134](#)
- Remove connecting pipe between exhaust gas recirculation valve and bypass flap.
- Remove thermostat housing from cylinder head.
- Unscrew securing bolt and sealing plug of shaft.
- Screw puller -T10055- into shaft.
- Pull out shaft by sliding hammer.

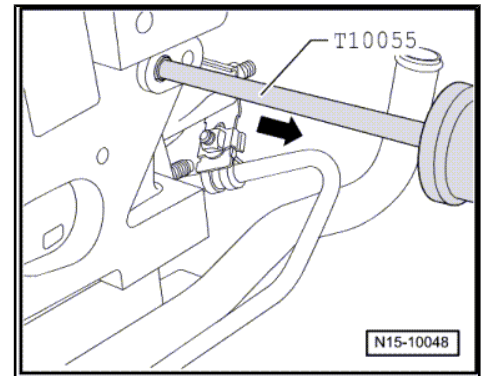
Installation is carried out in the reverse order. When installing, note the following:



Note

Do not interchange used roller rocker fingers.

- Push shaft into cylinder head, pushing on roller rocker fingers in the process.
- Tighten shaft securing bolt to 10 Nm.
- Renew sealing plug and tighten new sealing plug to 10 Nm.



2.2.2 Removing and installing inlet roller rocker finger

- Remove camshafts ⇒ [page 79](#) .
- Screw puller -T10055- into shaft.
- Pull out shaft by sliding hammer.

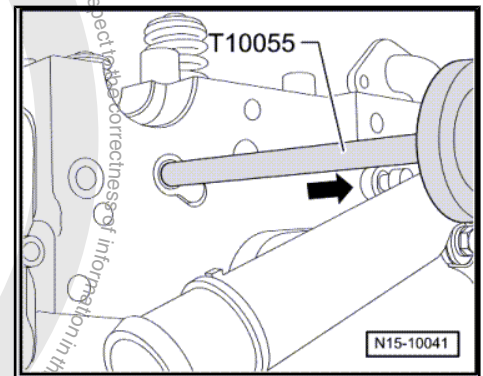
Installation is carried out in the reverse order. When installing, note the following:



Note

Do not interchange used roller rocker fingers.

- Push shaft into cylinder head, pushing on roller rocker fingers in the process.
- Shaft must be flush with cylinder head.





2.3 Valves

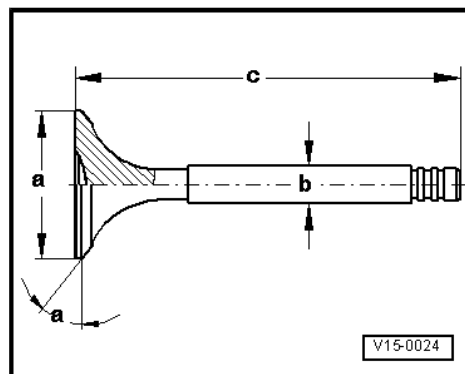
2.3.1 Valve dimensions



Note

Valves must not be reworked. Only lapping-in is permitted.

Dimension		Inlet valve	Exhaust valve
Ø a	mm	29.40	25.50
Ø b	mm	5.980	5.965
c	mm	88.50	88.20
α	°	45	45



2.3.2 Reworking valve seats



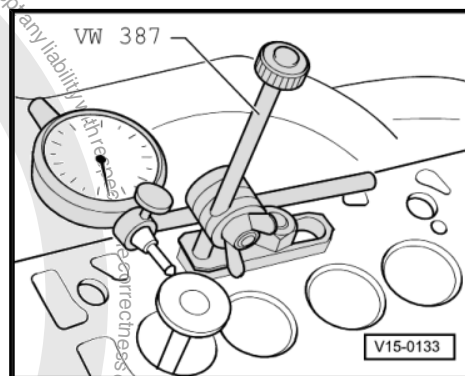
Note

Valve seats must not be reworked due to the very small tolerances.

2.3.3 Checking valve guides

Special tools and workshop equipment required

- ♦ Universal dial gauge bracket -VW 387-
- ♦ Dial gauge
- Insert new valve into guide. The end of the valve stem must be flush with the guide. On account of differing stem diameters, only use inlet valve in inlet guide and exhaust valve in exhaust guide.
- Determine rock. Wear limit: max. 1.3 mm
- Cylinder head must be renewed if the rock is greater than the wear limit.

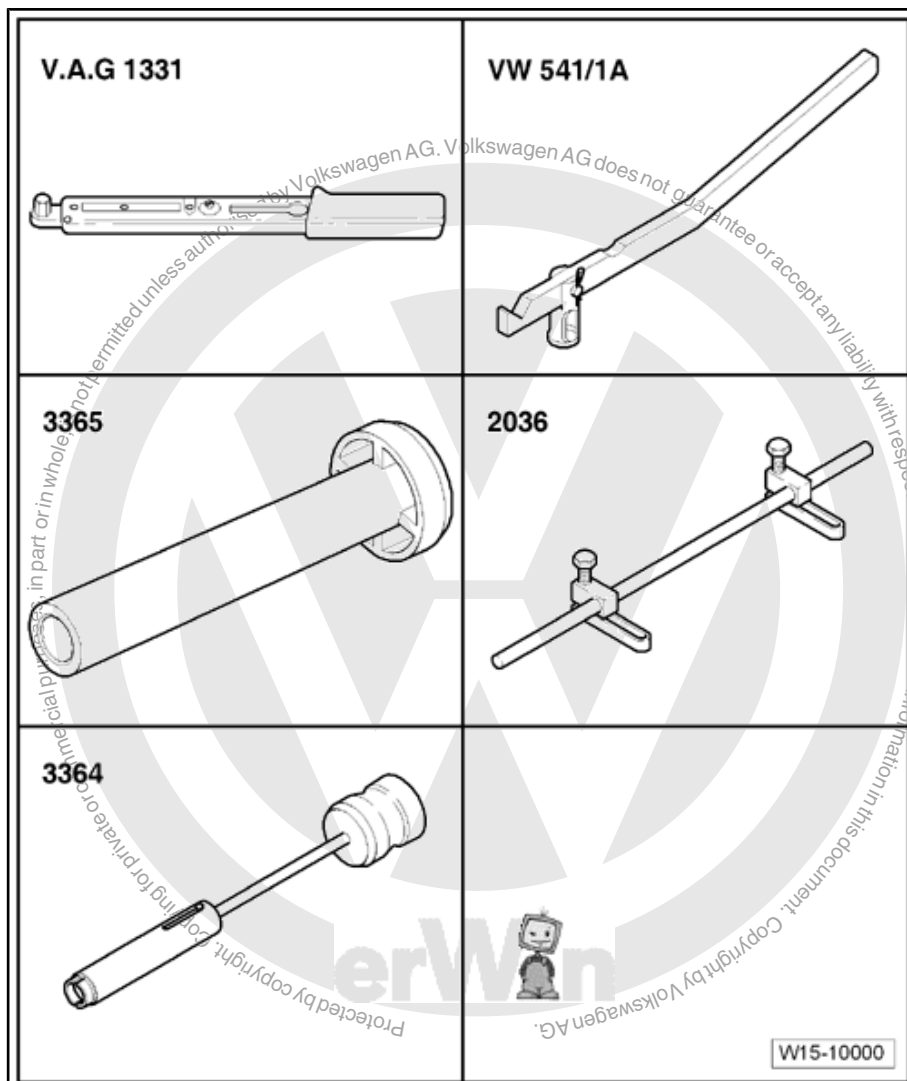




2.3.4 Renewing valve stem seals

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331/-
- ◆ Valve lever -VW 541/1A- with press tool -VW 541/6-
- ◆ Valve stem seal fitting tool -3365-
- ◆ Valve assembly device -2036-
- ◆ Valve stem seal puller -3364-



Removing

(With cylinder head installed)

- Remove camshafts ⇒ [page 79](#) .
- Remove unit injectors ⇒ [page 251](#) .
- Set piston of respective cylinder to top dead centre (TDC).
- Bolt valve assembly device -2036- tightly onto cylinder head.



- Remove valve springs using valve lever -VW 541/1A- and press tool -VW 541/6- .



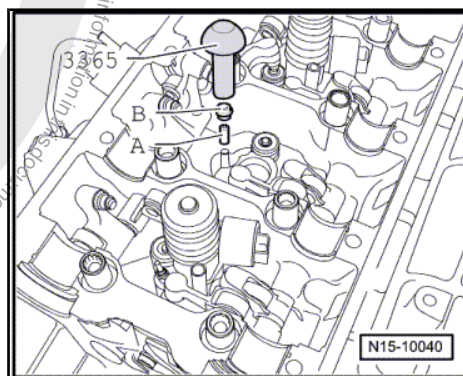
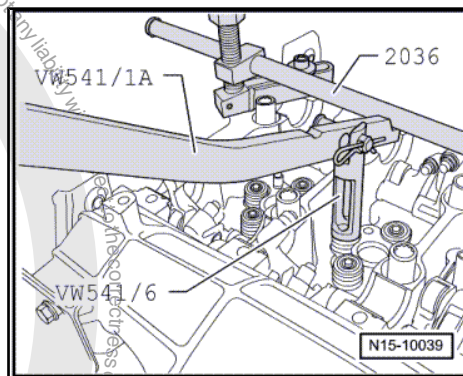
Note

The valves are supported by the piston crown.

- Pull off valve stem seals using valve stem seal puller -3364- .

Installing

- Place the plastic sleeve -A- supplied on the respective valve stem. This will prevent the new valve stem seal -B- being damaged.
- Place new valve stem seal in valve stem seal fitting tool -3365-
- Oil valve stem seal sealing lip and press carefully onto valve guide to stop.

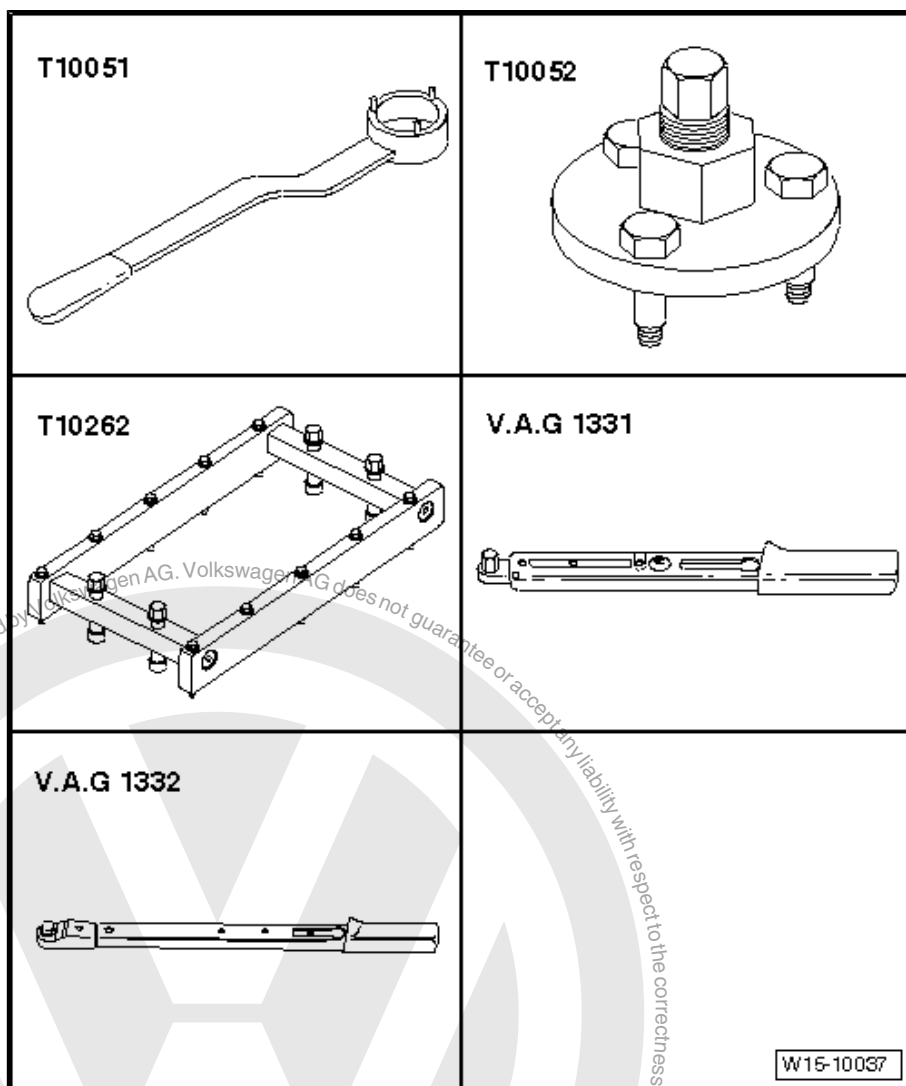




2.4 Removing and installing camshafts

Special tools and workshop equipment required

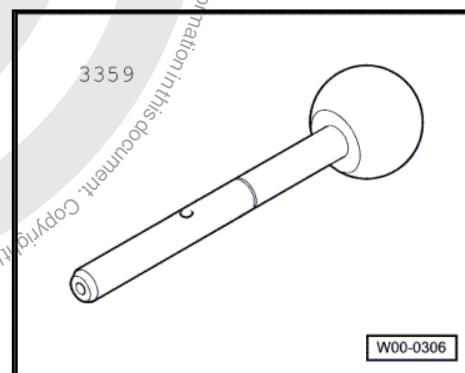
- ◆ Counterhold tool -T10051-
- ◆ Puller -T10052-
- ◆ Rack -T10262-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



- ◆ Diesel injection pump locking pin -3359-

Not illustrated:

Silicone adhesive sealant -D 176501 A1-

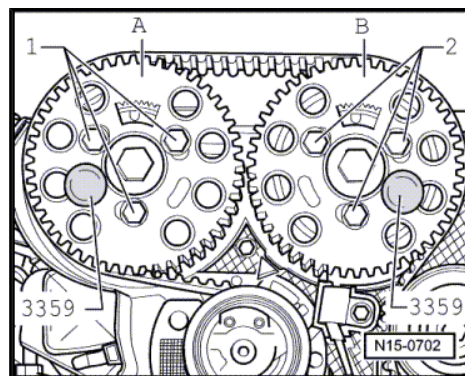


2.4.1 Removing

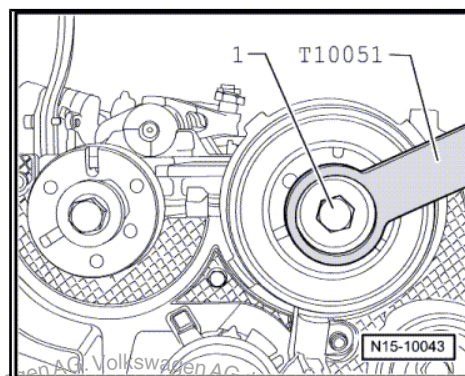
- Remove plenum chamber bulkhead. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front, plenum chamber bulkhead .
- Remove air filter housing with air mass meter and connecting pipe.
- Remove cooler for exhaust gas recirculation and bypass flap.



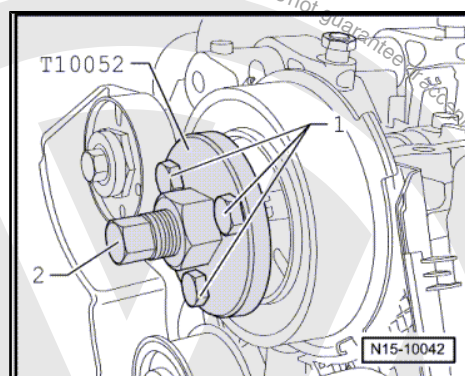
- Remove bracket for exhaust gas recirculation cooler.
- Remove toothed belt from camshaft pulleys ➔ [page 51](#) .
- Remove camshaft pulley securing bolts -1- and -2-.
- Remove camshaft pulleys from hubs.



- Loosen hub securing bolt -1-.
- To do this, use counterhold -T10051- .
- Loosen hub securing bolt about 2 turns.



- Fit puller -T10052- and align it with holes in hub.
- Tighten securing bolts -1-.
- Apply tension to hub by evenly tightening puller -2- until hub separates from taper of camshaft.



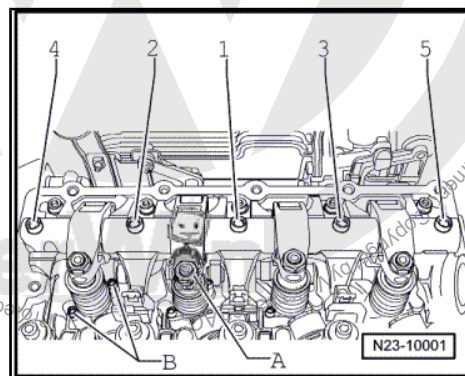
Note

When doing this, hold puller with 30 mm spanner.

- Remove hub from taper of camshaft.
- Remove exhaust camshaft hub in the same way.
- Remove cylinder head cover ➔ [page 49](#) .
- Remove tandem pump ➔ [page 227](#) .

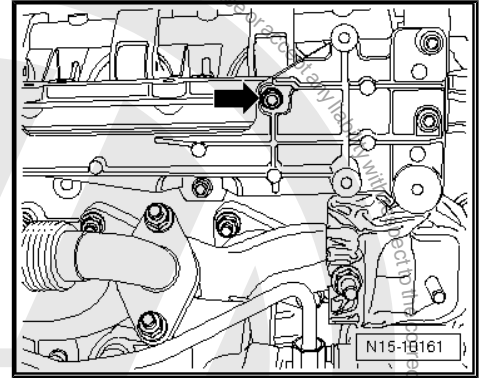
Bolted connection for rocker arm shaft

- Loosen lock nut of adjustment screw -A- and back out screw until respective rocker arm lies against plunger spring of unit injector.
- Unscrew bolts -4, 1 and 5-, then remove bolts -2 and 3- evenly and alternately.
- Remove rocker arm shaft.
- Unscrew upper securing bolts of rear toothed belt guard.



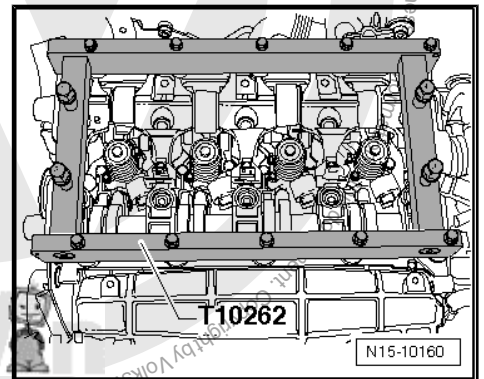


- Unscrew upper securing bolt -arrow- of bracket for bypass flap and exhaust gas recirculation cooler.
- Remove pre-wired wiring harness for unit injectors and glow plugs ⇒ [page 246](#) .
- Loosen remaining 15 bolts of retaining frame equally and from the outside in.
- Screw 15 mm ejector bolts of rack -T10262- anticlockwise by hand to stop.
- Position frame -T10262- as shown on retaining frame and tighten 10 mm securing bolts to 10 Nm.



Positioning frame -T10262-

- Screw ejector bolts clockwise by hand until they contact the cylinder head bolts.
- Now screw in ejector bolts in sequence stamped on bolt heads 1...4 equally until retaining frame is released from cylinder head.
- Remove the retaining frame.
- Remove camshafts.

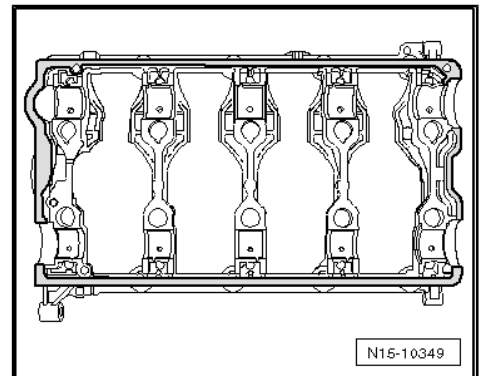


2.4.2 Installing



Note

- ◆ When camshafts are installed, cams for No. 1 cylinder must point upwards.
- ◆ Do not interchange used bearing shells (mark).
- ◆ When installing camshafts, ensure proper seating of retaining lugs in retaining frame and cylinder head.
- ◆ Seal parting surface between retaining frame and cylinder head using silicone adhesive sealant -D 176501 A1- ⇒ [page 81](#)
- ◆ Each time work is performed which requires adjustment of the unit injector, the adjustment screw in the rocker arm and also the unit injector ball stud must be renewed.

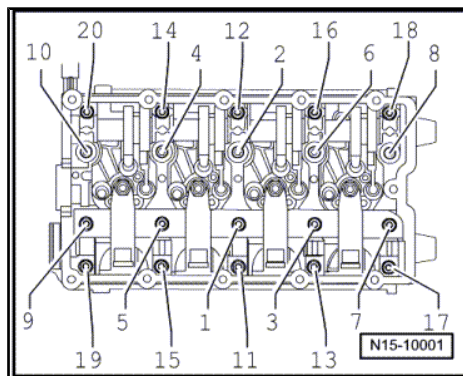


Sealing parting surfaces of retaining frame

- Oil running surfaces of shell bearings.
- Install new ball studs into unit injectors.
- Install retaining frame and rocker arm shaft.



- Evenly tighten bolts -1...20- as shown from inside to outside.
Specified torque: 20 Nm

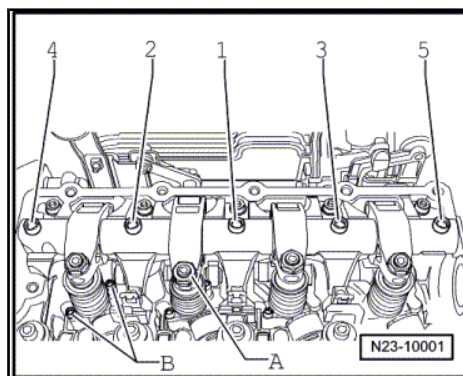


- Now tighten rocker arm shaft bolts -1...5- $\frac{1}{4}$ turn (90°) further.
- Screw new adjustment screws into rocker arms hand-tight and fit lock nut.
- Install camshaft oil seals $\Rightarrow$ [page 84](#) .

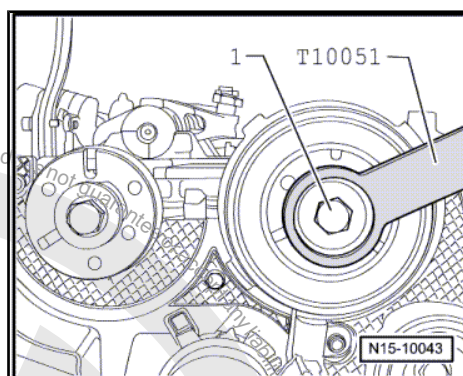


Caution

Clean camshaft journal with a cloth and degreasing agent before fitting i.e. brake cleaner. An oiled camshaft journal reduces the friction between components when bolting on. This can cause items to expand and eventually lead to the hub shearing.



- Set hubs on camshafts.
- Tighten securing bolts -1- for hubs. Torque specification: 100 Nm.
- To do this, use counterhold -T10051- .



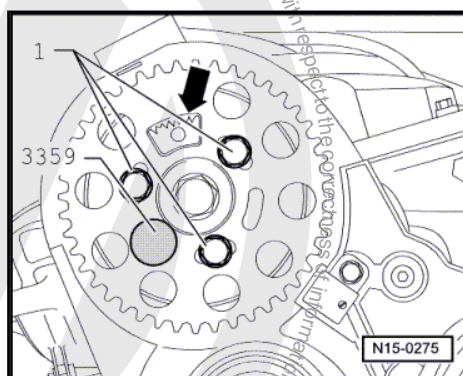
- Push camshaft pulleys onto hubs.



Note

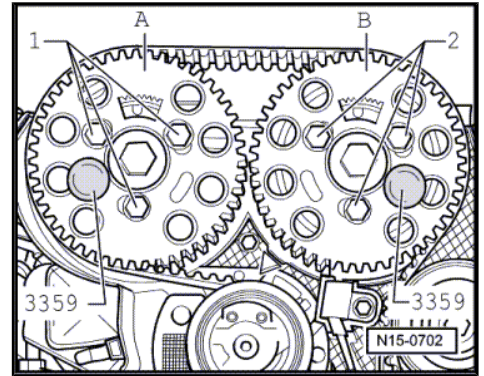
The toothed segment -arrow- of the camshaft toothed belt pulley must be on top.

- Hand tighten securing bolts -1- and -2- on camshaft pulleys so that there is no play.

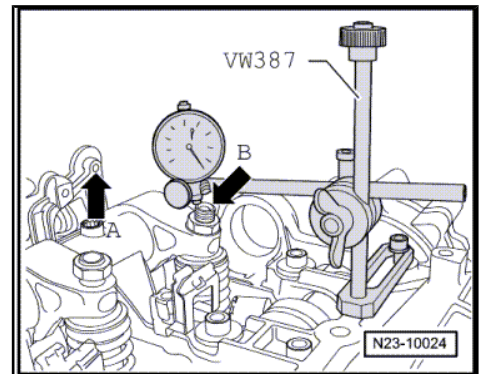




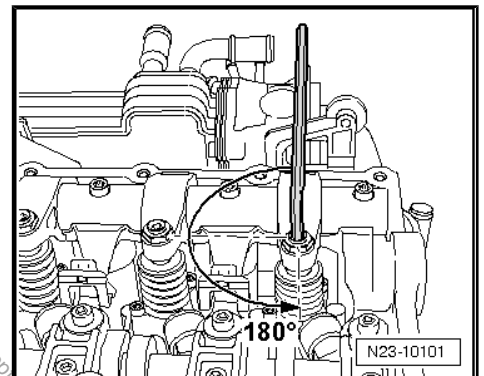
- Lock hubs using locking pin for diesel injection pump -3359- .
- Install toothed belt and adjust valve timing ⇒ [page 51](#) .



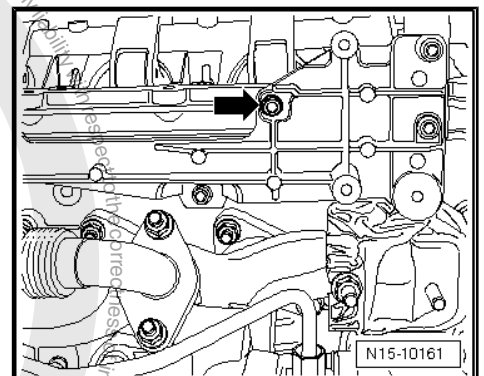
- Fit dial gauge onto adjustment screw of unit injector as shown.
- Turn the crankshaft in engine direction of rotation until the roller of the rocker arm is positioned on the peak of the drive cam. Roller side -arrow A- positioned at highest point. Dial gauge -arrow B- positioned at lowest point.
- Remove dial gauge.
- Now turn adjustment screw into rocker arm until a firm resistance is felt (unit injector positioned at stop).



- Turn adjustment screw 180° back off stop.
- Hold adjuster screw in this position and tighten lock nut to 30 Nm.



- Tighten upper securing bolt -arrow- of bracket for bypass flap and exhaust gas recirculation cooler to 10 Nm.
- Install tandem pump ⇒ [page 227](#) .
- Install cylinder head cover ⇒ [page 49](#) .



Note

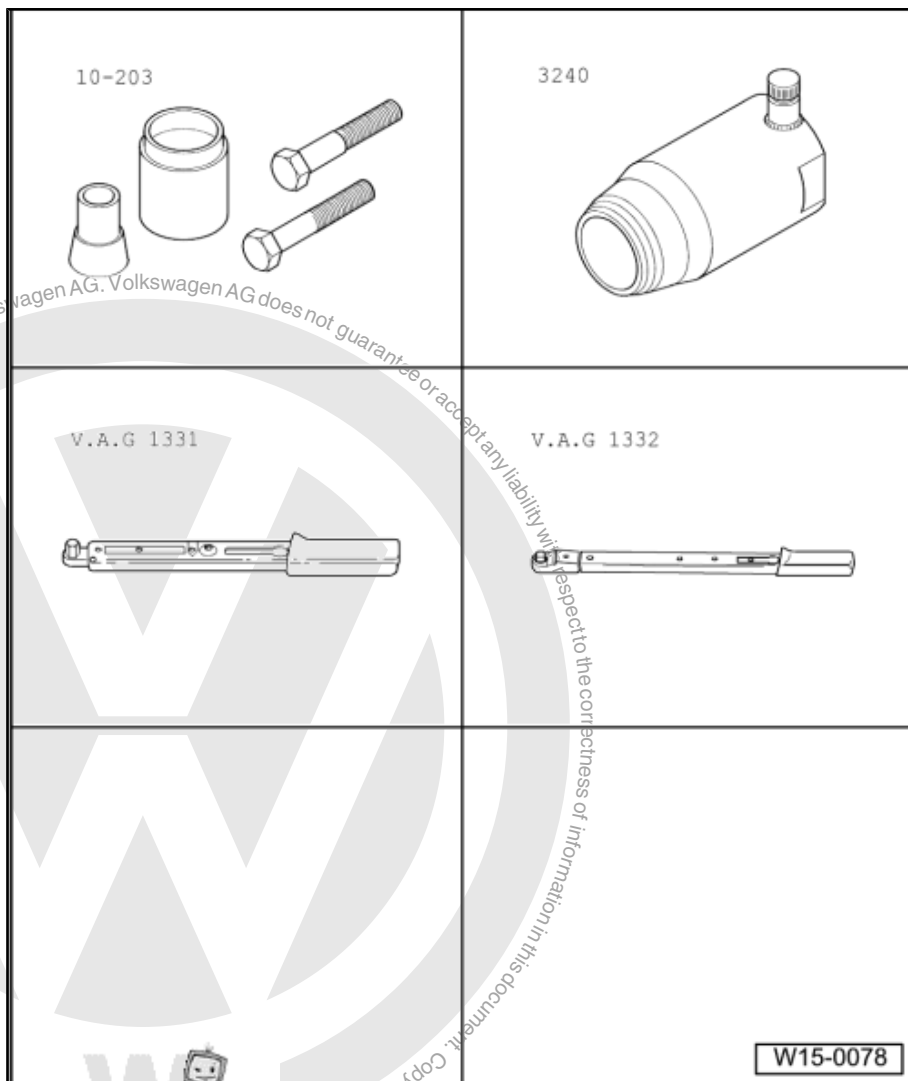
When new rocker fingers have been installed, engine must not be started for about 30 minutes. Hydraulic compensation elements must settle (otherwise valves will strike pistons).



2.5 Removing and installing camshaft oil seal

Special tools and workshop equipment required

- ◆ Fitting tool -V.A.G 10-203-
- ◆ Oil seal extractor -3240-
- ◆ Torque wrench -V.A.G 1331/-
- ◆ Torque wrench -V.A.G 1332/-
- ◆ Bolt M12×65



Removing

- Remove toothed belt ➔ [page 51](#) .
- Remove camshaft pulley and hub ➔ [page 79](#) .
- Screw inner part of oil seal extractor -VAS 3240- two turns (approx. 3 mm) out of outer part and lock using knurled screw.



- Lubricate threaded head of oil seal extractor -VAS 3240- , place it in position and while exerting firm pressure, screw it into oil seal as far as possible.
- Loosen knurled screw and turn inner part against camshaft until the oil seal is pulled out.

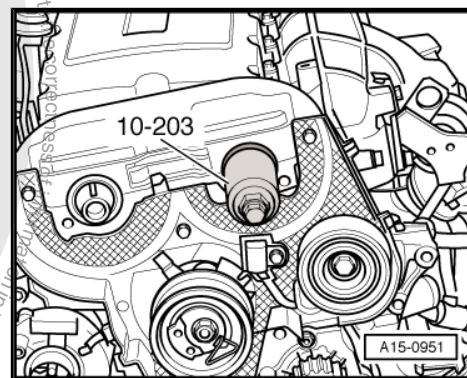
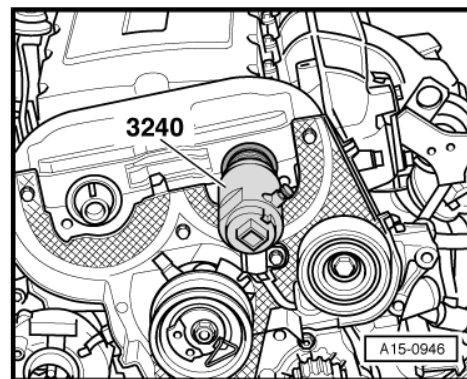
Installing



Note

The oil seal sealing lip must not be additionally oiled or greased.

- Remove oil residue from camshaft journal using a clean cloth.
- Mask off groove on taper of camshaft using commercial adhesive tape (e.g. Sellotape).
- Fit oil seal carefully on camshaft.
- Press seal in to stop using thrust piece from fitting tool 10-203 and M12×65 bolt.
- Install camshaft pulley and hub ⇒ [page 79](#) .
- Install toothed belt and adjust valve timing ⇒ [page 51](#) .





17 – Lubrication

1 Engine oil



Note

The oil level must not be above the max. mark - danger of damage to catalytic converter!

Engine oil specifications - Golf, Golf Plus ➔ Maintenance ; Booklet 38 .

Engine oil specifications - Touran ➔ Maintenance ; Booklet 18.1 .

Engine oil specifications - Passat ➔ Maintenance ; Booklet 21.1 .

Oil capacities - Golf, Golf Plus, Touran ➔ [page 86](#) .

Oil capacities - Passat ➔ [page 86](#) .

Checking engine oil level ➔ [page 86](#) .

1.1 Oil capacities - Golf, Golf Plus, Touran

Engine codes AZV, BKD

With change of oil filter 3.8 l

Without change of oil filter 3.3 l

Engine code BMN:

With change of oil filter 4.3 l

Without change of oil filter 3.8 l

1.2 Oil capacities - Passat

With oil filter 4.0 l

Without oil filter 3.5 l

1.3 Checking engine oil level

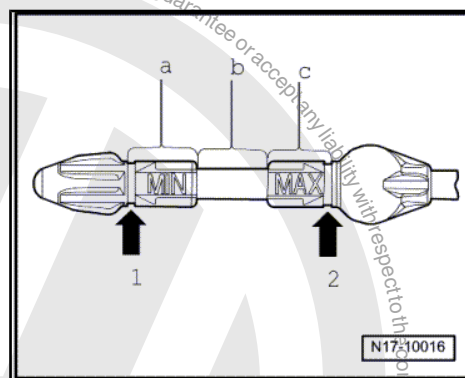
1 - Min. mark

2 - Max. mark

a - Area of min. mark: top-up with max. 0.5 l of engine oil!

b - Oil level in middle range: can be topped-up with engine oil.

c - Area of max. mark: do not add engine oil!





2 Parts of lubrication system (Golf, Golf Plus, Touran)



Caution

Finding metal shavings or a large quantity of small metal particles during engine repair could indicate that the crankshaft bearings or conrod bearings are damaged. To prevent this from causing further damage, perform the following repairs:

Thoroughly clean oil channels.

Renew oil cooler

Renew oil filter element

Assembly overview - oil pump, sump ➤ [page 87](#)

Removing and installing sump ➤ [page 89](#) .

2.1 Assembly overview - oil pump, sump

1 - 15 Nm

2 - Sealing flange

- ☐ With seal.
- ☐ Must be positioned on dowel sleeves.
- ☐ Removing and installing ➤ [page 35](#) .
- ☐ Install with silicone sealant -D 176 404 A2- .
- ☐ Do not additionally oil or grease the oil seal sealing lip.
- ☐ Before installing, remove oil residue from crankshaft journal using a clean cloth.

3 - Chain tensioner with tensioning rail, 15 Nm

- ☐ When installing, pretension spring and fit.

4 - Oil dipstick

- ☐ The oil level must not be above the max. mark!
- ☐ Markings ➤ [page 86](#) .

5 - Dipstick guide

6 - Guide tube

7 - Dowel sleeves

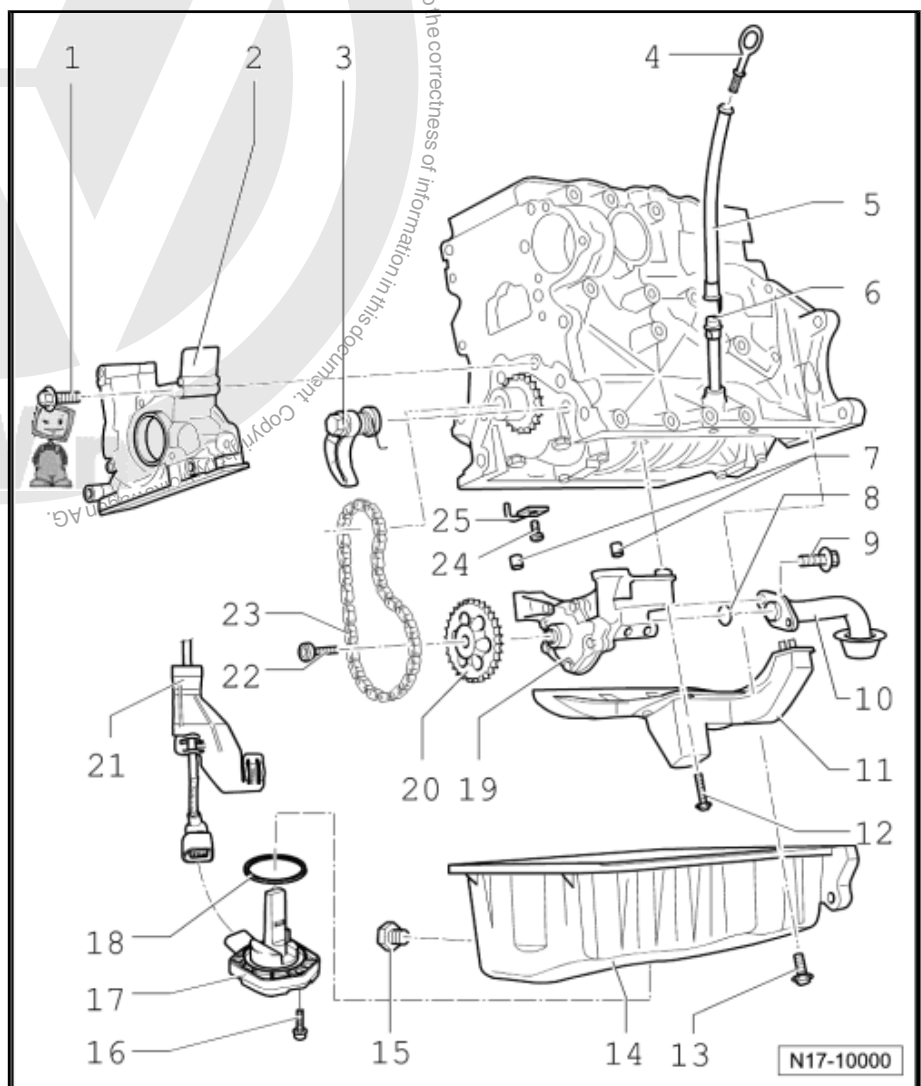
8 - O-ring

- ☐ Renew.

9 - 15 Nm

10 - Suction line

- ☐ Clean strainer if soiled.





11 - Baffle plate

12 - 15 Nm

13 - 15 Nm

14 - Oil sump

- ☐ Removing and installing ⇒ [page 89](#) .
- ☐ Clean sealing surface before fitting.
- ☐ Install with silicone sealant D 176 404 A2.

15 - Oil drain plug, 30 Nm

- ☐ Renew.

16 - 10 Nm

17 - Oil level and oil temperature sender -G266-

- ☐ Black connector, 3-pin.
- ☐ Check ⇒ Vehicle diagnostic tester.

18 - Seal

- ☐ Renew.

19 - Oil pump

- ☐ With 12 bar pressure relief valve.
- ☐ Before installing, check that both dowel sleeves for centring oil pump on cylinder block are fitted.
- ☐ Renew if running surfaces and gears are scored.

20 - Chain sprocket for oil pump

21 - Retainer

- ☐ For oil level and oil temperature sender -G266- wiring harness.

22 - 20 Nm + 1/4 turn (90°) further

23 - Chain

24 - 25 Nm

- ☐ Insert without sealant.

25 - Oil spray jet

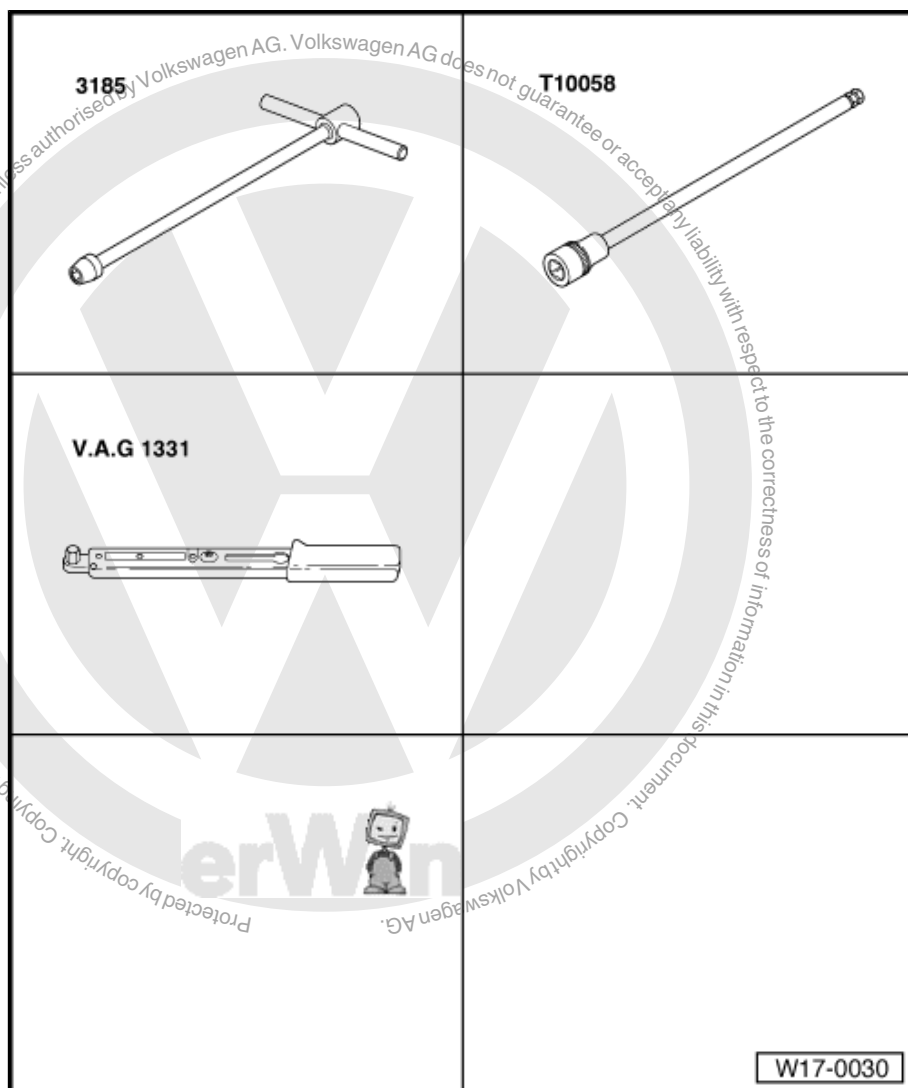
- ☐ For piston cooling.



2.2 Removing and installing oil sump

Special tools and workshop equipment required

- ◆ Jointed wrench 10 mm - VAS 3185-
- ◆ Special wrench, long reach -T10058-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



Special tools and workshop equipment required

- ◆ Silicone sealant -D176404A2-
- ◆ Hand drill with plastic brush attachment
- ◆ Eye protection
- ◆ Flat scraper

Removing

- Remove noise insulation tray ⇒ Rep. gr. 50 .
- Drain engine oil ⇒ Maintenance ; Booklet .



Note

Observe environmental regulations for disposal.

- Pull connector off oil level and oil temperature sender -G266- .
- Remove connecting bolts for sump to gearbox.



- Remove sump.
- Loosen sump with light blows of a rubber headed hammer if necessary.
- Remove sealant residue from cylinder block using a flat scraper.



WARNING

Wear eye protection.

- Remove sealant residue on sump with a rotating brush, e.g. a hand drill with a plastic brush.
- Clean sealing surfaces. They must be free of oil and grease.

Installing



Note

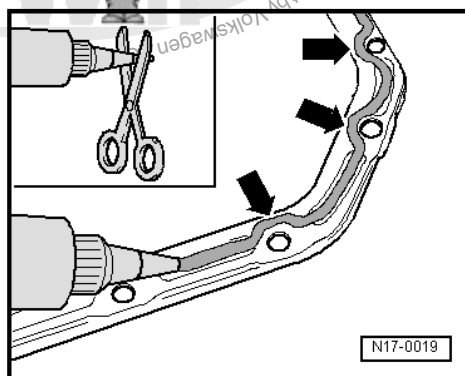
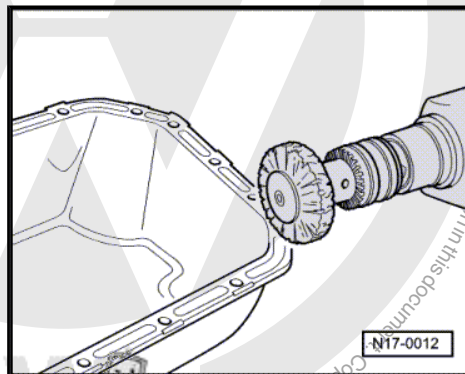
- ◆ *Observe expiry date of sealing compound.*
- ◆ *The sump must be installed within 5 minutes of applying silicone sealing compound.*

- Cut off tube nozzle at forward marking (Ø of nozzle approx. 3 mm).
- Apply silicone sealing compound, as shown, to clean sealing surface on sump. Sealant bead must be:
 - ◆ 2...3 mm thick.
 - ◆ Run bead along inner side of bolt holes -arrows-.



Note

The sealant bead must not be thicker, otherwise excess sealing compound will enter the oil sump and may block the oil suction line strainer.





- Apply silicone sealing compound bead as shown to the clean sealing surface of the sump. (The figure shows the position of the sealant bead on the cylinder block.)
- Install sump immediately and tighten the connecting bolts for sump to gearbox and all sump bolts lightly. Ensure that sump is flush against intermediate plate and gearbox flange.



Note

When installing sump with engine out of vehicle, ensure that sump is flush with cylinder block at flywheel end.

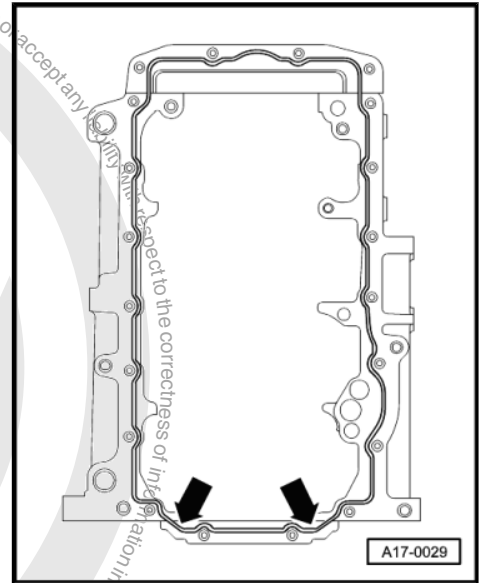
- Tighten sump bolts diagonally to 15 Nm.
- Tighten bolts securing sump to gearbox to 40 Nm.



Note

Let sealing compound dry for approx. 30 minutes after installing oil sump. Only then fill with engine oil.

Further assembly is basically the reverse of the dismantling sequence.





3 Parts of lubrication system (Passat)



Caution

Finding metal shavings or a large quantity of small metal particles during engine repair could indicate that the crankshaft bearings or conrod bearings are damaged. To prevent this from causing further damage, perform the following repairs:

Thoroughly clean oil channels.

Renew oil cooler

Renew oil filter element





Assembly overview - oil pump, sump, balancer shaft module with chain drive ➔ [page 93](#)

Removing and installing oil pump (for balancer shaft module with chain drive) ➔ [page 95](#)

Removing and installing balancer shaft module with chain drive ➔ [page 98](#)

Retrofitting spur gear drive for balancer shaft module ➔ [page 101](#)

Assembly overview - oil pump, sump, balancer shaft module with spur gear drive ➔ [page 104](#)

Removing and installing oil pump (for balancer shaft module with spur gear drive) ➔ [page 107](#)

Removing and installing balancer shaft module with spur gear drive ➔ [page 107](#)

Renewing spur gear for crankshaft ➔ [page 108](#)

Removing and installing sump ➔ [page 117](#) .

3.1 Assembly overview - oil pump, sump, balancer shaft module with chain drive

1 - 15 Nm

2 - Sealing flange

- ☐ With seal.
- ☐ Must seat on dowel sleeves.
- ☐ To remove, first remove sump ➔ [page 117](#) .
- ☐ Removing and installing ➔ [page 35](#) .
- ☐ Install with silicone sealant -D176404A2- .
- ☐ Do not additionally oil or grease the oil seal sealing lip.
- ☐ Before installing, remove oil residue from crankshaft journal using a clean cloth.
- ☐ Renewing crankshaft oil seal - belt pulley end ➔ [page 33](#) .

3 - Chain

- ☐ When removing mark direction of rotation with a permanent felt-tip pen.

4 - 25 Nm

- ☐ Insert without sealant.

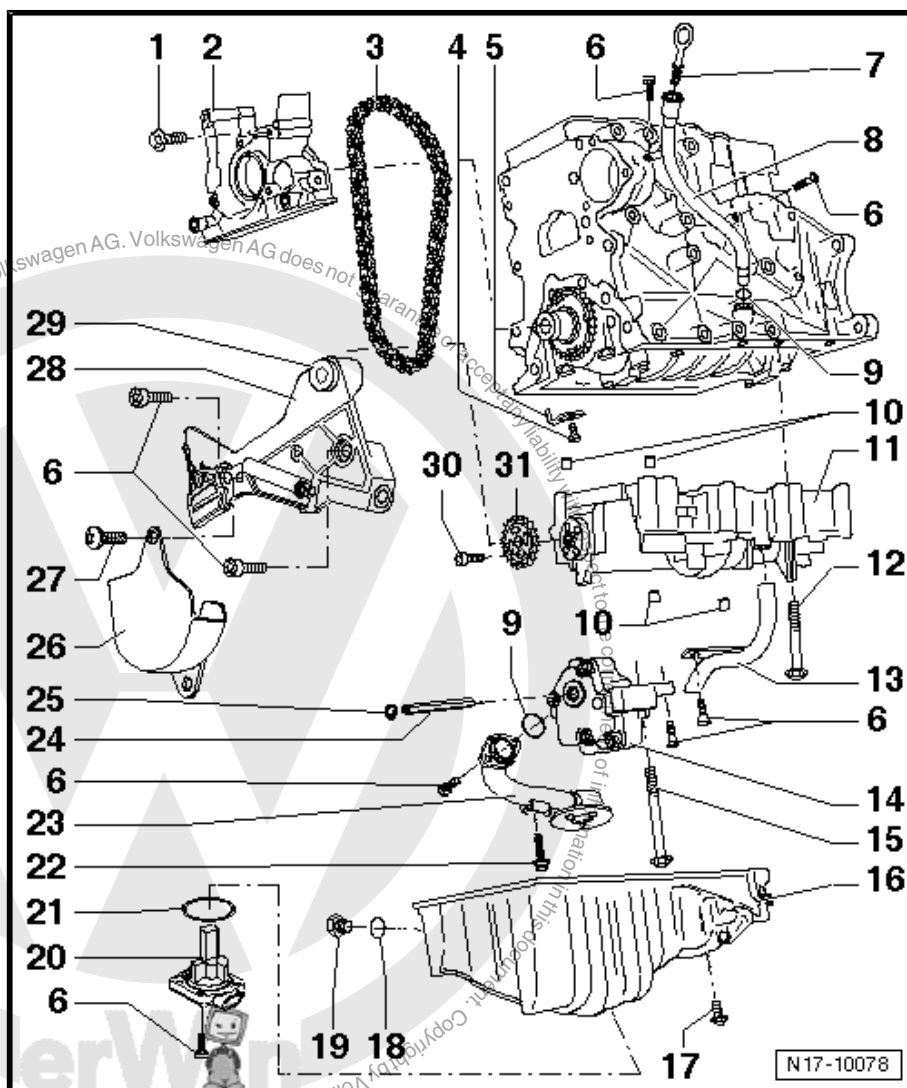
5 - Oil spray jet

- ☐ For piston cooling.

6 - 15 Nm

7 - Oil dipstick

- ☐ Lugs of oil dipstick and guide tube must align above one another.
- ☐ The oil level must not be above the max. mark!





- ☐ Markings ⇒ [page 86](#) .

8 - Guide tube

- ☐ For oil dipstick.
- ☐ Lugs of oil dipstick and guide tube must align above one another.

9 - O-ring

- ☐ Renew.

10 - Dowel sleeves

11 - Balancer shaft module

- ☐ Removing and installing ⇒ [page 98](#) .

12 - Securing bolt

- ☐ M8 = 20 Nm + 1/4 turn (90°) further.
- ☐ Renew.
- ☐ M7 = 13 Nm + 1/4 turn (90°) further.
- ☐ Renew.
- ☐ Observe tightening sequence ⇒ [page 98](#) .

13 - Guide tube

14 - Oil pump

- ☐ With 12 bar pressure relief valve.
- ☐ Before installing, check that both dowel sleeves are fitted for centring oil pump on cylinder block.
- ☐ Renew if running surfaces and gears are scored.
- ☐ Removing and installing ⇒ [page 95](#) .

15 - 13 Nm + 1/4 turn (90°) further

- ☐ Renew.

16 - Oil sump

- ☐ Removing and installing ⇒ [page 117](#) .
- ☐ Clean sealing surface before fitting.

17 - 15 Nm

18 - Seal

- ☐ Renew.

19 - Oil drain plug, 30 Nm

- ☐ If seal is leaking, nip open and renew.

20 - Oil level and oil temperature sender -G266-

21 - Seal

- ☐ Renew.

22 - 20 Nm + 1/4 turn (90°) further

- ☐ Renew.

23 - Suction line

- ☐ Clean strainer if soiled.

24 - Shaft

- ☐ For oil pump drive.

25 - Circlip

26 - Cover

27 - 6 Nm

- ☐ Insert with locking fluid -D 000 600 A2- .



28 - Chain tensioner

29 - 20 Nm

30 - 10 Nm + 1/4 turn (90°) further

☐ Renew.

31 - Chain sprocket

3.2 Removing and installing oil pump (for balancer shaft module with chain drive)

Special tools and workshop equipment required

◆ Torque wrench (5...50 Nm) -V.A.G 1331-

V.A.G 1331



W00-0427

◆ Locking pin -T10115-

T10115



W00-1231

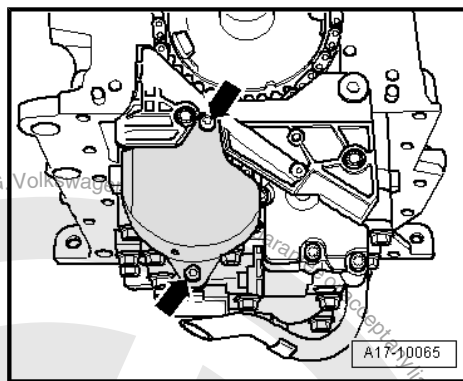
◆ Used oil collection and extraction unit -V.A.G 1782-

Removing

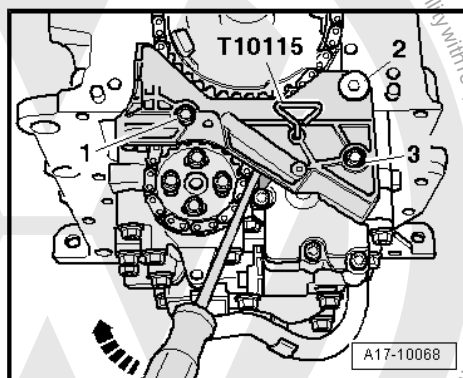
- Position crankshaft at TDC for cylinder No. 1.
- Remove toothed belt ⇒ [page 51](#) .
- Drain engine oil.
- Remove sump ⇒ [page 117](#) .
- Remove sealing flange ⇒ [page 35](#) .



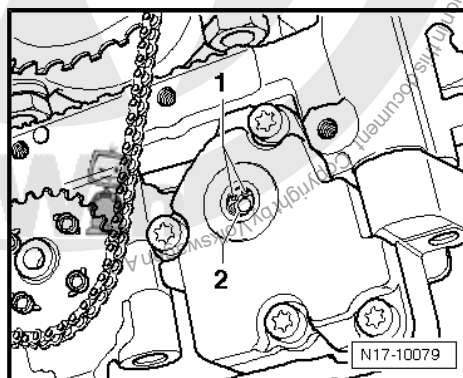
- Remove cover securing bolts -arrows- and remove cover.



- Push guide rail of chain tensioner in direction of arrow- with a screwdriver and secure chain tensioner with pin -T10115- .
- Remove chain tensioner securing bolts -1 and 3-.
- Loosen securing bolt -2- and remove chain tensioner.



- Remove circlip -1- using circlip pliers.
- Screw a M3 bolt in input shaft -2- and pull input shaft out of oil pump.
- Remove suction line from oil pump.



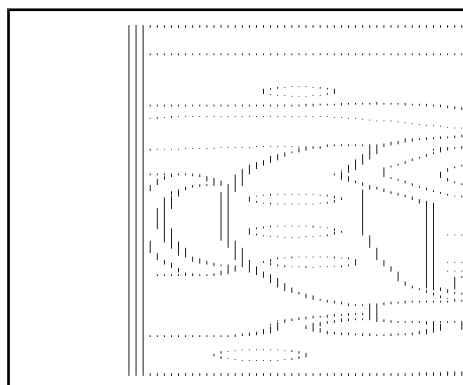
- Remove oil pump securing bolts -arrows- and remove oil pump downwards.

Installing



Note

Before installing check whether dowel sleeves are fitted in balancer shaft module.





- Install oil pump and tighten securing bolts -arrows- to correct specified torque:

M6 = 10 Nm

M7 = 13 Nm + 1/4 turn (90°) further (renew).

- Install oil pump suction line and tighten securing bolts to correct specified torque:

M6 = 10 Nm

M8 = 20 Nm + 1/4 turn (90°) further (renew).

- Install chain tensioner.

- First tighten securing bolt -2- to 20 Nm and then tighten securing bolts -1- and -3- to 10 Nm.

- Carefully push guide rail of chain tensioner in -direction of arrow- with a screwdriver to relieve tension on chain tensioner.

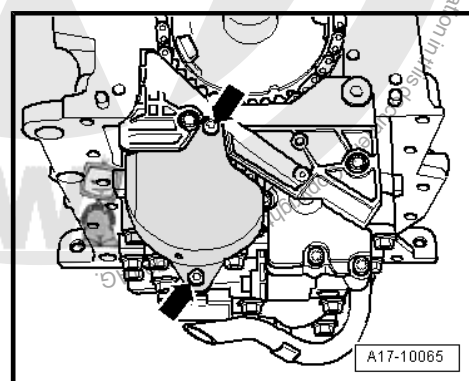
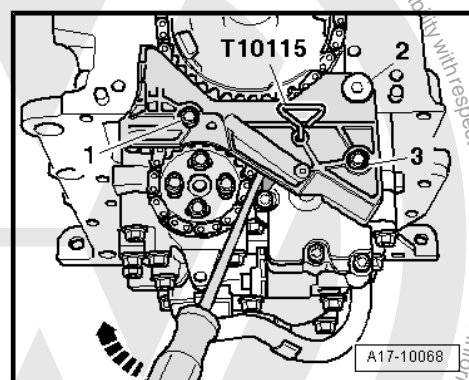
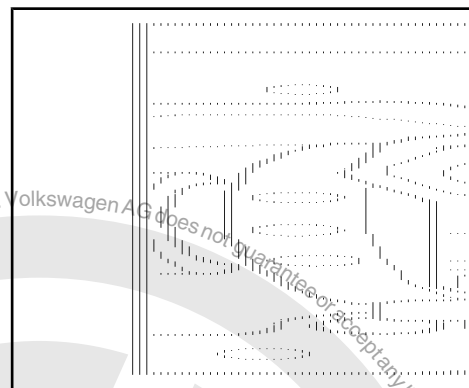
- Remove locking pin -T10115- from chain tensioner.



Note

Insert bolts for cover with locking fluid -D 000 600 A2- .

- Install cover and tighten bolts -arrows- to 6 Nm.
- Install sealing flange ⇒ [page 35](#) .
- Install sump ⇒ [page 117](#) .
- Install toothed belt ⇒ [page 51](#) .

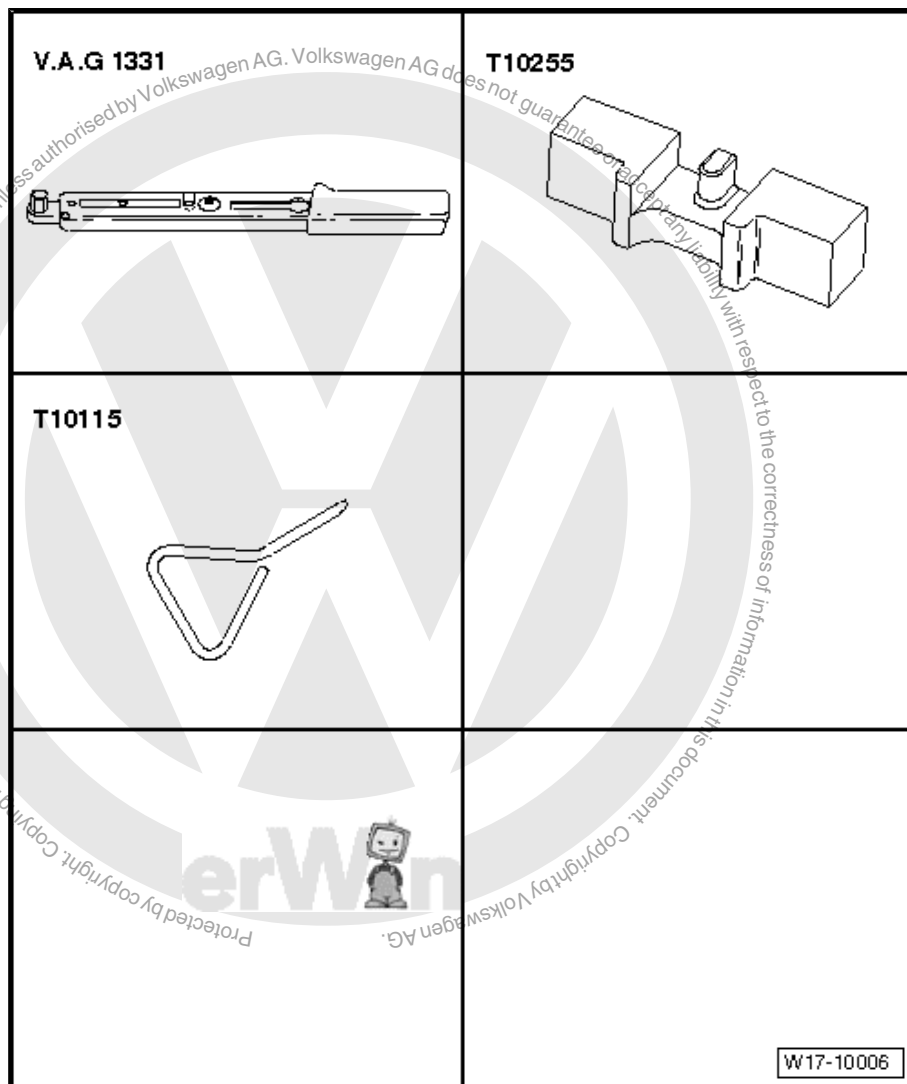




3.3 Removing and installing balancer shaft module with chain drive

Special tools and workshop equipment required

- ◆ Torque wrench (5...50 Nm)
-V.A.G 1331-
- ◆ Locking device -T10255-
- ◆ Locking pin -T10115-



Used oil collection and extraction unit -V.A.G 1782-

Removing

- Position crankshaft at TDC for cylinder No. 1.
- Remove toothed belt ➔ [page 51](#) .
- Drain engine oil.
- Remove sump ➔ [page 117](#) .
- Remove sealing flange ➔ [page 35](#) .

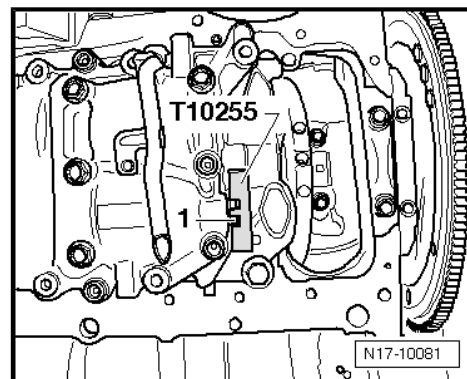


- Lock balancer shaft as shown using locking device -T10255- .

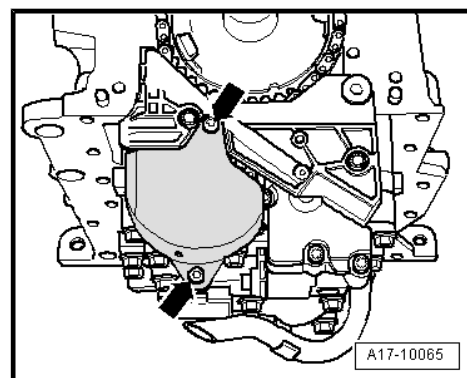


Note

When doing this the locking device -T10255- must engage in groove in balancer shaft -1-.



- Remove cover securing bolts -arrows- and remove cover.



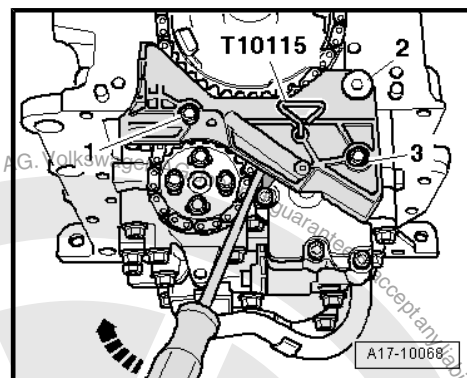
- Push guide rail of chain tensioner in -direction of arrow- with a screwdriver and secure chain tensioner with pin -T10115- .



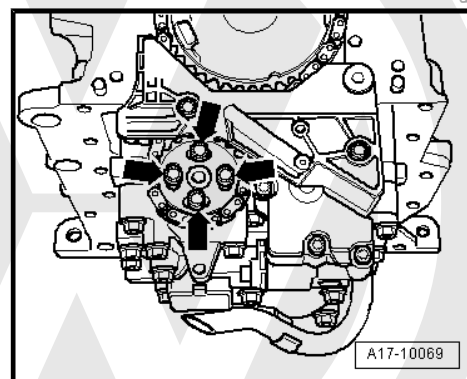
Note

Do not loosen bolt -2-.

- Remove securing bolts -1- and -3- for chain tensioner.



- Remove securing bolts -arrows- from chain sprocket and pull chain sprocket off balancer shaft.
- Remove suction line from oil pump





- Remove securing bolts in sequence -8...1-.
- Remove balancer shaft module.

Installing

Prerequisites

- Engine set to TDC No. 1 cylinder.
- Balancer shaft is locked with locking device -T10255- .



Note

Before installing check whether dowel sleeves are fitted in balancer shaft module.

- Install balancer shaft module and tighten all new securing bolts hand-tight.
- Then place chain sprocket onto shaft so that the bolt holes in the shaft are central in elongated holes in chain sprocket.



Note

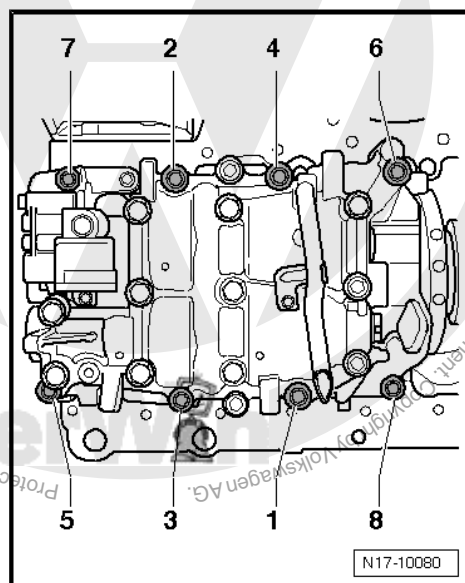
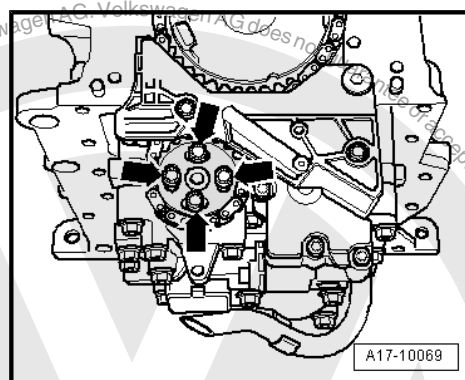
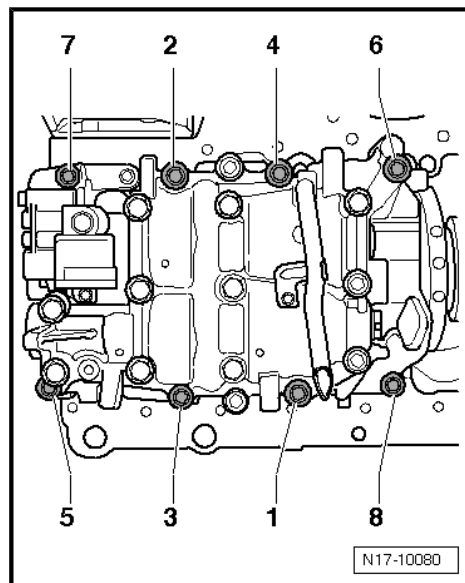
Turn chain sprocket one tooth further if the bolt holes do not lie centrally in elongated holes. The balancer shaft module must be unscrewed again for this.

- Tighten the new securing bolts -arrows- hand-tight. Then loosen securing bolts about one turn.

- Then tighten the balancer shaft module securing bolts to the prescribed torque in the sequence -1...8-.

M7 = 13 Nm + 1/4 turn (90°) further.

M8 = 20 Nm + 1/4 turn (90°) further.



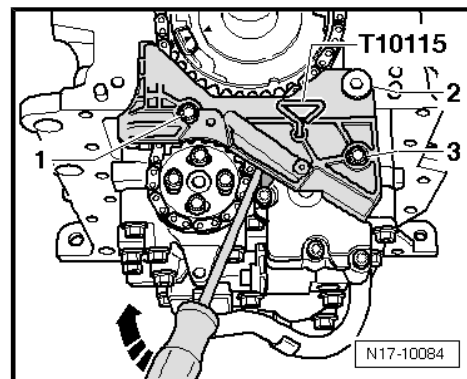


- Tighten securing bolts -1- and -3- to 10 Nm.
- Carefully push guide rail of chain tensioner in -direction of arrow- with a screwdriver to relieve tension on chain tensioner.
- Remove locking pin -T10115- from chain tensioner.



Note

Check marking arrows on uncoupled chain sprocket. Arrows must align.

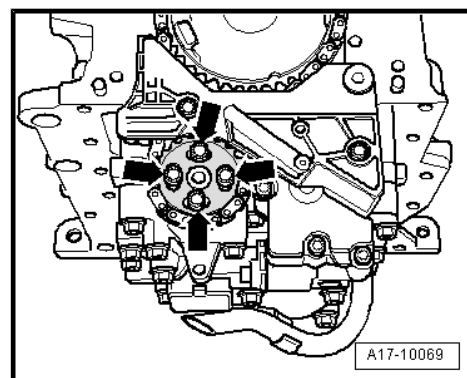


- Tighten the new securing bolts -arrows- for the chain sprocket. Specified torque: 10 Nm + 1/4 turn (90°) further.



Note

Insert bolts for cover with locking fluid -D 000 600 A2- .

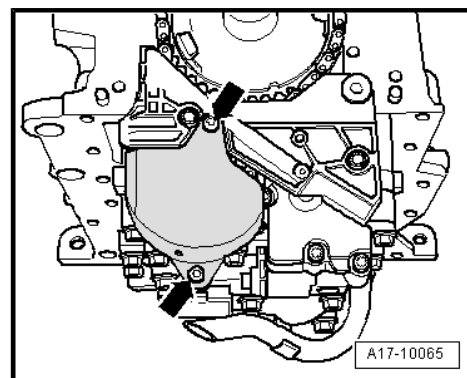


- Install cover and tighten bolts -arrows- to 6 Nm.
- Remove locking tool -T10255- .
- Install oil pump suction line and tighten securing bolts to correct specified torque:

M6 = 10 Nm

M8 = 20 Nm + 1/4 turn (90°) further (renew).

- Install sealing flange ➔ [page 35](#) .
- Install sump ➔ [page 117](#) .
- Install toothed belt ➔ [page 51](#) .



3.4 Retrofitting spur gear drive for balancer shaft module



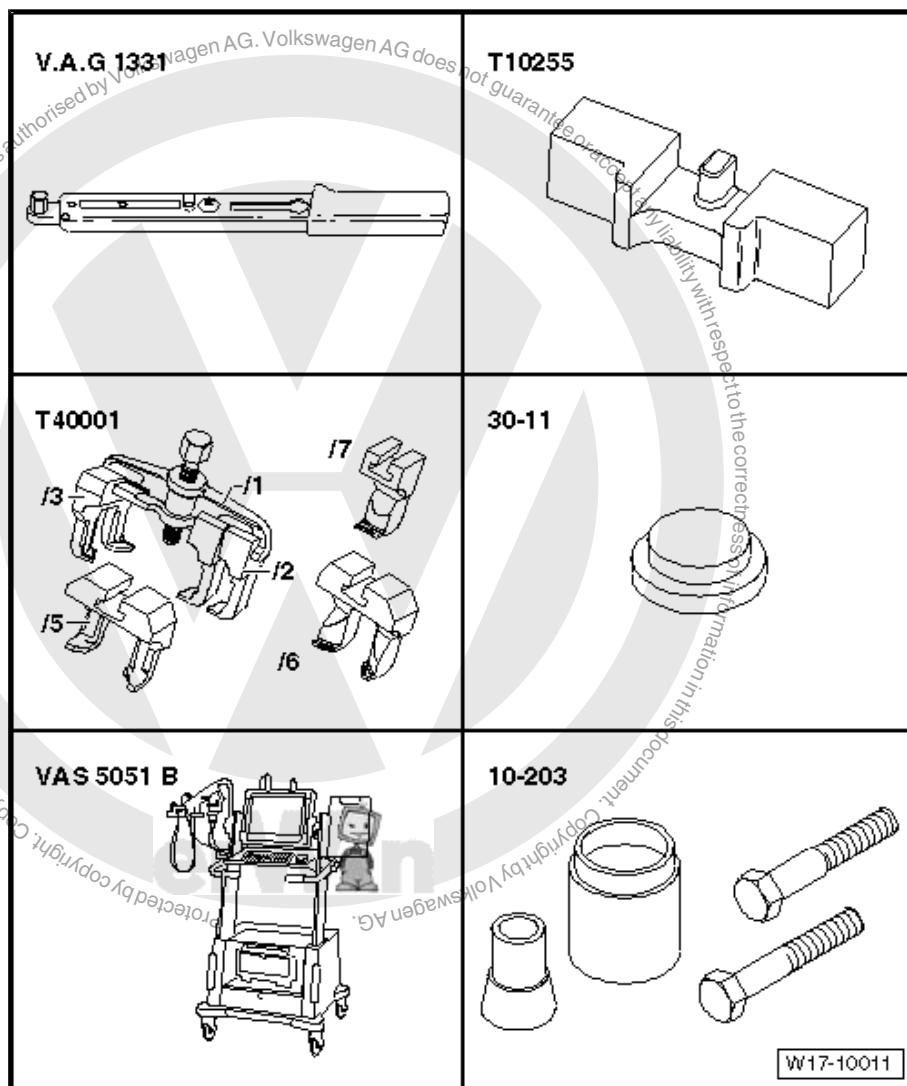
Note

When worn, the chain drive element of the balancer shaft module must be changed to a spur gear drive element. Chain drive balancer shaft modules are no longer available.

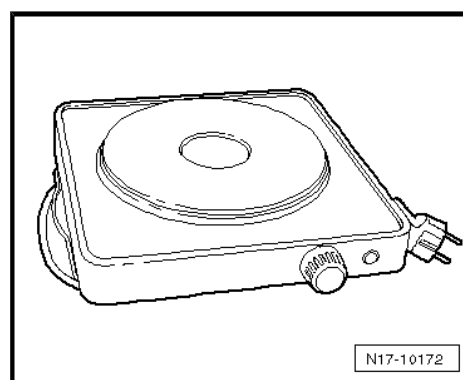


Special tools and workshop equipment required

- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Locking device -T10255-
- ◆ Locking pin -T10115-
- ◆ Two-arm puller -T40001- with claw -T40001/5- and claw -T40001/3-
- ◆ Thrust plate -30-11-
- ◆ Temperature gauge -VAS 6519- or hand-held multi-meter -V.A.G 1526D- in combination with temperature sensor -V.A.G 1526D/1-



- ◆ Commercially available hotplate



Procedure

- Remove insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .
- Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liners .
- Remove balancer shaft module ⇒ [page 98](#) .



- Position two-arm puller -T40001- with thrust plate -30 - 11- on drive sprocket of crankshaft journal as shown.



Caution

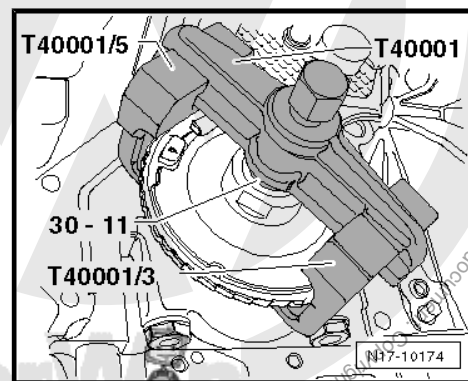
Ensure puller is positioned correctly. Crankshaft may suffer damage if sprocket is pulled of »skew«. The crankshaft is then unrepairable.

- Pull drive sprocket off crankshaft.



Note

- ◆ Check temperature when heating the new drive pulley using temperature gauge -VAS 6519- , or hand-held multimeter - V.A.G 1526D- in combination with temperature sensor -V.A.G 1526D/1- . To do this, push measuring tip of temperature sensor onto drive pulley.
- ◆ At a temperature of 200 °C there are approx. 4 seconds remaining to position the drive pulley onto crankshaft.
- ◆ There is more time for positioning at a higher temperature (220 °C = approx. 6 seconds).
- ◆ Ensure absolute cleanliness on crankshaft end.



Caution

The maximum temperature of 240 °C must not be exceeded, because this will lead to discolouring and distortion of the drive pulley.

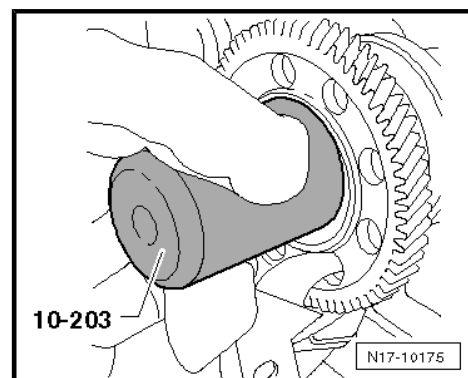
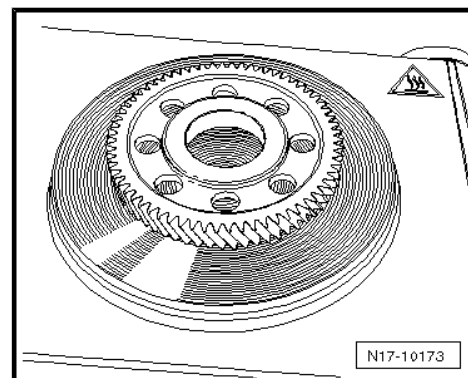
- Place new spur drive gear completely onto a commercially available hot plate and heat to at least 200 °C, maximum 240 °C. The inscription faces upwards.



WARNING

There is a risk of burning. Wear suitable protective gloves for further procedure.

- Grasp new drive gear with a pair of pliers once temperature has been achieved. Ensure you do not damage the teeth.
- Slide gear quickly onto crankshaft journal as far as the stop without canting the gear. Use puller -10 - 203- as an aid.
- Allow the drive gear to cool down a few minutes and then install new balancer shaft module ➔ [page 111](#) .





3.5 Assembly overview - oil pump, sump, balancer shaft module with spur gear drive

1 - Oil sump

- ☐ Removing and installing
⇒ [page 117](#) .
- ☐ With oil level and oil temperature sender - G266- ⇒ [page 106](#) .
- ☐ If an oil level sender is not installed, use sealing cap ⇒ ETKA (electronic parts catalogue) .

2 - 15 Nm

3 - Intake connecting pipe

- ☐ Clean strainer if soiled.

4 - 10 Nm

5 - O-ring

- ☐ Renew.

6 - Oil pump

- ☐ Removing and installing
⇒ [page 107](#) .
- ☐ Before installing, check that the two dowel sleeves for centring oil pump on balancer shaft module are fitted.

7 - Drive shaft for oil pump

8 - Circlip

- ☐ Must lie in base of groove.
- ☐ Renew damaged or over-tensioned circlip.

9 - Spur gear for balancer shaft

10 - 20 Nm + 90° (1/4 turn) further

- ☐ Renew.

11 - Hub

- ☐ For intermediate gear wheel.
- ☐ Renew.

12 - 90 Nm + 90° (1/4 turn) further

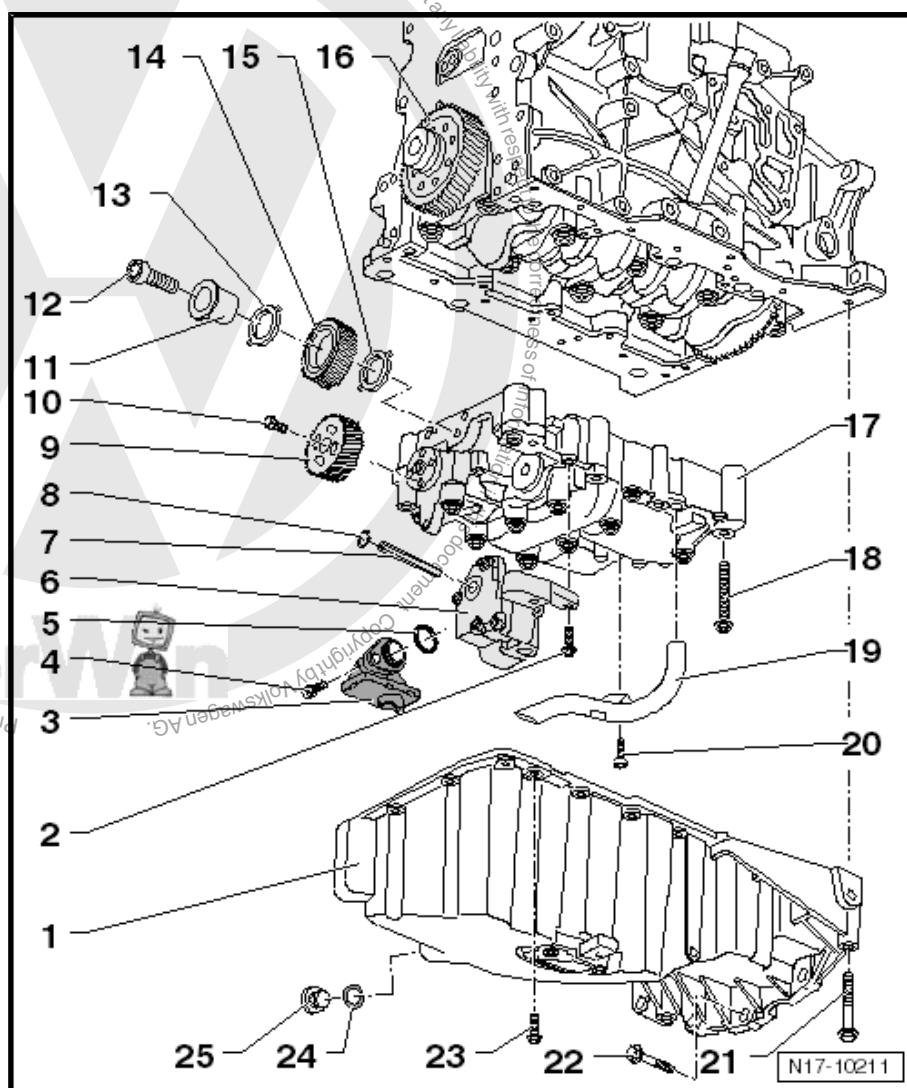
- ☐ Renew.

13 - Thrust washer

- ☐ For intermediate gear wheel.
- ☐ Renew.
- ☐ Note installation position ⇒ [page 106](#) .

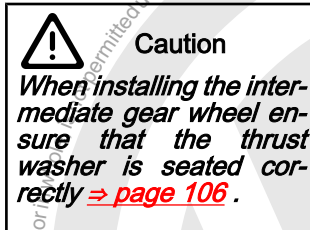
14 - Intermediate gear wheel

- ☐ Renew.
- ☐ A coating is applied to the new intermediate gear wheel which sets the correct tooth backlash through wear.





- ☐ When intermediate gear wheels are coated to areas around the circumference, a white spot is fitted to ensure correct installation position.
- ☐ The intermediate gear wheel without white spot is fully coated around the circumference.



- ☐ Installation position: Part number must be visible.
- ☐ Installing => [page 111](#) .

15 - Thrust washer

- ☐ For intermediate gear wheel.
- ☐ Renew.
- ☐ Note installation position => [page 106](#) .
- ☐ When installing intermediate gear wheel, secure to housing with grease, if necessary

16 - Spur gear for crankshaft

17 - Balancer shaft module

- ☐ Removing => [page 107](#)
- ☐ Installing new balancer shaft module => [page 111](#) .
- ☐ Reinstalling previously run balancer shaft module => [page 115](#) .
- ☐ Before installing, check that the two dowel sleeves for centring balancer shaft module on cylinder block are fitted.

18 - M7 = 13 Nm + 90° (1/4 turn) further; M8 = 20 Nm + 90° (1/4 turn) further

- ☐ Renew.
- ☐ Note tightening sequence: installing new balancer shaft module => [page 111](#) , reinstalling previously run balancer shaft module => [page 115](#) .

19 - Oil extraction pipe

20 - 10 Nm

21 - 40 Nm

22 - 45 Nm

23 - 15 Nm

- ☐ Tighten in stages and in diagonal sequence.

24 - Seal

- ☐ Permanently attached to drain plug

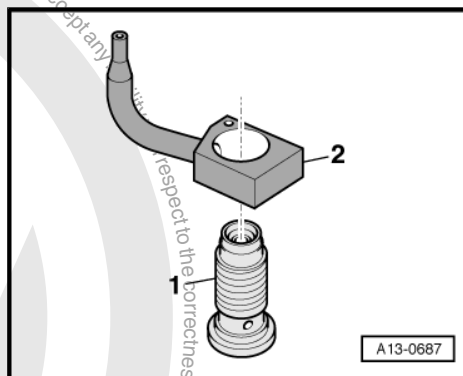
25 - Oil drain plug, 30 Nm

- ☐ With seal.
- ☐ Renew.



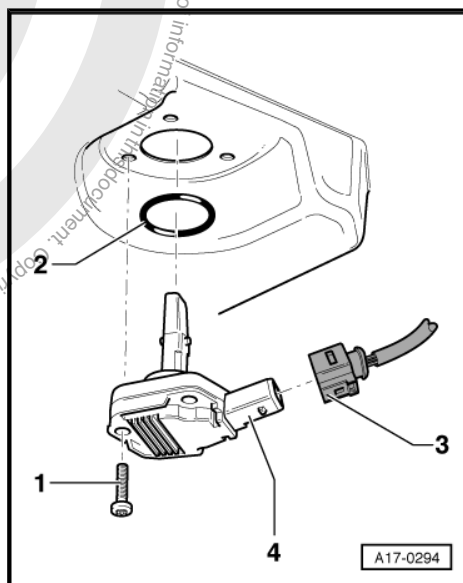
Oil spray jet and pressure relief valve

- 1 - Bolt with pressure relief valve, 27 Nm
- 2 - Oil spray jet (for cooling of pistons)



Removing and installing oil level and oil temperature sender - G266-

- 1 - Bolt -10 Nm-, self-locking, renew
- 2 - Seal; renew
- 3 - Electrical connector
- 4 - Oil level and oil temperature sender -G266-

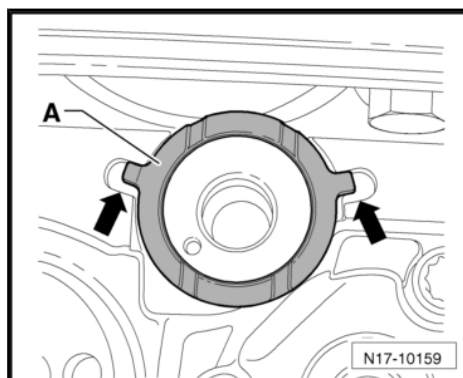


Thrust washer installation position



Caution

When installing intermediate gear wheel, ensure that thrust washer -A- does not slip out of indentations in balancer shaft housing -arrows- and becomes jammed. Secure to balancer shaft housing with grease if necessary.





3.6 Removing and installing oil pump (for balancer shaft module with spur gear drive)

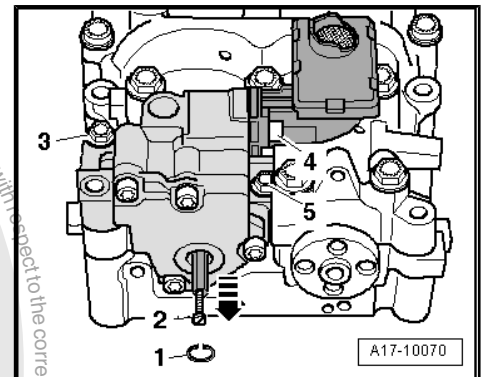
Removing

- Remove sump ➔ [page 117](#) .
- Remove circlip -1- using circlip pliers.
- Screw in a M3 bolt -2- and pull drive shaft out of oil pump -arrow-.
- Unscrew bolt -4- and pull intake connecting pipe off oil pump.
- Remove bolts -3- and -5- and remove oil pump.



Caution

Bolt on intermediate gear wheel must not be loosened.



Installing

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



Note

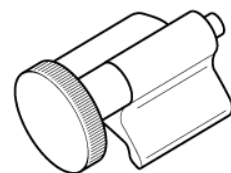
- ◆ Renew O-ring.
- ◆ Renew damaged or over-tensioned circlip.
- ◆ Circlip must lie in base of groove.
- Ensure both dowel sleeves are in place before installing oil pump.
- Install sump ➔ [page 117](#) .

3.7 Removing balancer shaft module with spur gear drive

Special tools and workshop equipment required

- ◆ Crankshaft stop -T10050- for engines with round crankshaft toothed belt pulley

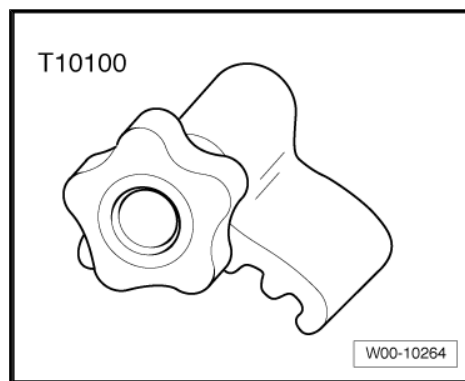
T10050



W00-0991

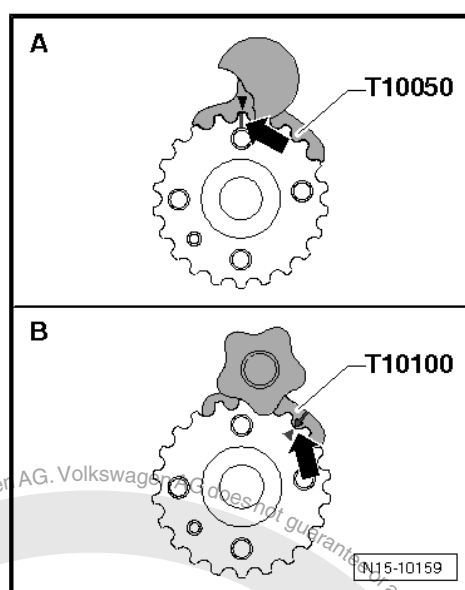


- ◆ Crankshaft stop -T10100- for engines with oval crankshaft toothed belt pulley

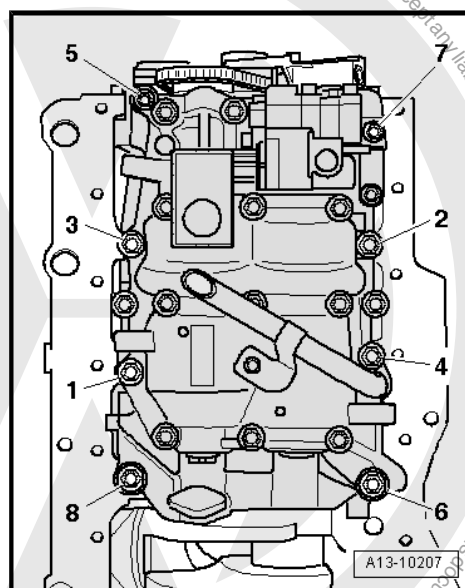


Procedure

- Remove sump ⇒ [page 117](#) .
- Turn crankshaft to TDC and lock with crankshaft stop - T10050- for engines with a round crankshaft toothed belt pulley or with crankshaft stop -T10100- for engines with an oval crankshaft toothed belt pulley.



- Unscrew bolts in sequence -8 ... 1- and remove balancer shaft module with oil pump.

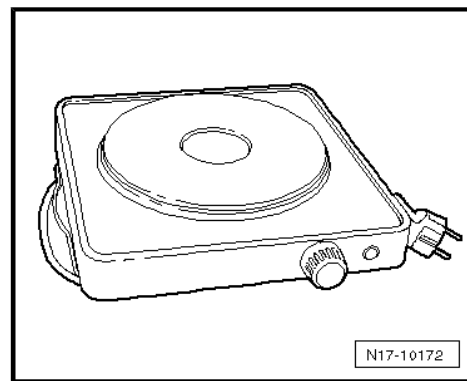


3.8 Renewing spur gear for crankshaft

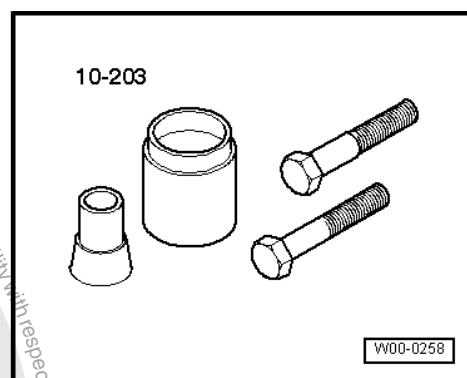
Special tools and workshop equipment required



- ◆ Commercially available hotplate



- ◆ Fitting tool -10 - 203-



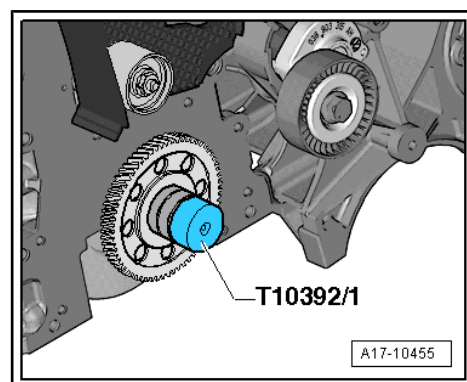
- ◆ Puller -T10392-
- ◆ Thrust piece -T10392/1-
- ◆ Temperature gauge -VAS 6519- or hand-held multimeter - V.A.G 1526D- in combination with temperature sensor -V.A.G 1526D/1-

Remove sealing flange (belt pulley end) ➤ [page 35](#) .

- Removing sump ➤ [page 117](#) .
- Remove balancer shaft module ➤ [page 107](#)

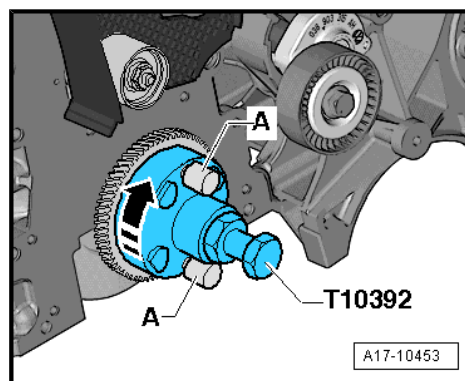
Pulling off spur gear

- Insert thrust piece -T10392/1- in crankshaft end.





- Insert puller -T10392- into holes of spur gear and turn clockwise -arrow-, screw in locating pins -A-.



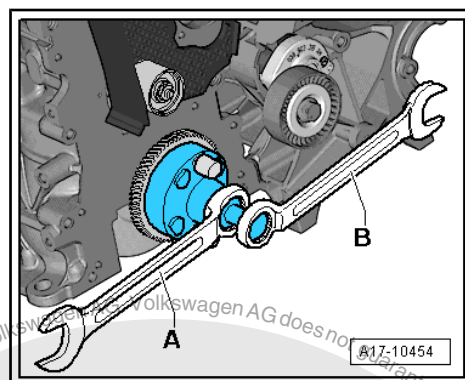
- Counterhold crankshaft with ring spanner -A-, pull spur gear off crankshaft journal by screwing spindle in using ring spanner -B- or ratchet.

Shrink-fitting spur gear



Note

- ♦ Check temperature when heating the new drive pulley using temperature gauge -VAS 6519-, or hand-held multimeter -V.A.G 1526D- in combination with temperature sensor -V.A.G 1526D/1-. To do this, push measuring tip of temperature sensor onto drive pulley.
- ♦ At a temperature of 200 °C there are approx. 4 seconds remaining to position the drive pulley onto crankshaft.
- ♦ There is more time for positioning at a higher temperature (220 °C = approx. 6 seconds).
- ♦ Ensure absolute cleanliness on crankshaft end.



Caution

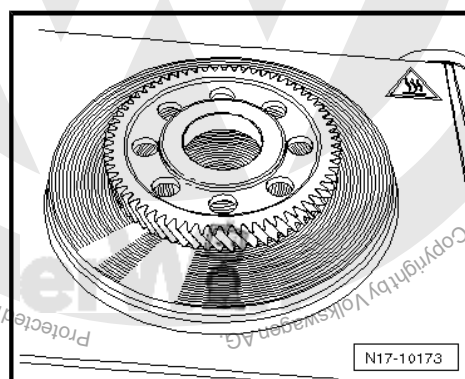
The maximum temperature of 240 °C must not be exceeded, because this will lead to discolouring and distortion of the drive pulley.

- Place new spur gear onto a commercially available hot plate and heat to at least 200 °C, maximum 240 °C. The inscription faces upwards.



WARNING

There is a risk of burning. Wear suitable protective gloves for further procedure.



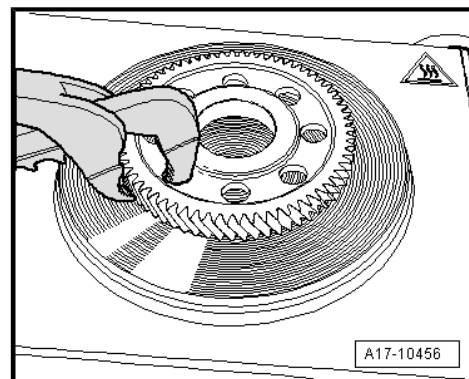


- When the temperature is reached, take spur gear up using pliers, as shown in illustration.

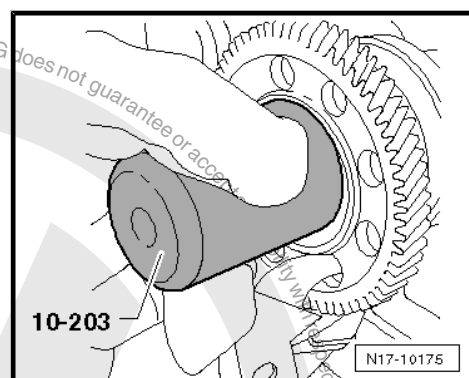


Note

Take care not to damage the splines on the spur gear.



- Slide spur gear quickly by hand without canting onto crankshaft end until stop using fitting tool -10 - 203.
- Allow the spur gear to cool down a few minutes and then install balancer shaft module ➔ [page 111](#).



3.9 Installing balancer shaft module

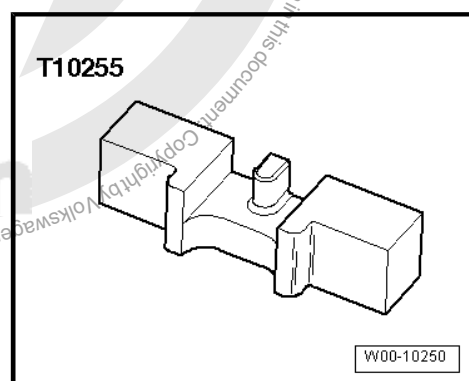
Installing a new balancer shaft module ➔ [page 111](#)

Installing a previously used balancer shaft module again
➔ [page 115](#)

3.9.1 Installing a new balancer shaft module

Special tools and workshop equipment required

- ◆ Locking device -T10255-





Procedure



Note

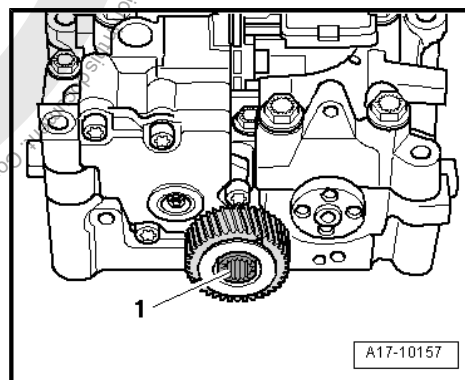
- ◆ *The spur gear drive of the balancer shaft module must be installed with correct tooth backlash.*
- ◆ *A coating is applied to the new intermediate gear wheel to set the correct tooth backlash.*
- ◆ *Intermediate gear wheels with white spot are coated to areas around the circumference, the intermediate gear wheel without white spot is fully coated around the circumference.*
- ◆ *The coating is quickly worn away which in turn sets the correct tooth backlash.*
- ◆ *For this reason a new balancer shaft module must always be installed with a new intermediate gear wheel with special coating.*
- ◆ *A white spot is positioned only on partly coated intermediate gear wheel to ensure correct installation position.*
- ◆ *For intermediate gear wheels with coating around the circumference the installation position is not relevant.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- Crankshaft locked with crankshaft stop -T10100- .



Caution

The threaded connection of intermediate gear wheel must be loosened to position the balancer shaft module. When doing this, do not loosen the bolt fully to prevent that the thrust washer does not slip behind the intermediate gear wheel. Thrust washer installation position ⇒ [page 106](#)

- Before positioning balancer shaft module on cylinder block, loosen bolt -1- for intermediate gear wheel approx. 45° (1/8 turn).
- Ensure both dowel sleeves are in place to correctly position the balancer shaft module on the cylinder block.





- Position balancer shaft module on cylinder block, observe correct position of partly coated intermediate gear wheel when doing this:
- The white spot -arrow- on the intermediate gear wheel must be positioned centrally on the crankshaft.



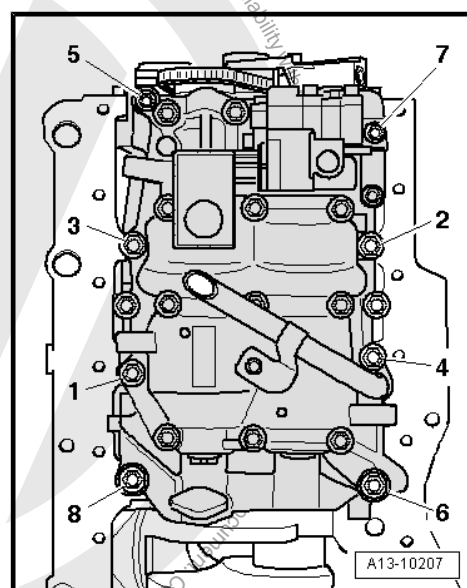
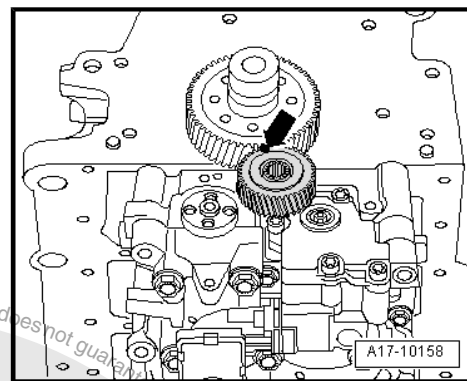
Note

- ◆ Take care not to damage the coating on the intermediate gear wheel.
- ◆ Due to the gear ratio the white spot -arrow- will not be in its original position after turning the engine over.

- Tighten bolts of balancer shaft module as follows:

Tightening sequence - balancer shaft module with 8 bolted connection points

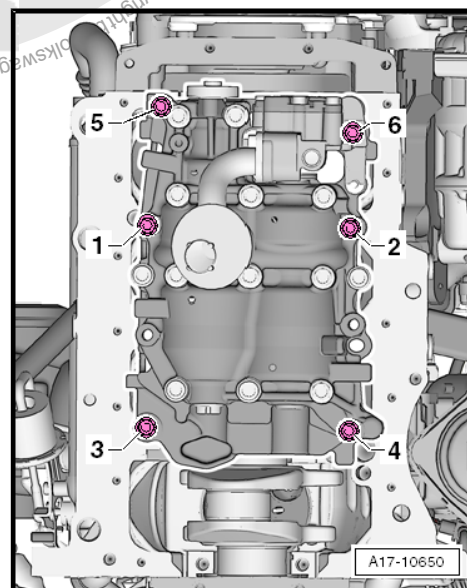
Stage	Bolts	Specified torque/ additional specified angle
1.	-1 ... 8-	Hand-tighten in sequence
2.	-1 ... 8-	Initially tighten in sequence to 6 Nm.
3.	-1 ... 4-	Tighten to 20 Nm.
4.	-5-	Tighten to 13 Nm.
5.	-6-	Tighten to 20 Nm.
6.	-7-	Tighten to 13 Nm.
7.	-8-	Tighten to 20 Nm.
8.	-1 ... 8-	Turn bolts 90° further in sequence using a fixed wrench.



Tightening sequence - balancer shaft module with 6 bolted connection points

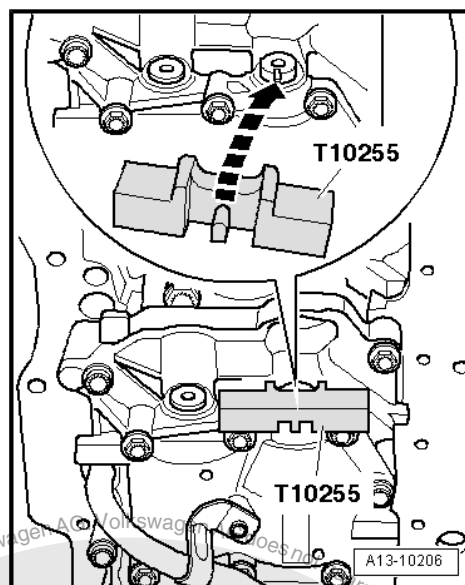
- Tighten bolts of balancer shaft module as follows:

Stage	Bolts	Specified torque/ additional specified angle
1.	-1 ... 6-	Hand-tighten in sequence
2.	-1 ... 6-	Initially tighten bolts in sequence to 6 Nm.
3.	-1 ... 4-	Tighten to 20 Nm.
4.	-5 and 6-	Tighten to 13 Nm.
5.	-1 ... 6-	Turn bolts 90° further in sequence using a fixed wrench.





- Lock balancer shaft using locking tool -T10255- , turn balancer shaft if necessary.
- Locking tool pin must engage in groove in balancer shaft when doing this.

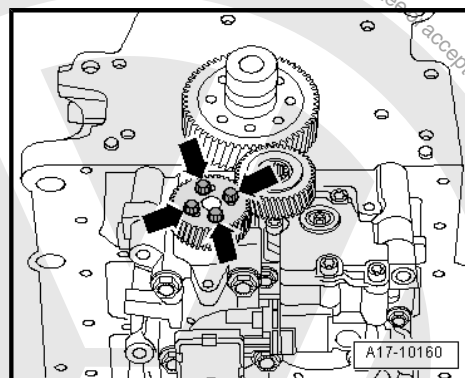


- Carefully fit the balancer shaft gear wheel onto the balancer shaft, push intermediate gear wheel slightly to side for this.



Note

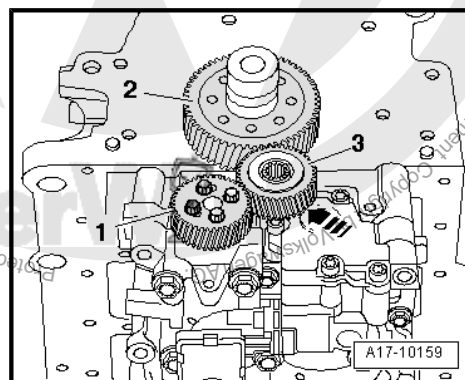
- ◆ Ensure the threaded holes in the balancer shaft are as central as possible within the elongated holes of the balancer shaft gear wheel.
- ◆ If the elongated holes in the balancer shaft gear wheel cannot be aligned to the threaded holes, then the balancer shaft gear wheel must be turned by the respective number of teeth and fitted again.



- Tighten bolts for balancer shaft gear wheel -arrows-.
- Remove locking tool -T10255- .

The following 3 procedures must be performed simultaneously (2nd mechanic required):

- Press intermediate gear wheel -3- forcefully (with assistance of a wooden rod if necessary) in -direction of arrow- into teeth of drive gear wheel -2- and balancer shaft gear wheel -1- (meshing together).
- Turn balancer shaft gear wheel lightly anti-clockwise for this.
- Tighten new bolt for intermediate gear wheel
⇒ [Item 12 \(page 104\)](#) .
- Remove crankshaft stop.



Note

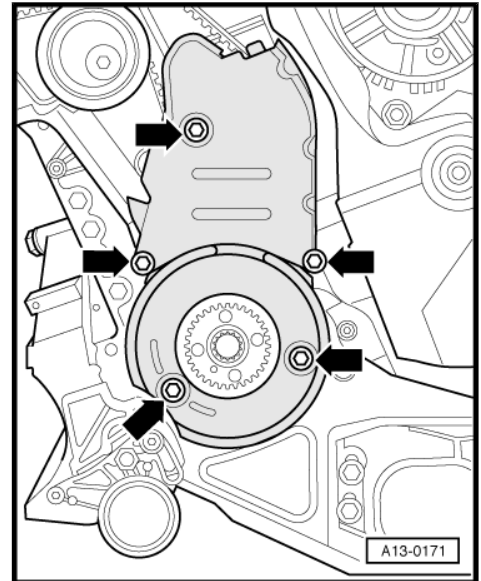
No backlash may be perceptible after installing intermediate gear wheel. This can be checked by hand using light force.



- Install lower toothed belt guard -arrows-.

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

- Install sump ➔ [page 117](#) .
- Install belt pulley vibration damper (renew securing bolts).
Specified torque: 10 Nm + 90° (1/4 turn) further.



3.9.2 Installing a previously used balancer shaft module again



Caution

If the intermediate gear wheel bolt was loosened, the drive gear wheel on crankshaft was renewed or the crankshaft was removed, a new intermediate gear wheel with coating must be installed and the hub ➔ [Item 11 \(page 104\)](#) with bolt ➔ [item 12 \(page 104\)](#) and thrust washers must be renewed, otherwise the tooth backlash is incorrect. Procedure when installing ➔ [page 111](#) .

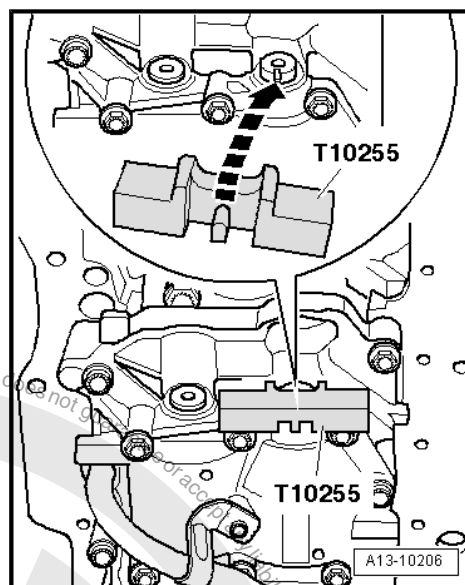


Note

- ◆ If the previously used balancer shaft module is to be reinstalled and the drive gear wheel on crankshaft was renewed or the crankshaft was removed, proceed as follows. The intermediate gear wheel must also not have been loosened.
- ◆ Renew the bolts tightened with specified tightening angle.



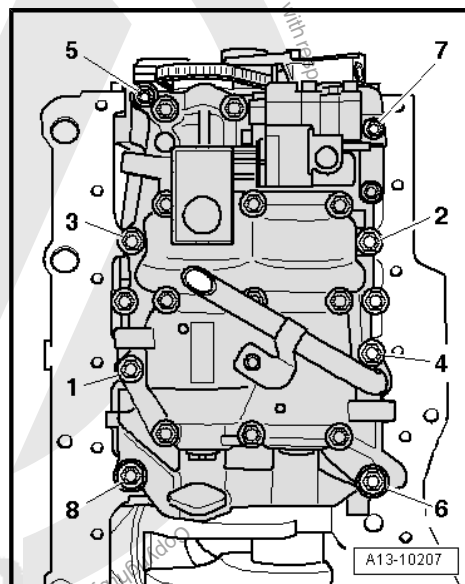
- Lock balancer shaft using locking tool -T10255- , turn balancer shaft if necessary.
- Locking tool pin must engage in groove in balancer shaft when doing this.
- Ensure both dowel sleeves are in place to correctly position the balancer shaft module on the cylinder block.
- Position balancer shaft on cylinder block.
- The intermediate gear wheel must mesh in the crankshaft drive gear wheel when the balancer shaft is locked.
- The intermediate gear wheel must have a slight tooth backlash.



Tightening sequence - balancer shaft module with 8 bolted connection points

- Tighten bolts of balancer shaft module as follows:

Stage	Bolts	Specified torque/ additional specified angle
1.	-1 ... 8-	Hand-tighten in sequence
2.	-1 ... 8-	Initially tighten in sequence to 6 Nm.
3.	-1 ... 4-	Tighten to 20 Nm.
4.	-5-	Tighten to 13 Nm.
5.	-6-	Tighten to 20 Nm.
6.	-7-	Tighten to 13 Nm.
7.	-8-	Tighten to 20 Nm.
8.	-1 ... 8-	Turn bolts 90° further in sequence using a fixed wrench.

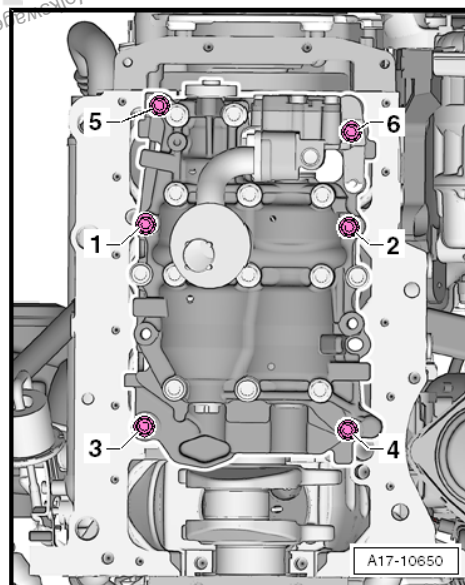


Tightening sequence - balancer shaft module with 6 bolted connection points

- Tighten bolts of balancer shaft module as follows:

Stage	Bolts	Specified torque/ additional specified angle
1.	-1 ... 6-	Hand-tighten in sequence
2.	-1 ... 6-	Initially tighten bolts in sequence to 6 Nm.
3.	-1 ... 4-	Tighten to 20 Nm.
4.	-5 and 6-	Tighten to 13 Nm.
5.	-1 ... 6-	Turn bolts 90° further in sequence using a fixed wrench.

- Remove crankshaft stop.

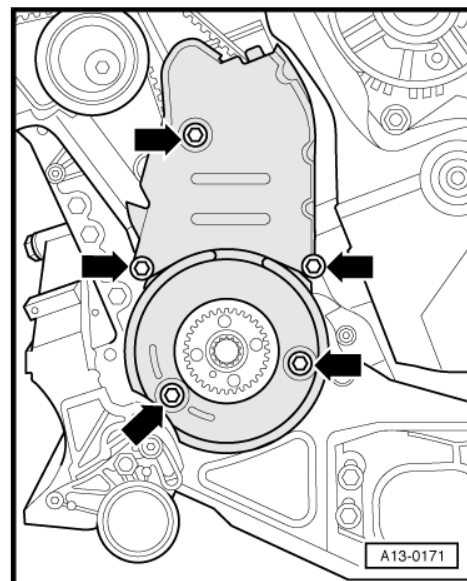




- Install lower toothed belt guard -arrows-.

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

- Install sump ➔ [page 117](#) .
- Install belt pulley vibration damper (renew securing bolts). Specified torque: 10 Nm + 90° (1/4 turn) further.



3.10 Removing and installing oil sump

Special tools and workshop equipment required

- ◆ Jointed wrench 10 mm - VAS 3185-
- ◆ Hexagon key extension, 5 mm -VAS 3249-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Used oil collection and extraction unit -V.A.G 1782-

3185	3249
V.A.G 1331	V.A.G 1782
	W17-10007



- ◆ Silicone sealant -D176404A2-
- ◆ Hand drill with plastic brush attachment
- ◆ Eye protection
- ◆ Flat scraper

Removing

- Remove noise insulation tray ⇒ Rep. gr. 50 .
- Place used oil collection and extraction unit -V.A.G 1782- under engine and drain engine oil.



Note

Observe environmental regulations for disposal.

- Pull connector off oil level and oil temperature sender -G266- .
- Remove connecting bolts for sump to gearbox.
- Remove sump.
- Loosen sump with light blows of a rubber headed hammer if necessary.
- Remove sealant residue from cylinder block using a flat scraper.



WARNING

Wear eye protection.

- Remove sealant residue on sump with a rotating brush, e.g. a hand drill with a plastic brush.
- Clean sealing surfaces. They must be free of oil and grease.

Installing



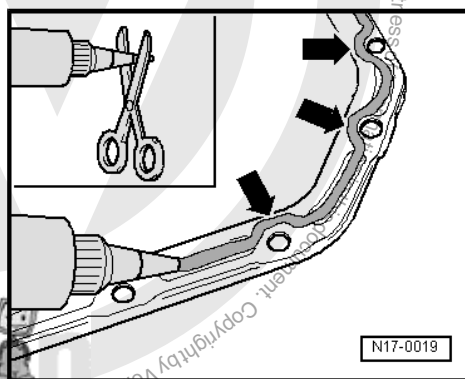
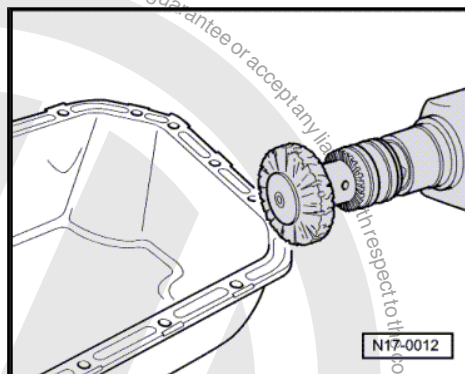
Note

- ◆ *Observe expiry date of sealing compound.*
- ◆ *The sump must be installed within 5 minutes of applying silicone sealing compound.*
- Cut off tube nozzle at forward marking (Ø of nozzle approx. 3 mm).
- Apply silicone sealing compound, as shown, to clean sealing surface on sump. Sealant bead must be:
 - ◆ 2...3 mm thick.
 - ◆ Run bead along inner side of bolt holes -arrows-.



Note

The sealant bead must not be thicker, otherwise excess sealing compound will enter the oil sump and may block the oil suction line strainer.





- Apply silicone sealing compound bead as shown to the clean sealing surface of the sump. (The figure shows the position of the sealant bead on the cylinder block.)
- Install sump immediately and tighten the connecting bolts for sump to gearbox and all sump bolts lightly. Ensure that sump is flush against intermediate plate and gearbox flange.



Note

When installing sump with engine out of vehicle, ensure that sump is flush with cylinder block at flywheel end.

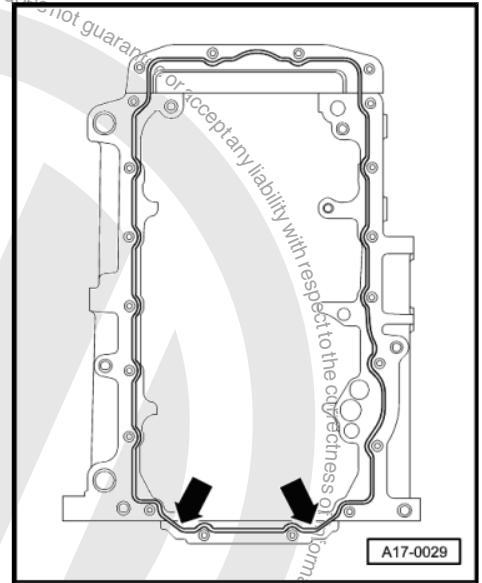
- Tighten sump bolts diagonally to 15 Nm.
- Tighten bolts securing sump to gearbox to 40 Nm.



Note

Let sealing compound dry for approx. 30 minutes after installing oil sump. Only then fill with engine oil.

Further assembly is basically the reverse of the dismantling sequence.





4 Oil filter bracket, oil cooler, oil pressure and oil supply line

Assembly overview - oil filter bracket and oil cooler
⇒ [page 120](#) .

Checking oil pressure and oil pressure switch ⇒ [page 121](#) .

Assembly overview -oil supply line to turbocharger ⇒ [page 123](#)

Removing and installing oil supply line to turbocharger
⇒ [page 123](#)

4.1 Assembly overview - oil filter bracket and oil cooler

1 - Seal

- ☐ Renew.

2 - 15 Nm + 1/4 turn (90°) further

- ☐ Renew.
- ☐ First fit upper left and lower right bolts and then tighten all four bolts diagonally.

3 - Oil filter bracket

- ☐ Ensure clearance to adjacent components.

4 - Seal

- ☐ Renew.

5 - Connection, 30 Nm

6 - Oil supply line, 22 Nm

- ☐ Removing and installing
⇒ [page 123](#) .
- ☐ To turbocharger.

7 - 0.7 bar oil pressure switch - F1-, 22 Nm

- ☐ Identification: brown.
- ☐ If seal is leaking, nip open and renew.
- ☐ Check ⇒ [page 121](#) .

8 - Sealing cap, 25 Nm

9 - O-ring

- ☐ Renew.

10 - Oil filter element

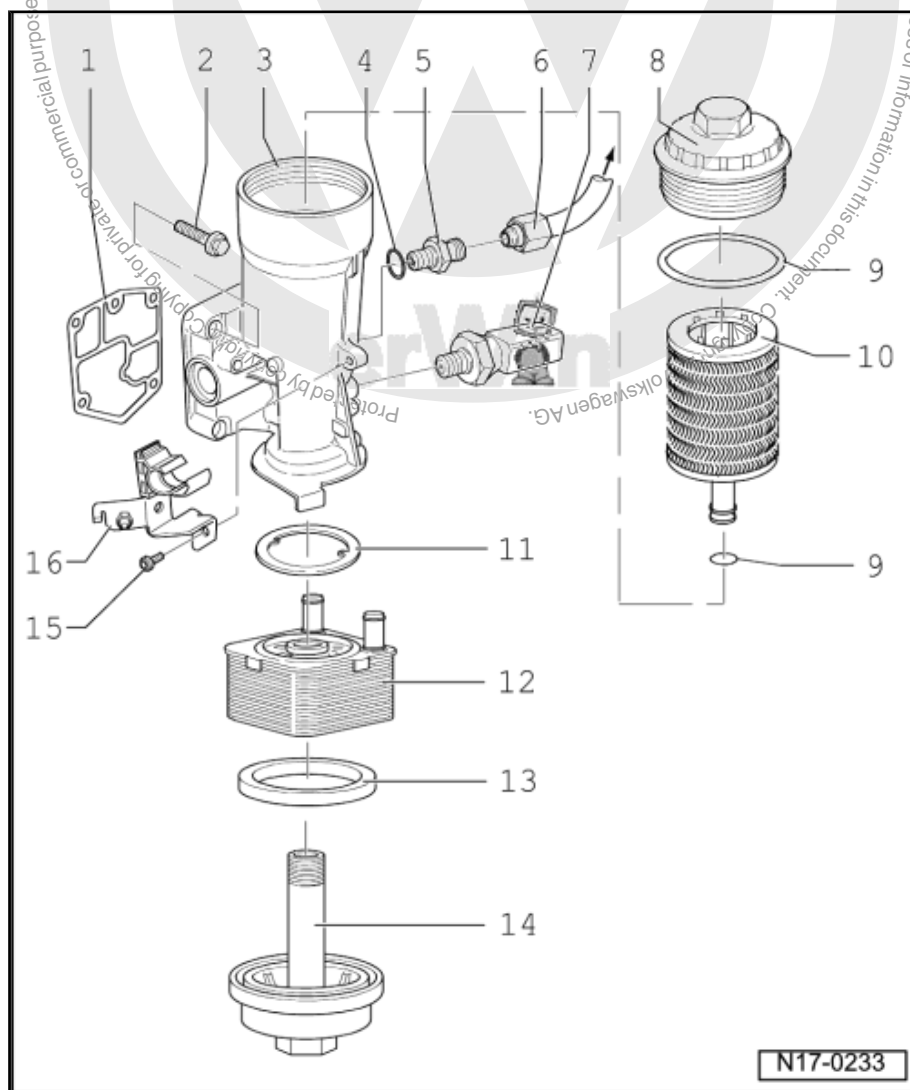
- ☐ See note.
- ☐ Observe change intervals.

11 - Seal

- ☐ Renew.
- ☐ Lubricate before installing.
- ☐ Fit into lugs on oil cooler.

12 - Oil cooler

- ☐ Ensure clearance to adjacent components.





- ☐ See note.
- ☐ Coolant hose schematic diagram ➔ [page 131](#) .
- ☐ Checking oil cooler for leaks ➔ [page 148](#) .

13 - Seal

- ☐ Renew.

14 - Plug, 25 Nm

15 - 10 Nm

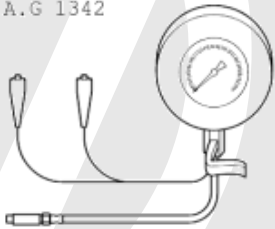
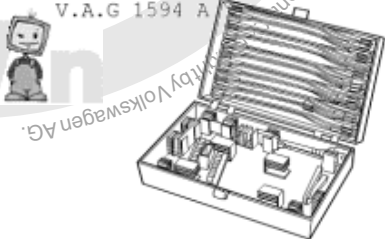
16 - Retainer

- ☐ For wiring harness.

4.2 Checking oil pressure and oil pressure switch

Special tools and workshop equipment required

- ◆ Oil pressure tester -V.A.G 1342/-
- ◆ Voltage tester -V.A.G 1527/ B-
- ◆ Auxiliary measuring set - V.A.G 1594/C-

V.A.G 1342 	V.A.G 1527 B 
V.A.G 1594 A 	
	W17-0001

Test prerequisites

- Engine oil level OK, checking ➔ [page 86](#) .
- Engine oil temperature at least 80 °C (radiator fan must have run once)

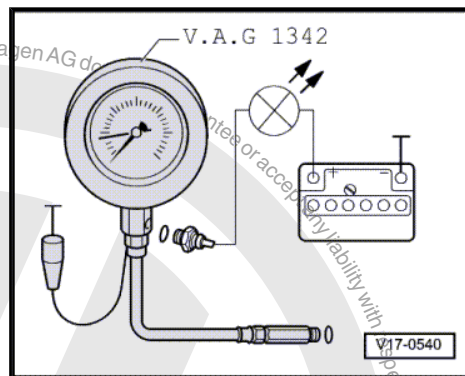


Note

Functional check and repair of the optical and acoustic oil pressure warning: ➔ Current flow diagrams, Electrical fault finding and Fitting locations

4.2.1 Checking oil pressure switch

- Remove 0.7 bar oil pressure switch -F1- -brown insulation- and screw into tester.
- Screw tester into oil filter bracket in place of oil pressure switch.
- Connect brown wire of tester to earth (-).
- Connect diode test lamp -V.A.G 1527 B- using auxiliary cables from -V.A.G 1594 A- to battery positive (+) and oil pressure switch. LED must not light up.
- Start engine and increase speed slowly. At 0.55...0.85 bar the LED must light up; otherwise renew oil pressure switch.



4.2.2 Checking oil pressure

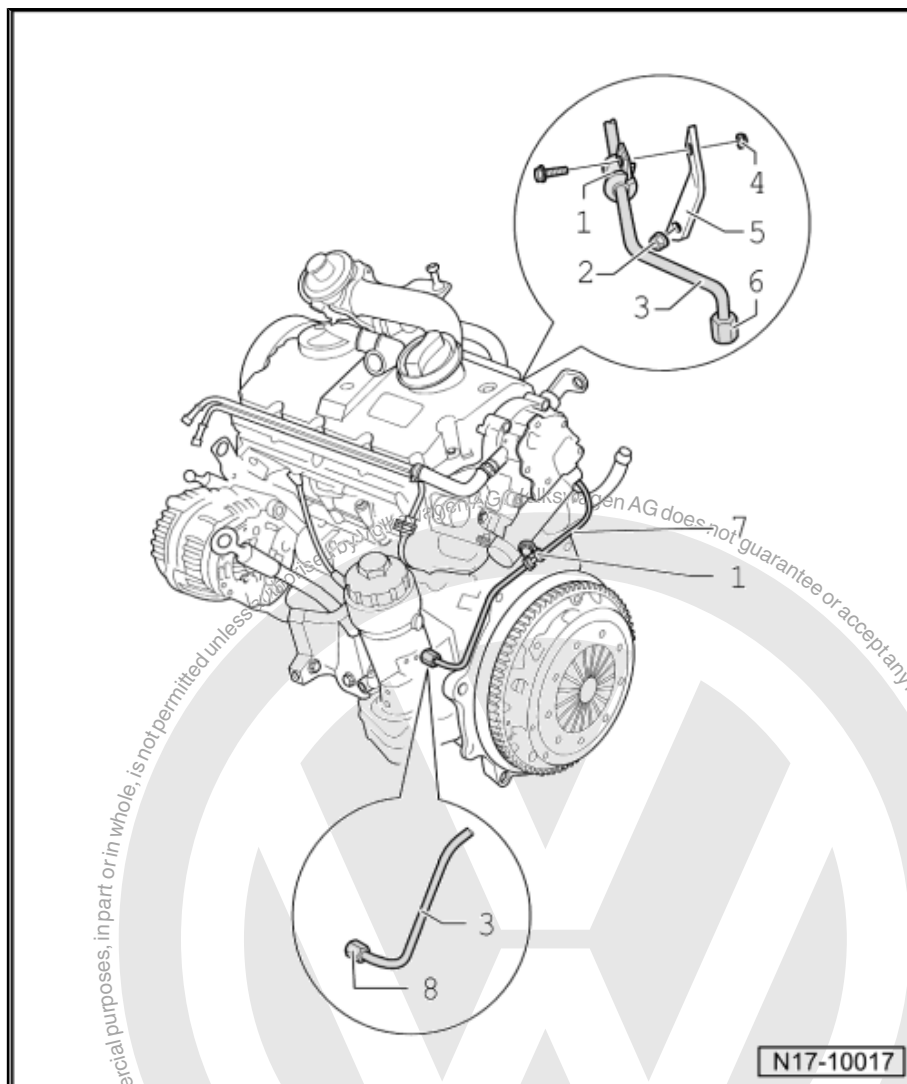
- Increase engine speed further. At 2000 rpm and an oil temperature of 80 °C the oil pressure should be at least 2.0 bar.

At higher engine speed, oil pressure must not exceed 7.0 bar. If necessary renew oil filter bracket.



4.3 Assembly overview - oil supply line to turbocharger

- 1 - Retaining clamp
- 2 - 25 Nm
 - ☐ Renew.
- 3 - Oil supply line
 - ☐ To turbocharger.
- 4 - 10 Nm
- 5 - Retainer
- 6 - Union nut, 22 Nm
- 7 - 10 Nm
- 8 - Union nut, 22 Nm



4.4 Removing and installing oil supply line to turbocharger

Removing

- Remove noise insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Remove air filter housing.
- Loosen union nuts on oil filter bracket and turbocharger.
- Loosen securing bolts for retaining clips.
- Remove oil supply line.



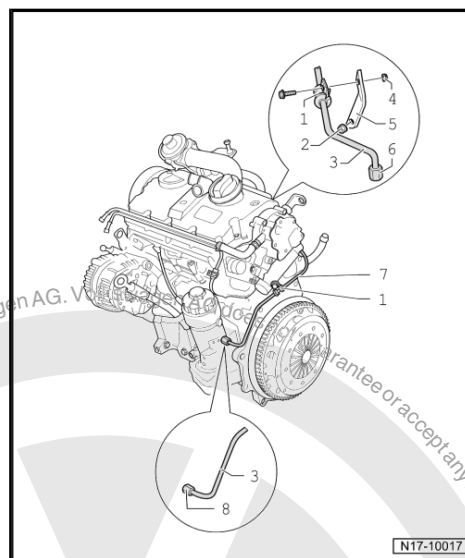
Installing



Note

The procedure must be followed to ensure that oil supply line is installed tension-free.

- Loosen securing nut -2- from retainer -5-.
- Start union nuts for oil supply line on connections.
- Tighten union nut -8- on oil filter bracket hand tight.
- Now tighten union nut -6- on turbocharger hand tight.
- First tighten union nut -8- on oil filter bracket and then union nut -6- on turbocharger to 22 Nm.
- Attach retaining clips -1- to brackets and tighten securing bolts to 10 Nm.
- Tighten securing nut -2- to 25 Nm.
- Install air filter housing and noise insulation tray.





19 – Cooling

1 Parts of cooling system



WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*



Note

- ◆ *When the engine is warm, the cooling system is under pressure. If necessary, release pressure before beginning repair work.*
- ◆ *Hoses are secured with spring-type clips. In case of repair, only use spring-type clips.*
- ◆ *Spring-type clip pliers -VAS 5024/- or hose clip pliers -V.A.G 1921/- are recommended for installation of spring-type clips.*
- ◆ *When installing coolant hoses, route stress-free so that they do not come into contact with other components (observe markings on coolant connection and hose).*

Test for leaks in cooling system using cooling system tester - V.A.G 1274/- and adapter for expansion tank -V.A.G 1274/8- and adapter for sealing cap -V.A.G 1274/9- .



Parts of cooling system - body side ➔ [page 126](#) ,

Parts of cooling system - engine side (Golf, Golf Plus, Touran)
➔ [page 127](#)

Parts of cooling system - engine side (Passat) ➔ [page 129](#)

Coolant hose schematic diagram ➔ [page 131](#) .

Draining and filling with coolant ➔ [page 134](#) .

Removing and installing radiator ➔ [page 140](#) .

Removing and installing coolant pump. ➔ [page 142](#)

Removing and installing thermostat. ➔ [page 144](#)

Checking cooling system for leaks ➔ [page 146](#) .

Checking oil cooler for leaks ➔ [page 148](#)

1.1 Parts of cooling system, body side

1 - Radiator

- ☐ Removing and installing
➔ [page 140](#) .
- ☐ After renewing, renew
entire coolant.

2 - O-ring

- ☐ Renew if damaged.

3 - Upper coolant hose

- ☐ Coolant hose schematic
diagram ➔ [page 131](#) .

4 - Cap

- ☐ Check using cooling
system tester -V.A.G
1274/- and adapter for
sealing cap -V.A.G
1274/9- .
- ☐ Test pressure: 1.4...1.6
bar.

5 - Connector

6 - 5 Nm

7 - Expansion tank

- ☐ Carry out leak test of
cooling system using
cooling system tester -
V.A.G 1274- and adapt-
er -V.A.G 1274/8- .

8 - Lower coolant hose

- ☐ Coolant hose schematic
diagram ➔ [page 131](#) .

9 - 5 Nm

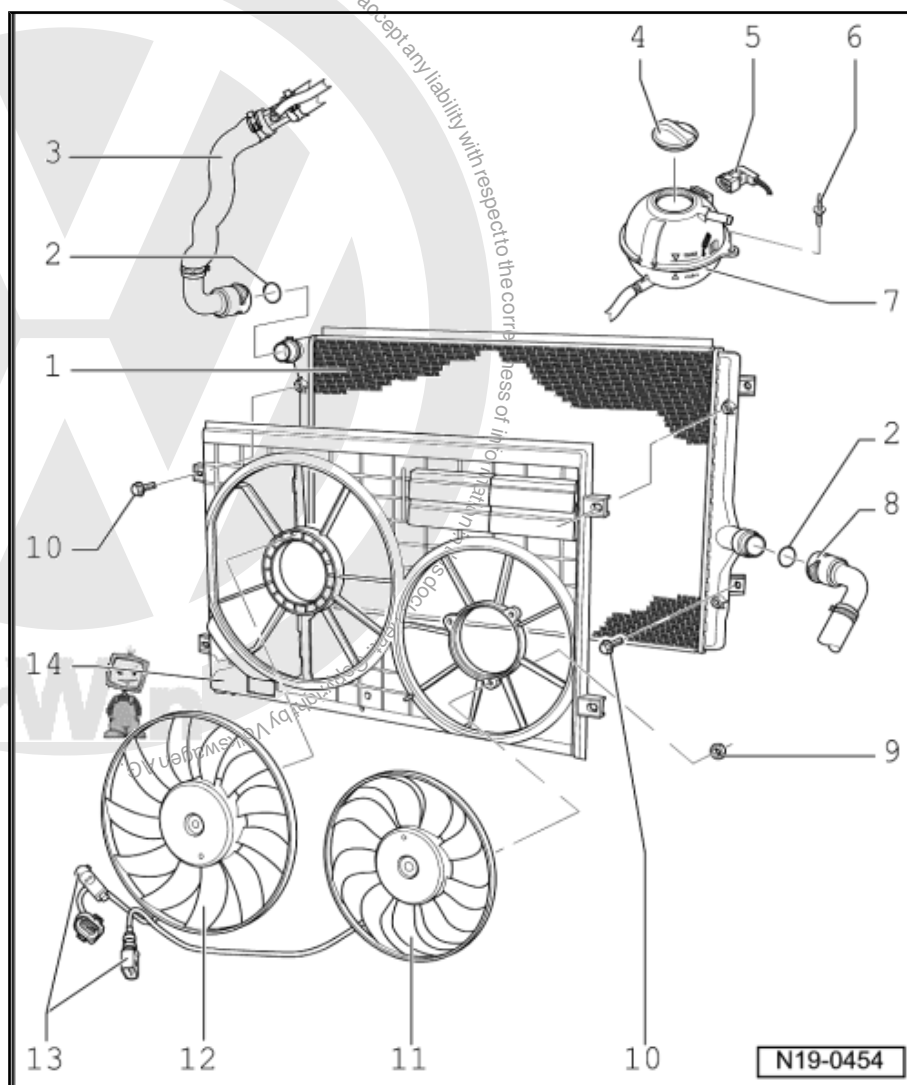
10 - 5 Nm

11 - Additional radiator fan

12 - Main radiator fan

13 - Connector

14 - Cowling





1.2 Assembly overview - parts of cooling system, engine side (Golf, Golf Plus, Touran)

1 - To top of expansion tank.

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

2 - Upper coolant pipe

- ☐ Bolted to cylinder head cover.

3 - To bypass flap.

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

4 - O-ring

- ☐ Renew.

5 - Retaining clip

- ☐ Check for secure seating.

6 - Coolant temperature sender -G62-

- ☐ With coolant temperature display sender -G2- .

7 - To exhaust gas recirculation cooler

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

8 - Connection

9 - 10 Nm

10 - To heat exchanger

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

11 - 40 Nm

12 - T-piece

13 - To bypass flap.

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

14 - T-piece

15 - To top of radiator

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

16 - 15 Nm

17 - To bottom of expansion tank

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

18 - Coolant pipe

19 - To bottom of radiator

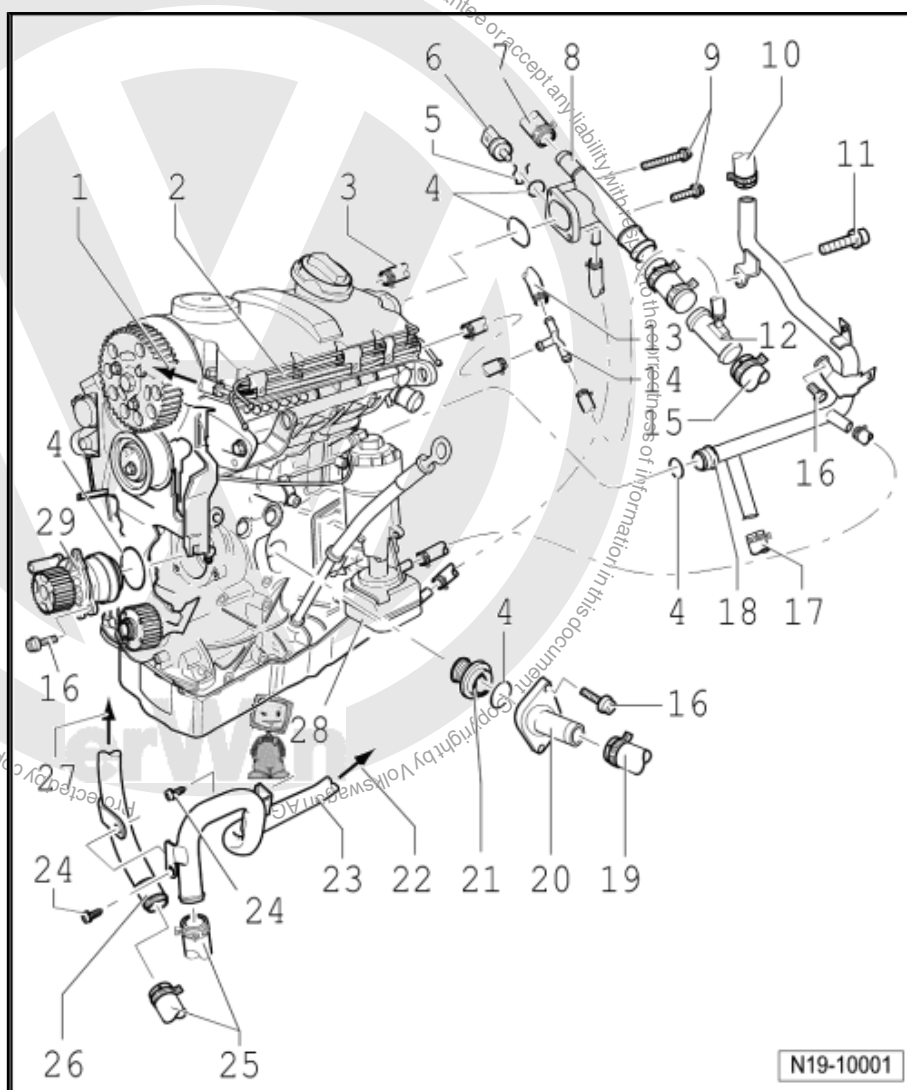
- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

20 - Connection

- ☐ For thermostat.

21 - Thermostat

- ☐ Removing and installing ➤ [page 144](#) .





- ☐ Note installation position ➤ [page 144](#) .
- ☐ Checking: heat thermostat in water.
- ☐ Opening begins at approx. 85 °C.
- ☐ Ends at approx. 105 °C.
- ☐ Opening lift at least 7 mm.

22 - To heat exchanger

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

23 - Rear coolant pipe

24 - 10 Nm

25 - To auxiliary heater

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

26 - Coolant pipe

27 - To exhaust gas recirculation cooler

- ☐ Coolant hose schematic diagram ➤ [page 131](#) .

28 - Oil cooler

29 - Coolant pump

- ☐ Check for ease of movement.
- ☐ Note installation position.
- ☐ Removing and installing ➤ [page 142](#) .



1.3 Assembly overview - parts of cooling system, engine side (Passat)

1 - To top of expansion tank.

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

2 - Upper coolant pipe

- ☐ Bolted to cylinder head cover.
- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

3 - O-ring

- ☐ Renew.

4 - Retaining clip

- ☐ Check for secure seating.

5 - Coolant temperature sender -G62-

- ☐ If necessary, release pressure in cooling system before removing.

6 - To exhaust gas recirculation cooler.

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

7 - Connection

8 - 10 Nm

9 - To top of radiator

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

10 - From heat exchanger

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

11 - 40 Nm

12 - T-piece

13 - From upper coolant hose T-piece

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

14 - 15 Nm

15 - From bottom of expansion tank

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

16 - Front coolant pipe

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .

17 - Seal

- ☐ Renew.

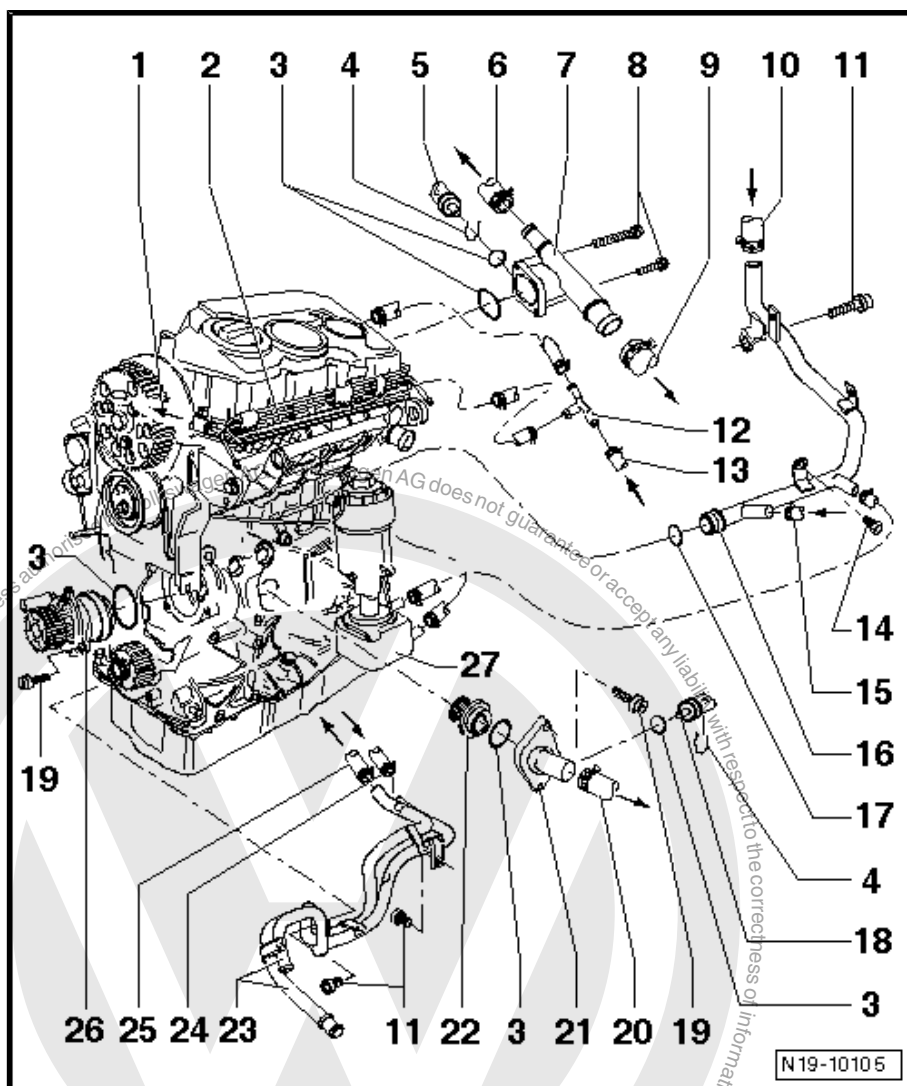
18 - Radiator outlet coolant temperature sender -G83-

- ☐ If necessary, release pressure in cooling system before removing.

19 - 15 Nm

20 - To bottom of radiator

- ☐ Coolant hose schematic diagram [⇒ page 131](#) .





21 - Connection

- ☐ For thermostat.
- ☐ Coolant hose schematic diagram ⇒ [page 131](#) .

22 - Thermostat

- ☐ Removing and installing ⇒ [page 144](#) .
- ☐ Note installation position ⇒ [page 144](#) .
- ☐ Checking: heat thermostat in water.
- ☐ Opening begins at approx. 85 °C.
- ☐ Ends at approx. 105 °C.
- ☐ Opening lift at least 7 mm.

23 - Rear coolant pipe

- ☐ Coolant hose schematic diagram ⇒ [page 131](#) .

24 - From exhaust gas recirculation cooler

- ☐ To recirculating pump -V55- .
- ☐ Coolant hose schematic diagram ⇒ [page 131](#) .

25 - To heat exchanger

- ☐ Coolant hose schematic diagram ⇒ [page 131](#) .

26 - Coolant pump

- ☐ Check for ease of movement.
- ☐ Note installation position.
- ☐ Removing and installing ⇒ [page 142](#) .

27 - Oil cooler

- ☐ For engine oil.
- ☐ Removing and installing ⇒ [page 120](#) .



1.4 Coolant hose schematic diagram

Vehicles with manual gearbox ➤ [page 131](#)

Vehicles with automatic gearbox ➤ [page 132](#)

Vehicles with dual clutch gearbox ➤ [page 133](#)

1.4.1 Vehicles with manual gearbox

1 - Expansion tank

2 - Bypass flap

3 - Radiator

☐ For exhaust gas recirculation.

4 - Heat exchanger for heater unit

5 - Cylinder head/cylinder block

6 - Upper coolant hose

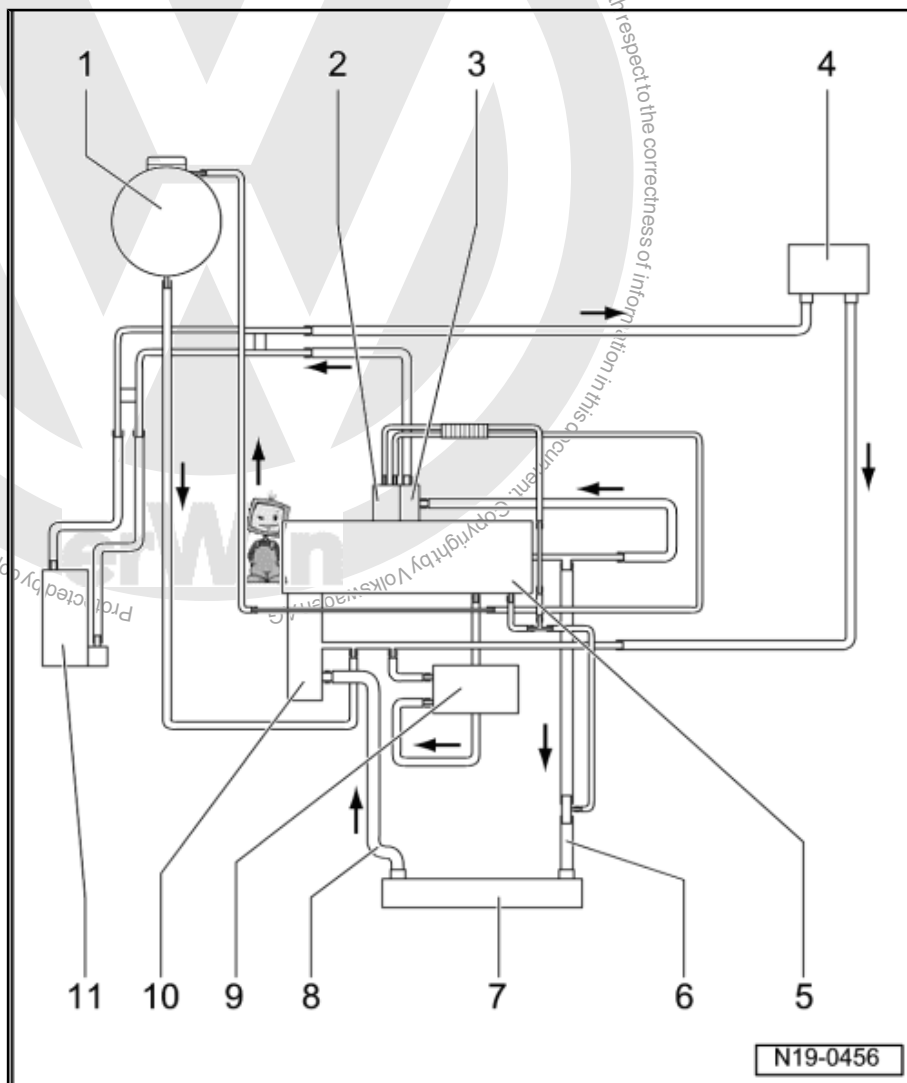
7 - Radiator

8 - Lower coolant hose

9 - Engine oil cooler

10 - Coolant pump and thermostat

11 - Auxiliary heater



N19-0456



1.4.2 Vehicles with automatic gearbox

1 - Expansion tank

2 - Bypass flap

3 - Radiator

☐ For exhaust gas recirculation.

4 - Heat exchanger for heater unit

5 - Gearbox oil cooler

6 - Cylinder head/cylinder block

7 - Additional cooler

☐ Not on all vehicles.

8 - Upper coolant hose

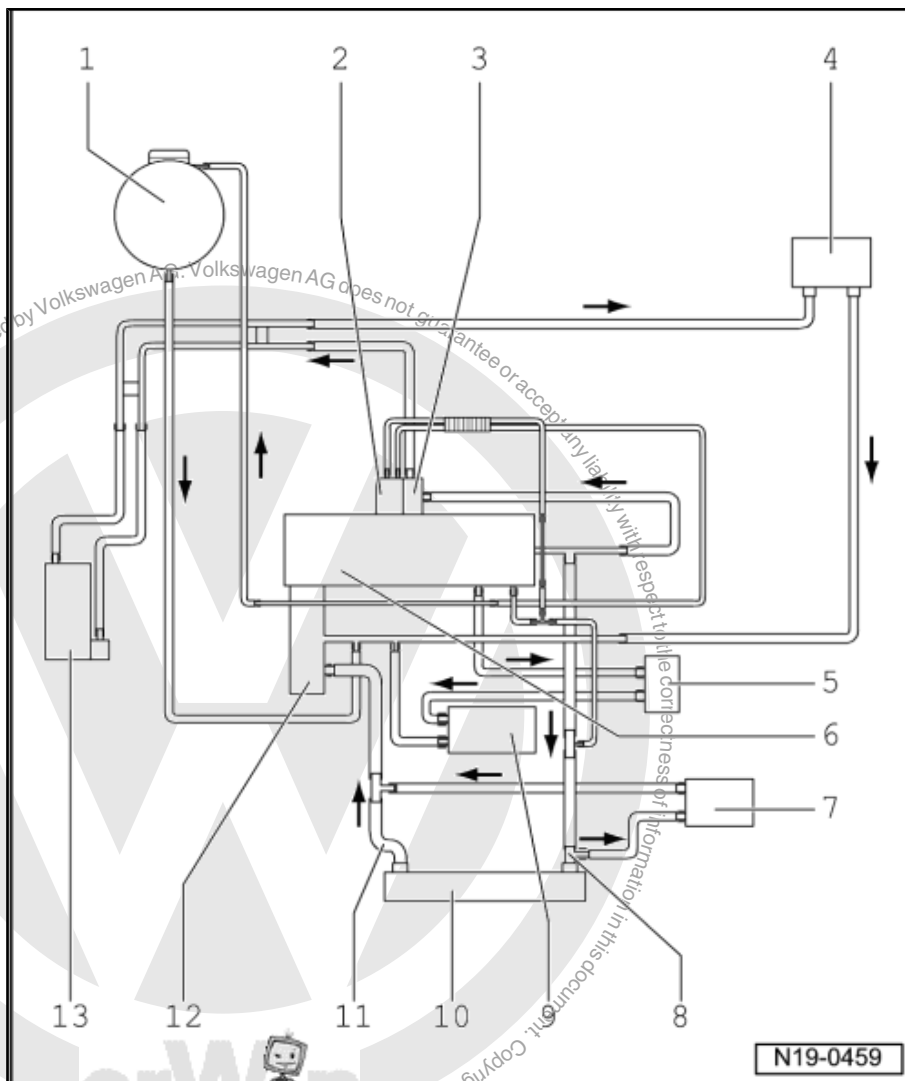
9 - Engine oil cooler

10 - Radiator

11 - Lower coolant hose

12 - Coolant pump and thermostat

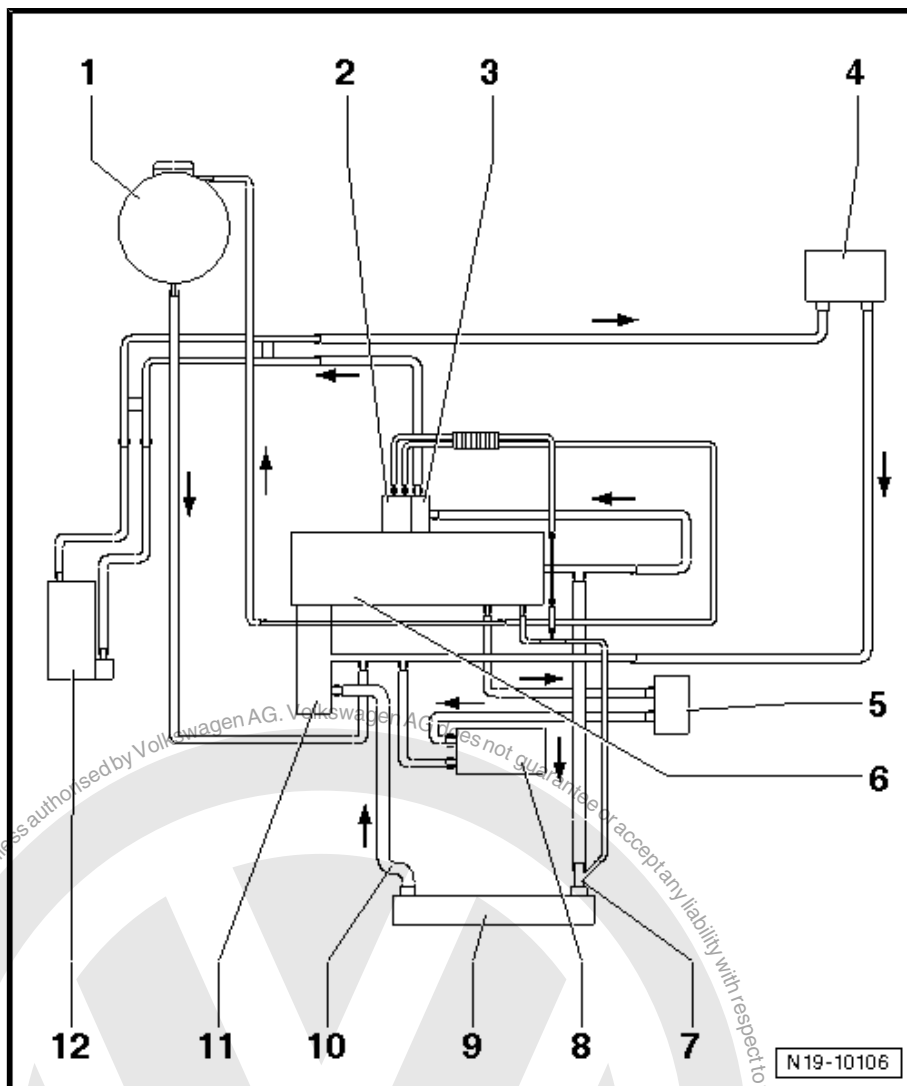
13 - Auxiliary heater





1.4.3 Vehicles with dual clutch gearbox

- 1 - Expansion tank
- 2 - Bypass flap
- 3 - Radiator
 - ☐ For exhaust gas recirculation.
- 4 - Heat exchanger for heater unit
- 5 - Gearbox oil cooler
- 6 - Cylinder head/cylinder block
- 7 - Upper coolant hose
- 8 - Engine oil cooler
- 9 - Radiator
- 10 - Lower coolant hose
- 11 - Coolant pump and thermostat
- 12 - Auxiliary heater

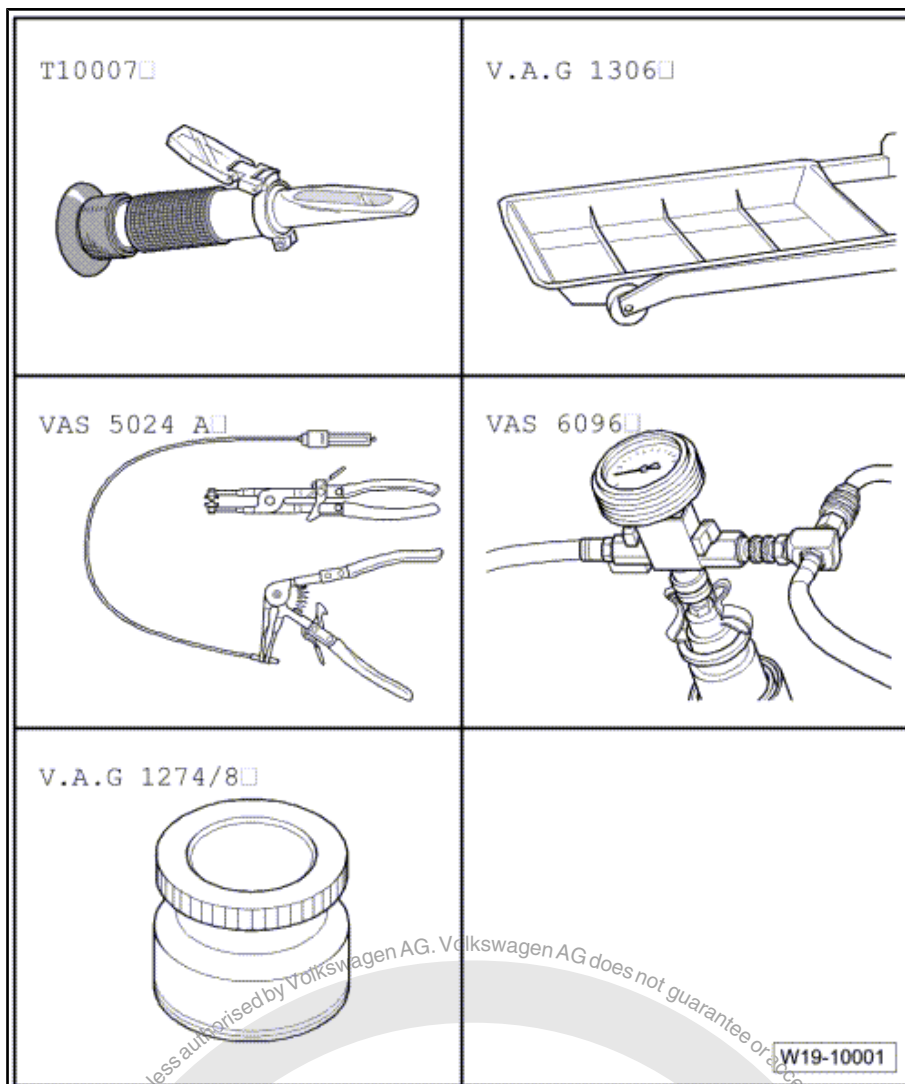




1.5 Draining and filling coolant

Special tools and workshop equipment required

- ◆ Refractometer -T10007-
- ◆ Drip tray for V.A.G 1202 - V.A.G 1306/-
- ◆ Spring-type clip pliers -VAS 5024/-
- ◆ Cooling system charge unit -VAS 6096-
- ◆ Adapter for cooling system tester -V.A.G 1274/8-



1.5.1 Draining



WARNING

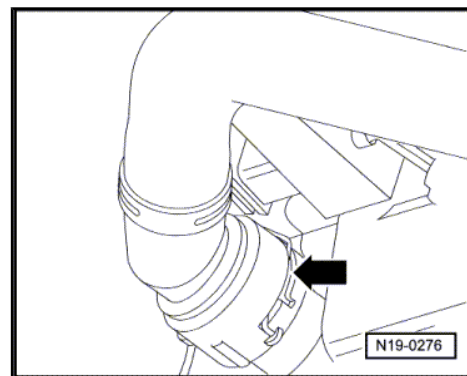
Hot steam may escape when expansion tank is opened. Place cloth over cap and open with caution.

- Remove cap from coolant expansion tank.

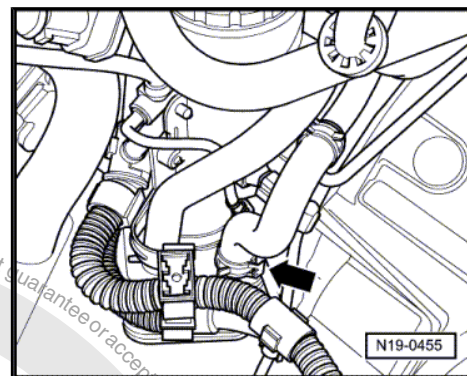
Remove insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .



- Pull off lower coolant hose retaining clip -arrow- and remove coolant hose from quick-release connection of radiator.



- To drain coolant from engine, also remove coolant hose from oil cooler -arrow-.



Note

Observe environmental regulations for disposal.

1.5.2 Filling



Note

An influencing factor of the effectiveness of the coolant is the amount of water used. Due to the various qualities in the various countries Volkswagen has decided to define the quality of the water to be used in the coolant system. Distilled water fulfils all requirements. It is therefore recommended that distilled water be mixed with the coolant whenever an older model's coolant is replenished or replaced. The use of distilled water is obligatory for new types of vehicle (year of manufacture 2010 ➤).



Caution

It is only permissible to use distilled water for mixing with G12 plus-plus. The use of distilled water ensures optimum protection against corrosion.

For engines with engine codes BMR and BUZ the cooling system must always be filled with cooling system charge unit VAS 6096-. Otherwise air pockets can form in the area of the exhaust gas recirculation cooler, which will cause pulsations.



Note

- ◆ Use only coolant additive G 12 plus-plus in accordance with TL VW 774 G.
- ◆ G 12, G12 plus and G 12 plus-plus must not be mixed!
- ◆ It is only permissible to use distilled water for mixing.
- ◆ G 12 plus-plus prevents frost and corrosion damage, scaling and also raises the boiling point of coolant. Therefore, the cooling system must be filled all year round with frost and corrosion protection additives.
- ◆ Because of its higher boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- ◆ Frost protection is required down to about -25 °C (in countries with arctic climates: down to about -35 °C).
- ◆ The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The coolant additive concentration must be at least 40 %.
- ◆ If for climatic reasons greater frost protection is required, the amount of G 12 plus-plus can be increased, but only up to 60 % (frost protection to about -40 °C). Otherwise frost protection and cooling effectiveness are reduced again.
- ◆ If radiator, heat exchanger, cylinder head or cylinder head gasket is renewed, do not reuse old coolant.
- ◆ The refractometer -T10007- is recommended for determining the current anti-freeze density.

Recommended mixing ratios (use only distilled water for mixing):

Frost protection to	Anti-freeze proportion	G 12 plus-plus ¹⁾	Water ¹⁾
-25 °C	40 %	3.2 l	4.8 l
-35 °C	50 %	4.0 l	4.0 l

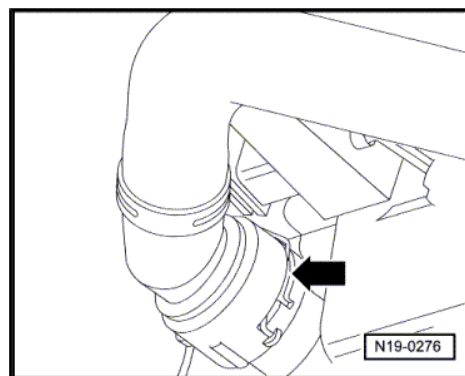
¹⁾ The quantity of coolant can vary depending upon the vehicle equipment.

- Install lower coolant hose and secure with retaining clip -arrow-.
- Connect coolant hoses to oil cooler.
- Install insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .

With cooling system charge unit -VAS 6096- :

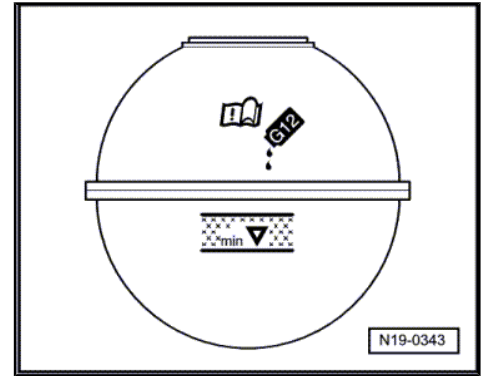
- Screw adapter for cooling system tester -V.A.G 1274/8- onto expansion tank.
- Fill coolant circuit using cooling system charge unit -VAS 6096- ⇒ Operating instructions for cooling system charge unit VAS 6096

Without cooling system charge unit -VAS 6096- (must not be used for engine codes BMR and BUZ)





- Slowly fill coolant to upper marking of shaded field on expansion tank.
- Fit expansion tank cap.
- Switch air conditioner to „Econ“ or „Off“.
- Start engine and maintain an engine speed of about 2000 rpm for about 3 minutes.
- Run engine until radiator fan cuts in.
- Check coolant level and top-up if necessary. When the engine is at normal operating temperature, the coolant level must be at the upper mark; when the engine is cold, in the middle of the shaded field.



1.5.3 Filling



Note

An influencing factor of the effectiveness of the coolant is the amount of water used. Due to the various qualities in the various countries Volkswagen has decided to define the quality of the water to be used in the coolant system. Distilled water fulfils all requirements. It is therefore recommended that distilled water be mixed with the coolant whenever an older model's coolant is replenished or replaced. The use of distilled water is obligatory for new types of vehicle (year of manufacture 2010 ➤).



Caution

It is only permissible to use distilled water for mixing with G12 plus-plus. The use of distilled water ensures optimum protection against corrosion.

For engines with engine code BMN the cooling system must always be filled with cooling system charge unit -VAS 6096-. Otherwise air pockets can form in the area of the exhaust gas recirculation cooler, which will cause pulsations.



Note

- ◆ Use only coolant additive G 12 plus-plus in accordance with TL VW 774 G.
- ◆ G 12, G12 plus and G 12 plus-plus must not be mixed!
- ◆ It is only permissible to use distilled water for mixing.
- ◆ G 12 plus-plus prevents frost and corrosion damage, scaling and also raises the boiling point of coolant. Therefore, the cooling system must be filled all year round with frost and corrosion protection additives.
- ◆ Because of its higher boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- ◆ Frost protection is required down to about -25 °C (in countries with arctic climates: down to about -35 °C).
- ◆ The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The coolant additive concentration must be at least 40 %.
- ◆ If for climatic reasons greater frost protection is required, the amount of G 12 plus-plus can be increased, but only up to 60 % (frost protection to about -40 °C). Otherwise frost protection and cooling effectiveness are reduced again.
- ◆ If radiator, heat exchanger, cylinder head or cylinder head gasket is renewed, do not reuse old coolant.
- ◆ The refractometer -T10007- is recommended for determining the current anti-freeze density.

Recommended mixing ratios (use only distilled water for mixing):

Frost protection to	Anti-freeze proportion	G 12 plus-plus ¹⁾	Water ¹⁾
-25 °C	40 %	3.2 l	4.8 l
-35 °C	50 %	4.0 l	4.0 l

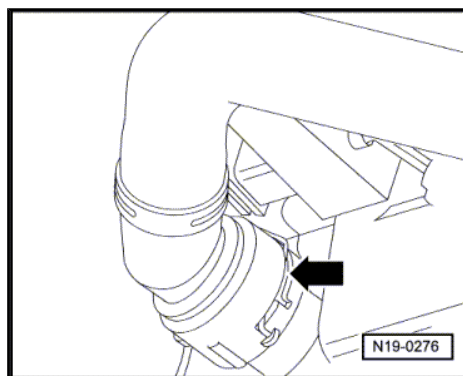
¹⁾ The quantity of coolant can vary depending upon the vehicle equipment.

- Install lower coolant hose and secure with retaining clip -arrow-.
- Connect coolant hoses to oil cooler.
- Install insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .

With cooling system charge unit -VAS 6096- :

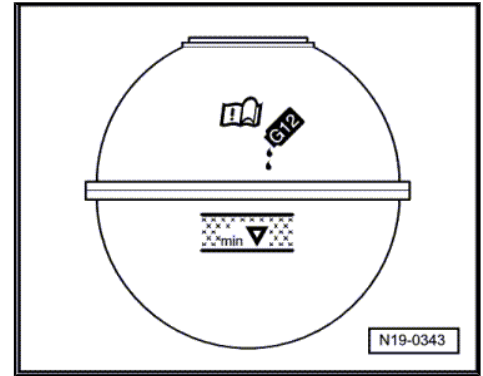
- Screw adapter for cooling system tester -V.A.G 1274/8- onto expansion tank.
- Fill coolant circuit using cooling system charge unit -VAS 6096- ⇒ Operating instructions for cooling system charge unit VAS 6096

Without cooling system charge unit -VAS 6096- (must not be used for engine code BMN)





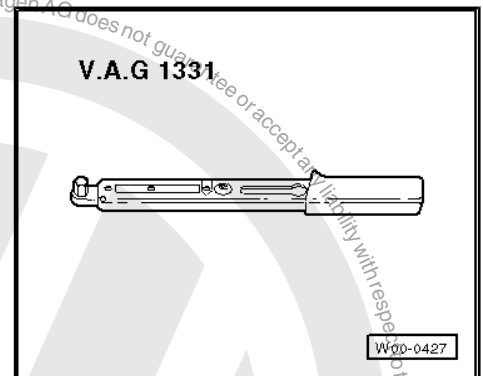
- Slowly fill coolant to upper marking of shaded field on expansion tank.
- Fit expansion tank cap.
- Switch air conditioner to „Econ“ or „Off“.
- Start engine and maintain an engine speed of about 2000 rpm for about 3 minutes.
- Run engine until radiator fan cuts in.
- Check coolant level and top-up if necessary. When the engine is at normal operating temperature, the coolant level must be at the upper mark; when the engine is cold, in the middle of the shaded field.



1.6 Removing and installing fan support with fans

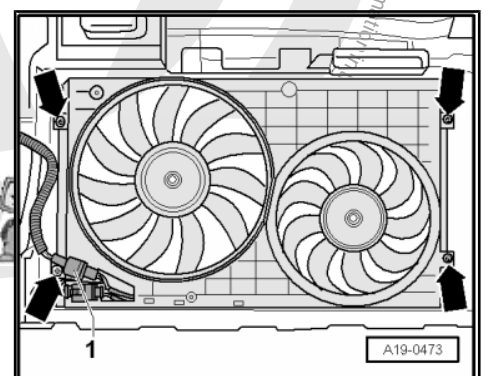
Special tools and workshop equipment required

- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



Removing

- Remove noise insulation tray ⇒ Rep. gr. 50 .
- Remove intake air duct from air filter ⇒ [page 259](#) .
- Bring lock carrier into service position ⇒ Rep. gr. 50 .
- Separate connector -1- and remove fan support securing bolts -arrows-.
- Remove fan support with fans upwards.



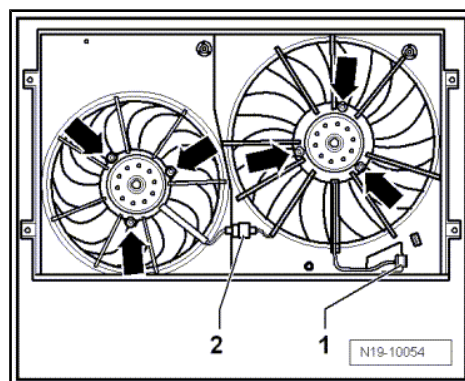


- Separate connection -2- and free wiring.
- Unclip connector -1- from fan support and move wiring clear.
- Remove securing nuts -arrows- and remove fans.

Installing

Installation is carried out in the reverse order. When installing, note the following:

Specified torques:

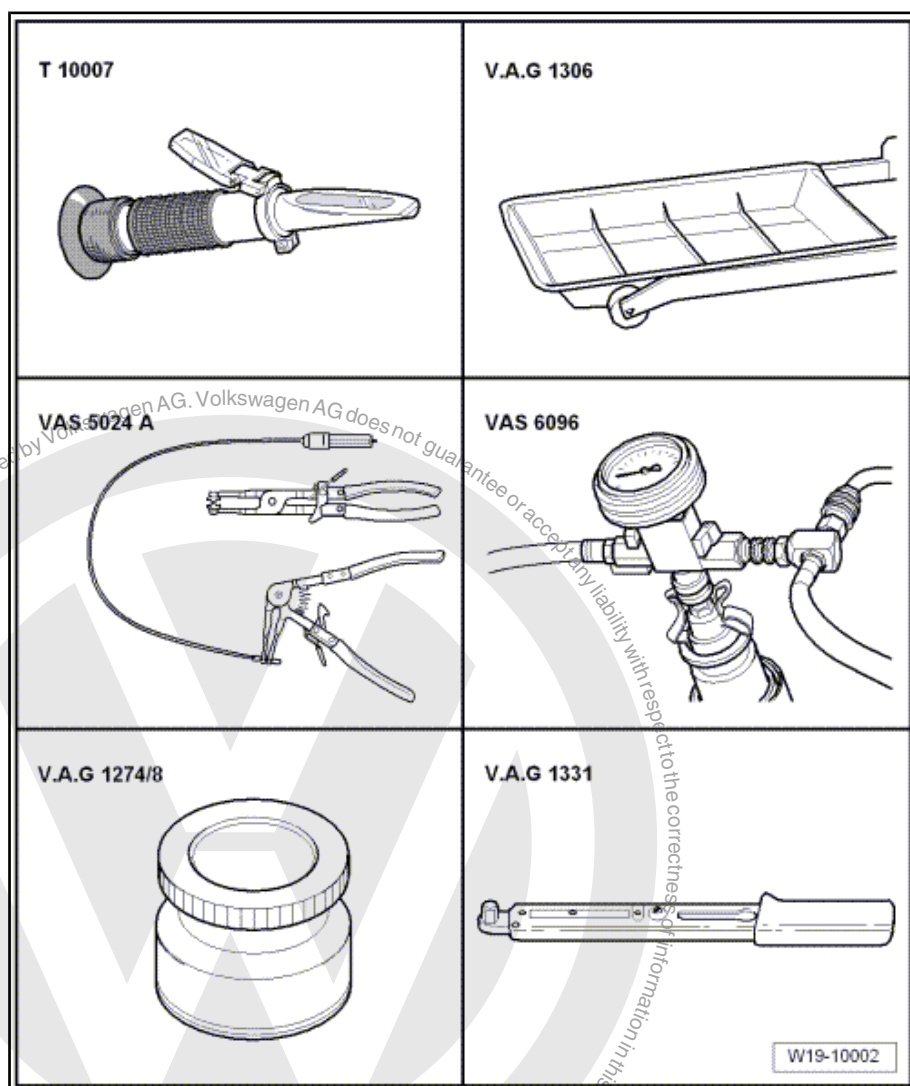


Component	Nm
Radiator fans to fan support	10
Fan support to radiator	5

1.7 Removing and installing radiator

Special tools and workshop equipment required

- ◆ Refractometer -T10007-
- ◆ Drip tray -V.A.G 1306- or drip tray -VAS 6208-
- ◆ Spring-type clip pliers -VAS 5024 A-
- ◆ Cooling system charge unit -VAS 6096-
- ◆ Adapter for cooling system tester -V.A.G 1274/8-
- ◆ Torque wrench -V.A.G 1331/-





Removing

- Drain coolant ➔ [page 134](#) .

Golf, Golf Plus, Touran:

- Bring lock carrier into service position ➔ General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier - service position .

Passat:

- Remove front bumper cover ➔ General body repairs, exterior; Rep. gr. 63 Bumper .

Continuation for all vehicle types:

- Remove fan support with fans ➔ [page 139](#) .
- Pull coolant hoses off radiator.
- Remove radiator securing bolts ➔ [Item 10 \(page 126\)](#) and remove radiator with fan downwards.

Installing

Installation is carried out in the reverse order. When installing, note the following:

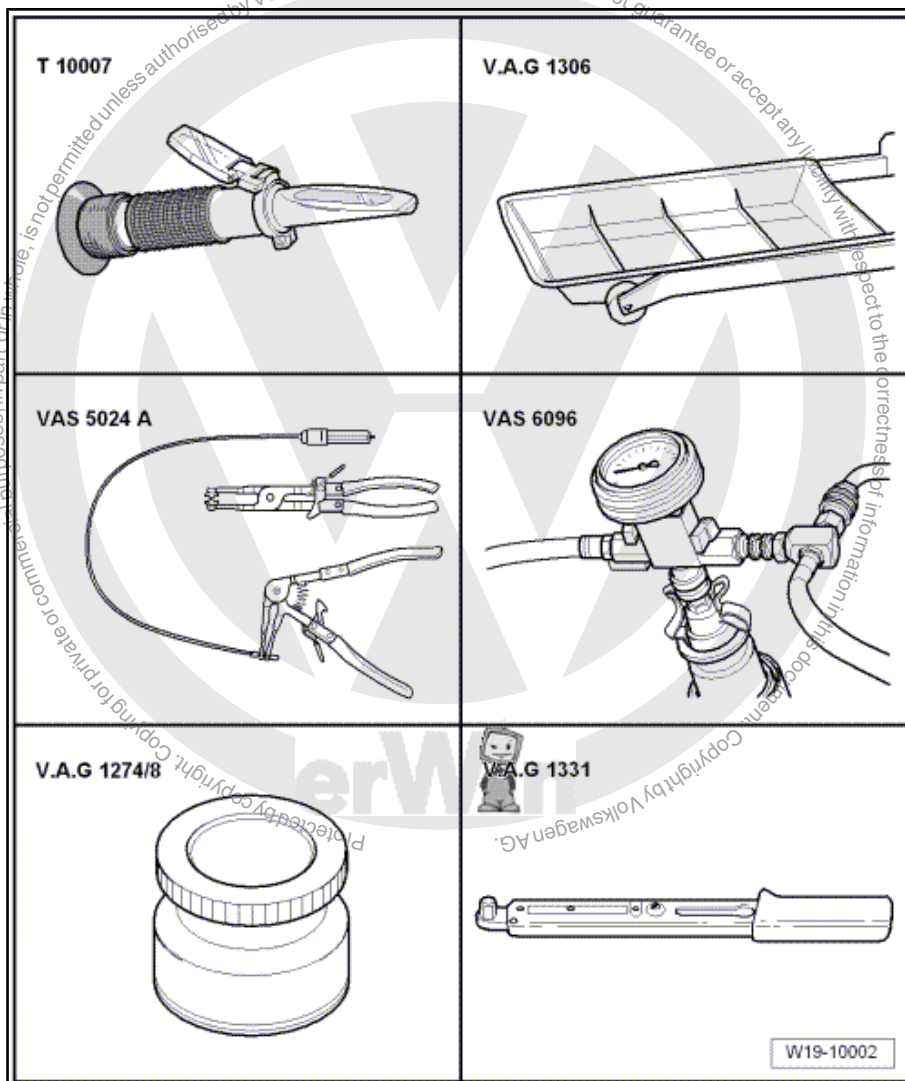
- Replenish coolant ➔ [page 134](#) .



1.8 Removing and installing coolant pump

Special tools and workshop equipment required

- ◆ Refractometer -T10007-
- ◆ Drip tray -V.A.G 1306- or drip tray -VAS 6208-
- ◆ Spring-type clip pliers - VAS 5024 A-
- ◆ Cooling system charge unit -VAS 6096-
- ◆ Adapter for cooling system tester -V.A.G 1274/8-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



Removing



Note

Always renew seals and gaskets.

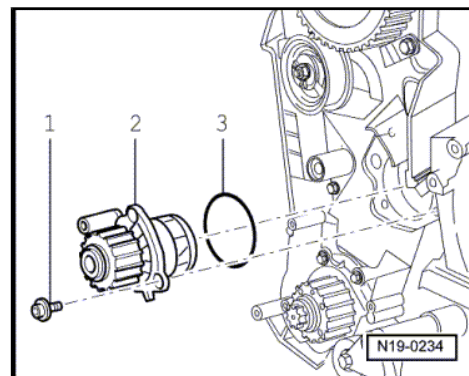
- Drain coolant ⇒ [page 134](#)
- Remove poly V-belt ⇒ [page 16](#) .
- Remove toothed belt. ⇒ [page 51](#)



- Remove securing bolts -1- for coolant pump -2- and carefully remove coolant pump.

Installing

Installation is carried out in the reverse order. When installing, note the following:

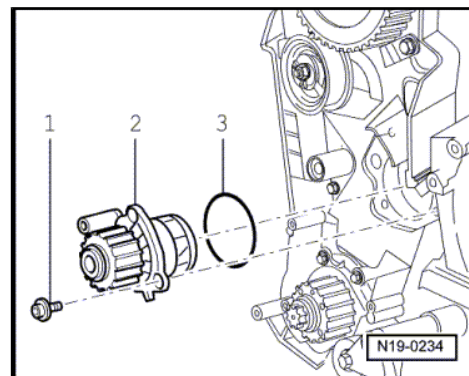


- Moisten new O-ring -3- with coolant.
- Insert coolant pump -2- in cylinder block and tighten securing bolts -1- to 15 Nm.



Note

The coolant pump plug faces downwards.



- Install toothed belt. ➔ [page 51](#)
- Install poly V-belt ➔ [page 16](#) .
- Replenish coolant. ➔ [page 134](#)

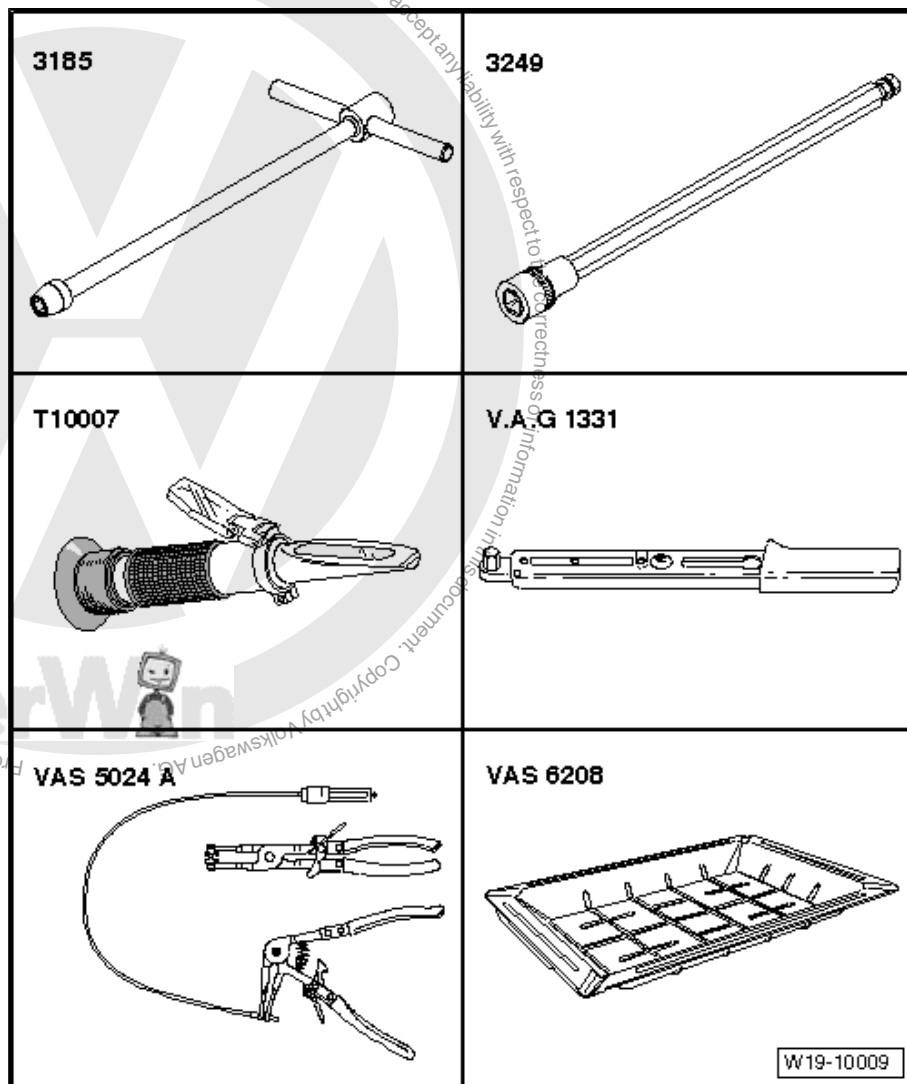




1.9 Removing and installing thermostat

Special tools and workshop equipment required

- ◆ Jointed wrench 10 mm -3185-
- ◆ Hexagon key extension, 5 mm -3249-
- ◆ Refractometer -T10007-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Spring-type clip pliers -VAS 5024/A-
- ◆ Drip tray for V.A.G 1202 - V.A.G 1306/- or drip tray for workshop crane -VAS 6208-



Removing



Note

Always renew seals and gaskets.

- Drain coolant ⇒ [page 134](#) .
- Remove alternator ⇒ Rep. gr. 27
- Pull connector off radiator outlet coolant temperature sender -G83- .
- Pull coolant hose off connection.

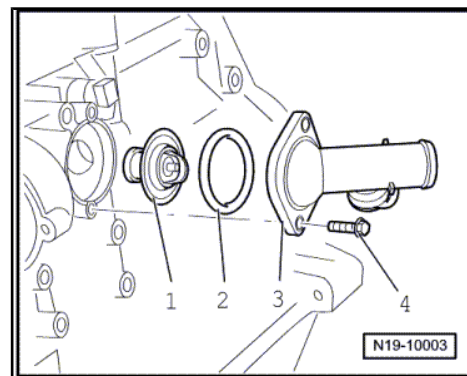


- Loosen securing bolts -4- of union -3- using T-bar and socket, 10 mm -3185- and remove using hexagon key extension, 5 mm -3249- and remove union -3- with thermostat -1-.
- Turn thermostat -1- $\frac{1}{4}$ turn (90 °) to left and remove from connection -3-.

Installing

Installation is carried out in the reverse order. When installing, note the following:

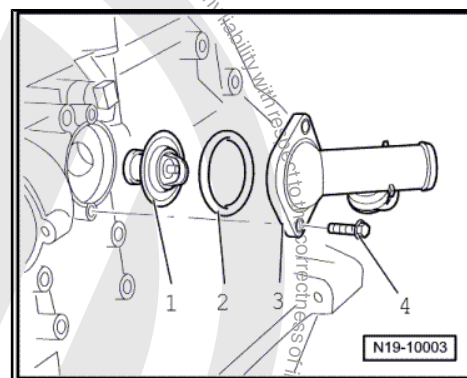
- Moisten new O-ring -2- with coolant.
- Insert thermostat -1- in union -3- and turn $\frac{1}{4}$ turn (90 °) to right.



Note

The brace on the thermostat must be almost vertical.

- Fit union -3- with thermostat -1- into cylinder block.
- Tighten securing bolts -4- using T-bar and socket, 10 mm -3185-. Specified torque: 15 Nm.
- Replenish coolant [page 134](#).

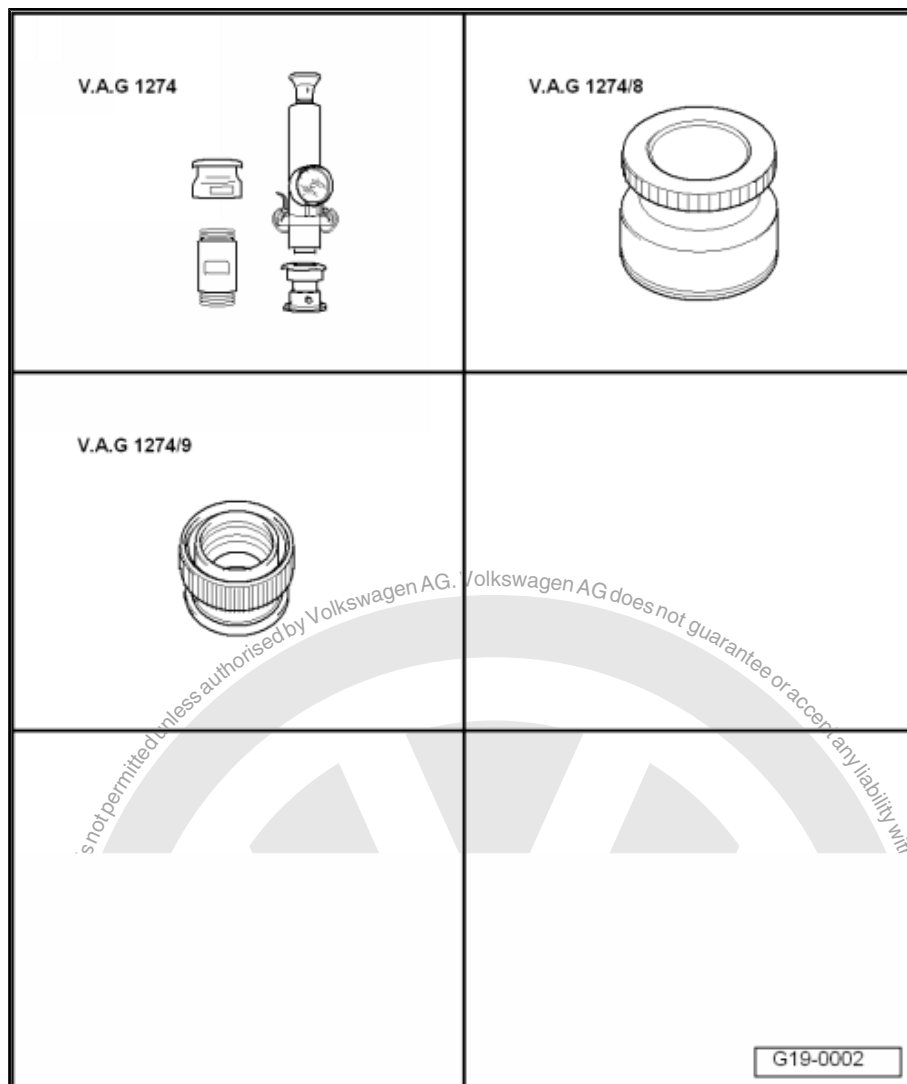




1.10 Checking cooling system for leaks

Special tools and workshop equipment required

- ♦ Cooling system tester - V.A.G 1274-
- ♦ Adapter for cooling system tester -V.A.G 1274/8-
- ♦ Adapter for cooling system tester -V.A.G 1274/9-



Test prerequisite

- Engine at operating temperature.

Test sequence:



WARNING

Hot steam may escape when expansion tank is opened. Place rag over cap and open with caution.

- Open cap on coolant expansion tank.



- Attach cooling system tester -V.A.G 1274- with cooling system tester adapter -V.A.G 1274/8- to expansion tank.
- Use hand pump on tester to create a pressure of about 1.0 bar.



Note

If the pressure test is carried out in a period of e.g. 10 minutes, the pressure will drop due to cooling of coolant. For this reason the first 30 seconds of test are important.

If the pressure drops within 30 seconds of test:

- Find leaks and rectify.

Checking pressure relief valve in cap

- Attach cooling system tester -V.A.G 1274- with cooling system tester adapter -V.A.G 1274/9- to cap.
- Use hand pump on cooling system tester to create a pressure of max. 1.6 bar.

The pressure relief valve must not open.

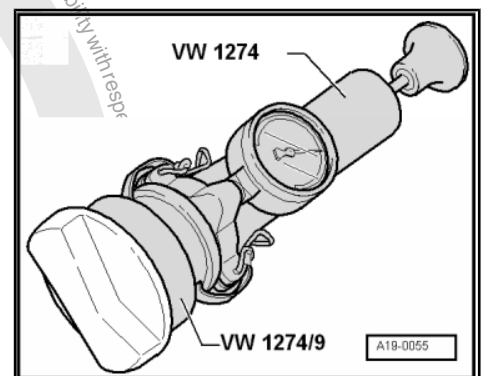
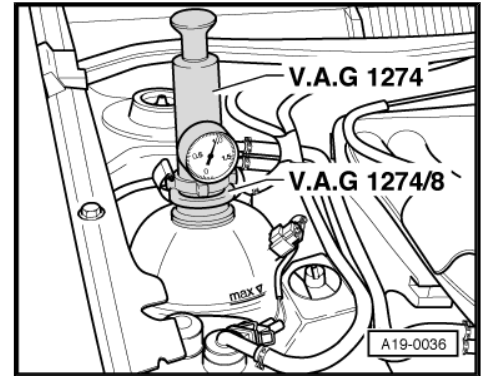
If the pressure relief valve opens prematurely:

- Renew sealing cap.
- Increase pressure to over 1.6 bar.

The pressure relief valve must open.

If the pressure relief valve does not open:

- Renew sealing cap.

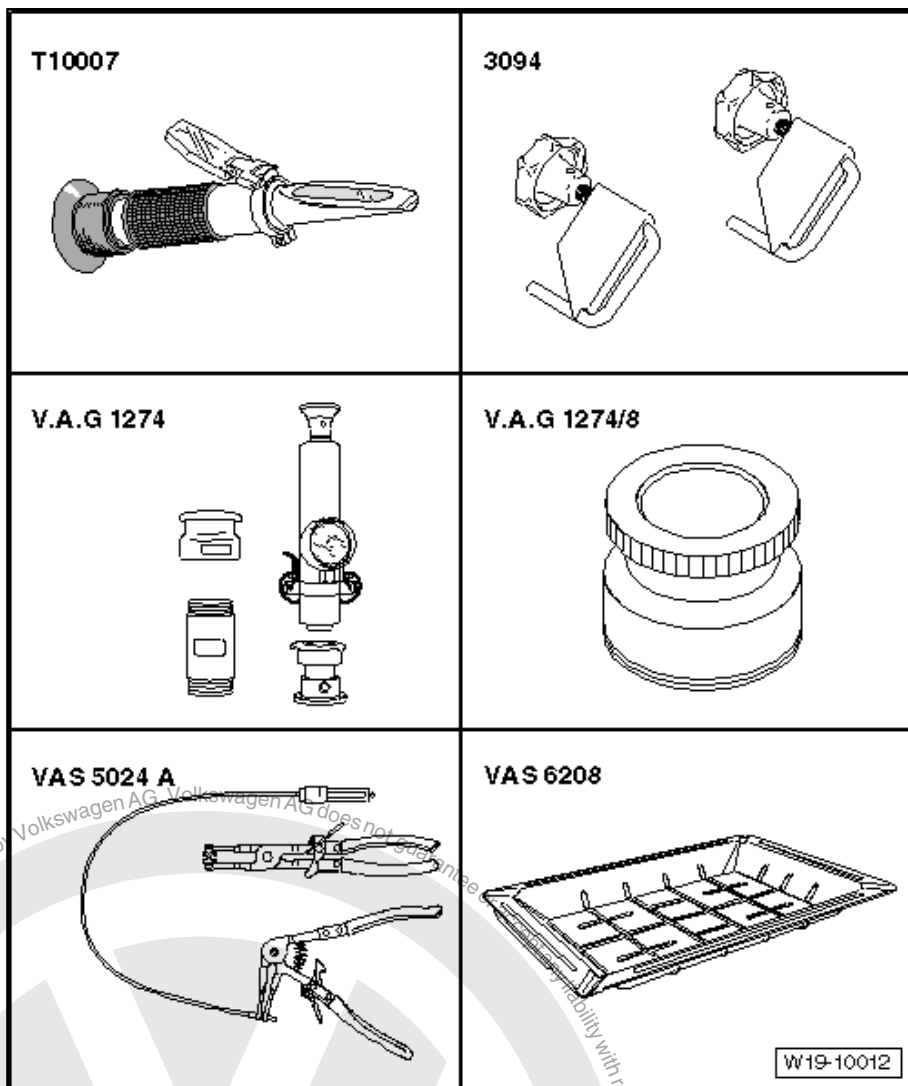




1.11 Checking oil cooler for leaks

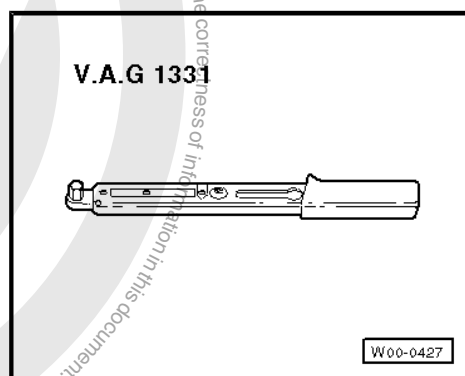
Special tools and workshop equipment required

- ◆ Refractometer -T10007-
- ◆ Hose clips up to 25 mm Ø -3094-
- ◆ Cooling system tester - V.A.G 1274-
- ◆ Adapter for cooling system tester -V.A.G 1274/8-
- ◆ Spring-type clip pliers -VAS 5024 A-
- ◆ Drip tray -V.A.G 1306- or drip tray -VAS 6208-



Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



Not illustrated

- ◆ Expansion tank -1K0 121 407 A- or expansion tank -1J0 121 407 B-
- ◆ Plug -191 211 343-



- ◆ Cap -1J0 121 324-
- ◆ Coolant hose -251 265 056-

Prerequisites:

- Engine cold

Test procedure

- Remove insulation tray.
- Clamp off supply and return lines to oil cooler using hose clips to Ø 25 mm -VAS 3094- .
- Loosen hose clips -arrows- using spring-type clip pliers -VAS 5024- .



Note

Collect escaping coolant with drip tray -V.A.G 1306- or drip tray -VAS 6208- .

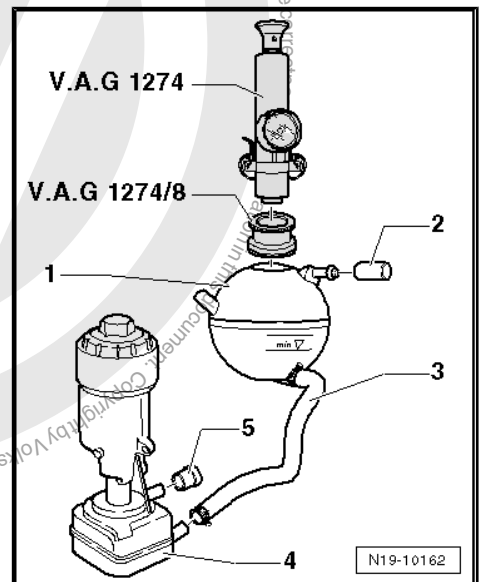
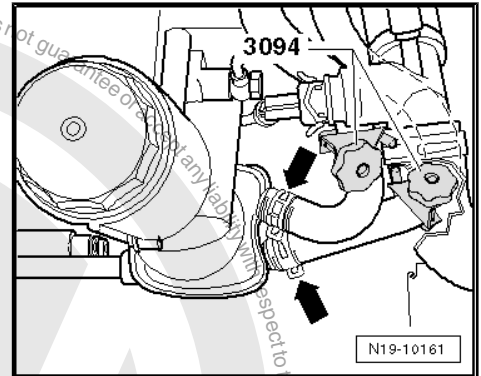
- Pull coolant hoses off oil cooler.
- Slide sealing cap -5- onto rear connection of oil cooler -4-.
- Secure sealing plug -2- to breather connection of expansion tank -1-.
- Secure coolant hose -3- to oil cooler and expansion tank.
- Fill expansion tank up to „Max“ marking.
- Attach cooling system tester -V.A.G 1274- with cooling system tester adapter -V.A.G 1274/8- to expansion tank.
- Use hand pump on tester to create a pressure of about 1.6 bar.
- Watch pressure drop on pressure gauge. A pressure drop within 10 minutes is not permitted.

If pressure drops:

- Renew oil cooler ⇒ [page 120](#) .

Installation is carried out in the reverse order. When installing, note the following:

- Check coolant level, replenish coolant if necessary ⇒ [page 134](#) .





20 – Fuel supply system

1 Safety precautions

1.1 Safety precautions when working on fuel supply system



WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*
- ◆ *The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!*
- ◆ *The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!*
- ◆ *Wear eye and hand protection when performing any type of repair work on the fuel system!*



When removing and installing fuel gauge sender or fuel pump (fuel delivery unit) from a full or partly full fuel tank, observe the following:

- ◆ Before beginning work, place an extraction hose close to sender opening in fuel tank to extract escaping fuel fumes and switch on exhaust extraction system. If no exhaust extraction system is available, a radial fan with a displacement greater than 15 m³/h can be used providing that motor is not in air flow.
- ◆ Prevent skin contact with fuel! Wear fuel-resistant gloves!



2 Rules for cleanliness

2.1 Rules for cleanliness when working on fuel supply system

When working on the fuel supply and injection system, pay careful attention to the following „6 rules“ for cleanliness:

- ◆ Thoroughly clean all unions and surrounding areas before disconnecting.
- ◆ Place removed parts on a clean surface and cover. Use only lint-free cloths.
- ◆ Carefully cover opened components or seal if repairs cannot be carried out immediately.
- ◆ Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- ◆ When system is open: do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.
- ◆ Also ensure that no diesel fuel runs on to the coolant hoses. Should this occur, the hoses must be cleaned immediately. Damaged hoses must be renewed.



3 Parts of fuel supply system (Golf, Golf Plus)

Safety precautions ➔ [page 150](#) .

Rules for cleanliness ➔ [page 151](#) .

Fuel tank, vehicles with front-wheel drive ➔ [page 152](#) .

Fuel tank, vehicles with four-wheel drive ➔ [page 156](#) .

Emptying fuel tank ➔ [page 162](#) .

Removing and installing fuel delivery unit ➔ [page 164](#) .

Removing and installing fuel gauge sender ➔ [page 166](#) .

Checking fuel pump ➔ [page 166](#) .

Assembly overview - fuel filter ➔ [page 171](#) .

Removing and installing fuel cooler ➔ [page 173](#) .

3.1 Fuel tank, vehicles with front-wheel drive



Note

- ◆ *Hose connections are secured with either spring-type or clamp-type clips.*
- ◆ *Always renew clamp-type clips with spring-type clips.*
- ◆ *Spring-type clip pliers -VAS 5024/- or hose clip pliers -V.A.G 1921/- are recommended for installation of spring-type clips.*



3.1.1 Assembly overview - fuel tank

1 - Cap

2 - 1.5 Nm

3 - Earth connection

- ☐ Check for secure seating.

4 - 10 Nm

5 - Cable guide

6 - Fuel tank

- ☐ When removing, support using engine and gearbox jack -V.A.G 1383/A- .
- ☐ Removing and installing ⇒ [page 154](#) .

7 - 25 Nm

- ☐ Renew.

8 - Clamping washer

9 - Securing strap

- ☐ Note installation position.

10 - Heat shield

- ☐ For fuel tank.

11 - Seal

- ☐ Renew if damaged.
- ☐ Moisten with fuel when installing

12 - Fuel delivery unit

- ☐ With fuel gauge sender (G).
- ☐ Note installation position of flange on fuel tank ⇒ [page 177](#) .
- ☐ Removing and installing ⇒ [page 164](#) .
- ☐ Checking fuel pump ⇒ [page 166](#) .
- ☐ Removing and installing fuel gauge sender ⇒ [page 186](#) .

13 - Locking ring

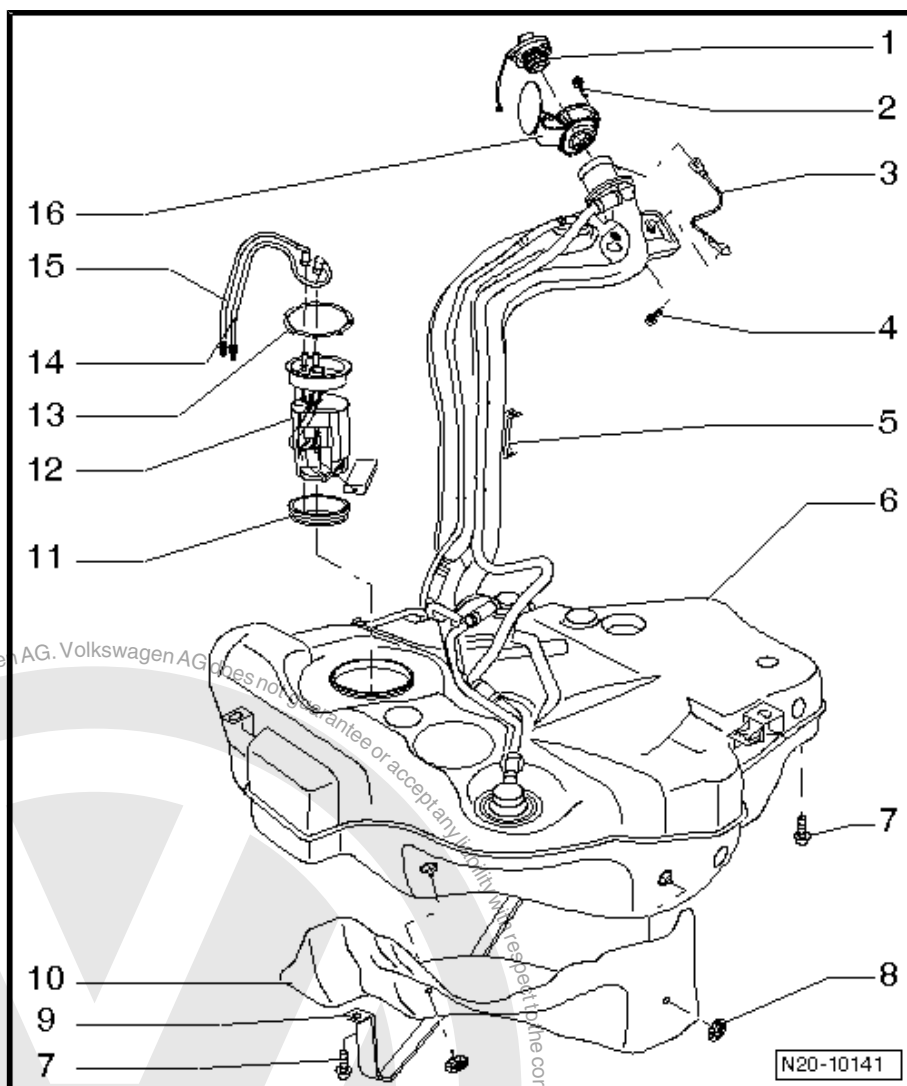
- ☐ Remove and install using wrench -T10202- .
- ☐ Specified torque: 110 Nm.

14 - Supply line

- ☐ To fuel filter
- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating
- ☐ Black
- ☐ To pull off flange, press release button on connecting piece.

15 - Return line

- ☐ From fuel cooler.
- ☐ Blue or with blue marking.
- ☐ Clipped onto fuel tank.





- ☐ Check for secure seating.
- ☐ To pull off flange, press release button on connecting piece.

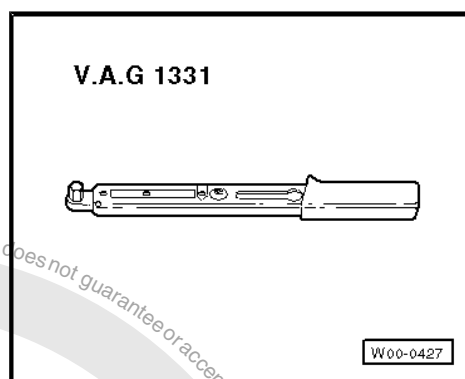
16 - Tank flap unit

- ☐ Removing and installing ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit .

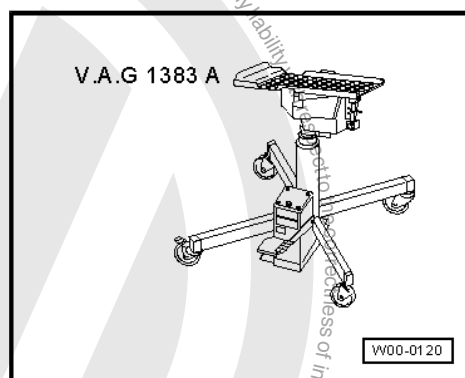
3.1.2 Removing and installing fuel tank

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331/-



- ◆ Engine and gearbox jack -V.A.G 1383/A-



Removing

- Note safety precautions before starting work ⇒ [page 150](#) .

Observe rules for cleanliness. ⇒ [page 151](#) .

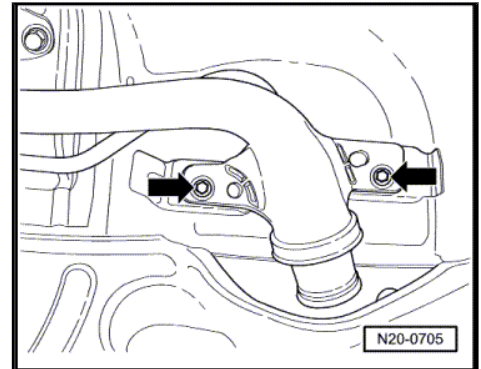


Note

- ◆ *Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.*
- ◆ *When lowering fuel tank, guide it carefully to prevent damage.*
- Disconnect earth strap from battery with ignition switched off
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
- Fold rear seats forwards.
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Pull connector off flange.



- Remove fuel flap unit. ⇒ General body repairs, exterior; Rep. gr. 55 ; Fuel flap unit
- Emptying fuel tank ⇒ [page 162](#) .
- Remove rear right wheel housing liner: ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .
- Remove bolts from filler neck -arrows-.



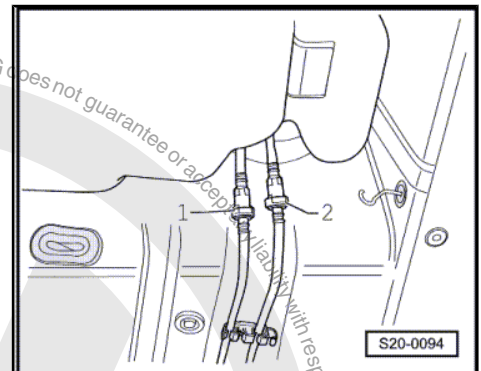
- Disconnect fuel lines at front right of fuel tank.



Note

Press buttons on hose couplings to do this.

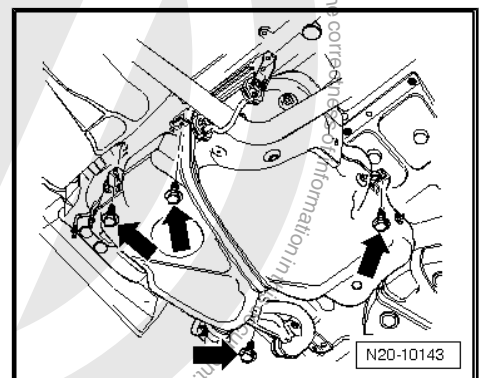
- If vehicle has supplementary heating, separate connector to metering pump and unclip wire. ⇒ Supplementary heating; Rep. gr. 82 ; Removing and installing metering pump -V54
- Remove bolts -A- and remove heat shield for fuel tank.
- Support fuel tank using engine and gearbox jack -V.A.G 1383/A- .
- Remove securing bolts -arrows- for the fuel tank.
- Slowly lower fuel tank and pull it forwards.
- Tilt fuel tank to get it past rear axle.



Installing

Install in reverse order. In the process, note the following:

- ◆ Install breather and fuel hoses free of kinks.
- ◆ Ensure that fuel hose connections are tight.
- ◆ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ◆ Clip supply and return lines onto fuel tank.





3.2 Fuel tank, vehicles with four-wheel drive

3.2.1 Assembly overview - fuel tank

1 - Supply line

- ☐ Black
- ☐ Check for secure seating.

2 - Return line

- ☐ Blue
- ☐ Check for secure seating.

3 - Seal

- ☐ Renew.
- ☐ When installing, fit dry in fuel tank opening.
- ☐ Moisten with fuel only when installing flange.

4 - Fuel delivery unit

- ☐ Removing and installing ⇒ [page 164](#) .
- ☐ Checking fuel pump
- ☐ Note installation position on fuel tank ⇒ [page 157](#) .
- ☐ With fuel gauge sender -G- .
- ☐ Removing and installing fuel gauge sender ⇒ [page 186](#) .

5 - Locking ring, 110 Nm

- ☐ Check for secure seating.
- ☐ Remove and install using wrench -T10202- .

6 - Tank flap unit

- ☐ With rubber cup.
- ☐ Removing and installing ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

7 - Cap

- ☐ Renew if damaged.

8 - Securing bolt

- ☐ Tighten to 1.5 Nm.

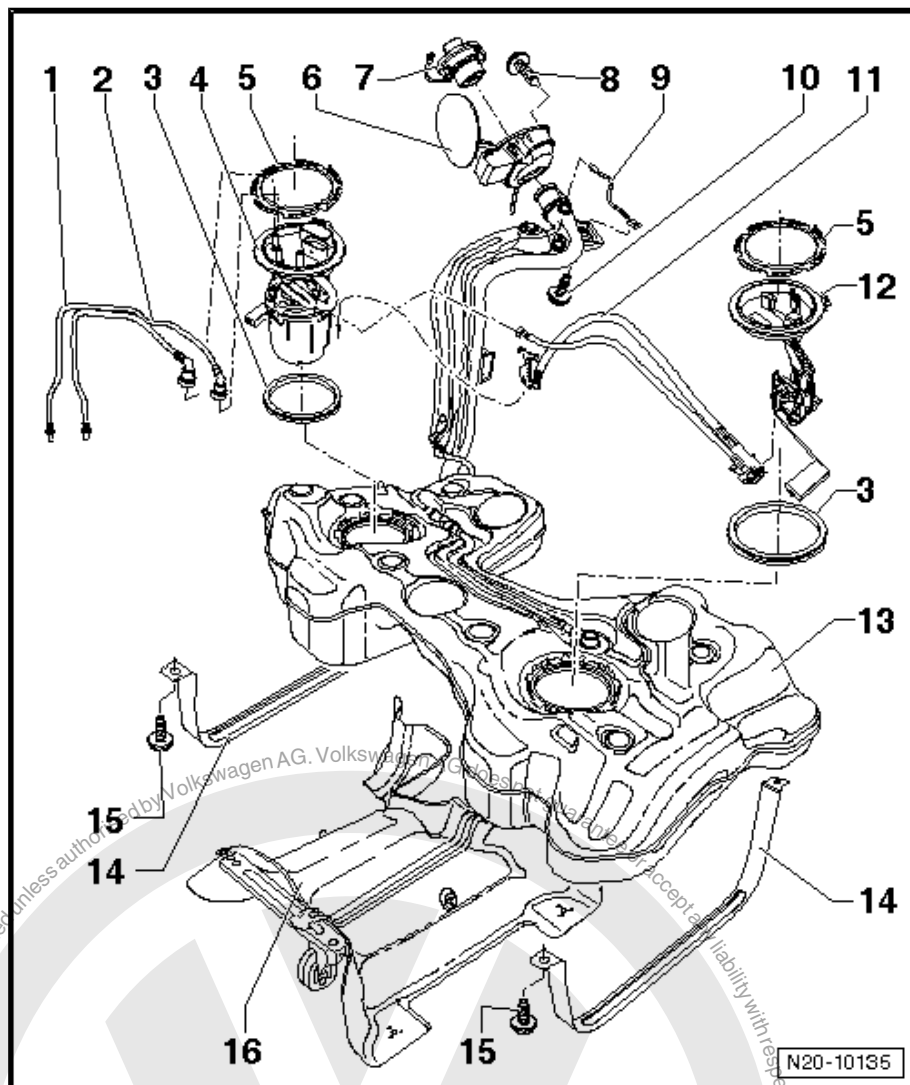
9 - Earth connection

- ☐ Check for secure seating.

10 - 10 Nm

11 - Suction-jet pump

- ☐ Clipped onto fuel gauge sender 2-G169-
- ☐ Removing and installing ⇒ [page 161](#) .





12 - Fuel gauge sender 2 -G169-

13 - Fuel tank

- ☐ When removing, support using engine and gearbox jack -V.A.G 1383 A- .
- ☐ Removing and installing ⇒ [page 157](#) .

14 - Securing strap

- ☐ Note installation position.

15 - 25 Nm

- ☐ Renew.

16 - Heat shield

- ☐ Riveted to exhaust pipe mounting

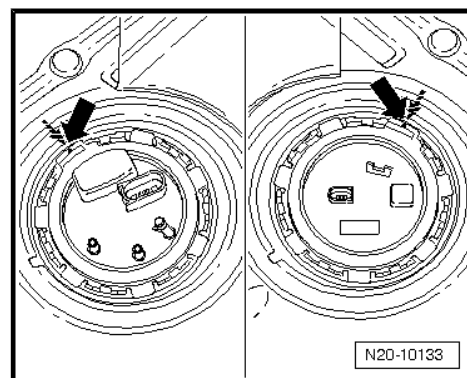
Installation position of flange for fuel delivery unit and fuel gauge sender 2 -G169-

The marking on the flange must align with the marking on the fuel tank -arrow-.



Note

The marking on the fuel tank is not clearly visible.



3.2.2 Removing and installing fuel tank

Special tools and workshop equipment required

- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-

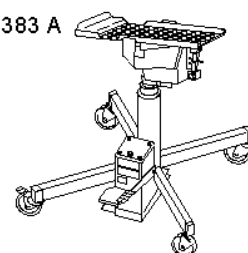
V.A.G 1331



W00-0427

- ◆ Engine and gearbox jack -V.A.G 1383 A-

V.A.G 1383 A



W00-0120

- Note safety precautions before beginning work ⇒ [page 150](#) .



Note

Before disconnecting battery, open fuel tank flap and if necessary remove wheel lock adapter from luggage compartment.

- First check whether a coded radio is fitted. If so, obtain anti-theft coding.
- Disconnect earth strap from battery with ignition switched off
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

If necessary, drain fuel tank using fuel extractor -VAS 5190-
⇒ [page 162](#)

- Remove rear right wheel.
- Remove rear right wheel housing liner. ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .
- Unscrew securing bolts and remove tank flap unit. ⇒ General body repairs, exterior; Rep. gr. 55 ; Fuel flap unit
- Unscrew filler neck from body -arrows- and unclip electrical wire from filler neck.
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seat; Removing and installing seat bench .

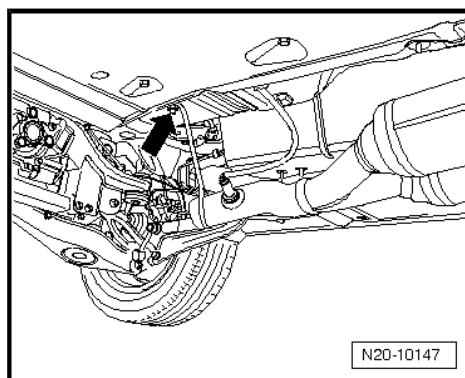
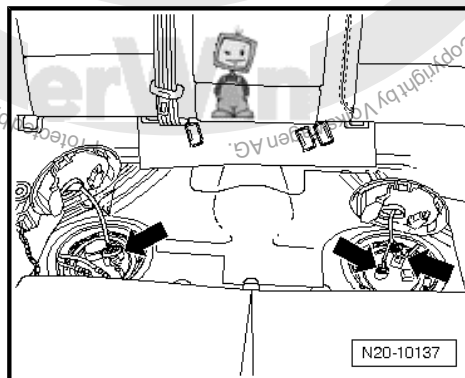
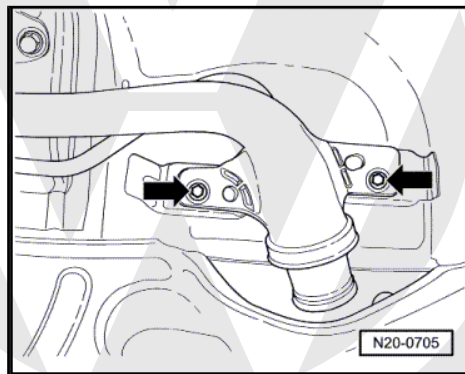
- Remove covers and separate electrical connectors -arrows-.
- Remove centre and rear silencers.

- Secure exhaust system to underbody using wire.
- Remove rear propshaft ⇒ Manual gearbox; Rep. gr. 39 ; Final drive, differential, differential lock



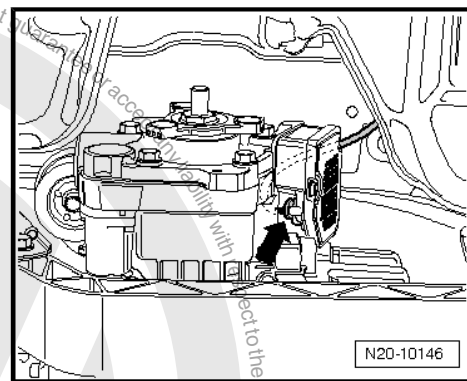
WARNING

Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.





- Pull off adapter cable on four-wheel drive control unit -J492- .

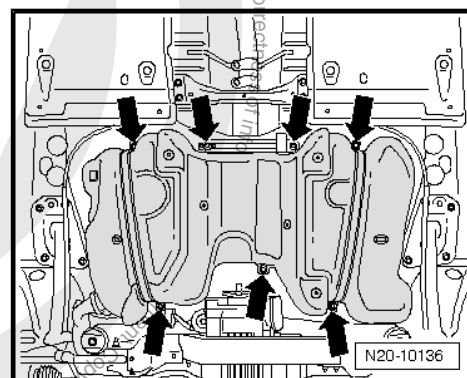


- Support fuel tank using engine and gearbox jack -V.A.G 1383 A- and unscrew tensioning straps and securing bolts.
- Slowly lower fuel tank.

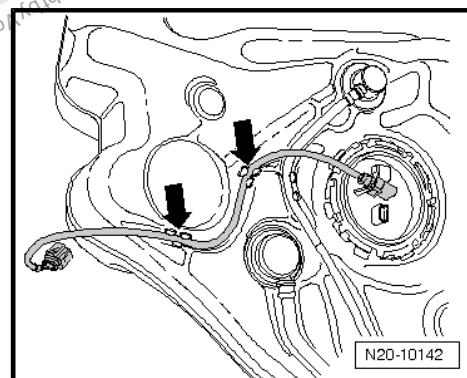


Note

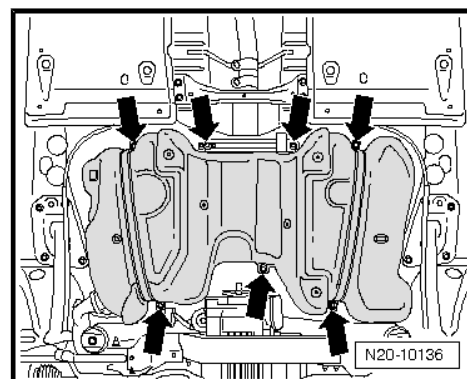
The filler neck must be „guided out“ between body and rear axle. To do this, take the fuel tank off engine and gearbox jack -V.A.G 1383 A- with the assistance of a 2nd mechanic.



- Clip in cable for four-wheel drive control unit -J492- on fuel tank.
- With the aid of a 2nd mechanic, guide the filler neck in between rear axle and body. Then place the fuel tank on the engine and gearbox jack -V.A.G 1383 A- .



- Raise fuel tank slowly up to installation position and secure it in place.

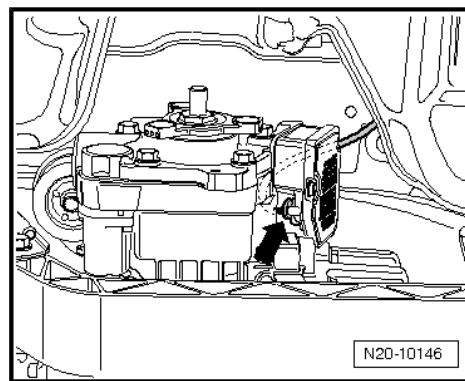




- Fit adapter cable on four-wheel drive control unit -J492- .

The remaining installation steps are carried out in the reverse sequence. In the process, note the following:

- ◆ Install breather and fuel lines free of kinks.
- ◆ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ◆ Ensure that line connections are tight.
- ◆ Check earth connection between tank and body of filler neck.



3.2.3 Removing and installing fuel gauge sender 2 -G169-

- The fuel tank should be no more than half full

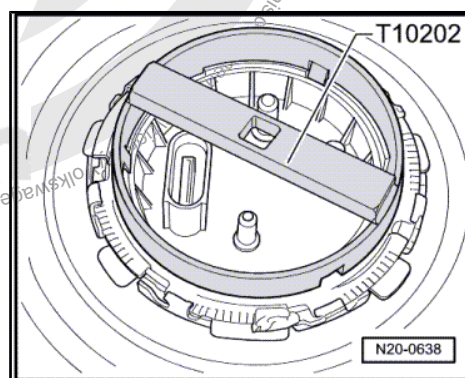


Note

- ◆ Ensure that the fuel gauge sender is not bent.
- ◆ If necessary, drain fuel tank using fuel extractor -VAS 5190- .
⇒ [page 162](#)
- ◆ Note safety precautions before beginning work ⇒ [page 150](#) .
- ◆ Observe rules for cleanliness ⇒ [page 151](#) .

Removing:

- First check whether a coded radio is fitted. If so, obtain anti-theft coding.
- Disconnect earth strap from battery with ignition switched off
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seat; Removing and installing seat bench .
- Remove left cover (as seen facing direction of normal travel) from fuel gauge sender 2 -G169- .
- Disconnect electrical connectors.
- Open locking ring using wrench -T10202- .





- Pull fuel gauge sender 2 -G169- upwards slightly and unclip it from the suction-jet pump.

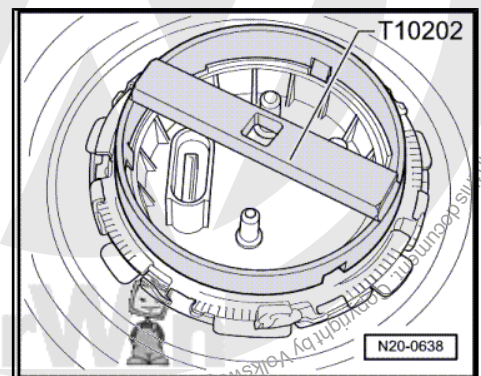
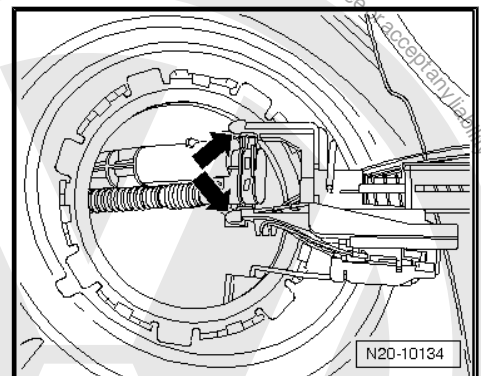
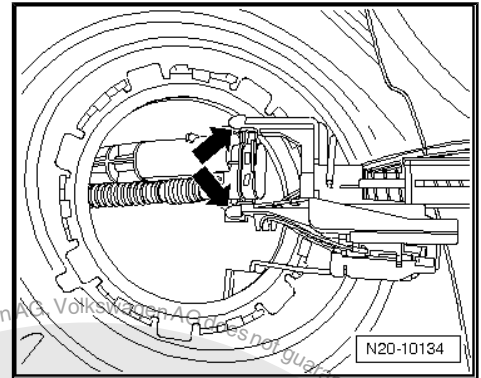
Installing:



Caution

When installing do not bend fuel gauge sender 2 -G169- float arm.

- Place fuel gauge sender 2 -G169- in fuel tank.
- Fit suction-jet pump on sender on inside of fuel tank. Locating lugs must engage.
- Place a new flange seal dry into opening in fuel tank and moisten inside (contact to flange) only with fuel.
- Note installation position of fuel gauge sender 2 -G169-
⇒ [page 157](#)
- Check for correct position of seal.
- Tighten locking ring using wrench -T10202- . Specified torque: 110 Nm
- Fit connectors.
- Install cover.
- Install bench seat. ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seat; Removing and installing seat bench .



3.2.4 Removing and installing suction-jet pump



Note

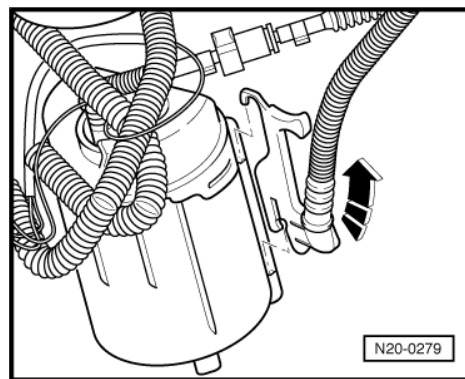
- ◆ *On vehicles with four-wheel drive, fuel has to be pumped from the area of fuel gauge sender 2 -G169- to the fuel delivery unit by means of a suction-jet pump due to the shape of the fuel tank.*
- ◆ *Checking is only necessary when the engine stops due to lack of fuel, even though the fuel gauge shows that the tank is still 1/4 full.*

Procedure

- Remove fuel delivery unit ⇒ [page 164](#)



- Pull return hose of suction-jet pump out of fuel delivery unit -arrow-.
- Separate quick-release coupling of supply line from suction-jet pump on Y-piece of fuel delivery unit.
- Remove fuel gauge sender 2 -G169- ➔ [page 160](#) .
- Now the suction-jet pump can be pulled out from side of fuel gauge sender 2 -G169- (left side of vehicle).
- Check that the fuel lines on suction-jet pump are fitted securely and are not damaged.
- Additionally check suction-jet pump for possible soiling.



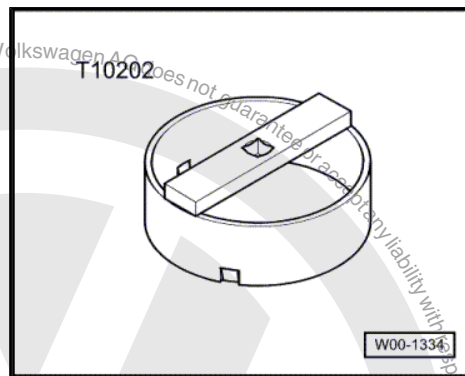
3.3 Emptying fuel tank

Special tools and workshop equipment required

- ◆ Fuel extractor -VAS 5190-



- ◆ Fuel tank sender unit tool -T10202-



- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-
- Note safety precautions before beginning work ➔ [page 150](#) .

Emptying fuel tank if it is more than $\frac{3}{4}$ full ➔ [page 162](#) .

Emptying fuel tank if it is less than $\frac{3}{4}$ full ➔ [page 163](#)

3.3.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full

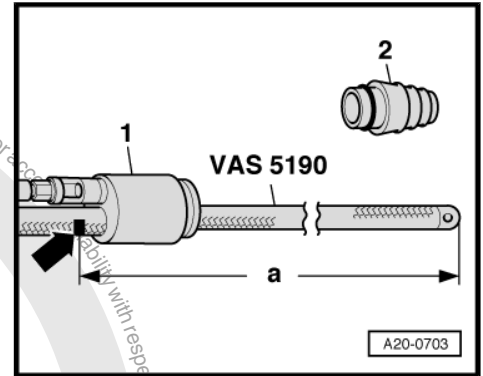


Caution

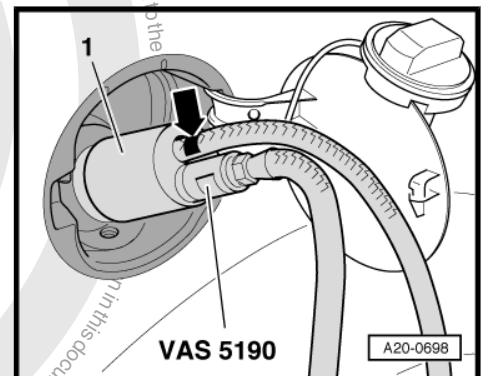
Secure earth wire of fuel extractor -VAS 5190- to a bare metal part of the body.



- Remove cotter -2- from shaft -1- of fuel extractor -VAS 5190- .
- At distance -a- = 1180 mm from end, mark extraction hose with insulating tape -arrow-



- Remove filler cap from fuel tank filler neck.
- Screw shaft end -1- of fuel extractor unit -VAS 5190- onto fuel filler neck.
- Push extraction hose into fuel tank until marking on hose -arrow- coincides with shaft end.



Note

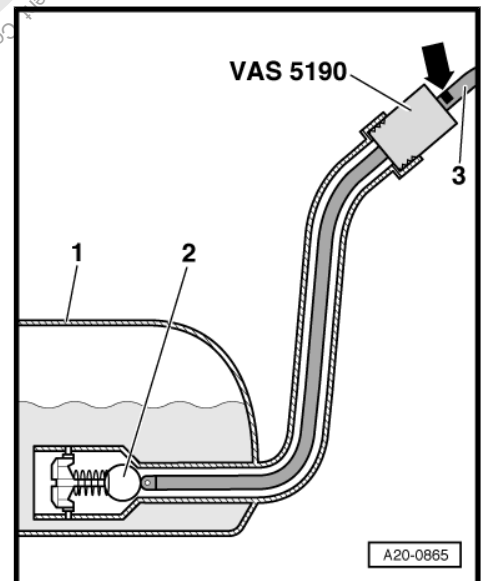
A ball valve -2- is located at the bottom of the filler neck in the fuel tank -1-; it must not be damaged by the extraction hose -3-. Therefore push hose into filler neck only as far as marking -arrow-.

- Empty fuel tank as far as possible.
- Carefully pull out extraction hose.



Note

- ◆ When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger.
- ◆ If the fuel tank has to be drained fully, proceed as follows:
⇒ [page 163](#)



3.3.2 Emptying fuel tank if it is less than $\frac{3}{4}$ full

- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
- Remove cover from fuel delivery unit.



WARNING

Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.



- Pull connector and fuel lines off flange.

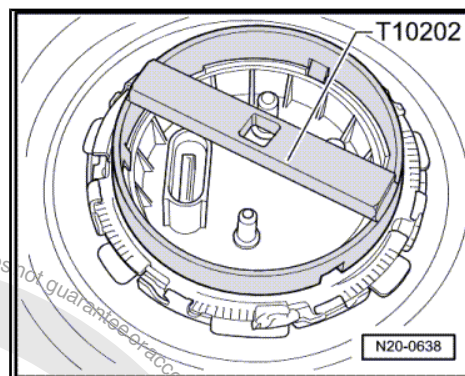


Note

Press buttons on hose couplings to do this.

- Open locking ring using fuel tank sender wrench -T10202- .
- Lift sender flange.
- Insert extraction hose of fuel extractor -VAS 5190- as deeply as possible into fuel tank and extract fuel.

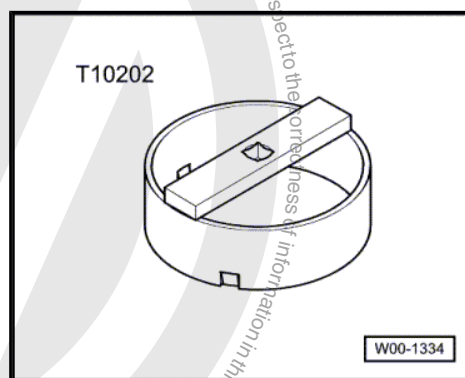
If fuel tank needed only to be emptied, reinstall sender flange.



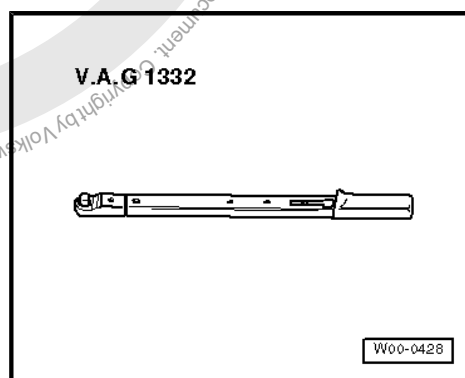
3.4 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Special wrench T10202-



- ◆ Torque wrench -V.A.G 1332-



Removing

Observe safety precautions ⇒ [page 150](#) .

Observe rules for cleanliness ⇒ [page 151](#) .

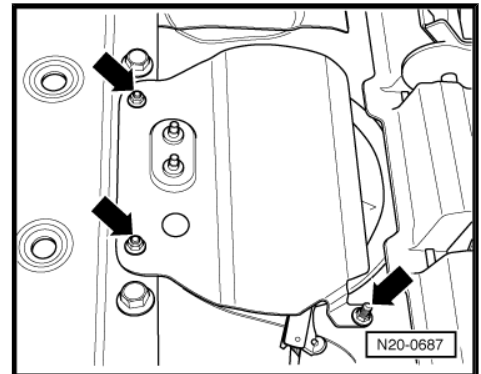
- First check whether a coded radio is fitted. If so, obtain anti-theft coding.
- Disconnect earth strap from battery with ignition switched off ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .



- Fold rear seats forwards.
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Pull 5-pin connector and fuel lines off flange.

i Note

Press buttons on hose couplings to do this.



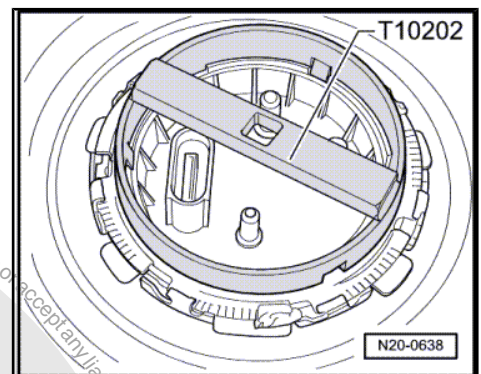
WARNING

- ◆ *The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!*
- ◆ *The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!*
- ◆ *Wear eye and hand protection when performing any type of repair work on the fuel system!*

- Remove union nut with wrench -T10202- .
- Pull fuel delivery unit and seal out of opening in fuel tank.

i Note

If delivery unit is to be renewed, drain old delivery unit before disposal.

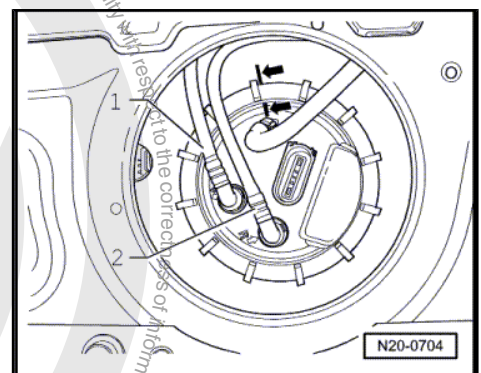


Installing

- Installation of fuel delivery unit is carried out in reverse order.

i Note

- ◆ *Do not bend fuel gauge sender when installing.*
- ◆ *Insert seal for flange or fuel delivery unit dry into opening of fuel tank.*
- ◆ *Moisten seal with fuel only when installing flange or fuel delivery unit.*
- ◆ *Ensure that fuel hose connections are tight.*
- ◆ *After installing fuel delivery unit, check that supply, return and breather lines are still clipped onto fuel tank.*
- ◆ *Note installation position of fuel delivery unit flange: mark on flange must align with mark -arrows- on fuel tank.*





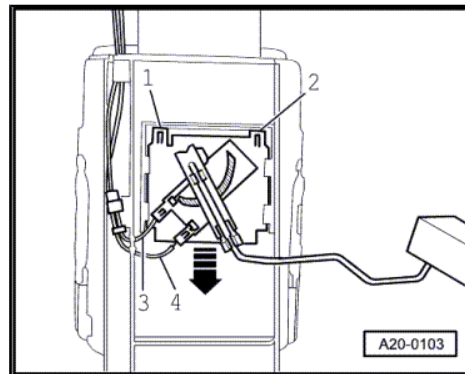
3.5 Removing and installing fuel gauge sender

Removing

- Remove fuel delivery unit ➔ [page 164](#)
- Release connector lugs on lines -3- and -4- and pull off.
- Lift retaining tabs -1- and -2- using a screwdriver and pull fuel gauge sender off downwards -arrows-.

Installing

- Insert fuel gauge sender into guides on fuel delivery unit and press upwards until it engages.



3.6 Checking fuel pump



Note

Check fuel filter connections for correct arrangement, before starting to check the fuel pump ➔ [page 171](#)

3.6.1 Checking delivery pressure of fuel pump

Special tools and workshop equipment required

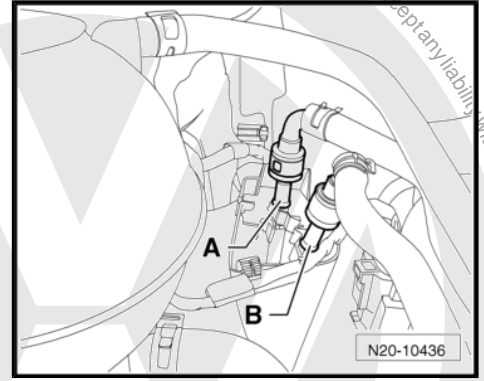
- ◆ Pressure gauge -VAS 6550-
- ◆ Vehicle diagnosis tester

Test prerequisite:

- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.



- Separate quick release coupling -A- (black or black marking) of fuel supply line.
- Connect pressure tester -VAS 6550- with cables -VAS 6550/1- and -VAS 6550/2- to open ends of fuel supply line.
- Switch on pressure tester -VAS 6550- by pressing **On/Off** button.
- Open shut-off taps „A“ and „B“ of pressure tester and close shut-off tap „C“.
- Start engine and run at idling speed.
- Read pressure on pressure tester -VAS 6550-. Specification: min. 0.5 bar.
- Place pressure tester -VAS 6550- onto windscreen so that it can be read from inside vehicle.
- Increase idling speed to 2500 rpm and read the pressure on pressure tester -VAS 6550-, specification min 0.25 bar.
- If the delivery pressure temporarily drops, renew fuel delivery unit ⇒ [page 210](#).
- If the specifications are attained, check tandem pump to ensure the fuel filter is not blocked ⇒ [page 225](#).
- If the tandem pump values are OK, check fuel pump delivery rate ⇒ [page 167](#).



3.6.2 Checking fuel pump delivery rate

Special tools and workshop equipment required

- ◆ Pressure gauge -VAS 6550-
- ◆ Container > 3 litre with measuring scale
- ◆ Vehicle diagnosis tester

Test prerequisite:

- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.



Note

The delivered fuel may be cloudy. This is normal and can be ignored.

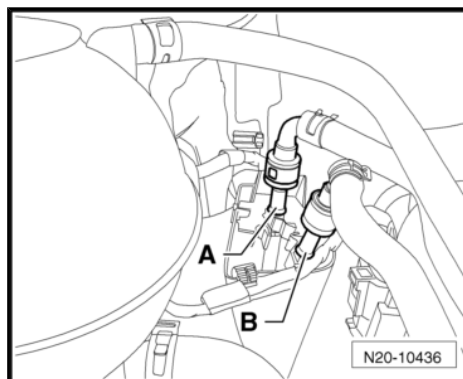


- Separate quick release coupling -A- (black or black marking) of fuel supply line.
- Connect -VAS 6550/1- pressure tester line to fuel supply -A-.
- Guide open end of line into measuring container.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.



- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

If the specification is not attained:

- Check fuel supply line between fuel pump and engine compartment for kinks, crushes or damage.
- If necessary, renew defective line and repeat test.
- If it is not kinked, crushed or damaged, remove rear seat bench
⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



Note

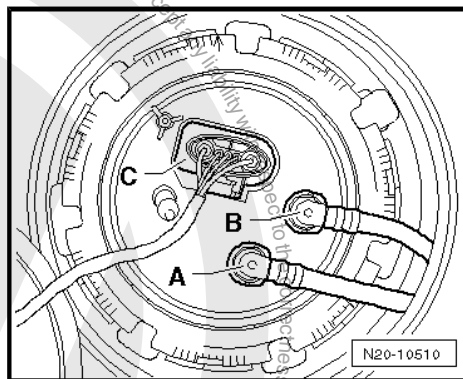
Press in securing ring to release fuel line.

- Pull fuel supply line (black, or black marking) -A- off fuel delivery unit.
- Connect -VAS 6550/1- pressure tester line to fuel supply -A-.
- Guide open end of line into measuring container.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.



- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

If the specification is not attained:

- Check voltage supply ⇒ [page 168](#) and current draw
⇒ [page 170](#) of fuel pump.

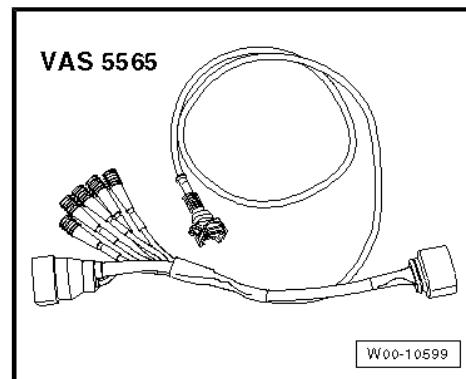
3.6.3 Checking voltage supply of fuel pump

Special tools and workshop equipment required

- ◆ Hand-held multimeter -V.A.G 1526D-
- ◆ Pickup clamp -V.A.G 1526B/2-



◆ Test instrument adapter/DSO (5-pin) -VAS 5565-



Test prerequisites

- Fuses must be OK.
- The battery voltage must be at least 12 V, if necessary connect battery charger.
- All electrical consumers, e.g. lights and rear window heating, must be switched off.
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Switch on ignition. The fuel pump must be heard to run for about 2 seconds.
- Switch off ignition.

If the fuel pump does not start:

- Pull connector off fuel delivery unit flange.
- Connect test instrument adapter/DSO (5-pin) -VAS 5565- between connector and flange.



- Connect hand-held multimeter -V.A.G 1526D- to contacts -1- and -5- of adapter.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- Read voltage value on hand-held multimeter -V.A.G 1526D- : Specification = battery voltage.

If no voltage is present:

- Check activation of fuel pump relay and wiring for an open or short circuit ⇒ Vehicle diagnostic tester.

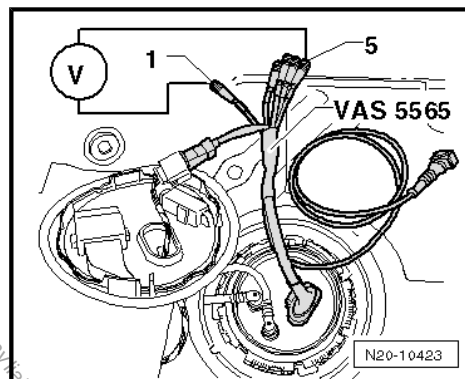
Voltage supply OK:

- Remove fuel delivery unit ⇒ [page 210](#)

Check that electrical wiring between flange and fuel pump is connected and has continuity.

If no open circuit can be found:

- Renew fuel delivery unit.



3.6.4 Checking current draw of fuel pump

Special tools and workshop equipment required

- ◆ Hand-held multimeter -V.A.G 1526D- or pickup clamp -V.A.G 1526B/2-
- ◆ Test instrument adapter/DSO (5-pin) -VAS 5565-
- ◆ Vehicle diagnosis tester



Note

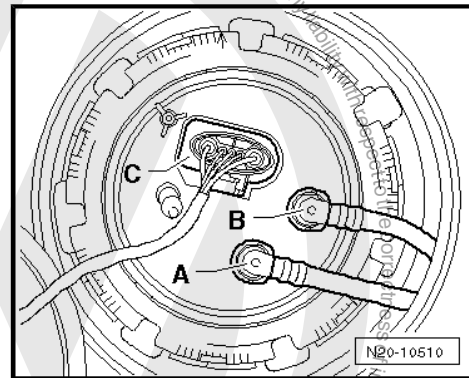
The battery voltage and the diesel fuel temperature have a great influence on the current draw of the fuel pump. For this reason ensure that the battery voltage is at least 12 V whilst checking and the diesel fuel temperature does not fall to the freezing point.

Test prerequisites

- Battery voltage at least 12 V
- Diesel fuel temperature above 10 °C
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



- Pull connector -C- off flange

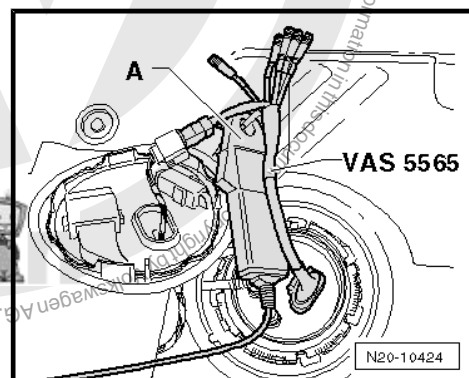


- Connect test instrument adapter/DSO (5-pin) -VAS 5565- to connector and fuel delivery unit.
- Connect pick-up clamp -A- to red terminal with lettering „pick-up clamp“ for test instrument adapter/DSO (5-pin) -VAS 5565- .



Note

Pickup clamp of hand-held multimeter -V.A.G 1715- can also be connected to red terminal with lettering „pick-up clamp“ of test instrument adapter/DSO (5-pin) -VAS 5565- .



- Switch on ignition.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- Read current draw on hand-held multimeter -V.A.G 1526D- . Specification: max. 7.5 amps.
- If the measured value is not within specifications:
- Renew fuel delivery unit ⇒ [page 210](#) .

3.7 Assembly overview - fuel filter



Note

*Note that there are different versions of fuel filter upper part
⇒ [page 173](#)*



1 - Supply line

- ☐ From fuel tank.
- ☐ White or with white marking.
- ☐ Check for secure seating.

2 - 5 Nm

3 - Return line

- ☐ To fuel cooler
- ☐ Check for secure seating.
- ☐ Blue or with blue marking.

4 - Plug for water extraction

- ☐ Remove and extract about 100 cm³ liquid using hand-operated vacuum pump with accessories -V.A.G 1390- and water drainage container -V.A.G 1390/1-.

5 - Seal

- ☐ Renew.

6 - Supply line

- ☐ To tandem pump.

7 - Return line

- ☐ From tandem pump.
- ☐ Blue or with blue marking.
- ☐ Check for secure seating.

8 - Upper part of fuel filter

9 - Fuel temperature sender -G81-

10 - Seal

- ☐ Renew.

11 - Filter insert

12 - Seal

- ☐ Renew.

13 - Lower part of fuel filter

14 - 8 Nm

15 - Retainer

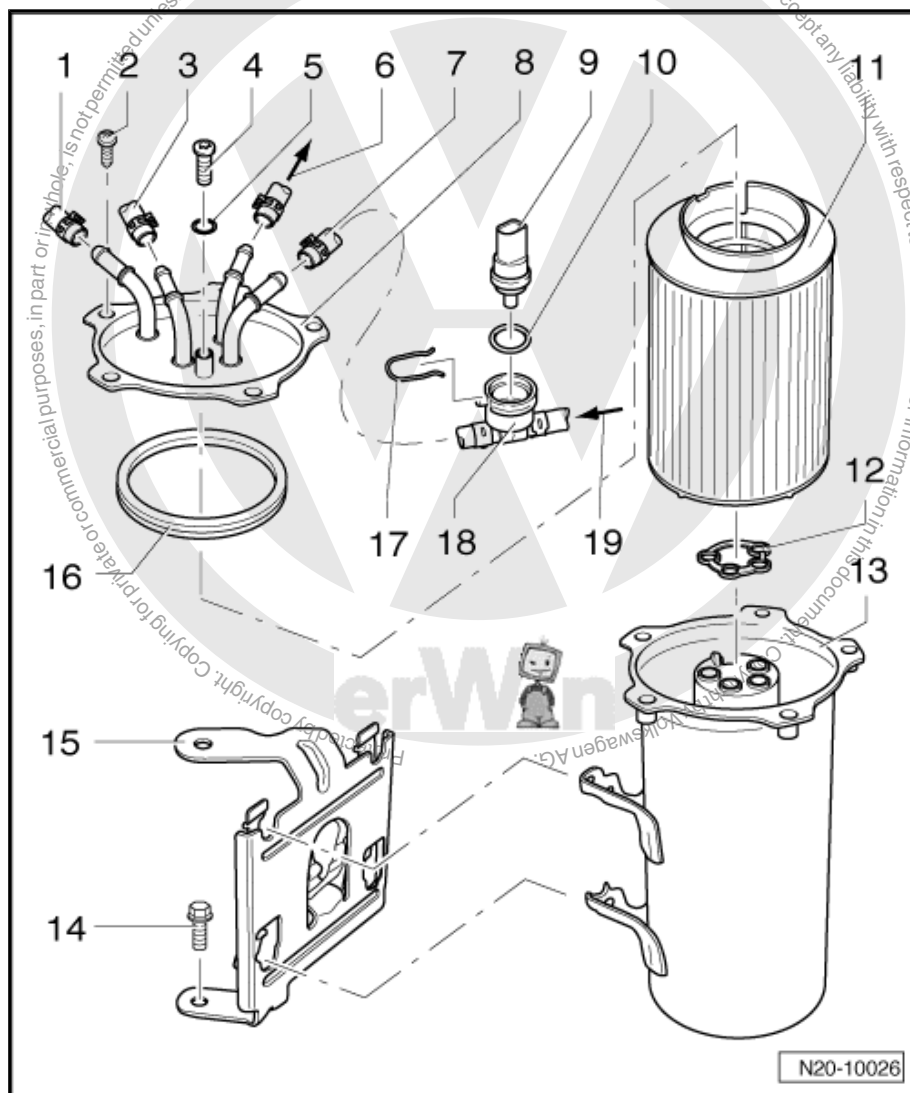
16 - Seal

- ☐ Renew.

17 - Retaining clip

18 - Connection

19 - From tandem pump.





3.7.1 Fuel filter upper part

Type A ➤ [page 173](#)

Type B ➤ [page 173](#)

Fuel filter upper part, type A

1 - 8 Nm

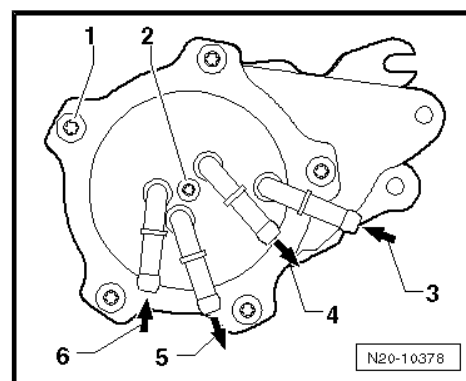
2 - Plug for water extraction (remove and extract about 100 cm³ liquid using hand-operated vacuum pump with accessories - V.A.G 1390- and water drainage container -V.A.G 1390/1- , renew seal)

3 - Fuel tank supply line, white or white marking. Check for secure seating.

4 - Fuel tank return line, blue or blue marking. Check for secure seating.

5 - Fuel supply line to engine, white or white marking. Check for secure seating.

6 - Fuel return line from engine, blue or blue marking. Check for secure seating.



Fuel filter upper part, type B

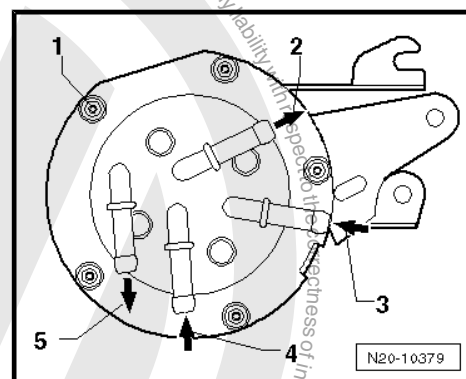
1 - 5 Nm

2 - Fuel tank return line, blue or blue marking. Check for secure seating.

3 - Fuel tank supply line, white or white marking. Check for secure seating.

4 - Fuel return line from engine, blue or blue marking. Check for secure seating.

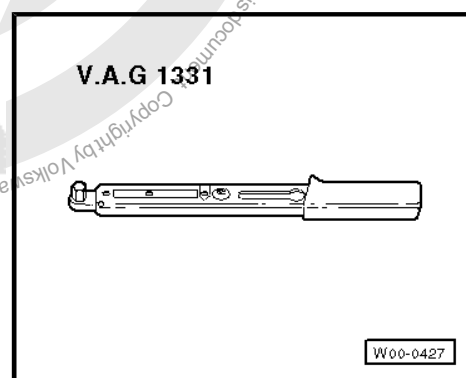
5 - Fuel supply line to engine, white or white marking. Check for secure seating.



3.8 Removing and installing fuel cooler

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331/-



Removing

– Note safety precautions before beginning work ➤ [page 150](#) .

Observe rules for cleanliness ➤ [page 151](#) .



Note

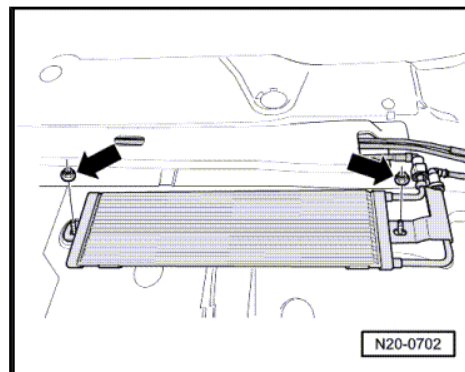
The fuel cooler is located in the return line to tank. It is located on the vehicle underbody.

- Remove underbody panel.
- Separate fuel lines at fuel cooler.
- Remove securing nuts -arrows-.

Installing

Install in reverse order. In the process, note the following:

- ◆ Tighten fuel cooler securing nuts to 15 Nm.





4 Parts of fuel supply system (Touran)



Note

- ◆ *Hose connections are secured with either spring-type or clamp-type clips.*
- ◆ *Always renew clamp-type clips with spring-type clips.*
- ◆ *Spring-type clip pliers -VAS 5024/- or hose clip pliers -V.A.G 1921/- are recommended for installation of spring-type clips.*





Safety precautions ➔ [page 150](#) .

Rules for cleanliness ➔ [page 151](#) .

Assembly overview - fuel tank with attachments ➔ [page 176](#) .

Emptying fuel tank ➔ [page 177](#) .

Removing and installing fuel tank ➔ [page 180](#) .

Assembly overview - fuel filter ➔ [page 182](#) .

Removing and installing fuel cooler ➔ [page 183](#) .

Removing and installing fuel delivery unit ➔ [page 184](#) .

Removing and installing fuel gauge sender ➔ [page 186](#) .

Checking fuel pump ➔ [page 186](#) .

4.1 Assembly overview - fuel tank with attachments

1 - Cap

2 - 1.5 Nm

3 - Tank flap unit

- ☐ Removing and installing. ➔ General body repairs, exterior; Rep. gr. 55 ; Fuel flap unit

4 - Earth connection

- ☐ Check for secure seating.

5 - 10 Nm

6 - Pressure retention valve with connecting hose

7 - Gravity/overflow valve

8 - Fuel tank

- ☐ When removing, support using engine and gearbox jack -V.A.G 1383/A- .
- ☐ Removing and installing ➔ [page 180](#) .

9 - Heat shield

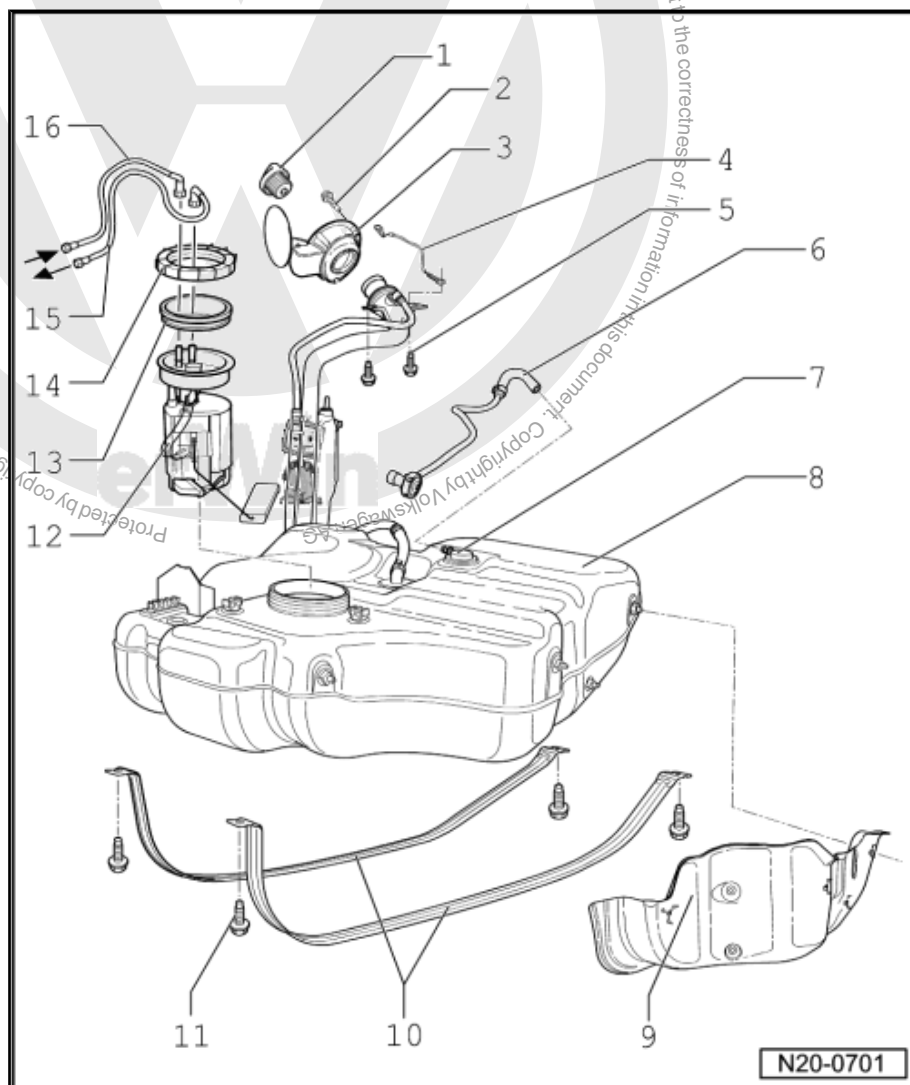
- ☐ For fuel tank.

10 - Securing strap

11 - 20 Nm + 1/4 turn (90°) further

12 - Fuel delivery unit

- ☐ With fuel gauge sender (G).
- ☐ Note installation position of flange on fuel tank ➔ [page 177](#) .
- ☐ Removing and installing ➔ [page 184](#) .
- ☐ Checking fuel pump ➔ [page 166](#) .
- ☐ Removing and installing fuel sender ➔ [page 186](#) .
- ☐ Clean strainer if soiled.





13 - Seal

- ☐ Renew.
- ☐ Moisten with fuel when installing.

14 - Union nut, 80 Nm

- ☐ Remove and install using union nut tool -3217- .

15 - Supply line

- ☐ To fuel filter
- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.
- ☐ Black
- ☐ To pull off flange, press release button on connecting piece.

16 - Return line

- ☐ From fuel cooler.
- ☐ Blue or with blue marking.
- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.
- ☐ To pull off flange, press release button on connecting piece.

Installation position of fuel delivery unit flange

Mark on flange must align with mark on fuel tank -arrows-.

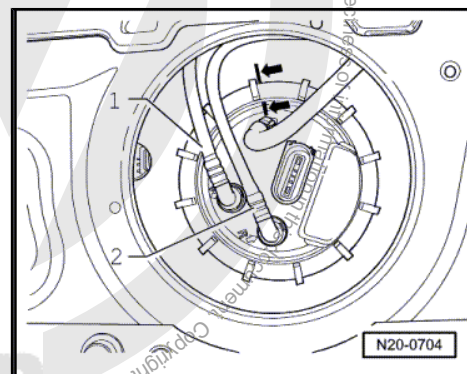
Black supply line -1- to connection marked -V-.

Return line -2- (blue or with blue marking) to connection marked -R-.



Note

After installing fuel delivery unit flange, check that supply, return and breather lines are still clipped onto fuel tank.



4.2 Emptying fuel tank

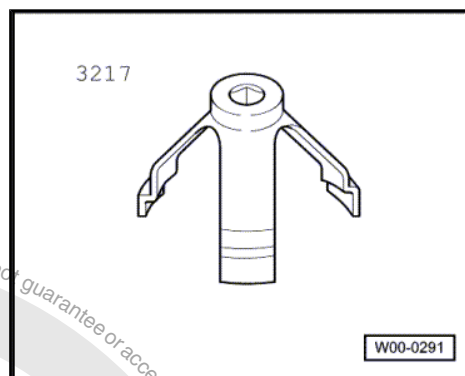
Special tools and workshop equipment required

- ◆ Fuel extractor -VAS 5190-

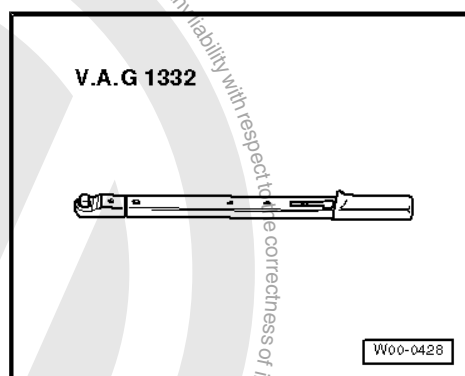




- ◆ Union nut tool -3217-



- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



- Note safety precautions before starting work ⇒ [page 150](#) .

Emptying fuel tank if it is more than $\frac{3}{4}$ full ⇒ [page 178](#) .

Emptying fuel tank if it is less than $\frac{3}{4}$ full ⇒ [page 179](#)

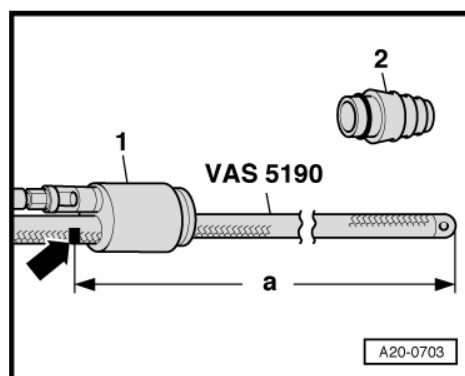
4.2.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full



Caution

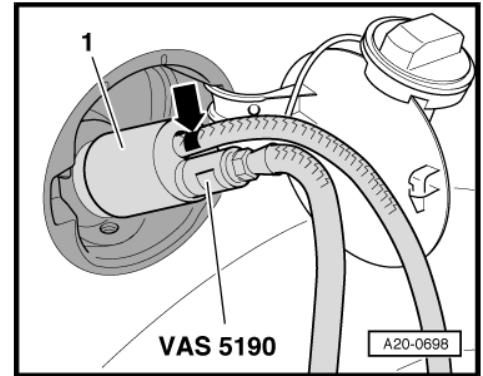
Secure earth wire of fuel extractor -VAS 5190- to a bare metal part of the body.

- Remove cotter -2- from shaft -1- of fuel extractor -VAS 5190- .
- At distance -a- = 1,200 mm from end, mark extraction hose with insulating tape -arrow-.





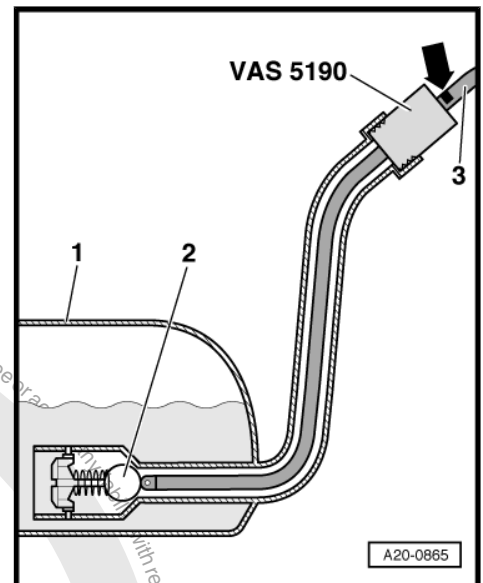
- Remove filler cap from fuel tank filler neck.
- Screw shaft end -1- of fuel extractor unit -VAS 5190- onto fuel filler neck.
- Push extraction hose into fuel tank until marking on hose -arrow- coincides with shaft end.



i Note

A ball valve -2- is located at the bottom of the filler neck in the fuel tank -1-; it must not be damaged by the extraction hose -3-. Therefore push hose into filler neck only as far as marking -arrow-.

- Drain fuel tank as much as possible through fuel filler neck.
- Carefully pull out extraction hose.



i Note

- ◆ *When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger. The tank may be removed while containing remaining fuel.*
- ◆ *If work must be performed on fuel pump or fuel tank sender, proceed as follows:*

4.2.2 Emptying fuel tank if it is less than $\frac{3}{4}$ full

- Fold rear seats forwards.
- Detach carpet under seats and fold it back. ➔ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



WARNING

Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- Pull connector and fuel lines off flange.

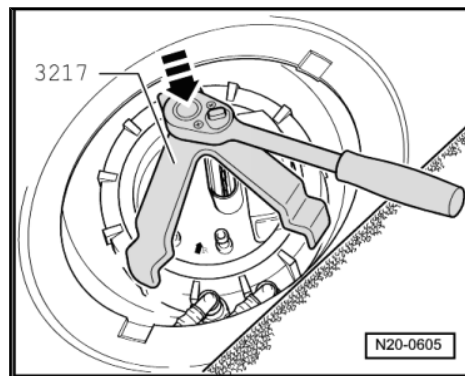
i Note

Press buttons on hose couplings to do this.



- Open locking ring using union nut tool -3217- .
- Lift fuel delivery unit.
- Insert extraction hose of fuel extractor -VAS 5190- as deeply as possible into fuel tank and extract fuel.

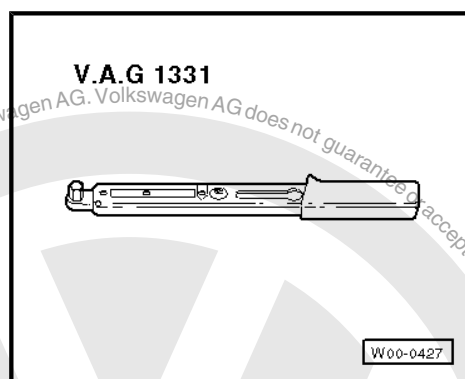
If fuel tank needed only to be emptied, reinstall fuel delivery unit
⇒ [page 184](#) .



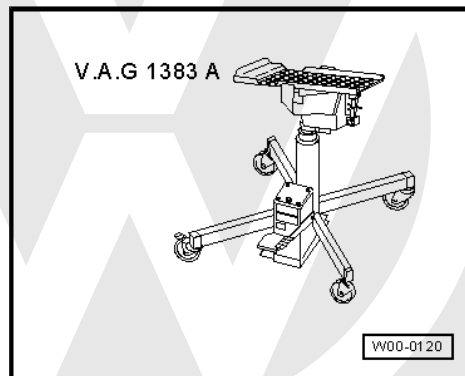
4.3 Removing and installing fuel tank

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331/-



- ◆ Engine and gearbox jack -V.A.G 1383/A-



Removing

- Note safety precautions before starting work ⇒ [page 150](#) .

Observe rules for cleanliness ⇒ [page 151](#) .

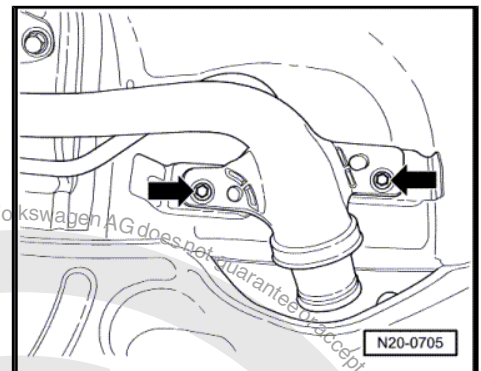


Note

- ◆ *Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.*
- ◆ *When lowering fuel tank, guide it carefully to prevent damage.*
- Disconnect earth strap from battery with ignition switched off
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
- Fold rear seats forwards.



- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Pull connector off flange.
- Remove fuel flap unit. ⇒ General body repairs, exterior; Rep. gr. 55 ; Fuel flap unit
- Emptying fuel tank ⇒ [page 177](#) .
- Remove rear right wheel housing liner: ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .
- Remove bolts from filler neck -arrows-.



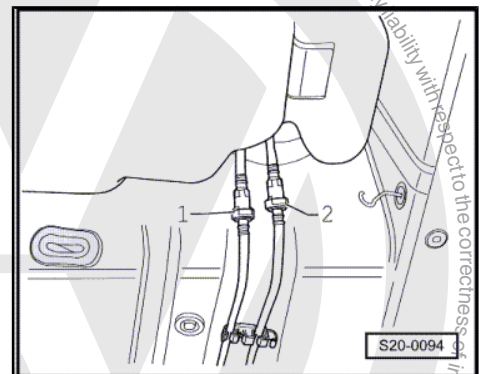
- Disconnect fuel lines at front right of fuel tank.



Note

Press buttons on hose couplings to do this.

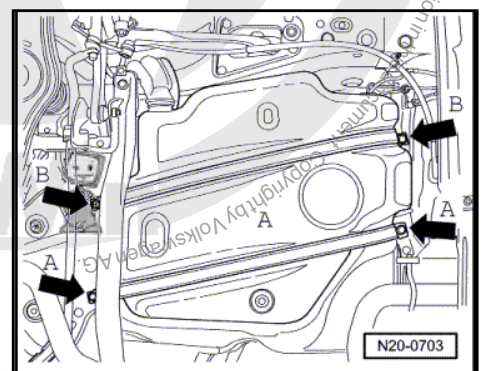
- If vehicle has supplementary heating, separate connector to metering pump and unclip wire. ⇒ Supplementary heating; Rep. gr. 82 ; Removing and installing metering pump -V54
- Remove bolts -A- and remove heat shield for fuel tank.
- Support fuel tank using engine and gearbox jack -V.A.G 1383/A- .
- Remove securing bolts -B- and remove retaining strap.
- Slowly lower fuel tank and pull it forwards.
- Tilt fuel tank to get it past rear axle.



Installing

Install in reverse order. In the process, note the following:

- ◆ Install breather and fuel hoses free of kinks.
- ◆ Ensure that fuel hose connections are tight.
- ◆ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ◆ Clip supply and return lines onto fuel tank.





4.4 Assembly overview - fuel filter

1 - Fuel filter upper part

- ☐ Observe various types
⇒ [page 183](#)

2 - Fuel temperature sender - G81-

- ☐ Installed in engine return line

3 - Seal

- ☐ Renew.

4 - Filter insert

- ☐ Observe change intervals.

5 - Seal

- ☐ Renew.

6 - Fuel filter lower part

7 - 8 Nm

8 - Retainer

9 - Seal

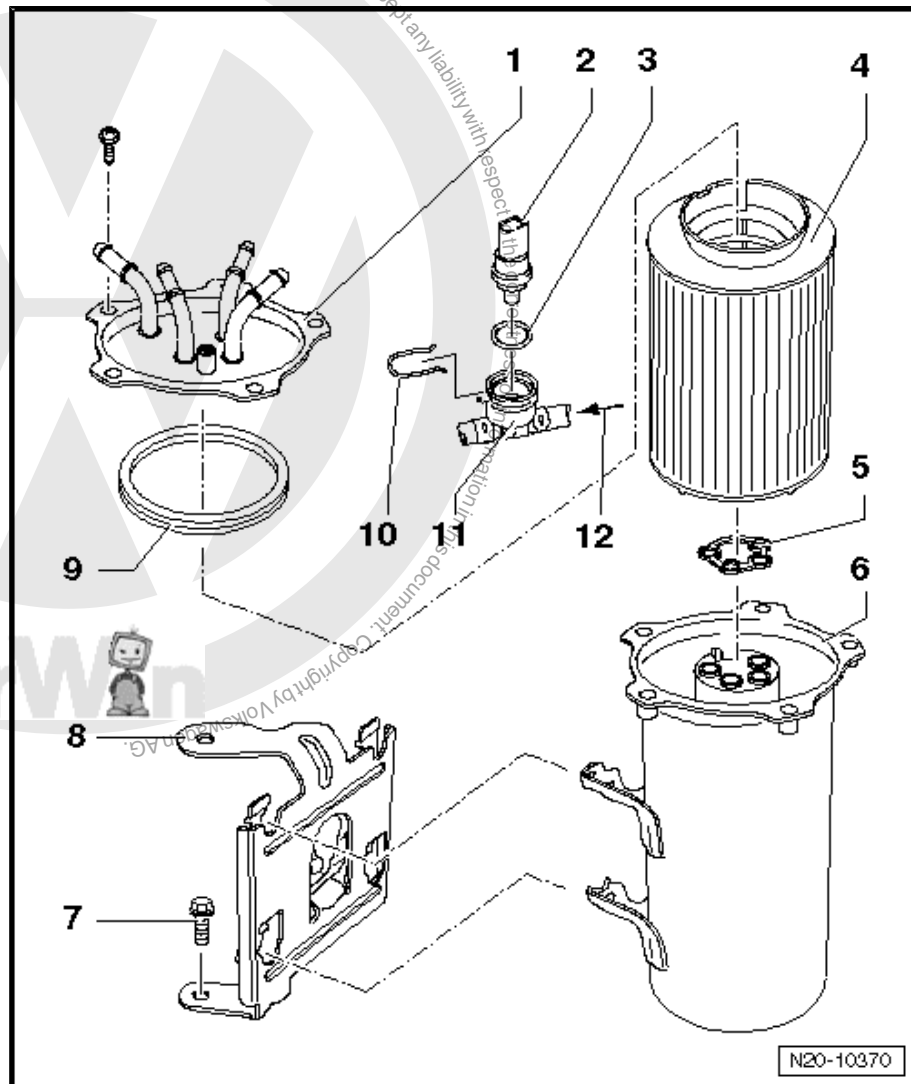
- ☐ Renew.

10 - Retaining clip

- ☐ Check for secure seating.

11 - Connection for fuel temperature sender - G81-

12 - From tandem pump.





4.4.1 Fuel filter upper part

Type A ➤ [page 183](#)

Type B ➤ [page 183](#)

Fuel filter upper part, type A

1 - 8 Nm

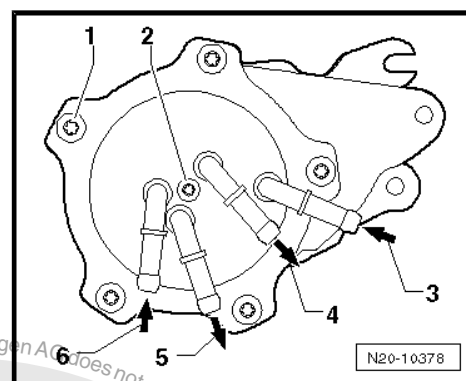
2 - Plug for water extraction (remove and extract about 100 cm³ liquid using hand-operated vacuum pump with accessories - V.A.G 1390- and water drainage container -V.A.G 1390/1- , renew seal)

3 - Fuel tank supply line, white or white marking. Check for secure seating.

4 - Fuel tank return line, blue or blue marking. Check for secure seating.

5 - Fuel supply line to engine, white or white marking. Check for secure seating.

6 - Fuel return line from engine, blue or blue marking. Check for secure seating.



Fuel filter upper part, type B

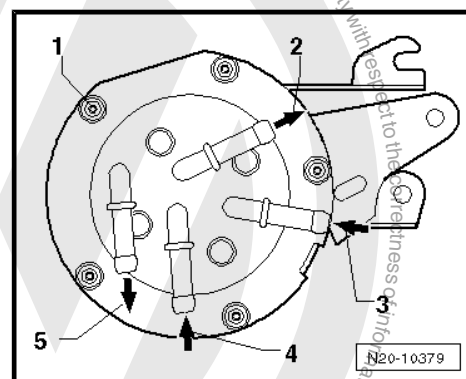
1 - 5 Nm

2 - Fuel tank return line, blue or blue marking. Check for secure seating.

3 - Fuel tank supply line, white or white marking. Check for secure seating.

4 - Fuel return line from engine, blue or blue marking. Check for secure seating.

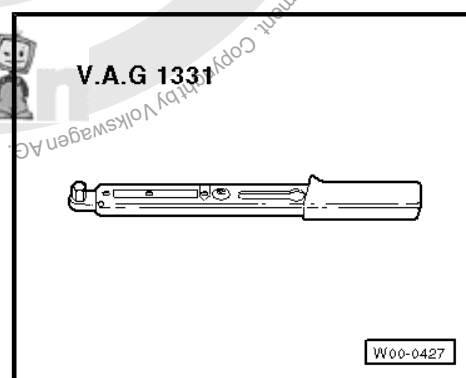
5 - Fuel supply line to engine, white or white marking. Check for secure seating.



4.5 Removing and installing fuel cooler

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331/-



Removing

- Note safety precautions before starting work ➤ [page 150](#) .

Observe rules for cleanliness ➤ [page 151](#) .



Note

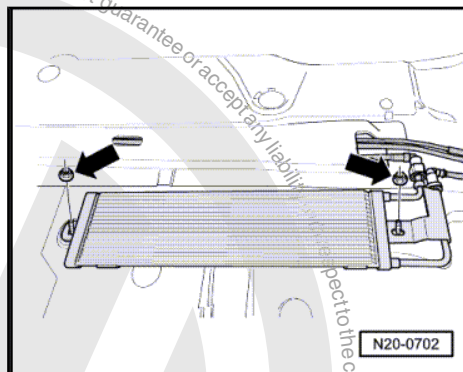
The fuel cooler is located in the return line to tank. It is located on the vehicle underbody.

- Remove underbody panel.
- Separate fuel lines at fuel cooler.
- Remove securing nuts -arrows-.

Installing

Install in reverse order. In the process, note the following:

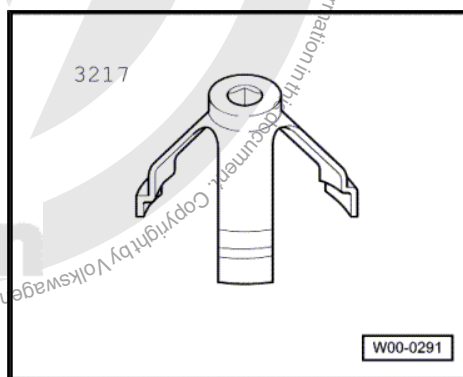
- ◆ Tighten fuel cooler securing nuts to 15 Nm.



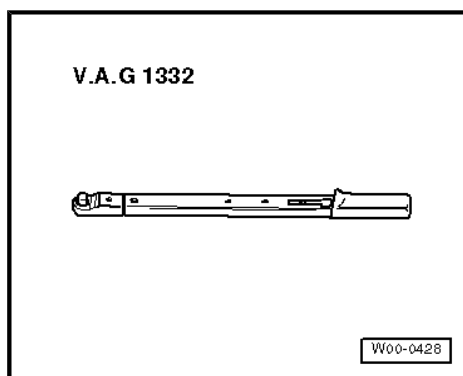
4.6 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Union nut tool -3217-



- ◆ Torque wrench -V.A.G 1332-



Removing

Observe safety precautions ⇒ [page 150](#) .

Observe rules for cleanliness ⇒ [page 151](#) .

- First check whether a coded radio is fitted. If so, obtain anti-theft coding.



- Disconnect earth strap from battery with ignition switched off
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
- Fold rear seats forwards.
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Pull 5-pin connector and fuel lines off flange.



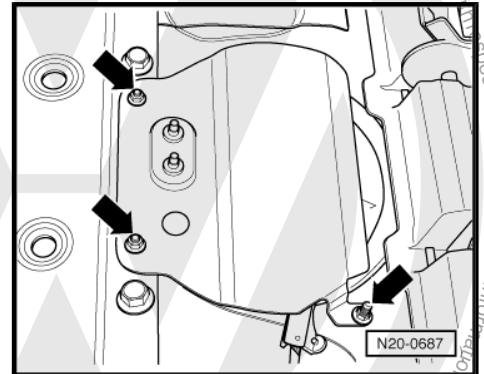
Note

Press buttons on hose couplings to do this.



WARNING

- ◆ **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- ◆ **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!**
- ◆ **Wear eye and hand protection when performing any type of repair work on the fuel system!**



- Unscrew union nut with union nut tool -3217- wrench .
- Pull fuel delivery unit and seal out of opening in fuel tank.

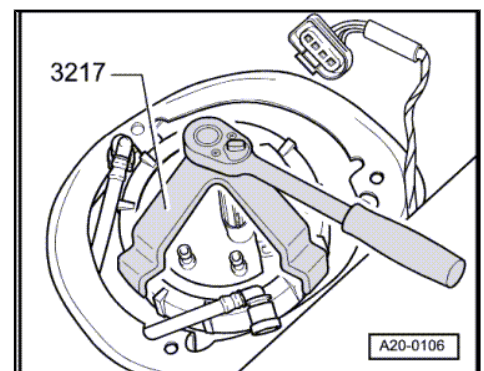


Note

If delivery unit is to be renewed, drain old delivery unit before disposal.

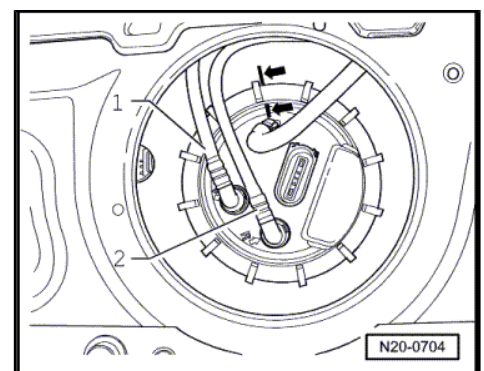
Installing

- Installation of fuel delivery unit is carried out in reverse order.



Note

- ◆ **Do not bend fuel gauge sender when installing.**
- ◆ **Insert seal for flange or fuel delivery unit dry into opening of fuel tank.**
- ◆ **Moisten seal with fuel only when installing flange or fuel delivery unit.**
- ◆ **Ensure that fuel hose connections are tight.**
- ◆ **After installing fuel delivery unit, check that supply, return and breather lines are still clipped onto fuel tank.**
- ◆ **Note installation position of fuel delivery unit flange: mark on flange must align with mark -arrows- on fuel tank.**





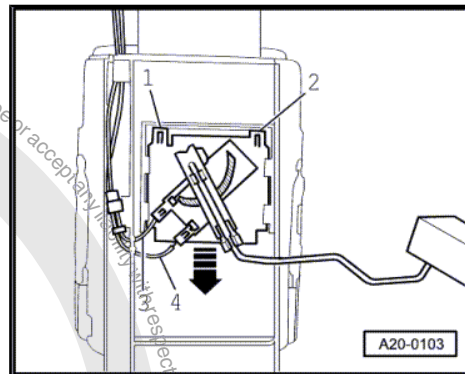
4.7 Removing and installing fuel gauge sender

Removing

- Remove fuel delivery unit ➔ [page 184](#)
- Release connector lugs on lines -3- and -4- and pull off.
- Lift retaining tabs -1- and -2- using a screwdriver and pull fuel gauge sender off downwards -arrows-.

Installing

- Insert fuel gauge sender into guides on fuel delivery unit and press upwards until it engages.



4.8 Checking fuel pump



Note

Check fuel filter connections for correct arrangement, before starting to check the fuel pump ➔ [page 173](#)

4.8.1 Checking delivery pressure of fuel pump

Special tools and workshop equipment required

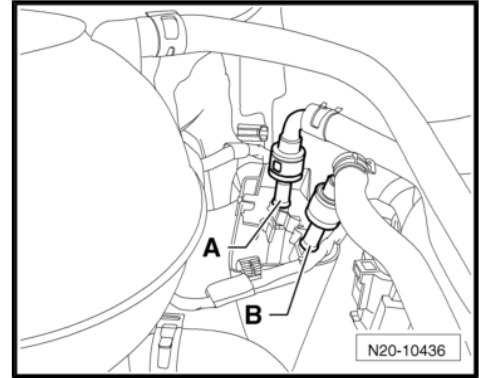
- ◆ Pressure gauge -VAS 6550-
- ◆ Vehicle diagnosis tester

Test prerequisite:

- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.



- Separate quick release coupling -A- (black or black marking) of fuel supply line.
- Connect pressure tester -VAS 6550- with cables -VAS 6550/1- and -VAS 6550/2- to open ends of fuel supply line.
- Switch on pressure tester -VAS 6550- by pressing **On/Off** button.
- Open shut-off taps „A“ and „B“ of pressure tester and close shut-off tap „C“.
- Start engine and run at idling speed.
- Read pressure on pressure tester -VAS 6550- . Specification: min. 0.5 bar.
- Place pressure tester -VAS 6550- onto windscreen so that it can be read from inside vehicle!
- Increase idling speed to 2500 rpm and read the pressure on pressure tester -VAS 6550- , specification min 0.25 bar.
- If the delivery pressure temporarily drops, renew fuel delivery unit ➔ [page 210](#) .
- If the specifications are attained, check tandem pump to ensure the fuel filter is not blocked ➔ [page 225](#) .
- If the tandem pump values are OK, check fuel pump delivery rate ➔ [page 187](#) .



4.8.2 Checking fuel pump delivery rate

Special tools and workshop equipment required

- ◆ Pressure gauge -VAS 6550-
- ◆ Container > 3 litre with measuring scale
- ◆ Vehicle diagnosis tester

Test prerequisite:

- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.



Note

The delivered fuel may be cloudy. This is normal and can be ignored.



- Separate quick release coupling -A- (black or black marking) of fuel supply line.
- Connect -VAS 6550/1- pressure tester line to fuel supply -A-.
- Guide open end of line into measuring container.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

If the specification is not attained:

- Check fuel supply line between fuel pump and engine compartment for kinks, crushes or damage.
- If necessary, renew defective line and repeat test.
- If it is not kinked, crushed or damaged, remove rear seat bench
⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



Note

Press in securing ring to release fuel line.

- Pull fuel supply line (black, or black marking) -A- off fuel delivery unit.
- Connect -VAS 6550/1- pressure tester line to fuel supply -A-.
- Guide open end of line into measuring container.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



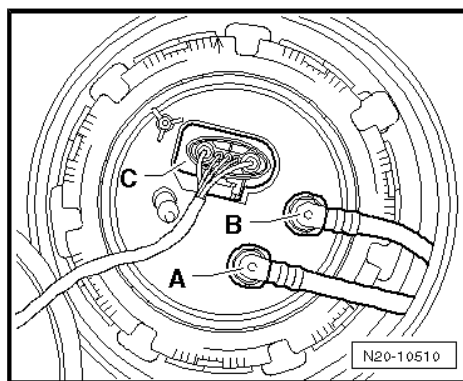
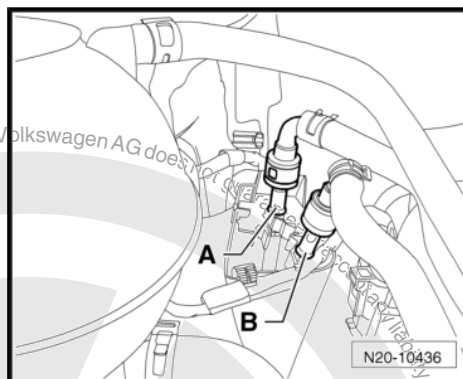
Note

The fuel pump is now activated for 30 seconds.

- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

If the specification is not attained:

- Check voltage supply ⇒ [page 188](#) and current draw
⇒ [page 190](#) of fuel pump.



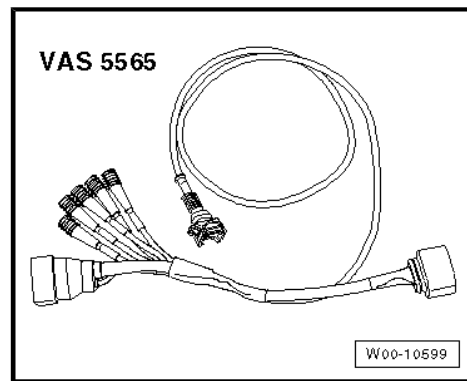
4.8.3 Checking voltage supply of fuel pump

Special tools and workshop equipment required

- ◆ Hand-held multimeter -V.A.G 1526D-
- ◆ Pickup clamp -V.A.G 1526B/2-



◆ Test instrument adapter/DSO (5-pin) -VAS 5565-



Test prerequisites

- Fuses must be OK.
- The battery voltage must be at least 12 V, if necessary connect battery charger.
- All electrical consumers, e.g. lights and rear window heating, must be switched off.
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Switch on ignition. The fuel pump must be heard to run for about 2 seconds.
- Switch off ignition.

If the fuel pump does not start:

- Pull connector off fuel delivery unit flange.
- Connect test instrument adapter/DSO (5-pin) -VAS 5565- between connector and flange.



- Connect hand-held multimeter -V.A.G 1526D- to contacts -1- and -5- of adapter.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- Read voltage value on hand-held multimeter -V.A.G 1526D- : Specification = battery voltage.

If no voltage is present:

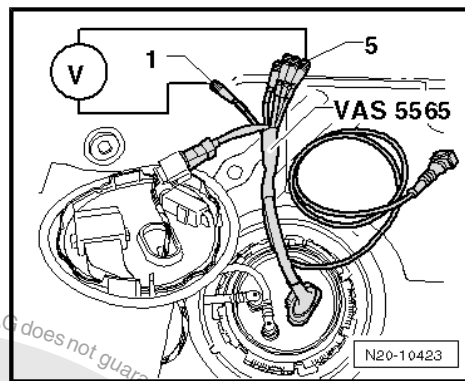
- Check activation of fuel pump relay and wiring for an open or short circuit ⇒ Vehicle diagnostic tester.

Voltage supply OK:

- Remove fuel delivery unit ⇒ [page 210](#)
- Check that electrical wiring between flange and fuel pump is connected and has continuity.

If no open circuit can be found:

- Renew fuel delivery unit.



4.8.4 Checking current draw of fuel pump

Special tools and workshop equipment required

- ♦ Hand-held multimeter -V.A.G 1526D- or pickup clamp -V.A.G 1526B/2-
- ♦ Test instrument adapter/DSO (5-pin) -VAS 5565-
- ♦ Vehicle diagnosis tester



Note

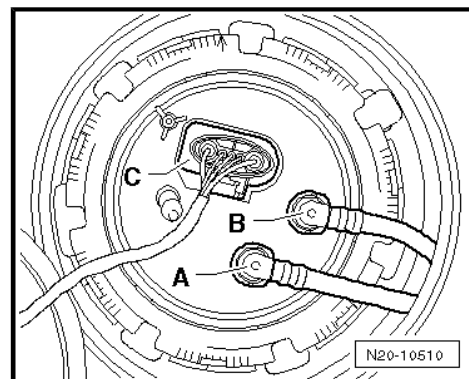
The battery voltage and the diesel fuel temperature have a great influence on the current draw of the fuel pump. For this reason ensure that the battery voltage is at least 12 V whilst checking and the diesel fuel temperature does not fall to the freezing point.

Test prerequisites

- Battery voltage at least 12 V
- Diesel fuel temperature above 10 °C
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



- Pull connector -C- off flange.

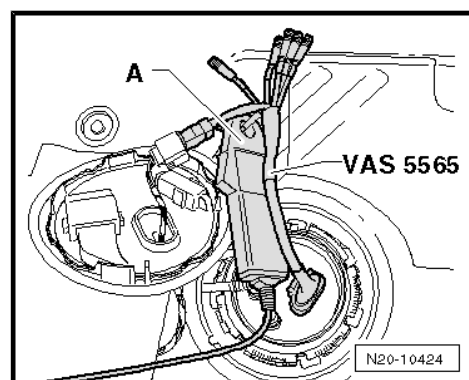


- Connect test instrument adapter/DSO (5-pin) -VAS 5565- to connector and fuel delivery unit.
- Connect pick-up clamp -A- to red terminal with lettering „pick-up clamp“ for test instrument adapter/DSO (5-pin) -VAS 5565- .



Note

Pickup clamp of hand-held multimeter -V.A.G 1715- can also be connected to red terminal with lettering „pick-up clamp“ of test instrument adapter/DSO (5-pin) -VAS 5565- .



- Switch on ignition.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- Read current draw on hand-held multimeter -V.A.G 1526D- . Specification: max. 7.5 amps.
- If the measured value is not within specifications:
- Renew fuel delivery unit ➔ [page 210](#) .





5 Parts of fuel supply system (Passat)

Safety precautions ➔ [page 150](#) .

Rules for cleanliness ➔ [page 151](#) .

Fuel tank, vehicles with four-wheel drive ➔ [page 192](#) .

Emptying fuel tank, vehicles with four-wheel drive ➔ [page 202](#)

Fuel tank, vehicles with front-wheel drive ➔ [page 206](#) .

Emptying fuel tank, vehicles with front-wheel drive ➔ [page 213](#)

Checking fuel pump ➔ [page 215](#) .

Assembly overview - fuel filter ➔ [page 219](#) .

Removing and installing fuel cooler ➔ [page 221](#) .

5.1 Fuel tank, vehicles with four-wheel drive

5.1.1 Assembly overview - fuel tank

1 - Supply line

- ☐ Clipped onto fuel tank
- ☐ Check for secure seating.

2 - Locking ring, 110 Nm

- ☐ Check for secure seating.
- ☐ Remove and install using wrench T10202- .

3 - Cap

- ☐ Renew if damaged.

4 - Securing bolt, 1.5 Nm

5 - Tank flap unit

- ☐ With rubber cup.
- ☐ Removing and installing ➔ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

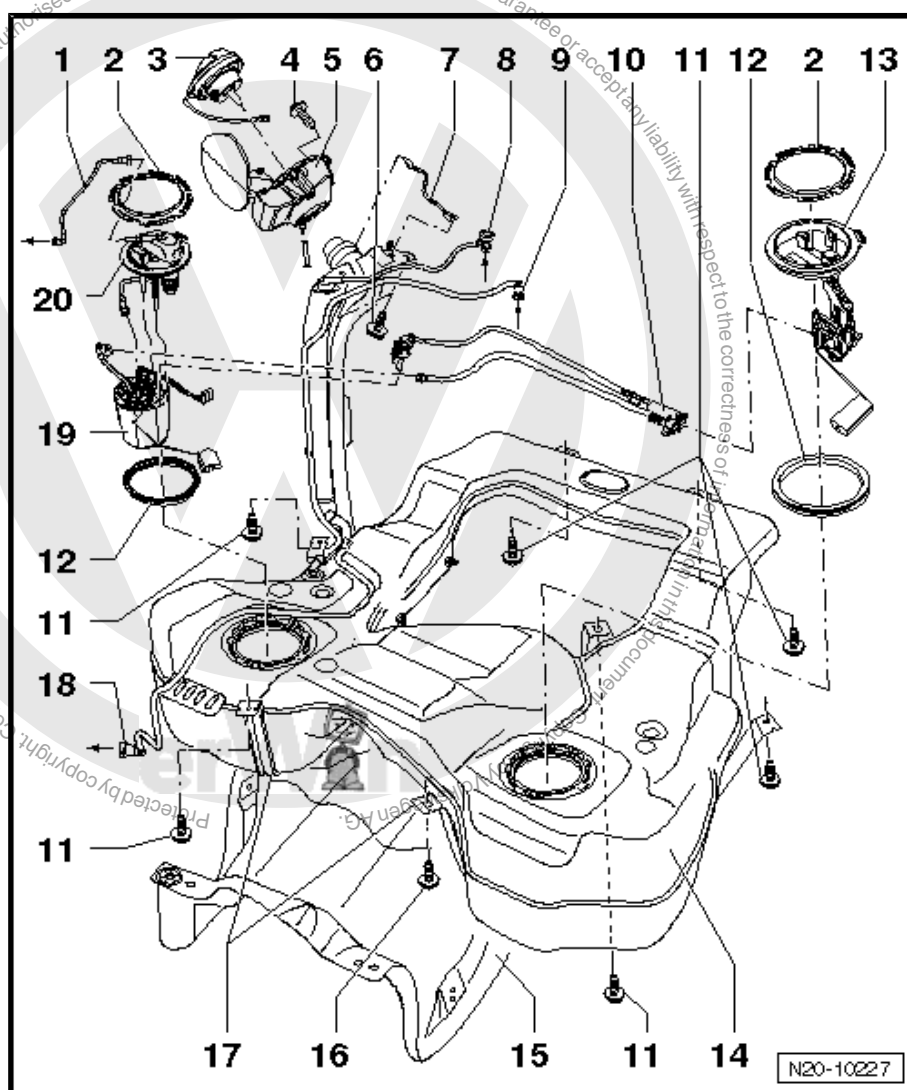
6 - 10 Nm

7 - Earth connection

- ☐ Check for secure seating.

8 - Pressure retention valve with connecting hose

- ☐ To remove, grasp securing ring (grey) and pull off upwards.
- ☐ Check for secure seating.
- ☐ From activated charcoal filter, assembly overview - activated charcoal filter system





9 - Breather line

- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.
- ☐ From activated charcoal filter, assembly overview - activated charcoal filter system

10 - Suction-jet pump

- ☐ Clipped onto fuel gauge sender 2 -G169-
- ☐ Removing and installing ⇒ [page 201](#) .

11 - 25 Nm

- ☐ Renew.

12 - Seal

- ☐ Renew.
- ☐ When installing, fit dry in fuel tank opening.
- ☐ Moisten with fuel only when installing flange.

13 - Fuel gauge sender 2 -G169-

- ☐ Note installation position on fuel tank ⇒ [page 194](#) .
- ☐ Removing and installing ⇒ [page 198](#) .

14 - Fuel tank

- ☐ Emptying fuel tank ⇒ [page 202](#) .
- ☐ Removing and installing ⇒ [page 194](#) .

15 - Heat shield

- ☐ Bolted with clamping washers.

16 - 25 Nm

- ☐ Renew.
- ☐ Bolt to secure securing strap, heat shield and supports for centre silencer. Secure support for centre silencer to body.

17 - Securing strap

18 - Breather line

- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.

19 - Fuel delivery unit

- ☐ Removing and installing.
- ☐ With fuel gauge sender -G- .
- ☐ Removing and installing fuel gauge sender -G-
- ☐ Clean strainer if soiled.

20 - Flange with fuel filter

- ☐ With 6-bar pressure limiting valve.
- ☐ Note installation position on fuel tank ⇒ [page 194](#) .
- ☐ Removing and installing.



Installation position of flange for fuel delivery unit and fuel gauge sender 2 -G169-

The marking on the flange must align with the marking on the fuel tank -arrow-.

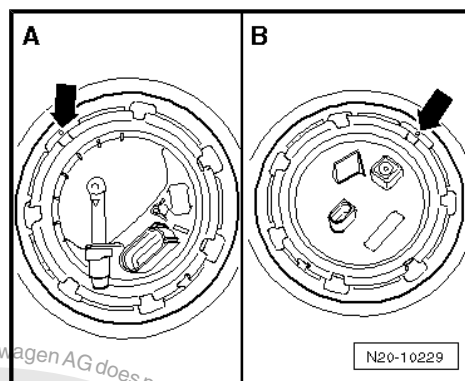


Note

The marking on the fuel tank is not clearly visible.

A - Fuel delivery unit flange

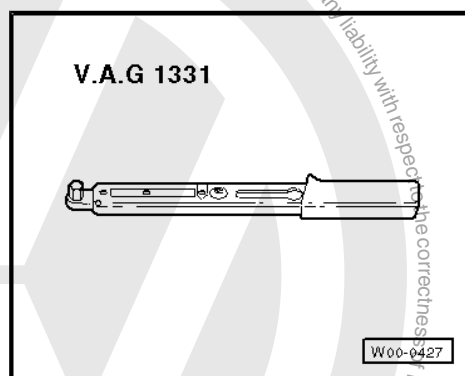
B - Fuel gauge sender 2 -G169- flange



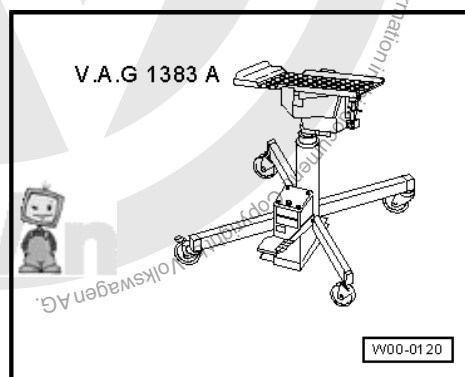
5.1.2 Removing and installing fuel tank

Special tools and workshop equipment required

- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



- ◆ Engine and gearbox jack -V.A.G 1383 A-



Removing



Note

- ◆ *The rear axle must be lowered to remove the fuel tank.*
- ◆ *Note safety precautions before beginning work ⇒ [page 150](#) .*
- ◆ *Observe rules for cleanliness ⇒ [page 151](#) .*
- ◆ *Assembly overview - fuel tank ⇒ [page 192](#) .*
- If necessary, empty fuel tank using fuel extractor -VAS 5190- ⇒ [page 202](#) .
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Remove cover from fuel delivery unit.

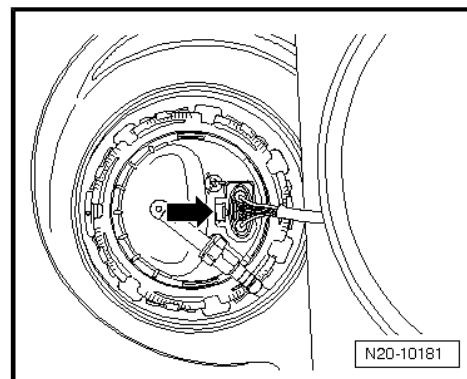


- Pull 5-pin connector -arrow- off flange.

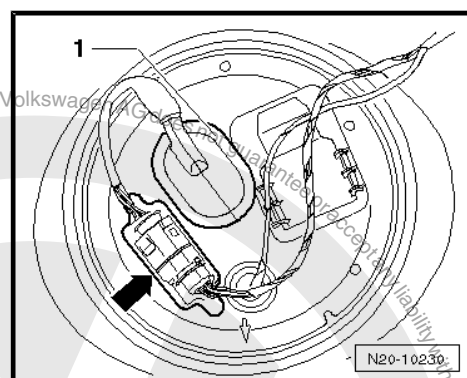


Note

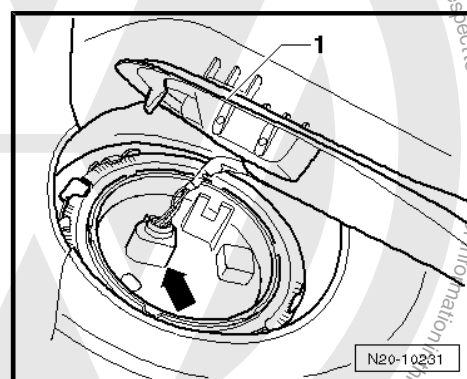
For vehicles with auxiliary heater the metering pump -V54- connector must be separated additionally.



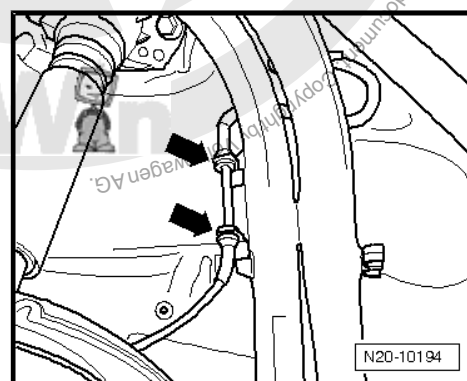
- Disconnect connector to four-wheel drive control unit -J492- -arrow-.
- Unclip sealing grommet -1- downwards out of cover and guide wiring harness of four-wheel drive control unit -J492- out downwards.



- Remove cover -1- and pull 3-pin connector -arrow- off flange.
- Remove rear right wheel.
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner .

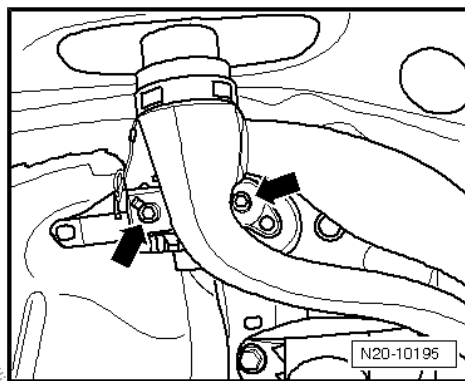


- Unclip electrical wire on filler neck.
- Unscrew tank flap unit securing bolt and remove tank flap unit ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing tank flap unit .

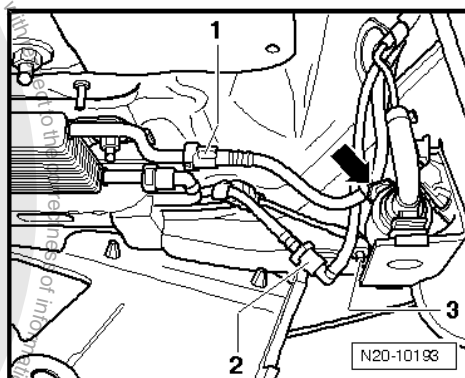




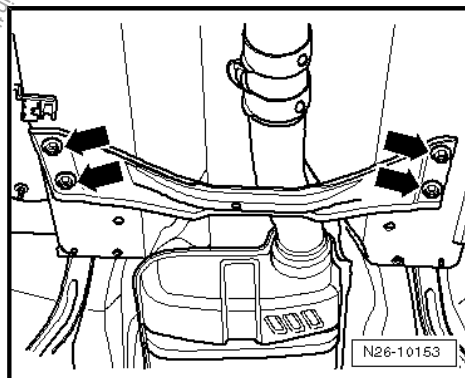
- Unbolt filler neck from body -arrows-.
- Remove front left and right underbody panels from underbody.



Separate return line -1- and supply line -2- at connections.
Pull connector -arrow- off metering pump -V54- .



- Remove tunnel bridge from underbody -arrows-.
- Remove heat shields below propshaft.
- Remove rear propshaft tube ⇒ Final drive 02D, 0AV; Rep. gr. 39 ; Overview - repairing propshaft .
- Remove heat shield below fuel tank.



WARNING

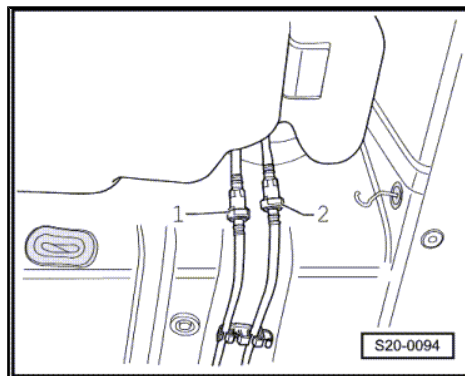
Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- Separate breather line (white) -1- and fuel line (black) -2- at connections.



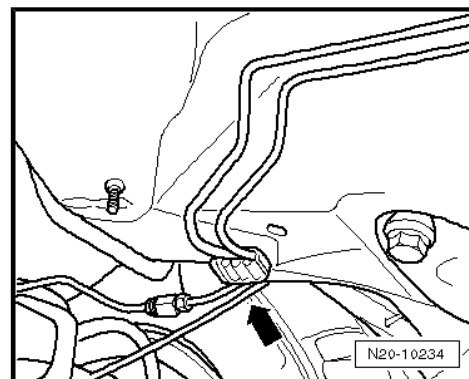
Note

- ◆ Press in securing ring to release fuel line.
- ◆ For vehicles with auxiliary heater the fuel line of the metering pump -V54- must be separated additionally.

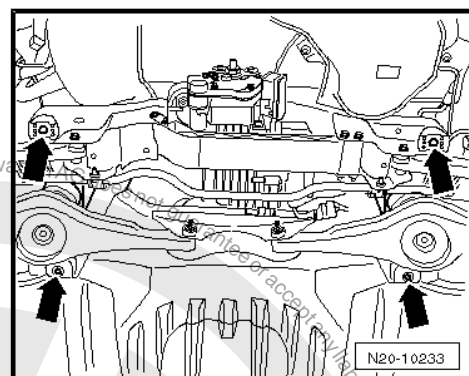




- Unclip brake lines -arrow- on left from body.
- Support rear axle using engine and gearbox jack -V.A.G 1383 A- .



- Remove securing bolts -arrows- and lower rear axle.



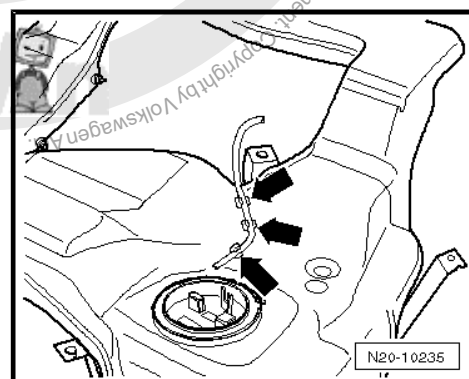
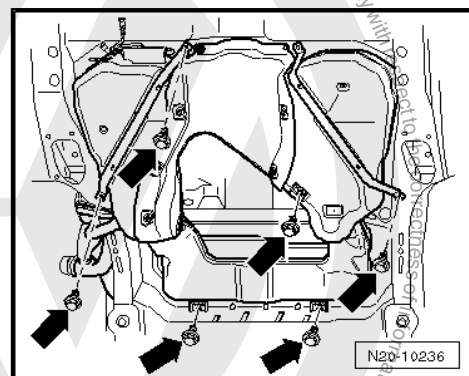
- Unscrew securing bolts for securing straps and fuel tank -arrows-. First support fuel tank with engine and gearbox jack -V.A.G 1383 A- .
- Slowly lower fuel tank and unclip wiring on fuel tank from four-wheel drive control unit -J492- .



Note

The filler neck must be „guided out“ between body and rear axle. To do this, take the fuel tank off engine and gearbox jack -V.A.G 1383 A- with the assistance of a 2nd mechanic.

- With the aid of a 2nd mechanic, guide the filler neck in between rear axle and body. Then place the fuel tank on the engine and gearbox jack -V.A.G 1383 A- .
- Clip in wiring on fuel tank for four-wheel drive control unit -J492- -arrows-.





- Raise fuel tank slowly up to installation position and secure it in place.
- Secure rear axle to body again ⇒ Running gear, axles, steering; Rep. gr. 42 .

The remaining installation steps are carried out in the reverse sequence. In the process, note the following:

- Observe installation position of covers -arrows-:

The -arrows- on the covers point forwards.

A - Fuel delivery unit cover

B - Cover for fuel gauge sender 2 -G169-

- ◆ Install breather and fuel lines free of kinks.
- ◆ Ensure that line connections are tight.
- ◆ Check earth connection on fuel tank and body to filler neck.

Specified torques:

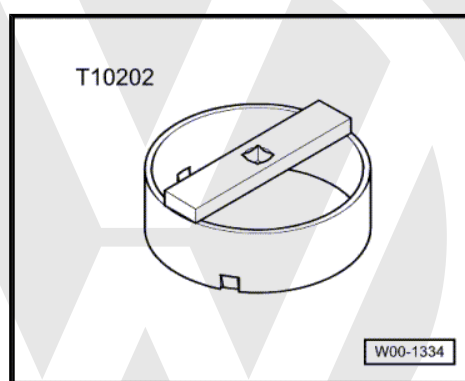
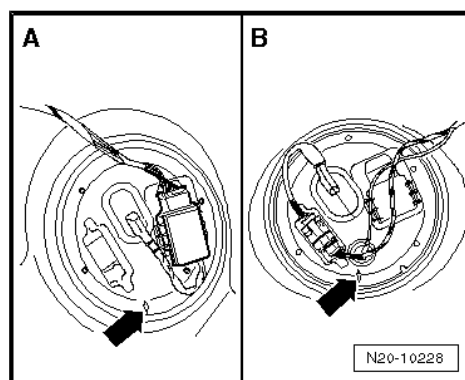
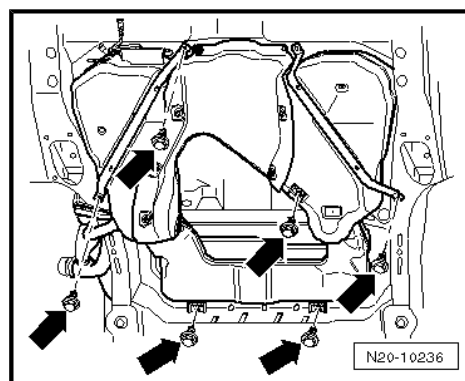
Component	Nm
Fuel tank to body	25 ¹⁾
Tunnel bridge to underbody	23
Filler neck to body	10

1) Renew.

5.1.3 Removing and installing fuel gauge sender 2 -G169-

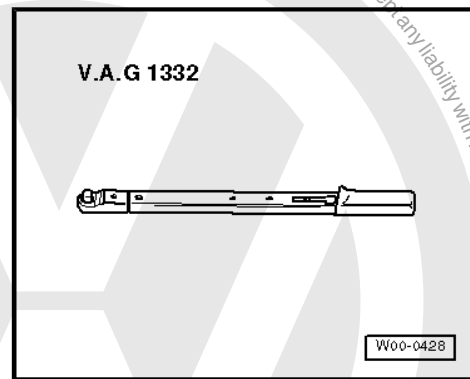
Special tools and workshop equipment required

- ◆ Special wrench -T10202-





- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



Removing

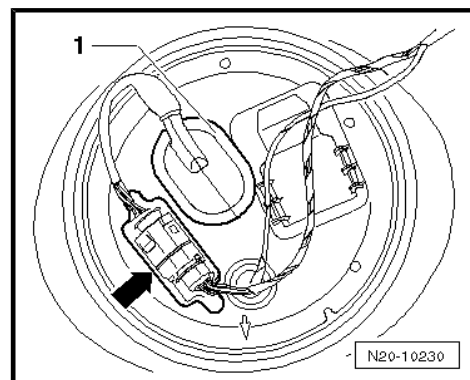
Prerequisites:

- Fuel tank must not be more than $\frac{1}{2}$ full.

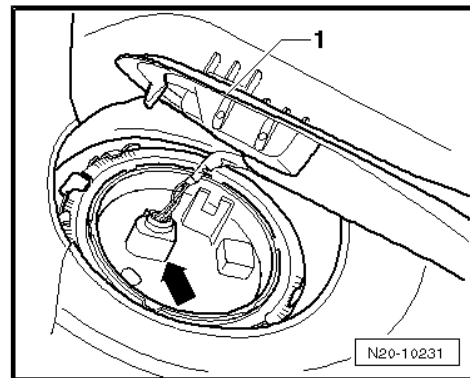


Note

- ◆ Note safety precautions before beginning work ⇒ [page 150](#) .
- ◆ Observe rules for cleanliness ⇒ [page 151](#) .
- ◆ Assembly overview - fuel tank ⇒ [page 192](#) .
- ◆ Ensure float arm of fuel gauge sender 2 -G169- is not bent.
- If necessary, empty fuel tank using fuel extractor -VAS 5190- ⇒ [page 202](#) .
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Disconnect connector to four-wheel drive control unit -J492- -arrow-.
- Unclip sealing grommet -1- downwards out of cover and guide wiring harness of four-wheel drive control unit -J492- out downwards.

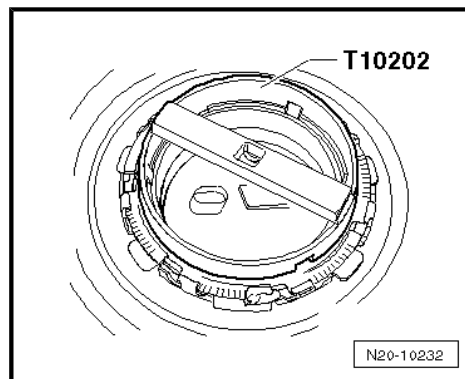


- Remove cover -1- and pull 3-pin connector -arrow- off flange.





- Open locking ring using wrench -T10202- .



- Pull fuel gauge sender 2 -G169- upwards slightly and unclip locking lugs -arrows- of suction-jet pump.

Installing



Caution

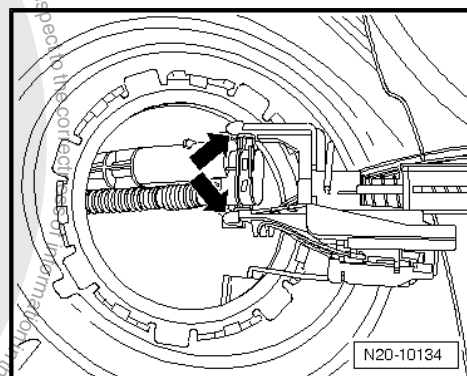
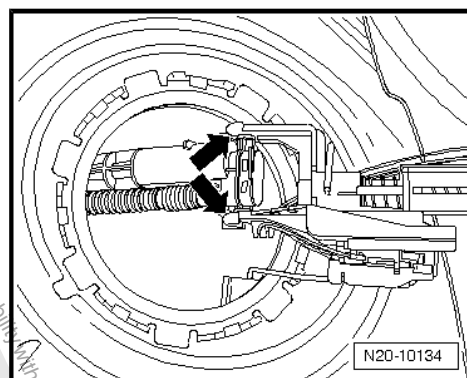
When installing do not bend fuel gauge sender 2 -G169- float arm.

- Place fuel gauge sender 2 -G169- in fuel tank.

Fit suction-jet pump on sender on inside of fuel tank. Suction-jet locking lugs -arrows- must engage.

The remaining installation steps are carried out in the reverse sequence. In the process, note the following:

- ♦ Moisten seal with fuel only when installing flange.



- Observe installation position of flange -B-:

The marking on the flange must align with the marking on the fuel tank -arrow-.

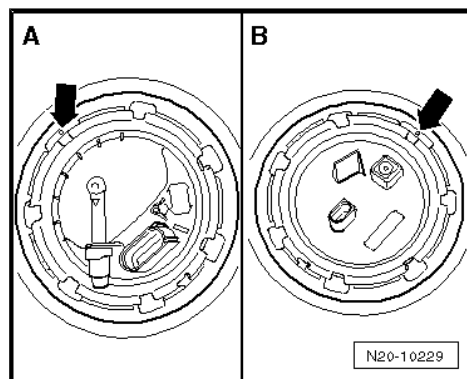


Note

The marking on the fuel tank is not clearly visible.

B - Fuel gauge sender 2 -G169- flange

- Tighten locking ring using wrench -T10202- . Specified torque: 110 Nm.

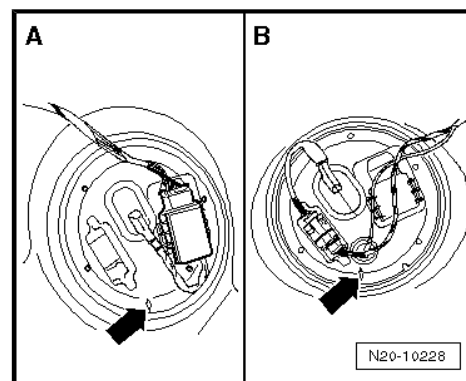




– Observe installation position of cover -B-:

The -arrow- on the cover points forwards.

B - Cover for fuel gauge sender 2 -G169-



5.1.4 Removing and installing suction-jet pump

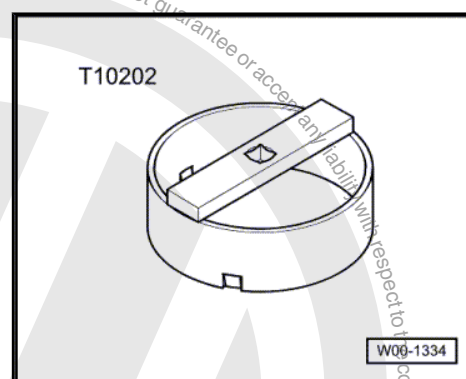


Note

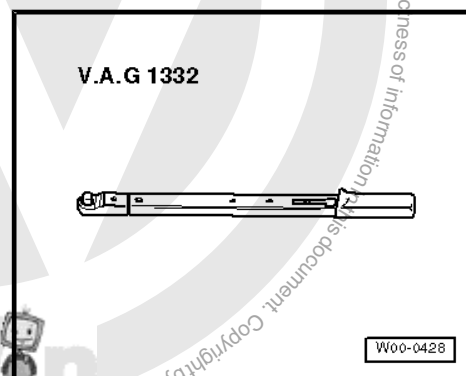
- ◆ On vehicles with four-wheel drive, fuel has to be pumped from the area of fuel gauge sender 2 -G169- to the fuel delivery unit by means of a suction-jet pump due to the shape of the fuel tank.
- ◆ Checking is only necessary when the engine stops due to lack of fuel, even though the fuel gauge shows that the tank is still 1/4 full.

Special tools and workshop equipment required

- ◆ Special wrench -T10202-



- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-





Removing suction-jet pump



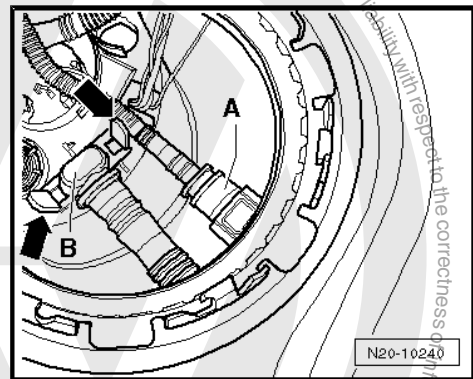
Note

- ◆ Note safety precautions before beginning work ➔ [page 150](#) .
- ◆ Observe rules for cleanliness ➔ [page 151](#) .
- ◆ Assembly overview - fuel tank ➔ [page 192](#) .
- Disconnect fuel lines -1 and 2- to suction-jet pump, removing and installing fuel delivery unit.
- Remove fuel gauge sender 2 -G169- ➔ [page 198](#) .
- Now the suction-jet pump can be pulled out from side of fuel gauge sender 2 -G169- (left side of vehicle).
- Check that the fuel lines on suction-jet pump are fitted securely and are not damaged.
- Additionally check suction-jet pump for possible soiling.

Installing suction-jet pump

Installation is performed in the reverse sequence. In the process, note the following:

- ◆ Fuel lines are to be installed free of kinks.
- ◆ Ensure that line connections are tight.



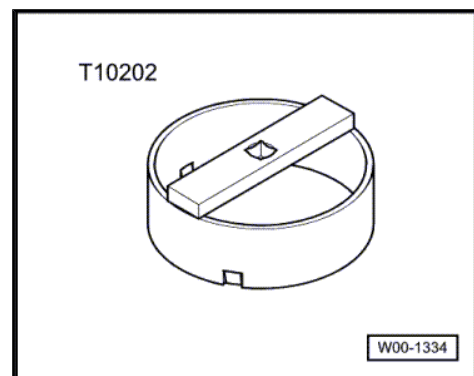
5.2 Emptying fuel tank, vehicles with four-wheel drive

Special tools and workshop equipment required

- ◆ Fuel extractor -VAS 5190-



- ◆ Special wrench -T10202-



- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



- Note safety precautions before beginning work ➔ [page 150](#) .

Emptying fuel tank if it is more than $\frac{3}{4}$ full ➔ [page 203](#) .

Emptying fuel tank if it is less than $\frac{3}{4}$ full ➔ [page 203](#)

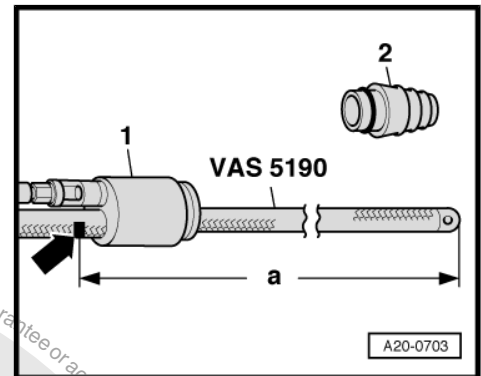
5.2.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full

- Use insulating tape to mark the extraction hose -arrow- at a distance of -a- = 990 mm from the end of the hose.
- Remove filler cap from fuel tank filler neck.
- Push extraction hose into fuel tank until marking on hose coincides with filler neck.



Note

- ◆ The shaft piece -1- is not used.
- ◆ There is a flap on the bottom end of the fuel filler neck in the fuel tank, this must not be damaged by the extraction hose. Therefore, only push the hose in as far as the marking.
- Drain fuel tank as much as possible through fuel filler neck.
- Carefully pull out extraction hose.



Note

- ◆ When no more fuel can be extracted, tank is emptied sufficiently for flange to be opened without danger. The tank may be removed while containing remaining fuel.
- ◆ Emptying the fuel tank completely ➔ [page 203](#) .

5.2.2 Emptying fuel tank if it is less than $\frac{3}{4}$ full

- Remove seat bench ➔ General body repairs, interior; Rep. gr. 72 ; Rear seats .



Note

To drain fuel tank completely: fuel must be extracted from fuel delivery unit flange and also from fuel pump sender 2 -G169- flange.

Draining fuel tank at fuel delivery unit flange ➔ [page 203](#)

Draining fuel tank at fuel gauge sender 2 -G169- flange
➔ [page 204](#)

Draining fuel tank at fuel delivery unit flange

- Remove cover from fuel delivery unit.



WARNING

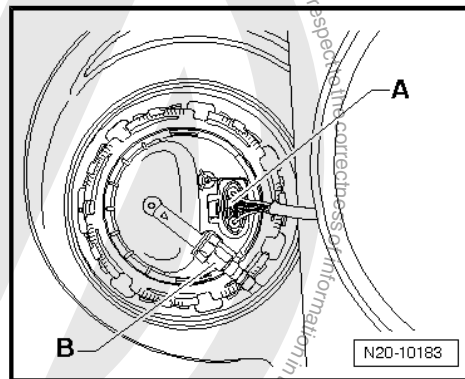
Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- Pull 5-pin connector -A- and fuel line -B- off flange.

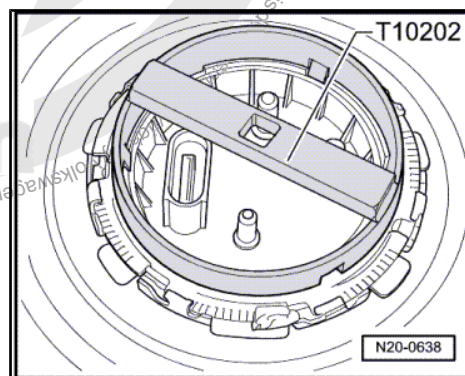


Note

- ◆ Press in securing ring to release fuel line.
- ◆ On vehicles with auxiliary heater the connector and the fuel line of the metering pump -V54- must also be separated.

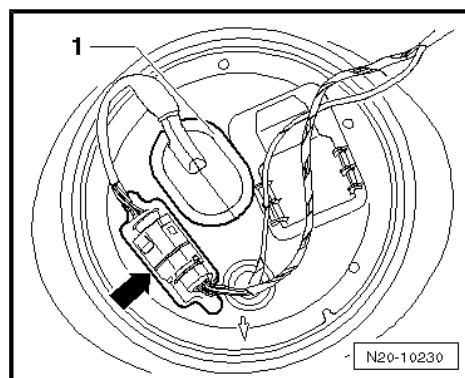


- Open locking ring using wrench -T10202- .
- Lift flange.
- Insert extraction hose of fuel extractor -VAS 5190- as deeply as possible into fuel tank and extract fuel.
- Drain fuel tank at fuel gauge sender 2 -G169- flange
⇒ [page 204](#) .

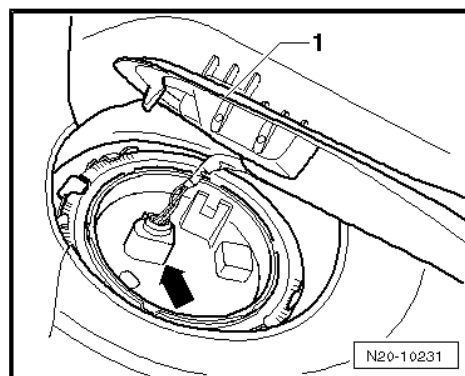


Draining fuel tank at fuel gauge sender 2 -G169- flange

- Disconnect connector to four-wheel drive control unit -J492- -arrow-.
- Unclip sealing grommet -1- downwards out of cover and guide wiring harness of four-wheel drive control unit -J492- out downwards.



- Remove cover -1- and pull 3-pin connector -arrow- off flange.





- Open locking ring using wrench -T10202- .
- Lift flange.
- Insert extraction hose of fuel extractor -VAS 5190- as deeply as possible into fuel tank and extract fuel.

If fuel tank needed only to be emptied, install flanges with covers again ➔ [page 205](#) .

Installing flanges with covers

Installation is performed in the reverse sequence. In the process, note the following:

- ◆ Moisten seal with fuel only when installing flange.
- ◆ Ensure that line connections are tight.

- Observe installation position of flanges -arrows-:

The marking on the flange must align with the marking on the fuel tank -arrows-.



Note

The marking on the fuel tank is not clearly visible.

A - Fuel delivery unit flange

B - Fuel gauge sender 2 -G169- flange

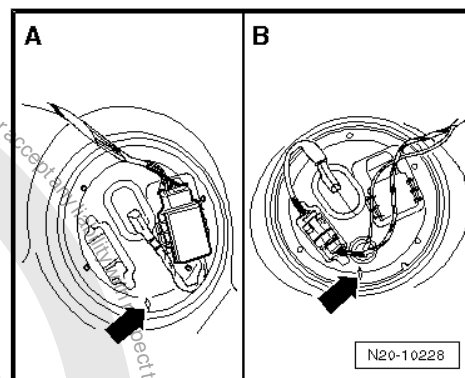
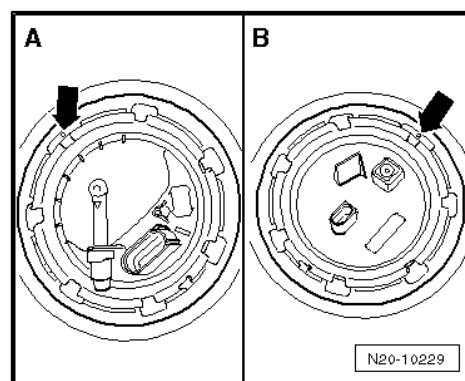
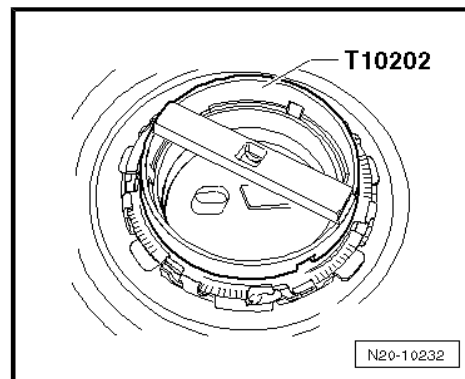
- Tighten locking ring using wrench -T10202- . Specified torque: 110 Nm.

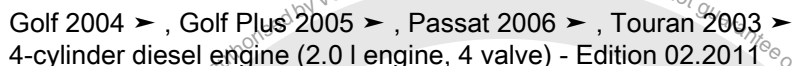
- Observe installation position of covers -arrows-:

The -arrows- on the covers point forwards.

A - Fuel delivery unit cover

B - Cover for fuel gauge sender 2 -G169-





5.3.1 Assembly overview - fuel tank

-
- This exploded view diagram illustrates the assembly of a vehicle's rear window. The components are numbered as follows:
- 1:** Rear window glass.
 - 2:** Mounting bracket for the glass.
 - 3:** Mounting bracket for the glass.
 - 4:** Mounting bracket for the glass.
 - 5:** Mounting bracket for the glass.
 - 6:** Mounting bracket for the glass.
 - 7:** Mounting bracket for the glass.
 - 8:** Mounting bracket for the glass.
 - 9:** Mounting bracket for the glass.
 - 10:** Mounting bracket for the glass.
 - 11:** Mounting bracket for the glass.
 - 12:** Mounting bracket for the glass.
 - 13:** Mounting bracket for the glass.
 - 14:** Mounting bracket for the glass.
 - 15:** Mounting bracket for the glass.
 - 16:** Mounting bracket for the glass.
 - 17:** Mounting bracket for the glass.
 - 18:** Mounting bracket for the glass.
 - 19:** Mounting bracket for the glass.
 - 20:** Mounting bracket for the glass.
- The diagram shows the relationship between the glass, the mounting brackets, and the rear window frame. The glass is shown being inserted into the frame, with the mounting brackets securing it in place. The frame is shown with the glass and brackets installed, and the mounting brackets are shown being secured to the frame.

- ❑ With fuel gauge sender (G).
- ❑ Removing and installing ⇒ [page 210](#) .
- ❑ Checking fuel pump ⇒ [page 215](#) .
- ❑ Removing and installing fuel gauge sender ⇒ [page 212](#) .



15 - Suction-jet pump

- ☐ Clean strainer if soiled.
- ☐ Not necessarily installed

16 - Flange

- ☐ For fuel delivery unit.
- ☐ Note installation position of flange on fuel tank ➔ [page 207](#) .

17 - Locking ring, 110 Nm

- ☐ Check for secure seating.
- ☐ Remove and install using wrench -3087- .

18 - Supply line

- ☐ For auxiliary heater.
- ☐ To metering pump -V54- .
- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.
- ☐ To pull off flange, press release button on connecting piece.

19 - Return line

- ☐ From fuel cooler.
- ☐ Blue or with blue marking.
- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.
- ☐ To pull off flange, press release button on connecting piece.

20 - Supply line

- ☐ To fuel filter.
- ☐ Clipped onto fuel tank.
- ☐ Check for secure seating.
- ☐ Black
- ☐ To pull off flange, press release button on connecting piece.

Installation position of fuel delivery unit flange

Marking -4- on flange points opposite direction of travel.



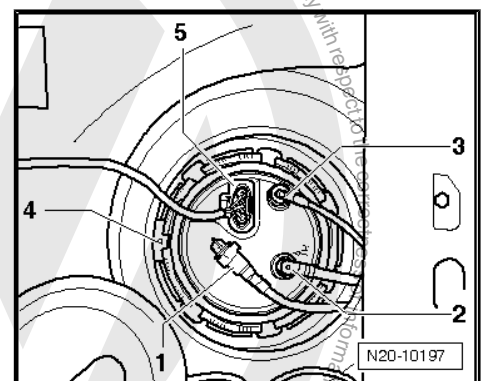
Note

Flange of fuel delivery unit can be installed only in this position.

Connect black supply line -1- with -arrow- to union on flange.

Return line -2- (blue or with blue marking) to connection marked -R-.

Black supply line -3- to metering pump -V54- for auxiliary heater.



Note

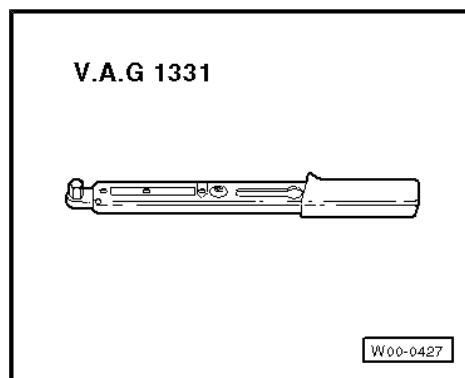
After installing fuel delivery unit flange, check that fuel lines are still clipped onto fuel tank.

5.3.2 Removing and installing fuel tank

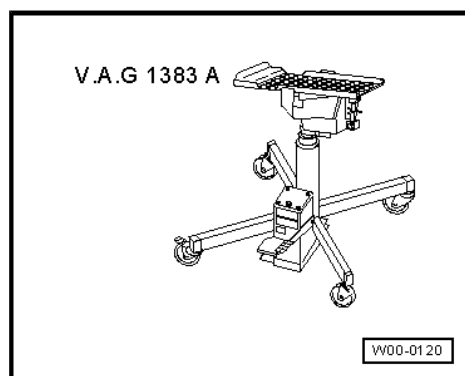
Special tools and workshop equipment required



- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



- ◆ Engine and gearbox jack -V.A.G 1383/A-



Removing



Note

- ◆ *The rear axle must be lowered to remove the fuel tank.*
 - ◆ *Before disconnecting battery, open fuel tank flap and if necessary remove wheel bolt lock adapter from luggage compartment.*
 - Note safety precautions before beginning work ➔ [page 150](#) .
- Observe rules for cleanliness ➔ [page 151](#) .

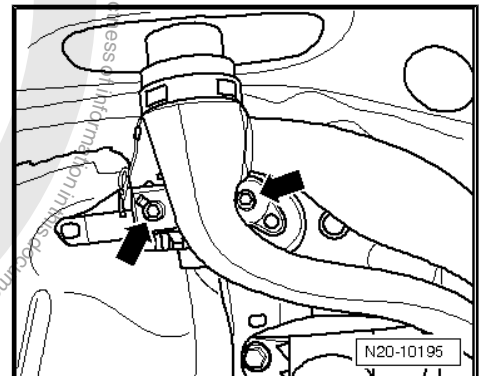
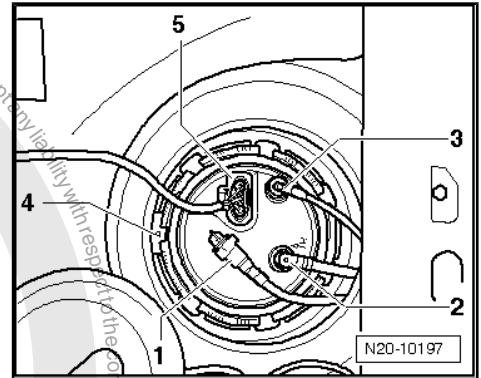


Note

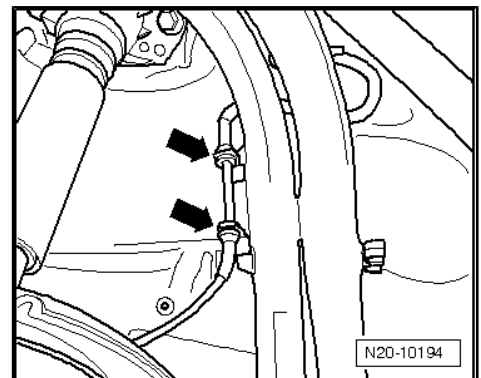
- ◆ *Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.*
- ◆ *When lowering fuel tank, guide it carefully to prevent damage.*
- With the ignition switched off, disconnect battery earth strap.
- Remove rear bench seat ➔ General body repairs, interior; Rep. gr. 72; Rear seat; Removing and installing bench seat .
- Remove cover from fuel delivery unit.



- Pull 5-pin connector -5- off fuel delivery unit flange.
- Open fuel tank filler flap.
- Unscrew securing bolt and remove tank flap unit with rubber cup ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit
- Empty fuel tank ⇒ [page 213](#) .
- Remove right rear wheel.
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .
- Remove bolts from filler neck -arrows-.



- Unclip ABS sensor wiring on fuel tank filler neck -arrows-.
- Remove underbody panel.



WARNING

- ◆ **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- ◆ **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!**
- ◆ **Wear eye and hand protection when performing any type of repair work on the fuel system!**

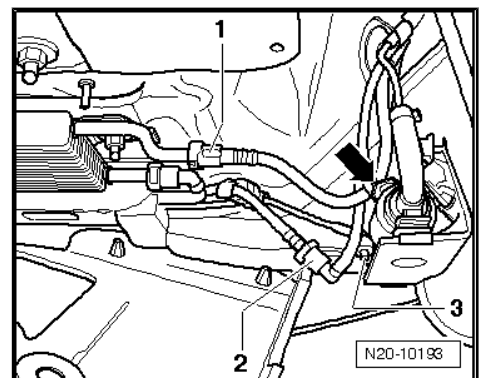
- Separate return line -1- and supply line -2- at connections.
- Separate fuel line -3- for metering pump -V54- at connections.



Note

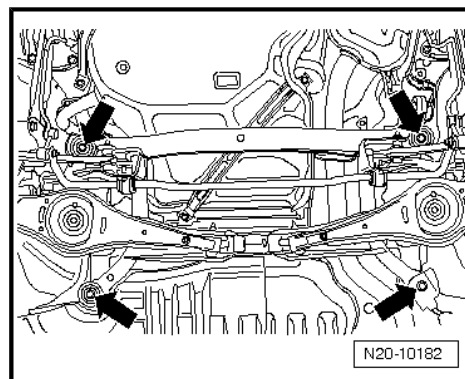
Press in securing ring to release fuel lines.

- Pull connector -arrow- off metering pump -V54- .
- Support rear axle using engine and gearbox jack -V.A.G 1383 A- .





- Remove securing bolts -arrows- and lower rear axle.
- Then support fuel tank using engine and gearbox jack -V.A.G 1383 A- .

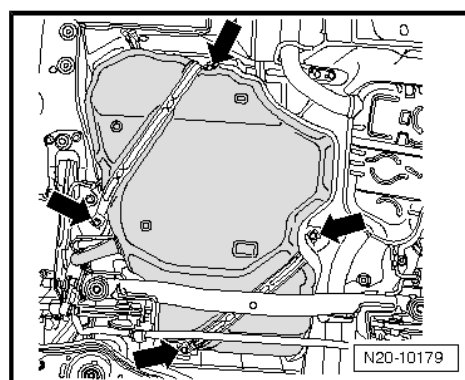


- Remove securing strap bolts.
- Slowly lower fuel tank. When doing this, pull fuel tank forwards, turn and guide filler neck between rear axle and body.

Installing

Install in reverse order. When doing this, note the following:

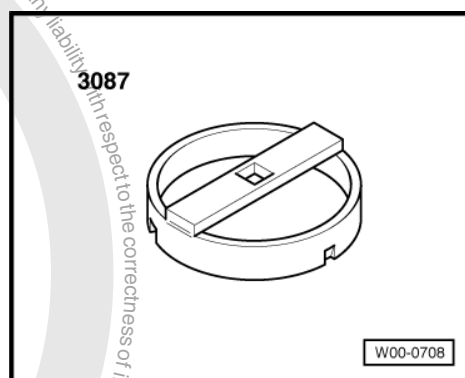
- Tighten bolts of rear axle to body ⇒ Running gear, axles, steering; Rep. gr. 42 .
- ♦ Fuel lines are to be installed free of kinks.
- ♦ Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- ♦ Ensure that line connections are tight.
- ♦ Connections for fuel lines must engage audibly when joined.
- ♦ Check earth connection between body and filler neck for proper seating.
- ♦ Clip fuel lines onto fuel tank.



5.3.3 Removing and installing fuel delivery unit

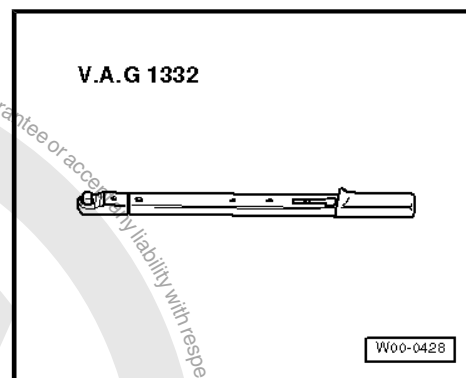
Special tools and workshop equipment required

- ♦ Fuel tank sender unit tool -3087-





- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-



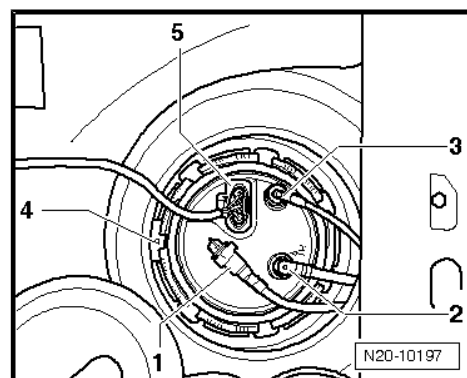
Removing

- Note safety precautions before beginning work ➔ [page 150](#) .
- Observe rules for cleanliness ➔ [page 151](#) .
- First check whether a coded radio is fitted. If so, obtain anti-theft coding.
- With the ignition switched off, disconnect battery earth strap.
- The fuel tank must not be more than $\frac{1}{2}$ full when removing the fuel delivery unit. Empty fuel tank if necessary ➔ [page 213](#) .
- Remove rear bench seat ➔ General body repairs, interior; Rep. gr. 72 ; Rear seat; Removing and installing bench seat .
- Remove cover from fuel delivery unit.
- Pull supply line -1-, return line -2-, supply line -3- to metering pump -V54- and 5-pin connector -5- off fuel delivery unit flange.

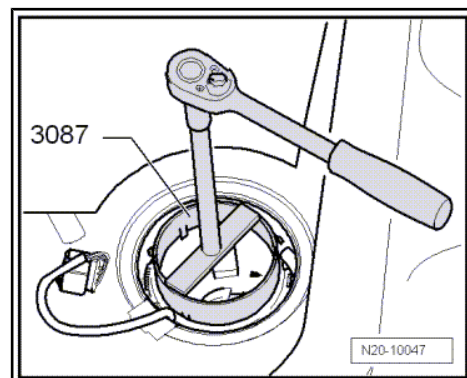


Note

Press in securing ring to release fuel lines.



- Open locking ring using fuel tank sender wrench -3087- .
- Lift sender flange.





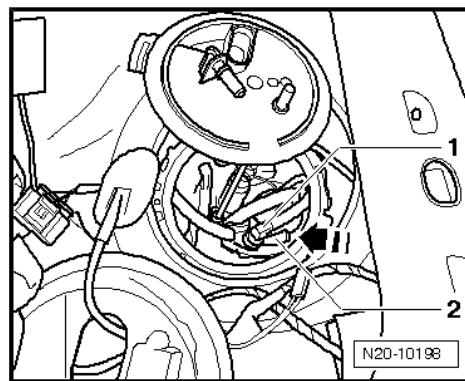
- Pull fuel line -1- off suction-jet pump (if fitted).



Note

Press in securing ring to release fuel line.

- Press tab -2- of suction-jet pump in -direction of arrow- and unclip from fuel delivery unit
- Pull fuel delivery unit along with suction-jet pump out of opening in fuel tank.



Note

If delivery unit is to be renewed, drain old delivery unit before disposal.

Installing

- Installation of fuel delivery unit is carried out in reverse order.



Note

- ◆ *For fuel delivery units of the new generation the suction jet pump is no longer available. If the fuel delivery unit is to be renewed, remove suction jet pump.*
- ◆ *When inserting fuel delivery unit, ensure that fuel gauge sender is not bent.*
- ◆ *Insert seal for flange or fuel delivery unit dry into opening of fuel tank.*
- ◆ *Moisten seal with fuel only when installing flange or fuel delivery unit.*
- ◆ *Fuel lines are to be installed free of kinks.*
- ◆ *Do not interchange supply and return lines (return line blue or with blue markings, supply line black).*
- ◆ *Ensure that fuel hose connections are tight.*
- ◆ *Connections for fuel lines must engage audibly when joined.*
- ◆ *After installing fuel delivery unit, check that fuel lines are still clipped onto fuel tank.*
- ◆ *Observe fitting position of fuel delivery unit flange*
⇒ [page 207](#) .

5.3.4 Removing and installing fuel gauge sender

Removing

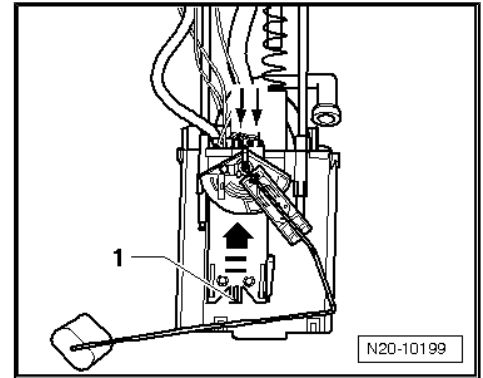
- Remove fuel delivery unit ⇒ [page 210](#) .



- Release connector tabs of wires -arrows- and pull them off.
- Lift up retaining tabs -1- using a screwdriver and pull off fuel gauge sender upwards in -direction of arrow-.

Installing

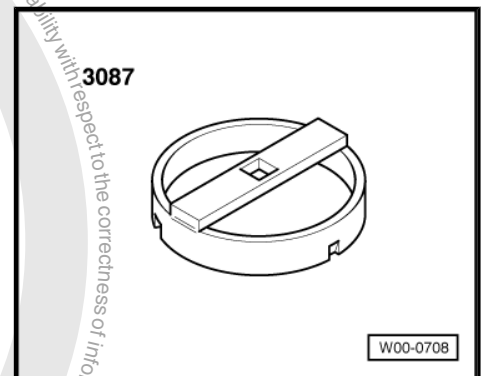
- Insert fuel gauge sender into guides on fuel delivery unit and press downwards until it engages.
- Install fuel delivery unit ➔ [page 210](#) .



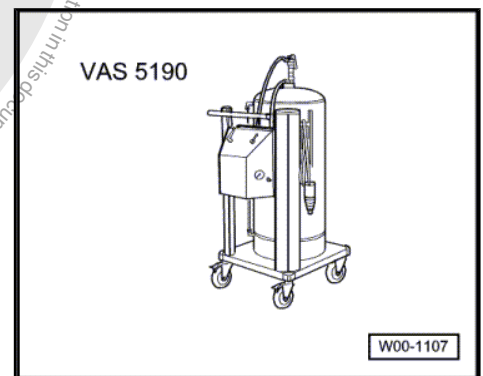
5.4 Emptying fuel tank, vehicles with front-wheel drive

Special tools and workshop equipment required

- ◆ Fuel tank sender unit tool -3087-



- ◆ Fuel extractor -VAS 5190-



- ◆ Torque wrench (40...200 Nm) -V.A.G 1332-

Emptying fuel tank if more than $\frac{3}{4}$ full ➔ [page 213](#)

Emptying fuel tank if less than $\frac{3}{4}$ full ➔ [page 214](#)

5.4.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full

Procedure

Note safety precautions before beginning work ➔ [page 150](#) .

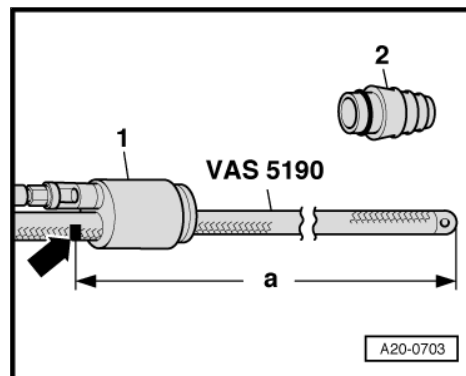


- Use insulating tape to mark the extraction hose -arrow- at a distance of -a- = 990 mm from the end of the hose.
- Open fuel tank filler flap.
- Push suction hose of fuel extractor -VAS 5190- into fuel filler neck until the previously made marking aligns with fuel filler neck.



Note

- ♦ The shaft piece -1- is not used.
- ♦ A flap is located on the lower end of the fuel filler neck, this must not be damaged by the extraction hose. Therefore, push the extraction hose into the fuel filler neck only up to previously made marking.



- Empty fuel tank as far as possible.
- Then carefully remove extraction hose.



Note

When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger. The tank may be removed while containing remaining fuel.

5.4.2 Emptying fuel tank if it is less than $\frac{3}{4}$ full

Procedure

Note safety precautions before beginning work ➔ [page 150](#) .

- Remove rear bench seat ➔ General body repairs, interior; Rep. gr. 72 ; Rear seat; Removing and installing bench seat .
- Remove cover from fuel delivery unit.



WARNING

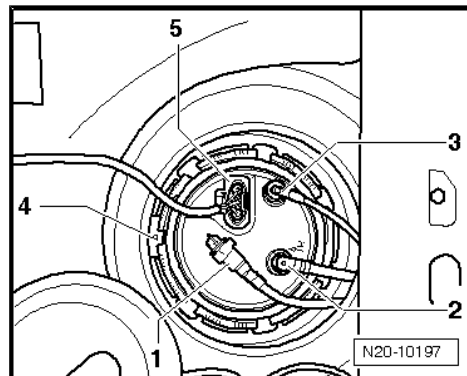
- ♦ The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!
- ♦ The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!
- ♦ Wear eye and hand protection when performing any type of repair work on the fuel system!

- Pull supply line -1-, return line -2-, supply line -3- to metering pump -V54- and 5-pin connector -5- off fuel delivery unit flange.



Note

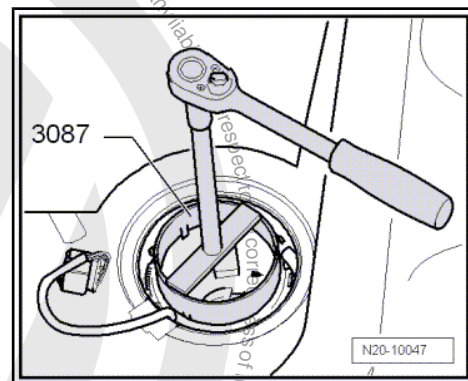
Press in securing ring to release fuel lines.





- Open locking ring using fuel tank sender wrench -3087- .
- Lift sender flange.
- Insert extraction hose of fuel extractor -VAS 5190- as deeply as possible into fuel tank and extract fuel.

If fuel tank needed only to be emptied, reinstall sender flange
⇒ [page 210](#) .



5.5 Checking fuel pump



Note

Check fuel filter connections for correct arrangement, before starting to check the fuel pump ⇒ [page 173](#)

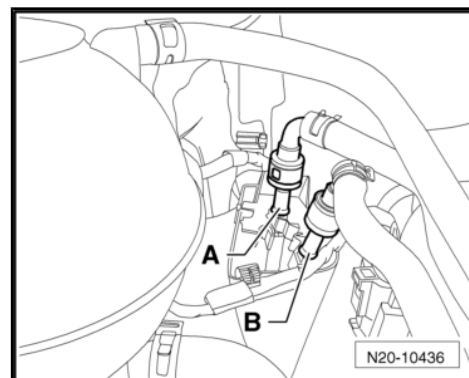
5.5.1 Checking delivery pressure of fuel pump

Special tools and workshop equipment required

- ◆ Pressure gauge -VAS 6550-
- ◆ Vehicle diagnosis tester

Test prerequisite:

- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.
- Separate quick release coupling -A- (black or black marking) of fuel supply line.
- Connect pressure tester -VAS 6550- with cables -VAS 6550/1- and -VAS 6550/2- to open ends of fuel supply line.
- Switch on pressure tester -VAS 6550- by pressing **On/Off** button.
- Open shut-off taps „A“ and „B“ of pressure tester and close shut-off tap „C“.
- Start engine and run at idling speed.
- Read pressure on pressure tester -VAS 6550- . Specification: min. 0.5 bar.
- Place pressure tester -VAS 6550- onto windscreen so that it can be read from inside vehicle.
- Increase idling speed to 2500 rpm and read the pressure on pressure tester -VAS 6550- , specification min 0.25 bar.
- If the delivery pressure temporarily drops, renew fuel delivery unit ⇒ [page 210](#) .
- If the specifications are attained, check tandem pump to ensure the fuel filter is not blocked ⇒ [page 225](#) .
- If the tandem pump values are OK, check fuel pump delivery rate ⇒ [page 216](#) .





5.5.2 Checking fuel pump delivery rate

Special tools and workshop equipment required

- ◆ Pressure gauge -VAS 6550-
- ◆ Container > 3 litre with measuring scale
- ◆ Vehicle diagnosis tester

Test prerequisite:

- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.



Note

The delivered fuel may be cloudy. This is normal and can be ignored.

- Separate quick release coupling -A- (black or black marking) of fuel supply line.
- Connect -VAS 6550/1- pressure tester line to fuel supply -A-.
- Guide open end of line into measuring container.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“



Note

The fuel pump is now activated for 30 seconds.

- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

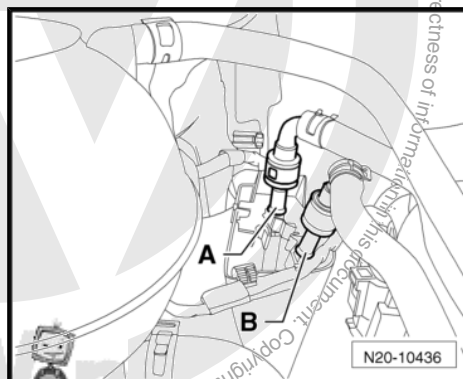
If the specification is not attained:

- Check fuel supply line between fuel pump and engine compartment for kinks, crushes or damage.
- If necessary, renew defective line and repeat test.
- If it is not kinked, crushed or damaged, remove rear seat bench
⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



Note

Press in securing ring to release fuel line.





- Pull fuel supply line (black, or black marking) -A- off fuel delivery unit.
- Connect -VAS 6550/1- pressure tester line to fuel supply -A-.
- Guide open end of line into measuring container.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



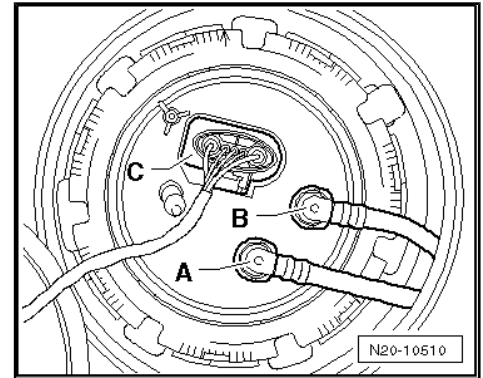
Note

The fuel pump is now activated for 30 seconds.

- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

If the specification is not attained:

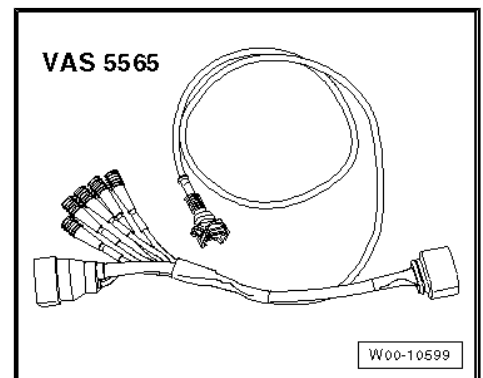
- Check voltage supply ➤ [page 217](#) and current draw ➤ [page 218](#) of fuel pump.



5.5.3 Checking voltage supply of fuel pump

Special tools and workshop equipment required

- ◆ Hand-held multimeter -V.A.G 1526D-
- ◆ Pickup clamp -V.A.G 1526B/2-
- ◆ Test instrument adapter/DSO (5-pin) -VAS 5565-



Test prerequisites

- Fuses must be OK.
- The battery voltage must be at least 12 V, if necessary connect battery charger.
- All electrical consumers, e.g. lights and rear window heating, must be switched off.
- Remove seat bench ➔ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ➔ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Switch on ignition. The fuel pump must be heard to run for about 2 seconds.
- Switch off ignition.

If the fuel pump does not start:

- Pull connector off fuel delivery unit flange.



- Connect test instrument adapter/DSO (5-pin) -VAS 5565- between connector and flange.
- Connect hand-held multimeter -V.A.G 1526D- to contacts -1- and -5- of adapter.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- Read voltage value on hand-held multimeter -V.A.G 1526D- : Specification = battery voltage.

If no voltage is present:

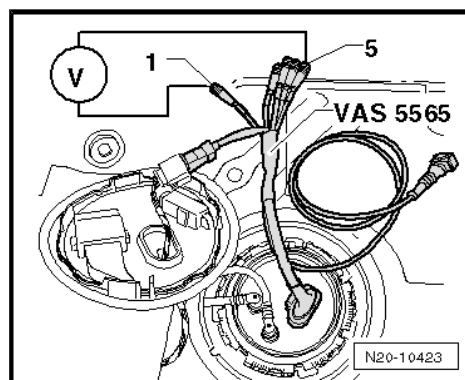
- Check activation of fuel pump relay and wiring for an open or short circuit ⇒ Vehicle diagnostic tester.

Voltage supply OK:

- Remove fuel delivery unit ⇒ [page 210](#)
- Check that electrical wiring between flange and fuel pump is connected and has continuity.

If no open circuit can be found:

- Renew fuel delivery unit.



5.5.4 Checking current draw of fuel pump

Special tools and workshop equipment required

- ◆ Hand-held multimeter -V.A.G 1526D- or pickup clamp -V.A.G 1526B/2-
- ◆ Test instrument adapter/DSO (5-pin) -VAS 5565-
- ◆ Vehicle diagnosis tester



Note

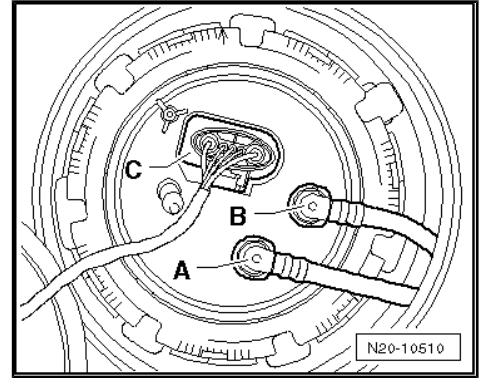
The battery voltage and the diesel fuel temperature have a great influence on the current draw of the fuel pump. For this reason ensure that the battery voltage is at least 12 V whilst checking and the diesel fuel temperature does not fall to the freezing point.

Test prerequisites

- Battery voltage at least 12 V
- Diesel fuel temperature above 10 °C
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .
- Detach carpet under seats and fold it back. ⇒ General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.



- Pull connector -C- off flange.

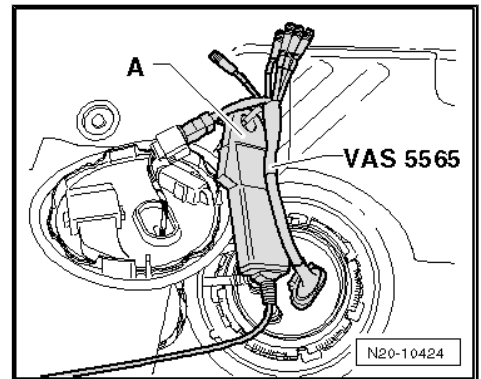


- Connect test instrument adapter/DSO (5-pin) -VAS 5565- to connector and fuel delivery unit.
- Connect pick-up clamp -A- to red terminal with lettering „pick-up clamp“ for test instrument adapter/DSO (5-pin) -VAS 5565- .



Note

Pickup clamp of hand-held multimeter -V.A.G 1715- can also be connected to red terminal with lettering „pick up clamp“ of test instrument adapter/DSO (5-pin) -VAS 5565- .



- Switch on ignition.
- Connect diagnosis tester and perform the guided function „Checking electric fuel pump(s)“.



Note

The fuel pump is now activated for 30 seconds.

- Read current draw on hand-held multimeter -V.A.G 1526D- . Specification: max. 7.5 amps.
- If the measured value is not within specifications:
- Renew fuel delivery unit ➔ [page 210](#) .

5.6 Assembly overview - fuel filter



Note

Note that there are different versions of fuel filter upper part ➔ [page 221](#)



1 - Return line

- ☐ To fuel cooler
- ☐ Check for secure seating.
- ☐ Blue or with blue marking.

2 - 6 Nm

3 - Washer

4 - Supply line

- ☐ From fuel tank.
- ☐ White or with white marking.
- ☐ Check for secure seating.

5 - Return line

- ☐ From tandem pump.
- ☐ Blue marking
- ☐ Check for secure seating.

6 - Supply line

- ☐ To tandem pump.
- ☐ White marking
- ☐ Check for secure seating.

7 - Upper part of fuel filter

8 - Fuel temperature sender - G81-

9 - Seal

- ☐ Renew.

10 - Filter insert

- ☐ Observe change intervals.

11 - Lower part of fuel filter

12 - 10 Nm

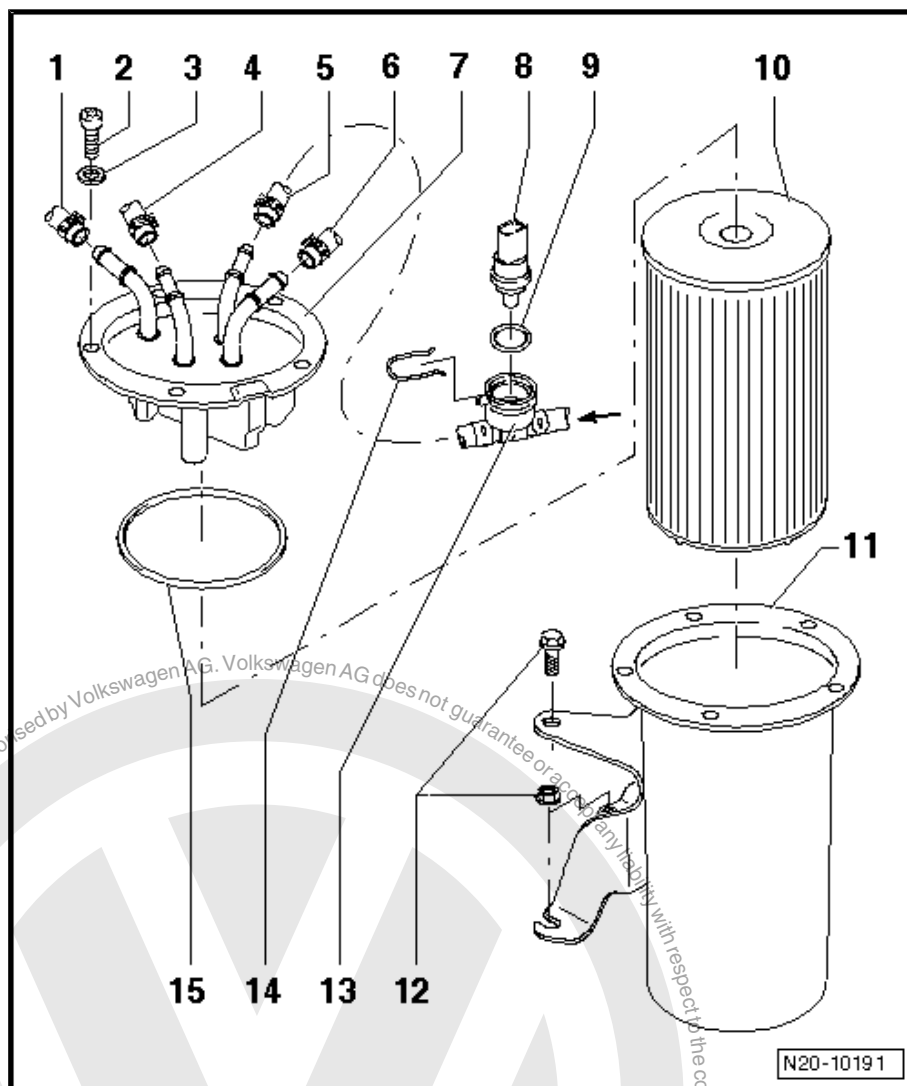
13 - Connection for fuel temperature sender -G81-

14 - Retaining clip

- ☐ Check for secure seating.

15 - O-ring

- ☐ Renew.





5.6.1 Fuel filter upper part

Type A ➤ [page 221](#)

Type B ➤ [page 221](#)

Fuel filter upper part, type A

1 - 8 Nm

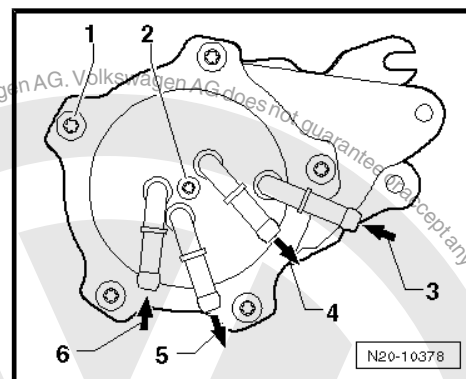
2 - Plug for water extraction (remove and extract about 100 cm³ liquid using hand-operated vacuum pump with accessories - V.A.G 1390- and water drainage container - V.A.G 1390/1- , renew seal)

3 - Fuel tank supply line, white or white marking. Check for secure seating.

4 - Fuel tank return line, blue or blue marking. Check for secure seating.

5 - Fuel supply line to engine, white or white marking. Check for secure seating.

6 - Fuel return line from engine, blue or blue marking. Check for secure seating.



Fuel filter upper part, type B

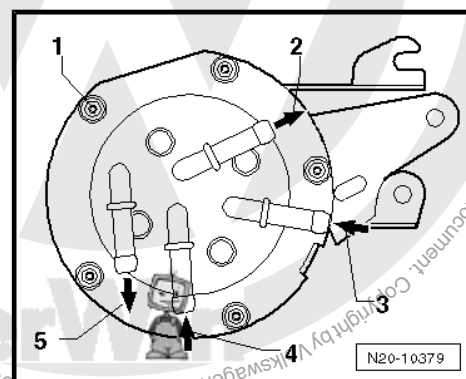
1 - 5 Nm

2 - Fuel tank return line, blue or blue marking. Check for secure seating.

3 - Fuel tank supply line, white or white marking. Check for secure seating.

4 - Fuel return line from engine, blue or blue marking. Check for secure seating.

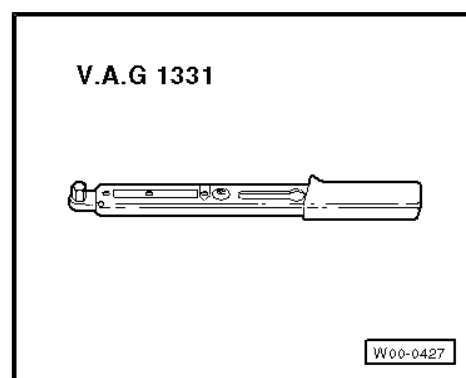
5 - Fuel supply line to engine, white or white marking. Check for secure seating.



5.7 Removing and installing fuel cooler

Special tools and workshop equipment required

- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



Removing

Note safety precautions before beginning work ➤ [page 150](#) .

Observe rules for cleanliness ➤ [page 151](#) .



Note

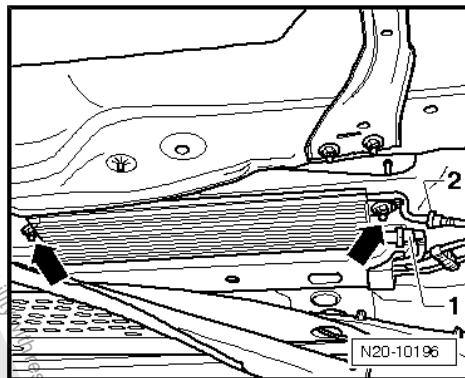
The fuel cooler is located in the return line to fuel tank. It is located on the vehicle underbody.

- Remove underbody panel.
- Pull fuel lines -1- and -2- off fuel cooler.
- Remove securing nuts -arrows-

Installing

Install in reverse order. When doing this, note the following:

- ◆ Tighten fuel cooler securing nuts to 15 Nm.





6 Accelerator mechanism

6.1 Assembly overview - accelerator mechanism

Removing and installing accelerator mechanism ⇒ [page 223](#) .

1 - Connector

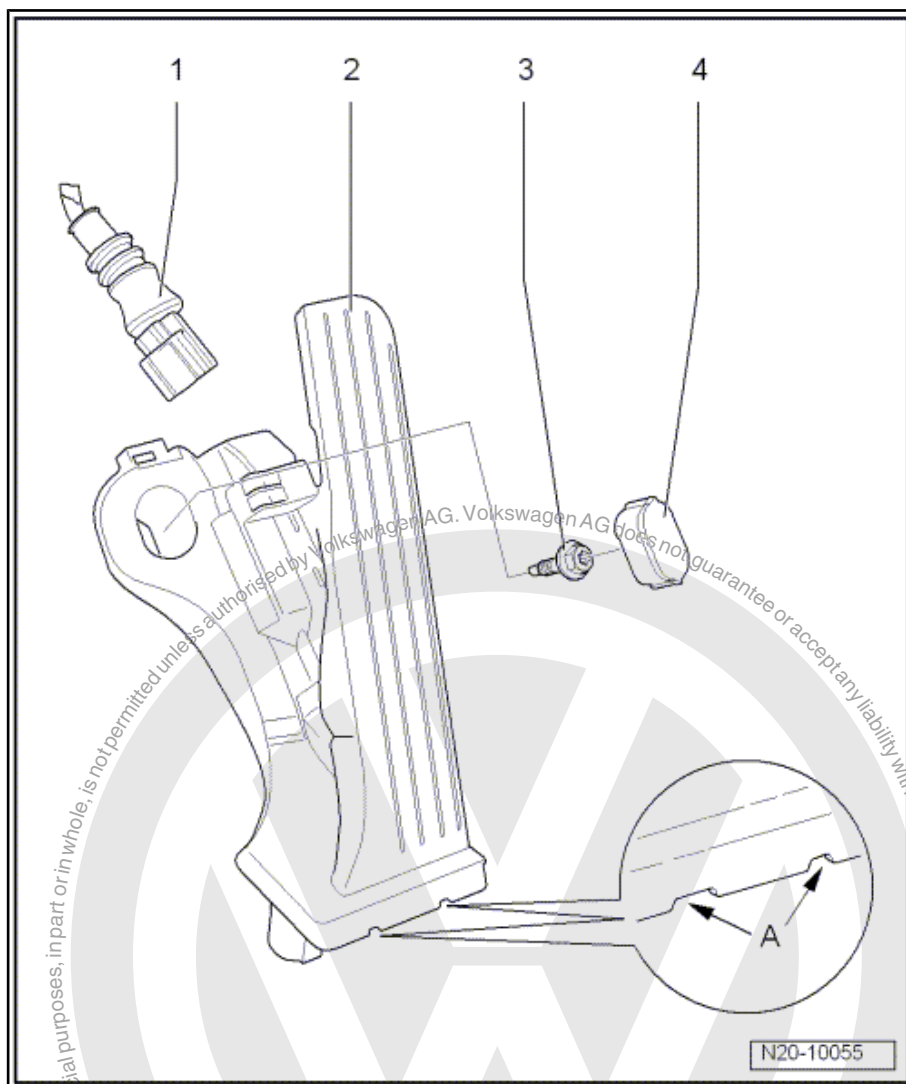
- ☐ Black, 6-pin.

2 - Accelerator position sender -G79-

- ☐ Not adjustable.
- ☐ The accelerator position sender passes the position of the accelerator on to the engine control unit.
- ☐ -A- openings for release tool
- ☐ Remove footwell cover to remove sender.

3 - 10 Nm

4 - Cap



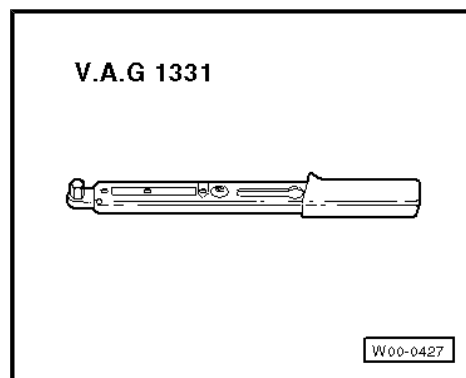
6.1.1 Removing and installing accelerator module

Special tools and workshop equipment required

- ◆ Release tool -T 10269- (for right-hand drive vehicles - T10297-).



- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-



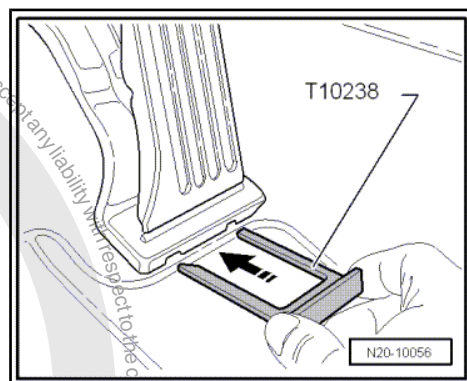
Removing

- Lever off cap ➔ [Item 4 \(page 223\)](#) using a screwdriver.
- Remove securing bolt beneath it.

Golf, Golf Plus and Passat:

- To remove accelerator module, push release tool -T 10238- (for right-hand drive vehicles -T10240-) into opening provided to stop.

Touran:



- To remove accelerator module, push release tool -T 10269- (for right-hand drive vehicles -T10297-) into opening provided to stop.

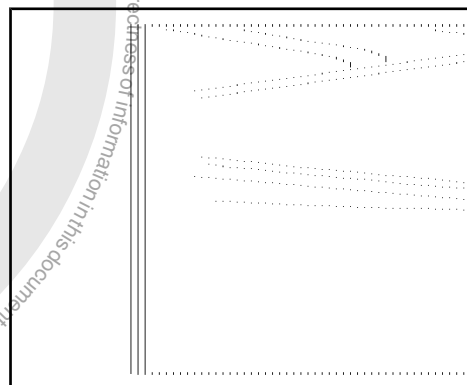
Continuation for all vehicle types:

- Pull connector off accelerator module.
- Pull wiring guide off accelerator pedal module.
- Pull out accelerator module vertically.

Installing

Installation is carried out in the reverse order. When installing, note the following:

- Attach connector and wiring guide to accelerator module.
- Press accelerator module onto securing pins.
- Insert centring pin into hole in vehicle floor.
- Secure accelerator module with securing bolt -3-. Specified torque: 9 Nm
- Attach cap.
- Install steering column cover.





7 Tandem pump

Checking tandem pump ⇒ [page 225](#) .

Removing and installing tandem pump ⇒ [page 227](#) .

7.1 Checking tandem pump

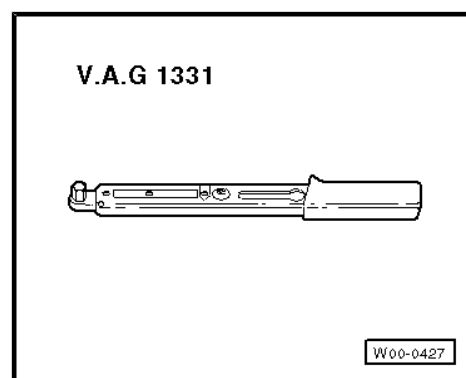
Checking delivery pressure ⇒ [page 225](#)

Checking for internal leaks ⇒ [page 226](#)

7.1.1 Checking delivery pressure

Special tools and workshop equipment required

- ◆ Tandem pump tester -VAS 5187-
- ◆ Torque wrench -V.A.G 1331-

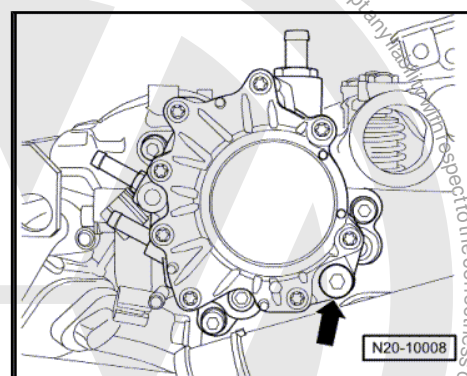


Test prerequisites

- Coolant temperature must be at least 85 °C.
- Unit injectors OK
- Fuel filter and fuel lines must not be blocked.

Procedure

- Remove air filter housing.
- Remove plug -arrow-.





- Connect tandem pump tester -VAS 5187- if necessary, with adapter -VAS 5187/7- or banjo bolt with seal -VAS 5187/1A- as shown.
- Remove air filter housing again.
- Start engine and raise engine speed to 4000 rpm.
- Observe pressure indicated on pressure gauge.

Specification: min. 10.5 bar, tandem pump OK.

If the specification is not attained:

- Renew fuel filter.
- Repeat check.

If the specifications are still not attained:

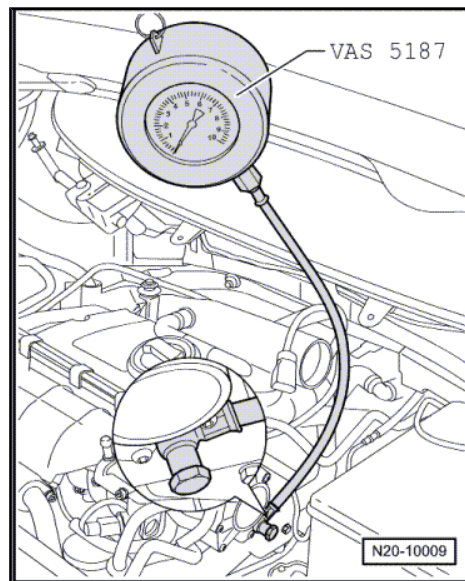
- Using a hose clip, clamp-off return line between fuel filter and tandem pump.
- Repeat check.

If specification is now obtained:

- Tandem pump is OK. Renew unit injector O-rings
⇒ [page 257](#) .

If the specification is not attained:

- Renew tandem pump ⇒ [page 227](#) .



Note

After removing pressure tester, tighten plug to 25 Nm. Always renew seal.

7.1.2 Checking for internal leaks

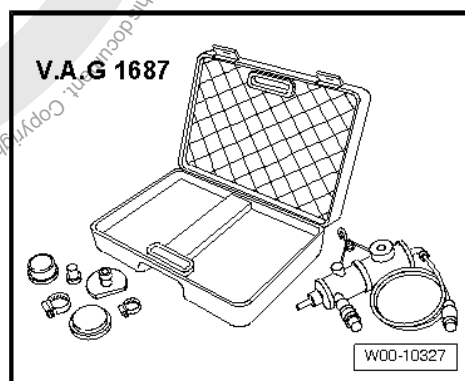


Note

The tandem pump must be checked for internal leaks between fuel side and oil side after reinstalling a used tandem pump, for example after renewing or repairing a cylinder head and/or when installing a "short" engine. When leaking it is possible for the fuel to mix with the oil which may cause the engine to fail.

Special tools and workshop equipment required

- ♦ Tester -V.A.G 1687-





Procedure

- Pull fuel supply hose (white marking) and fuel return hose (blue marking) off tandem pump.
- Seal fuel return union on tandem pump with a plug. Secure sealing plug with a spring-type clip.

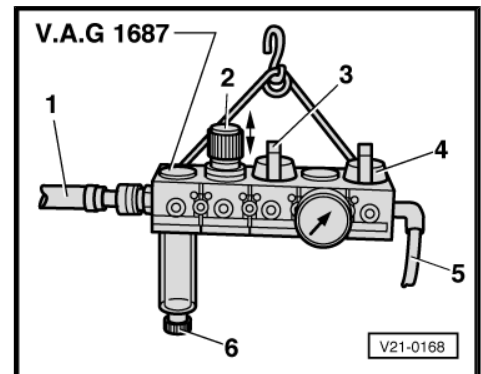
Prepare test unit -V.A.G 1687- as follows:

- Unscrew pressure regulating valve -2- and close valves -3- and -4-.
- Connect test connection -5- to fuel supply union of tandem pump using a commercially available compressed air connection and a section of fuel hose. Use a spring-type clip to secure.



Note

To turn the pressure regulating valve -2- the knob must be pulled upwards.



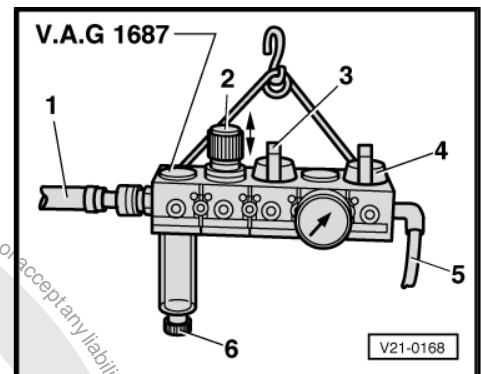
- Connect compressed air hose -1- (compressed air source) to charge air system tester -V.A.G 1687-.



Note

If there is water in the sight glass, drain at water drain screw -6-.

- Open valve -3-.
- Adjust pressure to 1.0 bar with pressure regulating valve -2-.



Caution

The maximum test pressure is 1.3 bar and this must not be exceeded.

- Open valve -4- and wait until the test circuit is filled. If necessary readjust pressure to 1.0 bar.
- Close valve -3- to retain pressure and observe the pressure drop over a period of 1 minute.

If the pressure does not drop the tandem pump can be reused, if the pressure drops the tandem pump must be renewed.

7.2 Removing and installing tandem pump



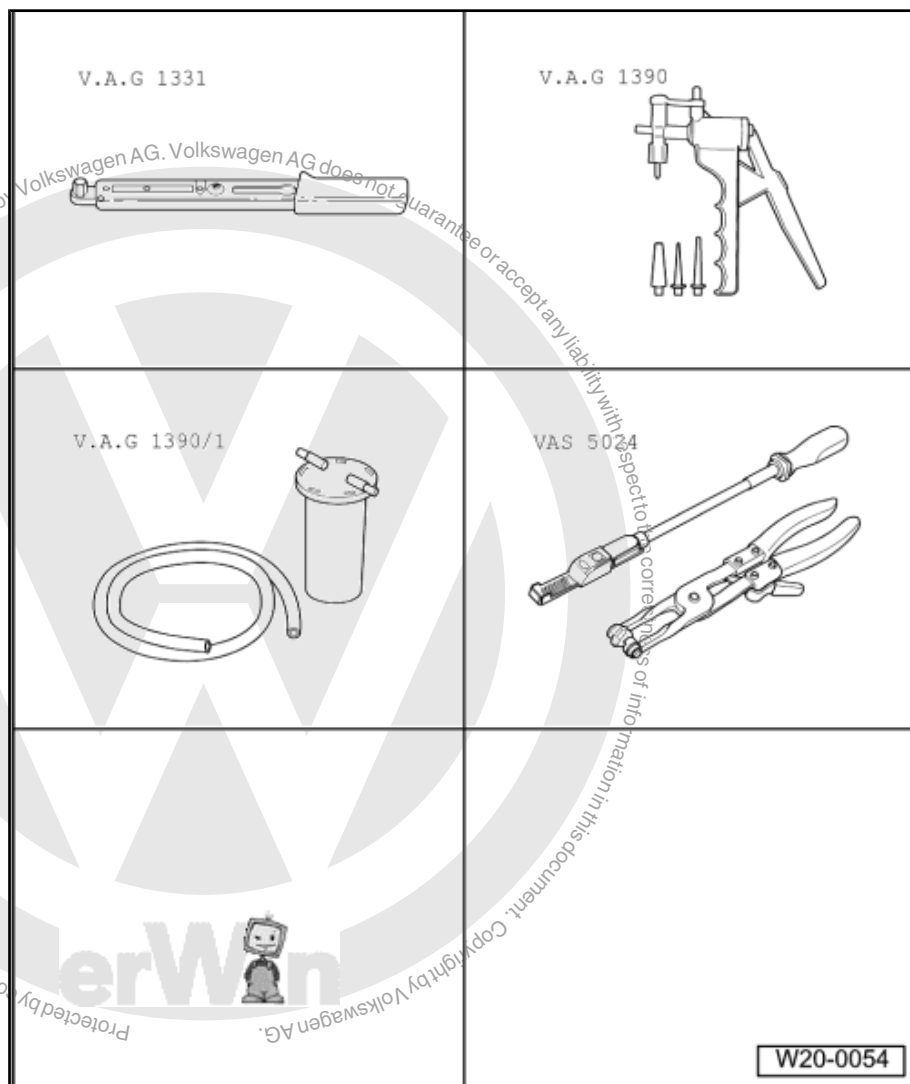
DANGER!

The tandem pump may, under no circumstances, be dismantled as the vacuum part could otherwise malfunction. This would result in the failure of the brake servo.



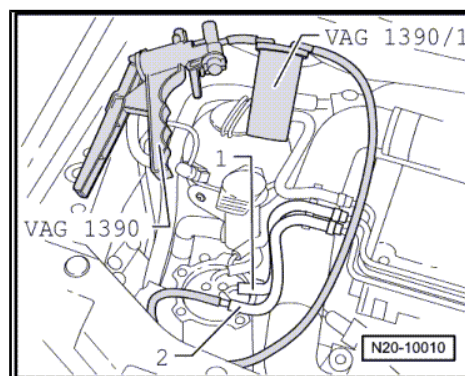
Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-
- ◆ Hand vacuum pump with accessories -V.A.G 1390-
- ◆ Water drainage container - V.A.G 1390/1-
- ◆ Spring-type clip pliers -VAS 5024 A-



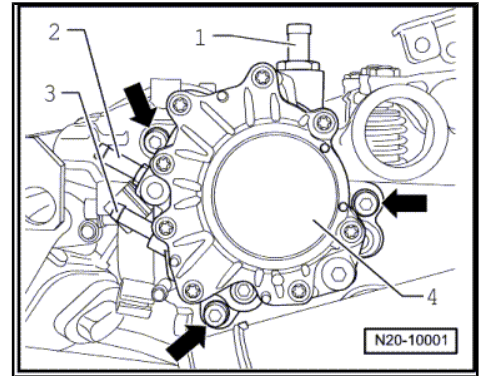
7.2.1 Removing

- Pull supply hose -1- (white marking) and return hose -2- (blue marking) off fuel filter.
- Connect hand vacuum pump with accessories -V.A.G 1390- and water drainage container -V.A.G 1390/1- to return hose -2-.
- Operate hand vacuum pump until no more fuel comes out of return hose. Be careful that no fuel is sucked into hand vacuum pump.
- Remove air filter housing ➔ [page 5](#) .

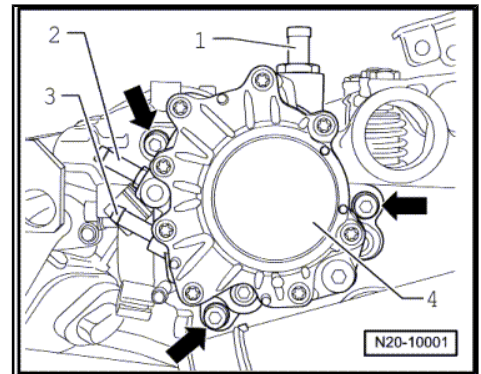




- Pull vacuum line -1- off tandem pump -4-.
- Pull supply hose -2- (white marking) and return hose -3- (blue marking) off tandem pump -4-.



- Remove securing bolts -arrows-.
- Remove tandem pump -4- from cylinder head.



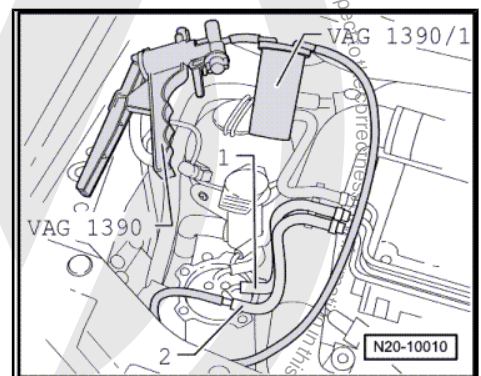
7.2.2 Installing

Installation is carried out in the reverse order. When installing, note the following:



Note

- ◆ *Ensure that tandem pump coupling seats properly in cam-shaft.*
- ◆ *Always renew tandem pump seals.*
- Install tandem pump and tighten securing bolts to 20 Nm.
- Attach return hose (blue marking) to return connection -3- of tandem pump.
- Attach supply hose (white marking) to supply connection -2- and vacuum hose -1- from brake servo to tandem pump.
- Attach supply hose -1- (white marking) to fuel filter.
- Connect hand vacuum pump with accessories -V.A.G 1390- and water drainage container -V.A.G 1390/1- to return hose -2- (blue marking) of fuel filter.
- Operate hand vacuum pump until fuel comes out of return hose. Be careful that no fuel is sucked into hand vacuum pump.
- Attach return hose (blue marking) to fuel filter.
- Perform leak test ➔ [page 226](#).





21 – Turbocharging/supercharging

1 Charge air system with turbocharger

Safety precautions ⇒ [page 230](#) .

Rules for cleanliness ⇒ [page 230](#) .

Hose connections with push-on connectors ⇒ [page 231](#)

Assembly overview - turbocharger with attachments
⇒ [page 232](#)

Assembly overview - parts of charge air cooling ⇒ [page 237](#) .

Checking charge air system for leaks ⇒ [page 238](#)

1.1 Safety precautions



WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*

Observe following if test and measuring instruments are required during a road test:

- ◆ Test and measuring instruments must always be secured to rear seat and operated by a second person from this location.

If test and measuring instruments are operated from front passenger seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

1.2 Rules for cleanliness

When working on the turbocharger, pay careful attention to the following rules for cleanliness:

- ◆ Thoroughly clean all unions and surrounding areas before disconnecting.
- ◆ Place removed parts on a clean surface and cover. Use only lint-free cloths.
- ◆ Carefully cover opened components or seal if repairs cannot be carried out immediately.
- ◆ Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- ◆ Existing transport and protective packaging and sealing caps must only be removed immediately prior to installation.
- ◆ When making repairs, remove oil from connection and hose ends.



- ◆ When system is open: do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.

1.3 Hose connections

1.3.1 Installing hose connections with connector couplings



Caution

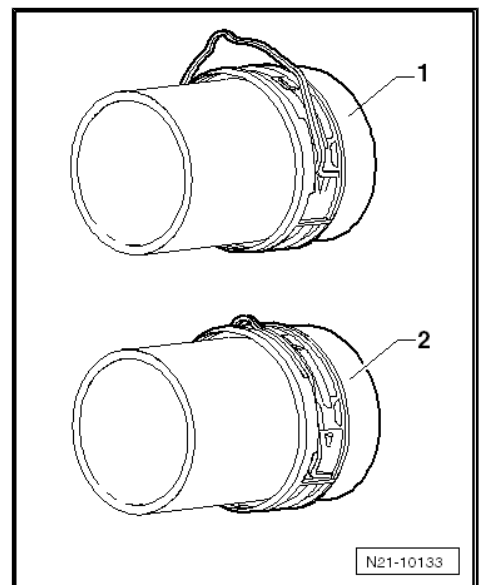
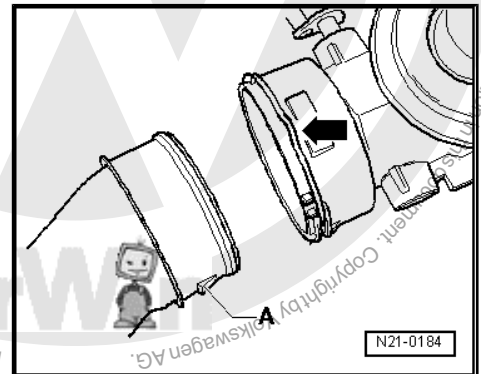
The seal in the plug-in connector can be damaged if the securing clip is in the locked position when fitting the connector. This can cause leakage. Observe installation instructions.

Removing

- Release plug-in connector by pulling out retaining clip -arrow-. Separate hose/pipe without tools.

Installing

- If renewed, place seal in groove of charge air hose. Ensure the seal is correctly seated in the groove.
- Lubricate sealing surface and seal with oil.
- Bring retaining clip to release position -1-.
- Push charge air hose into coupling to stop.
- Bring securing clip to locking position -2- and then push charge air hose again.
- Check if connector coupling seats correctly and is properly engaged by pulling hose.



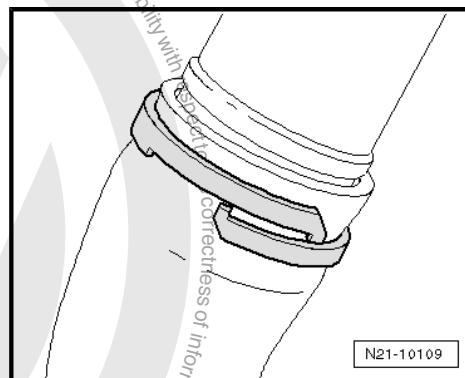


1.3.2 Hose connections with spring band ring



Note

There is a danger of a „hose detaching“ whilst driving after removing and reinstalling charge pressure lines with spring-type clips. For this reason, spring band rings are used which can be opened if a defect item requires the charge pressure line has to be disconnected. In cases of repair, the charge air pipe must be removed if necessary, the spring band ring must be destroyed using a suitable tool (e.g. angled grinder) and must be renewed by a replacement part according to ⇒ ETKA (electronic parts catalogue)



1.4 Assembly overview - turbocharger with attachments



Caution

When a mechanical fault is found on the turbocharger, e.g. a destroyed compressor impeller, it is not only sufficient to renew the turbocharger. To prevent this from causing further damage, perform the following repairs:

- ◆ *Check air filter housing, air filter element and intake hoses for soiling.*
- ◆ *Check complete charged air routing and charge air cooler for foreign objects.*

If foreign objects are found in the charge air system, the charged air routing must be cleaned and the charge air cooler must be renewed, if necessary.

Engine codes AZV, BKD, BKP, BMA, BVE and BWV

⇒ [page 232](#)

Engine codes BMN, BMR and BUZ ⇒ [page 234](#)

1.4.1 Engine codes AZV, BKD, BKP, BMA, BVE and BWV



Note

- ◆ *All hose connections are secured.*
- ◆ *Charge air system must be free of leaks.*
- ◆ *Renew self-locking nuts.*
- ◆ *Before screwing on oil supply line, fill turbocharger at connection with engine oil.*
- ◆ *After installing turbocharger, run engine for about 1 minute at idling speed to ensure that oil is supplied to turbocharger.*



Observe rules for cleanliness ➔ [page 230](#) .

Observe safety precautions ➔ [page 230](#) .

1 - Seal

- ☐ Renew.

2 - To bypass flap

3 - 25 Nm

- ☐ Renew.

4 - Connecting pipe

- ☐ To exhaust gas recirculation cooler.

5 - Retainer

- ☐ For oil supply line.

6 - 10 Nm

7 - Oil supply line

- ☐ Removing and installing ➔ [page 123](#) .
- ☐ Before installing oil supply line, ensure that it is not blocked.
- ☐ Before installing, fill turbocharger with engine oil through oil supply line connection.

8 - Union nut, 22 Nm

9 - Union nut, 22 Nm

10 - Connection, 30 Nm

11 - Seal

- ☐ Renew.

12 - Seal

- ☐ Renew.
- ☐ Note installation position.

13 - Turbocharger

- ☐ Can only be renewed together with exhaust manifold and vacuum unit.
- ☐ To remove turbocharger, first remove right drive shaft at gearbox ➔ Running gear, axles, steering - front and four-wheel drive; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

14 - Support

- ☐ Between turbocharger and cylinder block.

15 - 40 Nm

- ☐ First hand tighten all bolts

16 - Oil return line

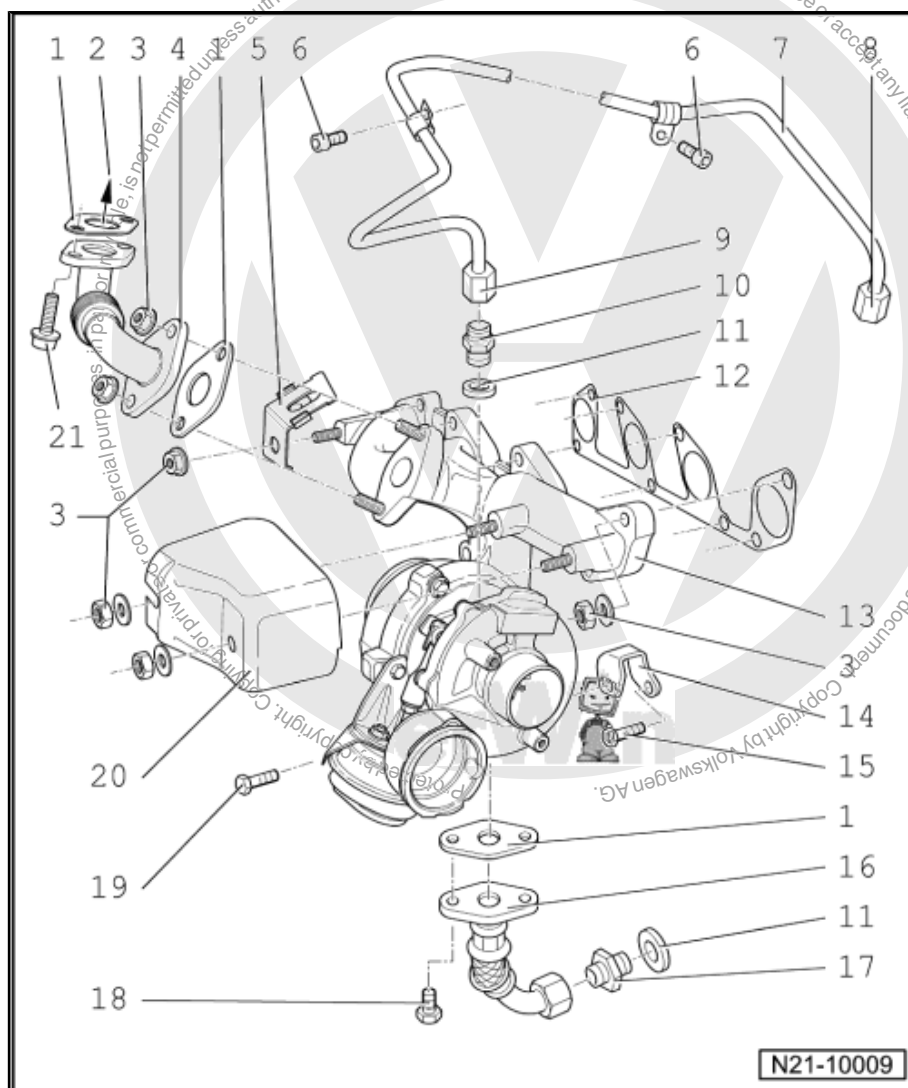
- ☐ To cylinder block.

17 - Connection, 40 Nm

18 - 20 Nm

19 - 20 Nm

- ☐ First hand tighten all bolts





20 - Heat shield

21 - 20 Nm

1.4.2 Engine codes BMN, BMR and BUZ



Note

- ◆ All hose connections are secured.
- ◆ Charge air system must be free of leaks.
- ◆ Renew self-locking nuts.
- ◆ Before screwing on oil supply line, fill turbocharger at connection with engine oil.
- ◆ After installing turbocharger, run engine for about 1 minute at idling speed to ensure that oil is supplied to turbocharger.

Observe rules for cleanliness ➔ [page 230](#) .

Observe safety precautions ➔ [page 230](#) .

1 - 10 Nm

2 - Retainer

3 - Heat shield

4 - Oil supply hose

- ☐ To oil supply line connection on turbocharger.
- ☐ Before installing oil supply line, ensure that it is not blocked.
- ☐ Before installing, fill turbocharger via oil supply hose with engine oil

5 - Turbocharger

- ☐ With position sender for charge pressure positioner -G581- .
- ☐ Can only be renewed with exhaust manifold.
- ☐ Removing and installing ➔ [page 235](#) .

6 - Vacuum hose

7 - Seal

- ☐ Renew.
- ☐ Note installation position.

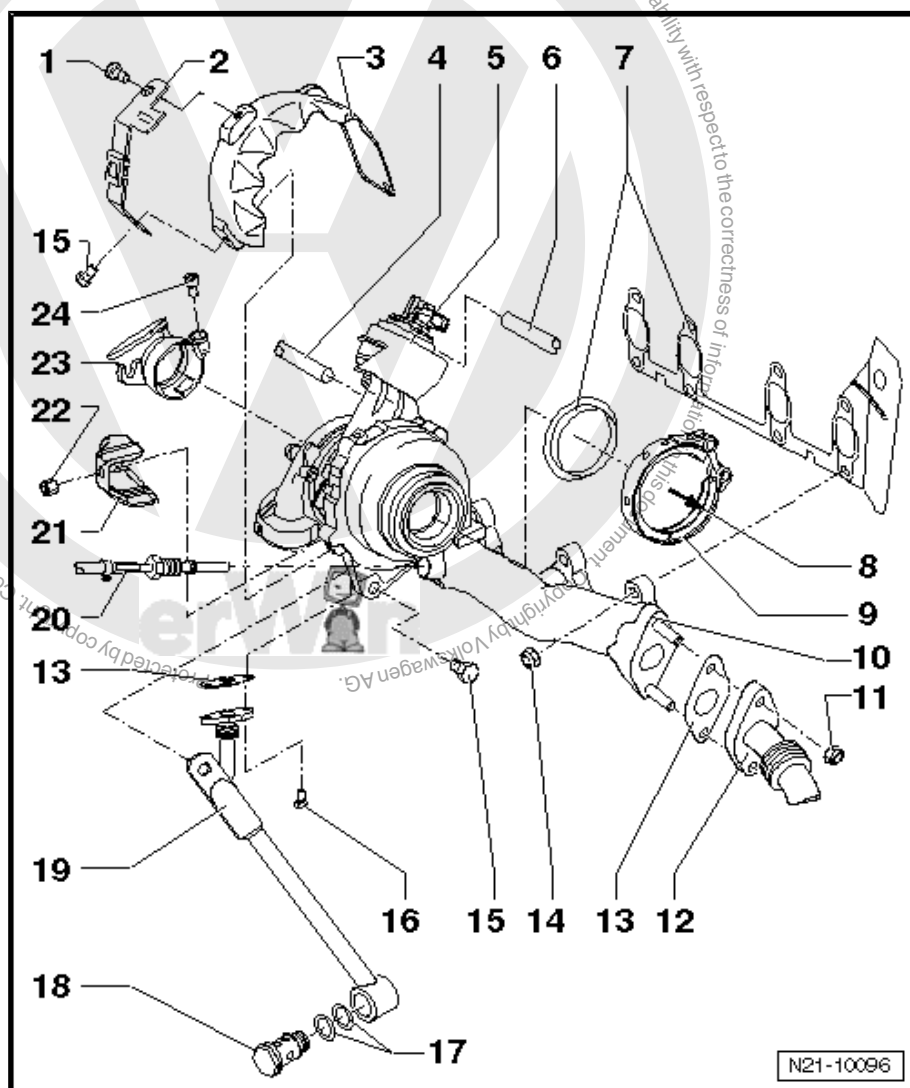
8 - To particulate filter

9 - Clamp, 7 Nm

- ☐ For turbocharger/particulate filter

10 - Exhaust manifold

- ☐ Can only be renewed together with turbocharger





11 - 25 Nm

- ☐ Renew.

12 - Connecting pipe

- ☐ To exhaust gas recirculation cooler

13 - Seal

- ☐ Renew.

14 - 25 Nm

- ☐ Renew.

15 - 25 Nm

16 - 15 Nm

17 - O-ring

- ☐ Renew.

18 - Banjo bolt, 60 Nm

- ☐ On vehicles with four-wheel drive covered by bevel box.

19 - Support

- ☐ For turbocharger.
- ☐ With oil return line

20 - Exhaust gas temperature sender 1 -G235-, 45 Nm

- ☐ Lubricate thread of sender using high-temperature paste -G 052 112 A3- .
- ☐ Note installation position for temperature sender with angled cable guide ➔ [page 235](#)
- ☐ Remove and install with Tool set -T10395- .

21 - Heat shield

22 - 25 Nm

- ☐ Renew.

23 - Connection

- ☐ For intake hose for air filter/turbocharger
- ☐ Assembly overview - air filter ➔ [page 259](#) .

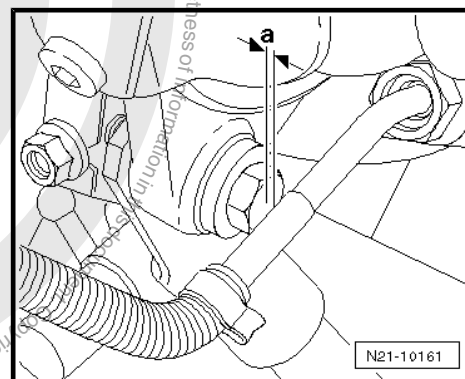
24 - 9 Nm

Installation position of exhaust gas temperature sender with angled cable guide



Note

- ◆ When installing the exhaust gas temperature sender with angled cable guide, it is absolutely necessary to keep to dimension -a- of 3...5 mm when tightening the turbocharger support.
- ◆ Remove and install with tool set -T10395- .



1.5 Removing and installing turbocharger

Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



Caution

When a mechanical fault is found on the turbocharger, e.g. a destroyed compressor impeller, it is not only sufficient to renew the turbocharger. To prevent this from causing further damage, perform the following repairs:

- ◆ Check air filter housing, air filter element and intake hoses for soiling.
- ◆ Check complete charged air routing and charge air cooler for foreign objects.

If foreign objects are found in the charge air system, the charged air routing must be cleaned and the charge air cooler must be renewed, if necessary.

Removing

- Remove noise insulation tray ⇒ General body repairs, exterior; Rep. gr. 50 ; Body front, noise insulation .

Vehicles with four-wheel drive:

- Remove front propshaft ⇒ Final drive 02D, 0AV; Rep. gr. 39 ; Assembly overview - repairing propshaft .

Continuation for all vehicles:

- Remove right drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 .

Vehicles with particulate filter:

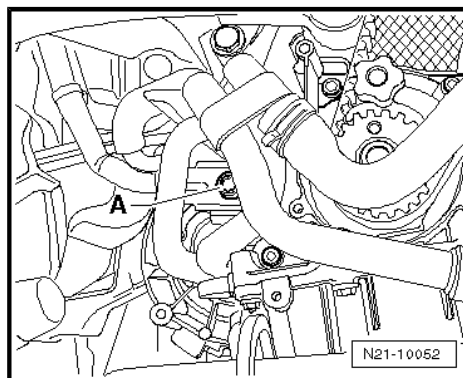
- Pull electrical connector off exhaust gas pressure sensor 1 - G450- in engine compartment and unscrew securing bolts.
- Separate electrical connectors to particulate filter.
- Remove subframe including steering and right drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 .
- Remove particulate filter.
- On vehicles with four-wheel drive remove the bevel box to reach the threaded connection for turbocharger support ⇒ 6-speed manual gearbox; Rep. gr. 34 ; Removing and installing bevel box .

Continuation for all vehicles:

- Disconnect fasteners -arrows- of coolant pipes for auxiliary heater, if part of original equipment.
- Remove support and oil return line or combi support ⇒ [Item 19 \(page 235\)](#) for turbocharger.
- Remove connecting pipe to exhaust gas recirculation cooler.
- Separate charge pressure line from turbocharger.
- Pull vacuum hose off turbocharger.
- Separate oil supply line from turbocharger.
- Unscrew securing bolts for exhaust manifold.
- Tilt the engine forwards in lower mounting and remove turbocharger with exhaust manifold downwards.

Installing

- Install in reverse order.





1.6 Assembly overview - charge air cooling



Note

- ◆ When making repairs, remove oil from connection and hose ends.
- ◆ All hose connections of charge air system are secured by spring-type clips or by connector couplings. Observe installation instructions ➔ [page 231](#)
- ◆ Charge air system must be free of leaks.
- ◆ Checking charge air system for leaks ➔ [page 238](#)

Engine codes AZV, BKD, BKP, BMA BVE and BWV
➔ [page 237](#)

Engine codes BMN, BMR and BUZ ➔ [page 238](#)

1.6.1 Engine codes AZV, BKD, BKP, BMA, BVE and BWV

Assembly of hose connections ➔ [page 231](#)

1 - 5 Nm

2 - Mounting

- ☐ For charge air cooler.

3 - Charge air cooler

- ☐ To remove, bring lock carrier into service position ➔ General body repairs; Rep. gr. 50 ; Body - front; lock carrier service position .

4 - Connecting hose

5 - 8 Nm

6 - Connecting hose

7 - To turbocharger

8 - Charge air pipe

9 - To intake connecting pipe

10 - Connecting hose

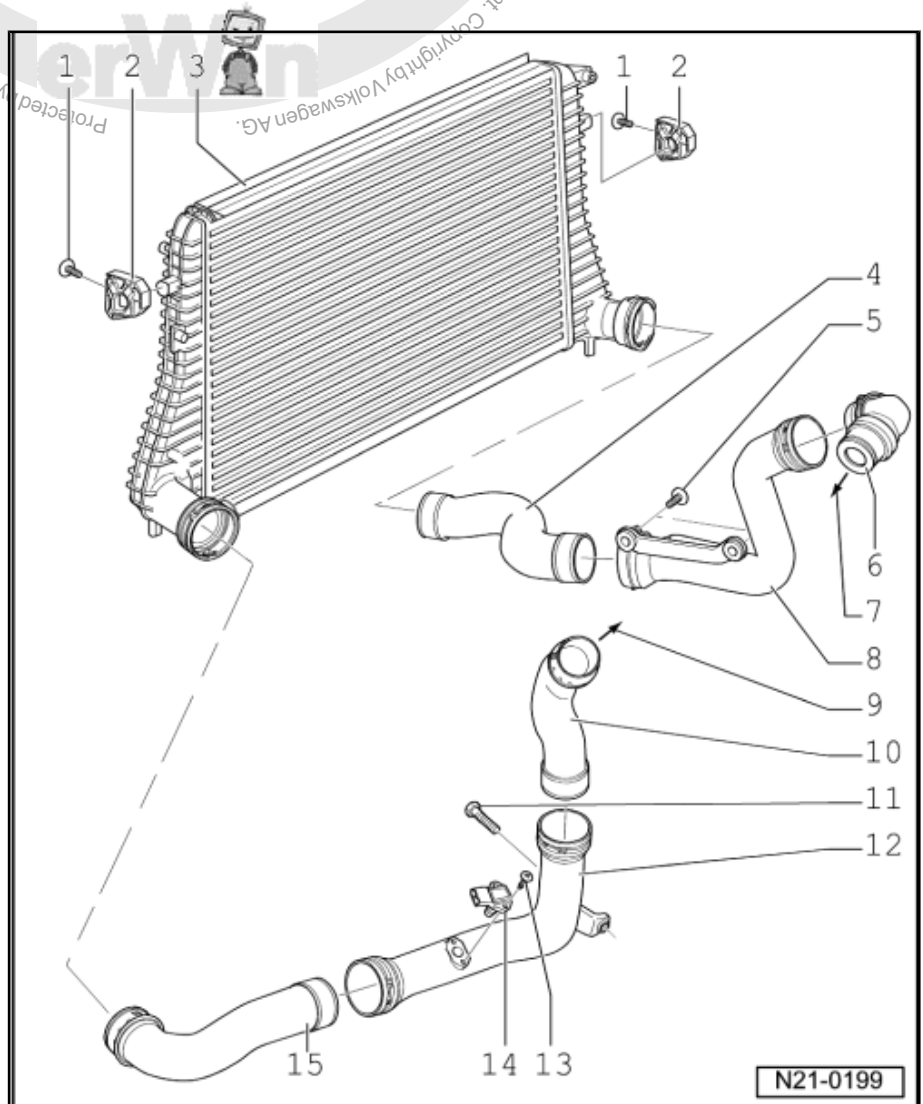
11 - 25 Nm

12 - Charge air pipe

13 - 8 Nm

14 - Charge air pressure sender -G31- with intake air temperature sender -G42-

15 - Connecting hose





1.6.2 Engine codes BMN, BMR and BUZ

Assembly of hose connections ➤ [page 231](#)

1 - 5 Nm

2 - Mounting

- For charge air cooler.

3 - Charge air cooler

- To remove, move lock carrier to service position ➤ Rep. gr. 50 .

4 - To intake connecting pipe

5 - Connecting hose

6 - Spring-type clip

7 - Connecting pipe

8 - 8 Nm

9 - Charge air pressure sender
-G31- with intake air temperature sender -G42-

10 - 8 Nm

11 - To turbocharger.

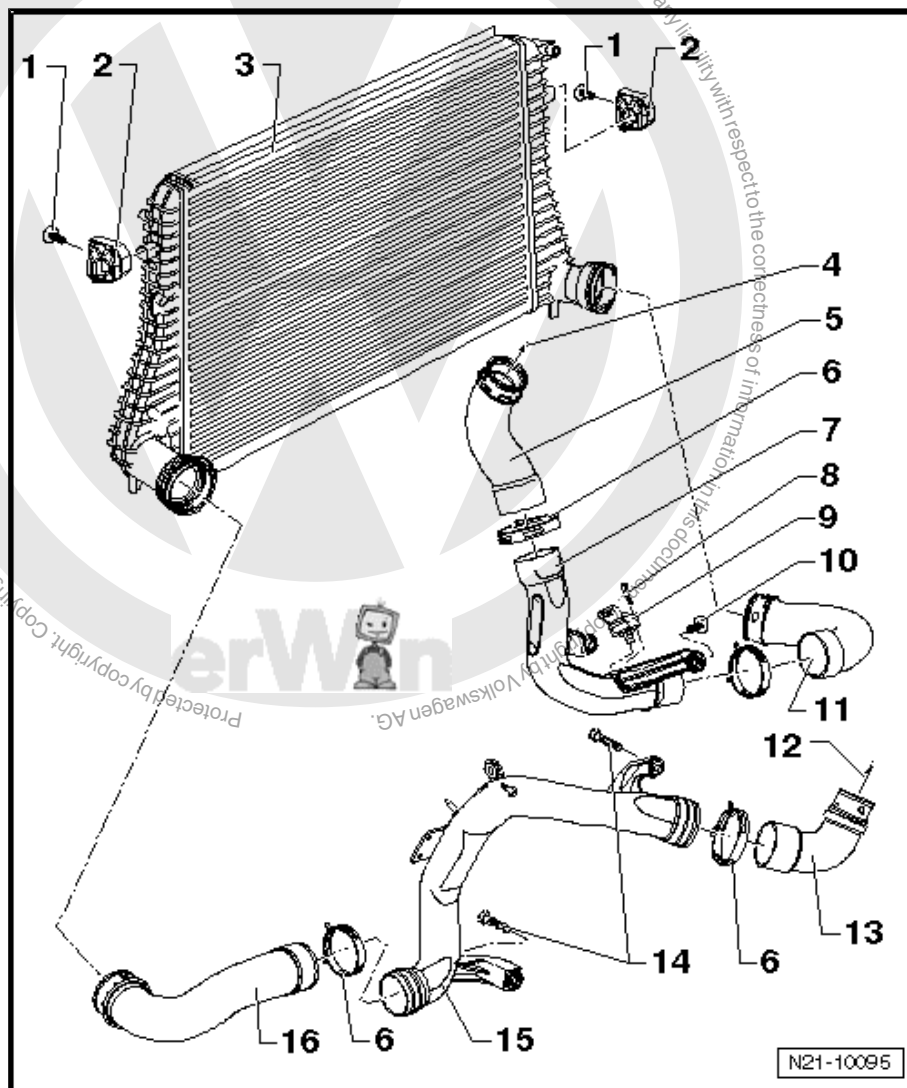
12 - Connecting hose

13 - Connecting hose

14 - 25 Nm

15 - Connecting pipe

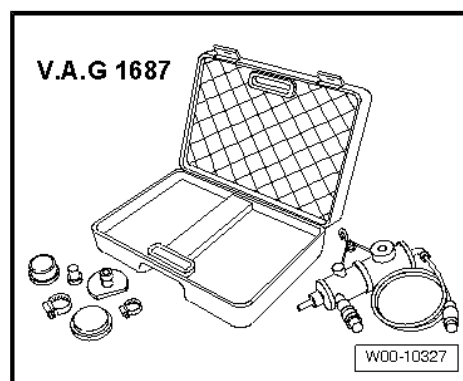
16 - Connecting hose



1.7 Checking charge air system for leaks

Special tools and workshop equipment required

- ◆ Charge air system tester -V.A.G 1687-

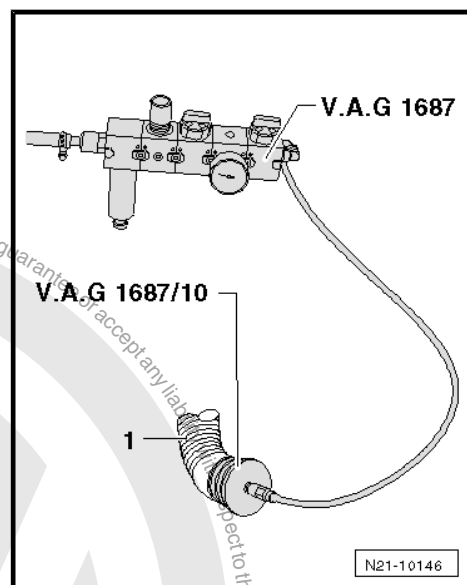


- ◆ Adapter -V.A.G 1687/10-



- Remove intake hose -1- from air filter.
- Connect adapter -1687/10- in intake hose -1- and secure with clip.

Prepare charge air system tester -V.A.G 1687- as follows:

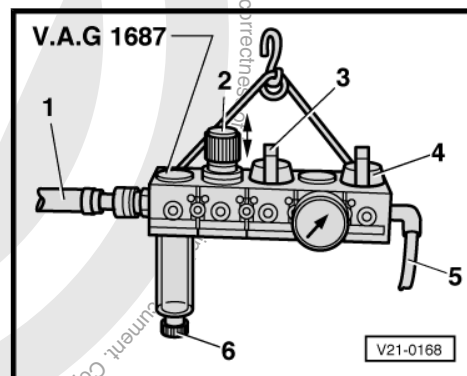


- Unscrew pressure regulating valve -2- and close valves -3- and -4-.

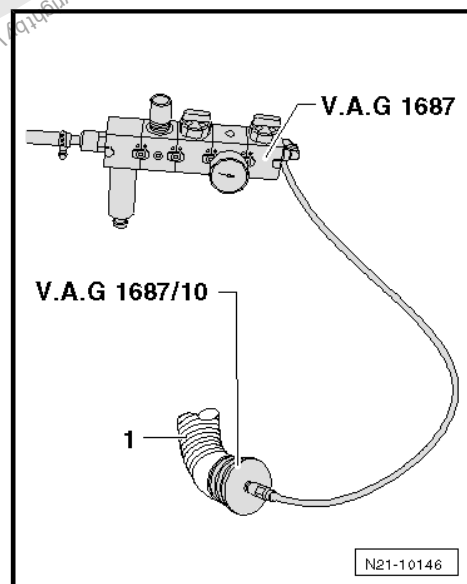


Note

To turn the pressure regulating valve -2- the knob must be pulled upwards.



- Connect charge air system tester -V.A.G 1687- to adapter -1687/10- as shown.





- Connect compressed air hose -1- (compressed air source) to charge air system tester -V.A.G 1687- .



Note

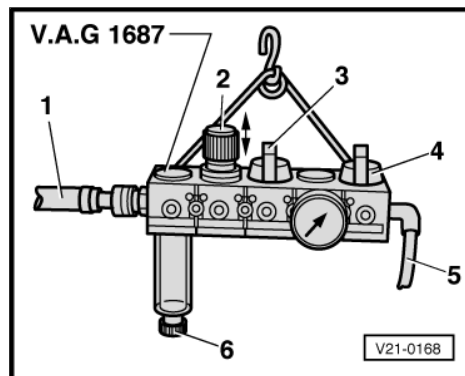
If there is water in the sight glass, drain at water drain screw -6-.

- Open valve -3-.
- Adjust pressure to 0.5 bar with pressure regulating valve -2-.



Caution

The pressure must not exceed 0.5 bar! If the pressure is too high this can cause damage to the engine.



- Open valve -4- and wait until the test circuit is filled. If necessary readjust pressure to 0.5 bar.
- Check the charge air system for leaks by hearing, touching, with commercially available leak detector spray or using ultrasonic tester -V.A.G 1842- .



Note

- ♦ How to use the ultrasonic tester -V.A.G 1842- ⇒ operating instructions
- ♦ If leaks occur, when doing any repair work observe notes for charge air system ⇒ [page 237](#) .
- ♦ Before removing the adapter, depressurise the test circuit by pulling coupling off adapter -1687/10- .

1.8 Vacuum hose schematic diagram

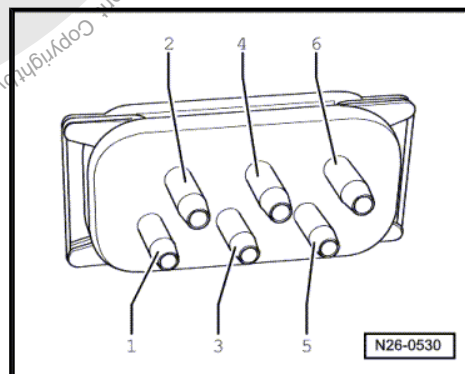
Engine codes AZV, BKD, BKP, BMA BVE and BWV
⇒ [page 240](#)

Engine codes BMN, BMR and BUZ ⇒ [page 241](#)

1.8.1 Engine codes AZV, BKD, BKP, BMA, BVE and BWV

Connector assignment on solenoid valve block

- 1 - Vacuum connection (on non-return valve for brake servo)
- 2 - To exhaust gas recirculation valve (mechanical)
- 3 - To bypass flap.
- 4 - To air filter.
- 5 - To vacuum reservoir
- 6 - To vacuum unit on turbocharger





1.8.2 Engine codes BMN, BMR and BUZ

1 - Air filter

2 - Charge pressure control solenoid valve -N75-

3 - Cylinder head cover

4 - Non-return valve

- ☐ Note installation position.

5 - Vacuum line to brake servo

6 - Exhaust gas recirculation cooler changeover valve - N345-

7 - Intake manifold flap air flow control valve -N316-

8 - Vacuum unit

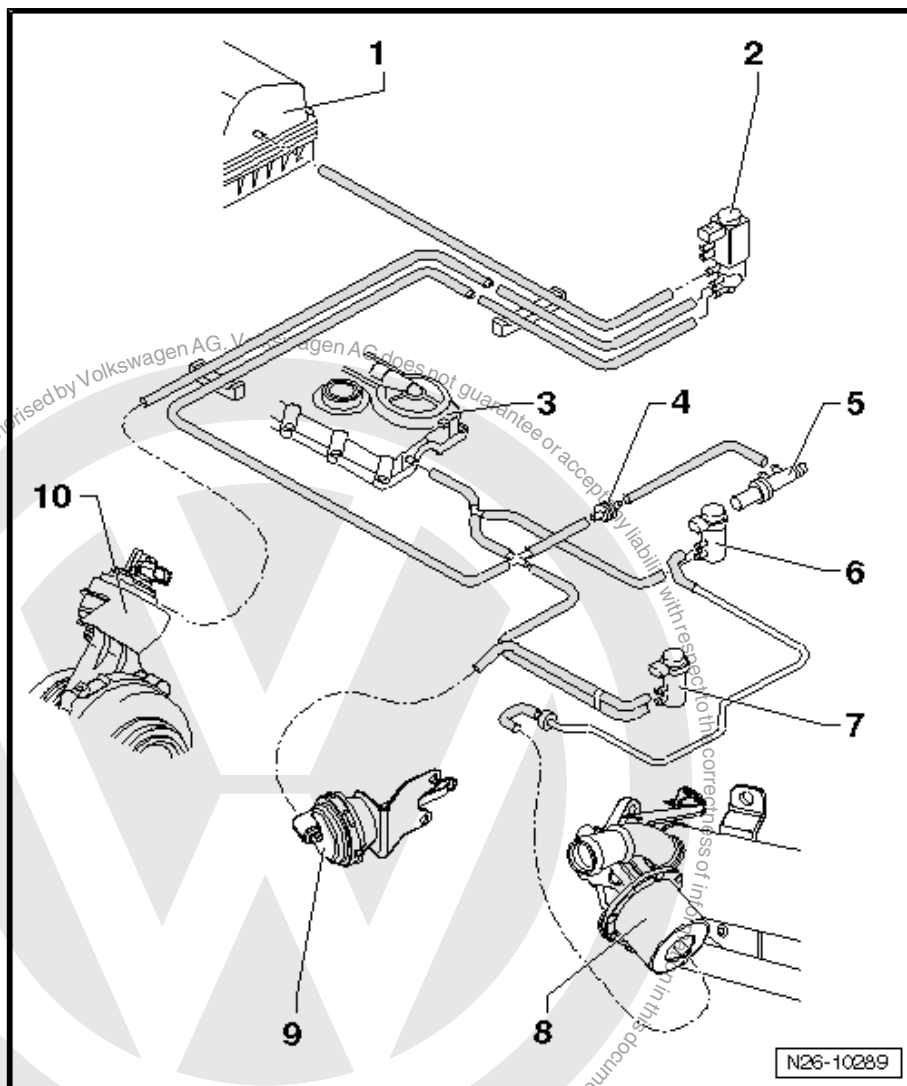
- ☐ For changeover for exhaust gas recirculation cooler.

9 - Vacuum unit

- ☐ For changeover for intake manifold.

10 - Vacuum unit

- ☐ On turbocharger.
- ☐ With position sender for charge pressure positioner -G581- .





23 – Mixture preparation - injection

1 Diesel direct injection system



Note

The diesel direct injection system control unit -J248- is equipped with a fault memory. Read fault memory before and after performing repairs or adjustments ⇒ Vehicle diagnostic tester.

Safety precautions ⇒ [page 242](#) .

Rules for cleanliness ⇒ [page 243](#) .

Assembly overview - intake manifold with attachments
⇒ [page 244](#) .

Removing and installing pre-wired wiring harness for unit injectors and glow plugs ⇒ [page 246](#)

Assembly overview - unit injector ⇒ [page 251](#)

Removing and installing unit injector ⇒ [page 251](#)

Cleaning unit injectors (engine codes BMN, BKP and BMR)
⇒ [page 255](#)

Removing and installing O-rings for unit injector ⇒ [page 257](#) .

Assembly overview - air filter ⇒ [page 259](#) .

1.1 Safety precautions



WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*

Observe following if test and measuring instruments are required during a road test:

- ◆ Test and measuring instruments must always be secured to rear seat and operated by a second person from this location.

If test and measuring instruments are operated from front passenger seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

To prevent injuries to persons and/or damage to the injection and glow plug system, the following must be noted:

- ◆ The ignition must be switched off before connecting or disconnecting injection or glow plug system wiring or tester cables.

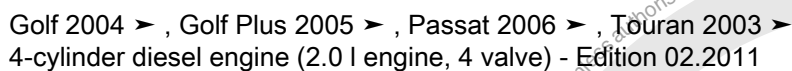


- ◆ If the engine is to be turned at starter speed, without starting, e.g. when checking compressions, disconnect unit injector connector on cylinder head.
- ◆ Disconnecting and connecting the battery must only be undertaken when the ignition is switched off otherwise the diesel direct injection system control unit may be damaged.

1.2 Rules for cleanliness

When working on fuel supply and injection system, pay careful attention to the following rules for cleanliness:

- ◆ Thoroughly clean all unions and surrounding areas before disconnecting.
- ◆ Place removed parts on a clean surface and cover. Use only lint-free cloths.
- ◆ Carefully cover opened components or seal if repairs cannot be carried out immediately.
- ◆ Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- ◆ When system is open: do not work with compressed air if this can be avoided. Do not move vehicle unless absolutely necessary.
- ◆ Also ensure that no diesel fuel runs on to the coolant hoses. Should this occur, the hoses must be cleaned immediately. Damaged hoses must be renewed.

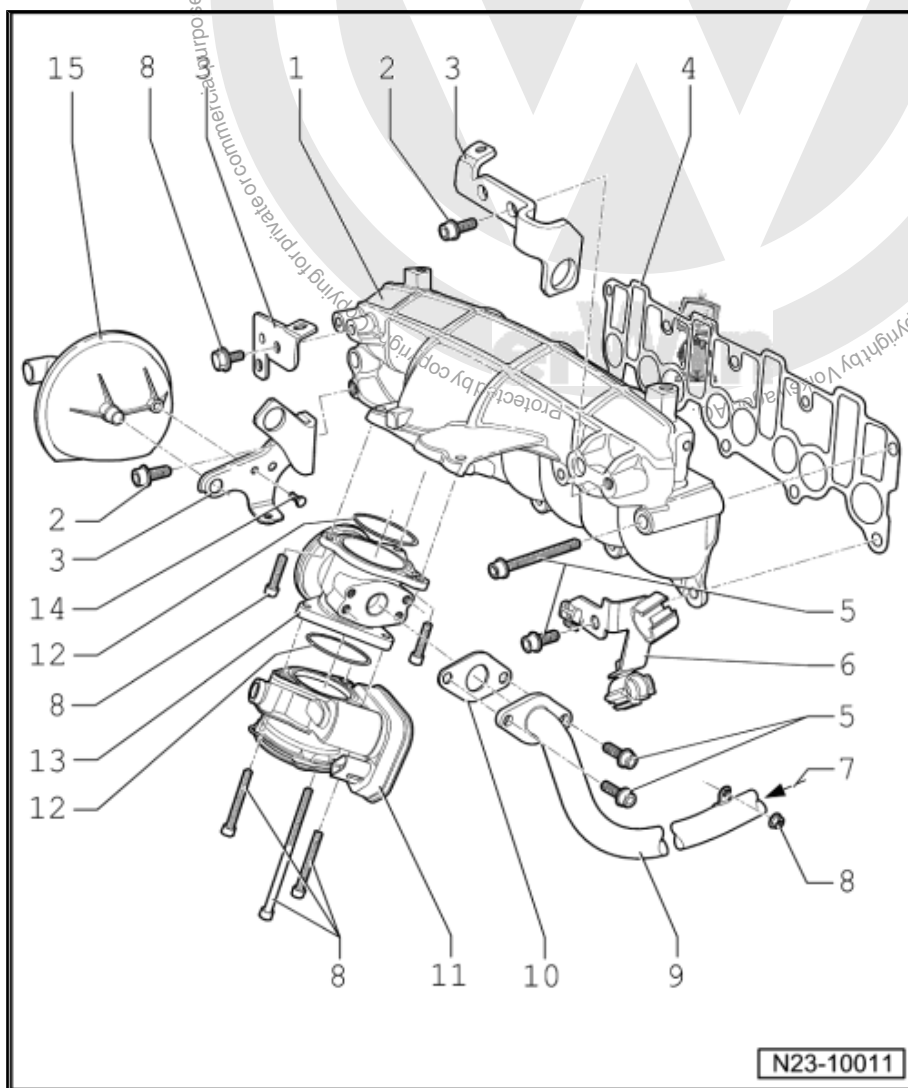


Engine codes AZV, BKD, BKP, BMA, BVE and BWV
⇒ page 244

Engine codes BMN, BMR and BUZ ⇒ page 245

1 - Intake manifold

- 2 - 20 Nm
- 3 - Retainer
- 4 - Seal
 - ☐ Renew.
- 5 - 20 Nm
- 6 - Cable retainer
- 7 - From exhaust gas recirculation cooler
- 8 - 10 Nm
- 9 - Connecting pipe
- 10 - Seal
 - ☐ Renew.
- 11 - Intake manifold flap motor -V157-
 - ☐ The intake manifold flap is closed for approx. 3 seconds when stopping engine and then opens again. This reduces the stop jolt.
- 12 - O-ring
 - ☐ Renew.
- 13 - Exhaust gas recirculation valve
- 14 - 3 Nm
- 15 - Vacuum reservoir





1.3.2 Engine codes BMN, BMR and BUZ

1 - 10 Nm

2 - Retainer

3 - 20 Nm

4 - Seal

☐ Renew.

5 - Intake manifold

☐ With optimised intake air swirl.

6 - Cable retainer

7 - 20 Nm

8 - 10 Nm

9 - Connecting pipe

☐ To exhaust gas recirculation cooler

10 - 20 Nm

11 - Seal

☐ Renew.

12 - 10 Nm

13 - Intake manifold flap motor -V157-

☐ The intake manifold flap is closed for approx. 3 seconds when stopping engine and then opens again. This reduces the stop jolt.

14 - O-ring

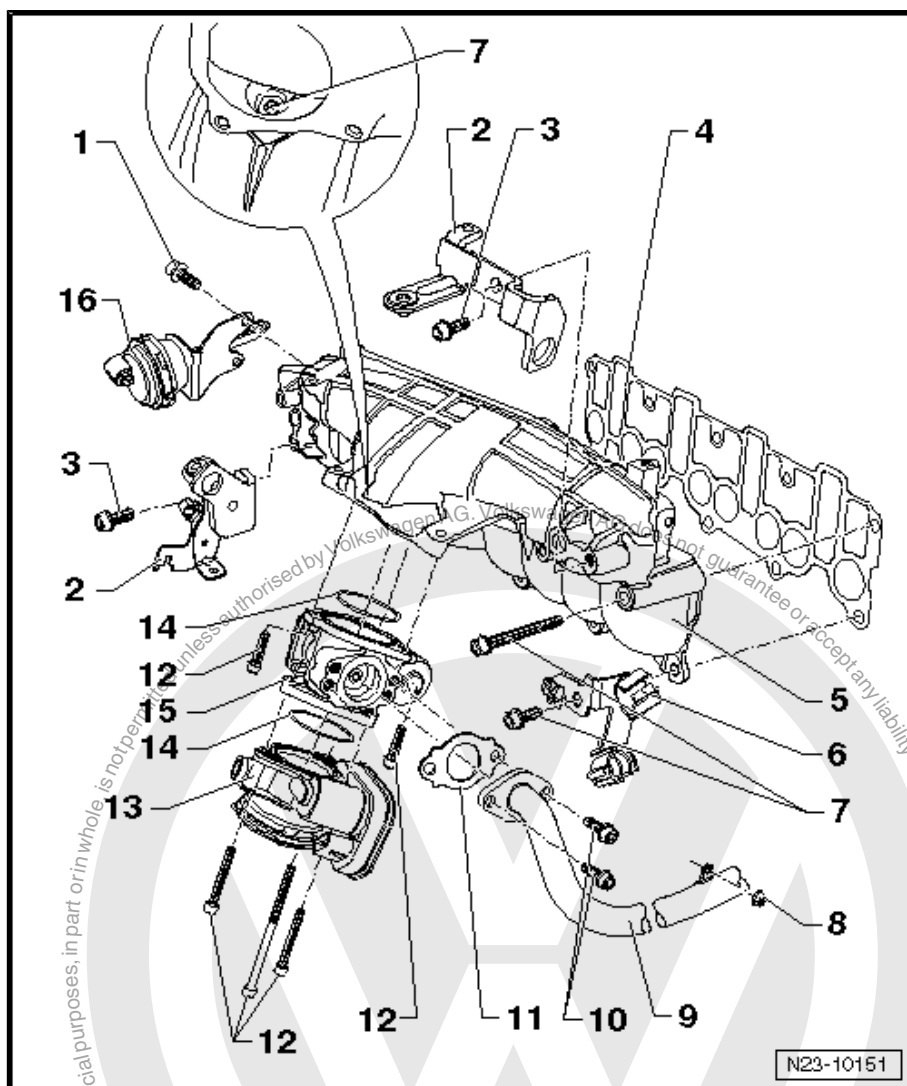
☐ Renew.

15 - Exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer -G212-

☐ Assembly overview - exhaust gas recirculation ➔ [page 288](#)

16 - Vacuum unit

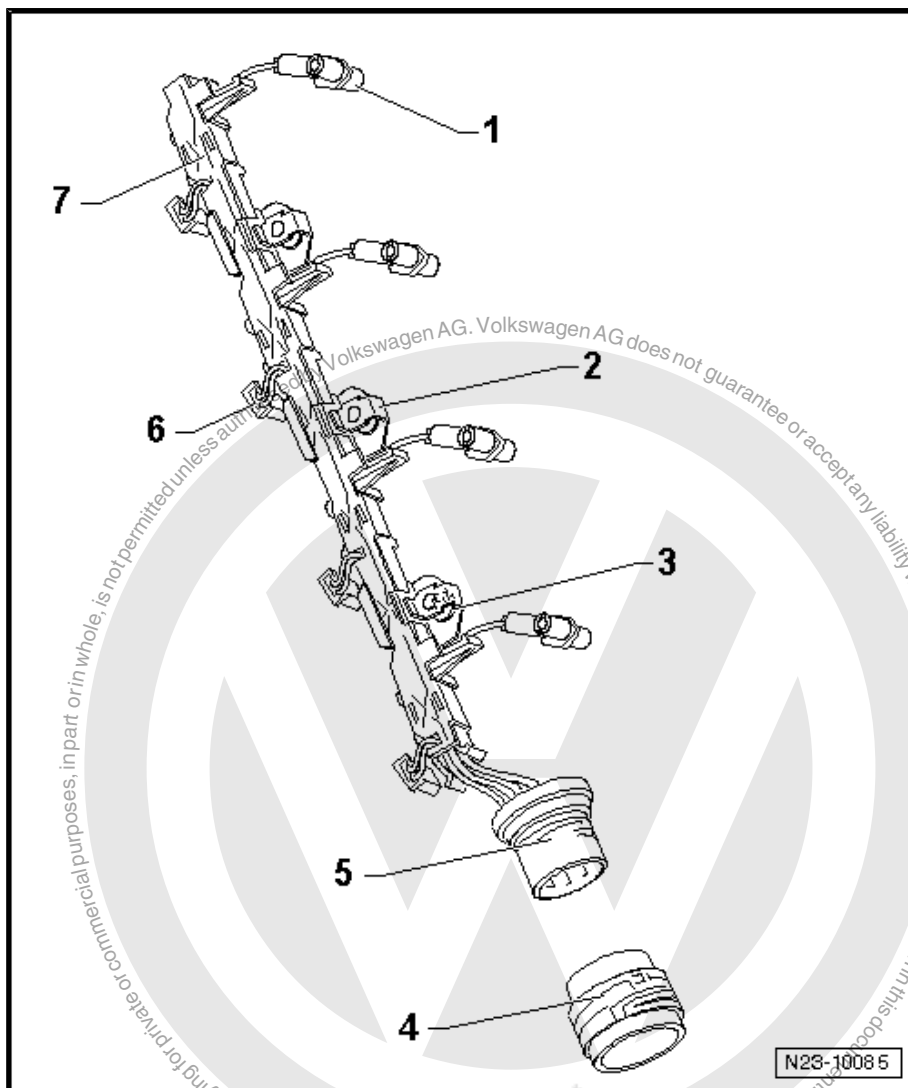
☐ For optimised swirl for intake air.





1.4 Assembly overview - pre-wired wiring harness for unit injectors and glow plugs

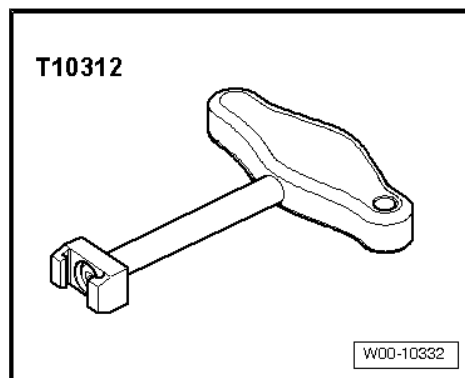
- 1 - Glow plug connector
- 2 - Stainless steel clips
 - ❑ Do not bend open.
- 3 - Securing bolt
 - ❑ Tighten to 10 Nm.
- 4 - Adapter ring
 - ❑ When installing, ensure positioned correctly
⇒ [page 246](#) .
- 5 - Central connector
 - ❑ When installing, ensure positioned correctly
⇒ [page 246](#) .
- 6 - Connector
 - ❑ 2-pin
 - ❑ For unit injector
- 7 - Cable channel
 - ❑ Remove and install together with
⇒ [Item 2 \(page 246\)](#) .



1.5 Removing and installing pre-wired wiring harness for unit injectors and glow plugs

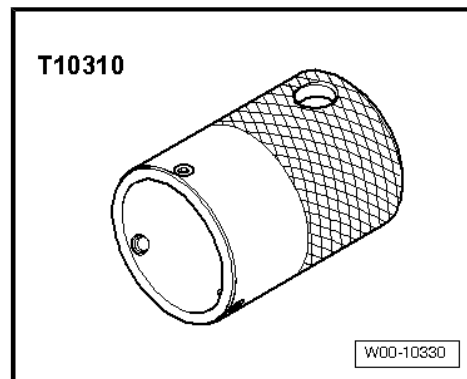
Special tools and workshop equipment required

- ◆ Puller -T10312-





◆ Special wrench -T10310-



Removing



Caution

Removal and installation of the pre-wired wiring harness may only be undertaken by unscrewing the clips. Releasing the cable channel at the clips bends the clips which may break the cables due the excessive play. This also applies when changing the unit injectors and all work which does not require the central connector to be completely removed.



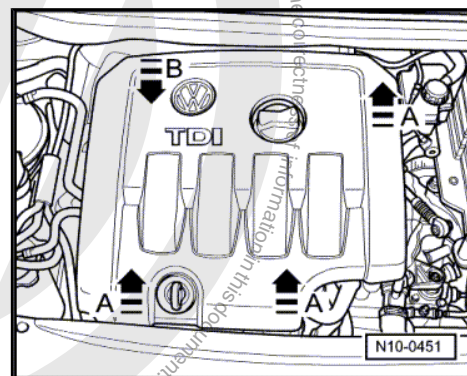
Note

Disconnecting connectors on piezo unit injectors may only be undertaken using special tool puller -T10312-.

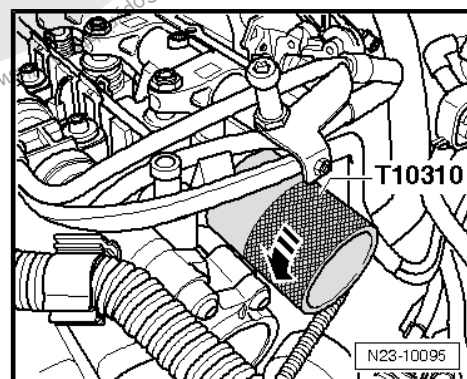
- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

- Remove cylinder head cover ➔ [page 49](#).
- Disconnect central connector on cylinder head.

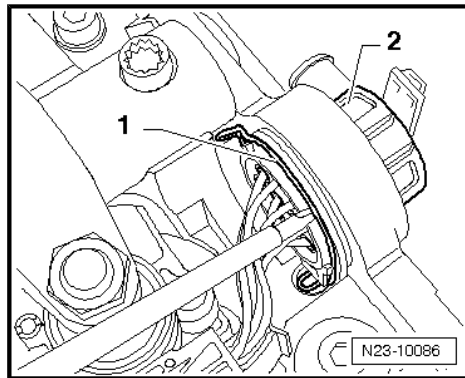


- Fit special wrench -T10310- on adapter ring and release it by turning key through 90° (1/4 turn) in -direction of arrow-.

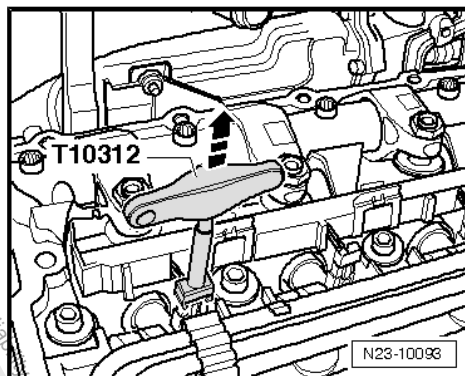




- Pull the securing clip -1- upwards lightly with a screwdriver and press the central connector -2- through inwards.



- Slide the puller -T10312- onto the unit injector connector from the side and pull it off in -direction of arrow-. Use pointed pliers for the older connector version.

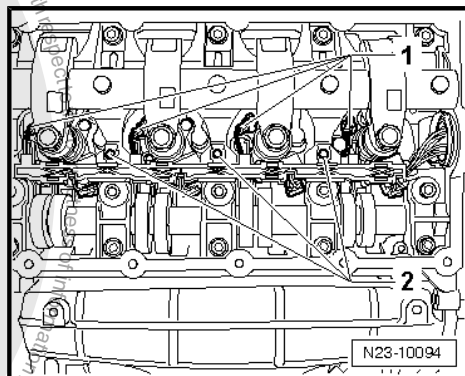


- Pull connectors off glow plugs -1- Unscrew securing bolts -2- of steel clips and remove complete pre-wired wiring harness.

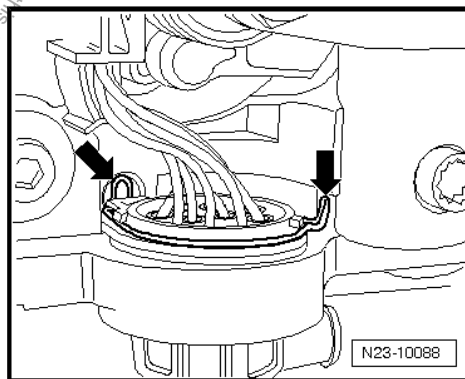
Installing

Installation is carried out in the reverse order. When installing, note the following:

Route pre-wired wiring harness and tighten securing bolts to 10 Nm.

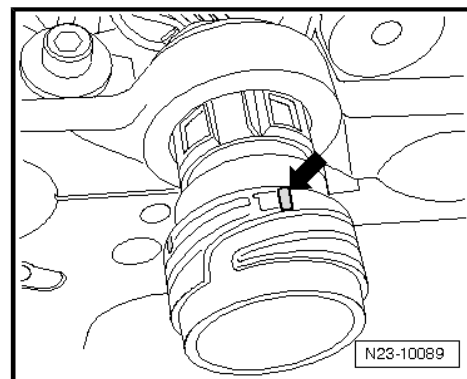


- Guide central connector through opening in retaining frame, ensure securing clips -arrows- are seated correctly when doing this.





- Fit adapter ring (colour marked „longer“ stud -arrow- faces 12 o'clock)



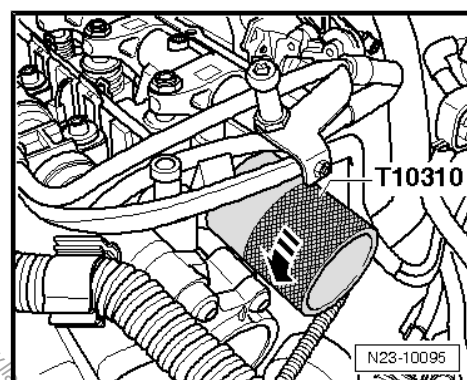
- Fit special wrench -T10310- on adapter ring and lock it by turning key through 90° (1/4 turn) in opposite -direction of arrow-.



Note

When adapter ring is installed correctly the colour marked „shorter“ stud faces 12 o'clock)

- Fit central connector to cylinder head and lock in position.
- Install cylinder head cover ⇒ [page 49](#) .
- Fit engine cover.



1.6 Assembly overview - unit injector

- ◆ Observe rules for cleanliness ⇒ [page 243](#) .
- ◆ Always renew O-rings and securing bolts.



1 - 3 Nm + 90° (1/4 turn) further
+ 180° (1/2 turn) further

- ☐ Remove using special wrench, long reach - T10054- .
- ☐ Renew.

2 - Rocker arm shaft

- ☐ With rocker arms
- ☐ Removing and installing
⇒ [page 251](#) .

3 - 20 Nm + 1/4 turn (90°) further

- ☐ Renew.

4 - Adjuster screw

- ☐ Renew.

5 - Lock nut

6 - Unit injector

- ☐ Removing and installing
⇒ [page 251](#) .

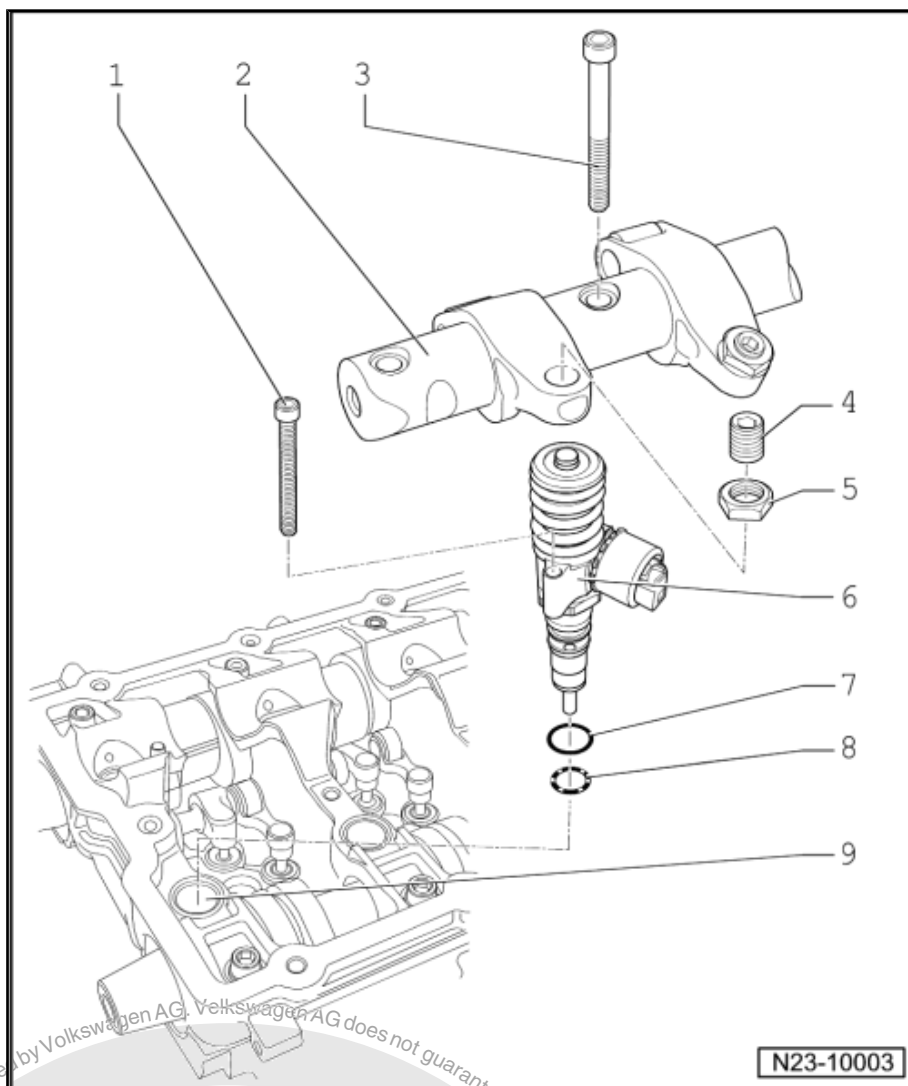
7 - O-ring

- ☐ Renewing ⇒ [page 257](#) .

8 - O-ring

- ☐ Renewing ⇒ [page 257](#) .

9 - Cylinder head



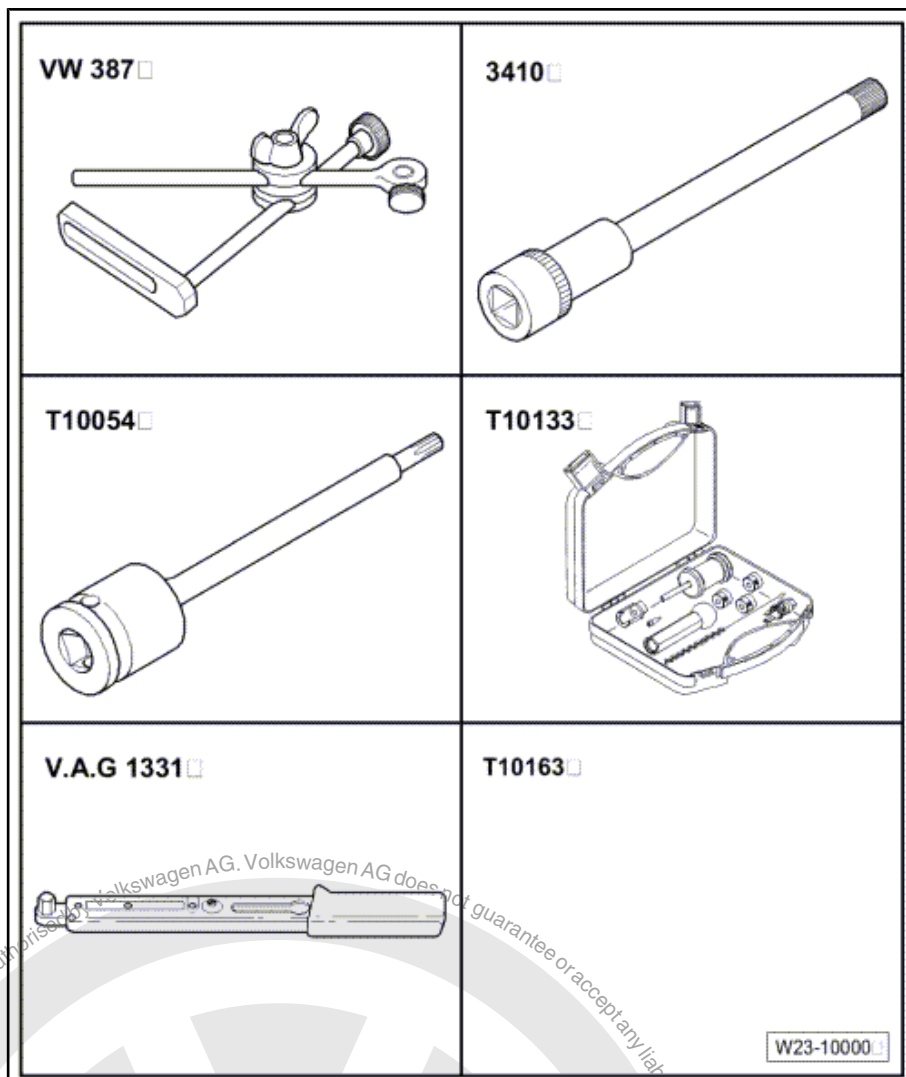
N23-10003



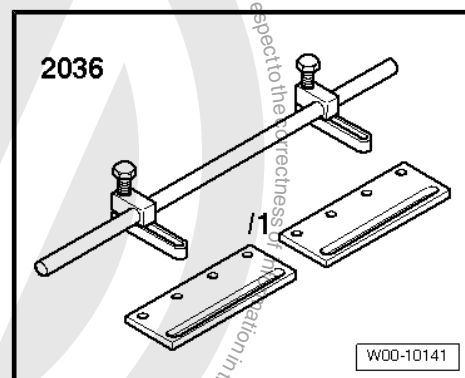
1.7 Removing and installing unit injector

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket -VW 387-
- ◆ Special wrench, long reach -3410-
- ◆ Special wrench, long reach -T10054-
- ◆ Torque wrench -V.A.G 1331/-
- ◆ Slide hammer -T10133/3-
- ◆ Puller -T10163-

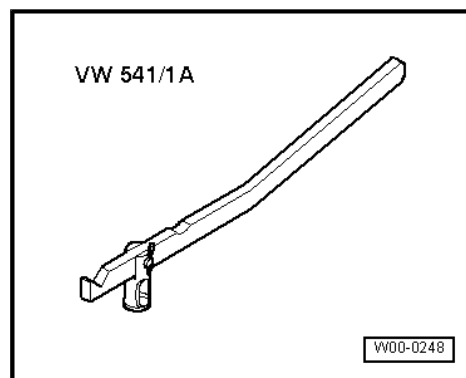


- ◆ Assembly tool 2036-

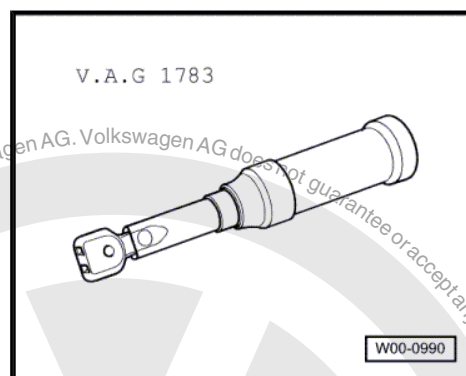




- ◆ Valve lever -VW 541/1 A- with press tool -VW 541/5-

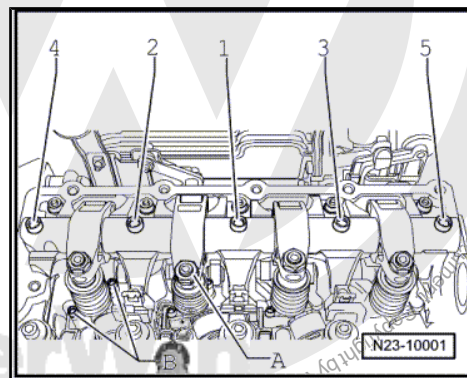


- ◆ Torque wrench -V.A.G 1783-



Removing

- Remove upper toothed belt guard and cylinder head cover.
- Remove pre-wiring for unit injectors [= page 246](#) and place it to side. The central connector of the pre-wiring may remain in the cylinder head.
- Loosen lock nut of adjustment screw **A**- and back out screw until respective rocker arm lies against plunger spring of unit injector.
- Remove rocker arm securing bolts -5...1- (from outwards to inwards) using socket -3410- and remove rocker arm shaft.
- Loosen securing bolts -B- for unit injectors using special wrench -T10054- and remove bolts.
- Pull ball stud out of injector unit.





- Insert puller -T10163- in bolt holes on unit injector.
- Turn spindle -A- down lightly onto the unit injector. Hand-tighten lock nut -B-.
- Pull unit injector upwards out of cylinder head seat with cautious taps of slide hammer -T10133/3-.

Do not interchange unit injectors which have been used.

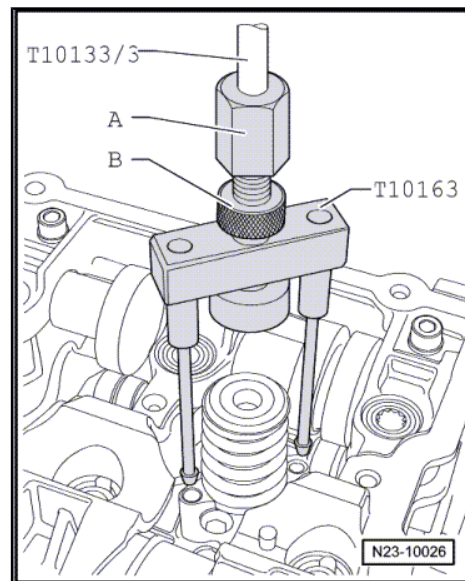
Installing



Caution

Each time work is performed which requires adjustment of the unit injector via adjustment screw, the adjustment screw in the rocker arm and also the unit injector ball stud must be renewed, otherwise excessive wear of the components is the result.

It is absolutely necessary to renew the securing bolts of the unit injector.



- Before installing unit injector, check that new seals are properly seated.



Note

- ◆ New unit injectors are supplied with O-rings.
- ◆ If old unit injector is reused, O-rings must be renewed ⇒ [page 257](#).
- ◆ The seals must not be twisted.
- Oil the seals and stem of unit injector.
- Check seat of unit injector in cylinder head for soiling or foreign objects (metal shavings/carbon deposits etc.) and clean with compressed air, if necessary.
- Insert unit injector into cylinder head with great care.



Note

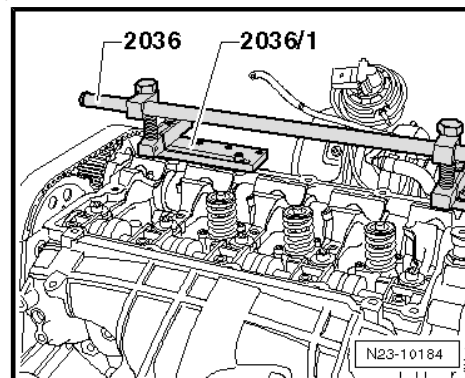
If the securing plates -2036/1- cannot be fitted as described below, due to the exhaust gas recirculation cooler, use other tools to raise the item, e.g. large washers.

- Fit valve assembly device -2036- with securing plates -2036/1- on retaining frame of cylinder head as shown.



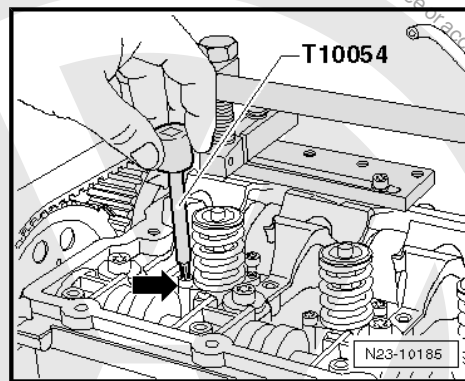
Caution

If the unit injector is pulled down by the securing bolts, there is a risk of the unit injector not being pulled correctly into its seat. This can result in engine running problems and starting problems. For this reason the unit injector may only be secured after it has been pushed in its seat.





- Fit the new securing bolts and carefully screw in by hand onto stop -arrow- without force.

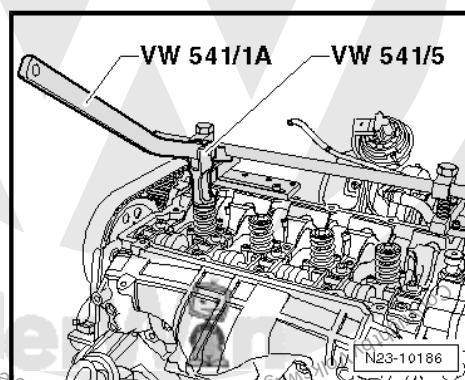


- Now fit valve lever -VW 541/1 A- with thrust piece -VW 541/5- .
- Carefully press unit injector in its seat using valve lever -VW 541/1 A- and maintain this force.
- Carefully screw in securing bolts of unit injector by hand and without force onto stop using special wrench, long reach - T10054- .
- Tighten new securing bolts as follows:

Stage I = 3 Nm

Stage II = 1/4 turn (90°) further

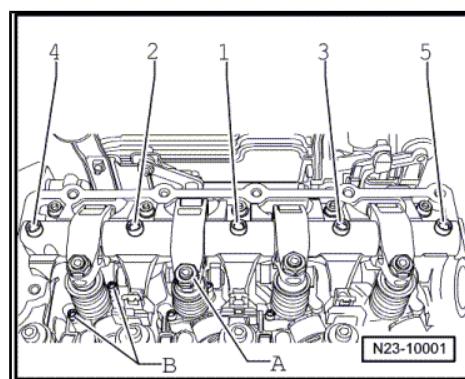
Stage III = 1/2 turn (180°) further



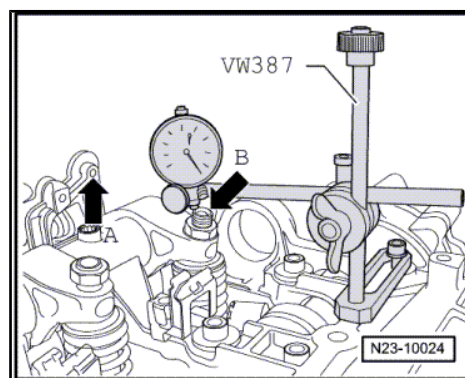
Note

Renew adjustment bolts -A- and ball pins of unit injector.

- Put rocker arm shaft in place and evenly tighten new securing bolts in the sequence 1...5 hand tight.
- Then evenly tighten to 20 Nm and 90° (1/4 turn) further in the same sequence.

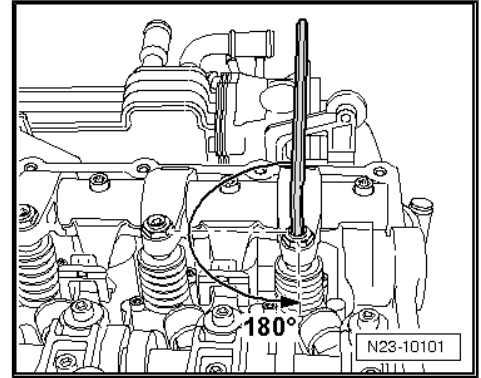


- Fit dial gauge onto adjustment screw of unit injector as shown.
- Turn the crankshaft in engine direction of rotation until the roller of the rocker arm is positioned on the peak of the drive cam. Roller side -arrow A- positioned at highest point. Dial gauge -arrow B- positioned at lowest point.
- Remove dial gauge.
- Now turn adjustment screw into rocker arm until a firm resistance is felt (unit injector positioned at stop).





- Turn adjustment screw 180° back off stop.
- Hold adjuster screw in this position and tighten lock nut to 30 Nm.
- Push on unit injector connector and install cylinder head cover and toothed belt guard.



1.8 Cleaning unit injectors (engine codes BMN, BKP, BMA, BUZ and BMR)

Special tools and workshop equipment required

- ◆ Ultrasonic cleaner -VAS 6418-
- ◆ Mounting plate for unit injectors -VAS 6418/3-
- ◆ Cleaner Tickopur -D 600 300 A2-

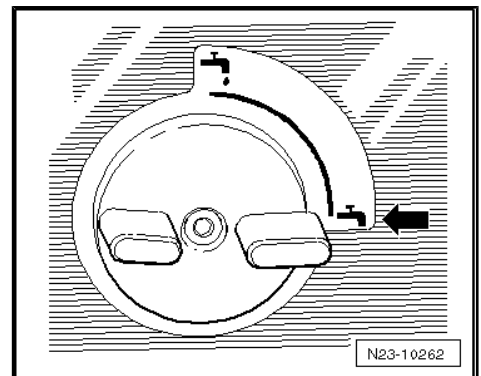


Note

- ◆ *Cleaning the unit injectors may only be carried out using the support plate for unit injectors -VAS 6418/3-. Under no circumstances should the unit injector be immersed in cleaning fluid.*
- ◆ *The unit injectors must be operated within 2 hours after they have been cleaned.*
- ◆ *To reduce the warm-up period of the cleaning fluid, it is recommended that warm tap water is filled into the system and the cover of the unit is fitted.*
- ◆ *Change cleaning fluid weekly and only clean max. five sets of unit injectors per bath.*
- ◆ *Replenish evaporated cleaning fluid with tap water.*
- ◆ *Do not clean any other components in the cleaning fluid.*
- ◆ *Do not clean the outside of the unit injectors mechanically (wire brush, abrasives, etc.).*
- ◆ *Renew O-rings, ball studs, adjusting and securing bolts.*

Procedure

- Attach drain tap -arrow- from ultrasonic cleaner -VAS 6418- to right-hand side of housing.
- Fill cleaning unit with 1870 ml tap water and 330 ml cleaner Tickopur -D 600 300 A2- .





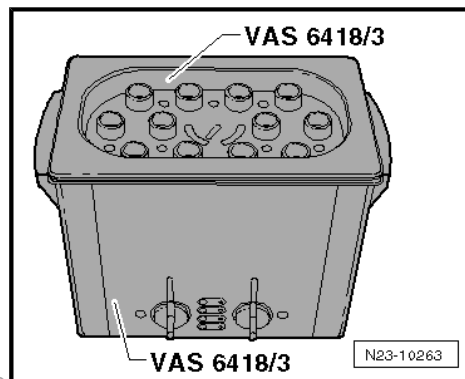
- Set mounting plate for unit injectors -VAS 6418/3- onto cleaning unit.



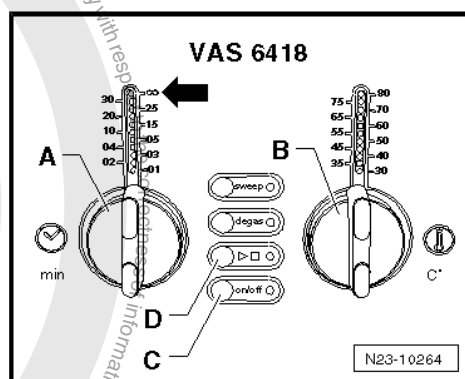
WARNING

Before starting ultrasonic cleaner -VAS 6418- it is essential that the safety information is observed in the operating instructions.

The ideal fluid level is reached when the cleaning agent is approx. 1-10 mm above the base of the support plate. The ultrasonic cleaner -VAS 6418- could become damaged if the fluid level is too low.



- Insert the unit injectors in the guides of the support plate.
- Switch on cleaner by pressing **[on/off]** button -C-.
- Turn rotary temperature switch -B- until lamp indicator is at 70° C warm-up temperature
- Set rotary switch for operating period -A- to „∞“ -arrow- (continuous operation).



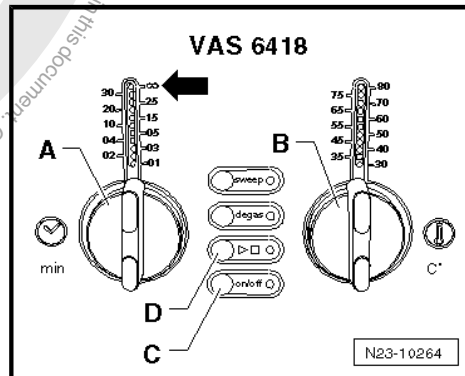
- Press button **[D]** -D- for longer than 2 seconds to switch the unit on.



Note

Temperature-controlled cleaning is now activated. During the warm-up period, ultrasonic waves are activated to mix the cleaning fluid. Once the preselected temperature is reached, the ultrasonic waves are switched to continuous operation. Cleaning time must be at least 120 minutes and cleaning only starts at a temperature of at least 70 °C.

- After 120 min. of cleaning, switch the unit off by pressing button **[D]** -D-.
- Take unit injectors out of mounting plate and dry at ambient air for max. 1 hour.
- Reinstall unit injectors ➔ [page 251](#) .



Caution

The unit injectors must be operated within 2 hours after they have been cleaned, to prevent possible corrosion being caused by the cleaning fluid.

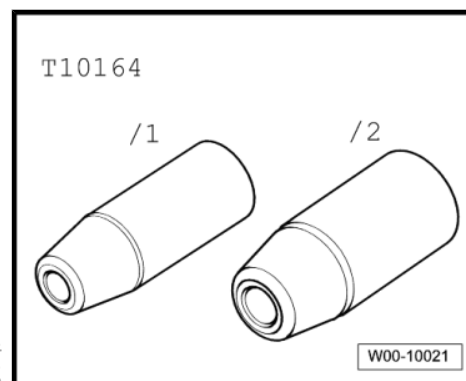


1.9 Removing and installing O-rings for unit injector

For unit injectors with solenoid valve:

Special tools and workshop equipment required

- ◆ Assembly sleeve -T10164/1-

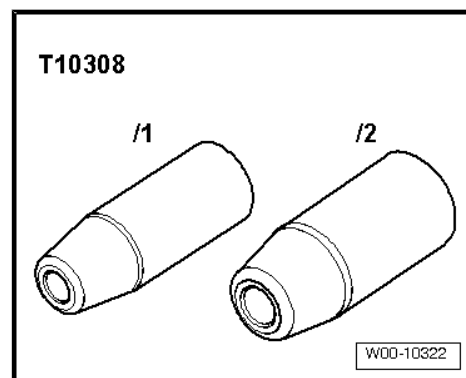


- ◆ Assembly sleeve -T10164/2-

For unit injectors with piezo elements (identifying feature: octagonal feature on end of injector):

Special tools and workshop equipment required

- ◆ Assembly sleeves -T10308-



Removing

- Remove unit injector ➔ [page 251](#) .
- Lever old O-rings very carefully off unit injector using a „soft“ tool.
- Above all ensure that burrs are not caused on the seating for the O-ring.

Installing

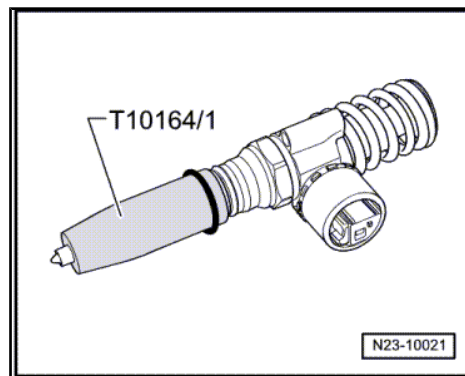


Note

- ◆ *Always use the assembly sleeves to fit the O-rings. There is a danger of damaging the O-rings if the sleeves are not used. The procedure for both types of assembly sleeves is the same.*
- ◆ *Take care to ensure correct allocation of O-rings to grooves.*
- ◆ *Prevent O-rings from rolling when sliding them on. The O-rings must not be twisted in their seats in unit injector.*
- Clean seating surfaces for O-rings on unit injector very carefully.



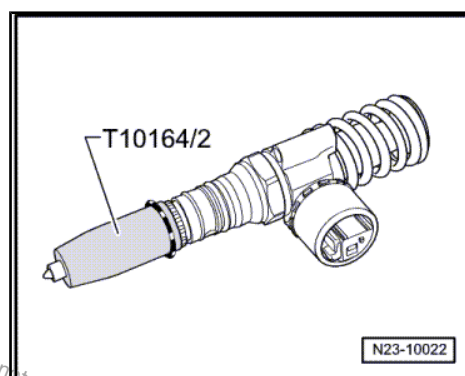
- Slide assembly sleeve -T10164/1- or assembly sleeve - T10308/1- onto stop on unit injector.
- Push the upper, thicker O-ring carefully onto assembly sleeve and into seat on unit injector. Ensure that it is correctly positioned ➔ [page 258](#) .
- Remove assembly sleeve.



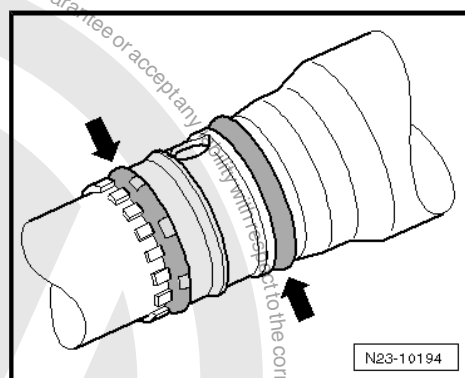
- Slide assembly sleeve -T10164/2- or assembly sleeve - T10308/2- onto stop on unit injector.
- Slide lower O-ring, marked white, carefully on to assembly sleeve and into seat on unit injector. Ensure that it is correctly positioned.

Unit injector with solenoid valve ➔ [page 258](#)

Unit injectors with piezo elements (identifying feature: octagonal feature on end of injector) ➔ [page 258](#)

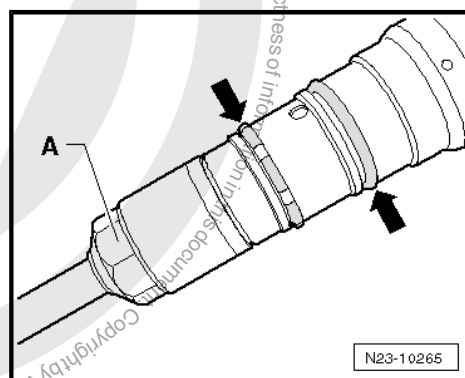


Position of O-rings -arrows- for unit injectors with solenoid valve



Position of O-rings -arrows- for unit injectors with piezo elements (identifying feature: octagonal feature on end of injector -A-)

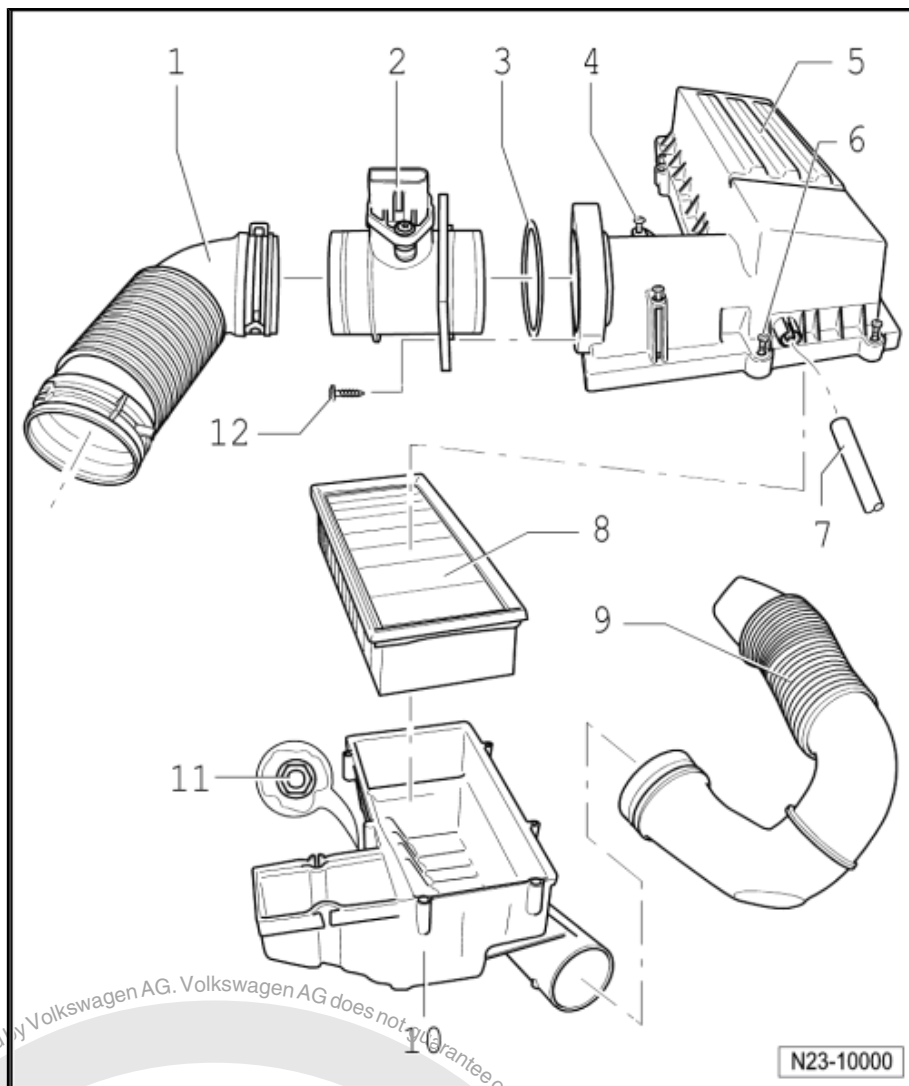
- Remove assembly sleeve.





1.10 Assembly overview - air filter

- 1 - Intake hose
☐ To turbocharger.
- 2 - Air mass meter -G70-
- 3 - O-ring
☐ Renew if damaged.
- 4 - 8 Nm
- 5 - Upper part of air filter
- 6 - 8 Nm
- 7 - Vacuum hose
☐ To solenoid valve block
- 8 - Filter element
- 9 - Air duct
☐ To lock carrier.
- 10 - Lower part of air filter
- 11 - 10 Nm





2 Engine control unit (Golf)

Removing and installing engine control unit ➔ [page 260](#) .

Removing and installing anti-theft engine control unit
➔ [page 260](#) .

2.1 Removing and installing engine control unit



Note

If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.

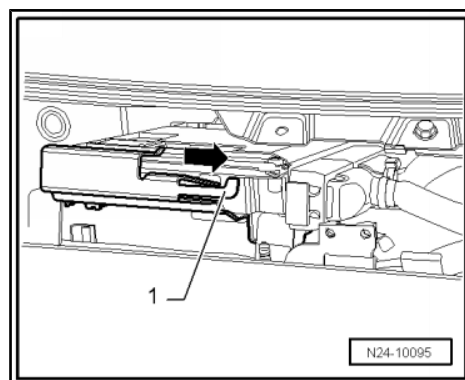
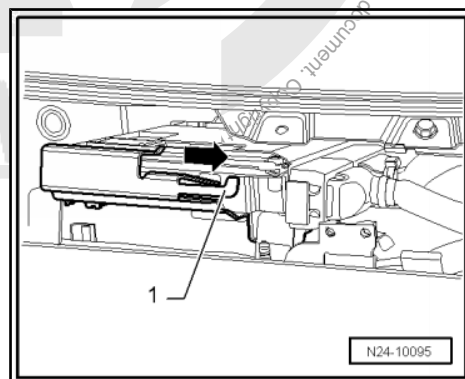
Removing:

- Switch off ignition.
- Remove wiper arms, plenum chamber cover and plenum bulkhead ➔ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .
- Bend catch open slightly -1-.
- Then push engine control unit out of retainer -arrow-.
- Now release connector on engine control unit and pull off connector.

Installing:

- Fit connector to engine control unit and lock connector in position.
- Push engine control unit onto bracket.

- Press catch -1- against engine control unit.
- Install plenum chamber bulkhead, plenum chamber cover and wiper arms ➔ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .



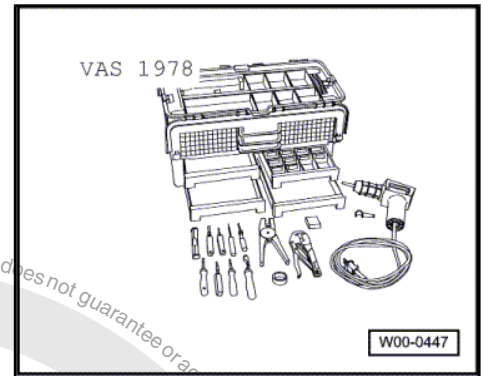
2.2 Removing and installing anti-theft engine control unit

Special tools and workshop equipment required

- ♦ Grip pliers



- ◆ Hot air blower from wiring harness repair set -VAS 1978-



Note

- ◆ If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.
- ◆ The shear-head bolt threads are coated with locking compound. Heating the shear-head bolt with a hot air blower releases the locking effect of the locking compound.

Removing:

- Switch off ignition.
- Remove wiper arms, plenum chamber cover and plenum bulkhead ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .



Caution

Cover lines, connections and control units in the vicinity of the engine control unit to prevent damage through heat (scorching/melting of plastics etc.).

Perform settings on hot air blower -4- as shown:

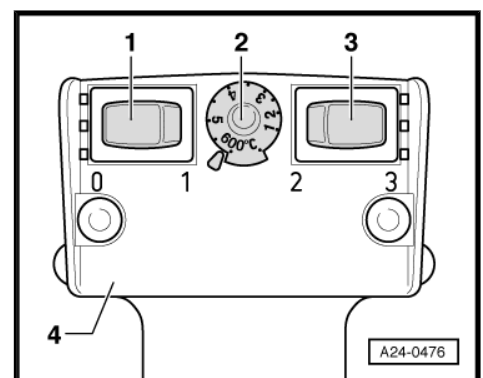
- Turn temperature settings potentiometer -2- to a maximum heat output of 600 °C.
- Set two-stage switch for volume of air -3- to position 3.



WARNING

When shear-head bolts are heated up, parts of the protective housing will be subjected to a large amount of heat. Wear protective gloves to avoid possible injury.

- Place nozzle of hot air blower close to shear-head bolt.
- Switch on hot air blower and heat the bolts.
- Remove bolts with grip pliers .





Note

If the bolts will not move, saw into heads of shear-head bolts so that two parallel slots are created -arrows- and then remove the bolts.

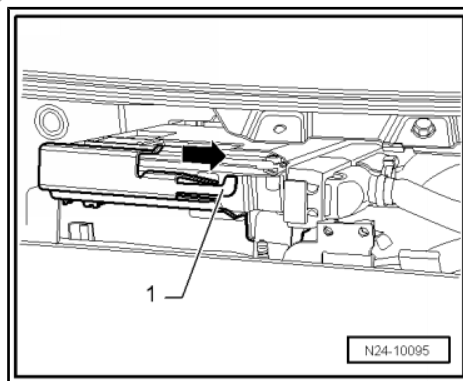
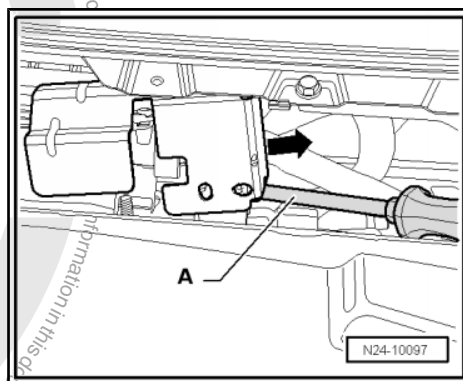
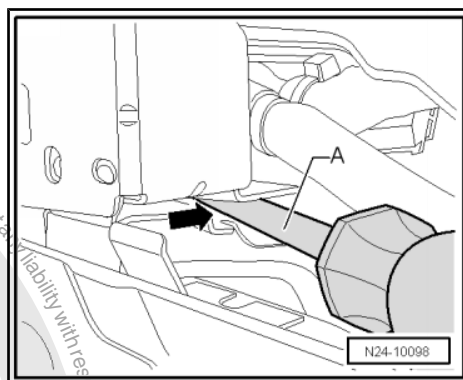
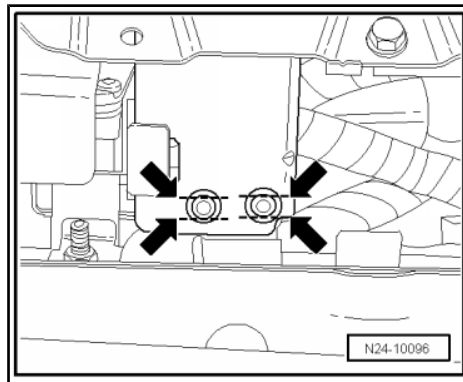
- Insert a screwdriver between protective housing -A- and bracket -arrow-.

- Lever up protective housing using screwdriver -A- and pull to side off bracket -arrow-.

- Bend catch open slightly -1-.
- Then push engine control unit out of retainer -arrow-.
- Now release connector on engine control unit and pull off connector.

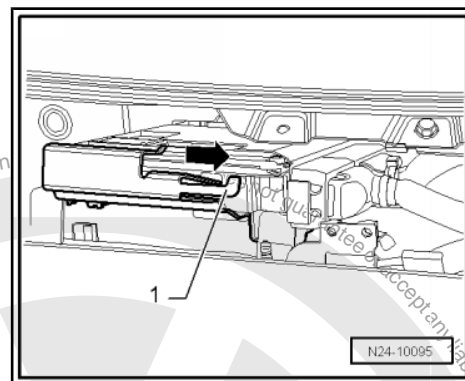
Installing:

- Fit connector to engine control unit and lock connector in position.
- Push engine control unit onto bracket.

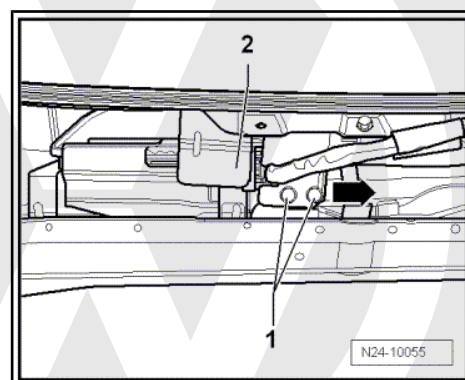




- Press catch -1- against engine control unit.
- Push protective housing onto bracket.



- Tighten new shear-head bolts -1- evenly until heads shear-head off.
- Install plenum chamber bulkhead, plenum chamber cover and wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .





3 Engine control unit (Golf Plus, Touran)

Removing and installing engine control unit ➔ [page 264](#)

Removing and installing anti-theft engine control unit
➔ [page 265](#) .

3.1 Removing and installing engine control unit

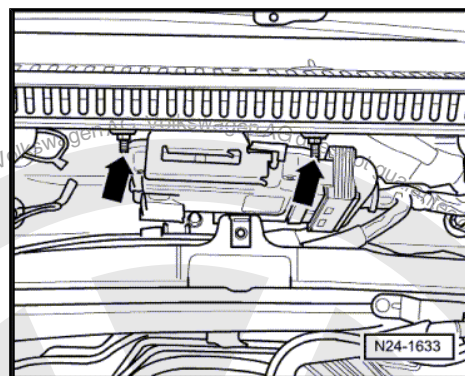


Note

If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.

Removing engine control unit

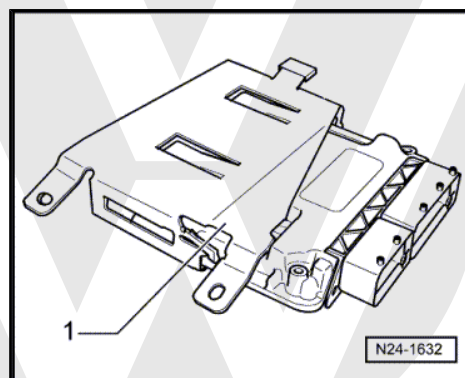
- Switch off ignition.
- Remove plenum chamber bulkhead ➔ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
- Loosen securing nuts -arrows-.
- Release connectors on engine control unit and pull them off.



- Push bracket -1- off engine control unit in direction of arrow.

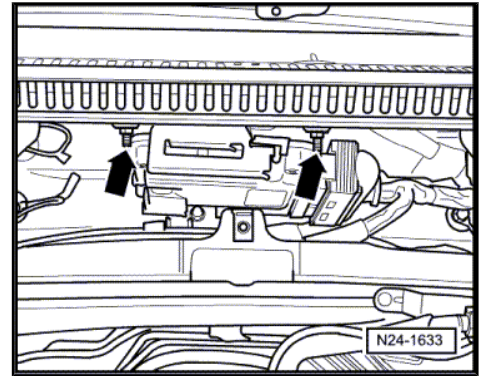
Installing engine control unit

- Push bracket onto engine control unit.





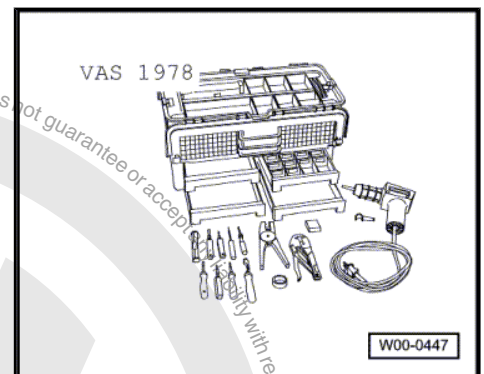
- Tighten securing nuts -arrows- to 10 Nm.
- Fit connector and lock in position.
- Install plenum chamber bulkhead ⇒ General body repairs;
Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .



3.2 Removing and installing anti-theft engine control unit

Special tools and workshop equipment required

- ◆ Grip pliers
- ◆ Hot air blower from wiring harness repair set -VAS 1978-



Note

- ◆ *If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.*
- ◆ *The shear-head bolt threads are coated with locking compound. Heating the shear-head bolt with a hot air blower releases the locking effect of the locking compound.*

Removing:

- Switch off ignition.
- Remove plenum chamber bulkhead ⇒ General body repairs;
Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .



Caution

Cover lines, connections and control units in the vicinity of the engine control unit to prevent damage through heat (scorching/melting of plastics etc.).

Perform settings on hot air blower -4- as shown:

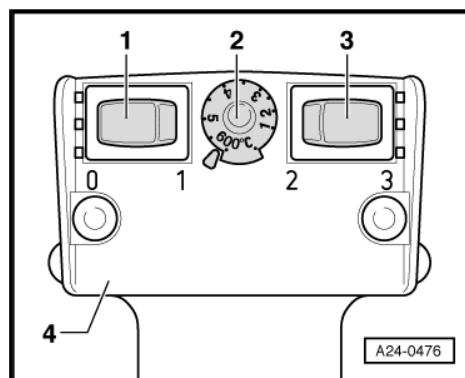


- Turn temperature settings potentiometer -2- to a maximum heat output of 600 °C.
- Set two-stage switch for volume of air -3- to position 3.
- Place nozzle of hot air blower close to shear-head bolt.
- Switch on hot air blower and heat the bolts.

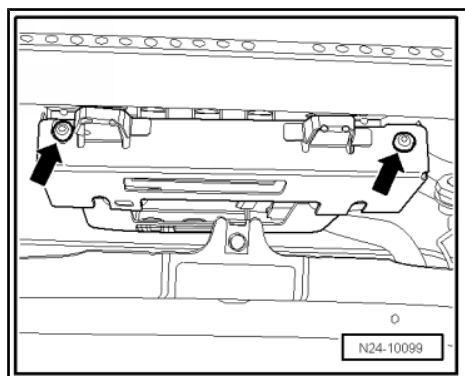


WARNING

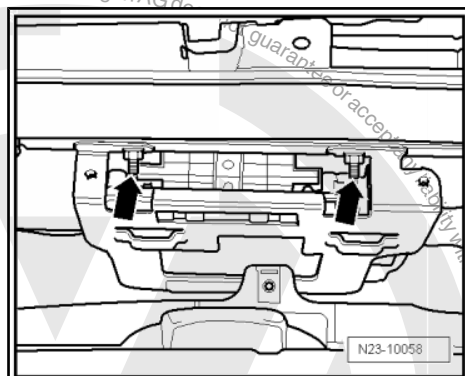
When shear-head bolts are heated up, parts of the protective housing will be subjected to a large amount of heat. Wear protective gloves to avoid possible injury.



- Twist shear-head bolts -arrows- out using grip pliers and remove cover from protective housing.



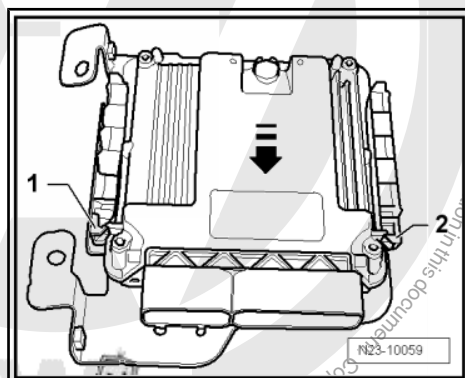
- Then remove securing nuts for control unit bracket -arrows-.
- Release connectors on engine control unit and pull them off.



- Press catches -1- and -2- outwards. Then pull engine control unit off control unit bracket in direction of arrow.

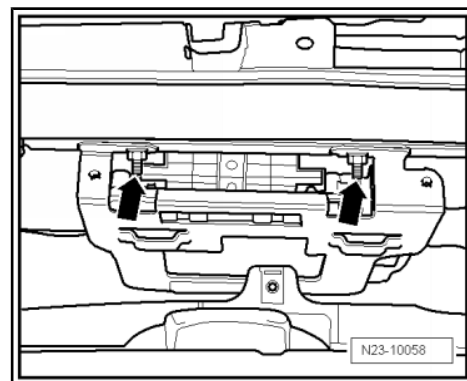
Installing:

- Push engine control unit onto control unit bracket until it engages in catches.
- Fit connector to engine control unit and lock in position.

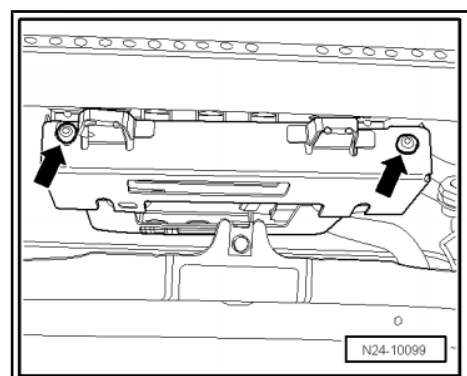




- Tighten securing bolts -arrows- to 10 Nm.
- Install cover of protective housing.



- Tighten new shear-head bolts -arrows- evenly until heads shear off.
- Install plenum chamber bulkhead ⇒ General body repairs;
Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .





4 Engine control unit (Passat)

Removing and installing engine control unit ➔ [page 268](#) .

Removing and installing anti-theft engine control unit
➔ [page 269](#) .

4.1 Removing and installing engine control unit

If the engine control unit is to be renewed, connect vehicle diagnosis, testing and information system -VAS 5051B- and perform „Renewing control unit“ in Guided functions.



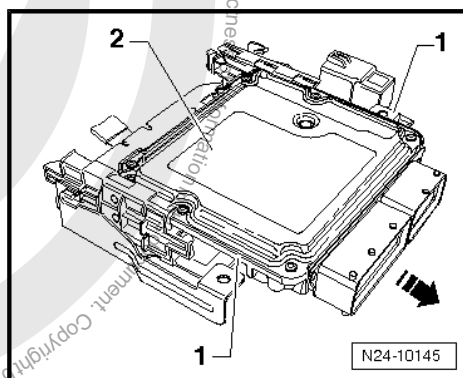
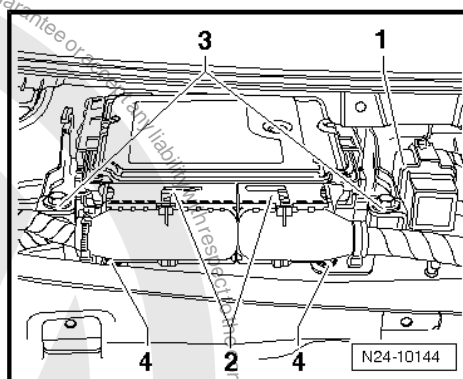
DANGER!

Vehicles with heavy duty running gear; vehicle must be restricted to a maximum of 210 km/h via the engine control unit. Drive shafts can be damaged at speeds above 210 km/h. Perform function „Restricting maximum speed“ in guided function using vehicle diagnostic, testing and information system -VAS 5051B- .

Removing

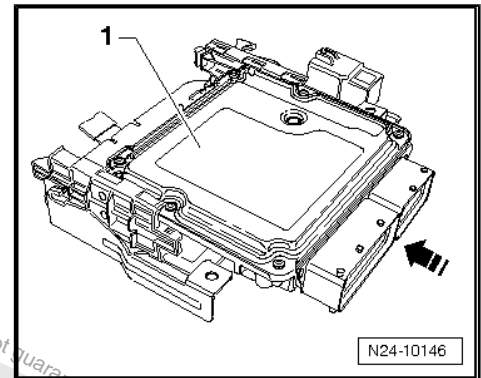
- Switch off ignition.
 - Remove wiper arms ➔ Rep. gr. 92 .
 - Remove plenum chamber cover ➔ Rep. gr. 64 .
 - Pull connector -1- off heated windscreen control unit -J505- .
 - Slide connector locking devices -2- on engine control unit outwards and pull off both connectors.
 - Remove securing bolts -3-.
 - Remove retainer frame with engine control unit from plenum chamber.
-
- Press locking device -1- outwards and slide engine control unit -2- in -direction of arrow-.

Installing

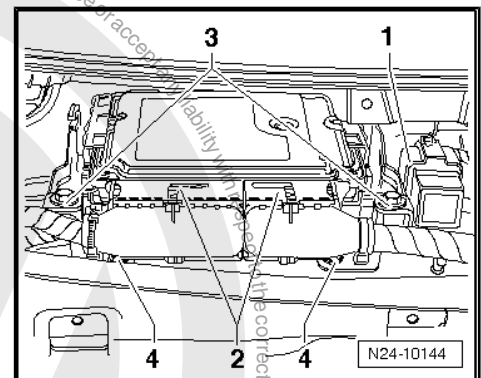




- Slide engine control unit -1- into retaining frame in -direction of arrow-.



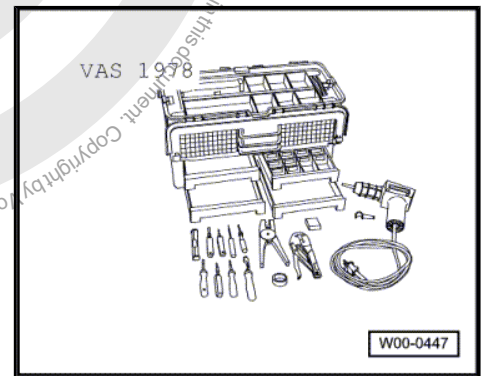
- Fit retainer frame with engine control unit onto retainer -4-.
- Specified torque of securing nuts for retainer -4-: 6 Nm.
- Tighten securing bolts -3- to 7 Nm.
 - Fit connector to engine control unit and slide locking devices -2- inwards.
 -
 - Fit connector -1- to heated windscreen control unit -J505- .
 - Install plenum chamber cover ⇒ Rep. gr. 64 .
 - Install wiper arms ⇒ Rep. gr. 92 .



4.2 Removing and installing anti-theft engine control unit

Special tools and workshop equipment required

- ◆ Hot air blower from wiring harness repair set -VAS 1978-



- ◆ Nozzle from wiring harness repair set -VAS 1978-

If the engine control unit is to be renewed, connect vehicle diagnosis, testing and information system -VAS 5051B- and perform „Renewing control unit“ in Guided functions.



DANGER!

Vehicles with heavy duty running gear; vehicle must be restricted to a maximum of 210 km/h via the engine control unit. Drive shafts can be damaged at speeds above 210 km/h. Perform function „Restricting maximum speed“ in guided function using vehicle diagnostic, testing and information system -VAS 5051B- .



Removing

- Switch off ignition.
- Remove wiper arms ⇒ Rep. gr. 92 .
- Remove plenum chamber cover ⇒ Rep. gr. 64 .



Note

The shear-head bolt threads are coated with locking compound. Heating the shear-head bolt with a hot air blower releases the locking effect of the locking compound.



Caution

Cover lines, connections and control units in the vicinity of the engine control unit to prevent damage through heat (scorching/melting of plastics etc.).

Perform settings on hot air blower -4- as shown:

- Turn temperature settings potentiometer -2- to a maximum heat output of 600 °C.
- Set two-stage switch for volume of air -3- to position 3.



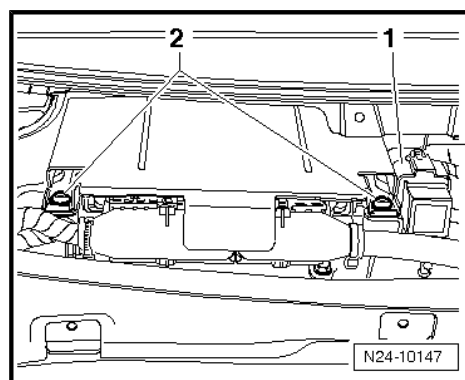
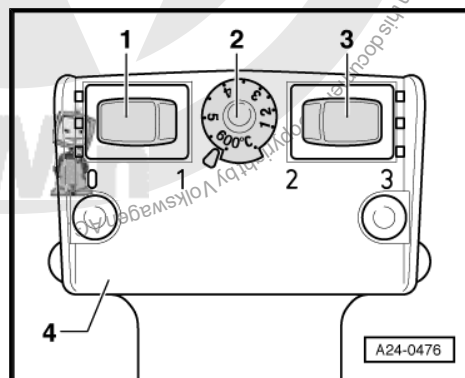
WARNING

When shear-head bolts are heated up, parts of the protective housing will be subjected to a large amount of heat. Wear protective gloves to avoid possible injury.

- Place nozzle of hot air blower close to shear-head bolt.
- Switch on hot air blower and heat bolt for about 20 to 25 seconds.
- Unscrew shear-head bolt -2- using pliers on bolt head.

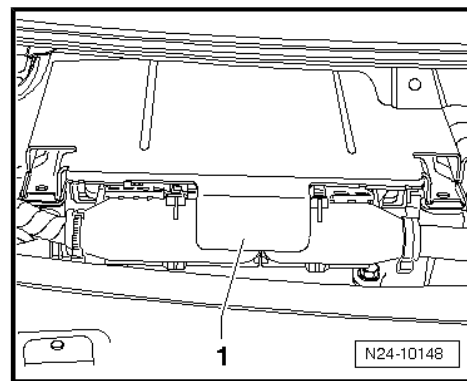
The procedure for the second shear-head bolt is exactly the same.

- Pull connector -1- off heated windscreen control unit -J505- .

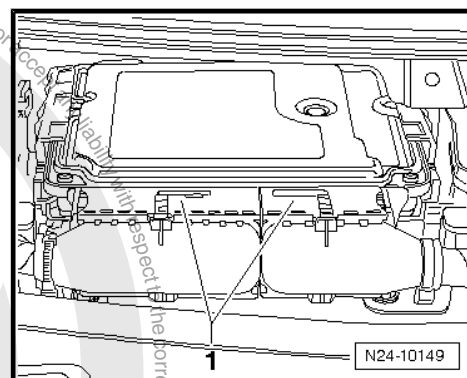




- Lift cover -1- and pull it forwards.

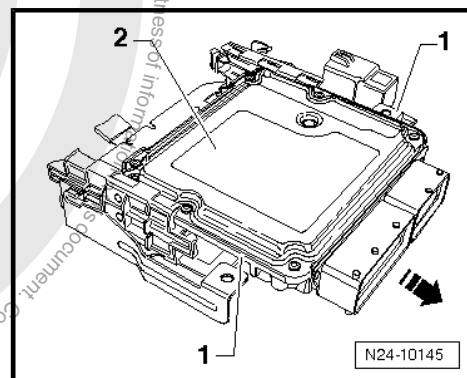


- Slide connector locking devices -1- on engine control unit outwards and pull off both connectors.
- Remove retainer frame with engine control unit from plenum chamber.

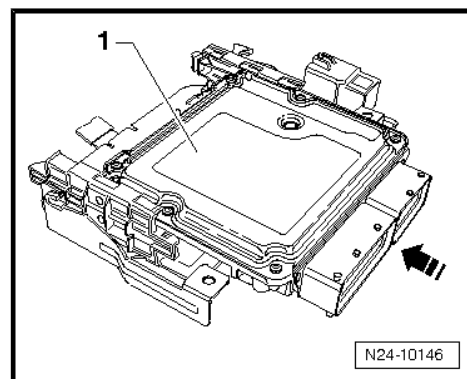


- Press locking device -1- outwards and slide engine control unit -2- in -direction of arrow-.

Installing



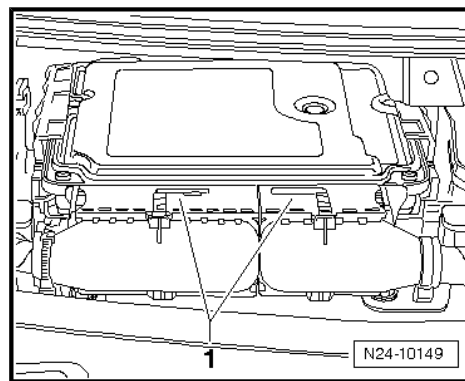
- Slide engine control unit -1- into retaining frame in -direction of arrow-.
- Fit retainer frame with engine control unit onto retainer in plenum chamber.



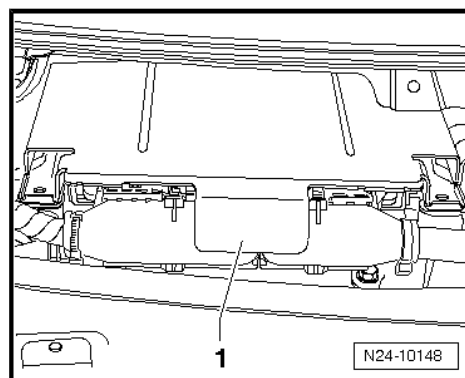
Specified torque of securing nuts for retainer: 6 Nm.



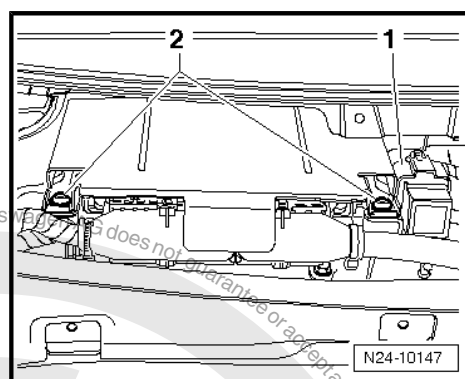
- Fit connector to engine control unit and slide locking devices -1- inwards.



- Slide cover -1- over engine control unit and press it downwards.



- Tighten new shear-head bolts -2- evenly until bolt head shears off.
- Fit connector -1- to heated windscreen control unit -J505- .
- Install plenum chamber cover ⇒ Rep. gr. 64 .
- Install wiper arms ⇒ Rep. gr. 92 .





26 – Exhaust system

1 Front exhaust pipe

Note

- ◆ Removing and installing exhaust manifold ➔ [page 232](#)
- ◆ After working on the exhaust system ensure that the system is not under stress, and that there is sufficient clearance to the bodywork. If necessary, loosen clamp and align silencer and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support rings are evenly loaded.
- ◆ Renew self-locking nuts.

Assembly overview - front exhaust pipe with catalytic converter
➔ [page 273](#)

Assembly overview - front exhaust pipe with particulate filter
➔ [page 274](#).

1.1 Assembly overview - front exhaust pipe with catalytic converter

1 - Front exhaust pipe with catalytic converter

2 - 40 Nm

3 - Support

4 - Marking

- ☐ For clamp.
- ☐ Specified torque and installation position of clamp ➔ [page 279](#)

5 - To front silencer

6 - 25 Nm

7 - Mounting

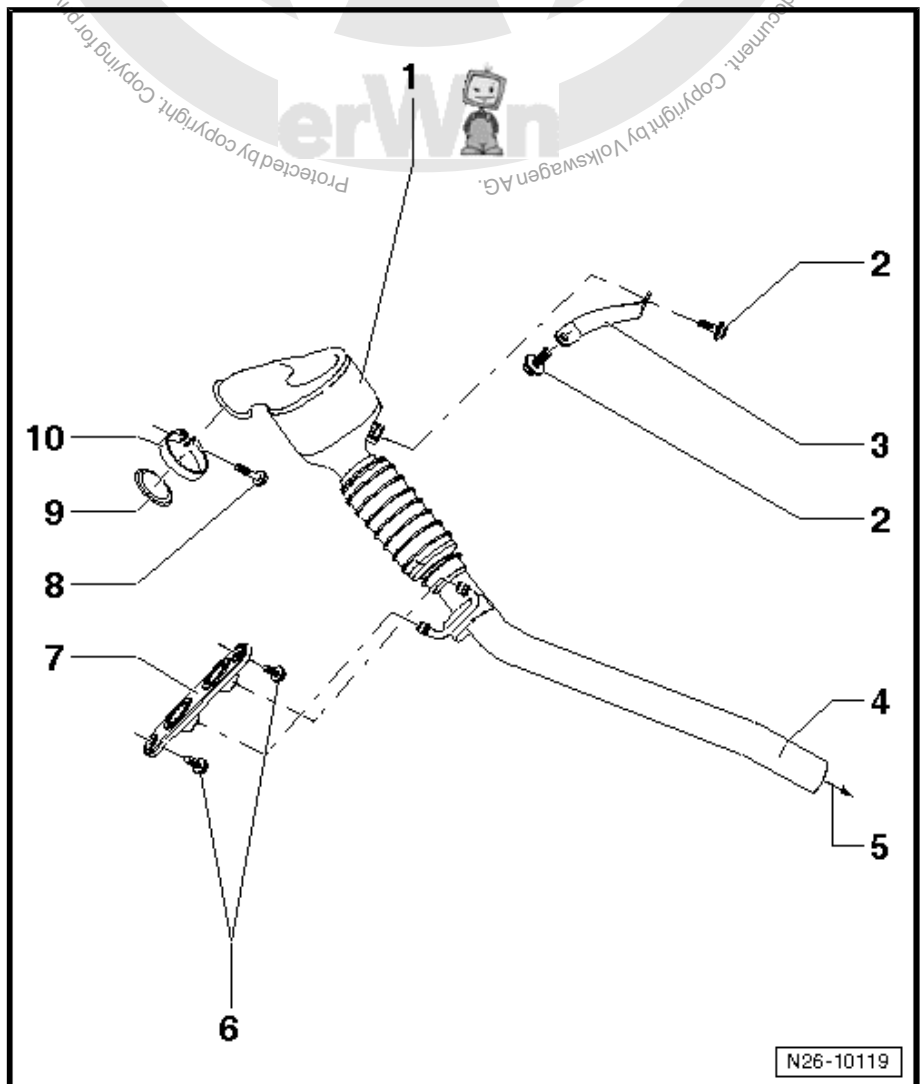
- ☐ Renew if damaged.

8 - 7 Nm

9 - Seal

- ☐ Note installation position.

10 - Clip



N26-10119



1.2 Assembly overview - front exhaust pipe with particulate filter

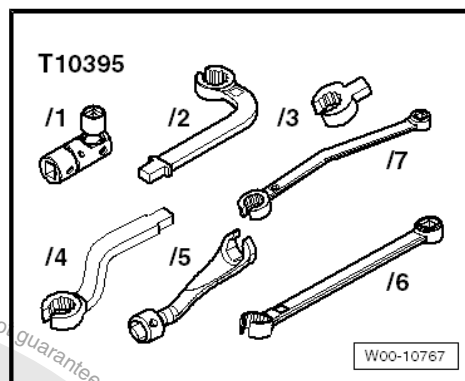


Note

- ◆ Removing and installing exhaust manifold ⇒ [page 232](#)
- ◆ After working on the exhaust system ensure that the system is not under stress, and that there is sufficient clearance to the bodywork. If necessary, loosen clamp and align silencer and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support rings are evenly loaded.
- ◆ Renew self-locking nuts.

Special tools and workshop equipment required

- ◆ Tool set, 17 mm -T10395-



Note

If the particulate filter or the exhaust gas pressure sensor 1 -G450- is changed, the exhaust gas pressure sensor 1 -G450- must always be adapted using diagnosis tester : Guided functions; adapting exhaust pressure sensor 1 -G450- .



1 - 8 Nm

2 - Exhaust gas pressure sensor 1 -G450-

3 - Retainer

- ☐ For control lines

4 - 10 Nm

5 - Control line, 45 Nm

6 - Lambda probe -G39- , 50 Nm

- ☐ Grease threads only with high-temperature paste -G 052 112 A3- , high temperature paste -G 052 112 A3- must not get into the slots of probe body.
- ☐ To remove use Lambda probe open ring spanner set -3337- .

7 - Exhaust gas temperature sender 2 for cylinder bank 1 -G448- , 45 Nm

- ☐ Lubricate thread of sender using high-temperature paste -G 052 112 A3- .
- ☐ Remove and install with tool set -T10395- .

8 - Particulate filter

- ☐ is removed downwards with exhaust gas pressure sensor 1 -G450-

- ☐ To remove, remove subframe and steering

⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing subframe and steering box .

9 - Front exhaust pipe

10 - Marking

- ☐ For clamp.
- ☐ Specified torque and installation position of clamp ⇒ [page 279](#)

11 - To front silencer

12 - 25 Nm

13 - Mounting

- ☐ Renew if damaged.

14 - Temperature sender after particulate filter -G527-

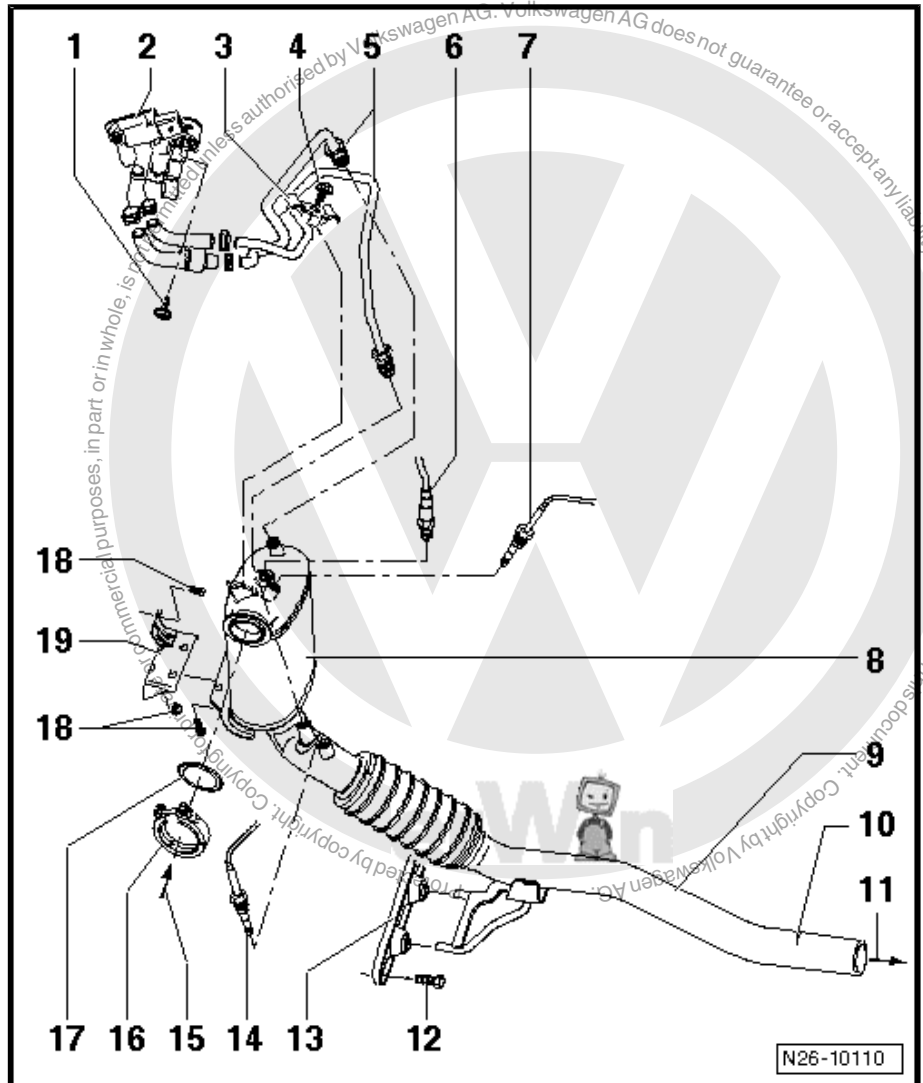
- ☐ Lubricate thread of sender using high-temperature paste -G 052 112 A3- .
- ☐ Remove and install with tool set -T10395- .

15 - From turbocharger

16 - Clamp, 7 Nm

17 - Seal

- ☐ Renew.
- ☐ Note installation position.





18 - 40 Nm

19 - Retainer

- ☐ Bolted to cylinder head.





2 Silencer (Golf, Golf Plus)

2.1 Assembly overview - silencer, vehicles with front-wheel drive



Note

- ◆ Removing and installing exhaust manifold ➔ [page 232](#)
- ◆ After working on the exhaust system ensure that the system is not under stress, and that there is sufficient clearance to the bodywork. If necessary, loosen clamp and align silencer and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support rings are evenly loaded.
- ◆ Renew self-locking nuts.



Note

Rear silencer -A- only fitted on special model „Golf Speed“.

1 - Mounting

- ☐ Renew if damaged.

2 - 25 Nm

3 - 25 Nm

4 -

5 - Mounting

- ☐ With retaining ring.
- ☐ Renew if damaged.

6 - Rear silencer

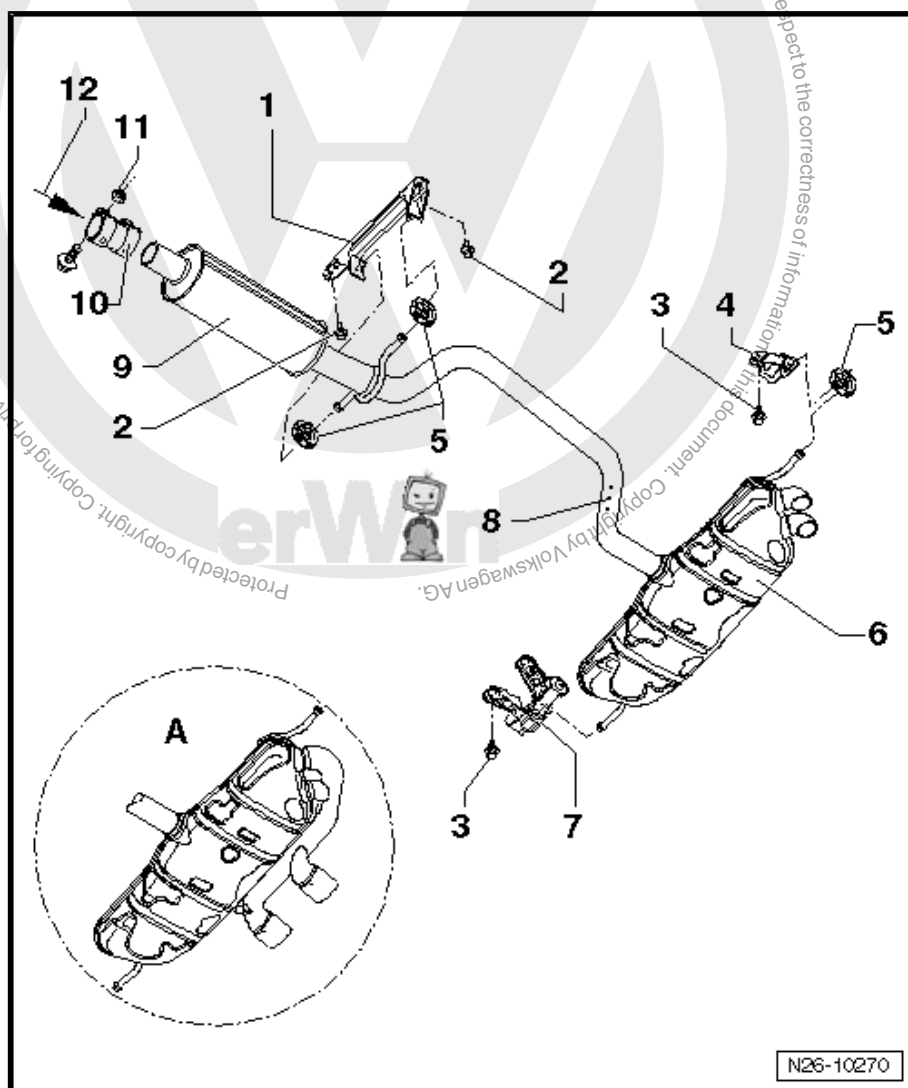
- ☐ For repairs, renew individually.

7 - Mounting

- ☐ With retaining ring.
- ☐ Renew if damaged.

8 - Separating point

- ☐ For repair cases
- ☐ Marked by three indentations on circumference of exhaust pipe
- ☐ Front and rear silencers are installed as a single component during production. In repair cases, the front and rear silencers are supplied individually with a repair clamp for connecting them.
- ☐ Cutting exhaust pipe ➔ [page 278](#).



N26-10270



9 - Front silencer

- ❑ For repairs, renew individually.

10 - Clamp

Specified torque and installation position ➔ [page 279](#)

11 - Threaded union

- ❑ Tighten bolted connections evenly. Specified torque and installation position ➔ [page 279](#)

12 - From front exhaust pipe

2.2 Assembly overview - silencer, vehicles with four-wheel drive

1 - Front exhaust pipe with catalytic converter

2 - Mounting

- ❑ Renew if damaged.

3 - 25 Nm

4 - Clamp

Specified torque and installation position ➔ [page 279](#)

5 - Threaded union

- ❑ Tighten bolted connections evenly. Specified torque and installation position ➔ [page 279](#)

6 - Mounting

- ❑ Renew if damaged.

7 - Rear silencer

8 - Retaining ring

- ❑ Renew if damaged.

9 - Mounting

10 - 40 Nm

11 - 40 Nm

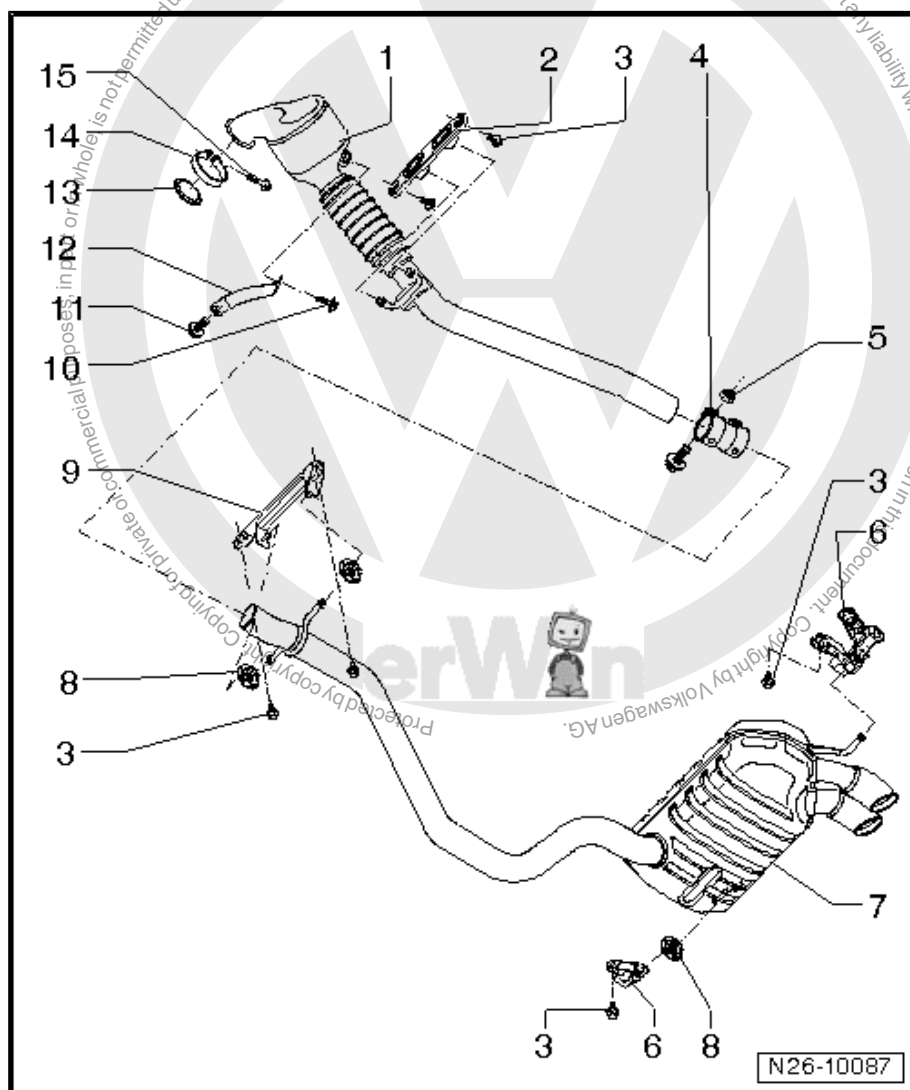
12 - Support

13 - Seal

- ❑ Renew.

14 - Clip

15 - 7 Nm

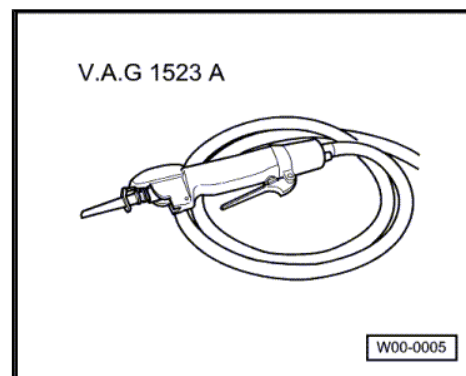


2.3 Cutting exhaust pipe

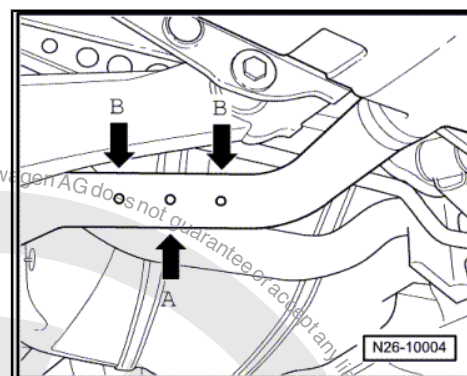
Special tools and workshop equipment required



◆ Pneumatic sabre saw -V.A.G 1523/A-



- Cut exhaust pipe at right angles at separating point -A-.
 - When installing, position repair clamp at side markings -B-.
- Specified torque ➔ [page 279](#)



2.4 Installation position and specified torque of the clamp



Note

Gradual introduction of clamp with continuous clip.

Specified torque and installation dimensions of clamp

Clamp -A- with 2 individual clips.

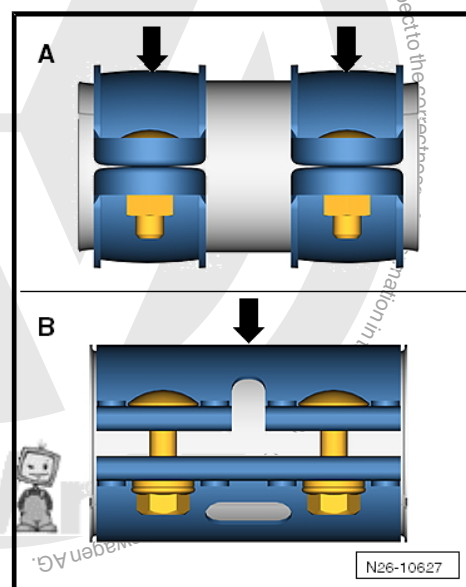
Specified torque: 25 Nm.

Installation dimensions -a- 5 mm (only for front clamp)

Clamp -B- with continuous clip.

Specified torque: 35 Nm.

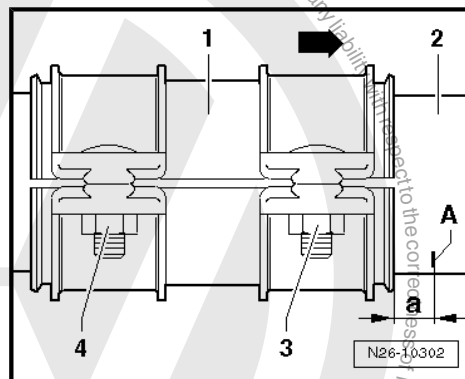
Installation dimensions -a- 8.5 mm (only for front clamp)





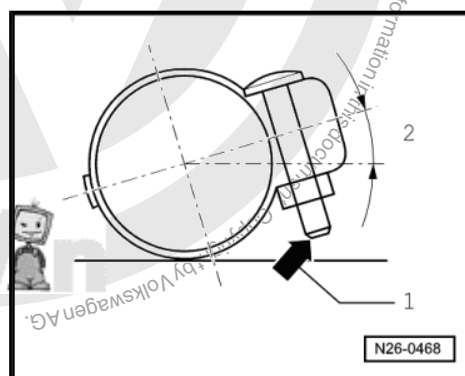
Installation dimension -a- for vehicles with marking on front exhaust pipe

- 1 - Clamp
- 2 - Front exhaust pipe
- a - Installation dimension
- A - Marking



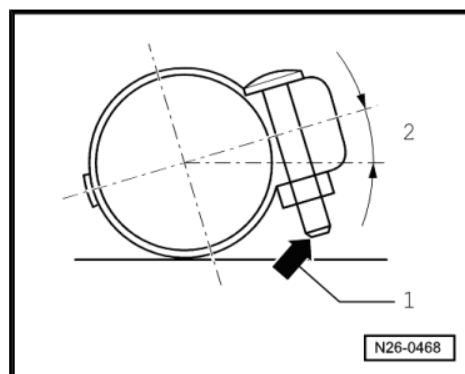
Installation position of front clamp

- Install clamp so that end of bolt -arrow- does not extend beyond lower edge of clamp.
- Threaded connection faces right



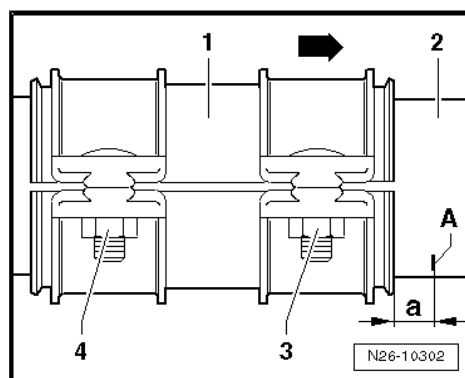
Installation position of rear clamp

- Install clamp so that end of bolt -arrow- does not extend beyond lower edge of clamp.
- Threaded connection faces to rear.



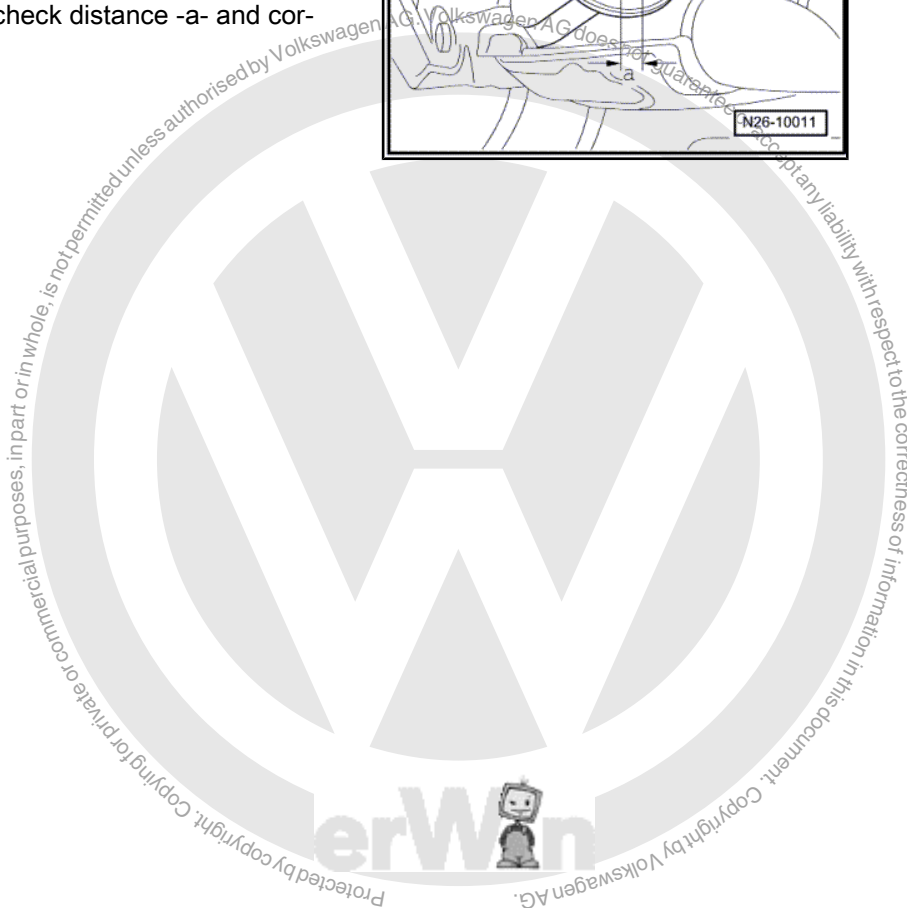
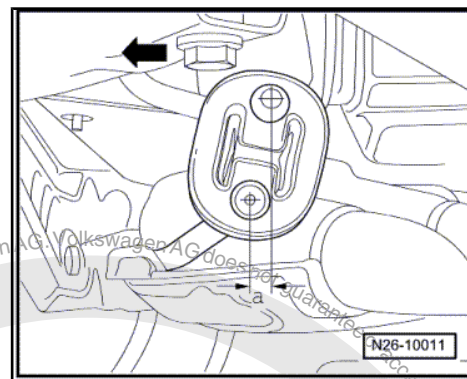
2.5 Aligning exhaust system free of stress

- Engine must be cold.
- Loosen threaded connection of clamp between catalytic converter and front silencer.
- Loosen bolts -3 and 4- on front clamp -1-.
- Align front clamp -1- to marking -A- on front exhaust pipe -2- (-arrow- points forwards).
- Dimension -a- = ➔ [page 279](#)
- The bolts must be on the right and the ends of the bolts must not protrude beyond the lower edge of the clamp.
- Tighten front clamp bolts -3- hand-tight.





- Push rear silencer forwards into clamp until dimension -a- = 15...17 mm is attained between mounting attachment points for body and rear silencer. -Arrow- points in direction of travel.
- Align rear silencer horizontally.
- Tighten clamp bolts in this position. Specified torque
⇒ [page 279](#) .
- Once clamp has been tightened, check distance -a- and correct if necessary.





3 Silencer (Touran)

3.1 Assembly overview - silencers



Note

- ◆ After working on the exhaust system ensure that the system is not under stress, and that there is sufficient clearance to the bodywork. If necessary, loosen clamp and align silencer and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support rings are evenly loaded.

- ◆ Renew self-locking nuts.

1 - Mounting

- Renew if damaged.

2 - Retaining ring for rear silencer

- Renew if damaged.

3 - Rear silencer

- For repairs, renew individually.

4 - 25 Nm

5 - Mounting

- With retaining ring.
- Renew if damaged.

6 - Separating point

- For repair cases
- Marked by three indentations on circumference of exhaust pipe
- Front and rear silencers are installed as a single component during production. In repair cases, the front and rear silencers are supplied individually with a repair clamp for connecting them.
- Cutting exhaust pipe
⇒ [page 283](#).

7 - Front silencer

- For repairs, renew individually.

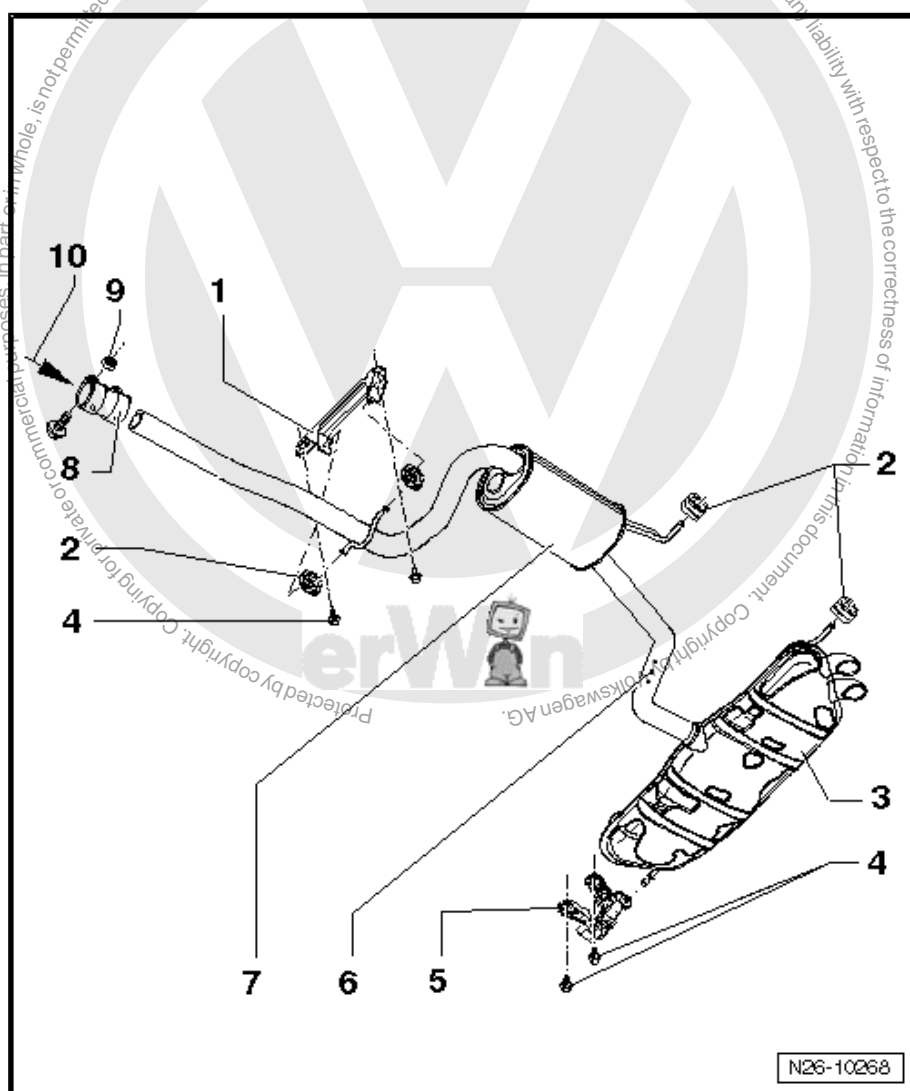
8 - Clamp

- Specified torque and installation position ⇒ [page 279](#)

9 - Threaded union

- Tighten bolted connections evenly. Specified torque and installation position ⇒ [page 279](#)

10 - From front exhaust pipe

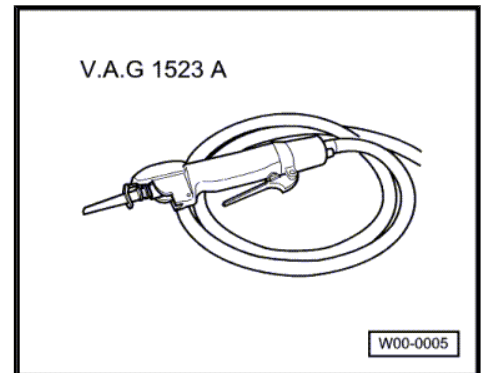




3.2 Cutting exhaust pipe

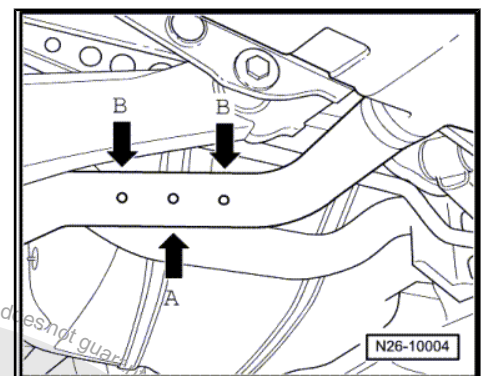
Special tools and workshop equipment required

- ◆ Pneumatic sabre saw -V.A.G 1523/A-



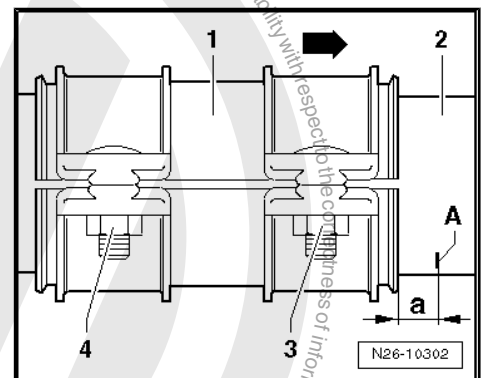
- Cut exhaust pipe at right angles at separating point -A-.
- When installing, position repair clamp at side markings -B-.

Specified torque ➔ [page 279](#)

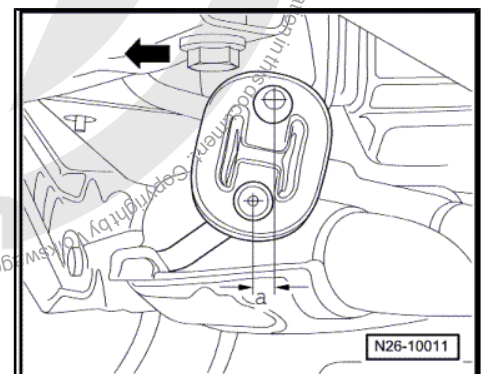


3.3 Aligning exhaust system free of stress

- Engine must be cold.
- Loosen bolts -3 and 4- on front clamp -1-.
- Align front clamp -1- to marking -A- on front exhaust pipe -2- (-arrow- points forwards).
- Dimension -a- = ➔ [page 279](#)
- The bolts must be on the right and the ends of the bolts must not protrude beyond the lower edge of the clamp.
- Tighten front clamp bolts -3- hand-tight.



- Push rear silencer forwards into clamp until dimension -a- = 15...17 mm is attained between mounting attachment points for body and rear silencer ➔ [Item 2 \(page 282\)](#) . -Arrow- points in direction of travel.
- Align rear silencer horizontally.
- Tighten clamp bolts in this position. Specified torque ➔ [page 279](#) .
- Once clamp has been tightened, check distance -a- and correct if necessary.





4 Silencer (Passat)

4.1 Assembly overview - silencer, vehicles with front-wheel drive

1 - From front exhaust pipe

2 - Clamp

- ☐ Before tightening, align cold exhaust system free of tension
⇒ [page 285](#)
- ☐ Tighten bolted connections evenly.
- ☐ Specified torque
⇒ [page 279](#)

3 - Front silencer

4 - Mounting

- ☐ Renew if damaged.

5 - 25 Nm

- ☐ Renew.

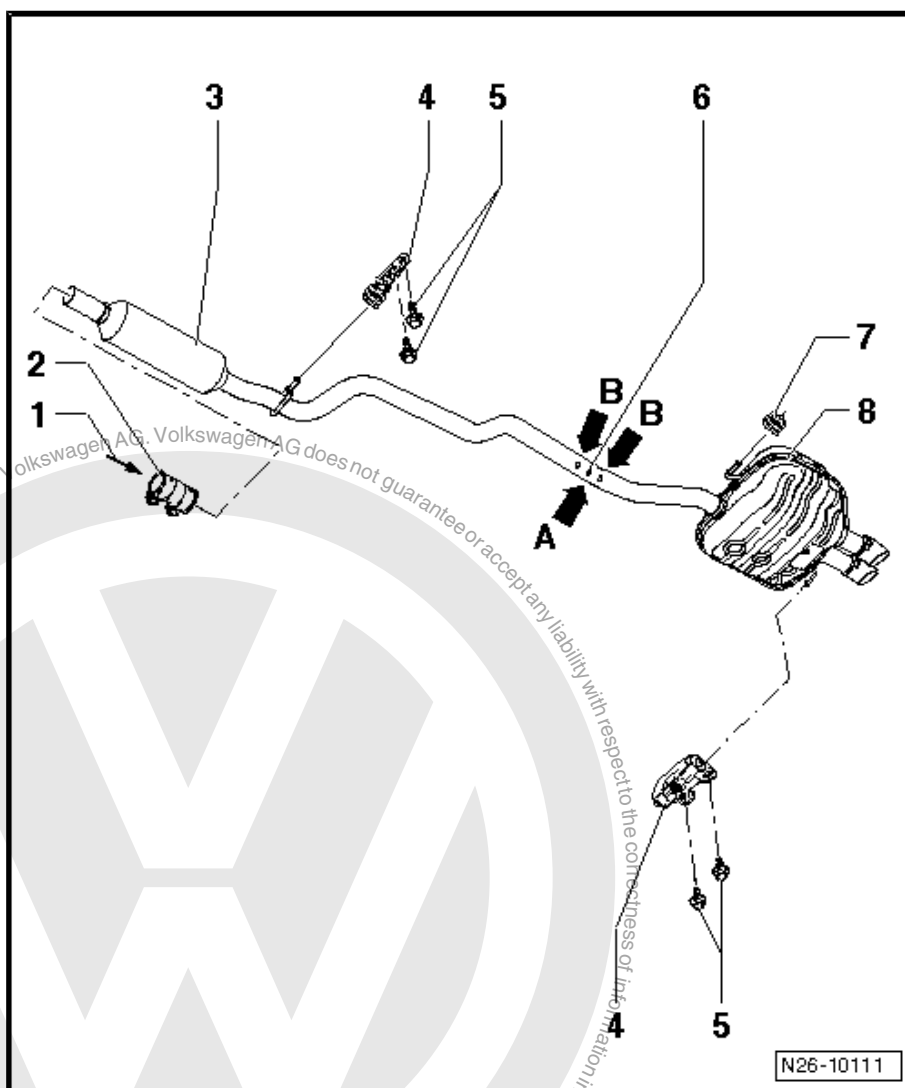
6 - Separating point

- ☐ Marked by impressions on exhaust pipe.
- ☐ Centre and rear silencers are installed as a single component during production. In cases of repair, the centre and rear silencer are supplied separately, with a clamp for connecting.
- ☐ Cut through exhaust pipe at right angles using e.g. body saw - V.A.G 1523- at separating point - arrow A- (wear eye protection)
- ☐ When installing, position repair clamp at side markings - arrows B-.
- ☐ Evenly tighten threaded connections of clamp (repair clamp).
- ☐ Specified torque of the clamping sleeve (repair clamping sleeve) ⇒ [page 279](#)
- ☐ Before tightening, align cold exhaust system free of tension ⇒ [page 285](#)

7 - Retaining ring

- ☐ Renew if damaged.

8 - Rear silencer





4.2 Assembly overview - silencer, vehicles with four-wheel drive

1 - Clamp

- ☐ Before tightening, align cold exhaust system free of tension
⇒ [page 285](#)
- ☐ Tighten bolted connections evenly.
- ☐ Specified torque
⇒ [page 279](#)

2 - Retaining ring

- ☐ Renew if damaged.

3 - Front mounting

- ☐ Renew if damaged.

4 - 25 Nm

- ☐ Renew.

5 - Centre mounting

- ☐ Renew if damaged.

6 - Rear left mounting

- ☐ Renew if damaged.

7 - Rear silencer

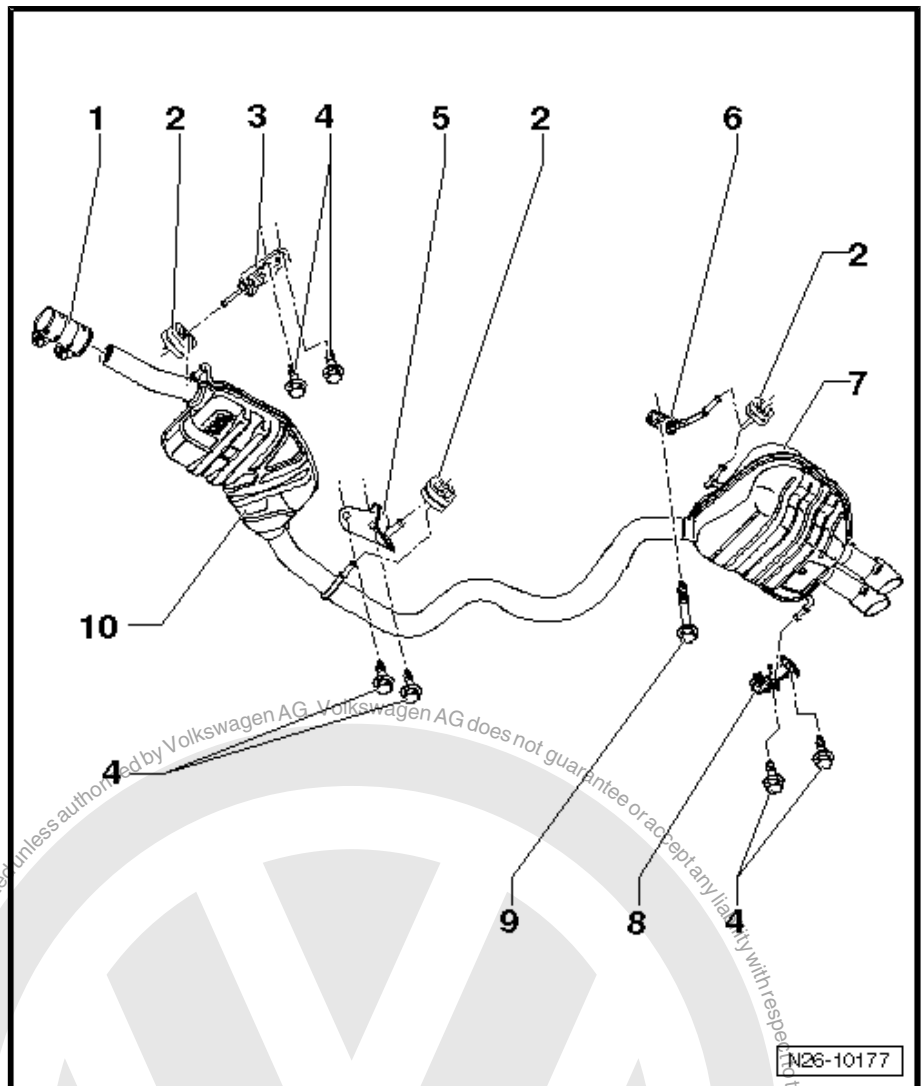
8 - Rear right mounting

- ☐ Renew if damaged.

9 - Securing bolt

- ☐ Specified torque ⇒ Running gear, axles, steering; Rep. gr. 42 ; Rear suspension; Specified torques for rear axle .

10 - Front silencer



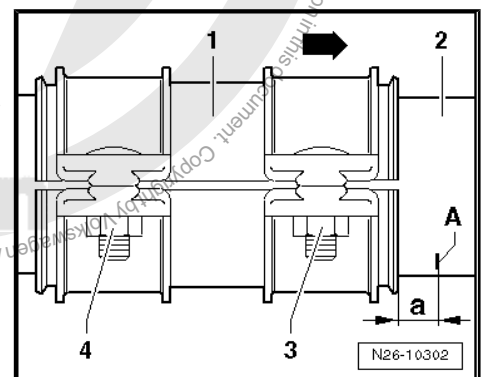
4.3 Aligning exhaust system free of stress

Test prerequisite

- Engine must be cold

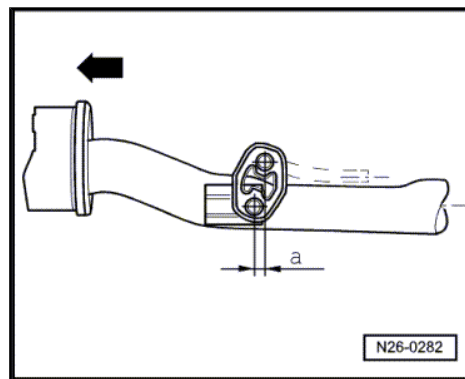
Procedure

- Loosen bolts -3 and 4- on front clamp -1-.
- Align front clamp -1- to marking -A- on front exhaust pipe -2- (-arrow- points forwards).
- Dimension -a- = ⇒ [page 279](#)
- The bolts must be on the right and the ends of the bolts must not protrude beyond the lower edge of the clamp.
- Tighten front clamp bolts -3- hand-tight.





- Push front and rear silencer into clamp until dimension -a- (4 mm) is attained between mounting attachment points for body and rear silencer. -Arrow- points in direction of travel.
- Align rear silencer horizontally.
- With parts in this position, tighten bolted connections of clamp. Specified torque ⇒ [page 279](#)
- Once clamp has been tightened, check distance -a- and correct if necessary.





5 Exhaust gas recirculation system

Assembly overview - parts of exhaust gas recirculation
⇒ [page 287](#) .

Schematic diagram of vacuum hoses ⇒ [page 240](#) .



Note

- ◆ *The exhaust gas recirculation system is actuated by the diesel direct injection system control unit -J248- via the exhaust gas recirculation valve -N18- (electro-pneumatic) to the exhaust gas recirculation valve (mechanical).*
- ◆ *The exhaust gas recirculation valve -N18- (electro-pneumatic) is located in the solenoid valve block.*
- ◆ *The cone-shaped plunger in the mechanical exhaust gas recirculation valve ensures that various cross sectional openings are possible at different plunger lifts.*
- ◆ *Pulsed control enables every conceivable valve position.*
- ◆ *Renew self-locking nuts.*

5.1 Assembly overview - exhaust gas recirculation

Engine codes AZV, BKD, BKP, BMA BVE and BWV
⇒ [page 287](#)

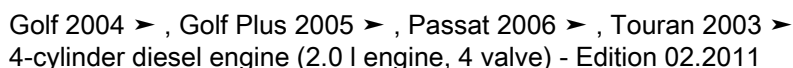
Engine codes BMN, BMR and BUZ ⇒ [page 288](#)

5.1.1 Engine codes AZV, BKD, BKP, BMA, BVE and BWV



Note

- ◆ *The exhaust gas recirculation system is actuated by the diesel direct injection system control unit -J248- via exhaust gas recirculation valve -N18- (electro-pneumatic) to the exhaust gas recirculation valve (mechanical).*
- ◆ *The exhaust gas recirculation valve -N18- (electro-pneumatic) is located in the solenoid valve block.*
- ◆ *The cone-shaped plunger in the mechanical exhaust gas recirculation valve ensures that various cross sectional openings are possible at different plunger lifts.*
- ◆ *Pulsed control enables every conceivable valve position.*
- ◆ *Renew self-locking nuts.*

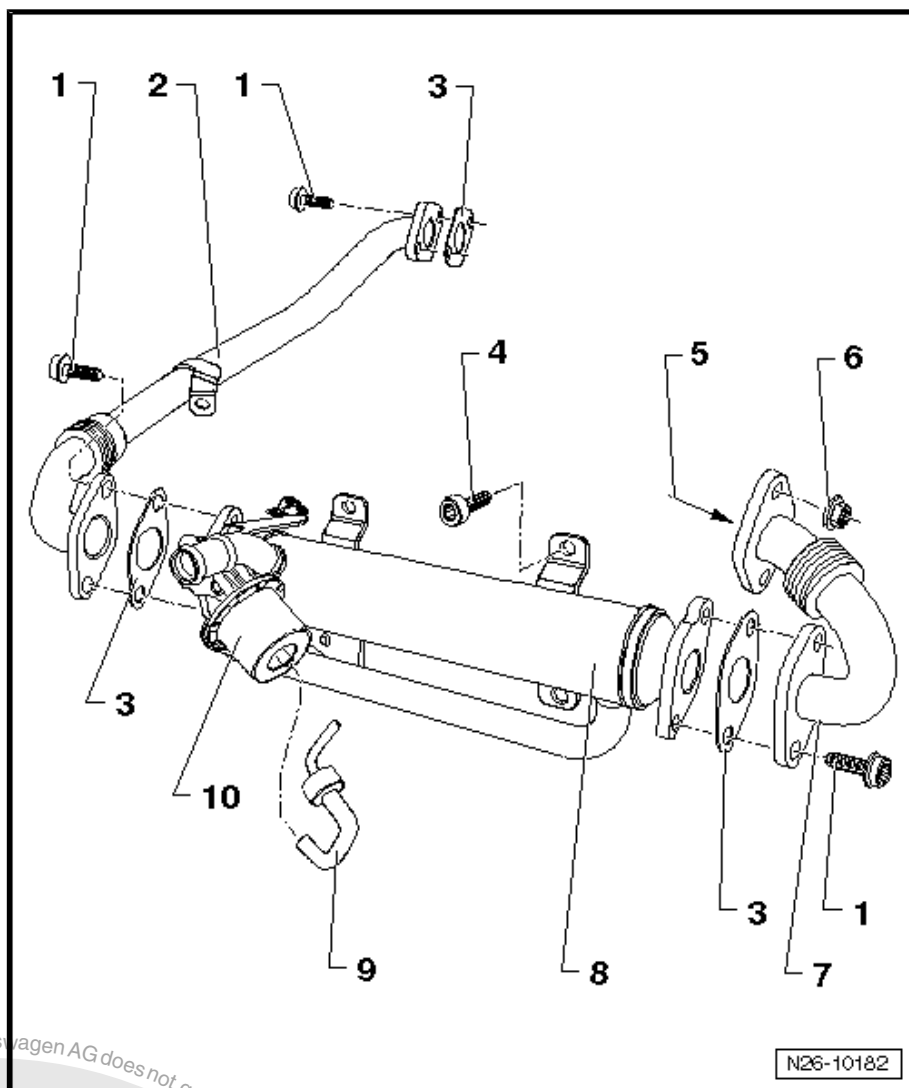


-
- This diagram illustrates the assembly of a rear suspension component, likely a rear axle housing or differential housing, with various sub-components and fasteners. The numbered callouts are as follows:
- 1: Two small screws at the top left.
 - 2: A bracket or housing part at the top left.
 - 3: A flange or plate at the bottom left.
 - 4: A small pin or clip at the top left.
 - 5: A long, thin bracket or arm on the left side.
 - 6: A large, multi-ribbed housing or bell housing in the center.
 - 7: A bracket or arm on the right side.
 - 8: A small pin or clip on the right side.
 - 9: A long, thin bracket or arm on the far right.
 - 10: A small pin or clip at the bottom center.
 - 11: A flange or plate at the bottom left.
 - 12: A small pin or clip at the bottom left.
- The diagram shows the relative positions of these parts, with dashed lines indicating the assembly path. Arrows point to specific areas of interest, such as the top left and bottom center.

Before removing the exhaust gas recirculation cooler, first remove particulate filter ⇒ [page 274](#).



- 1 - 20 Nm
- 2 - Connecting pipe
- 3 - Seal
 - ☐ Renew.
- 4 - 10 Nm
- 5 - From exhaust manifold
- 6 - 25 Nm
- 7 - Connecting pipe
- 8 - Radiator
 - ☐ For exhaust gas recirculation.
 - ☐ With bypass flap.
- 9 - Vacuum hose
- 10 - Vacuum unit
 - ☐ To switch-over of by-pass flap.





28 – Glow plug system

1 Optical characteristics of metal or ceramic glow plugs



WARNING

The ceramic glow plugs ➔ [page 290](#) are sensitive to jolts and bending. For this reason a glow plug which has dropped from a small height (approx. 2 cm) must not be used, even if there is no obvious damage. It is absolutely necessary to follow the installation instructions, otherwise the heater pin of the glow plug can break and cause engine damage.

Optical characteristics of glow plugs

Vehicles with 2 valves per cylinder head

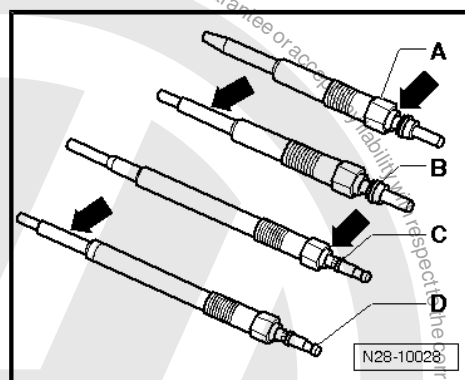
- A- = Metal glow plug, colour-coded -arrow-.
- B- = Ceramic glow pin plug with support tube -arrow-, not colour-coded.

Vehicles with 4 valves per cylinder head

- C- = Metal glow plug, colour-coded -arrow-.
- D- = Ceramic glow pin plug with support tube -arrow-, not colour-coded.

Removing and installing metal glow plug ➔ [page 290](#)

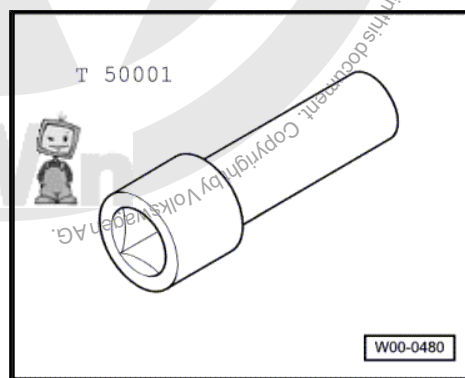
Remove, install or check ceramic glow pin plugs ➔ [page 292](#) .



1.1 Removing and installing metal glow plug

Special tools and workshop equipment required

- ♦ Special wrench, long reach -T50001-



Note

Testing glow plugs with battery voltage is not permitted. This will destroy the glow plug.



Procedure



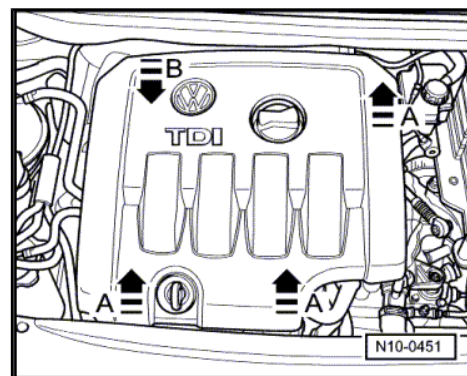
Note

Do not cant glow plugs when removing and installing. Remove any components hindering assembly.

- Remove engine cover.

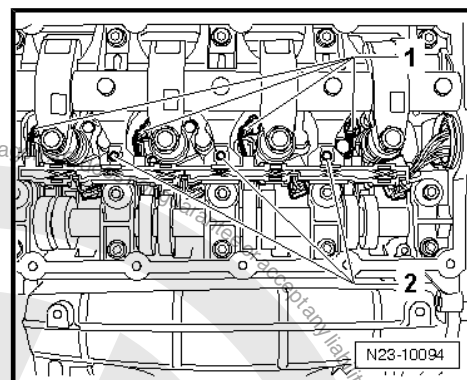
To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

- Remove cylinder head cover ⇒ [page 49](#) .



- Pull connectors -1- off ceramic glow plugs.
- Remove and install glow plugs using socket -T50001- .

Specified torque: 10 Nm

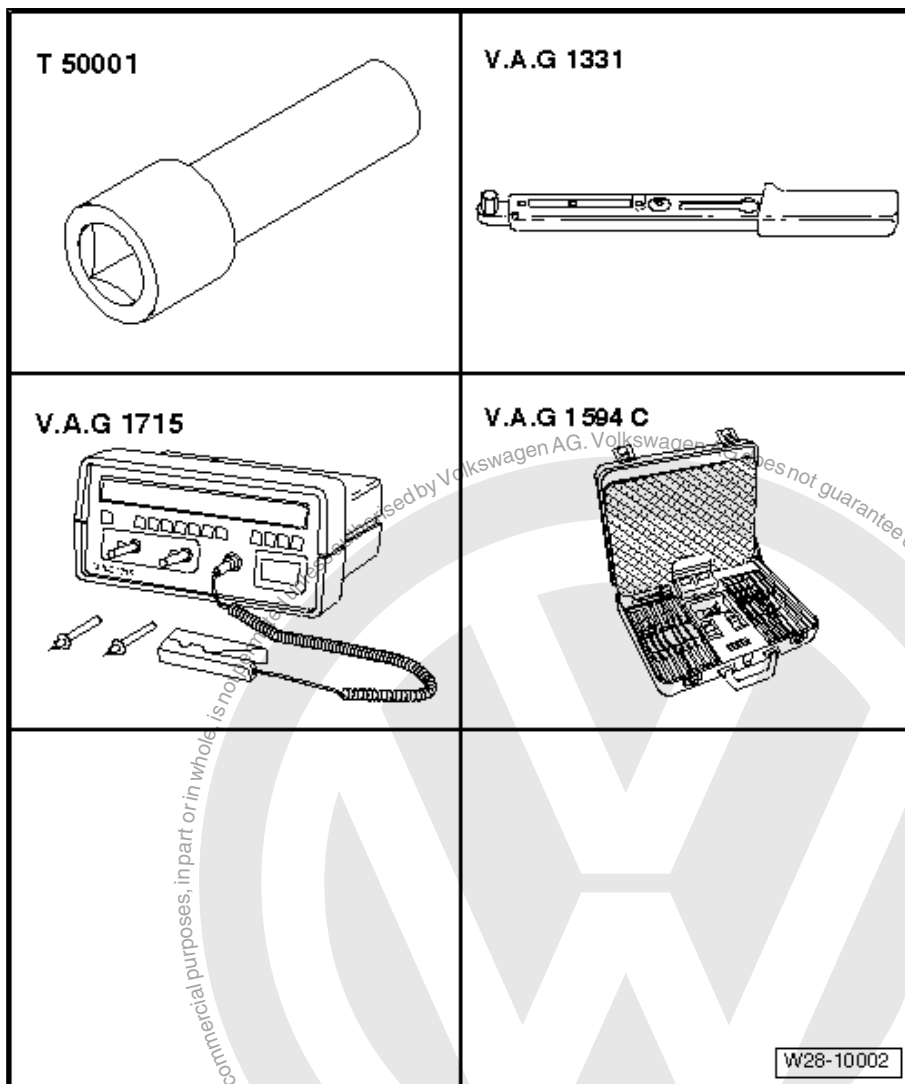




1.2 Removing and installing ceramic glow plugs

Special tools and workshop equipment required

- ◆ Special wrench, long reach -T50001-
- ◆ Torque wrench (5...50 Nm) -V.A.G 1331-
- ◆ Multimeter -V.A.G 1715- or hand multimeter - V.A.G 1526 A-
- ◆ Auxiliary measuring set - V.A.G 1594 C-



Test prerequisites

- Engine is cold
- Ignition switched off

Procedure



Note

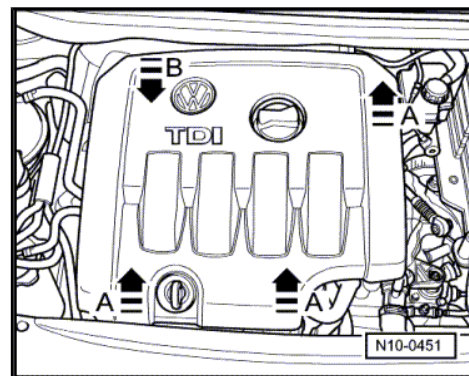
*Do not cant ceramic glow plugs when removing and installing.
Remove any components hindering assembly.*



- Remove engine cover.

To do this, pull engine cover upwards abruptly at front and right -arrows A- and then pull forwards out of rear fastening -arrow B-.

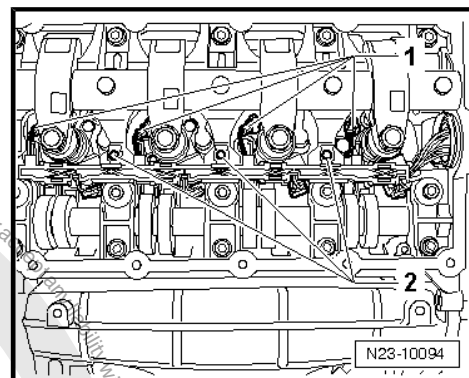
- Remove cylinder head cover ➔ [page 49](#) .



- Pull connectors -1- off ceramic glow plugs.
- Remove ceramic glow plugs using socket -T50001- .

Installation is carried out in the reverse order. When installing, note the following:

- Before installing the drilling in cylinder head and the threads must completely cleaned of all deposits.



Note

Never oil or grease thread of cylinder head bore or of ceramic glow plugs.

- Screw ceramic glow plugs into cylinder head by hand using socket -T50001- .
- Then tighten the ceramic glow plugs. Specified torque: 12 Nm



WARNING

After installing and before the engine is started, always perform a resistance test on all ceramic glow plugs when engine is cold.

- ◆ Specification: max. 1 Ω
- If the specification is exceeded, renew the defective ceramic glow plug.



Note

If the defective ceramic glow plug is broken, remove all fragments from the engine, otherwise these can cause damage to the engine.