



Workshop Manual

Golf 2004 ➤

Golf Plus 2005 ➤

Passat 2006 ➤

Touran 2003 ➤

4-cylinder diesel engine (1.9 l engine)

Engine ID	AVQ	BJB	BKC	BLS	BRU	BXE	BXF	BXJ	
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Edition 08.2010



List of Workshop Manual Repair Groups

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

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00 – Technical data

1 Technical data

Engine number ⇒ [page 1](#)

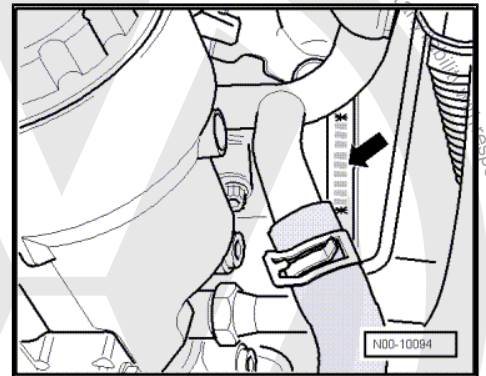
Engine data ⇒ [page 1](#)

1.1 Engine number

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

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

The engine code is also included on the vehicle data sticker.



1.2 Engine data

Edition 07.2010 Version 5.0

	AVQ	BJB	BKC	BRU	BLS	BXE	BXF	BXJ
Golf/Golf Plus production		10.03 ▶	10.03 ▶	04.04 ▶	02.06 ▶	03.06	03.06	11.07
Passat production			12.04 ▶		05.05 ▶	03.06		
Touran production	02.03 ▶		10.03 ▶	10.04	02.06 ▶	03.06	03.06 ▶	10.06 ▶
Emissions fulfil	EU4 standard	EU3 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard
Capacity l	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Output kW at rpm	74/4000	77/4000	77/4000	66/4000	77/4000	77/4000	66/4000	66/4000
Torque Nm at rpm	250/1900	250/1900	250/1900	210/1800 ...2500	250/1900	250/1900	210/1800	210/1800 ...2500
Bore Ø mm	79.5	79.5	79.5	79.5	79.5	79.5	79.5	79.5
Stroke mm	95.5	95.5	95.5	95.5	95.5	95.5	95.5	95.5
Valves per cylinder	2	2	2	2	2	2	2	2
Compression ratio	19.0	19.0	19.0	19.0	18.5	18.5	19.0	19.0
Fuel according to	DIN 590 EN	DIN 590 EN	DIN 590 EN	DIN 590 EN	DIN 590 EN	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
Catalytic converter	yes	yes	yes	yes	yes	yes	yes	yes
Exhaust gas recirculation	yes	yes	yes	yes	yes	yes	yes	yes



	AVQ	BJB	BKC	BRU	BLS	BXE	BXF	BXJ
Turbocharging/supercharging	yes	yes	yes	yes	yes	yes	yes	yes
Charge air cooler	yes	yes	yes	yes	yes	yes	yes	yes
Particulate filter	no	no	no	no	yes	no	no	yes





10 – Removing and installing engine

1 Removing and installing engine

Removing engine (Golf, Golf Plus) ⇒ [page 3](#)

Removing engine (Touran) ⇒ [page 9](#)

Removing engine (Passat) ⇒ [page 14](#)

Securing engine to assembly stand ⇒ [page 20](#) .

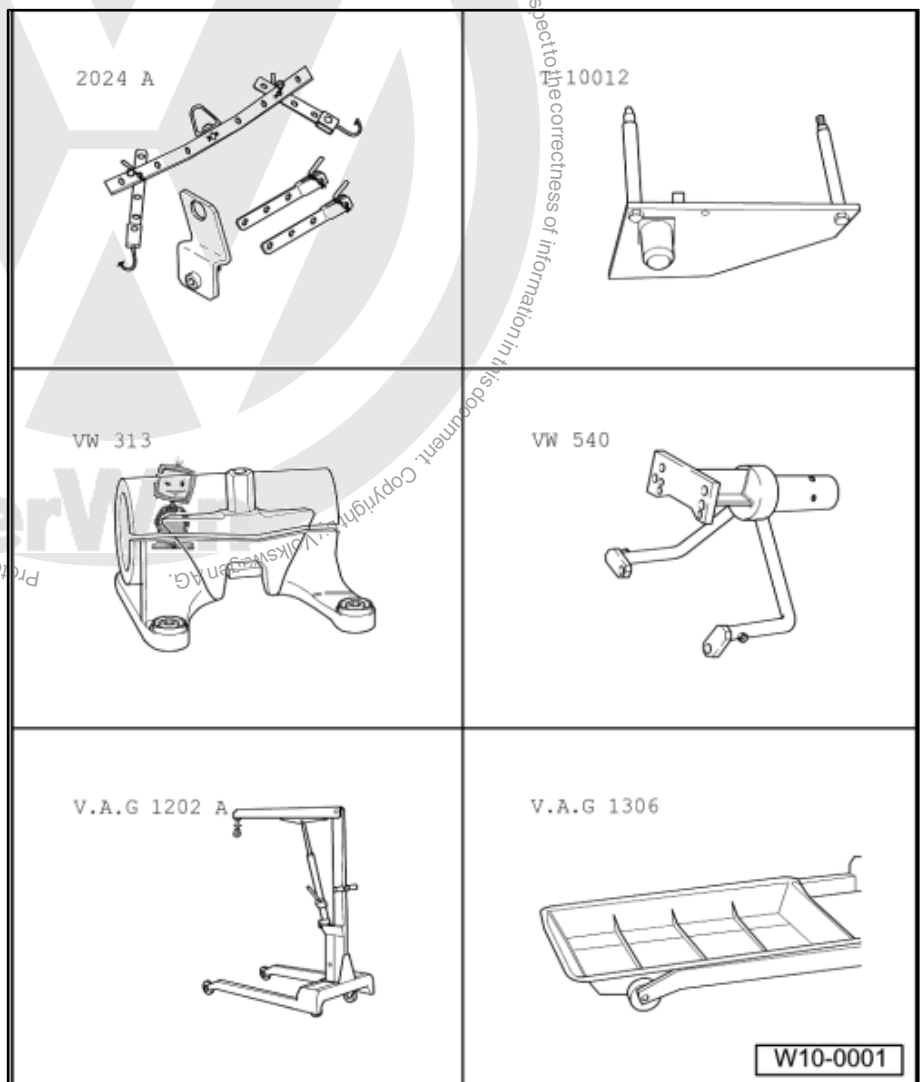
Notes on installing ⇒ [page 21](#) .

Assembly mountings ⇒ [page 22](#)

1.1 Removing engine (Golf, Golf Plus)

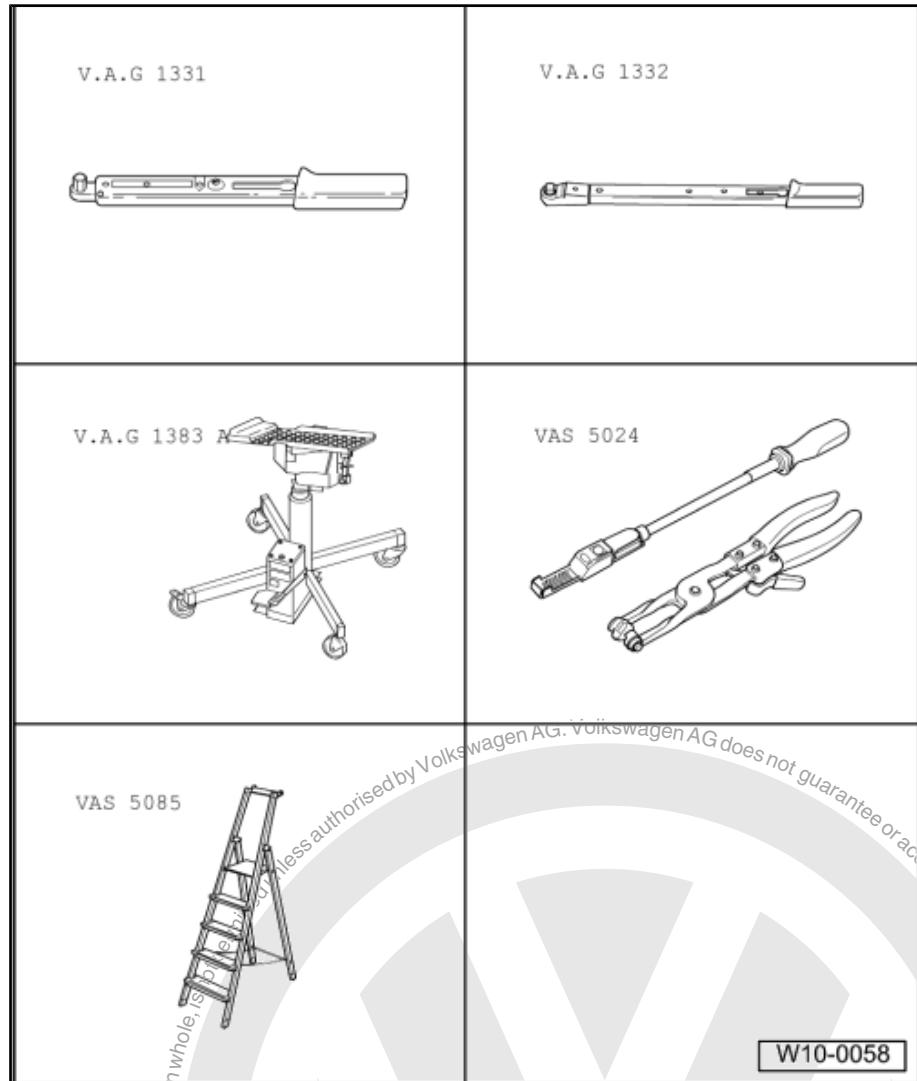
Special tools and workshop equipment required

- ◆ Lifting tackle -2024 A-
- ◆ Engine bracket -T10012-
- ◆ Support clamp -VW 313-
- ◆ Engine and gearbox support -VW 540-
- ◆ Workshop hoist -V.A.G 1202 A-
- ◆ Drip tray -V.A.G 1306-





- ◆ 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-
- ◆ Stepladder -VAS 5085-
- ◆ Guide rods -T10093-
- ◆ Cable ties



Note

- ◆ *Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted and obtain anti-theft coding 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:

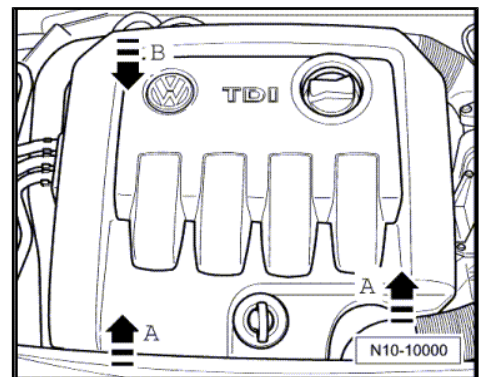
- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*

Procedure

- With ignition switched off, disconnect earth strap from battery.

One-piece engine cover

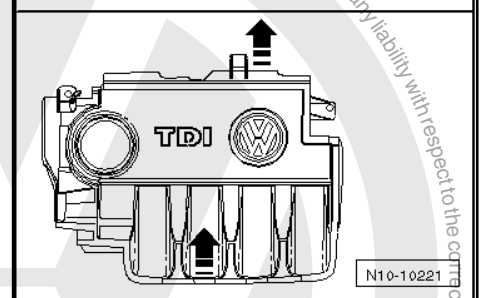
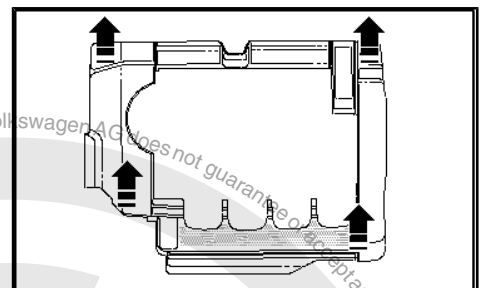
For one-piece engine cover, pull engine cover abruptly upwards at front and right -arrows A-, then pull forwards out of rear fastening -arrow B-.



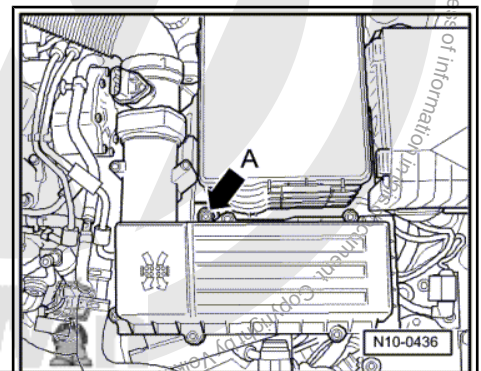
Two-piece engine cover

For two-piece engine cover, first pull outer engine cover abruptly upwards at -arrows-, then pull inner engine cover abruptly upwards at -arrows-.

- 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.
- Disconnect fuel supply and return lines as well as coolant line on cylinder head.





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 noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Assembly overview - Body - front .
- Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier - service position .
- Drain coolant ⇒ [page 123](#) .

Vehicles with air conditioner



Note

To prevent damage to condenser or 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:

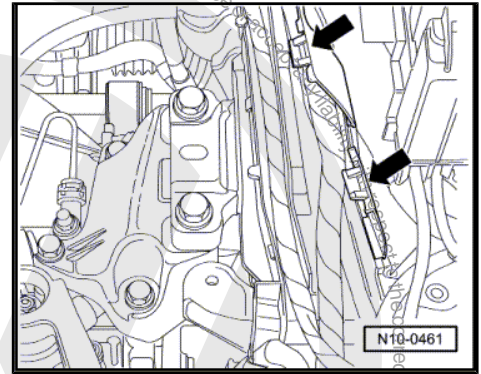
- Remove poly V-belt ⇒ [page 25](#) .
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Removing and installing compressor bracket .
- Secure air conditioner compressor to lock carrier so that refrigerant lines/hoses are free of stress.
- Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Removing and installing alternator and poly V-belt .

Continuation for all vehicles

- Remove connecting pipes between charge air cooler and engine.
- Unbolt left and right-hand drive shafts from gearbox ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shaft .
- Remove front exhaust pipe ⇒ [page 255](#) .
- Release connector from engine control unit, disconnect connector.



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



Vehicles with manual gearbox

- Remove slave cylinder for hydraulic clutch. => 6-speed manual gearbox 02S; Rep. gr. 30 ; Repairing clutch mechanism; Assembly overview - hydraulics .
- Unbolt selector mechanism from gearbox => 6-speed manual gearbox 02S; Rep. gr. 34 ; Repairing selector mechanism .

Vehicles with four-wheel drive:

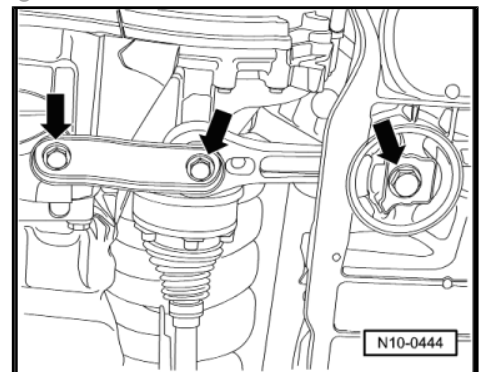
- Remove selector mechanism from gearbox => 6-speed manual gearbox 02Q, four-wheel drive; Rep. gr. 34 ; Repairing selector mechanism .
- Separate pressure line for hydraulic clutch control.
- Remove front propshaft => Final drive 02D, 0AV; Rep. gr. 39 ; Assembly overview - repairing propshaft

Continuation for all vehicles:

- Unbolt pendulum support -arrows-

Vehicles with particulate filter

- Remove subframe => Running gear, axles, steering; Rep. gr. 40 ; Removing and installing subframe .
- Remove right drive shaft => Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shafts .
- Remove steering box => Running gear, axles, steering; Rep. gr. 48 ; Removing and installing steering box .



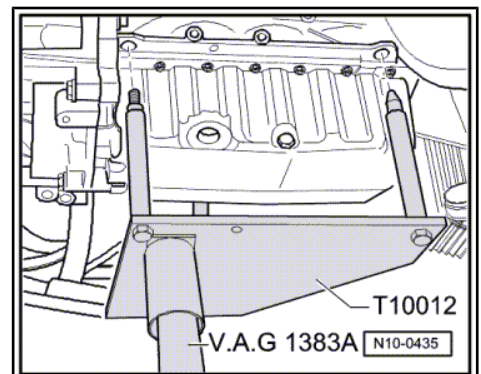
Continuation for all vehicles:

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

Note

Support pins must be secured to engine bracket -T10012- as shown.

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



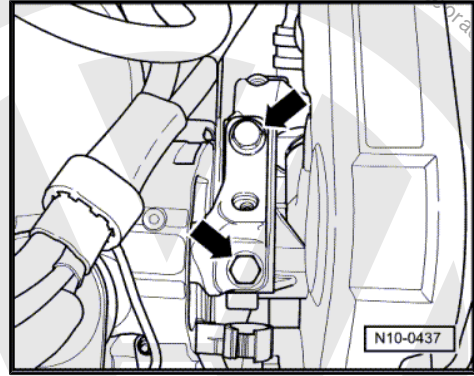


- Unbolt assembly mounting on engine side from engine bracket -arrows-.



Note

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

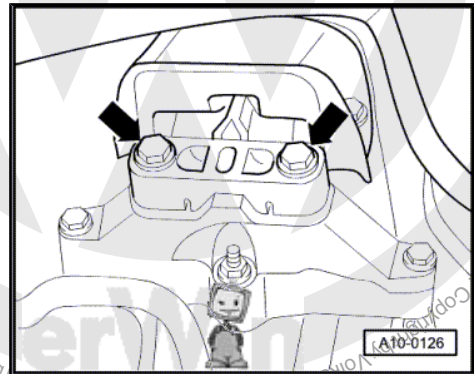


- Unbolt assembly mounting on gearbox side from gearbox bracket -arrows-.
- Carefully lower engine with gearbox.



Note

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

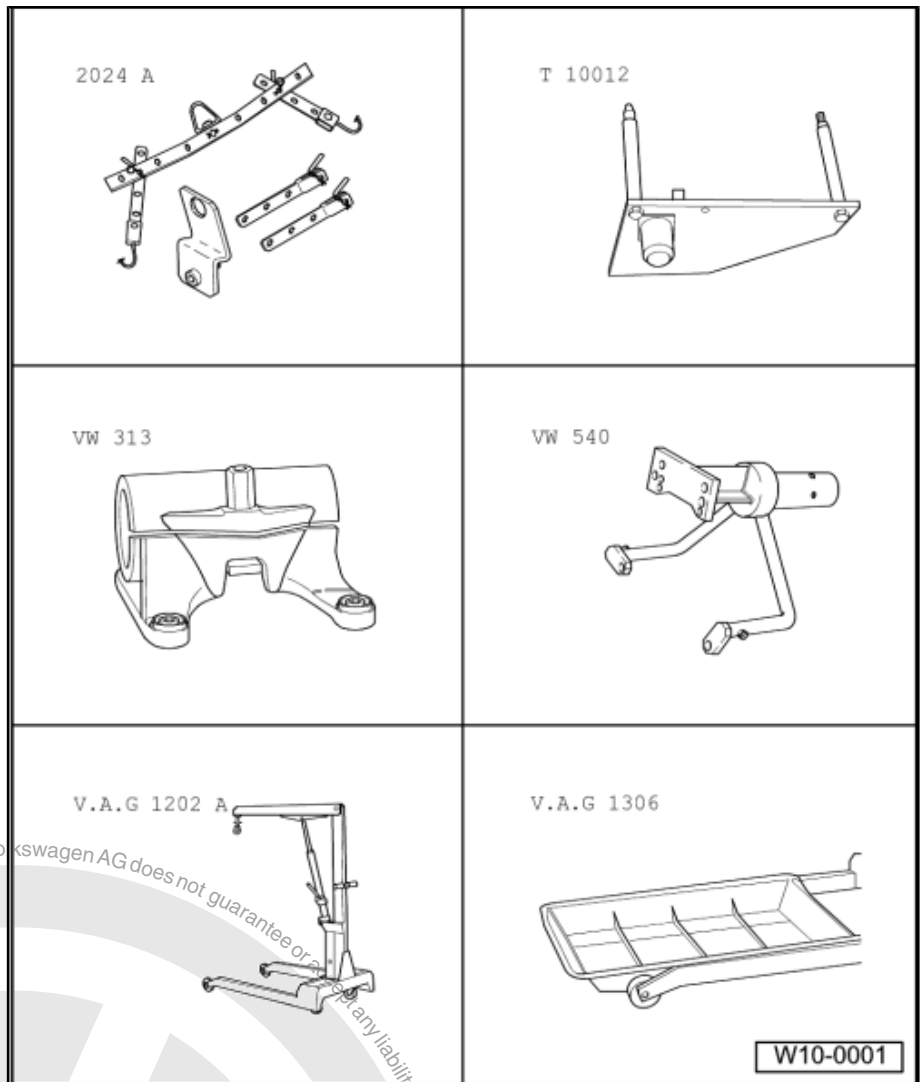




1.2 Removing engine (Touran)

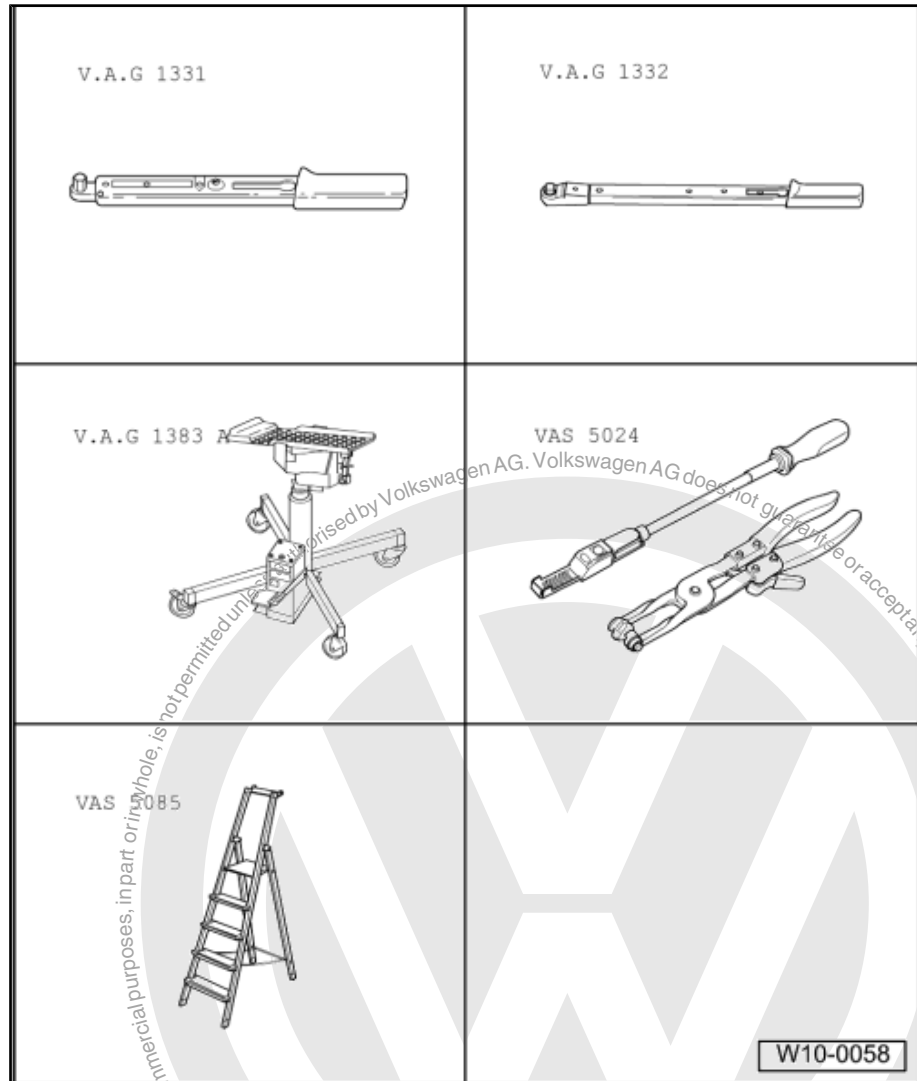
Special tools and workshop equipment required

- ◆ Lifting tackle -2024 A-
- ◆ Engine bracket -T10012-
- ◆ Support clamp -VW 313-
- ◆ Engine and gearbox support -VW 540-
- ◆ Workshop hoist -V.A.G 1202 A-
- ◆ Drip tray -V.A.G 1306-





- ◆ 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-
- ◆ Stepladder -VAS 5085-
- ◆ Guide rods -T10093-
- ◆ Cable ties



Note

- ◆ Before carrying out further work, disconnect battery earth strap. 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.

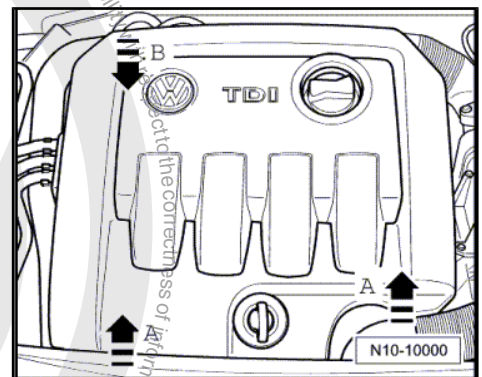


WARNING

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 and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*

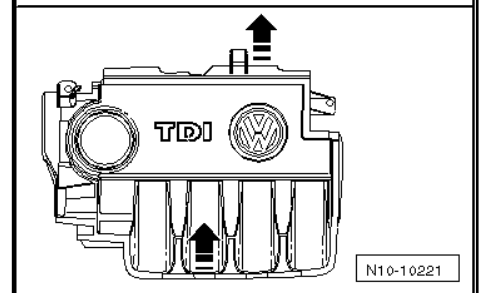
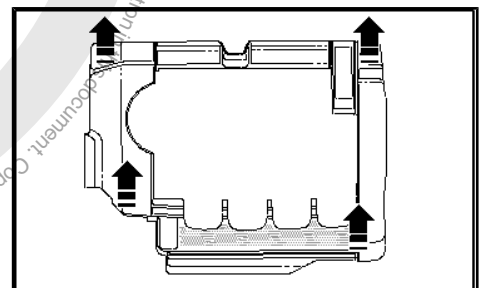
- With ignition switched off, disconnect earth strap from battery.
- Remove engine cover. To do this, pull engine cover upwards abruptly at front -arrows A- and then pull forwards out of rear fastening -arrow B-.



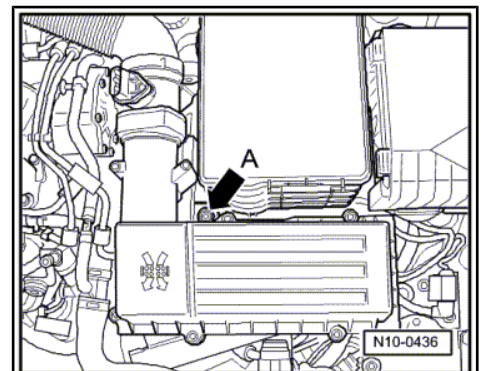
Two-piece engine cover

For two-piece engine cover, first pull out engine cover abruptly upwards at -arrows-, then pull inner engine cover abruptly upwards at -arrows-.

- 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.
- Disconnect fuel supply and return lines as well as coolant line on cylinder head.





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 noise insulation. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .
- Bring lock carrier into service position. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier service position .
- Drain coolant ⇒ [page 123](#)

Vehicles with air conditioner



Note

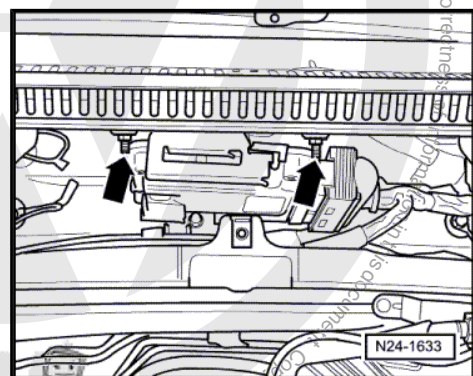
To prevent damage to condenser or to refrigerant lines/hoses, ensure that the lines and hoses are not stretched, kinked or bent.

To facilitate removing and installing engine without opening refrigerant circuit:

- Remove poly V-belt ⇒ [page 25](#) .
- Remove air conditioner compressor. ⇒ Heating, air conditioning; Rep. gr. 87 ; Removing and installing compressor bracket .
- Secure air conditioner compressor to lock carrier so that refrigerant lines/hoses are free of stress.
- Remove alternator. ⇒ Electrical system; Rep. gr. 27 ; Removing and installing alternator with poly V-belt .

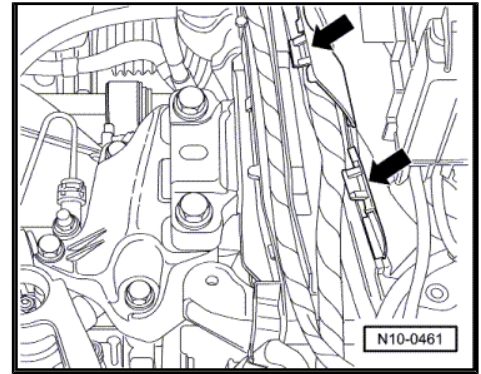
Continuation for all vehicles

- Remove connecting pipes between charge air cooler and engine.
- Unbolt left and right-hand drive shafts from gearbox ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shaft .
- Remove front exhaust pipe.
- Remove securing nuts -arrows- for engine control unit.
- Release connector from engine control unit, disconnect connector.



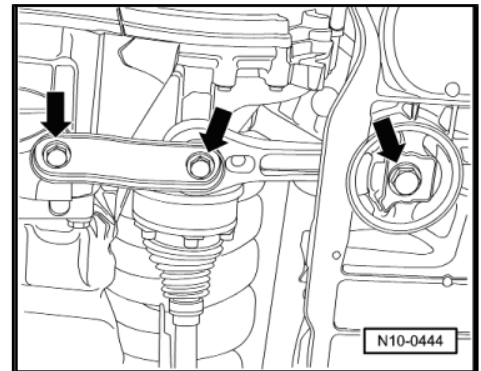


- Open all cable guide fasteners -arrows-.
- Remove wiring harness from cable guide on longitudinal member and lay to side on engine.
- Pull off or disconnect all other electrical connections from engine and gearbox as necessary and lay to side.
- Separate all connecting, coolant, vacuum and intake hoses from engine.
- Remove slave cylinder for hydraulic clutch. ⇒ 6-speed manual gearbox 02S; Rep. gr. 30 ; Repairing clutch mechanism; Assembly overview - hydraulics .
- Unbolt selector mechanism from gearbox ⇒ 6-speed manual gearbox 02S; Rep. gr. 34 ; Repairing selector mechanism .
- Unbolt pendulum support -arrows-.



Vehicles with particulate filter

- Remove subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing subframe .
- Remove right drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shafts .
- Remove steering box ⇒ Running gear, axles, steering; Rep. gr. 48 ; Removing and installing steering box .



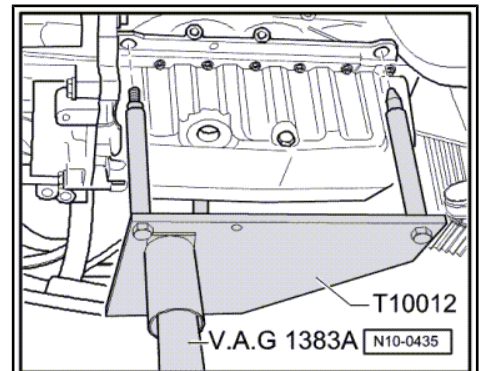
Continuation for all vehicles:

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

Note

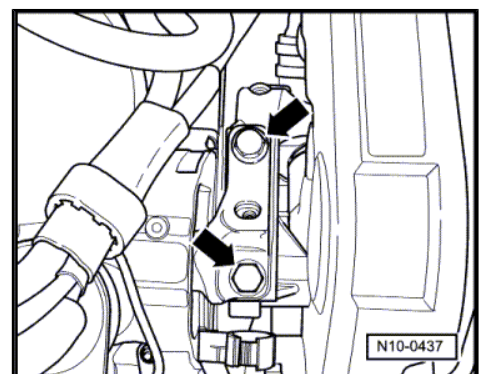
Support pins must be secured to engine bracket -T10012- as shown.

- Fit engine bracket -T10012- to cylinder block with M10 × 25/ 8.8 bolt and tighten to approx. 40 Nm.
- Raise engine and gearbox slightly using engine and gearbox jack -V.A.G 1383 A- .
- Unbolt assembly mounting on engine side from engine bracket -arrows-.



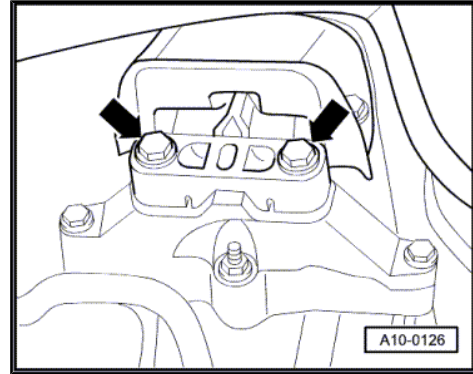
Note

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





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



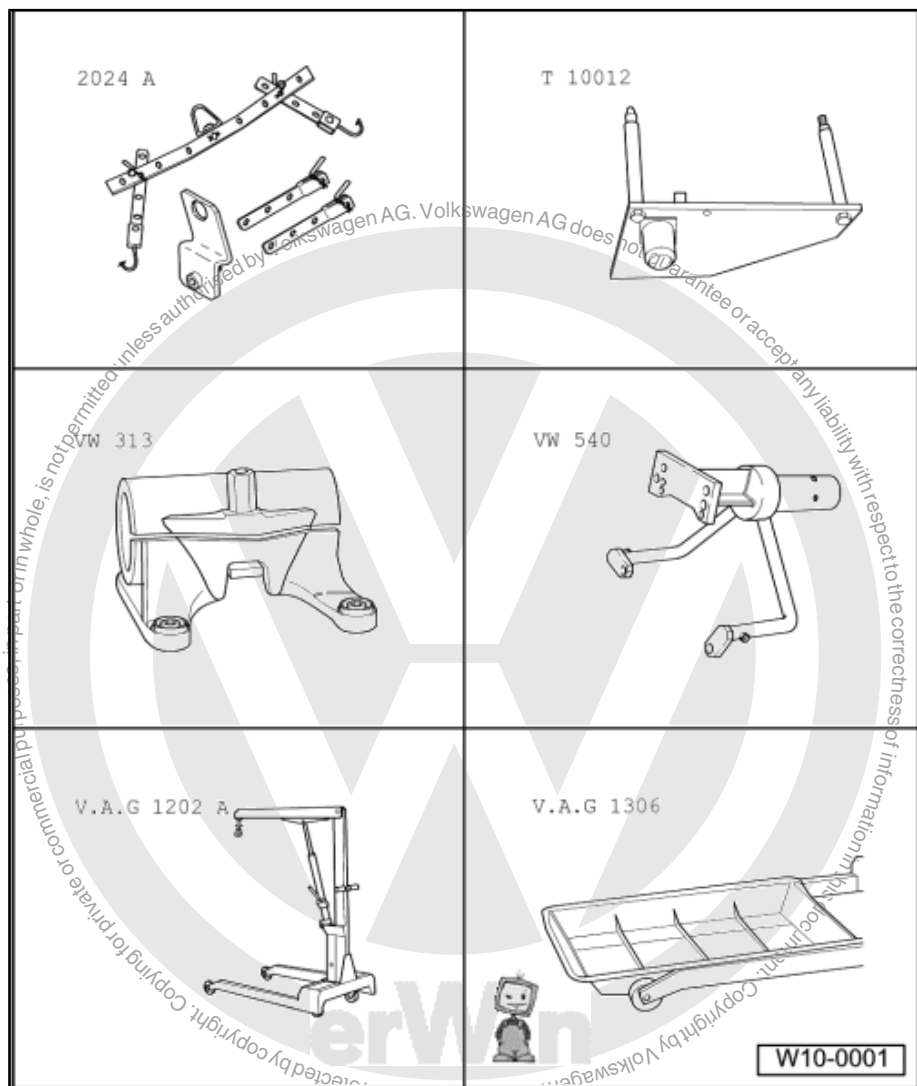
Note

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

1.3 Removing engine (Passat)

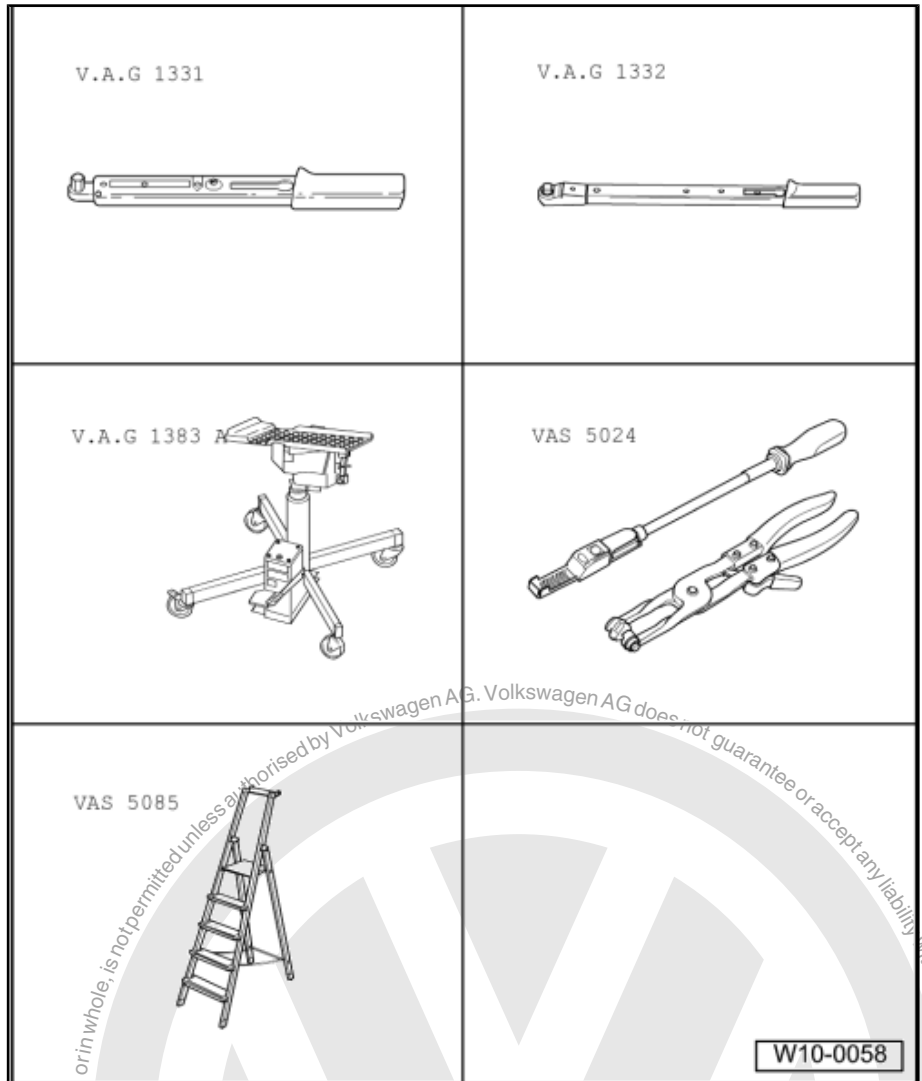
Special tools and workshop equipment required

- ◆ Lifting tackle -2024 A-
- ◆ Engine bracket -T10012-
- ◆ Support clamp -VW 313-
- ◆ Engine and gearbox support -VW 540- or engine and gearbox support -VAS 6095-
- ◆ Workshop hoist -V.A.G 1202 A- or workshop crane -VAS 6100-
- ◆ Drip tray -V.A.G 1306- or drip tray -VAS 6208-





- ◆ Torque wrench (5... 50 Nm) -V.A.G 1331-
- ◆ Torque wrench (40... 200 Nm) -V.A.G 1332-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Spring-type clip pliers -VAS 5024-
- ◆ Stepladder -VAS 5085-



Not illustrated:

- ◆ Container for removed parts -V.A.G 1698-
- ◆ Engine bung set -VAS 6122-
- ◆ Grease -G 000 100-
- ◆ Cable ties



Procedure



Note

- ◆ Before carrying out further work, disconnect battery earth strap. Check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.
- ◆ The engine is removed downwards together with the gearbox.
- ◆ Leave ignition key in ignition lock to prevent steering lock from engaging.
- ◆ It is advisable to remove the front wheels before beginning engine removal. The vehicle can then be lowered on hoist until the brake disc splash plates are just above the floor. This provides the most ergonomic working position regarding accessibility of engine compartment components.
- ◆ All cable ties which are opened or cut through when engine is removed must be replaced in the same position when engine is installed.
- ◆ To prevent damage to removed components, place them in the container for removed parts -V.A.G 1698- .
- ◆ Some components cannot be removed, or removed only with difficulty, with the engine installed. Therefore, you should determine all defective components before removing engine and renew them while engine is removed.



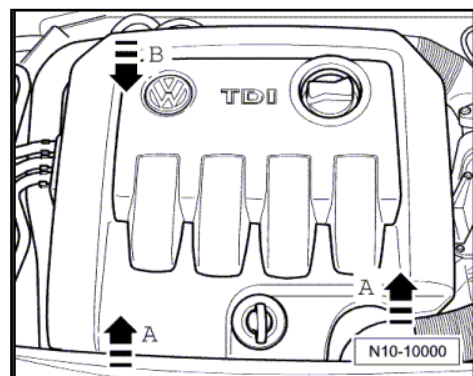
WARNING

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 and refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.
 - ◆ Ensure that there is sufficient clearance to all moving or hot components.
- 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.

One-piece engine cover

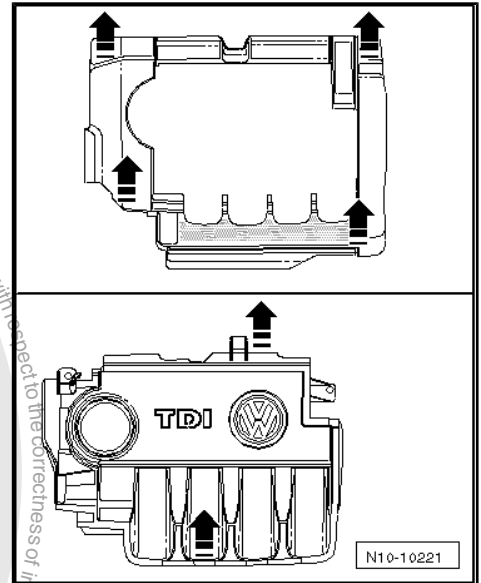
For one-piece engine cover, pull engine cover abruptly upwards at front and right -arrows A-, then pull forwards out of rear fastening -arrow B-.



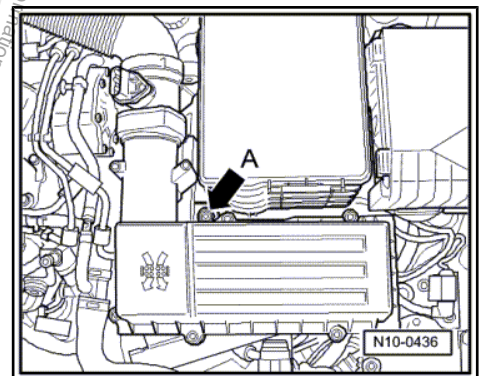


Two-piece engine cover

For two-piece engine cover, first pull outer engine cover abruptly upwards at -arrows-, then pull inner engine cover abruptly upwards at -arrows-.



- 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.
- Remove battery and battery tray.
- Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 64 ; Removing and installing plenum chamber cover.



Vehicles without anti-theft alarm system

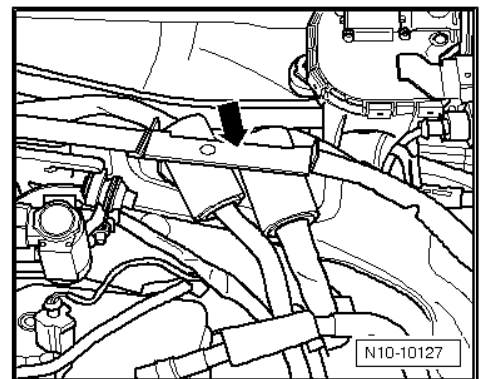
- Release and disconnect connector from engine control unit ⇒ [page 251](#) , Removing and installing engine control unit.

Vehicles with anti-theft alarm system

- Release and disconnect connector from engine control unit ⇒ [page 240](#) , Removing and installing engine control unit with theft protection.

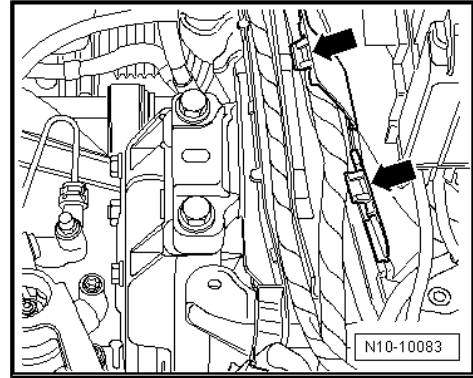
Continuation for all vehicles

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





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

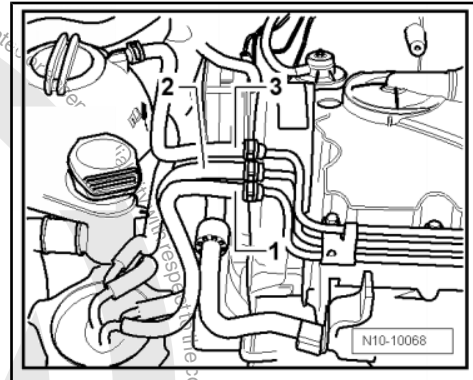


- Pull off fuel supply hose -2-, fuel return hose -1- and coolant hose -3-.

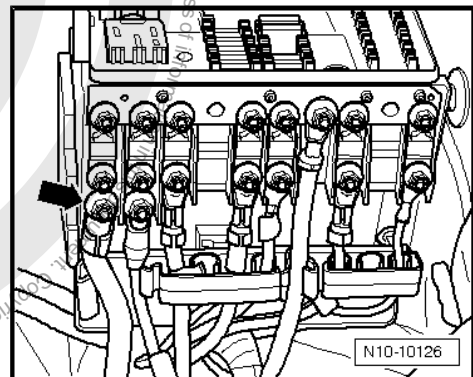


WARNING

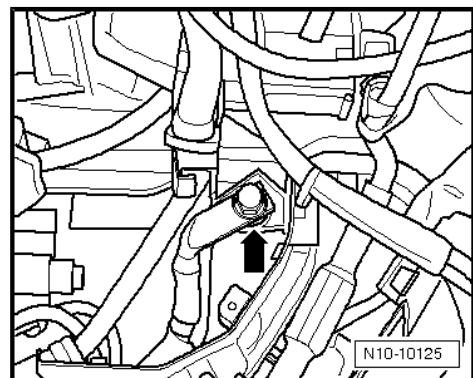
- ◆ **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- ◆ **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!**
- ◆ **Wear eye and hand protection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



- Remove wire from central electrics -arrow-.



- Unscrew earth cable from longitudinal member.
- 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.
- Remove selector mechanism from gearbox ⇒ 5-speed manual gearbox 0A4; Rep. gr. 34 ; Repairing selector mechanism .
- Remove hydraulic clutch slave cylinder ⇒ 5-speed manual gearbox 0A4; Rep. gr. 30 .
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Assembly overview - Body - front .
- Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier - service position .
- Pull connector off oil level and oil temperature sender -G266- .

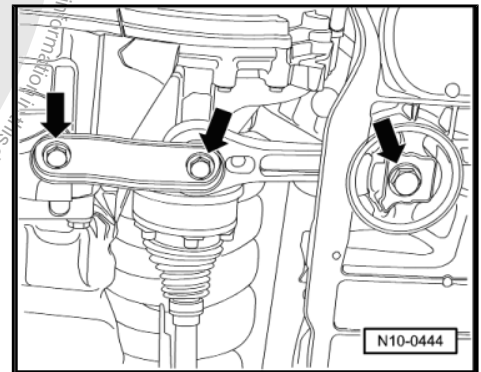




- Pull retainer for oil level and oil temperature sender -G266- connector off subframe.
- Drain coolant ⇒ [page 123](#) .
- Completely remove exhaust pipes from auxiliary heater ⇒ Heating, air conditioning; Rep. gr. 82 .
- Pull off coolant hoses on coolant pipes to supplementary heater.
- Separate all other coolant hoses from engine.
- Unbolt left and right drive shafts from gearbox ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shafts .
- Unbolt pendulum support -arrows-.

To facilitate removing and installing engine without opening refrigerant circuit:

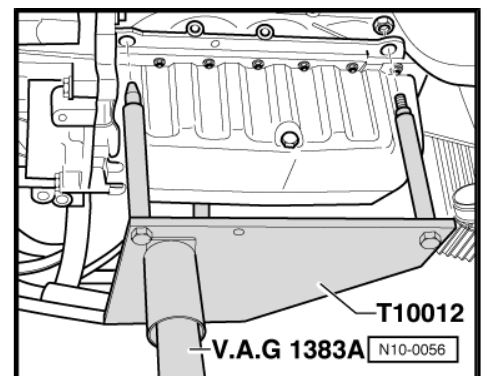
- Remove poly V-belt ⇒ [page 25](#) .
- Remove air conditioner compressor from ancillary bracket ⇒ Heating, air conditioning; Rep. gr. 87 ; Removing and installing compressor bracket .
- Secure air conditioner compressor to lock carrier so that refrigerant lines/hoses are free of stress.



Note

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

- On vehicles with particulate filter remove subframe ⇒ Running gear, axles, steering; Rep. gr. 40
- Remove front exhaust pipe ⇒ [page 255](#) .
- Unscrew rear coolant pipe ⇒ [page 120](#) .
- Tighten engine bracket -T10012- on cylinder block with securing nut and M10 × 25/ 8.8 bolt to approx. 40 Nm.
- Insert engine bracket -T10012- in engine and gearbox jack - V.A.G 1383 A- .
- Raise engine and gearbox slightly using engine and gearbox jack -V.A.G 1383 A- .



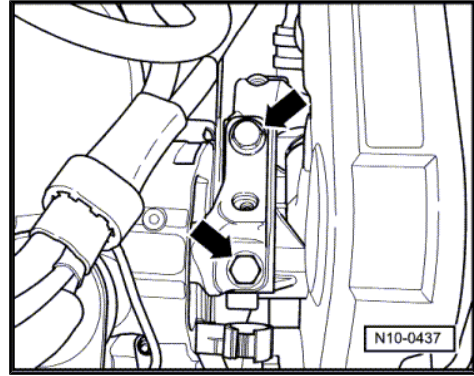


- Unbolt assembly mounting on engine side from engine bracket -arrows-.



Note

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

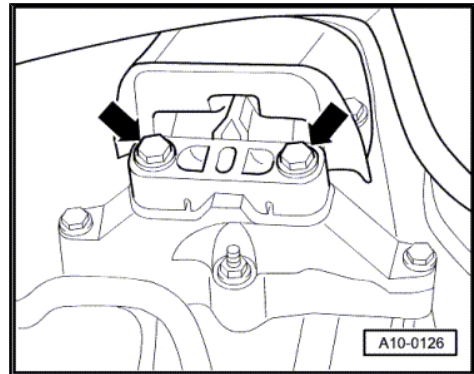


- Unbolt assembly mounting on gearbox side from gearbox bracket -arrows-.



Note

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



- Carefully lower engine with gearbox.



Note

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

1.4 Securing engine to assembly stand

When working on the engine, secure it to support clamp -VW 540- of the assembly stand using engine and gearbox support -VW 313- .

Procedure

- Disconnect gearbox.
- Attach lifting tackle -2024 A- as shown and raise engine out of engine and gearbox jack -V.A.G 1202 A- using workshop crane -V.A.G 1383 A- .

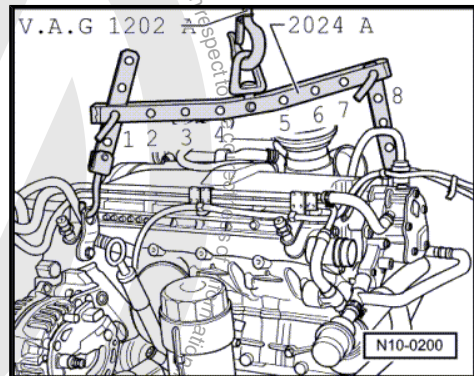
Belt pulley end: 2nd hole in hook rail at position 1

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



WARNING

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



Note

- ◆ The holes marked with 1 ... 4 of the support bar point to the belt pulley.
- ◆ The holes in the hook rails are counted up from the hook.
- Secure engine on support clamp -VW 540- using engine and gearbox jack -VW 313- .



1.5 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.
- Lubricate splines of input shaft lightly with G 000 100.
- Check whether dowel sleeves for centring engine and gearbox are in cylinder block and install if necessary.

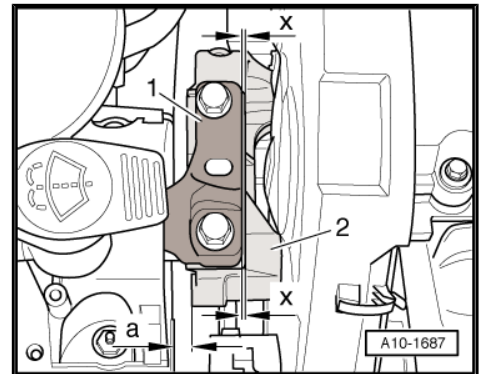
When installing engine, ensure correct position of assembly mounting:

- On belt pulley side, ensure that there is a distance -a- of at least 10 mm between engine support and right longitudinal member.
- The side surface of the engine support -2- should be located parallel to the support arm -1-. Dimension -x- must be identical at top and bottom.



Note

Distance -a- = 10 mm can also be checked with a metal rod of suitable size, or similar.

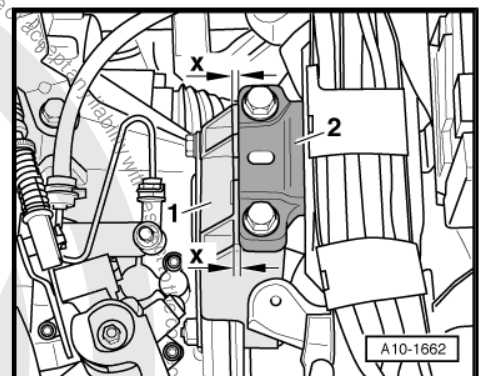


- Ensure that the edges of the support arm on the gearbox assembly mounting -2- and gearbox support -1- are parallel with one another. Dimension -x- must be identical at top and bottom.



Note

- ◆ Specified torques for assembly mountings ⇒ [page 22](#)
- ◆ Electrical connections and routing. ⇒ *Electrical system*; Rep. gr. 97



Procedure

- Install pendulum support.
- Install drive shafts ⇒ *Running gear, axles, steering*; Rep. gr. 40 ; *Removing and installing drive shafts* .
- Install front exhaust pipe ⇒ [page 255](#) .

Vehicles with manual gearbox

- Install slave cylinder for hydraulic clutch ⇒ 6-speed manual gearbox 02S; Rep. gr. 30 ; *Repairing clutch mechanism*; *Assembly overview - hydraulics* .
- Remove selector mechanism from gearbox ⇒ 6-speed manual gearbox 02S; Rep. gr. 34 ; *Repairing selector mechanism* .

Vehicles with four-wheel drive:

- Install selector mechanism on gearbox ⇒ 6-speed manual gearbox 02Q, four-wheel drive; Rep. gr. 34 ; *Repairing selector mechanism* .
- Install pressure line for hydraulic clutch mechanism.
- Install front propshaft ⇒ Final drive 02D, 0AV; Rep. gr. 39 ; *Assembly overview - repairing propshaft* .



Continuation for all vehicles:

- On vehicles with particulate filter install subframe => Running gear, axles, steering; Rep. gr. 40
- Install alternator => Electrical system; Rep. gr. 27 ; Removing and installing alternator and poly V- belt .
- Install air conditioner compressor => Heating, air conditioning; Rep. gr. 87 ; Removing and installing compressor bracket.
- Install poly V-belt => [page 26](#) .
- Install noise insulation => General body repairs, exterior; Rep. gr. 50 ; Assembly overview - Body - front .
- Install engine control unit => [page 239](#) .
- Install plenum chamber bulkhead => General body repairs, exterior; Rep. gr. 50 Body - front; Plenum chamber bulkhead .
- Fill coolant system with coolant => [page 123](#) .
- Carry out road test and then read fault memory => [page 239](#) .

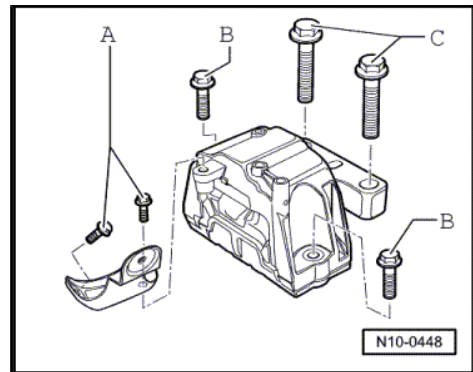
Specified torques

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

1.6 Assembly mountings

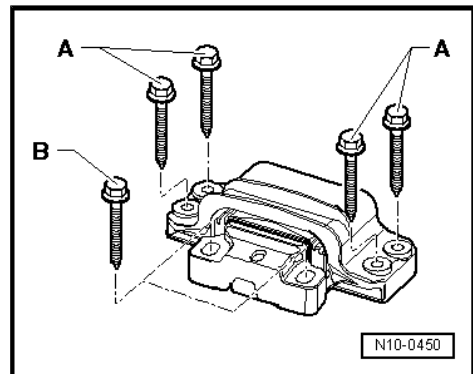
Engine assembly mountings

- A = 20 Nm + 90° further ¹⁾
- B = 40 Nm + 90° further ¹⁾
- C = 60 Nm + 90° further ¹⁾
- 1) Renew.



Gearbox assembly mounting

- A = 40 Nm + 90° further ¹⁾
- B = 60 Nm + 90° further ¹⁾
- 1) Renew.





Pendulum support

Always note the size and strength rating of bolt. Different specified torques are valid.

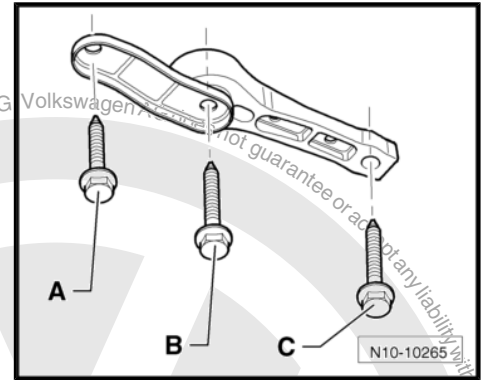


Caution

From model year 08, in manual gearboxes 02Q Heli Coil inserts are installed in the threaded connections to pendulum support. Difference \Rightarrow Rep. gr. 34

For these and all other gearboxes bolts with strength rating 10.9 must be used.

If Heli Coil inserts are not fitted in manual gearboxes 02Q, use bolts with strength rating 8.8 and the specified torques.



Bolt -A-

M10 x 35 strength rating 8.8: turn 40 Nm + 90° further

M10 x 35 strength rating 10.9: turn 50 Nm + 90° further

Always renew after removing

Bolt -B-

M10 x 75 strength rating 8.8: turn 40 Nm + 90° further

M10 x 75 strength rating 10.9: turn 50 Nm + 90° further

Always renew after removing

Bolt -C-

M14 x 1.5 x 70

100 Nm + 90° turn

Do not tighten until pendulum support is bolted on gearbox

Always renew after removing





13 – Crankshaft group

1 Dismantling and assembling engine

Assembly overview - poly V-belt drive ⇒ [page 24](#) .

Removing and installing poly V-belt ⇒ [page 25](#) .

Assembly overview - toothed belt drive ⇒ [page 28](#) .

Assembly overview - crankcase ⇒ [page 32](#)



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 engine oil cooler in order to prevent subsequent damage.

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 - Bracket

- For alternator and air conditioner compressor.

5 - Poly V-belt tensioning element

- Swing with ring spanner to slacken poly V-belt.

6 - 25 Nm

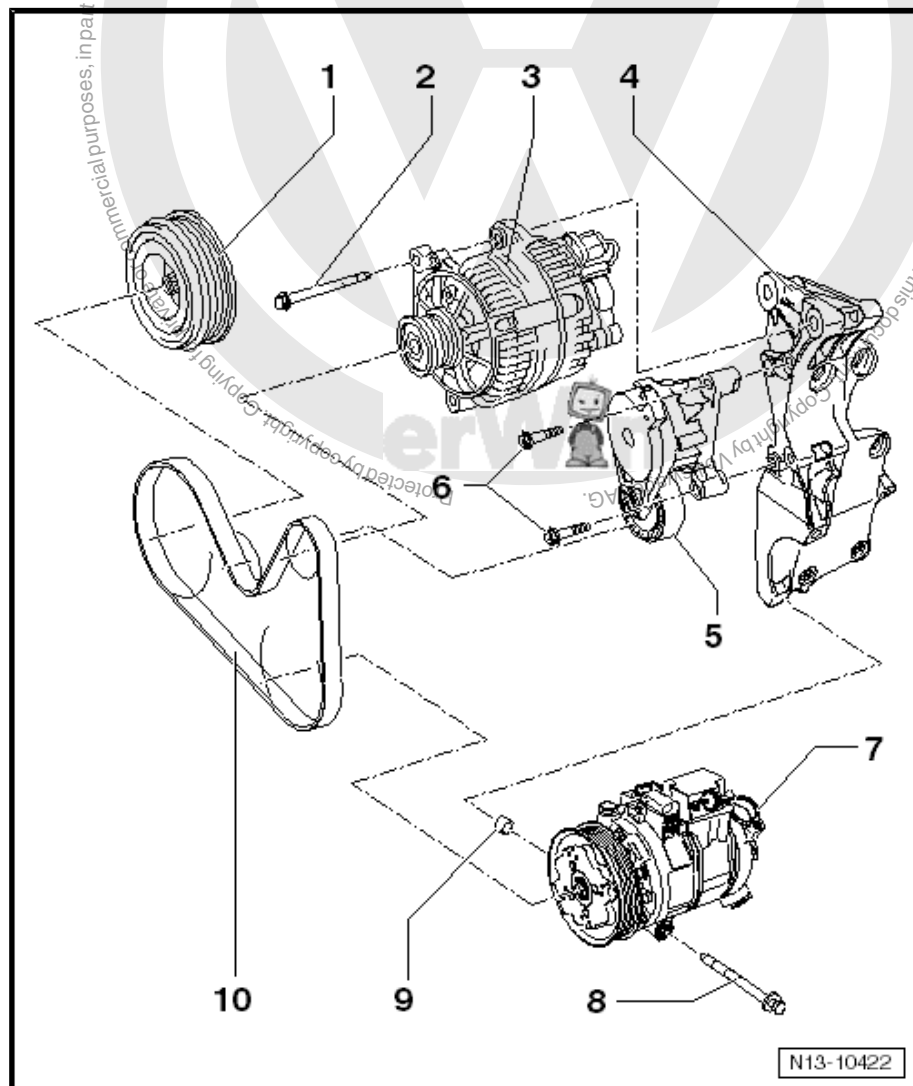
7 - Air conditioner compressor

8 - 25 Nm

9 - Dowel sleeves

10 - Poly V-belt

- Mark direction of rotation before removing.
- Check for wear.
- Do not kink.
- Removing and installing ⇒ [page 25](#)



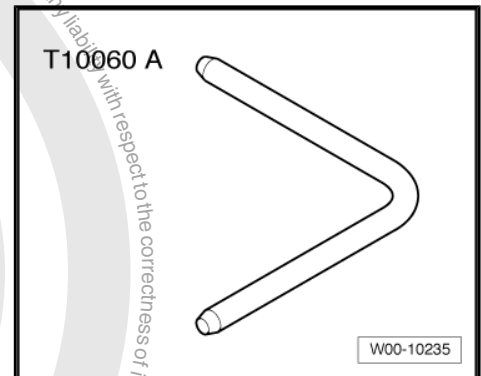
N13-10422



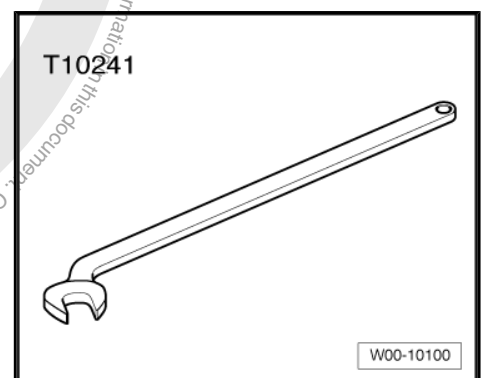
1.1.1 Removing poly V-belt

Special tools and workshop equipment required

- ◆ Locking pin -T10060 A-



- ◆ 16 mm open-end spanner -T 10241-



- Remove noise insulation. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .
- Remove lower part of front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .



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!**

- Golf, Golf Plus, Touran: Pull fuel filter out of bracket and place it with hoses to one side.

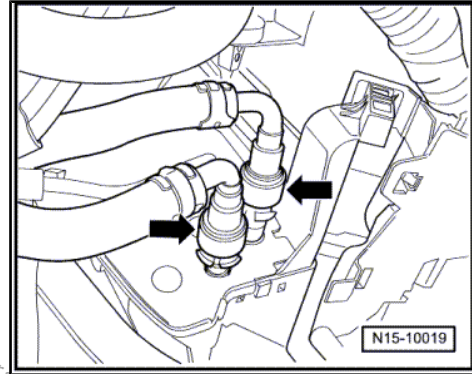


- Only Passat: Separate push-fit couplings of fuel lines -arrows-



Note

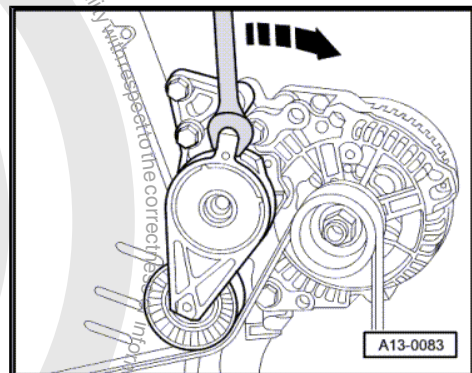
Do this by lifting catch of push-on connectors.



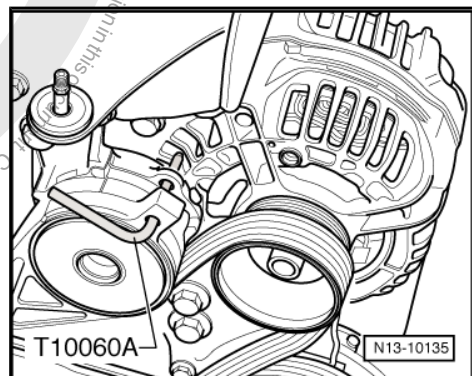
All other vehicles continued

- Unbolt fuel filter from engine assembly mounting and lay to side (hoses remain connected).
- Mark direction of rotation of poly V-belt.
- Swing tensioning element in direction of arrow to remove tension from poly V-belt.

The open-end spanner 16 mm -T 10241- is particularly well suited to relieve tension.



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



1.1.2 Installing poly V-belt

- Install in reverse order.



Note

- ◆ Ensure, before installing poly V-belt, that all ancillaries (alternator, air conditioner compressor) are secured tightly.
- ◆ When fitting poly V-belt, check direction of belt rotation and ensure proper seating of belt in pulleys.
- ◆ Lastly, place poly V-belt over alternator.

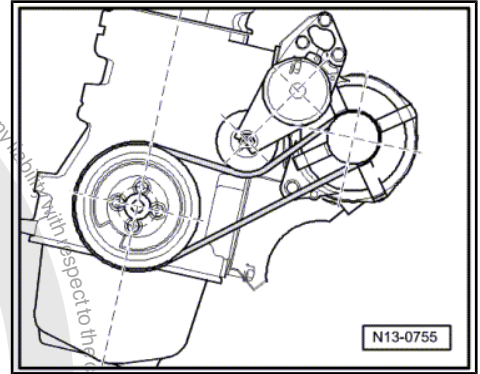
- Only Passat: Install fuel filter. Specified torque: 10 Nm.

After completing repairs always:

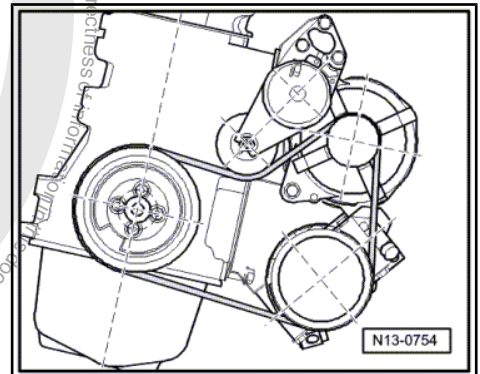


- Start engine and check belt running.

Belt drive without air conditioner compressor



Belt drive with air conditioner compressor





1.2 Assembly overview - toothed belt drive

1 - Toothed belt guard upper part

2 - 100 Nm

3 - 25 Nm

4 - Camshaft pulley

5 - Hub

- With sender wheel
- Use counterhold tool - T10051- to loosen and tighten.
- To remove, use puller - T10052- .
- Removing and installing => [page 97](#) , removing and installing camshaft.

6 - 10 Nm

- Renew.

7 - Stud

- 15 Nm

8 - Rear toothed belt guard

9 - 25 Nm

10 - Sealing grommet

- Renew if damaged.

11 - 20 Nm + turn (45°)

12 - Tensioning roller

- Remove engine support in order to remove and install => [page 29](#) .

13 - 20 Nm

14 - Idler roller

15 - Coolant pump

- Removing and installing => [page 128](#)

16 - Crankshaft toothed belt pulley

17 - 120 Nm + turn (90°)

- Renew.
- Use counterhold tool -3099- to loosen and tighten.
- Do not additionally oil or grease thread and shoulder.
- Turning further can be done in several stages.

18 - 15 Nm

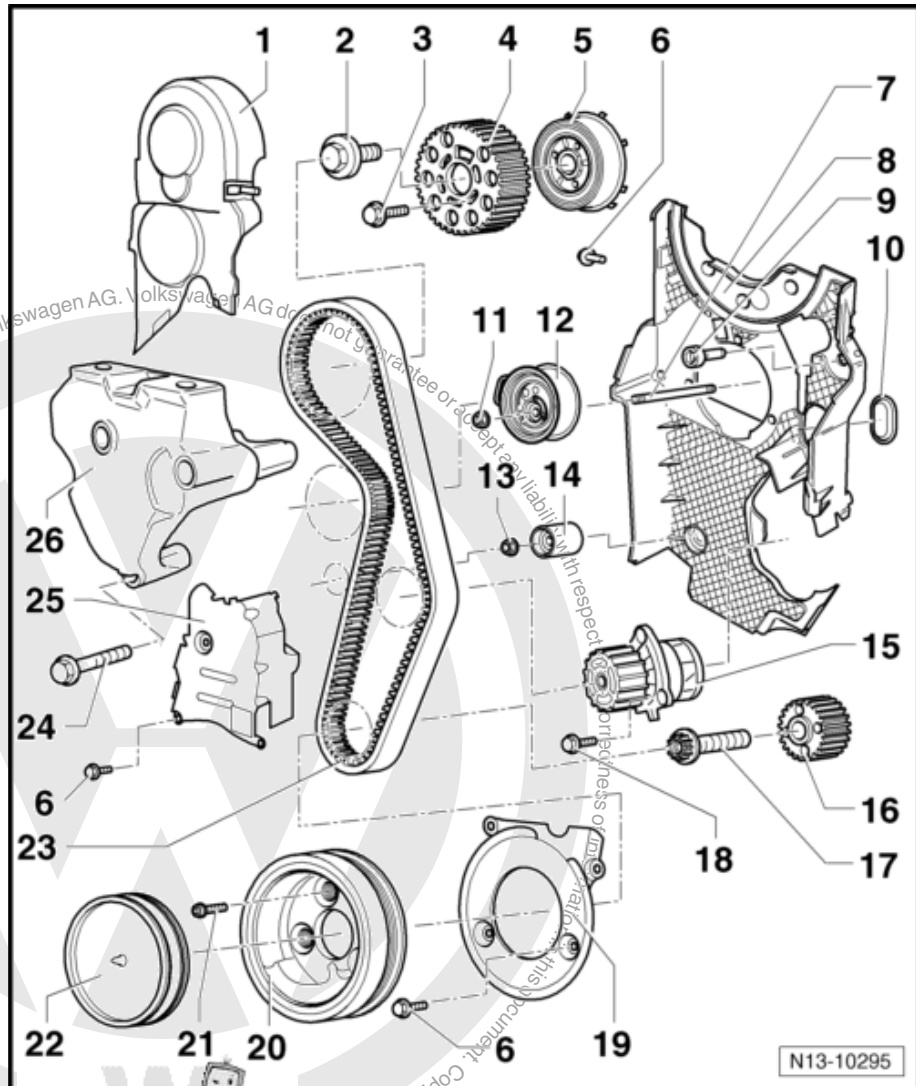
19 - Toothed belt guard lower part

20 - Belt pulley and vibration damper

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

21 - 10 Nm + turn (90°)

- Renew.



N13-10295



22 - Cover

23 - Toothed belt

- Mark direction of rotation before removing.
- Check for wear.
- Do not kink.
- Removing, installing and tensioning ⇒ [page 66](#) .

24 - 40 Nm + turn (180°)

- Renew.

25 - Toothed belt guard centre part

26 - Engine bracket

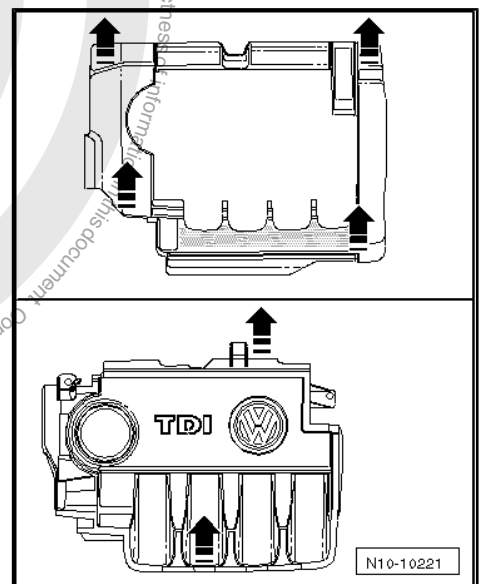
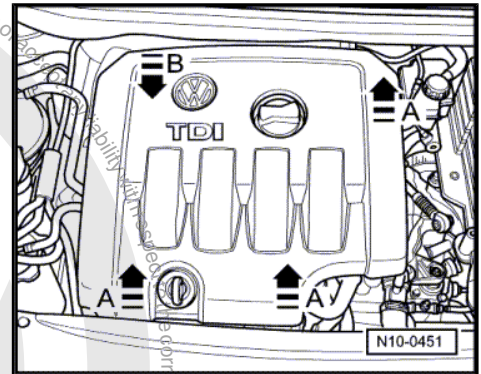
1.3 Removing and installing engine support

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-

Two-piece engine cover

For two-piece engine cover, first pull out engine cover abruptly upwards at -arrows-, then pull inner engine cover abruptly upwards at -arrows-.



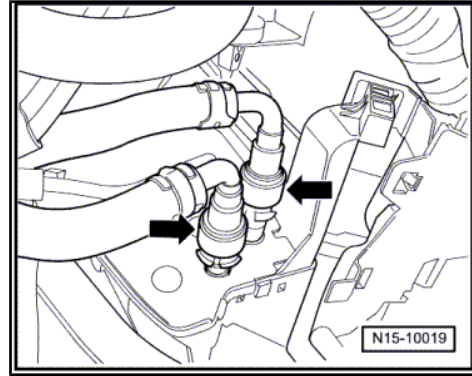


- Separate push-on connectors of fuel lines -arrows-.



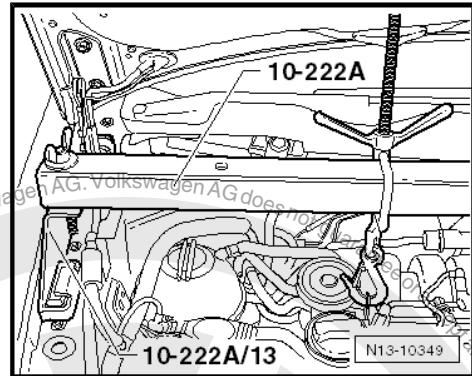
Note

- ◆ 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 turbocharger.
- Carefully cover or seal open ends.



Golf, Golf Plus and Touran:

- Fit engine support bracket -10-222A- with adapters -10-222A/13- and take up weight of engine in installation position.

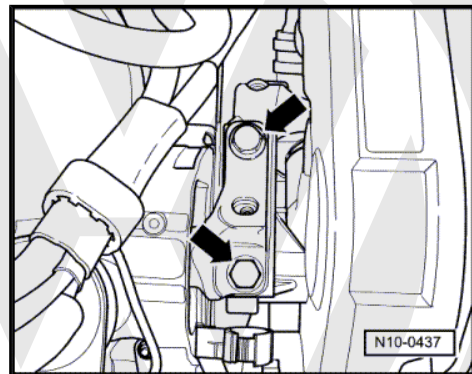


- Remove securing bolts from assembly mounting/engine support -arrows- and remove complete assembly mounting.



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.

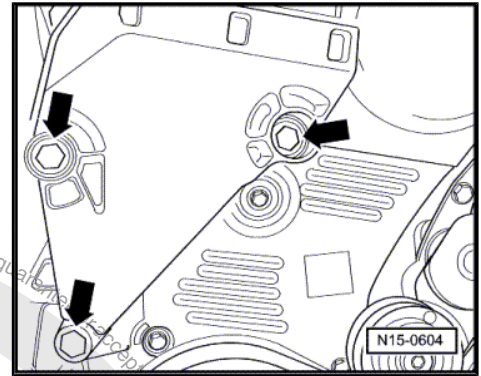
- Remove noise insulation => General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Remove front right wheel housing liner.



- 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 on cylinder block.
- Insert new bolts and tighten by hand.



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 + (180°) turn further. To do this, raise or lower engine using support bracket -10 - 222 A- .

I : Engine support with less clearance to engine

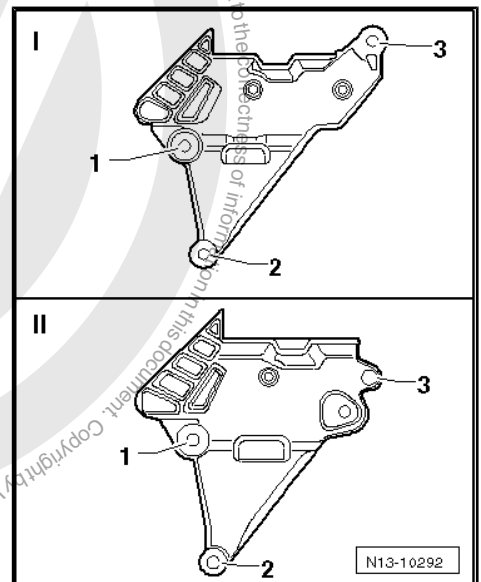
II: Engine support with greater clearance to engine



Note

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

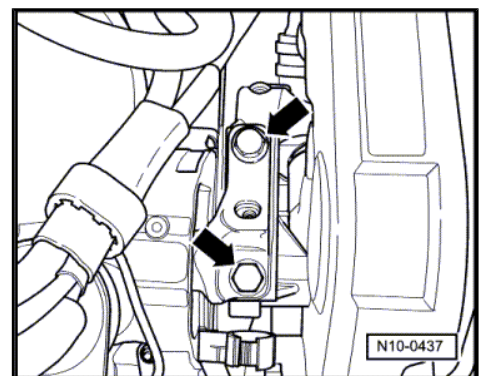
- Install assembly mounting between engine and body, renew securing bolts ⇒ [page 22](#).



- Bolt engine assembly mounting to engine support -arrows- by bringing contact surfaces together using support bracket -10-222A- . Specified torque: 60 Nm + turn 90° 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 line and return line (return line blue or with blue marking, supply line black).
- ◆ When installing charge air pipes, ensure that locking lugs engage correctly.
- Install wheel housing liner.
- Install noise insulation. ⇒ 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 33](#) .
- Removing and installing crankshaft ⇒ [page 48](#) .
- Dismantling and assembling pistons and con-rods ⇒ [page 48](#)

2 - Seal

- Renew.

3 - Oil filter bracket

- Dismantling and assembling ⇒ [page 109](#) .

4 - 15 Nm + turn (90°)

- Renew.
- First fit upper left and lower right bolts and then tighten all 4 bolts in diagonal sequence.

5 - Bracket

6 - 20 Nm

7 - Connection

- For thermostat.

8 - 15 Nm

9 - O-ring

- Renew.

10 - Thermostat

- Removing and installing ⇒ [page 130](#)
- Observe installation position ⇒ [page 130](#) , removing and installing thermostat.
- Checking heat thermostat in water.
- Opening begins at approx. 85 °C.
- Ends at approx. 105 °C
- Opening lift at least 7 mm.

11 - Hexagon bolt

- Tightening sequence and torque specifications ⇒ Heating, air conditioning; Rep. gr. 87 ; Removing and installing compressor bracket .

12 - Bracket

- For alternator, if air conditioner compressor is fitted

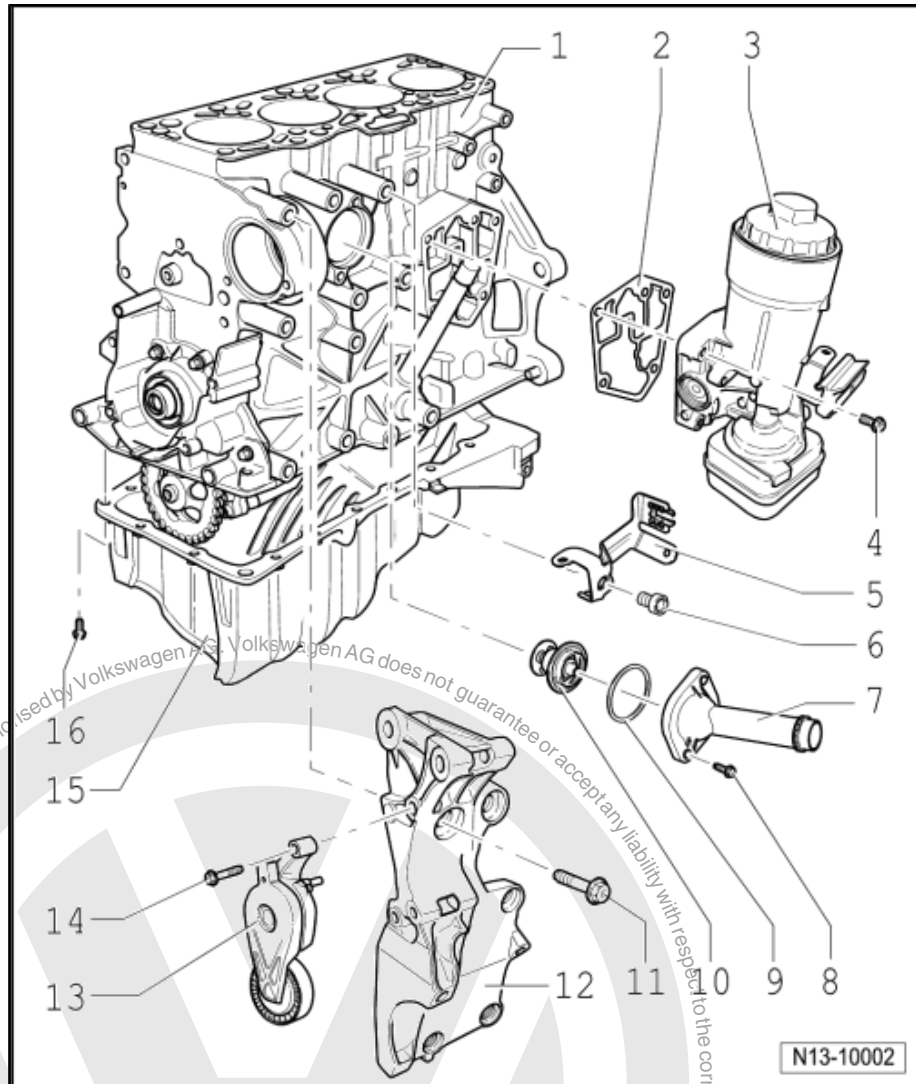
13 - Poly V-belt tensioning element

14 - 25 Nm

15 - Oil sump

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

16 - 15 Nm



N13-10002



2 Removing and installing sealing flange and flywheel

Assembly overview - sealing flange and flywheel ⇒ [page 33](#)

Removing and installing engine speed sender ⇒ [page 46](#)

Renewing crankshaft oil seal - belt pulley end ⇒ [page 36](#) .

Removing and installing sealing flange - pulley end ⇒ [page 36](#) .

Removing and installing dual-mass flywheel ⇒ [page 34](#) .

Renewing crankshaft sealing flange - flywheel end ⇒ [page 40](#) .

2.1 Assembly overview - sealing flanges and flywheel



Note

Repairing clutch ⇒ 6-speed manual gearbox 02S; Rep. gr. 30 ; Repairing clutch .

1 - Seal

- Do not additionally oil or grease the oil seal sealing lip.
- Before installing, remove deposits from crankshaft journal using a clean cloth.
- Renewing crankshaft oil seal - belt pulley end ⇒ [page 36](#) .

2 - Sealing flange

- Must seat on dowel sleeves.
- Removing and installing ⇒ [page 38](#)
- Install with silicone sealant -D 176 404 A2- ⇒ [page 38](#) .

3 - Cylinder block

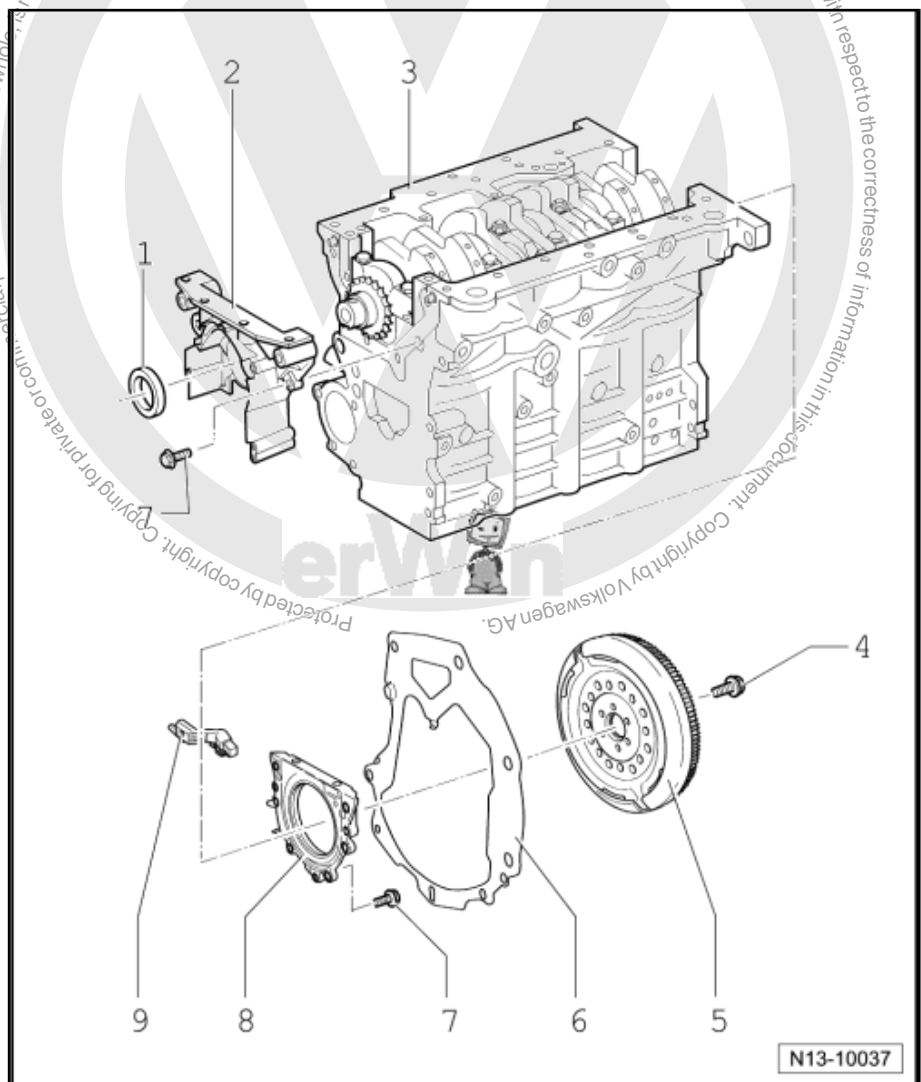
- Removing and installing crankshaft ⇒ [page 48](#) .
- Dismantling and assembling pistons and con-rods ⇒ [page 48](#)

4 - 60 Nm + turn (90°)

- Renew.

5 - Flywheel

- To remove and install flywheel, counterhold with 3067.
- Removing and installing dual-mass flywheel ⇒



N13-10037



[page 34](#) .

6 - Intermediate plate

- Must sit on dowel sleeves
- Do not damage or bend when assembling.

7 - 15 Nm

- Renew.

8 - Sealing flange with oil seal

- Renew complete with oil seal and sender wheel only.
- Removing and installing => [page 40](#)

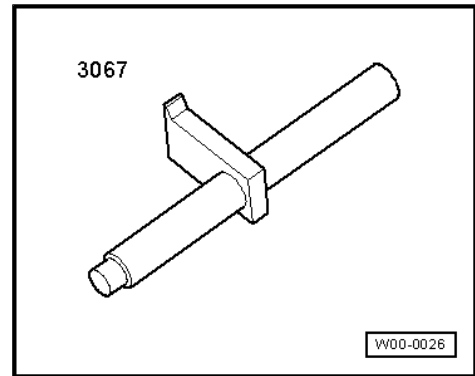
9 - Removing and installing engine speed sender -G28- => [page 46](#) .

- Loosen and tighten using commercially available ball-ended hexagon key socket
- Specified torque: 5 Nm.

2.2 Removing and installing dual-mass fly-wheel

Special tools and workshop equipment required

- ◆ Counterhold -3067-



Removing

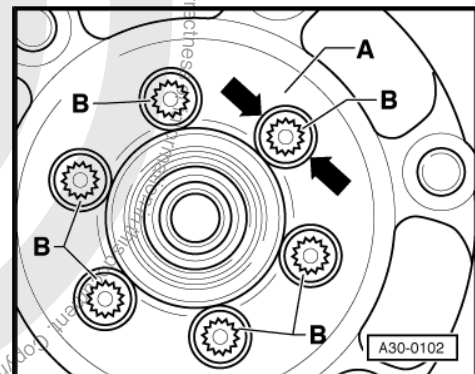
- Remove gearbox => Power transmission; Rep. gr. 37 ; Removing and installing gearbox .



Caution

To prevent damage to the dual-mass flywheel when removing, the bolts -B- must not be removed with an impact wrench or similar. The bolts may only be removed by hand.

- Mark position of dual-mass flywheel in relation to engine.
- Rotate the dual-mass flywheel -A- so that the bolts -B- align centrally with the holes -arrows-.
- When unscrewing bolts -B-, ensure that none of the bolt heads come into contact with the dual-mass flywheel -arrows-. The flywheel will otherwise be damaged when the bolts are unscrewed further.



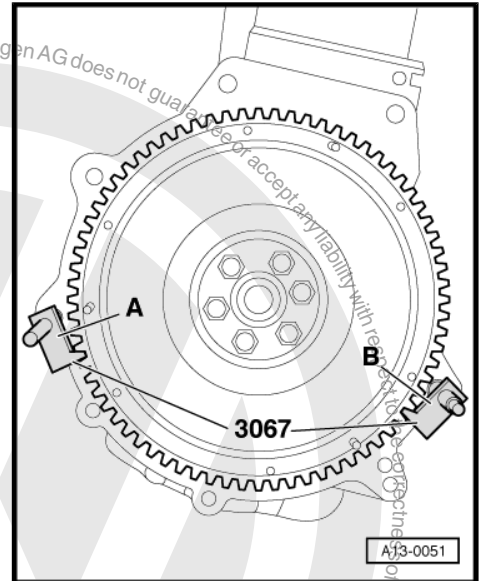


- Insert counterhold -3067- in hole on cylinder block -B-.
- Unscrew dual-mass flywheel.

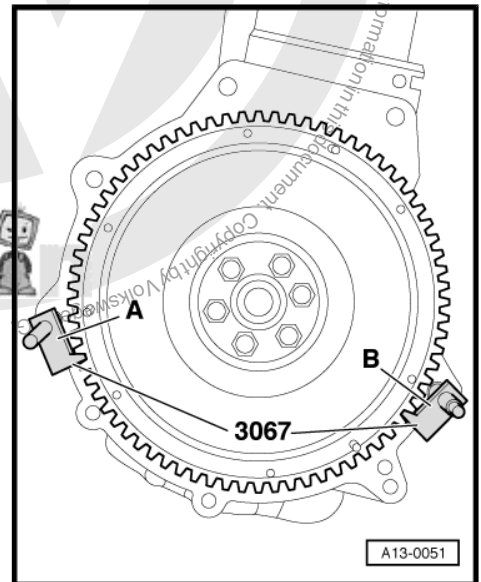
Installing

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

- Specified torque ⇒ [Item 4 \(page 33\)](#) .
- Use new bolts for securing.



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

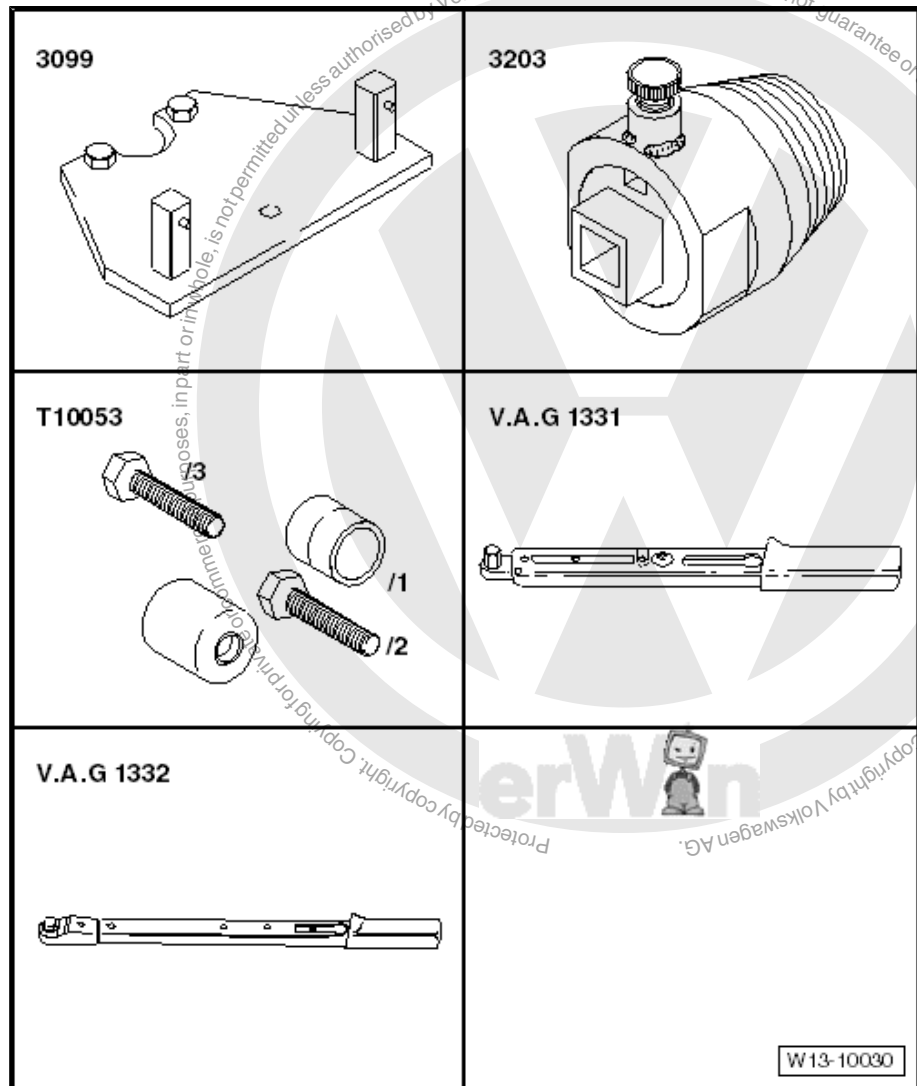




2.3 Renewing crankshaft oil seal - belt pulley end

Special tools and workshop equipment required

- ◆ Counterhold tool -3099-
- ◆ Oil seal extractor -3203-
- ◆ Assembly tool -T10053+3-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-



2.3.1 Removing

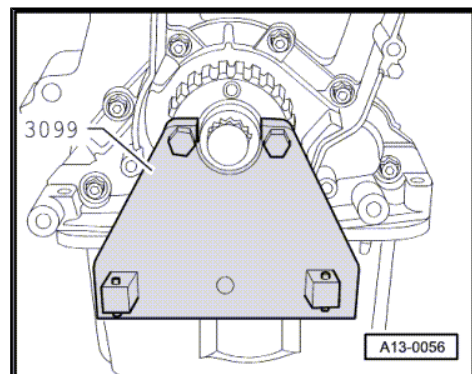
- Remove toothed belt. => [page 66](#)
- Remove crankshaft toothed belt pulley. To do this, lock toothed belt pulley using counterhold -3099- .



Note

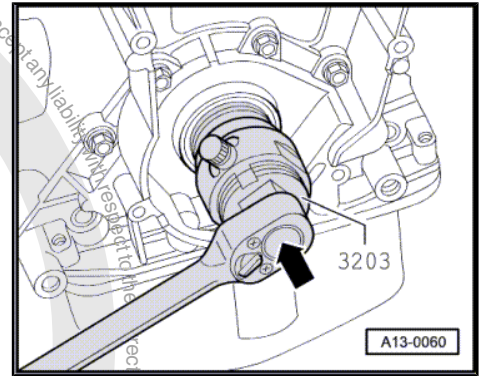
When bolting on counterhold, place two washers between toothed belt pulley and counterhold.

- 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.

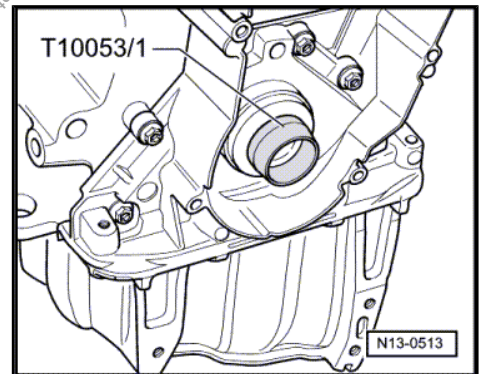


2.3.2 Installing

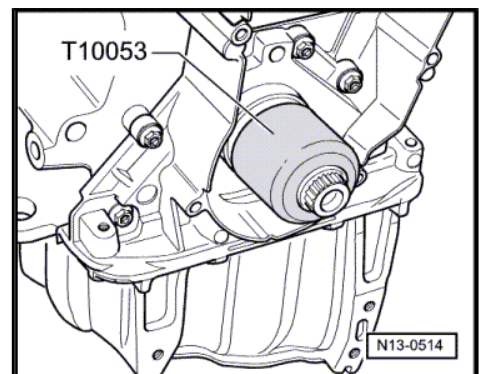
Note

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 and tighten toothed belt ⇒ [page 66](#) .

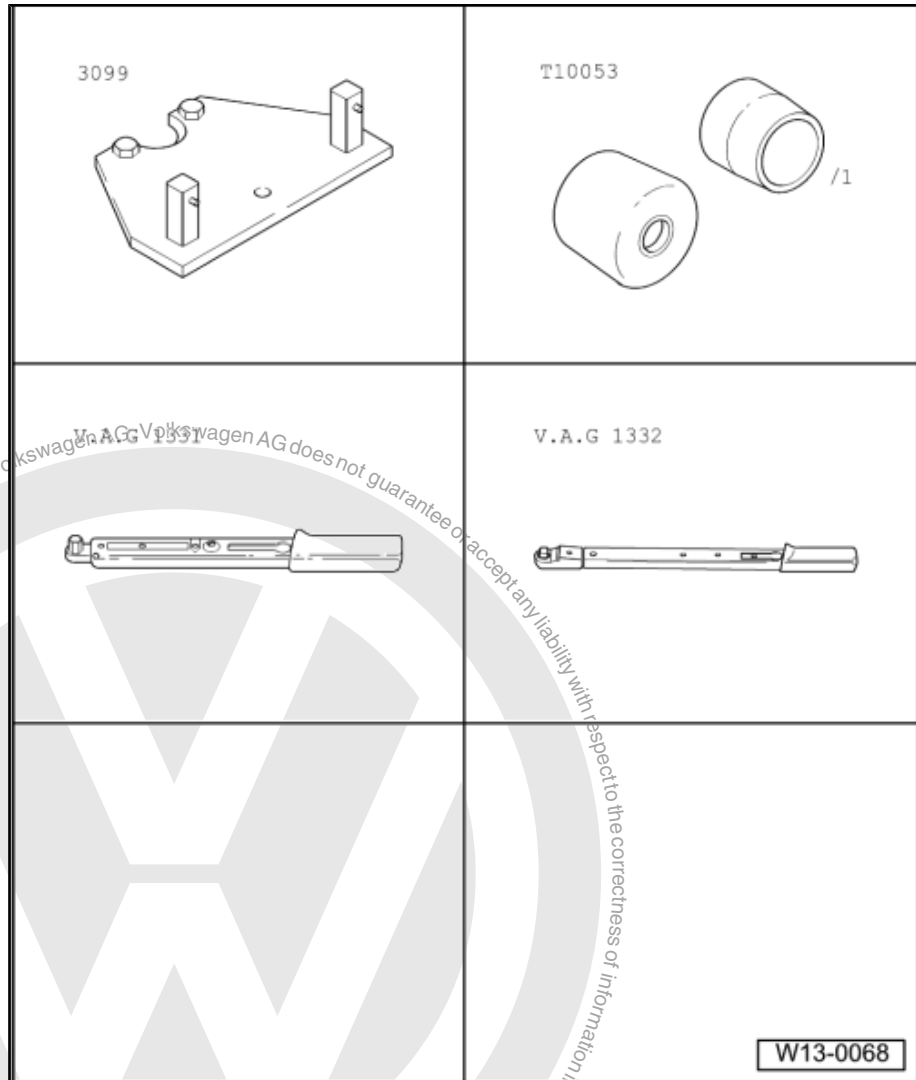




2.4 Removing and installing sealing flange - pulley end

Special tools and workshop equipment required

- ◆ Counterhold tool -3099-
- ◆ Assembly tool -T10053-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Hand drill with plastic brush attachment
- ◆ Silicone sealant -D 176 404 A-
- ◆ Flat scraper



2.4.1 Removing

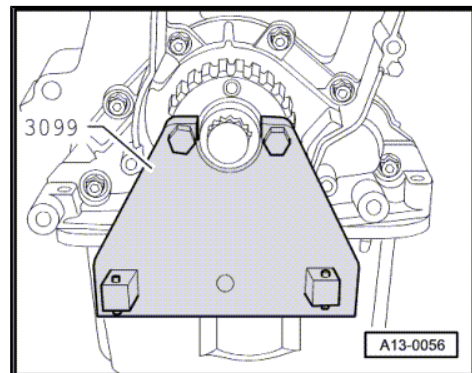
- Remove toothed belt. ⇒ [page 66](#)
- Remove crankshaft toothed belt pulley. To do this, lock toothed belt pulley using counterhold -3099- .



Note

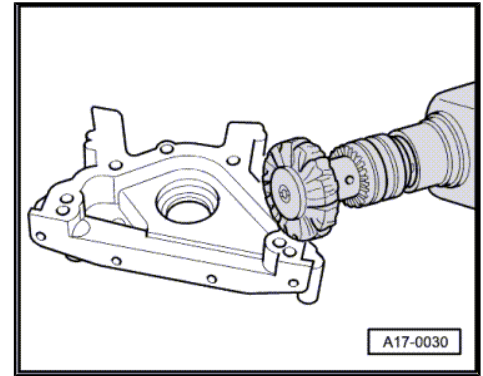
When bolting on counterhold, place two washers between toothed belt pulley and counterhold.

- Drain engine oil.
- Remove sump ⇒ [page 105](#) .
- 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 with a flat scraper.





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



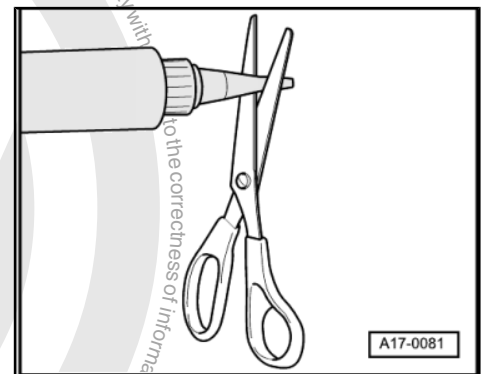
2.4.2 Installing

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 (\varnothing of nozzle approx. 3 mm).

Note

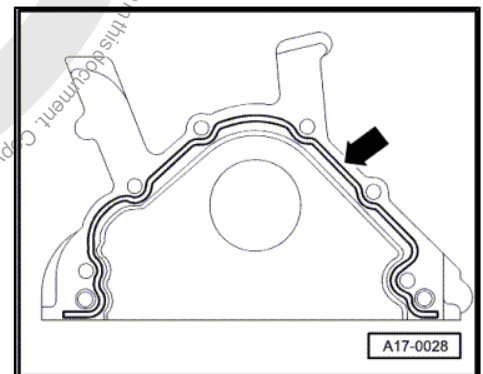
- ◆ The sealant bead must not be thicker than 2... 3 mm, otherwise excess sealant can enter sump and block the strainer in oil pump suction pipe, as well as drip onto the sealing surface of crankshaft oil seal.
 - ◆ Before applying sealant bead, cover sealing surface of oil seal with a clean cloth.
- 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 sump ⇒ [page 105](#) .



Note

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

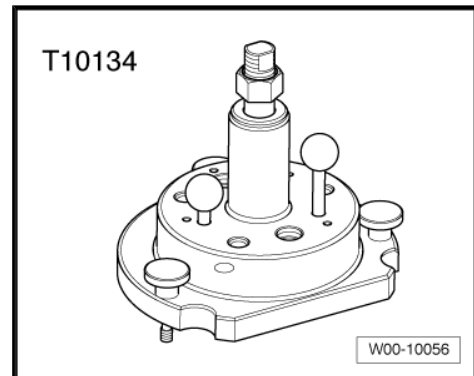
Installing toothed belt and adjusting valve timing. ⇒ [page 66](#)



2.5 Renewing crankshaft sealing flange - flywheel end

Special tools and workshop equipment required

- ◆ Assembly tool -T10134-



- ◆ Torque wrench -V.A.G 1331-
- ◆ Socket -V.A.G 1332/11-
- ◆ Vernier gauge
- ◆ Three hexagon bolts M 6 x 35 mm
- ◆ Two hexagon bolts M 7 x 35 mm

2.5.1 Pressing out sealing flange with sender wheel



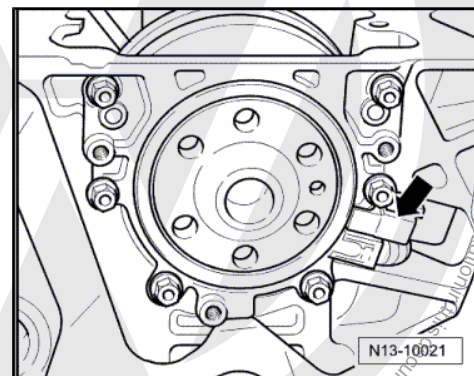
Note

- ◆ 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 flywheel.
- Remove intermediate plate.
- Set engine to TDC No. 1 cylinder ⇒ [page 66](#) , Removing and installing toothed belt.
- Remove sump ⇒ [page 105](#) .
- Remove engine speed sender -G28- -arrow- using a commercially available ball-ended hex key socket ⇒ [page 46](#) .
- Unscrew sealing flange securing bolts.



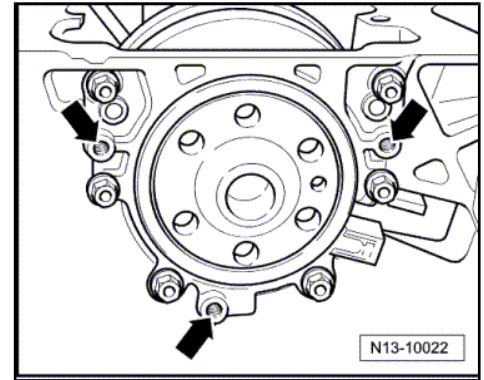
Note

Sealing flange and sender wheel are pressed off the crankshaft together using three M 6 x 35 mm bolts.





- Screw three M 6 x 35 mm bolts into threaded holes -arrows- of sealing flange.
- Screw bolts alternately (max. 1/2 turn 180° for each bolt) into sealing flange and press sealing flange together with sender wheel off crankshaft.



2.5.2 Pressing in sealing flange with sender wheel

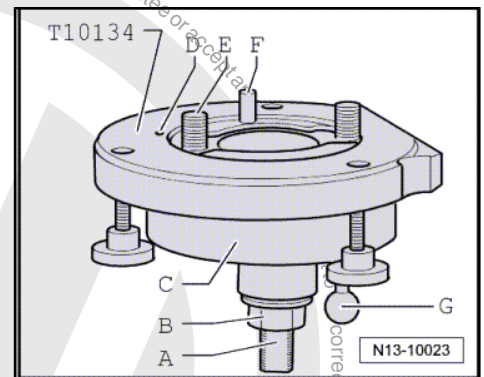


Note

- ◆ 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-

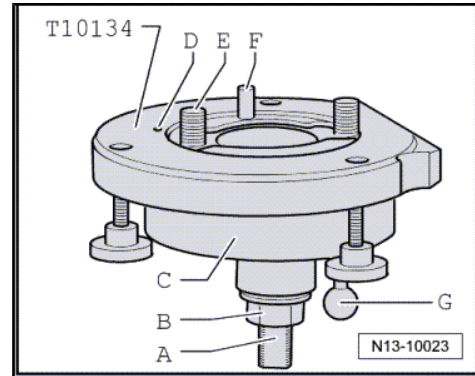
- A - Clamping surface
- B - Hexagon nut
- C - Assembly housing
- D - Locating pin
- E - Hexagon socket head bolt
- F - Guide pin for diesel engines (black knob)
- G - Guide pin for petrol engines (red knob)





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

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

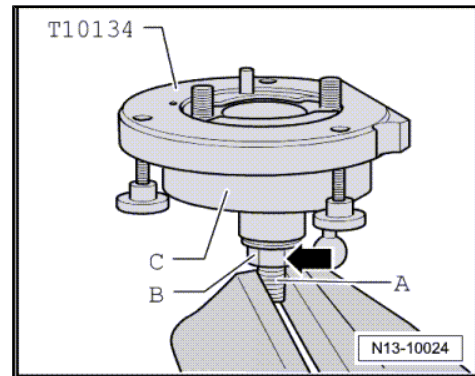


- Clamp assembly device -T10134- in a vice on clamping surface -A- of threaded spindle.
- Press assembly housing -C- downwards until it lies on hexagon nut -B- -arrow-.



Note

Inner part of assembly tool and assembly housing must be at same height.

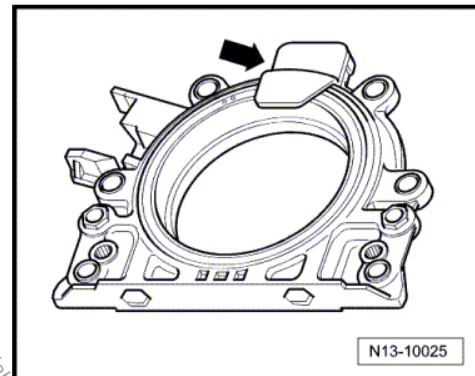


- Remove securing clip -arrow- from new sealing flange.



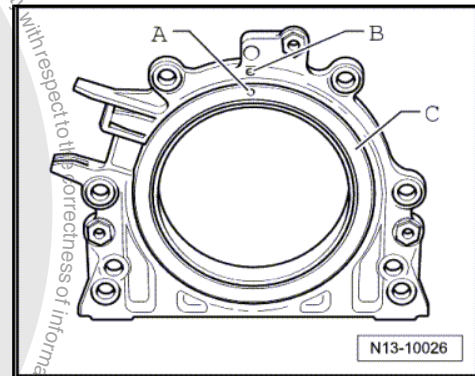
Note

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



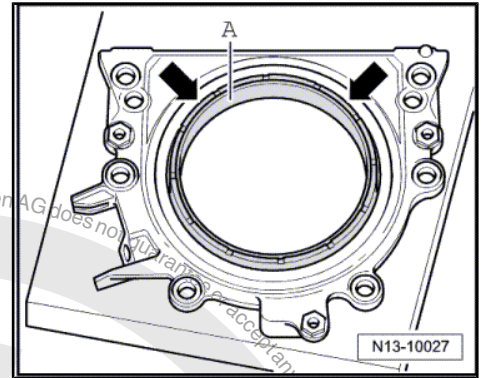
- Locating hole -A- on sender wheel -C- must align with marking -B- on sealing flange.

Place sealing flange with front side downwards on a clean flat surface.

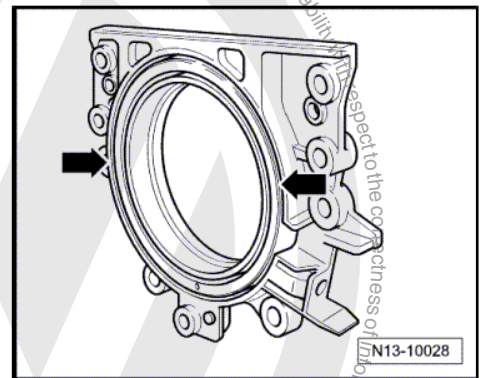




- Push sealing lip support ring -A- downwards in direction of arrow until it lies on flat surface.



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

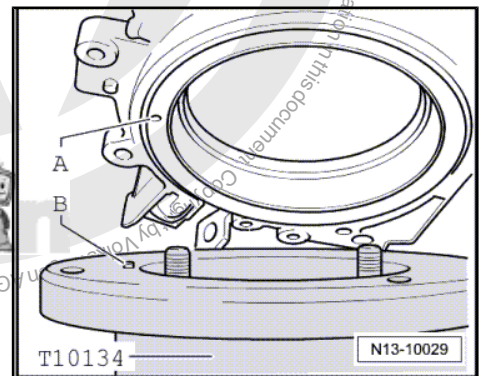


- Place sealing flange with front side on assembly tool -T10134- so that locating pin -B- can be inserted in sender wheel hole -A-.



Note

Ensure sealing flange lies flat on assembly tool.

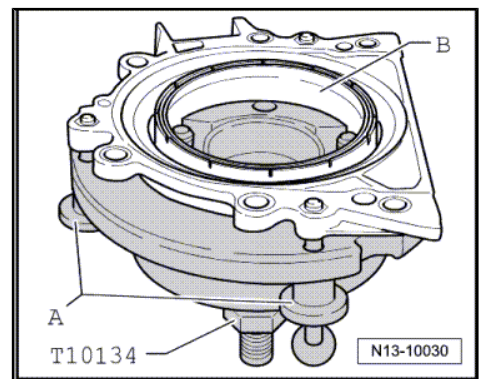


- Push sealing flange and support ring for sealing lip -B- against surface of assembly tool -T10134- whilst tightening the three knurled screws -A- so that locating pin cannot slide out of sender wheel hole.



Note

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

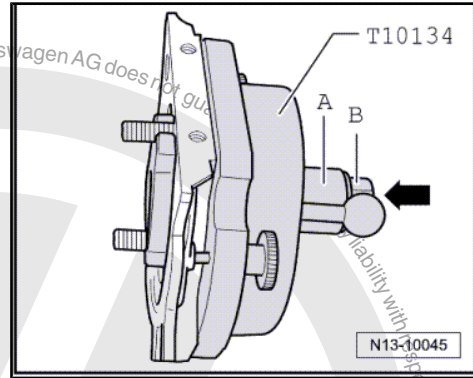


2.5.4 B - Attaching assembling tool -T10134- with sealing flange on crankshaft flange

- Crankshaft flange must be free of oil and grease.
- Engine positioned at TDC No. 1 cylinder.



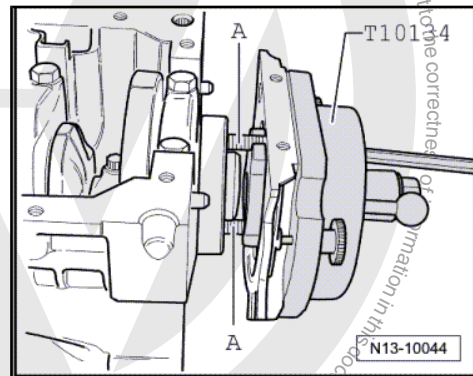
- Screw hexagon nut -B- to end of threaded spindle.
- Press threaded spindle of assembly tool -T10134- in direction of arrow, until hexagon nut -B- lies against assembly housing -A-.
- Align flat side of assembly housing on sump side of crankcase sealing surface.



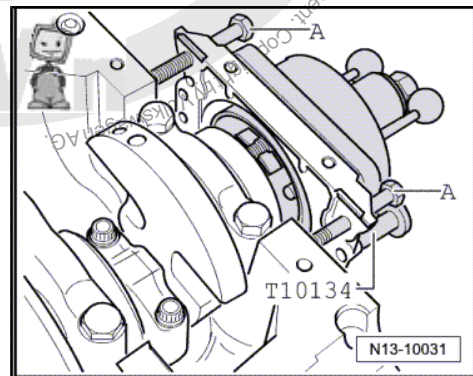
- Secure assembly tool -T10134- to crankshaft flange using hexagon socket head bolts -A-.

i Note

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



- To guide sealing flange, screw two M 7 x 35 mm bolts -A- into cylinder block.



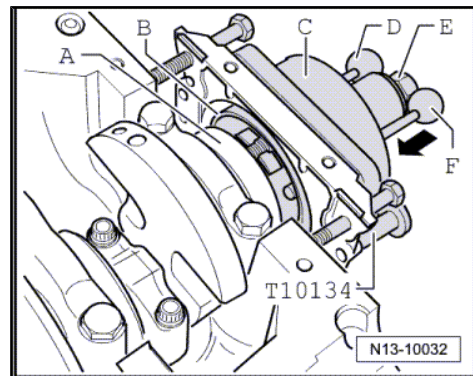
2.5.5 C - Bolting assembly tool -T10134- onto crankshaft flange

- 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.

i 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-.





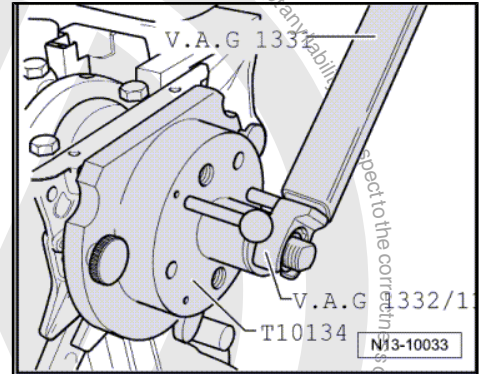
2.5.6 D - Pressing sender wheel onto crankshaft flange using assembly tool - T10134-

- 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- .



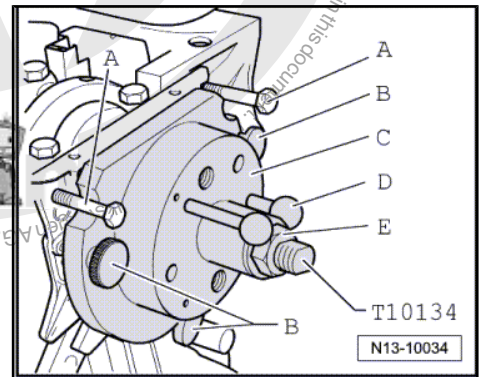
Note

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

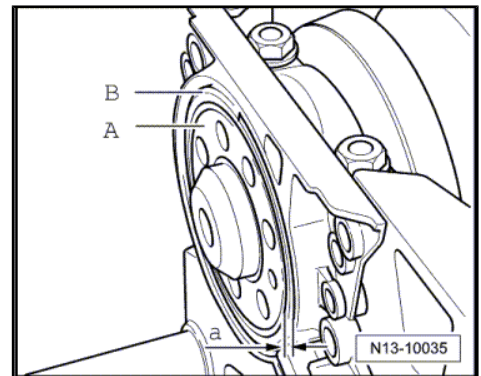


2.5.7 E - Checking sender wheel installation position on crankshaft

- 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-.



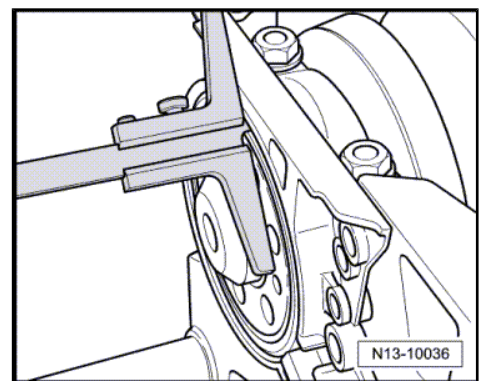
- Set vernier gauge on crankshaft flange.
- Measure distance -a- between crankshaft flange and sender wheel.

If measurement -a- is too small:

- Press sender wheel further. => [page 46](#)

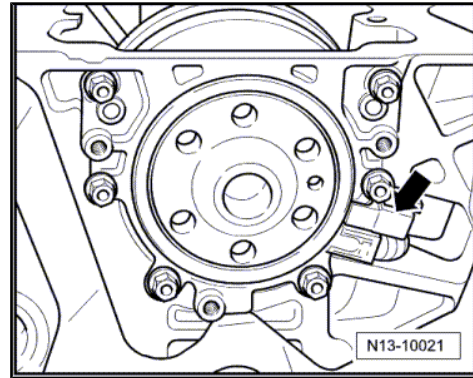
If dimension -a- is attained:

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



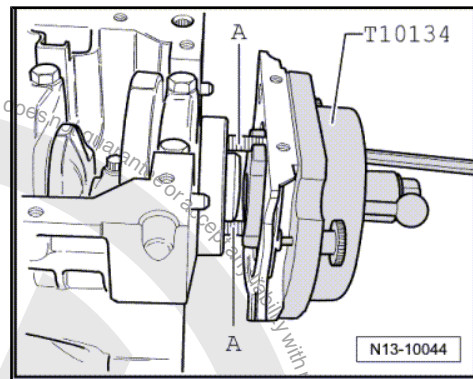


- Install engine speed sender -G28- -arrow- and tighten securing bolt to 5 Nm.
- Install sump => [page 105](#) .
- Install intermediate plate.
- Install flywheel using new bolts. Tighten securing bolts to 60 Nm + turn 90° further.

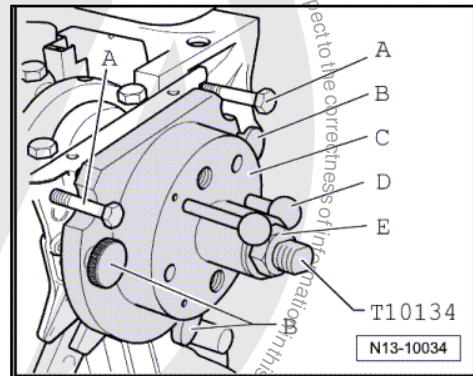


2.5.8 F - Re-pressing sender wheel

- 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.



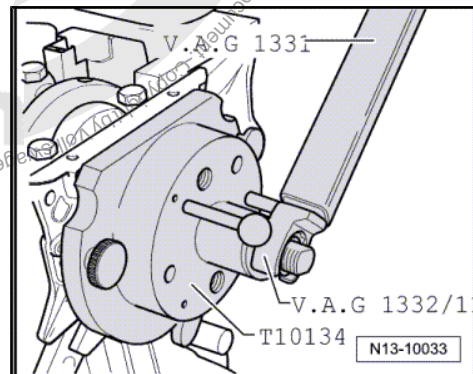
- Screw hexagon nut -E- onto threaded spindle by hand until it lies on assembly housing -C-.



- 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 45](#)

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 45](#)

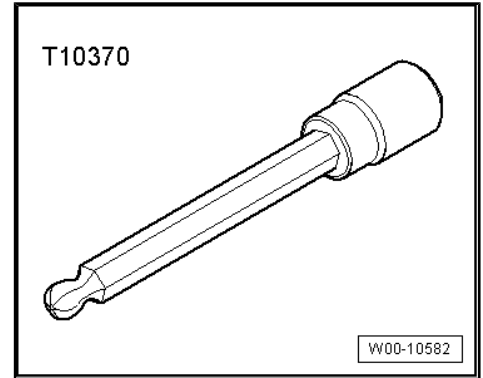


2.6 Removing and installing engine speed sender -G28-

Special tools and workshop equipment required



- ◆ Hexagon key extension, 4 mm -T10370-



- ◆ Or commercially available ball-ended hexagon key socket, 5 mm

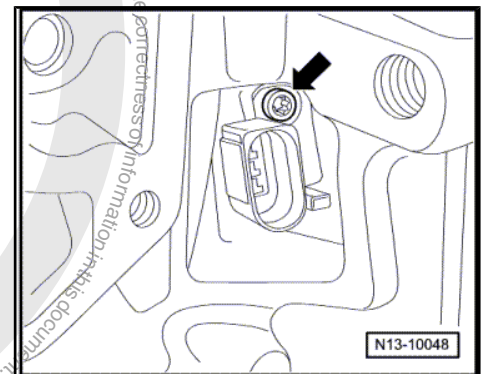


Note

Two different bolts are installed, check which tool is to be used.

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Clamp off coolant hoses at engine oil cooler using hose clip and pull off hoses.
- Remove oil filter bracket.
- Remove securing bolt -arrow- and pull out engine speed sender -G28- .

Installation is performed in the reverse order, observing the following: specified torque for engine speed sender -G28- securing bolt: 5 Nm.





3 Crankshaft

Assembly overview - crankshaft ⇒ [page 48](#) .

Renewing needle bearing in crankshaft - vehicles with dual clutch gearbox ⇒ [page 49](#)

Crankshaft dimensions ⇒ [page 48](#) .

3.1 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 + turn (90°)

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

3 - Bearing cap

- Bearing cap 1: 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

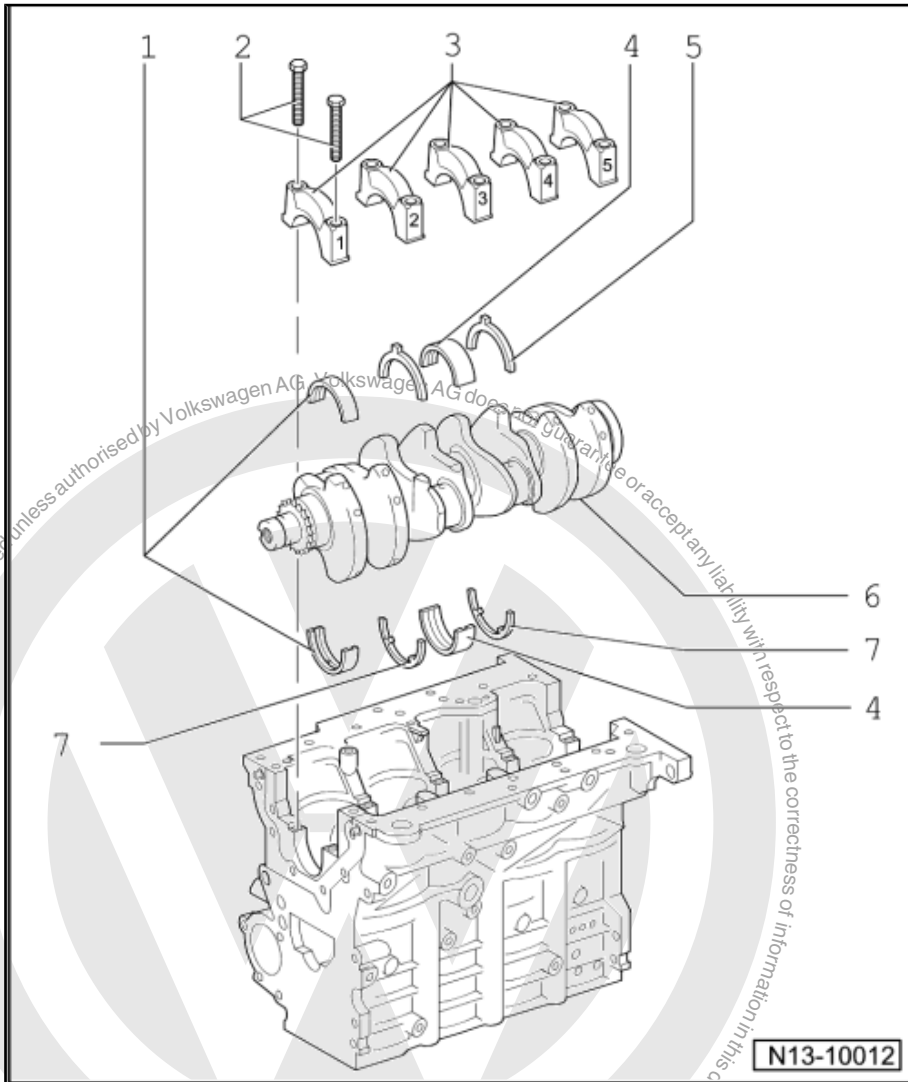
- For bearing cap 3.
- Note fixing arrangement.

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 48](#) .

7 - Thrust washer

- For cylinder block, bearing 3



3.1.1 Crankshaft dimensions

(Dimensions in mm)

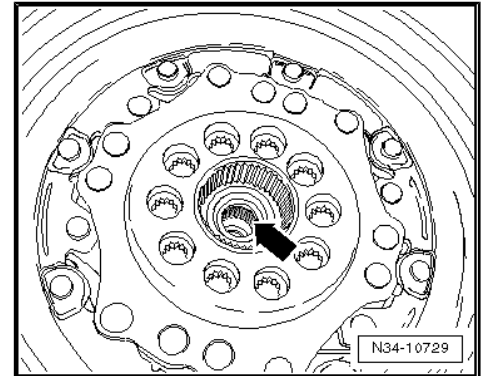


Honing dimension	Main journal Ø	Conrod journal Ø
Basic dimension	54.00 -0.022 -0.042	47.80 -0.022 -0.042

3.1.2 Renewing needle bearing in crankshaft - vehicles with dual clutch gearbox

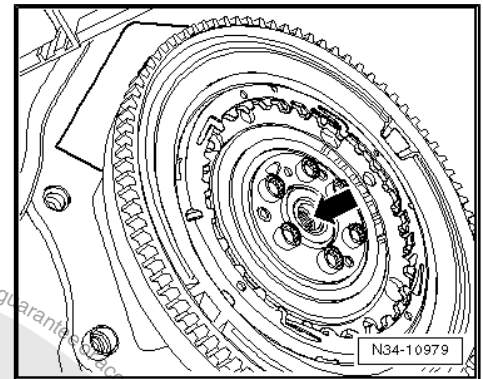
6-speed dual clutch gearbox: If the engine or gearbox has to be removed during repairs, check needle bearing in crankshaft. If it is damaged or tarnished blue, it must be renewed.

- If it is not damaged, lightly grease with high-temperature grease -G052133A2- .



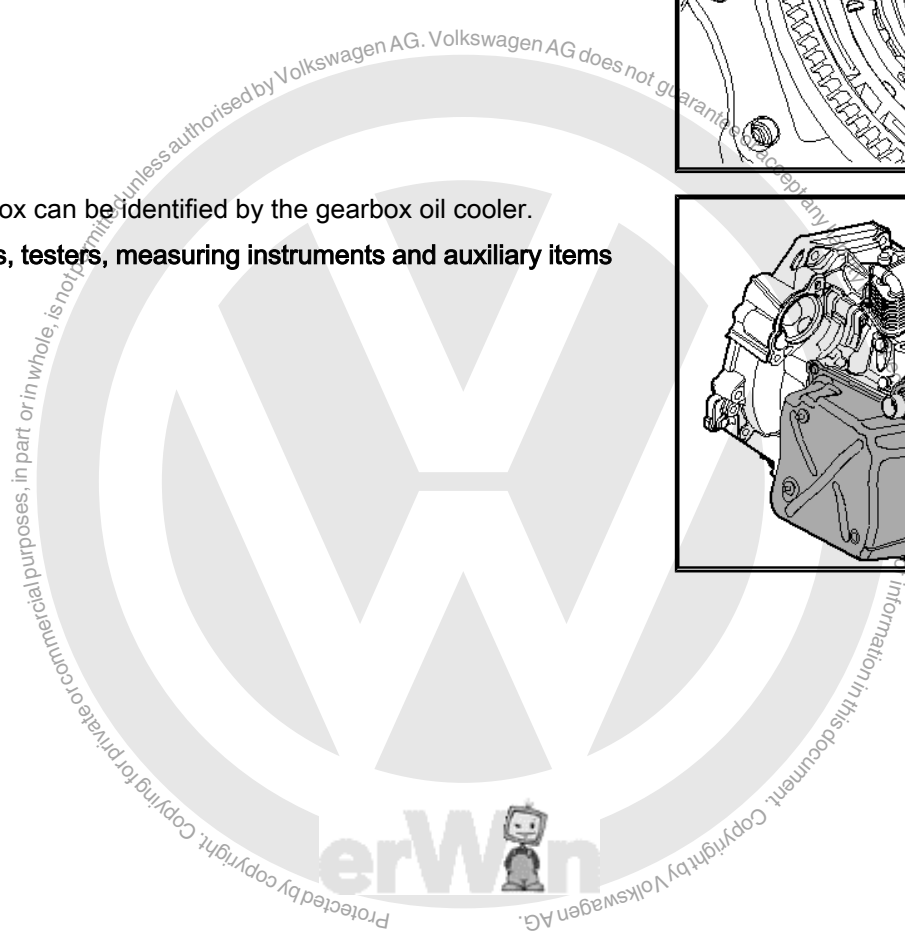
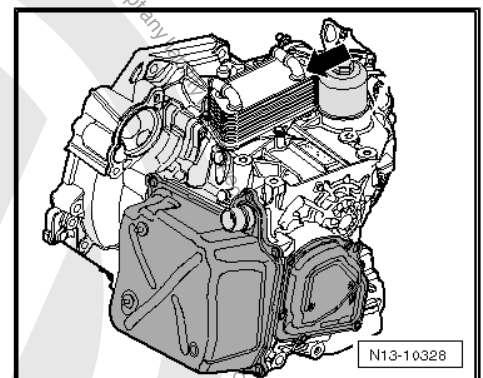
7-speed dual clutch gearbox: Always renew needle bearing when removing engine or gearbox.

6-speed dual clutch gearbox



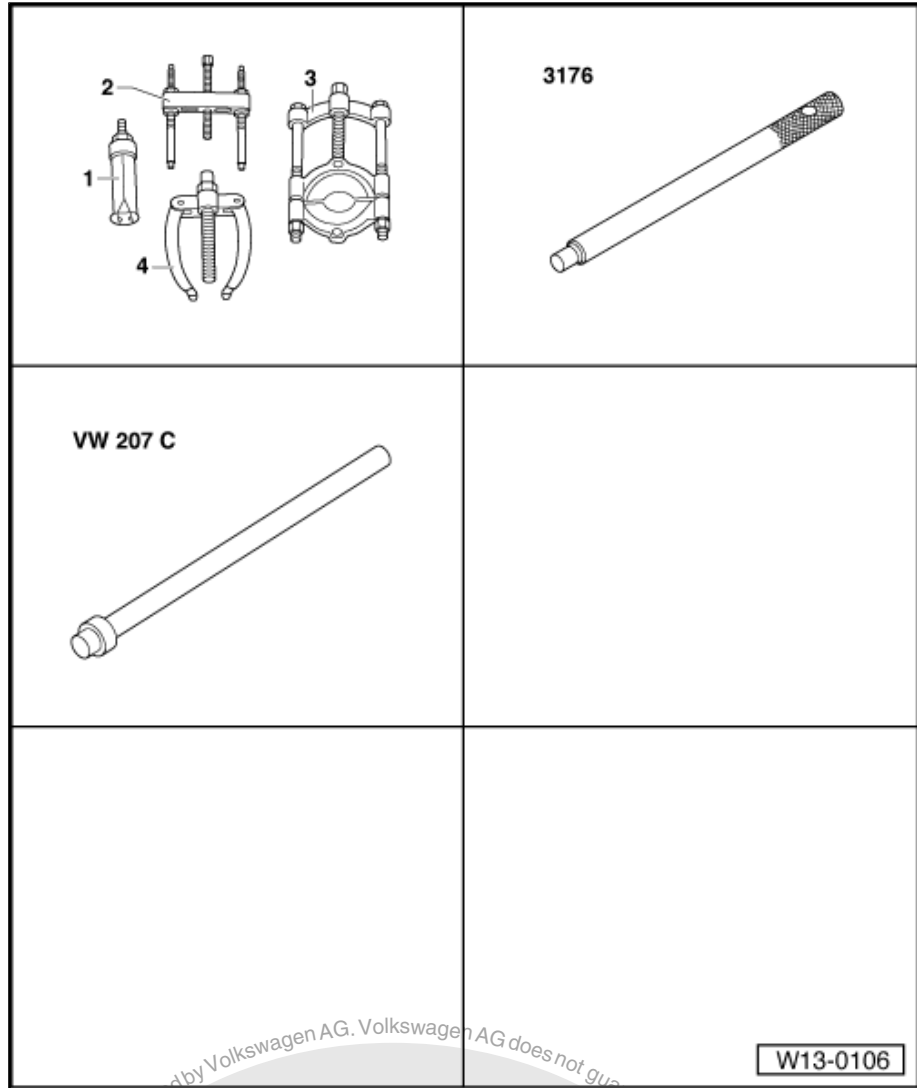
- This gearbox can be identified by the gearbox oil cooler.

Special tools, testers, measuring instruments and auxiliary items required





- 1 - -1- Kukko 21/2
- 2 - Centring mandrel -3176-
- 3 - Drift -VW 207 C-

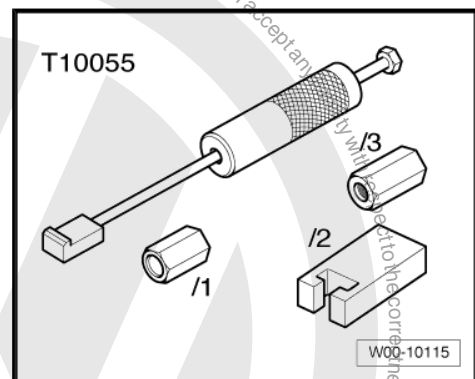


Puller -T10055- with adapter -T10055/3-

Procedure

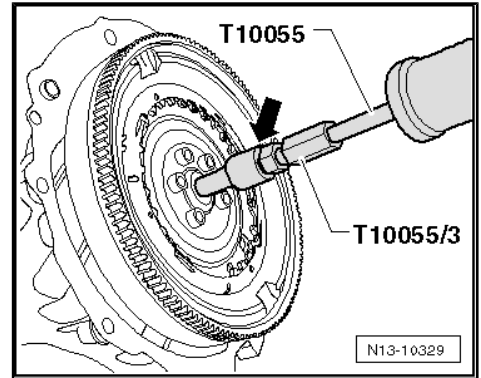
- Gearbox is separated from engine

Pulling needle bearing out:





- Pull out needle roller bearing using Kukko 21/2, adapter - T10055/3- and puller -T10055- .

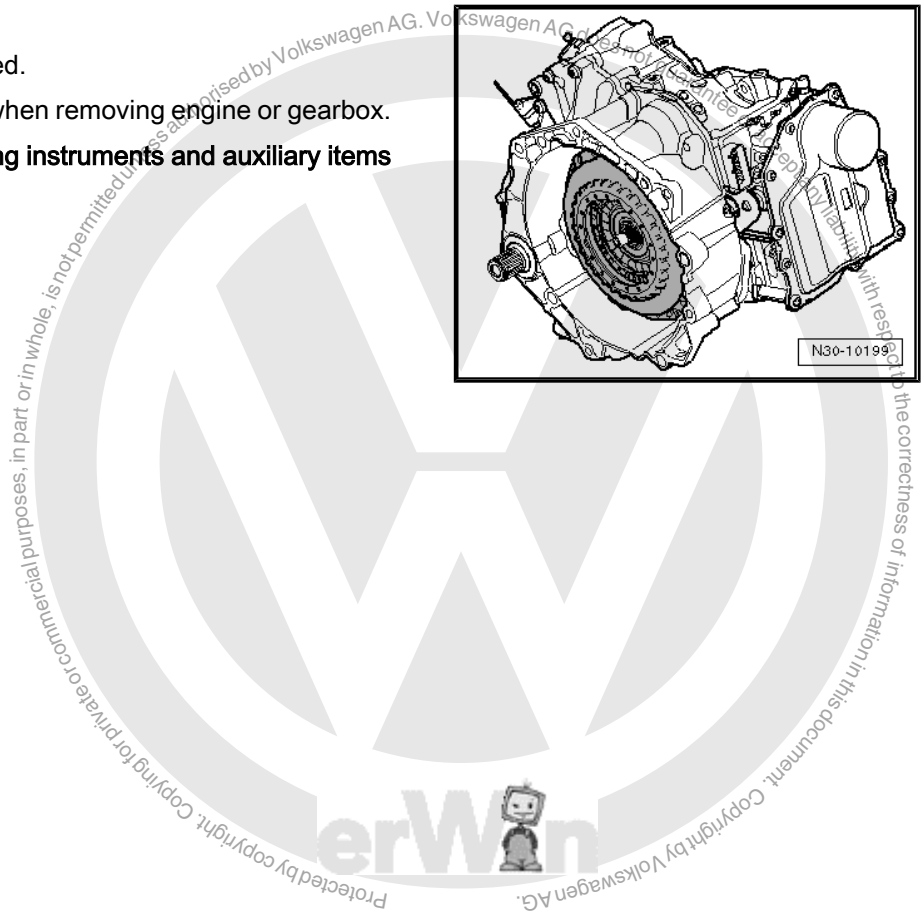
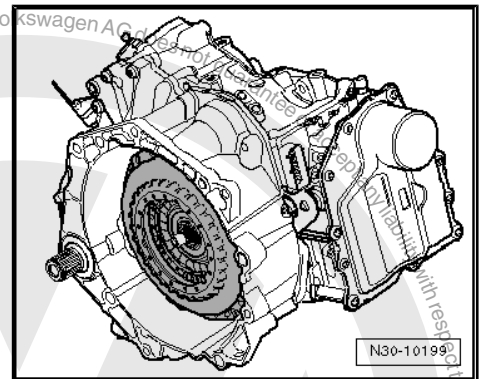


7-speed dual clutch gearbox

No gearbox oil cooler is installed.

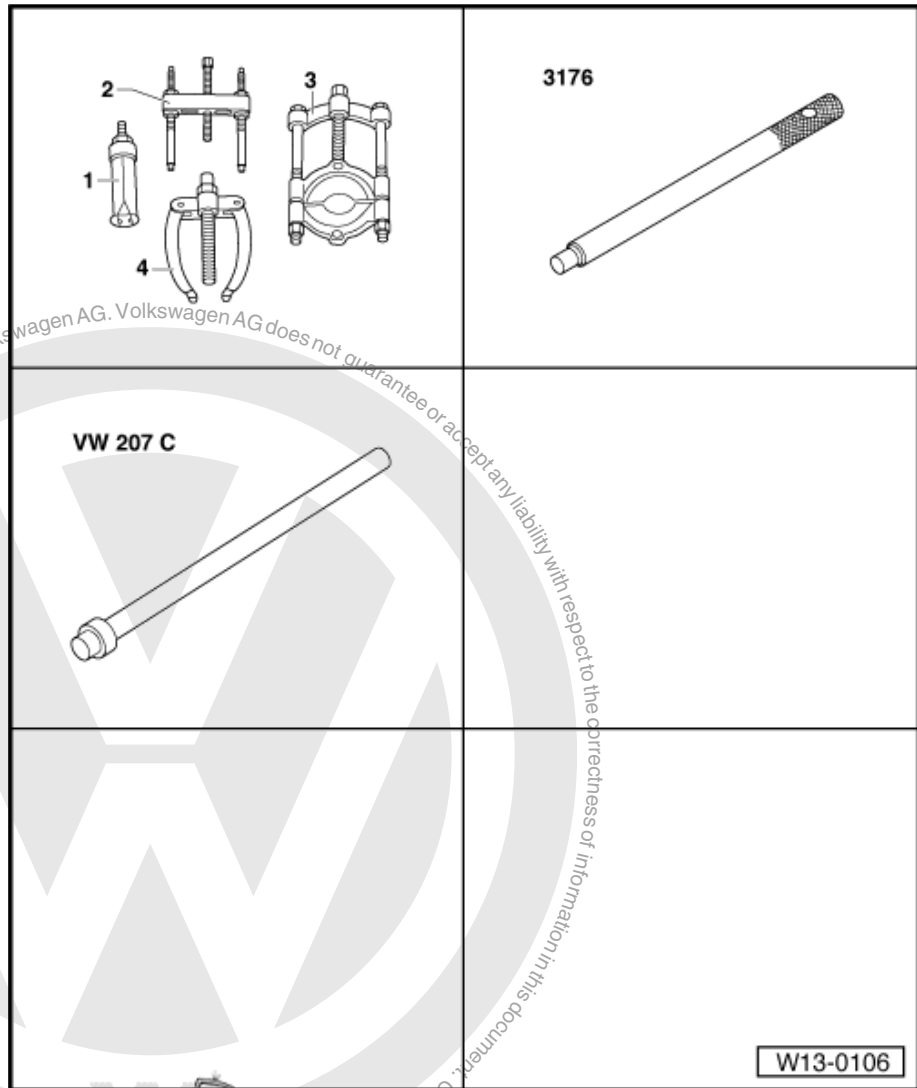
Always renew needle bearing when removing engine or gearbox.

Special tools, testers, measuring instruments and auxiliary items required





- 1 - -1- Kukko 21/2 and -4- Kukko 22/1
- 2 - Centring mandrel -3176-
- 3 - Drift -VW 207 C-



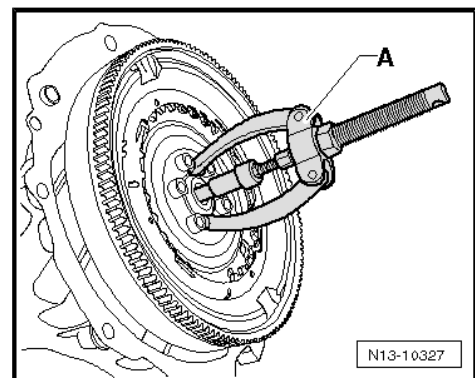
Procedure

- Gearbox is separated from engine

Pulling needle bearing out:

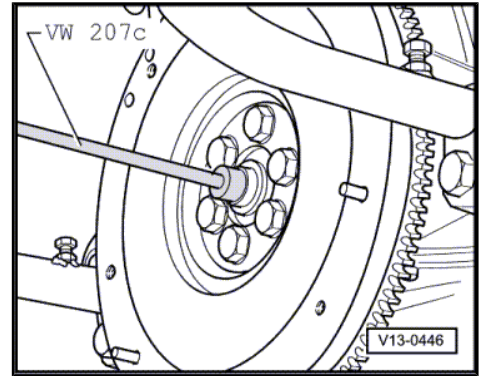
- Pull out using commercially available puller -A-, e.g. Kukko 21/2 and Kukko 22/1.

Installing

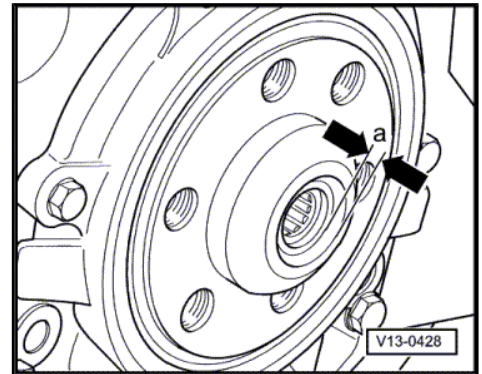




- Drive needle bearing in with drift -VW 207 C- or with centring mandrel -3176- .
 - Carefully drive needle bearing in.
 - Always measure the driving depth when driving in.
- Renew bearing, if driving depth is too deep.



- Driving depth: Dimension -a- = 1.5 to 1.8 mm.





4 Pistons and conrods

Assembly overview - pistons and conrods ⇒ [page 54](#) .

Separating new conrod ⇒ [page 55](#) .

Checking piston projection at TDC ⇒ [page 56](#) .

Piston and cylinder dimensions ⇒ [page 57](#) .

Piston rings, cylinder bore and piston installation position ⇒ [page 57](#)

4.1 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 57](#) .
- Checking ring-to-groove clearance ⇒ [page 58](#) .

2 - Piston

- With combustion chamber.
- Mark installation position and cylinder number.
- Installation position and allocation of piston to cylinder ⇒ [page 58](#) .
- Arrow on piston crown points to belt pulley end.
- Install using piston ring clamp.
- If piston skirt is cracked, renew piston.
- Checking piston projection at TDC ⇒ [page 56](#) .

3 - Piston pin

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

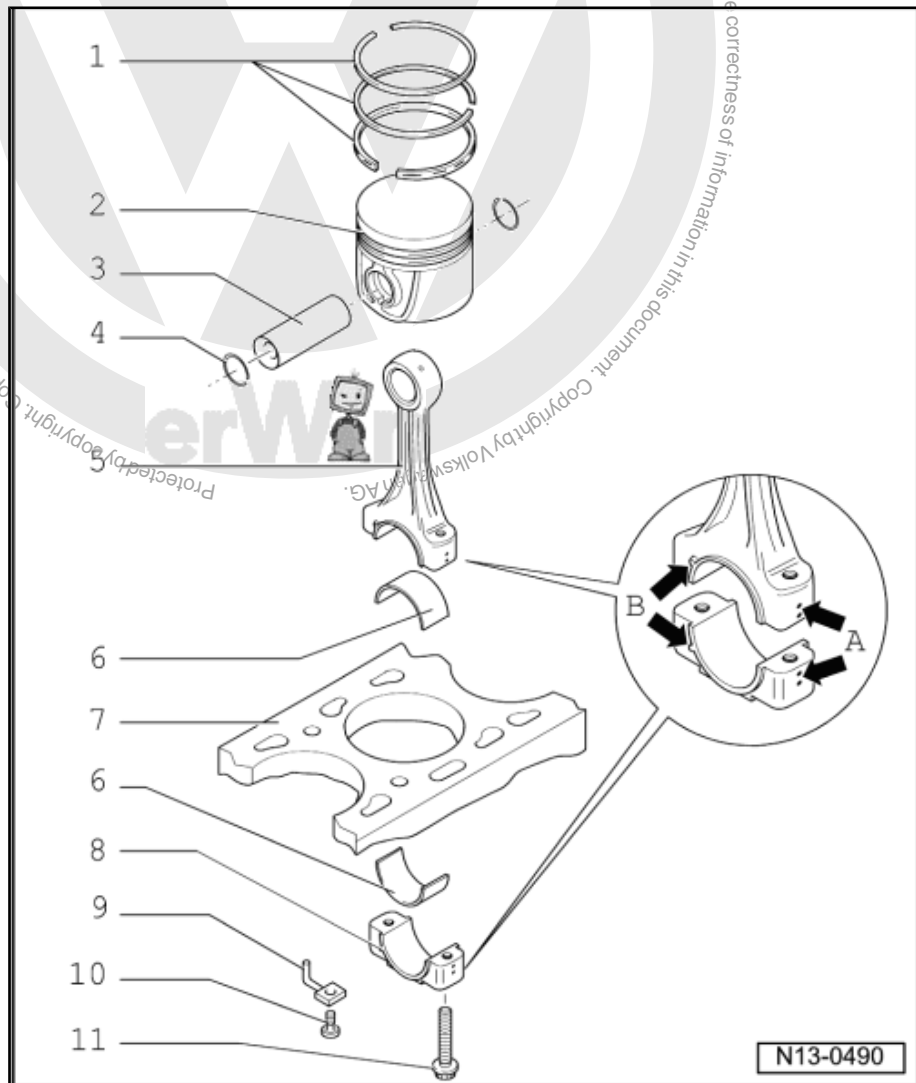
4 - Circlip

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 58](#) .
- Piston and cylinder dimensions ⇒ [page 57](#) .

8 - Conrod bearing cap

- Note installation position.
- The caps only fit in one position and only on the appropriate conrod due to the breaking procedure (cracking) separating the cap from the conrod.

9 - Oil spray jet

- For piston cooling.



Note

10 - 25 Nm

- Insert without sealant.

11 - Conrod bolt, 30 Nm + turn (90°)

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

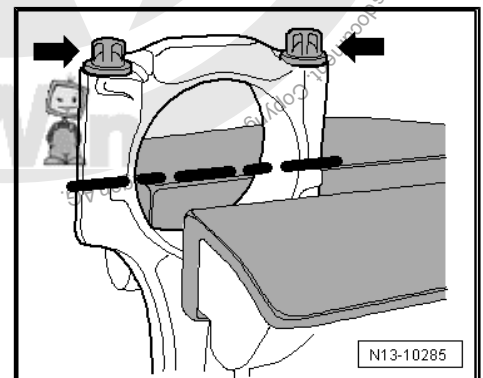
4.2 Separating new conrod

- Mark cylinder allocation of conrod ⇒ [Item 5 \(page 54\)](#)
- Lightly clamp the conrod in a vice using aluminium vice clamps, as shown in the illustration.



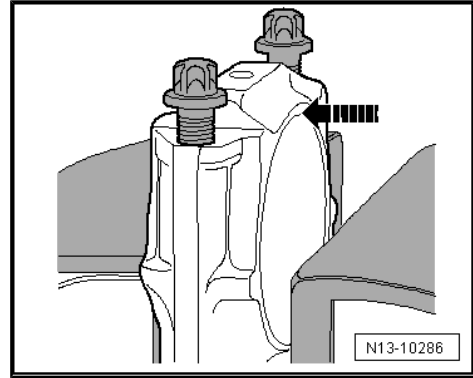
Note

- ◆ To prevent damage to the conrod, only clamp conrod in lightly.
- ◆ Clamp conrod in below the marked line.
- Unscrew the two bolts -arrows- approx. 5 turns.





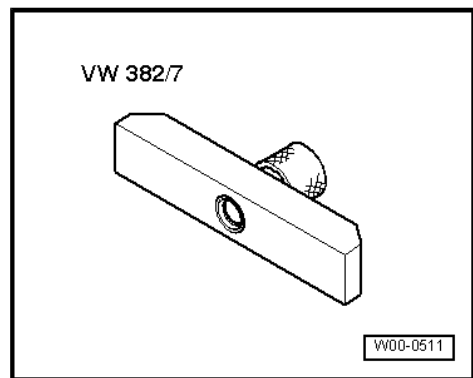
- Using a plastic hammer, carefully knock against conrod bearing cap -arrow- until it is loose.



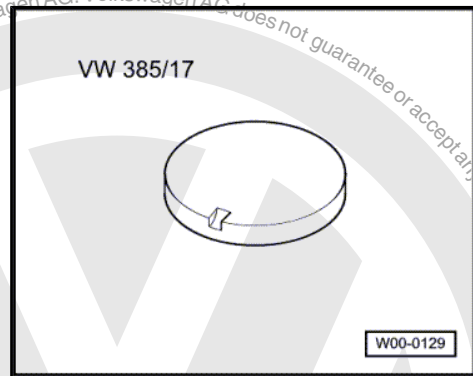
4.3 Checking piston projection at TDC

Special tools and workshop equipment required

- ◆ Measuring bridge -VW 382/7-



- ◆ End dimension plate -VW 385/17-



- ◆ Dial gauge

Test procedure



Note

If different values are determined during the projection measurement, use the largest dimension for selecting the gasket.

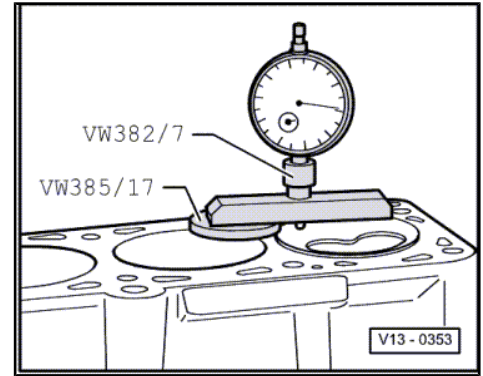


Piston projection at TDC must be measured when installing new pistons or a short engine. Install the appropriate cylinder head gasket depending upon piston projection, according to following table:

i Note

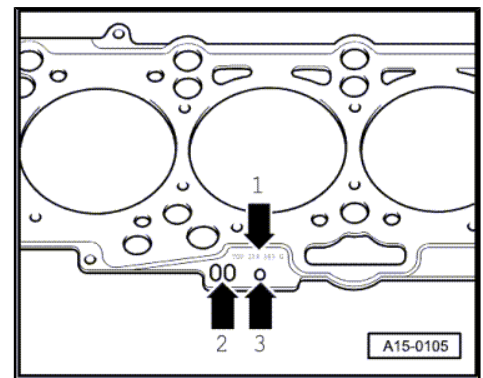
Turn engine clockwise to measure piston projection at TDC.

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 (can be disregarded)
- ◆ Holes = arrow 3

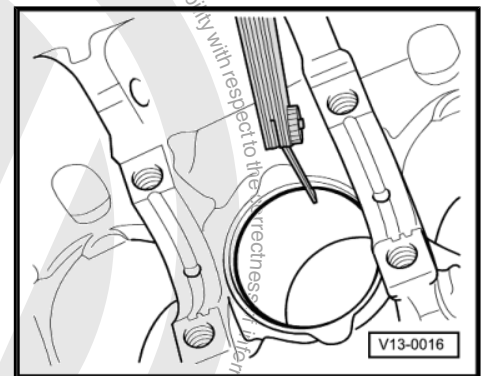


4.4 Piston and cylinder dimensions

Honing dimension	Piston Ø	Cylinder bore Ø
Basic dimension mm	79.47	79.51
Stage I mm	79.72	79.76
Stage II mm	79.97	80.01

4.5 Piston rings, cylinder bore and piston installation position

Checking piston ring gap



Special tools and workshop equipment required

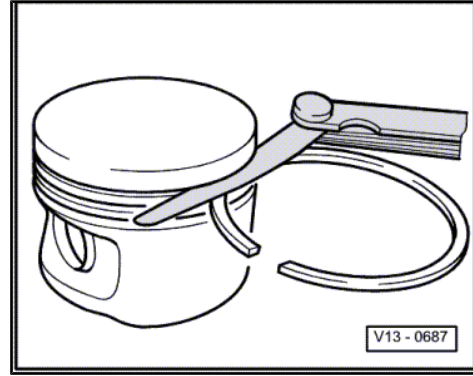
- ◆ Feeler gauges



- 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

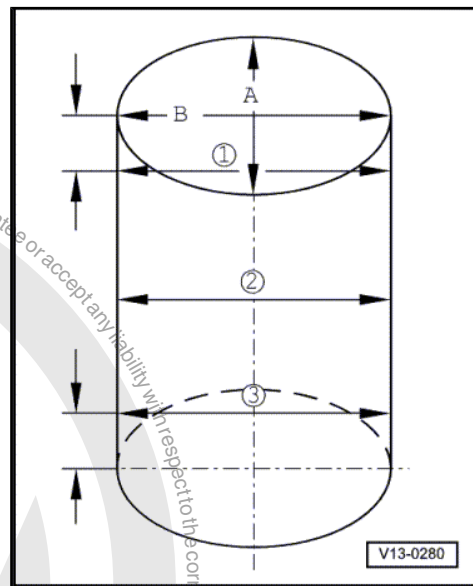


Special tools and workshop equipment required

- ◆ 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

- ◆ Inside caliper 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 cylinder block is mounted on a repair stand with engine support bracket -VW 540-, as measurements may then be incorrect.

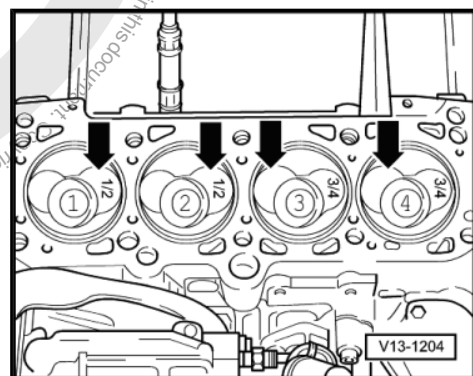
Piston installation position and allocation of piston to cylinder

Piston in cylinders 1 and 2:

Larger inlet valve recess -arrows- towards flywheel.

Piston in cylinders 3 and 4:

Larger inlet valve recess -arrows- towards belt pulley end.





Note

- ◆ *New piston allocation to cylinders is shown by a coloured marking on piston crown.*
- ◆ *Piston for cylinders 1 and 2: marked 1/2*
- ◆ *Piston for cylinders 3 and 4: marked 3/4*





15 – Cylinder head, valve gear

1 Cylinder head



Note

- ◆ *When installing an exchange cylinder head with fitted camshaft, the contact surfaces between the bucket tappets and the cam must be oiled before installing the cylinder head cover.*
- ◆ *The plastic packing pieces for protecting the open valves must not be removed until immediately before fitting cylinder head.*
- ◆ *If the cylinder head is replaced, all the coolant in the system must also be renewed.*





Assembly overview - cylinder head ⇒ [page 61](#) .

Removing and installing cylinder head cover ⇒ [page 64](#) .

Removing, installing and tensioning toothed belt ⇒ [page 66](#) .

Removing and installing cylinder head ⇒ [page 83](#) .

Checking compression ⇒ [page 89](#) .

1.1 Assembly overview - cylinder head

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 66](#) .

3 - 10 Nm

- Renew.

4 - 25 Nm

5 - 100 Nm

6 - Camshaft pulley

7 - Hub

- With sender wheel
- Use counterhold tool - T10051- to loosen and tighten.
- To remove, use puller - T10052- .
- Removing and installing.

8 - Rear toothed belt guard

9 - Sealing grommet

- Renew if damaged.

10 - Hall sender -G40-

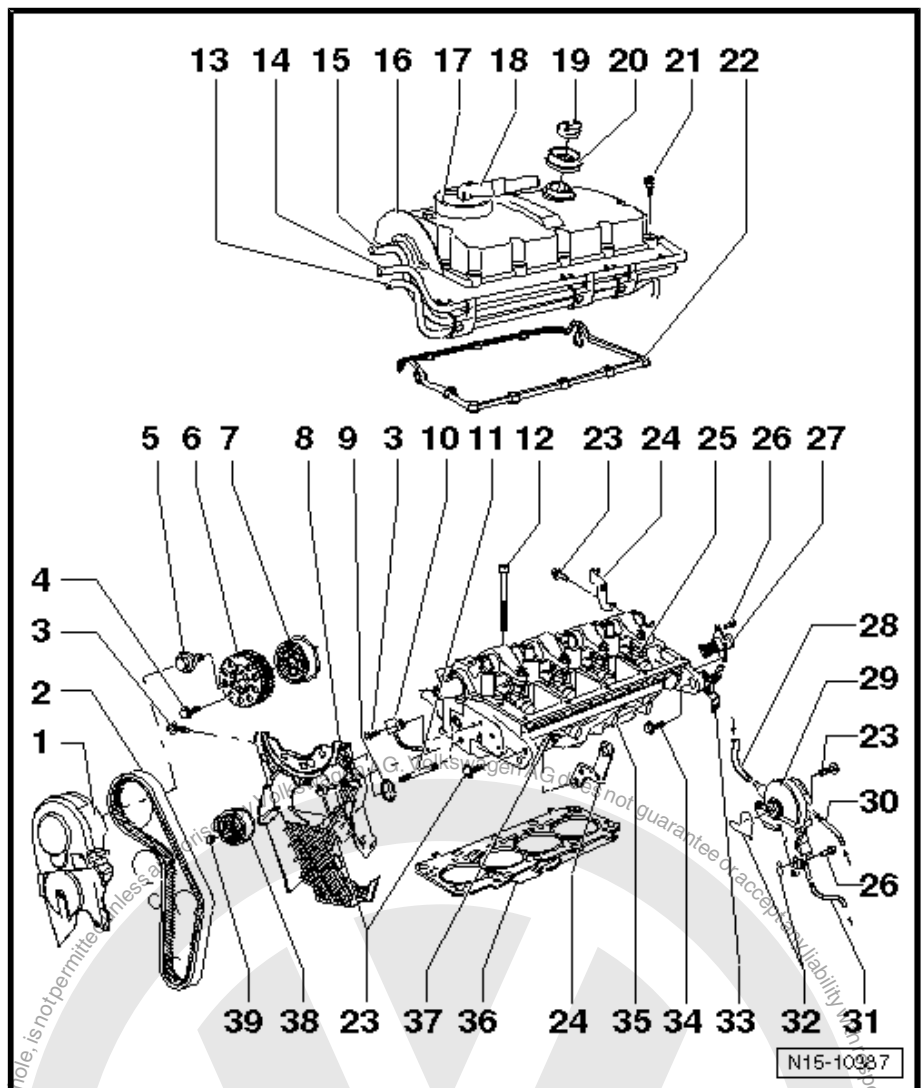
- For camshaft position
- To remove, unbutton sealing grommet ⇒ [Item 9 \(page 61\)](#) from rear toothed belt guard.

11 - Stud

- 15 Nm

12 - Cylinder head bolt

- Observe sequence when loosening and tightening ⇒ [page 83](#) .
- Before installing, place washers in cylinder head ⇒ [Item 4 \(page 92\)](#) .





13 - Fuel return line

14 - Fuel supply line

15 - Coolant line

16 - Cylinder head cover

- Before fitting, thoroughly clean sealing surface of cylinder head with clean cloth.

17 - Pressure regulating valve

- For crankcase ventilation.

18 - To turbocharger.

19 - Cap

- Renew seal if damaged.

20 - Seal

- Renew if damaged.

21 - 10 Nm

- Observe tightening sequence ⇒ [page 64](#) .

22 - Gasket for cylinder head cover

- Renew together with cylinder head cover only.
- Before fitting, seal transitions with „AMV 174 004 01“ ⇒ [page 64](#)

23 - 20 Nm

24 - Lifting eye

25 - Unit injector

- Removing and installing ⇒ [page 230](#)

26 - 10 Nm

27 - Central connector

- For unit injector

28 - From brake servo

29 - Tandem pump

- For fuel and vacuum supply
- Check ⇒ [page 195](#) .
- Removing and installing ⇒ [page 198](#)
- Must not be dismantled.

30 - Supply hose

- From fuel filter.
- White or with white marking.
- Check for secure seating.
- Secure with spring-type clips.

31 - Return hose

- To fuel filter
- Blue or with blue marking.
- Check for secure seating.
- Secure with spring-type clips.

32 - Seal

- Renew.



33 - Bracket

34 - 20 Nm

35 - Cylinder head

- Removing and installing ⇒ [page 83](#)
- After renewing, renew entire coolant.

36 - Cylinder head gasket

- Renew.
- Note marking ⇒ [page 63](#) .
- After renewing, renew entire coolant.

37 - Glow plug

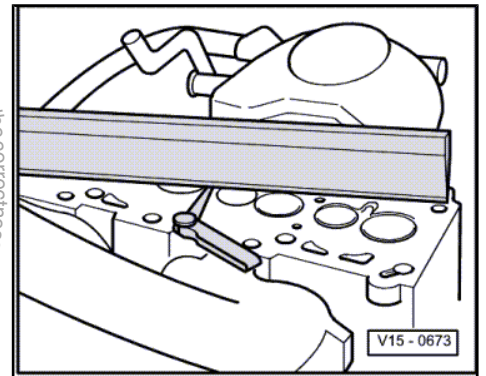
- 15 Nm
- Check ⇒ [page 269](#) .

38 - Tensioning roller

- Remove engine support in order to remove and install ⇒ [page 29](#) .

39 - 20 Nm + turn (45°)

Checking cylinder head for distortion



Special tools and workshop equipment required

- ◆ Straight edge
- ◆ Feeler gauges

Max. permissible distortion: 0.1 mm.

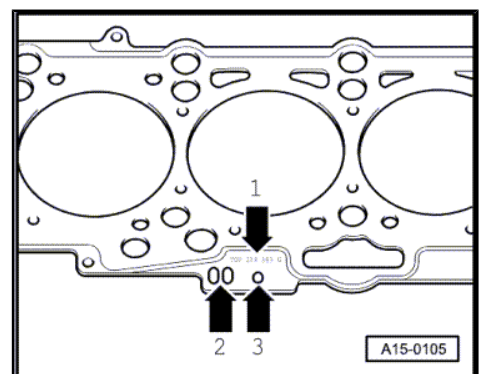


Note

Reworking diesel cylinder heads is not permissible.

Cylinder head gasket identification

- ◆ Part No. = arrow 1
- ◆ Production control code = arrow 2 (can be disregarded)
- ◆ Holes = arrow 3

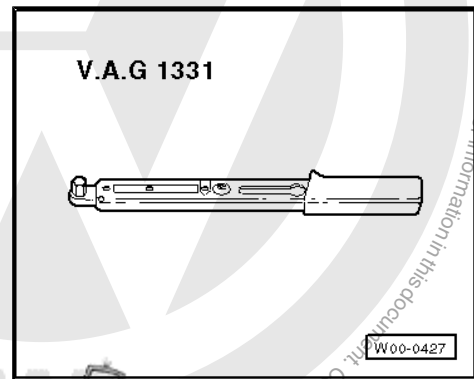




Note

- ◆ Different thicknesses of cylinder head gasket are fitted depending on the piston projection. When renewing gasket, install new gasket with same identification.
- ◆ Piston projection at TDC must be determined when installing new pistons or a short engine. ⇒ [page 56](#)

1.2 Removing and installing cylinder head cover

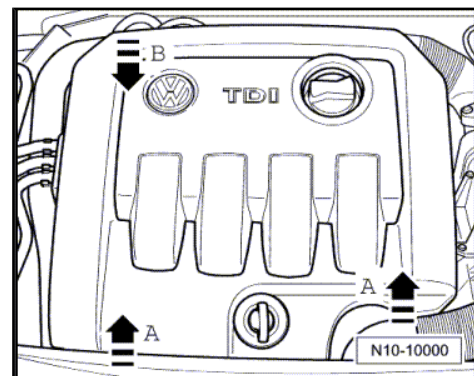


Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-
- ◆ Sealant -AMV 174 004 01-

⇒ [page 5](#) Removing

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

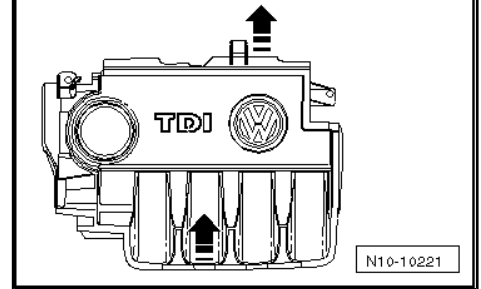
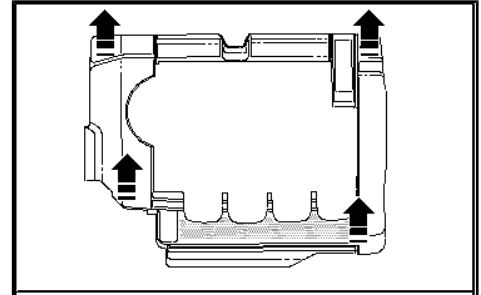




Two-piece engine cover

For two-piece engine cover, first pull out engine cover abruptly upwards at -arrows-, then pull inner engine cover abruptly upwards at -arrows-.

- Remove upper toothed belt guard.
- Disconnect crankcase breather hose at union on rear of charge air pipe.
- Unbolt bracket from exhaust gas recirculation valve.

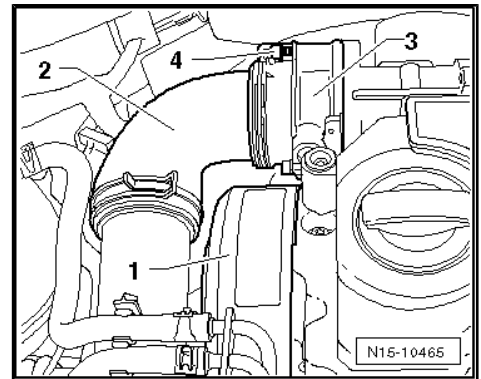


Engine codes BLS, BXJ: to remove cylinder head cover, additionally remove:

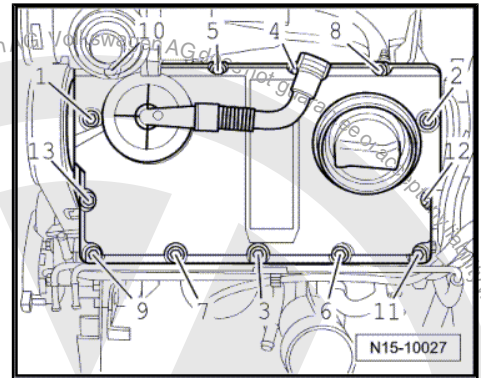
- ◆ -1- upper toothed belt guard
- ◆ -2- intake hose
- ◆ -3- intake manifold flap Renew seal.
- ◆ -4- bolt, 8 Nm

Continuation for all vehicles

- Remove cylinder head cover.



Cylinder head cover, engine codes: AVQ, BJB, BKC, BRU, BXE, BXF



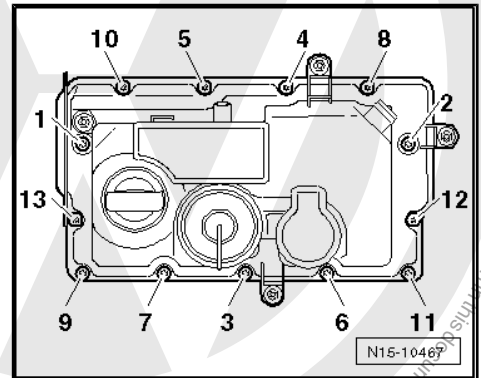
Cylinder head cover, engine codes: BLS, BXJ

Installing for all engine codes

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

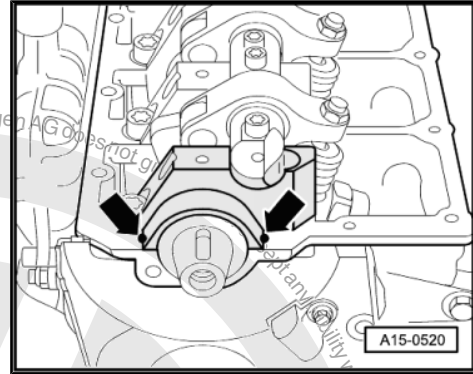
Note

- ◆ Renew cylinder head cover gasket and seal for bolts if damaged.
- ◆ Renew seal for intake manifold flap. Engine codes BLS, BXJ



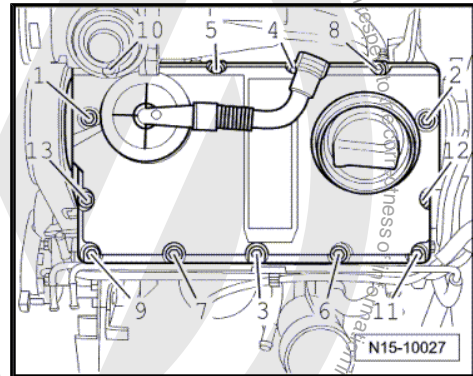


- Place a drop of sealant -AMV 174 004 01- (\varnothing approx. 5 mm) -arrows- on edges of both sealing surfaces of bearing cap and cylinder head at front of engine.



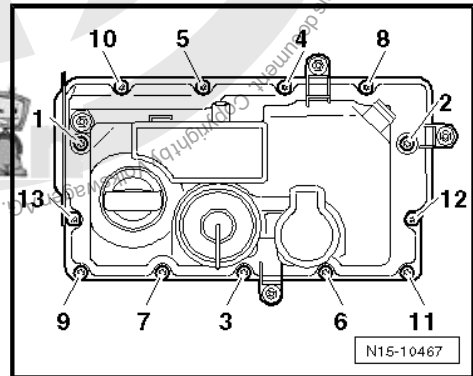
Cylinder head cover, engine codes: BJB, BKC, BRU, BXE, BXF

- Screw on cylinder head cover by hand in sequence -1 ... 13-.
- Tighten bolts in sequence -1 ... 13- to 10 Nm.



Cylinder head cover, engine codes: BLS, BXJ

- Screw on cylinder head cover by hand in sequence -1 ... 13-.
- Tighten bolts in sequence -1 ... 13- to 10 Nm.



1.3 Removing, installing and tensioning toothed belts



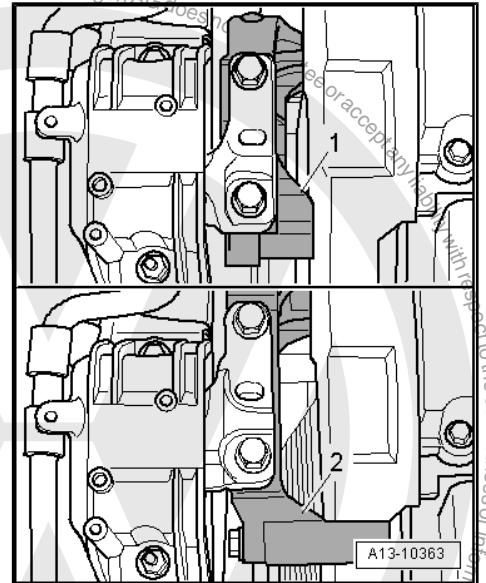
Note

- ◆ A revised engine support has been introduced gradually and it is no longer necessary to remove the engine support and to support the engine for the procedure „removing, installing and tensioning toothed belt“.
- ◆ To change the tensioning roller, for both versions the engine support must be removed.
- Determine which type of engine support is installed in the vehicle.

-1-: Engine support bolted close to engine (removal necessary)
⇒ [page 67](#) .



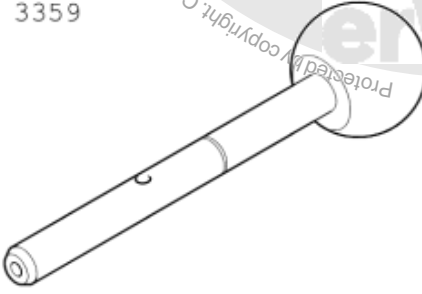
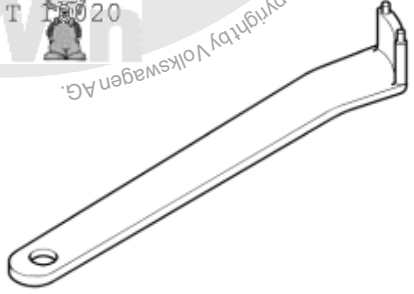

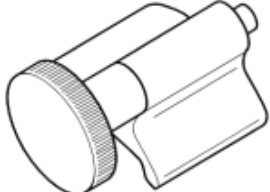


-2-: Engine support bolted further away from engine ▶ (removal not necessary) ⇒ [page 77](#) .



1.3.1 Removing and installing toothed belt (vehicles with engine support bolted close to engine)

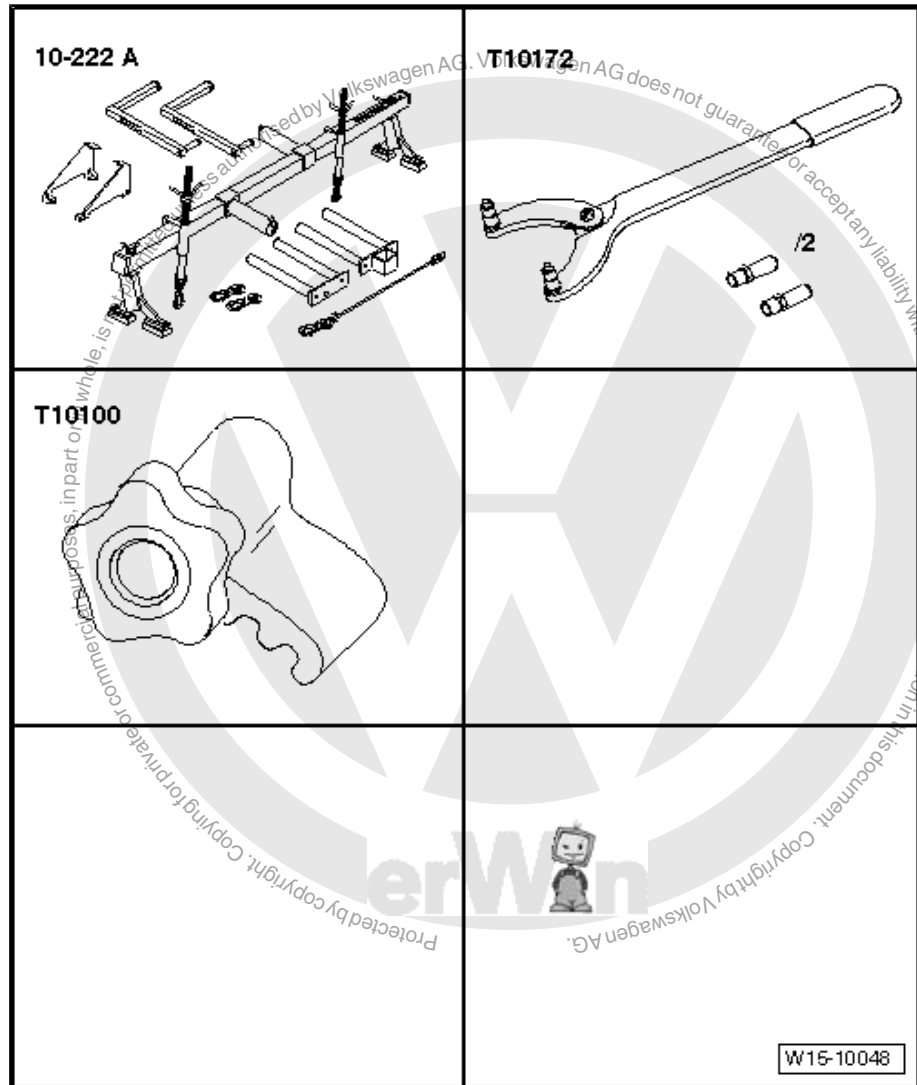
Special tools and workshop equipment required

- ◆ Locking pin -3359-
- ◆ Pin wrench -T10020- or hexagon wrench
- ◆ Locking pin -T10115-
- ◆ Crankshaft stop -T10050-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-

<p>3359</p> 	<p>T 10020</p> 
<p>T10115</p> 	<p>T10050</p> 
<p>V.A.G 1331</p> 	<p>V.A.G 1332</p>  <p style="text-align: right;">W15-10001</p>



- ◆ Support bracket -10-222A- with adapters -10-222A/1-
- ◆ Counterhold tool -T10172- with pins -T10172/4-
- ◆ Crankshaft stop -T10100- (on vehicles with oval 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.

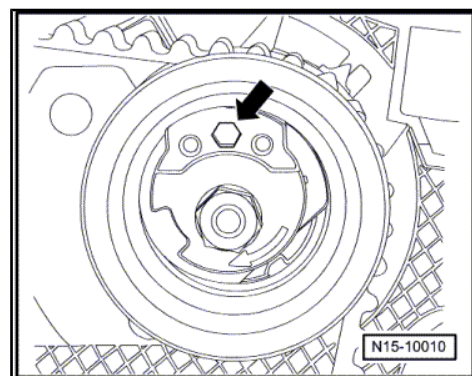
Removing



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. ⇒ [page 5](#)
- Remove coolant expansion tank, coolant hoses remain connected.
- Remove poly V-belt ⇒ [page 25](#) .
- Remove tensioning element for poly V-belt.





- Remove front right wheel housing liner.
- Remove charge air pipe between charge air cooler and turbocharger. ⇒ [page 218](#)
- Carefully cover or seal open ends.
- Remove belt pulley with vibration damper.
- Remove lower and centre parts of toothed belt guard.

Golf, Golf Plus, Touran

- Set up support bracket -10-222A- with adapters -10-222A/22- and support engine in installation position.

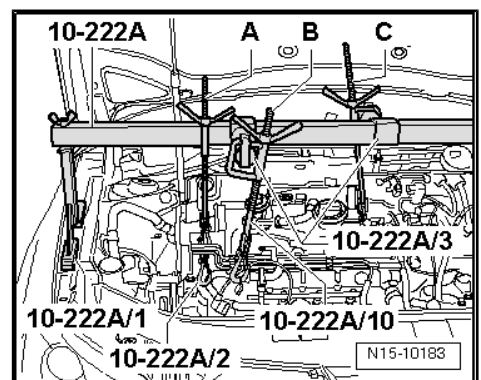
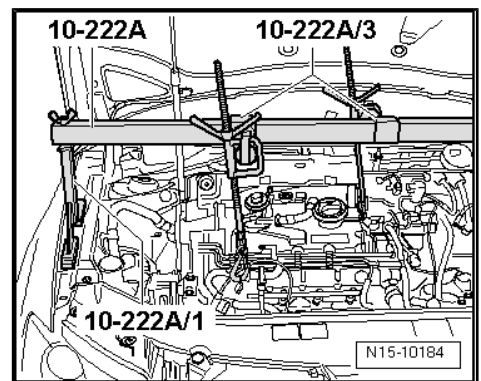
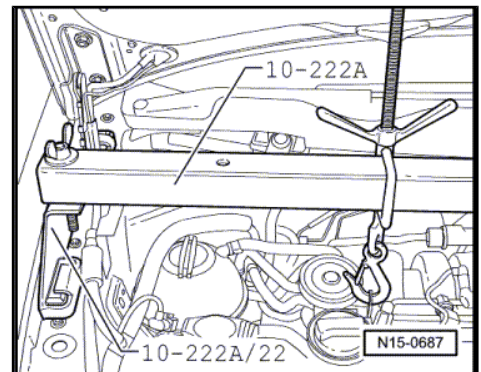
Note

If toothed belt is to be removed in order to remove cylinder head, set up support bracket -10-222A- with higher adapters -10-222A/13-. This will provide the space necessary for removing the cylinder head.

Passat:

- Set up support bracket -10-222A- with adapters -10-222A/1- and support engine in installation position.

Passat: If the toothed belt has to be taken off for removal of the cylinder head.



Note

Both lifting eyes for the support are located on the cylinder head, so an additional spindle -A- with bracket to support the engine must be secured on the cylinder block.

- Set up support bracket -10-222A- with adapters -10-222A/1- and support engine in installation position with spindles -B- and -C-.

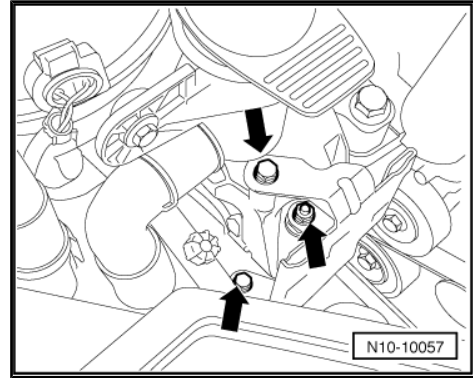
Note

- ◆ Spindle -A- hangs loose.
- ◆ Unscrew filler neck for window wash system.
- ◆ Unbolt coolant expansion tank and lay to side (hoses remain connected).
- Pull fuel filter out of bracket.
- Unscrew filler neck for window wash system.



- Unbolt fuel filter bracket from engine mounting -arrows-.
- Unbolt coolant expansion tank and lay to side (hoses remain connected).

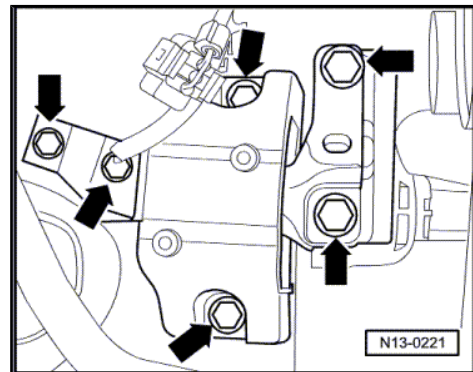
Continuation for all vehicles



- Remove securing bolts between assembly mounting and engine bracket and between assembly mounting and body -arrows- and remove complete assembly mountings.

Note

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



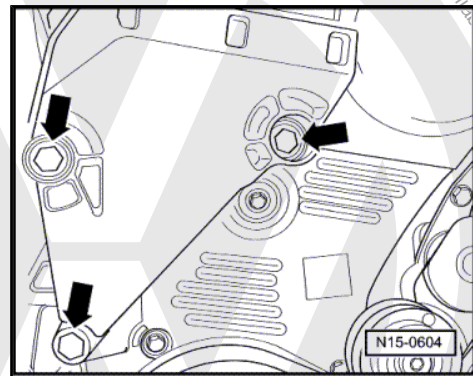
WARNING

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 bracket can be loosened.
- Lower engine with support bracket -10-222A- until both lower bolts of engine bracket can be loosened.
- Remove refrigerant line securing clamp from longitudinal member.
- Remove engine support.
- Turn crankshaft to TDC No. 1 cylinder.

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 instead of crankshaft stop -T10050-. Observe identification characteristics -arrows-.





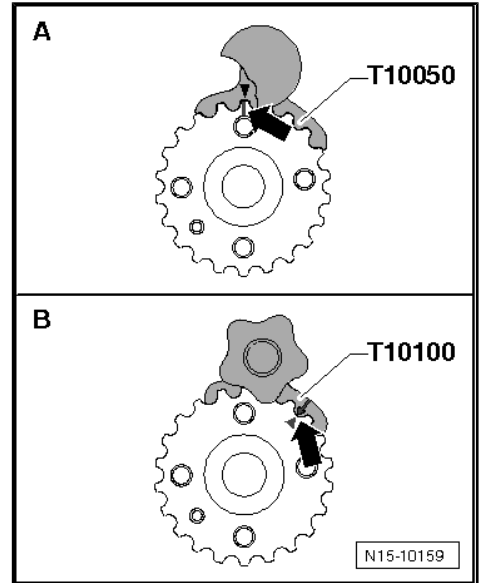
Characteristics of crankshaft toothed belt pulley

A = round belt pulley, lock using crankshaft stop -T10050- , TDC marking at 12 o'clock

B = oval belt pulley, lock using crankshaft stop -T10100- . TDC marking at 1 o'clock

Vehicles with round crankshaft pulley

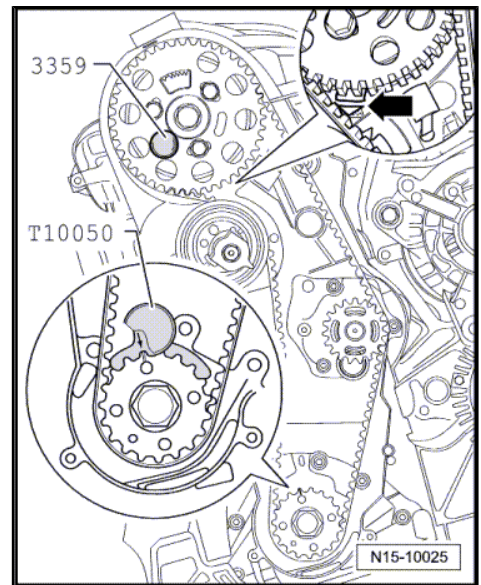
- Turn crankshaft to TDC No. 1 cylinder.



Note

Turn crankshaft until marking on crankshaft pulley and tooth segment of camshaft pulley is on top. The marking on the rear toothed belt guard must align with the marking on the camshaft sender wheel -arrow-.

- Lock hub using locking pin -3359- . To do this, slide locking pin through the free elongated hole on left into hole in cylinder head.
- Lock crankshaft toothed belt pulley with crankshaft stop - T10050 - . To do this, push crankshaft stop into teeth of belt pulley from face side.

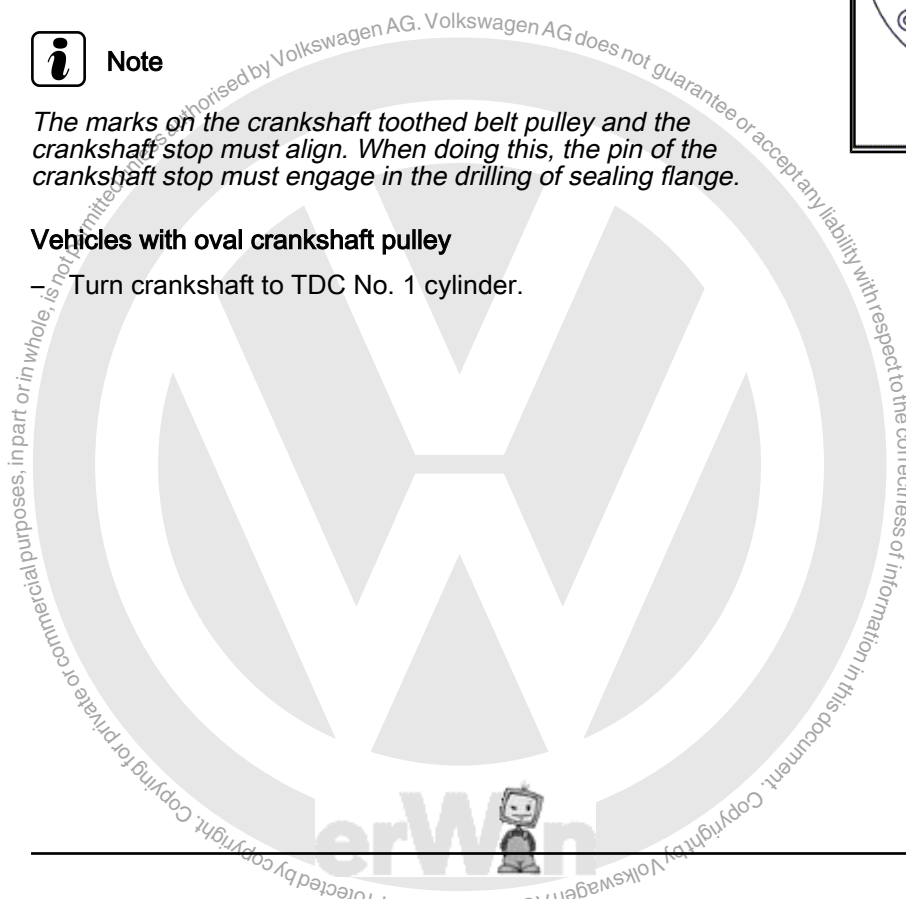


Note

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

Vehicles with oval crankshaft pulley

- Turn crankshaft to TDC No. 1 cylinder.





Note

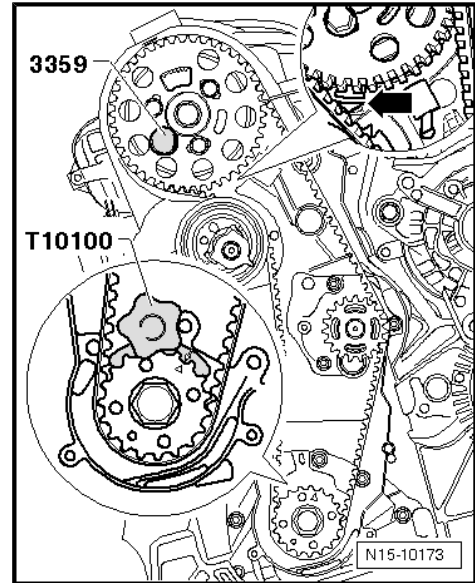
Turn crankshaft until marking on crankshaft pulley and tooth segment of camshaft pulley is on top. The marking on the rear toothed belt guard must align with the marking on the camshaft sender wheel -arrow-.

- Lock hub using locking pin -3359- . To do this, slide locking pin through the free elongated hole on left into hole in cylinder head.
- Lock crankshaft toothed belt pulley with crankshaft stop - 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 engage in the drilling of sealing flange.



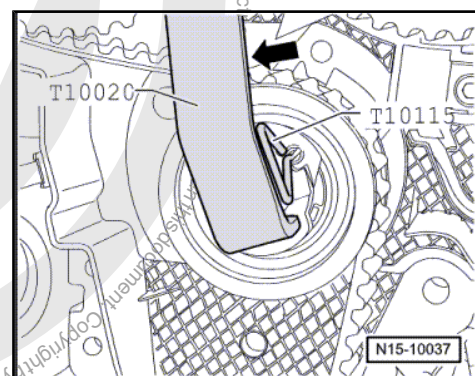
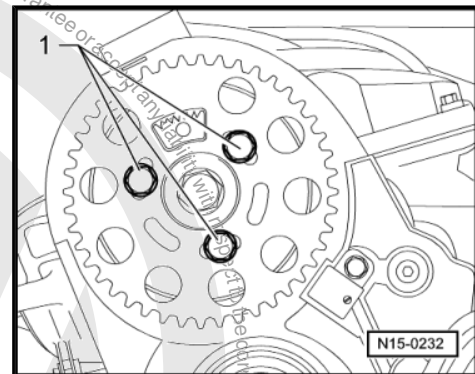
Continuation for all vehicles

- Mark direction of rotation of toothed belt.
- Loosen securing bolts -1- of camshaft pulley until the camshaft pulley can be moved within the elongated holes.
- Loosen tensioning roller securing nut.
- Turn pin wrench -T10020- anti-clockwise until toothed belt tensioning roller can be locked with locking pin -T10115- .



Note

A hexagon key can be used to tension or relieve tension on the tensioner.





- Now turn pin wrench -T10020- clockwise to stop and tighten securing nut -1- hand tight.
- Remove toothed belt first from coolant pump and then from remaining pulleys.

Installing

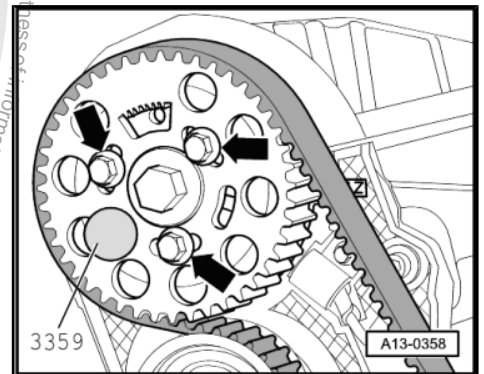
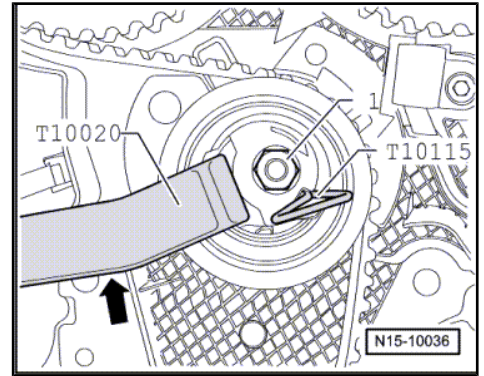
- Camshaft locked with locking pin -3359- .
- The crankshaft is locked with crankshaft stop -T10050- or crankshaft stop -T10100- .
- Tensioning roller locked with locking pin -T10115- and secured to right stop.



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.

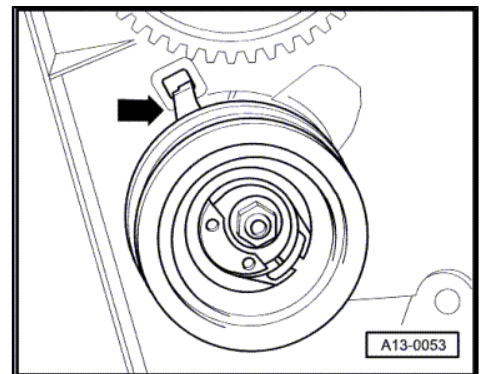
- Turn camshaft pulley in its elongated holes to centre position -arrows-.
- Fit toothed belt onto crankshaft toothed belt pulley, tensioning roller, camshaft toothed belt pulley and idler roller.
- Then fit toothed belt on coolant pump toothed belt pulley.



Note

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

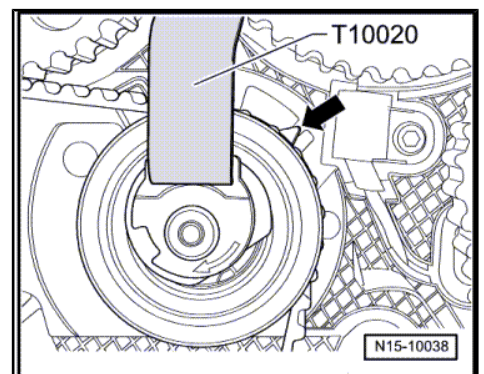
- Loosen tensioning roller securing nut and pull out locking pin -T10115- .



- Now carefully turn tensioning roller clockwise using pin wrench -T10020- until indicator is in middle of gap in the 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.





- Fit counterhold -T10172- with pins -T10172/4- as shown. Press counterhold -T10172- in direction of arrow, keeping camshaft toothed belt pulley under tension.
- In this position, tighten camshaft toothed belt pulley securing bolts -1- to 25 Nm.
- Remove locking pin -3359- and crankshaft stop -T10050- .
- Turn crankshaft two rotations in engine direction of rotation until crankshaft is just before TDC No.1 cylinder.

Vehicles with round crankshaft pulley

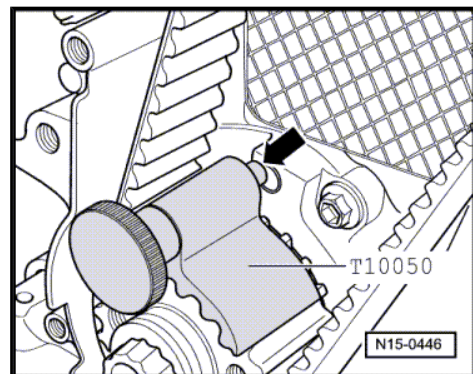
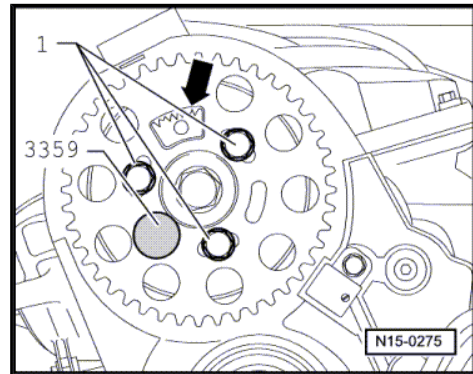
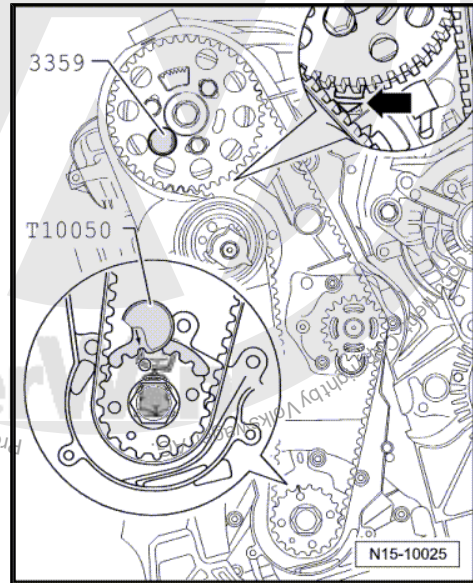
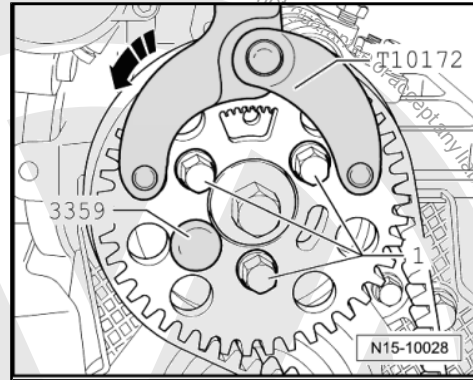
- Lock hub with locking pin -3359- whilst turning engine in direction of rotation.
- Check whether crankshaft can be locked with crankshaft stop -T10050- .

If crankshaft cannot be locked:

- Loosen securing bolts -1- for camshaft toothed belt pulley.

- 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.

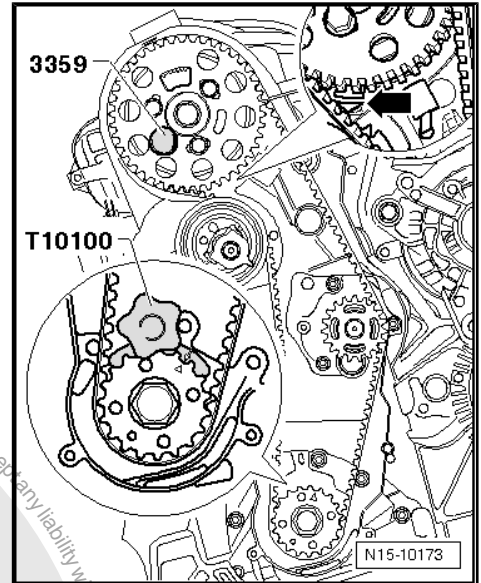
Vehicles with oval crankshaft pulley



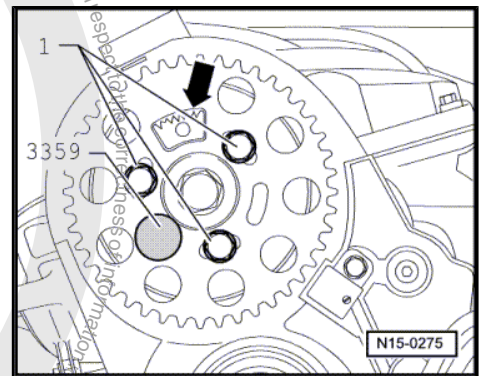


- Lock hub with locking pin -3359- whilst turning engine in direction of rotation.
- Check whether crankshaft can be locked with crankshaft stop -T10100- .

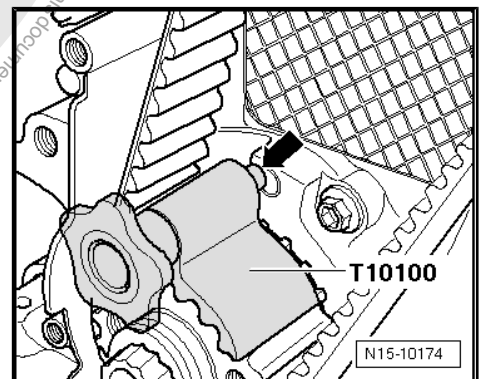
If crankshaft cannot be locked:



- Loosen securing bolts -1- for camshaft toothed belt pulley.

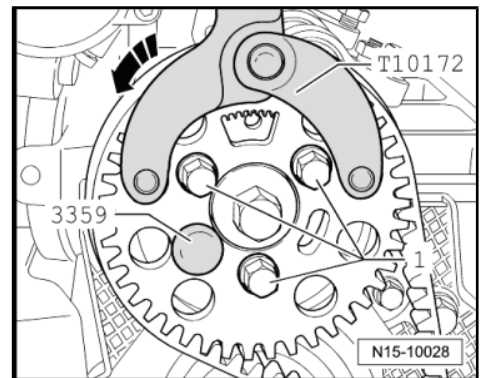


- Turn crankshaft slightly against engine direction of rotation until the pin of the crankshaft stop is positioned just before the hole in the sealing flange -arrow-.
- Now turn crankshaft in engine direction of rotation until crankshaft stop pin engages in sealing flange whilst turning.



Continuation for all vehicles

- Fit counterhold -T10172- with pins -T10172/4- as shown. Press counterhold -T10172- in direction of arrow, keeping camshaft toothed belt pulley under tension.
- In this position, tighten camshaft toothed belt pulley securing bolts -1- to 25 Nm.
- Remove locking pin -3359- and crankshaft stop -T10050- .
- Turn crankshaft two rotations in engine direction of rotation until crankshaft is just before TDC No. 1 cylinder.
- Repeat check.





- Set engine bracket against cylinder block and tighten securing bolts -A- to 40 Nm + (180°) turn further.



Note

Before installing assembly mounting, tighten all engine bracket bolts to specified torque.

- Install assembly mounting between engine and body (renew securing bolts).

Tightening torque of M 8 bolts: 20 Nm + (90°) turn further

Tightening torque of M 10 bolts: 40 Nm + (90°) turn further

- Bolt engine assembly mounting to engine bracket by bringing contact surfaces together using support bracket -10-222A- .

Specified torque: 60 Nm + turn (90°) further

- Install centre and lower parts of toothed belt guard.
- Install belt pulley vibration damper (renew securing bolts).

Tightening torque: 10 Nm + (90°) turn further

- Install poly V-belt ⇒ [page 26](#) .

- Install upper toothed belt guard.

- Install front right wheel housing liner.

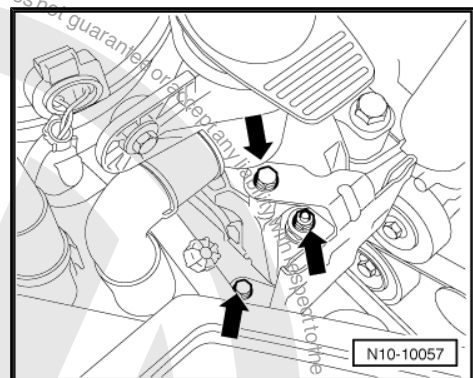
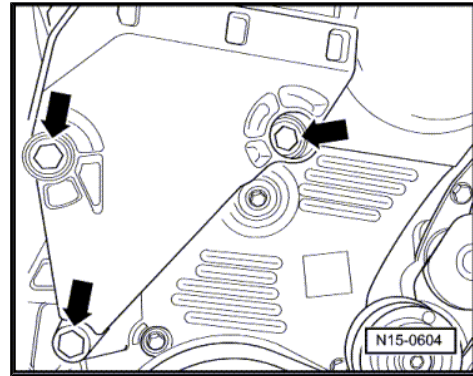
- Install coolant expansion tank.

- Bolt fuel filter bracket to engine mounting to 8 Nm torque -arrows-.

- Engage fuel filter in bracket.

- Bolt on filler neck for window wash system.

- Fit engine cover.





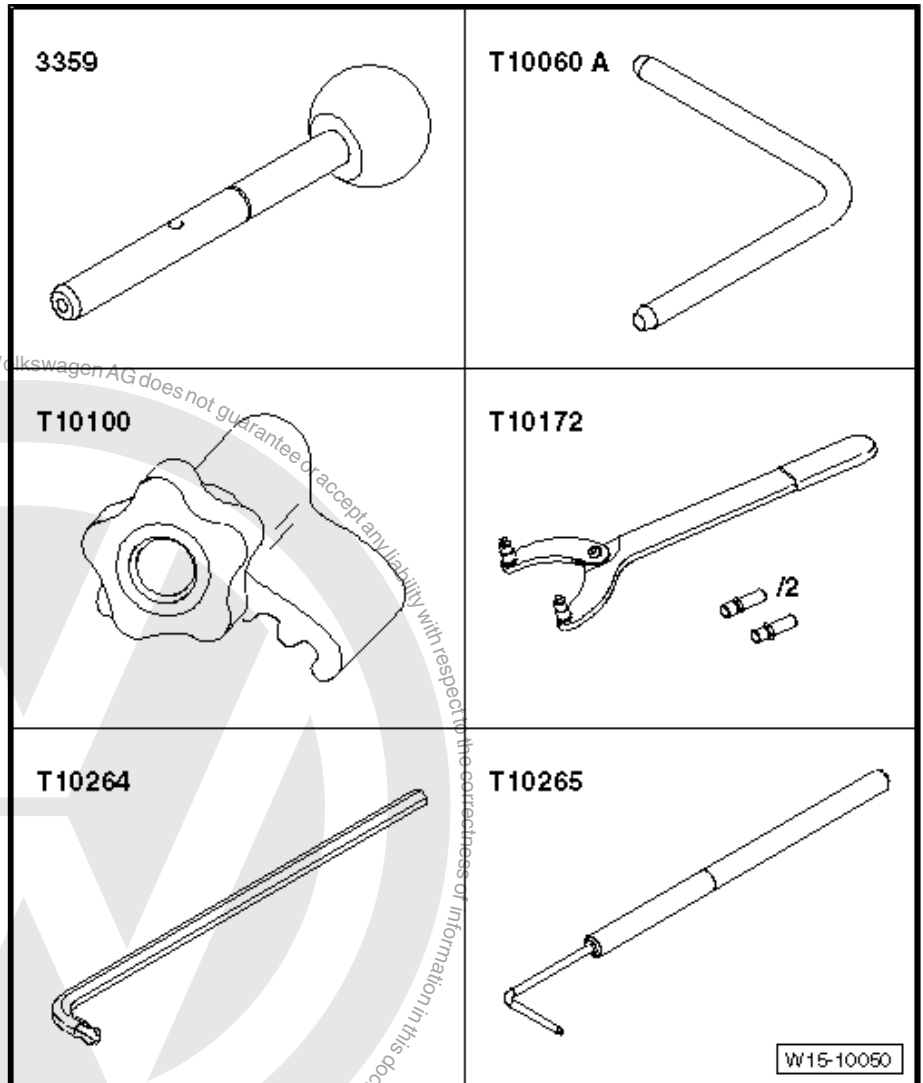
1.3.2 Removing and installing toothed belt (vehicles with engine support bolted further away from engine)

Note

- ◆ A revised engine support has been introduced gradually and it is no longer necessary to remove the engine support and to support the engine for the procedure „removing, installing and tensioning toothed belt“.
- ◆ To change the tensioning roller, for both versions the engine support must be removed.

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

- Remove engine cover. ⇒ [page 5](#) To do this, pull engine cover upwards abruptly at front -arrows A- and then pull forwards out of rear fastening -arrow B-.

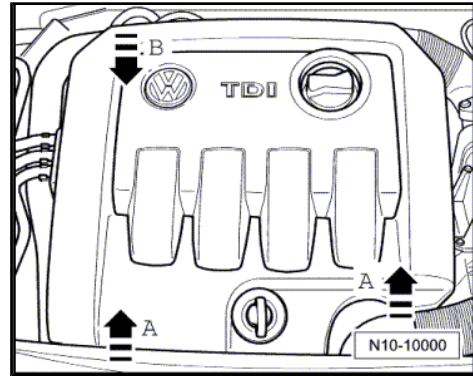


- Remove two-piece engine cover panel => [page 5](#) .

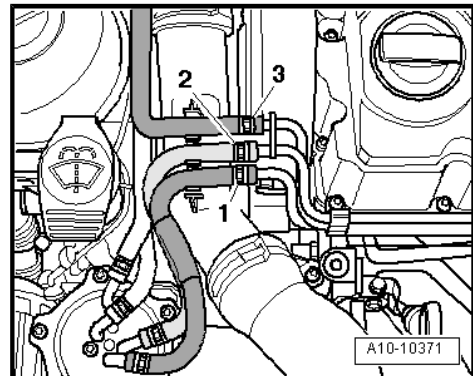


WARNING

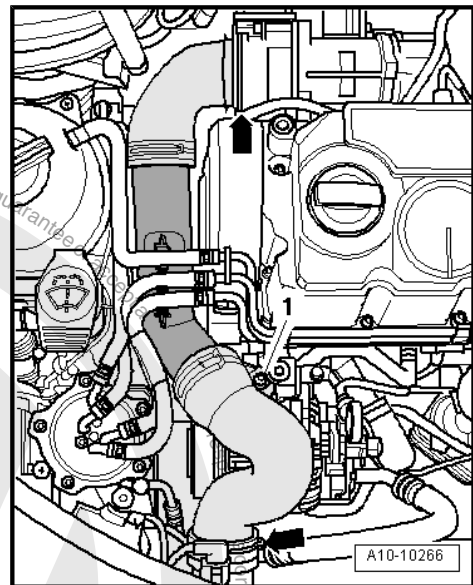
- ◆ *In extreme cases the fuel lines and the fuel can reach a temperature of 100 °C on vehicles with unit injector engine. Allow the fuel to cool down before disconnecting the lines - danger of scalding.*
- ◆ *Wear protective gloves.*
- ◆ *Wear eye protection.*



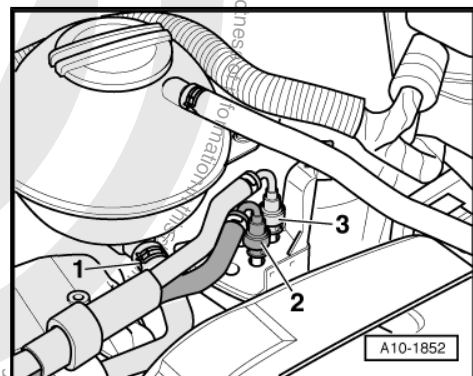
- Pull fuel supply hose -1- and fuel return hose -2- off fuel lines.
- Pull off coolant line -3-.
- Remove bolt -1-.



- Remove connecting pipe between charge air cooler and intake connecting pipe, to do this, lightly lift retaining clips -arrows-.

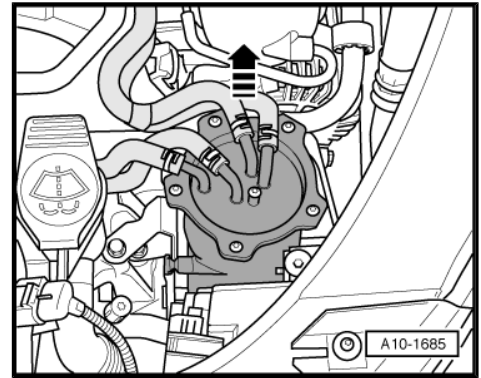


- Disconnect fuel supply line -3- and return line -2- by pulling release tabs.
- Remove fuel filter »screwed filter« and lay it with hoses to side -arrow-.

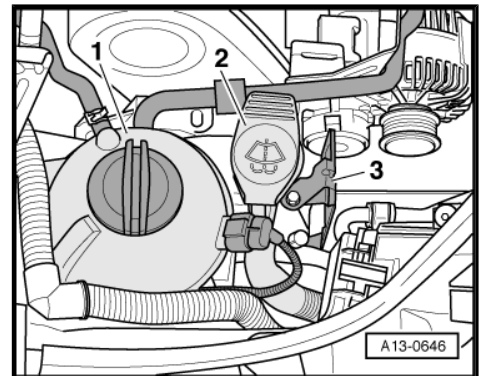




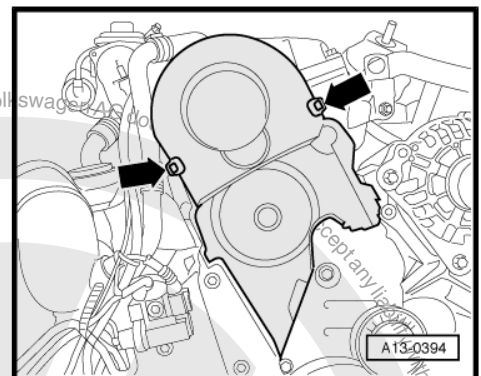
- Pull fuel filter »inserted filter« out of bracket -arrow-.
- Unscrew bolt at filler neck -2- for windscreen washer system reservoir.
- Unscrew bracket -3- for fuel filter.



- Disconnect electrical connector on coolant expansion tank -1-.
- Remove coolant expansion tank, coolant hoses remain connected. Place it on engine.
- Remove poly V-belt ⇒ [page 25](#) .
- Remove tensioning element for poly V-belt.



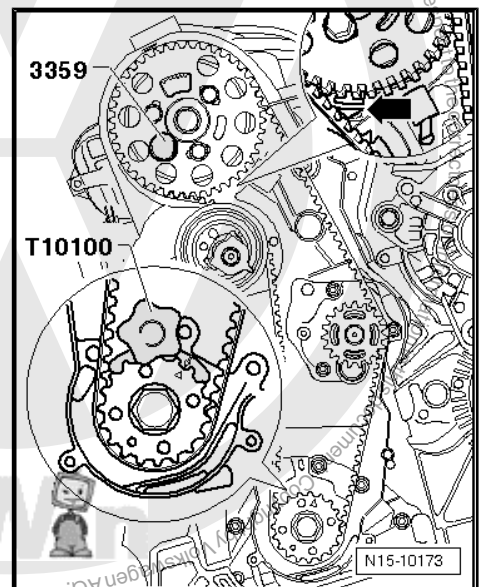
- Remove upper toothed belt guard, to do this, loosen retaining clips -arrows-.
- Remove front right wheel housing liner.
- Remove belt pulley with vibration damper.
- Remove lower and centre parts of toothed belt guard.
- Turn crankshaft to TDC No. 1 cylinder.



i Note

Turn crankshaft until marking on crankshaft pulley and tooth segment of camshaft pulley is on top. The marking on the rear toothed belt guard must align with the marking on the camshaft sender wheel -arrow-.

- Lock hub using locking pin -3359- . To do this, slide locking pin through the free elongated hole on left into hole in cylinder head.
- Lock crankshaft toothed belt pulley with crankshaft stop - T10100- . To do this, push crankshaft stop into teeth of belt pulley from face side.

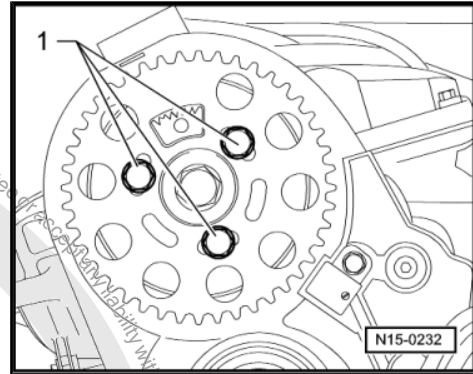


i Note

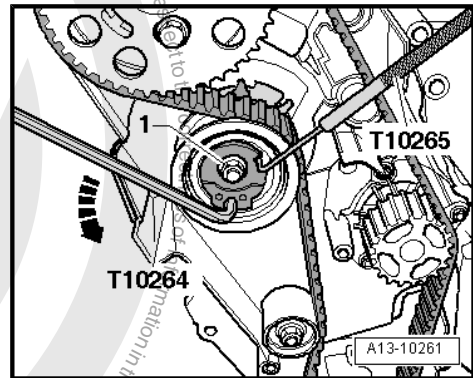
The marks on the crankshaft toothed belt pulley and the crankshaft stop must align. When doing this, the pin of the crankshaft stop must engage in the drilling of sealing flange.



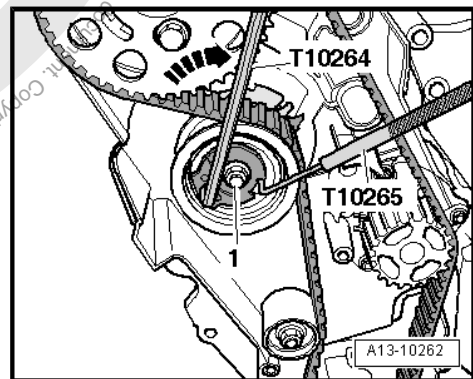
- Mark direction of rotation of toothed belt.
- Loosen securing bolts -1- of camshaft pulley until the camshaft pulley can be moved within the elongated holes.



- Loosen tensioning roller securing nut -1-.
- 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 toothed belt pulleys.



Installing

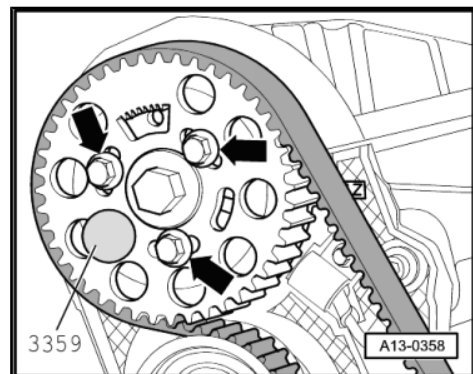
- Camshaft locked with locking pin -3359- .
- Crankshaft locked with crankshaft stop -T10100- .
- Tensioning roller locked with locking pin -T10265- and secured to right stop with securing nut.



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.

- Turn camshaft pulley in its elongated holes to centre position -arrows-.
- Guide toothed belt through gap between engine support and engine.
- Fit toothed belt onto crankshaft toothed belt pulley, tensioning roller, camshaft toothed belt pulley and idler roller.
- Then fit toothed belt on coolant pump toothed belt pulley.



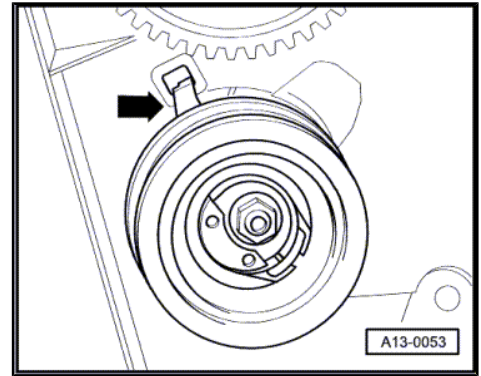


i Note

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

- Remove locking pin -T10265- from tensioning roller.
- Loosen tensioning roller securing nut -1-.

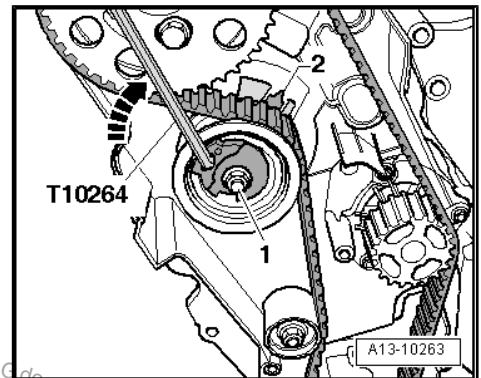
- Turn eccentric of tensioning roller clockwise -arrow- using special wrench, long reach -T10264- until indicator -2- is in middle of gap in base plate.



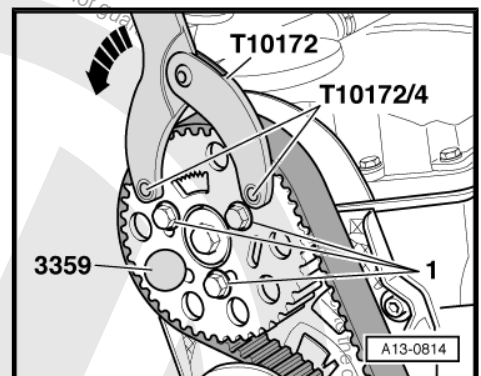
i Note

Ensure that securing nut does not turn as well.

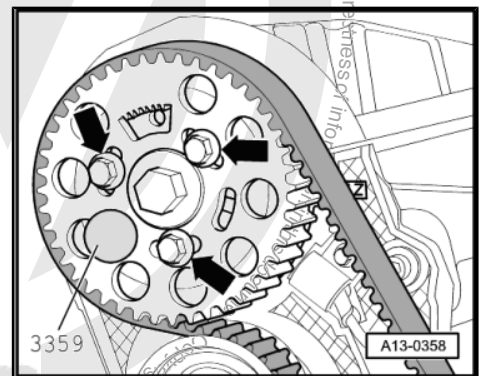
- Hold tensioning roller in this position and tighten tensioning roller nut to 20 Nm + turn 45° further.



- Fit counterhold -T10172- with pin -T10172/4- as shown in illustration, and keep the toothed belt under tension on pulling side, by pressing in -direction of arrow-.
- Tighten bolts -1- of camshaft toothed belt pulley to 25 Nm.
- Remove locking pin -3359- and crankshaft stop -T10100- .
- Turn crankshaft two rotations in engine direction of rotation until the crankshaft is just before TDC again.



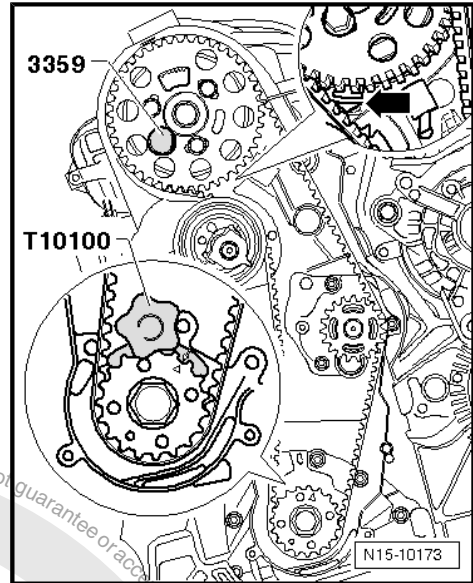
- Lock hub of camshaft with locking pin -3359- whilst turning engine in direction of rotation.



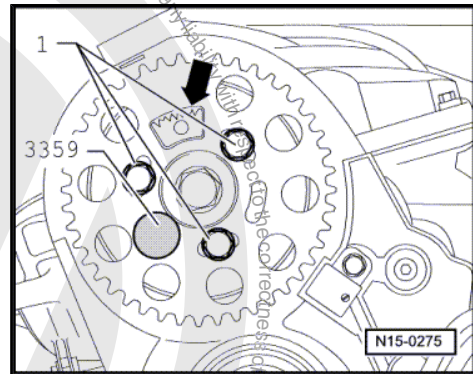


- Check whether crankshaft can be locked with crankshaft stop -T10100- .

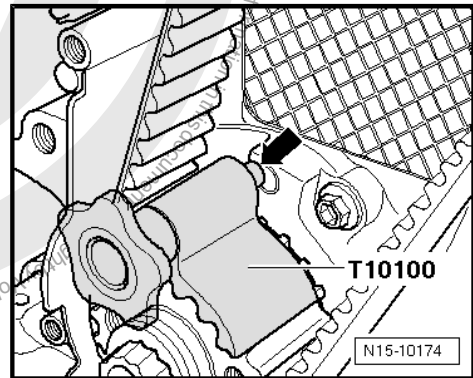
If crankshaft cannot be locked:



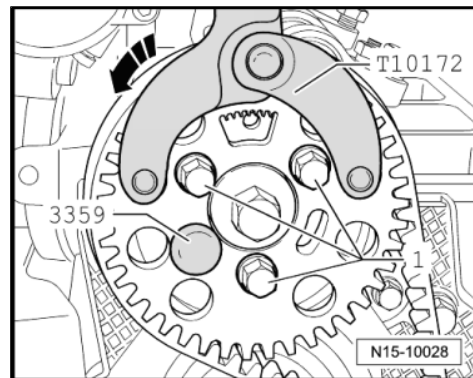
- Loosen securing bolts -1- for camshaft toothed belt pulley.



- 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.



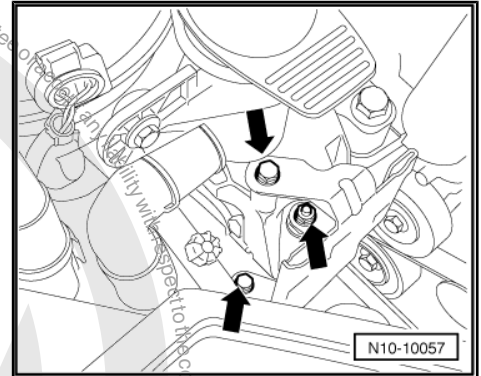
- Fit counterhold -T10172- with pins -T10172/4- as shown. Press counterhold -T10172- in direction of arrow, keeping camshaft toothed belt pulley under tension.
- In this position, tighten camshaft toothed belt pulley securing bolts -1- to 25 Nm.
- Remove locking pin -3359- and crankshaft stop -T10100- .
- Turn crankshaft two rotations in engine direction of rotation until crankshaft is just before TDC No. 1 cylinder.
- Repeat check and adjustment if necessary.
- Install centre and lower parts of toothed belt guard.
- Install belt pulley vibration damper (renew securing bolts).





Tightening torque: 10 Nm + (90°) turn further

- Install poly V-belt ⇒ [page 26](#) .
- Install upper toothed belt guard.
- Install connecting pipe between charge air cooler and intake connecting pipe.
- Install front right wheel housing liner.
- Install coolant expansion tank.
- Bolt fuel filter bracket to engine mounting to 8 Nm torque -arrows-.
- Engage fuel filter in bracket.
- Bolt on filler neck for window wash system.
- Fit engine cover.

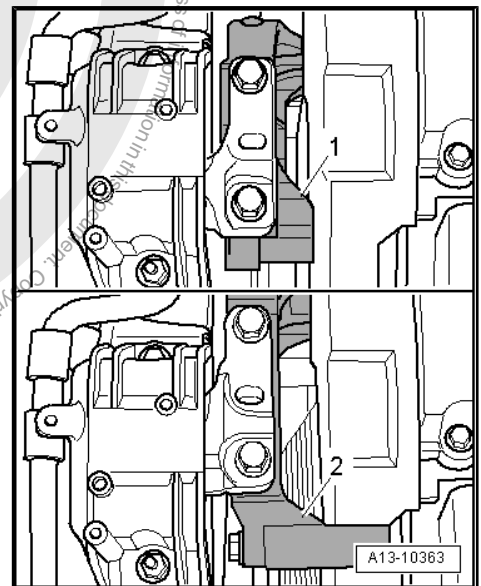


1.4 Removing and installing cylinder head



Note

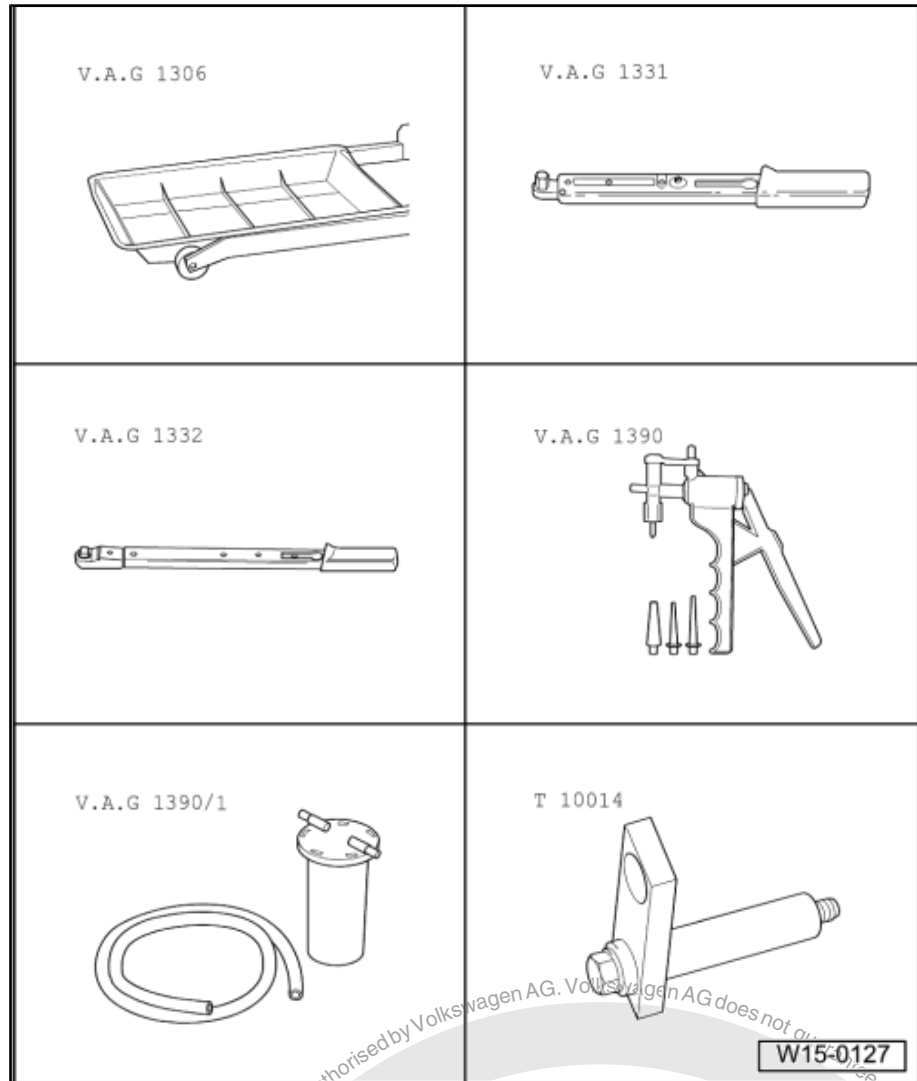
- ◆ From 05.05 a modified engine support has been introduced, it is no longer necessary to support the engine for the procedure „removing and installing the cylinder head“.
- ◆ -1-: Engine support ▶ 05.05 (support necessary)
- ◆ -2-: Engine support 06.05 ▶ (support not necessary)





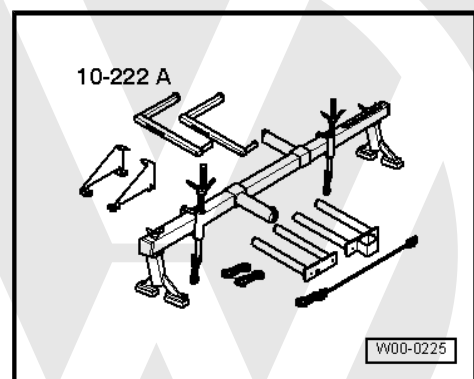
Special tools and workshop equipment required

- ◆ Drip tray -V.A.G 1306- or drip tray -VAS 6208-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Hand vacuum pump with accessories -V.A.G 1390-
- ◆ Water drainage container - V.A.G 1390/1-
- ◆ Retainer -T10014- (only vehicles ▶ 05.05)



Special tools and workshop equipment required

- ◆ Support bracket -10-222A- with adapters -10-222A/13- (only vehicles ▶ 05.05)





Note

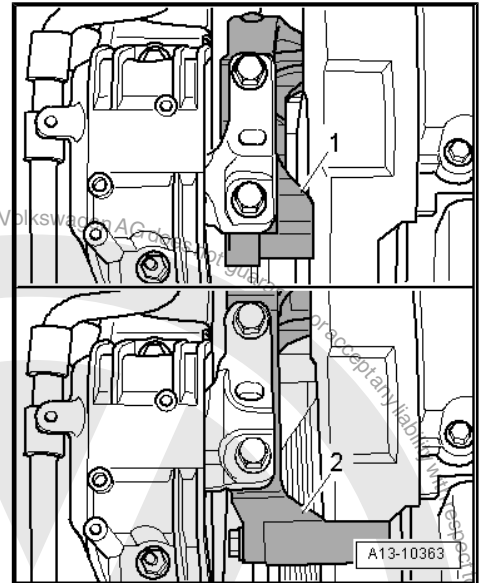
- ◆ From 05.05 a modified engine support has been introduced, it is no longer necessary to support the engine for the procedure „removing and installing the cylinder head“.
- ◆ -1-: Engine support ▶ 05.05 (support necessary)
- ◆ -2-: Engine support 06.05 ▶ (support not necessary)
- ◆ All cable ties which are opened or cut through when cylinder head is removed must be replaced in the same position when cylinder head is installed.



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 and 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



Note

Before removing cylinder head, extract fuel using hand-operated vacuum pump with accessories -V.A.G 1390- and water drainage container -V.A.G 1390/1- .

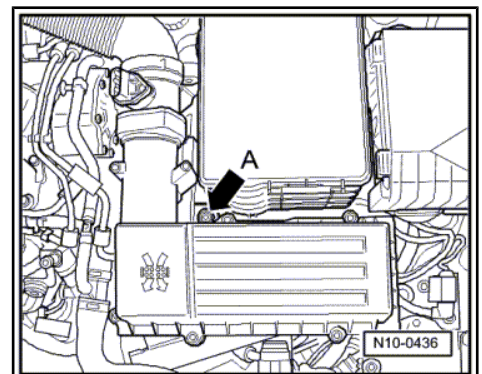
- Remove engine cover panel ⇒ [page 5](#) .

Golf, Golf Plus, Touran

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

All other vehicles continued

- 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 noise insulation. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .
- Drain coolant ⇒ [page 123](#)
- 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 with accessories -V.A.G 1390- and water drainage container -V.A.G 1390/1- ⇒ [page 195](#) .
- Pull fuel filter module upwards out of bracket and lay it with hoses to side.





- Remove front exhaust pipe ⇒ [page 255](#) .
- Remove turbocharger support and oil return from turbocharger.
- Remove oil supply line and lay it to side ⇒ [page 112](#) .



Note

From 05.05 a modified engine support has been introduced, it is no longer necessary to remove the engine support and supporting the engine for the procedure „removing, installing and tensioning toothed belt“ ⇒ [page 66](#)

- Remove toothed belt. ⇒ [page 66](#)
- Remove toothed belt tensioning roller.
- Install hub for camshaft pulley ⇒ [page 97](#) , Removing and installing camshaft.
- Remove rear toothed belt guard securing bolts -2- and -4-.
- Unscrew Hall sender -G40- -3-.
- Remove exhaust gas recirculation connecting pipe.
- 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.

Golf, Golf Plus Touran: Vehicles ▶ 05.05



Note

Both lifting eyes for the support are located on the cylinder head, so an additional bracket for supporting the engine must be secured on the cylinder block.

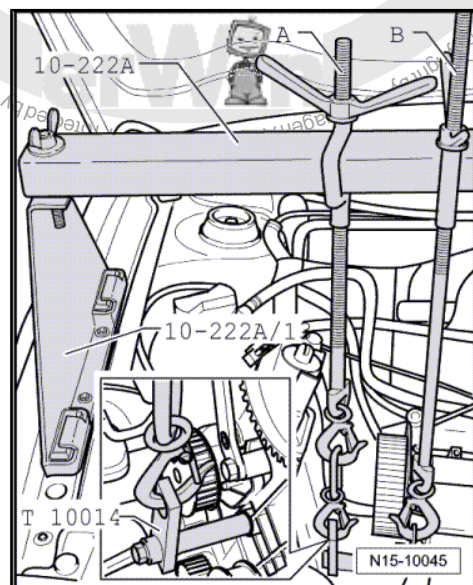
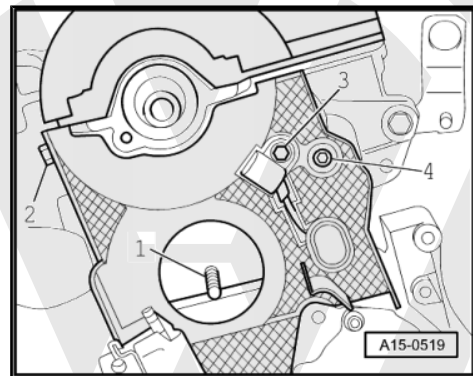
- Screw retainer -T10014- into threaded hole above coolant pump and tighten to 20 Nm.
- Lift engine slightly using spindle -A- until spindle -B- is relieved.
- Unhook spindle -B- and push it to side.

Passat: Vehicles ▶ 05.05



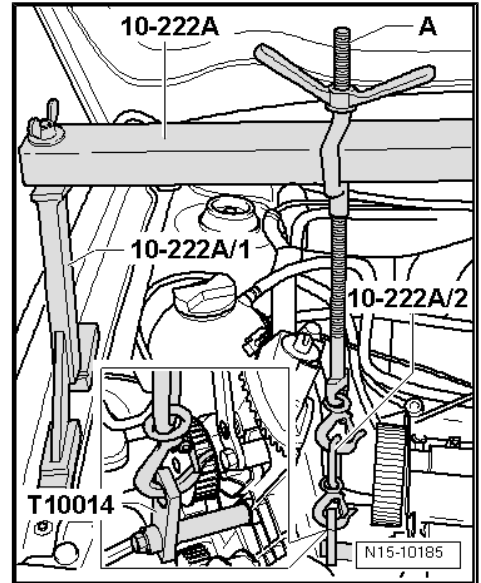
Note

Both lifting eyes for the support bracket are located on the cylinder head. Therefore, an additional spindle with bracket must be secured on the cylinder block to support the engine.





- Screw retainer -T10014- into threaded hole above coolant pump and tighten to 20 Nm.
- Lift up engine slightly via spindle -A-.



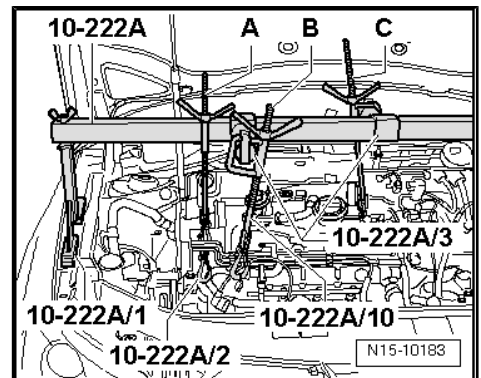
- Once spindles -B- and -C- are no longer under tension, unhook them and slide them to one side.

For vehicles 06.05 ▶

- Remove tensioning roller securing nut for toothed belt

Continuation for all vehicles

- Remove cylinder head cover. ⇒ [page 64](#)

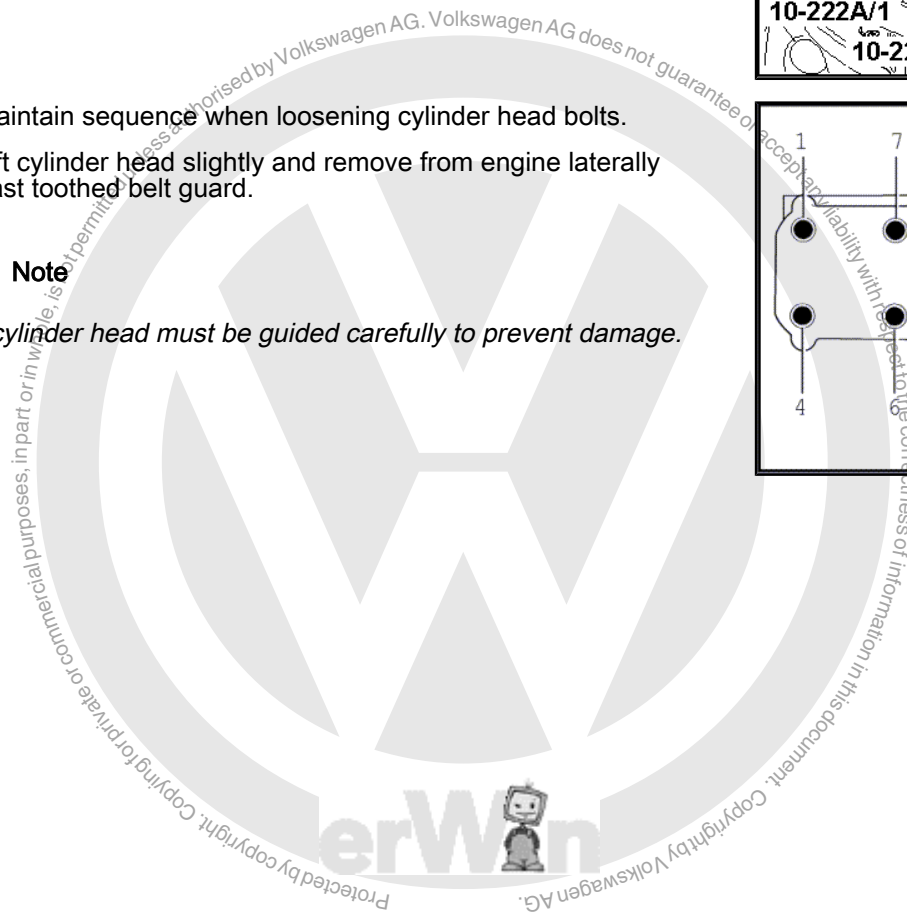
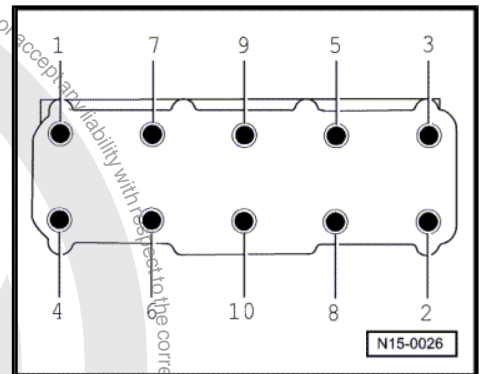


- Maintain sequence when loosening cylinder head bolts.
- Lift cylinder head slightly and remove from engine laterally past toothed belt guard.



Note

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 made on the surfaces. When using abrasive paper do not use a grade less than 100.
 - ◆ Carefully remove remains of emery and abrasives.
 - ◆ 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.
- Turn crankshaft to TDC marking before fitting cylinder head.
 - Turn crankshaft opposite engine direction of rotation until all pistons are approximately equally placed below TDC.
 - Fit cylinder head gasket.



Note

Note identification on cylinder head gasket => [page 63](#) .

- Fit cylinder head and tighten all cylinder head bolts hand-tight.
- Tighten cylinder head in four stages in sequence as shown as follows:

1 - Tighten initially with torque wrench;

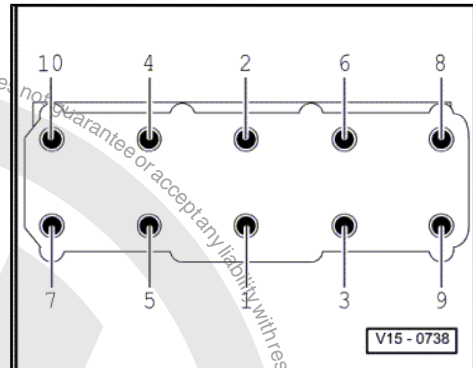
Stage I = 35 Nm

Stage II = 60 Nm

2 - Turn further with rigid spanner:

Stage III = + (90°) turn further

Stage IV = + (90°) turn further



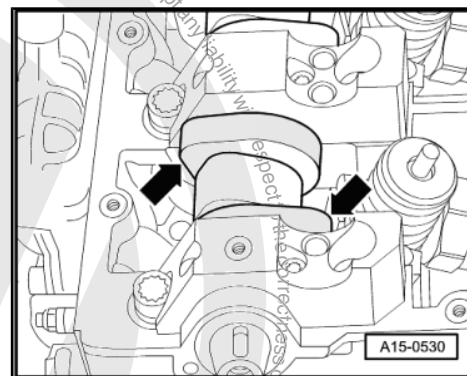
Note

After repair work it is not necessary to retighten the cylinder head bolts.

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



- After tightening cylinder head, turn camshaft so that cams for No. 1 cylinder point equally upwards. Before fitting toothed belt, turn crankshaft in engine direction of rotation ⇒ [page 66](#) , removing, installing and tightening toothed belt.
- Install hub for camshaft toothed belt pulley ⇒ [page 97](#) , Removing and installing camshaft.
- Install toothed belt ⇒ [page 66](#) .
- Install poly V-belt ⇒ [page 26](#) .
- Install oil supply line ⇒ [page 112](#) .
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Assembly overview - Body - front .
- Install plenum chamber bulkhead ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
- Fill coolant system with coolant ⇒ [page 123](#) .
- Carry out road test and then read fault memory ⇒ [page 239](#) .



1.5 Checking compression



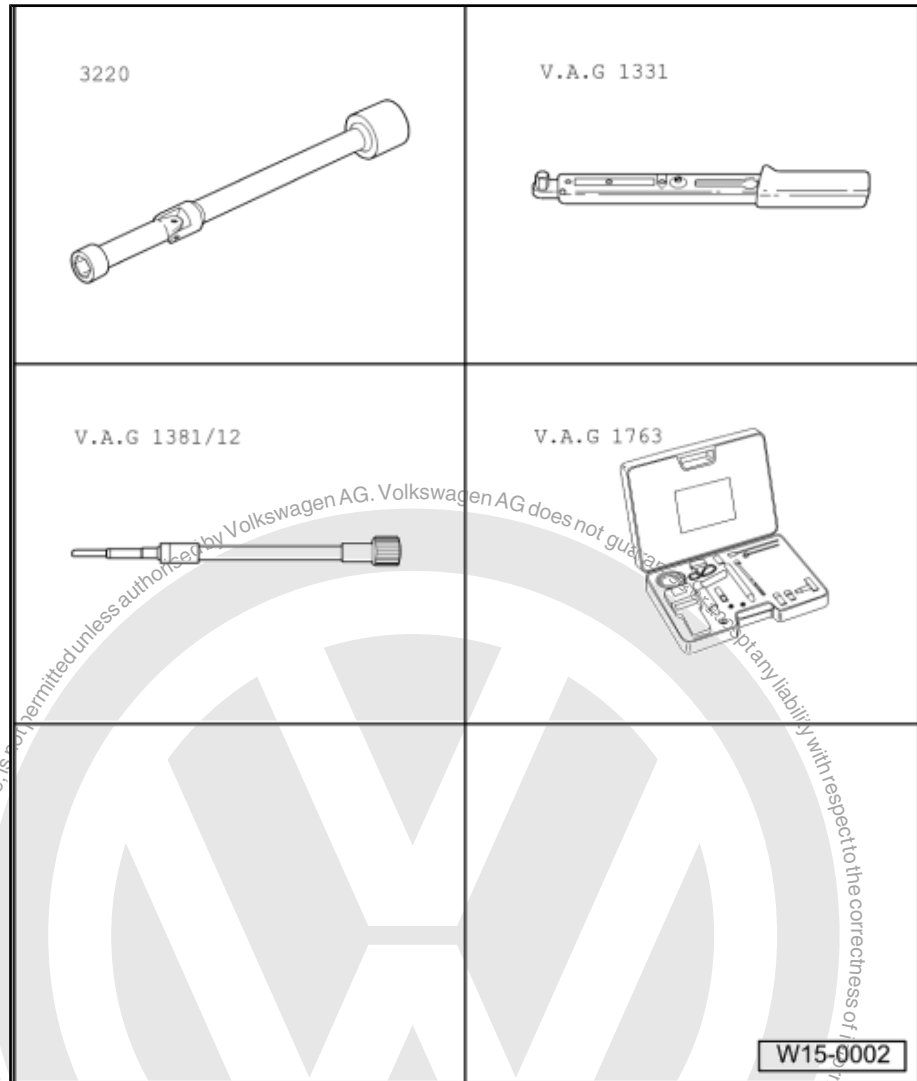
Note

If ceramic glow plugs are fitted, before removing check idling speed smooth running control using vehicle diagnosis, testing and information system -VAS 5051B-. The compression test is only justified if one or more cylinders are conspicuous.



Special tools and workshop equipment required

- ◆ Jointed spanner -3220-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Adapter -V.A.G 1381/12-
- ◆ Compression tester - V.A.G 1763-



Test prerequisite

- Engine oil temperature min. 30 °C

Test procedure

- Pull off central connector for unit injectors



Note

If ceramic glow plugs are fitted, always observe notes on removing and installing ceramic glow plugs ⇒ [page 269](#) .

- Remove all glow plugs or ceramic glow plugs using jointed extension and socket -3220- .



- Screw in adapter -V.A.G 1381/12- in place of glow plugs or ceramic glow plugs.
- Check compression using compression tester -V.A.G 1763- .

i Note

Using the compression tester → Operating instructions.

- Operate starter until tester shows no further pressure increase.

Compression pressures:

New: 25 ... 31 bar, wear limit: 19 bar

Maximum permissible difference between all cylinders: 5 bar

i Note

If ceramic glow plugs are fitted, always observe notes on removing and installing ceramic glow plugs ⇒ [page 269](#) .

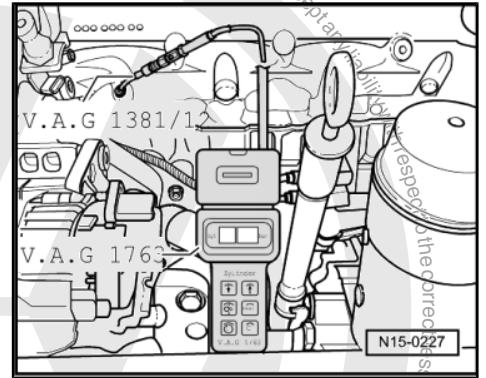
- Remove glow plugs or ceramic glow plugs using jointed extension and socket -3220- .

Specified torque: 15 Nm.

- Read fault memory of engine control unit ⇒ [page 239](#) .

i Note

Disconnecting the central connector for unit injectors causes faults to be stored. Therefore, read fault memory and clear if necessary.





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 92](#) .

Checking valve guides ⇒ [page 94](#) .

Renewing valve stem seals ⇒ [page 95](#) .

Removing and installing camshaft ⇒ [page 97](#) .

Removing and installing camshaft seal ⇒ [page 101](#) .

2.1 Assembly overview - valve gear

1 - 20 Nm + turn (90°)

- Renew.
- Note sequence when loosening and tightening ⇒ [page 97](#) , Removing and installing camshaft.

2 - Rocker arm shaft

- Do not interchange

3 - Cylinder head bolt

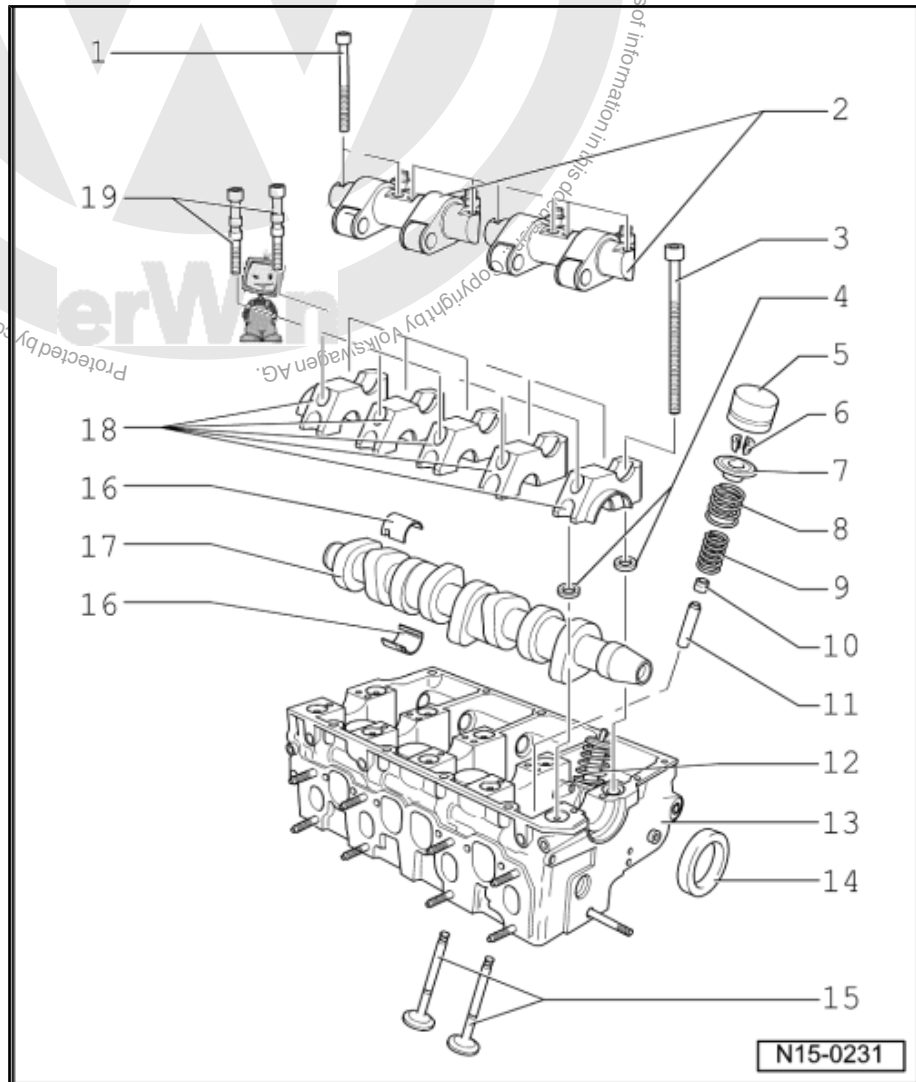
- Renew.
- Note sequence when loosening and tightening ⇒ [page 83](#) , Removing and installing cylinder head.
- Before installing, insert washers ⇒ [Item 4 \(page 92\)](#) in cylinder head.

4 - Washer

- For cylinder head bolts.
- Insert in cylinder head before installing bearing caps

5 - Bucket tappet

- Do not interchange.
- With hydraulic valve clearance compensation.
- Store with cam contact surface downwards.
- Before installing, check camshaft axial clearance ⇒ [page 93](#) .
- Oil contact surfaces.
- Before removing, remove camshaft bearing caps





6 - Valve cotter

7 - Valve spring plate

8 - Outer valve spring

- Removing and installing: with cylinder head removed, use valve spring compressor -2037- ; with cylinder head installed ⇒ [page 95](#) , Renewing valve stem seals.

9 - Inner valve spring

- Removing and installing: with cylinder head removed, use valve spring compressor -2037- ; with cylinder head installed ⇒ [page 95](#) , Renewing valve stem seals.

10 - Valve stem seal

- Renewing ⇒ [page 95](#) .

11 Valve guide

- Check ⇒ [page 94](#) .

12 Unit injector

- Removing and installing ⇒ [page 230](#)

13 - Cylinder head

- See note ⇒ [page 92](#) .

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, tape over groove in taper of camshaft (e.g. using Sellotape).
- Removing and installing ⇒ [page 101](#)

15 - Valves

- Valve dimensions ⇒ [page 94](#) .

16 - Bearing shell

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

17 - Camshaft

- Checking axial clearance ⇒ [page 93](#) .
- Removing and installing ⇒ [page 97](#)
- Check radial clearance with Plastigage, wear limit: 0.11 mm.
- Runout: max. 0.01 mm.

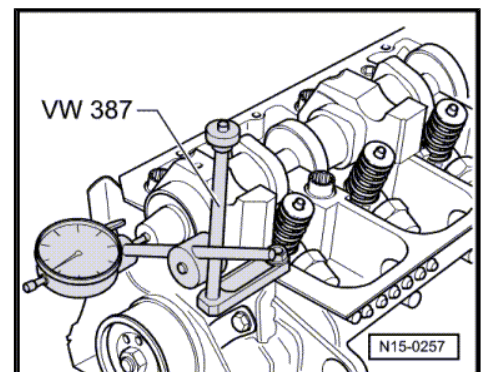
18 - Bearing cap

- Installation sequence ⇒ [page 97](#) , removing and installing camshaft
- To install, seal parting surfaces of bearing caps 1 and 5 with sealant -AMV 174 004 01- ⇒ [page 94](#)

19 - 8 Nm + turn (90°)

- Renew.

Checking camshaft axial clearance





Special tools and workshop equipment required

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

Check with bucket tappets removed and with first, third and last bearing caps fitted.

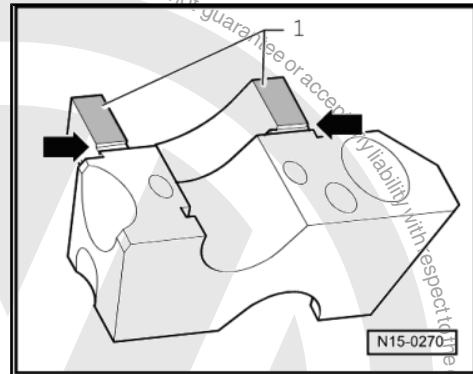
Wear limit: max. 0.15 mm

Seal parting surfaces of bearing caps 1 and 5 with sealant -AMV 174 004 01-

- Apply sealant -AMV 174 004 01- thinly and evenly on the surfaces -1-.

i Note

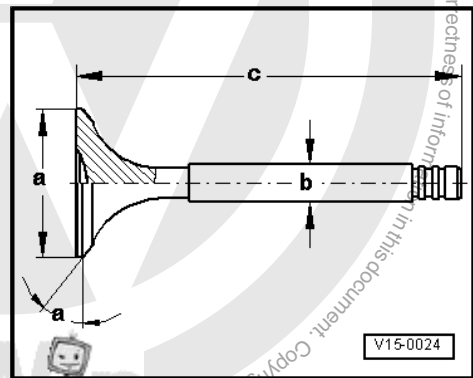
Be careful that no sealant gets into grooves -arrows-.



Valve dimensions

i Note

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

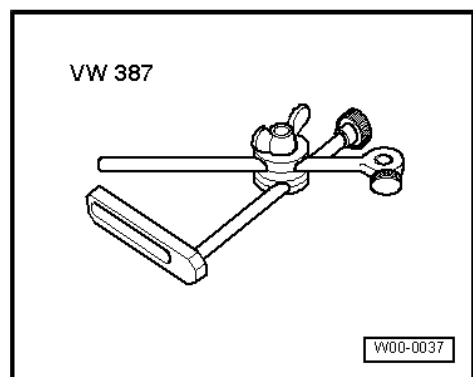


Dimension		Inlet valve	Exhaust valve
∅ a	mm	35.95	31.45
∅ b	mm	6.980	6.956
c	mm	89.95	89.95
α	∠°	45	45

2.2 Checking valve guides

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket -VW 387-

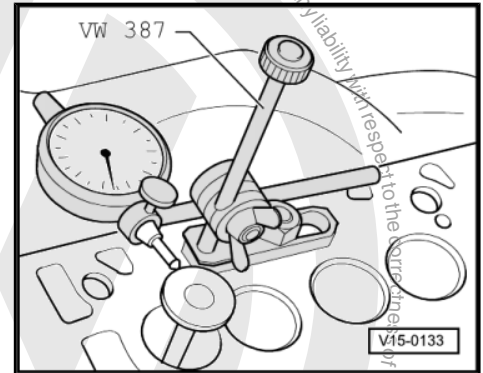


- ◆ Dial gauge



Test procedure

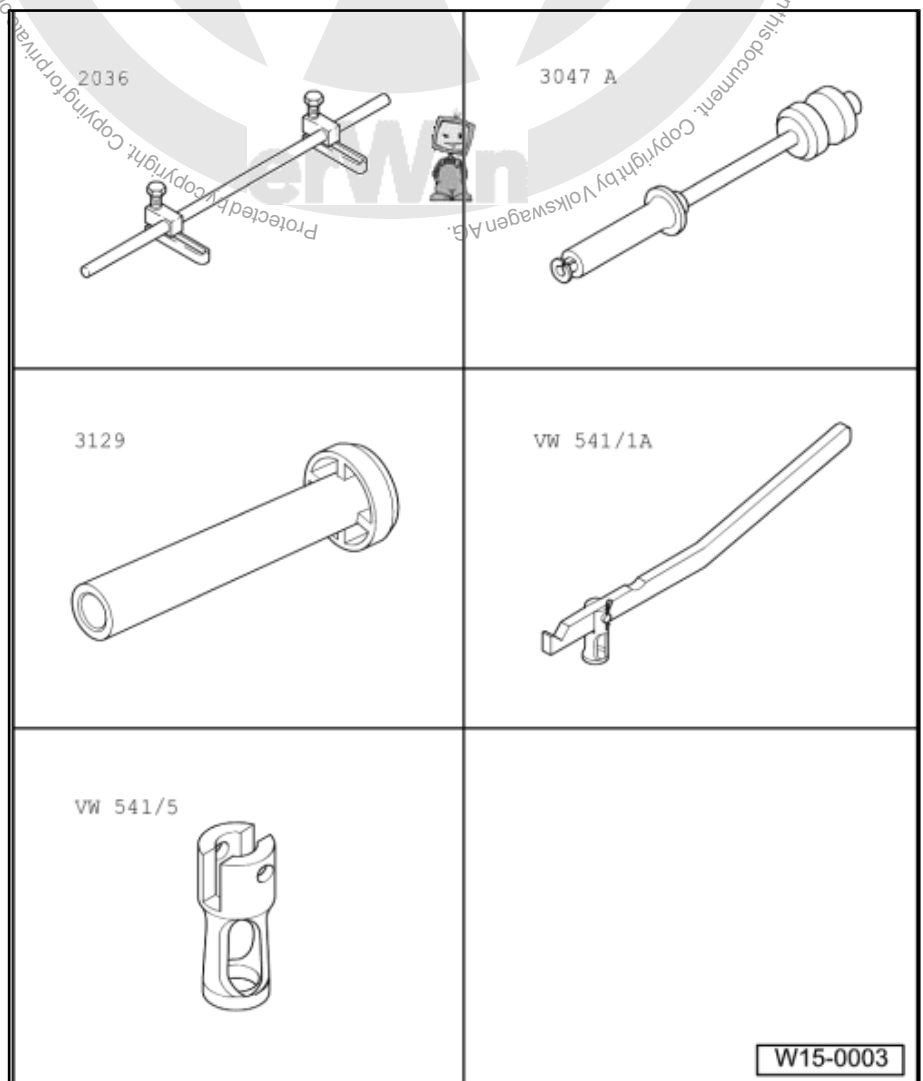
- Insert new valve into guide. The end of the valve stem must be flush with the guide. On account of differing stem diameters, only use inlet valve in inlet guide and exhaust valve in exhaust guide.
- Determine rock. Wear limit: max. 1.3 mm
- Cylinder head must be renewed if rock exceeds wear limit.



2.3 Renewing valve stem seals

Special tools and workshop equipment required

- ◆ Assembly tool -2036-
- ◆ Puller -3047 A-
- ◆ Fitting tool -3129-
- ◆ Valve lever -VW 541/1A-
- ◆ Thrust piece -VW 541/5-



2.3.1 Removing

(With cylinder head installed)

- Remove camshaft. ⇒ [page 97](#)



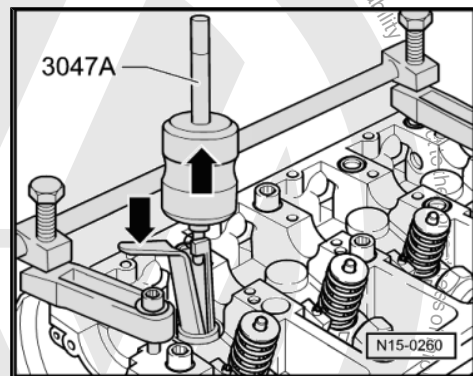
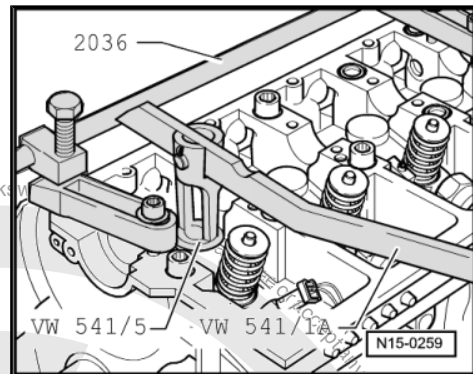
- Remove bucket tappets and place them with the contact surface downwards. When doing this, ensure that the tappets are not interchanged.
- Set piston of respective cylinder to top dead centre (TDC).
- Insert valve assembly device -2036- and adjust mounting to height of studs.
- Remove valve springs using valve lever -VW 541/1A- and press tool -VW 541/5- .



Note

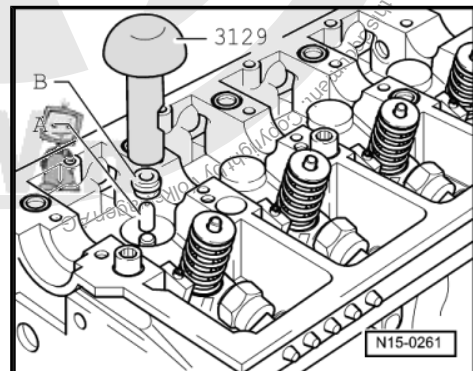
The valves are supported by the piston crown.

- Pull off valve stem seals using puller -3047 A- .



2.3.2 Installing

- Place the plastic sleeve -A- supplied on the respective valve stem. This will prevent the new valve stem seal -B- being damaged.
- Insert new valve stem seal in fitting tool -3129- .
- Lubricate sealing lip of valve stem seal and carefully push on valve guide.

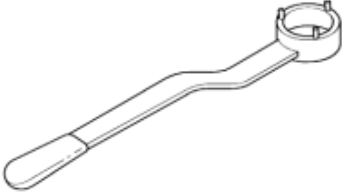
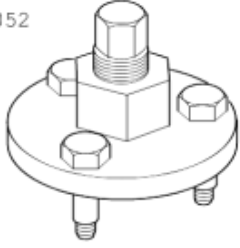






2.4 Removing and installing camshaft

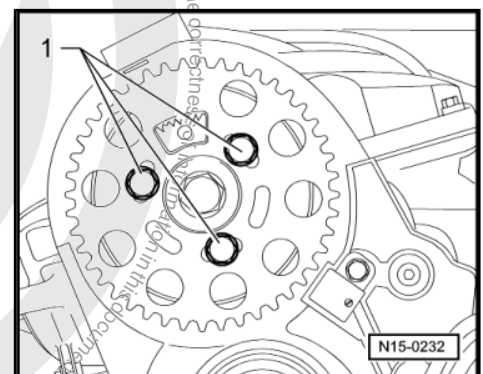
Special tools and workshop equipment required

- ◆ Counterhold tool -T10051-
- ◆ Puller -T10052-
- ◆ Torque wrench (5... 50 Nm) -V.A.G 1331-
- ◆ Torque wrench (40... 200 Nm) -V.A.G 1332-
- ◆ Sealant -AMV 174 004 01-

<p>T10051</p> 	<p>T10052</p> 
<p>V.A.G 1331</p> 	<p>V.A.G 1332</p> 
<p style="text-align: right;">W15-0083</p>	

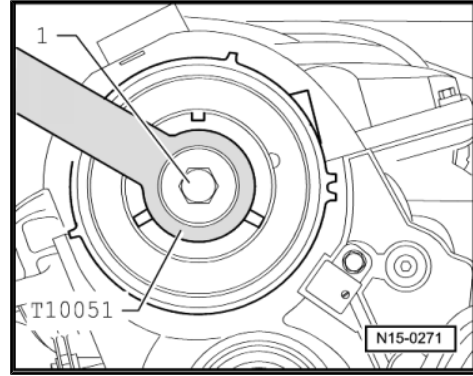
2.4.1 Removing

- Remove toothed belt. ⇒ [page 66](#)
- Remove securing bolts for camshaft toothed belt pulley -1-
- Pull camshaft toothed belt pulley off hub.

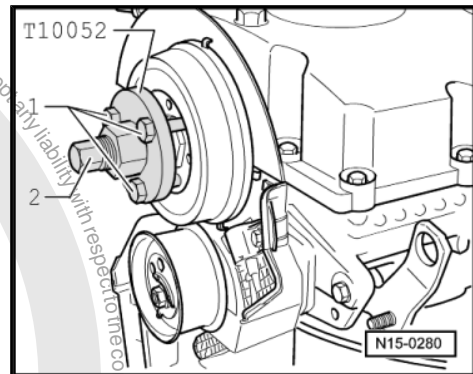




- Loosen hub securing bolt -1-.
- To do this, use counterhold -T10051- .
- Loosen hub securing bolt about 2 turns.



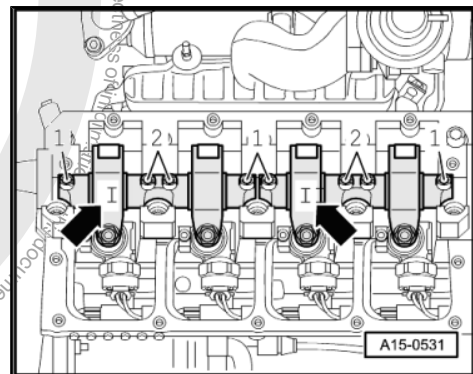
- Apply puller -T10052- and screw securing bolts -1- into hub.
- Apply tension to hub by evenly tightening puller until hub separates from taper of camshaft.



i Note

When doing this, hold puller with 30 mm spanner.

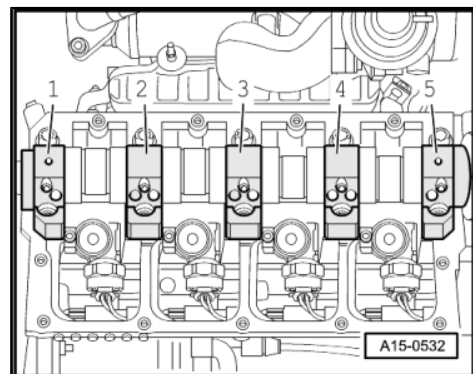
- Remove hub from taper of camshaft.
- Remove cylinder head cover.
- Mark rocker arm shafts using a permanent felt tip marker to prevent interchanging. This will prevent having to perform basic settings of unit injectors -arrows-.
- Remove rocker arm shafts.



i Note

First loosen both outer and then inner securing bolts respectively.

- Remove tandem pump => [page 195](#) .
- First remove bearing caps 5, 1 and 3. Then loosen bearing caps 2 and 4 alternately and diagonally.
- Remove camshaft.

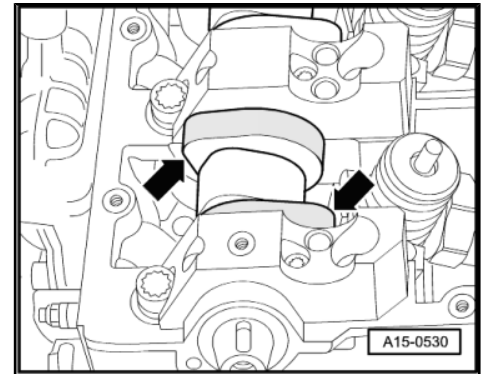




2.4.2 Installing

Note

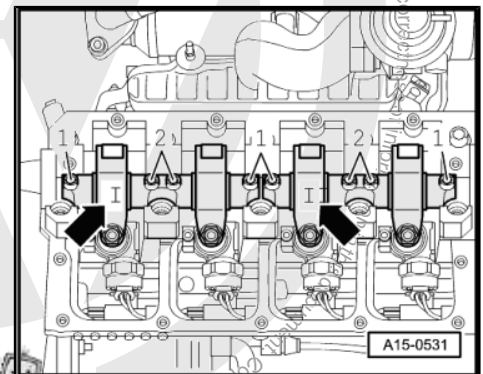
- ◆ When camshaft is installed, No. 1 cylinder cams must point upwards.
- ◆ Do not interchange used bearing shells (mark).
- ◆ When installing the camshaft, ensure proper seating of retaining lugs in bearing caps and cylinder head.
- ◆ Before installing bearing caps, ensure that cylinder head bolt washers are inserted in the cylinder head.



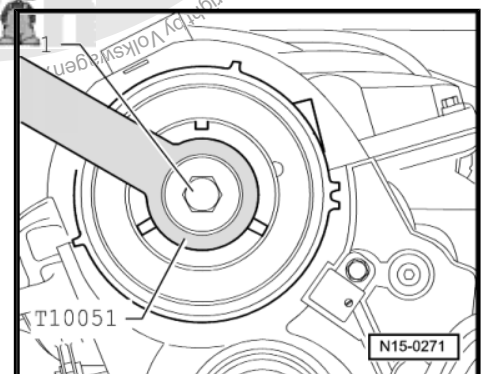
- Oil bearing shell running surfaces.
- Install bearing caps 2 and 4 using new bolts.
- Tighten bearing caps 2 and 4 in diagonal sequence alternately to 8 Nm + (90°) turn further.
- Install bearing caps 5, 1 and 3 using new bolts.

Note

- ◆ Seal parting surfaces of bearing caps 1 and 5 with sealant - AMV 174 004 01- ⇒ [page 94](#) .
- ◆ Bearing cap 5 must be flush with outer edge of cylinder head, otherwise leaks can occur at the tandem pump.
- Tighten bearing caps 5, 1 and 3 likewise to 8 Nm + (90°) turn further.
- Install camshaft oil seal. ⇒ [page 101](#)
- Install injector rocker arm shafts with new securing bolts and tighten, first the inner -2- and then the outer -1-, evenly and in diagonal sequence to 20 Nm + (90°) turn further.
- Fit hub onto camshaft.



- Tighten hub securing bolt -1- to 100 Nm.
- To do this, use counterhold -T10051- .





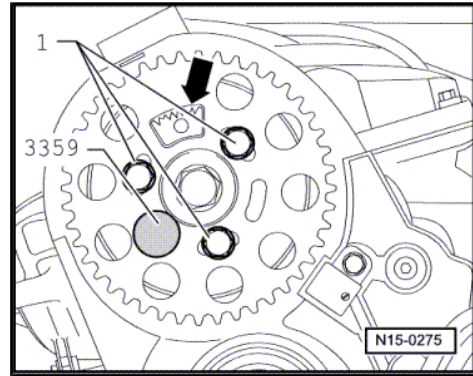
- Push camshaft toothed belt pulley onto hub.



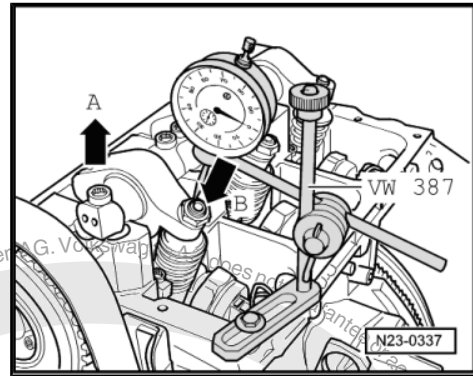
Note

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

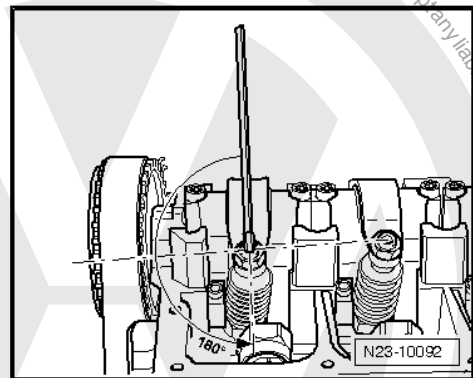
- Align camshaft toothed belt pulley at centre of elongated holes.
- Hand tighten securing bolts -1- to camshaft toothed belt pulley so that there is no play.
- Lock hub using locking pin -3359- .
- Install and tighten toothed belt ⇒ [page 66](#) .
- Screw new adjustment screws into rocker arms hand-tight and fit lock nut.



- Fit dial gauge onto adjustment screw of unit injector as shown.
- Turn crankshaft in direction of engine rotation until roller of rocker arm is located at tip of drive cam. Roller side -arrow A- positioned at highest point, dial gauge -arrow B- positioned at lowest point.
- Remove dial gauge.
- Now turn the adjuster screw into rocker arm until significant resistance can be felt (unit injector is at limit stop).



- Turn adjustment screw 180° back off stop.
- Hold adjuster screw in this position and tighten lock nut to 30 Nm.
- Install tandem pump ⇒ [page 195](#) .
- Install cylinder head cover.



Note

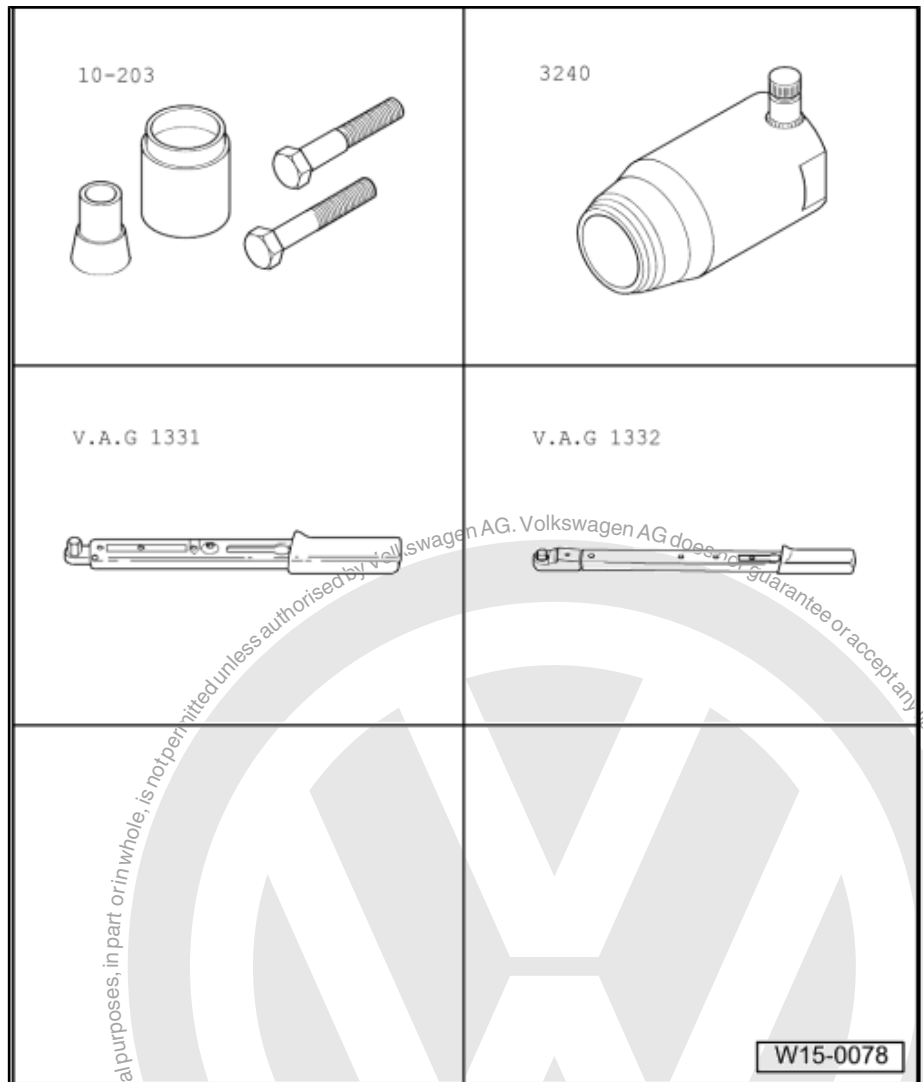
When new bucket tappets have been installed the engine must not be started for about 30 minutes. The hydraulic compensation elements must settle (otherwise valves will strike pistons).



2.5 Removing and installing camshaft oil seal

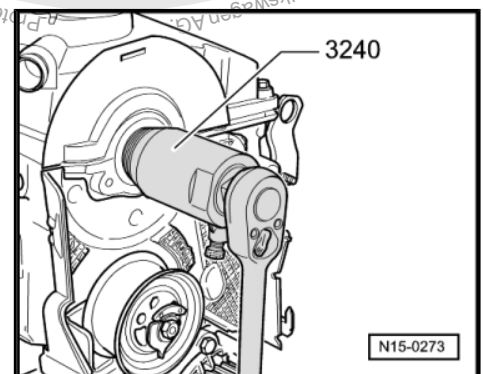
Special tools and workshop equipment required

- ◆ Fitting sleeves -10-203-
- ◆ Oil seal extractor -3240-
- ◆ Torque wrench -V.A.G 1331-
- ◆ Torque wrench -V.A.G 1332-
- ◆ Bolt M12×1.5 × 65



2.5.1 Removing

- Remove toothed belt. ⇒ [page 66](#)
- Remove camshaft toothed belt pulley and hub ⇒ [page 97](#) , Removing and installing camshaft.
- Unscrew inner part of oil seal extractor -3240- two turns (approx. 3 mm) out of outer part and lock with knurled screw.
- Lubricate threaded head of oil seal extractor -3240- , place it in position and exerting firm pressure, screw it as far as possible into oil seal.
- Loosen knurled screw and turn inner part against camshaft until oil seal is pulled out.





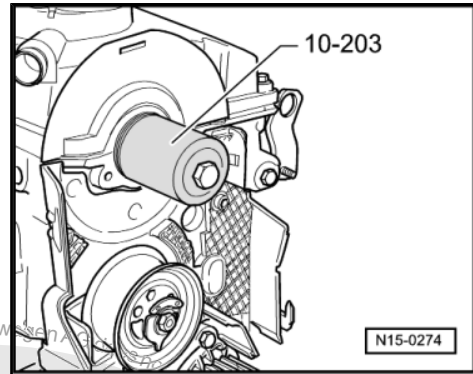
2.5.2 Installing



Note

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

- Remove oil residue from camshaft journal using a clean cloth.
- Tape over groove in taper of camshaft (e.g. with Sellotape).
- Fit oil seal carefully on camshaft.
- Press in oil seal with press piece of fitting tool -10-203- and bolt M12 -5 x 65 onto stop.
- Install and tighten toothed belt ⇒ [page 66](#) .





17 – Lubrication

1 Engine oil



Note

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

Engine oil specification ⇒ Maintenance ; Booklet 38

Oil capacities ⇒ [page 103](#)

Checking engine oil level ⇒ [page 103](#)

1.1 Oil capacities

Engine codes AVQ BJB, BKC, BRU, BXE and BXF

With oil filter change: 3.8 l

Without oil filter change: 3.3 l

Engine codes BLS and BXJ

With oil filter change: 4.3 l

Without oil filter change: 3.8 l

1.2 Checking engine oil level

Check which dipstick is installed.

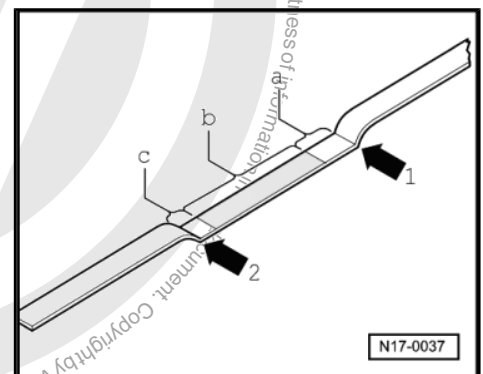
1 - Max. mark

2 - Min. mark

a - Area above hatched field up to max. mark: Do not top up with engine oil!

b - Oil level within hatched field: Can be topped up with engine oil.

c - Area from min. mark up to hatched field: Must be topped up, max. 0.5 l of engine oil!



1.3 Checking engine oil level

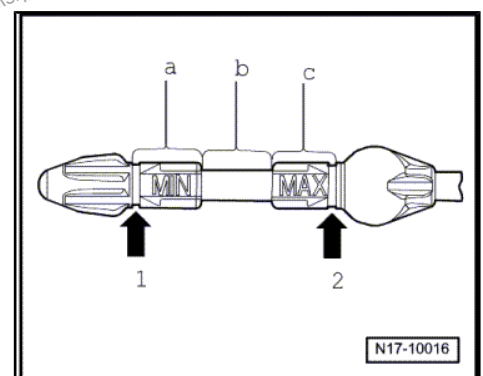
1 - Min. mark

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



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 engine oil cooler

Renew oil filter element

Assembly overview - oil pump, sump ⇒ [page 104](#)

Removing and installing sump ⇒ [page 105](#) .

2.1 Assembly overview - oil pump, sump

1 - 15 Nm

2 - Sealing flange

- With seal.
- Must sit on dowel sleeves
- Removing and installing ⇒ [page 38](#)
- Install with silicone sealant -D 176 404 A2- ⇒ [page 38](#) .
- 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 36](#) .

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 103](#) .

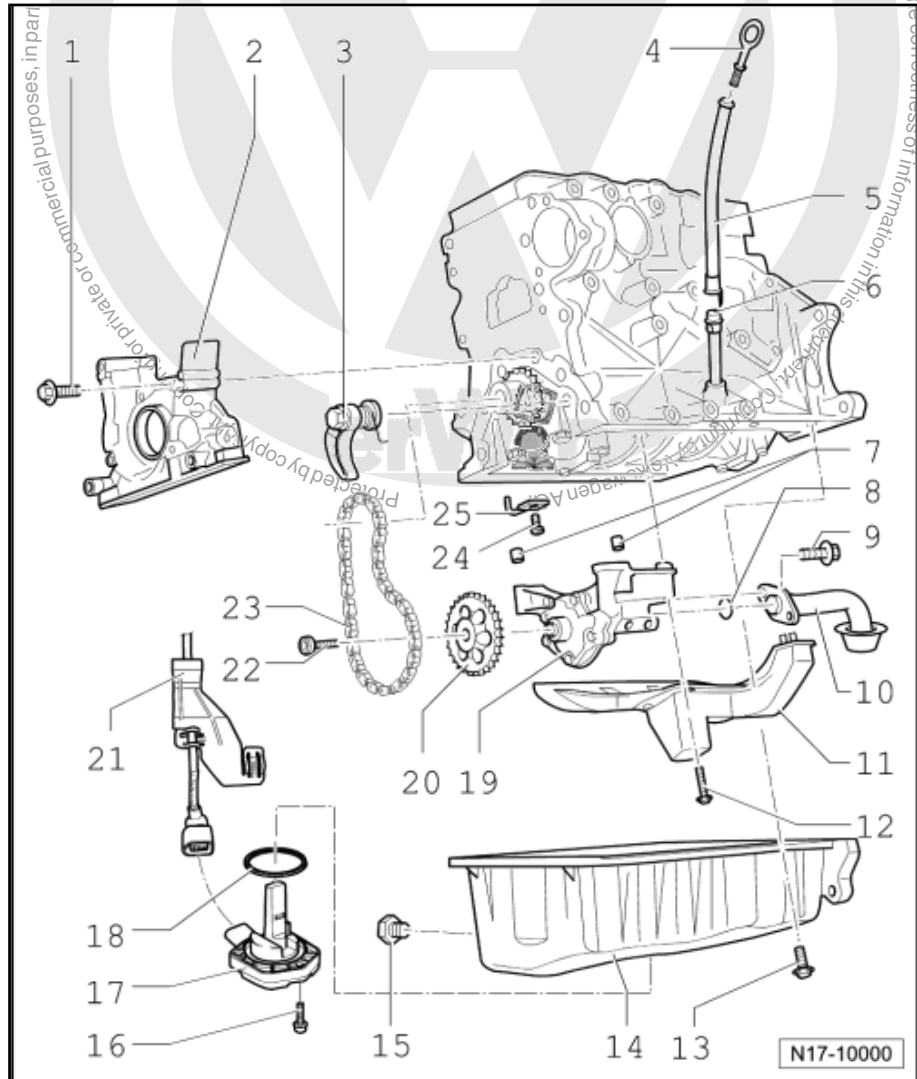
5 - Piston fitting tool

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

- Clean sealing surface before fitting.
- Install with silicone sealant -D176404A2- .
- Removing and installing => [page 105](#)

15 - Oil drain plug, 30 Nm

- Renew.

16 - 10 Nm

17 - Oil level and oil temperature sender -G266-

- Black 3-pin connector

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 - Bracket

- For oil level/temperature sender wiring harness.

22 - 20 Nm + turn (90°)

- Renew.

23 - Chain

24 - 25 Nm

- Insert without sealant.

25 - Oil spray jet

- For piston cooling.



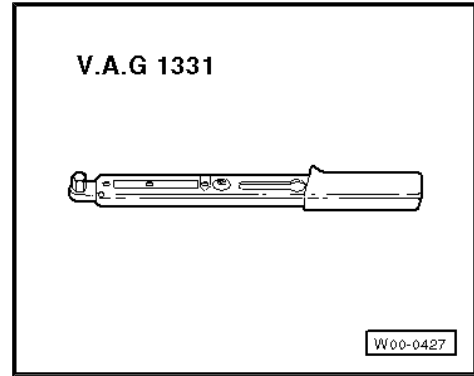
Note

2.2 Removing and installing oil sump

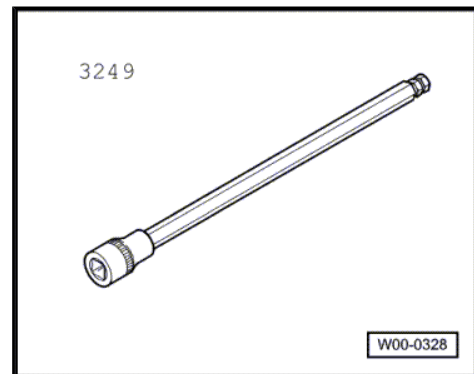
Special tools and workshop equipment required



- ◆ Torque wrench -V.A.G 1331-



- ◆ Hexagon key extension, 5 mm -3249-



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

2.2.1 Removing

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



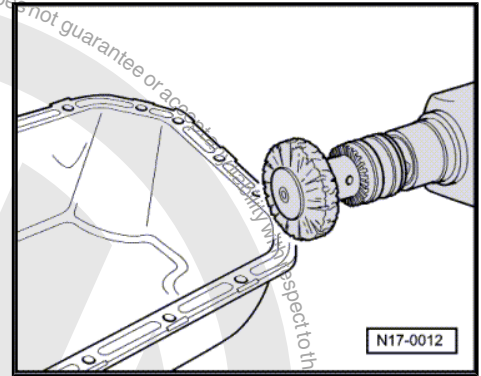
Note

Observe environmental regulations for disposal.

- Pull 3-pin connector off oil level and oil temperature sender -
G266- .
- Remove sump.
- Loosen sump with light blows of a rubber headed hammer if
necessary.
- Remove sealant residue from cylinder block with a flat scraper.



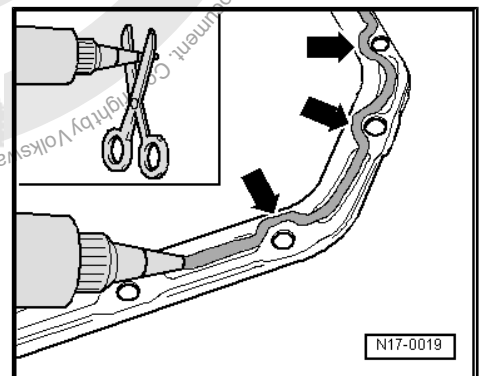
- Remove sealant residue on sump with a rotating brush, e.g. an electric hand drill with a plastic brush attachment (wear eye protection).
- Clean sealing surfaces. They must be free of oil and grease.



2.2.2 Installing

i 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 (\varnothing of nozzle approx. 3 mm).
- Apply silicone sealing compound, as shown, to clean sealing surface on sump. Sealant bead must be:
 - ◆ 2 ... 2...3 mm thick.
 - ◆ Run bead along inner side of bolt holes -arrows-.



i 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 all sump bolts lightly. Ensure that sump is flush against intermediate plate and gearbox flange.

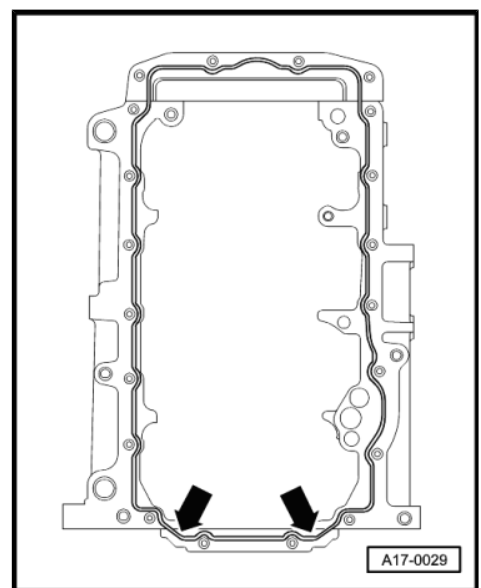
i Note

When installing sump with engine removed, 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 45 Nm.

i 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 Oil filter bracket, oil pressure, engine oil cooler and oil supply line

Assembly overview - oil filter bracket and oil cooler ⇒ [page 109](#)

Checking oil pressure and oil pressure switch ⇒ [page 110](#) .

Assembly overview -oil supply line to turbocharger ⇒ [page 111](#)

Removing and installing oil supply line to turbocharger ⇒ [page 112](#)

3.1 Assembly overview - oil filter bracket and engine oil cooler

1 - Oil filter bracket

2 - 15 Nm + turn (90°)

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

3 - Seal

- Renew.

4 - Seal

- Renew.

5 - Union, 35 Nm

6 - Oil supply line, 22 Nm

- To turbocharger.
- Removing and installing ⇒ [page 112](#)

7 - Cap, 25 Nm

8 - Seal

- Renew.

9 - Oil filter element

- Ensure "Top" is uppermost when fitting

10 - Plug, 10 Nm

- If seal is leaking, nip open and renew.

11 - Oil pressure switch -F1-

- 0.7 bar switch: brown.
- Tighten to 20 Nm.
- If seal is leaking, nip open and renew.
- Check ⇒ [page 110](#) .

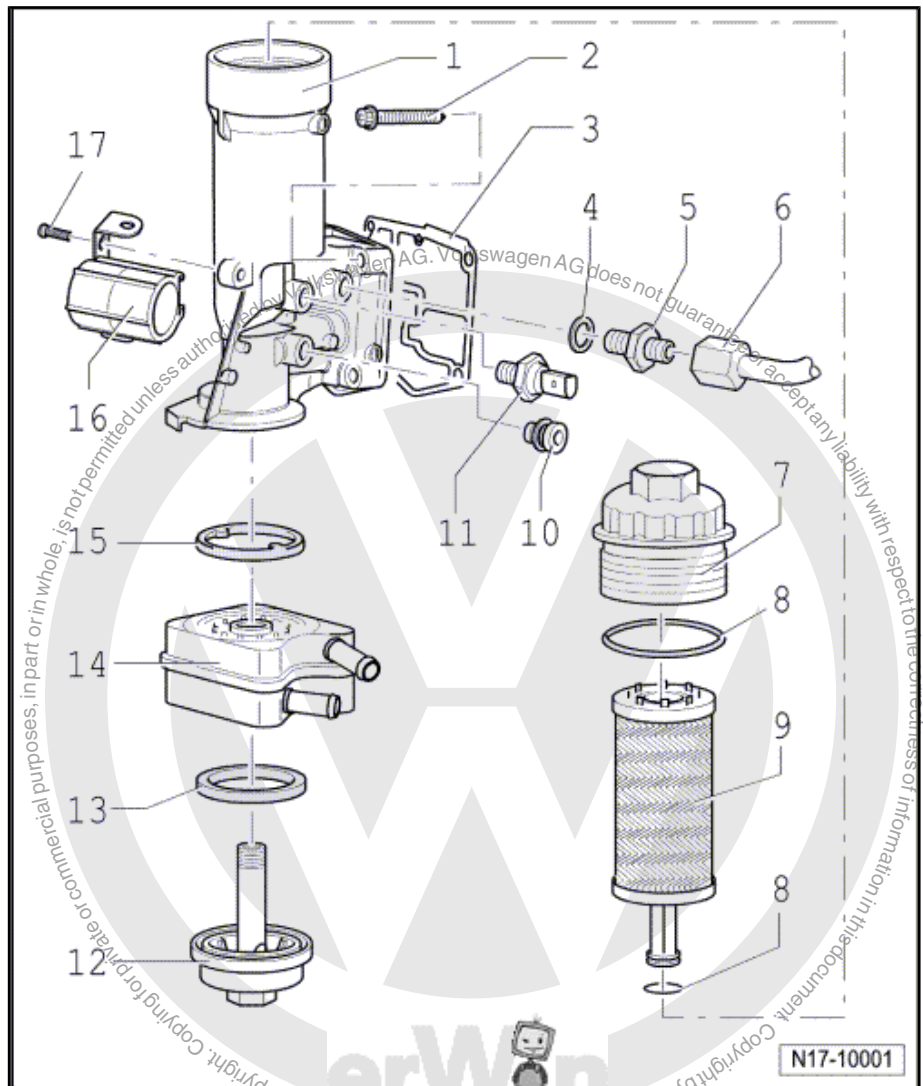
12 - Plug, 25 Nm

13 - Seal

- Renew.

14 - Engine oil cooler

- Ensure clearance to adjacent components.





- See note ⇒ [page 104](#) .
- Checking engine oil cooler for leaks ⇒ [page 134](#)

15 - Seal

- Renew.

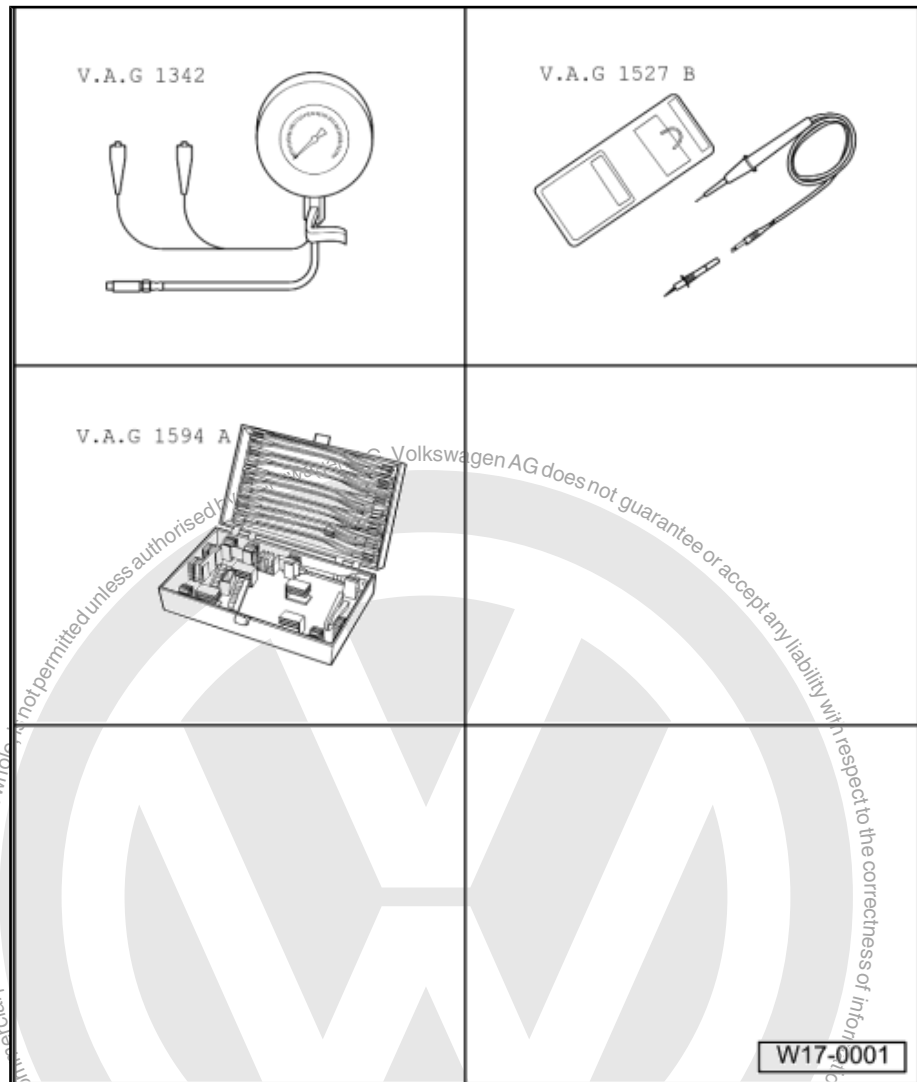
16 - Bracket

17 - 10 Nm

3.2 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 A-



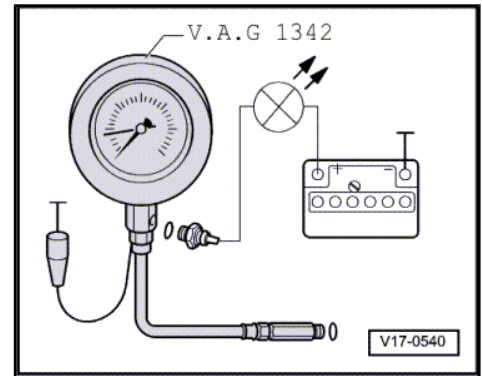
3.2.1 Test procedure

 **Note**

Functional check and repair of optical and acoustic oil pressure warning: ⇒ Current flow diagrams, Electrical fault finding and Fitting locations Guided fault finding with VAS 5051.



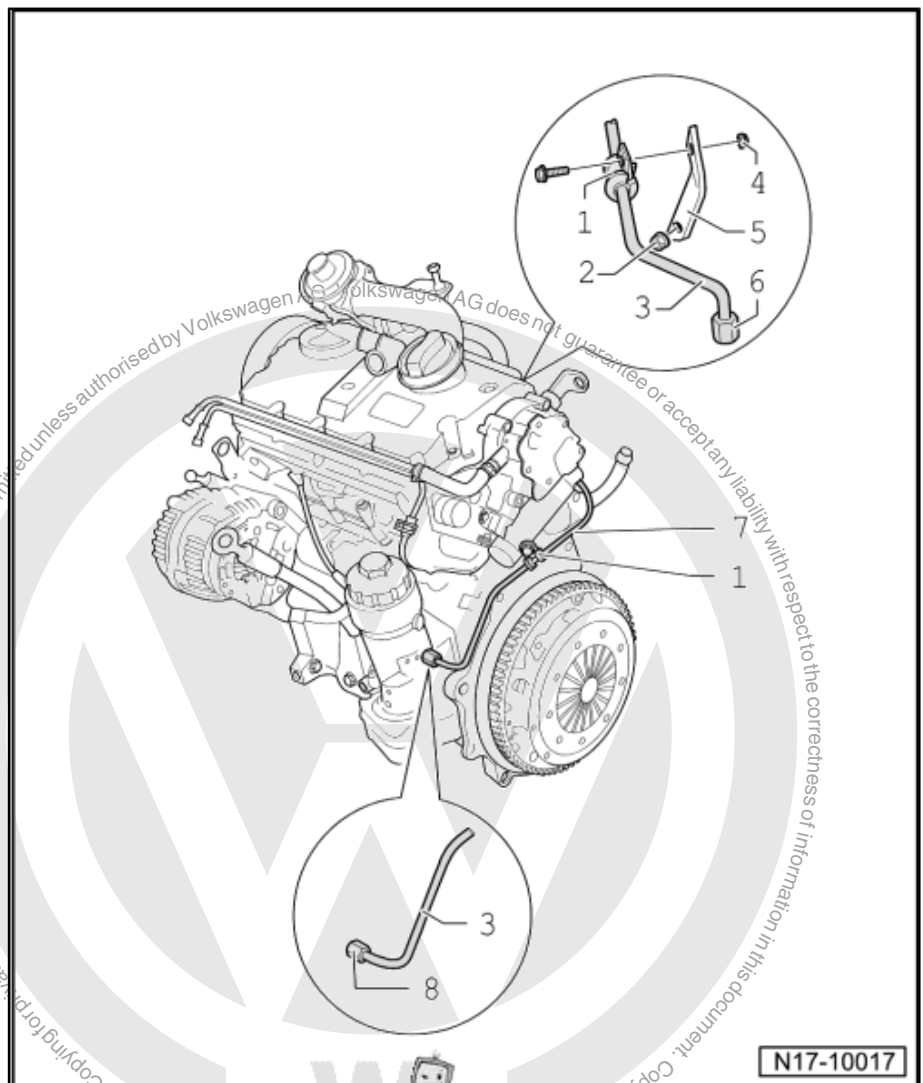
- Remove oil pressure switch -F1- and screw into tester.
- Screw tester into oil filter bracket in place of oil pressure switch.
- Connect brown wire of tester to earth (-).
- Connect voltage tester -V.A.G 1527 B- to battery positive (+) and oil pressure switch using cable from auxiliary measuring set -V.A.G 1594 A- . 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.
- 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 speeds, oil pressure must not exceed 7.0 bar. If necessary renew oil filter bracket.

3.3 Assembly overview - oil supply line to turbocharger

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

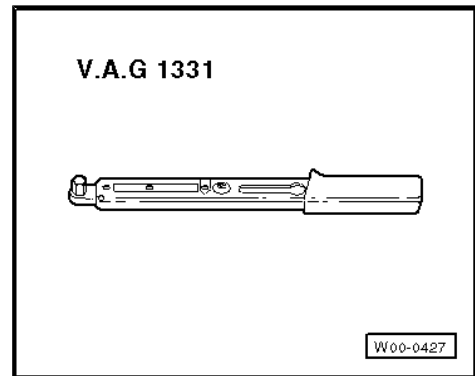




3.4 Removing and installing oil supply line to turbocharger

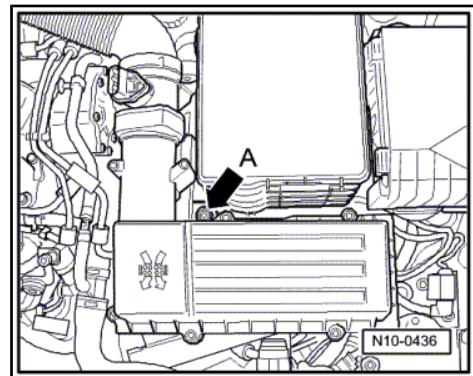
Special tools and workshop equipment required

- ◆ Torque wrench -V.A.G 1331-



3.4.1 Removing

- Remove engine cover. ⇒ [page 5](#)
- 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 noise insulation. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .
- Loosen securing bolts for retaining clips.
- Loosen oil supply line union nuts on oil filter bracket and turbocharger.
- Remove oil supply line.

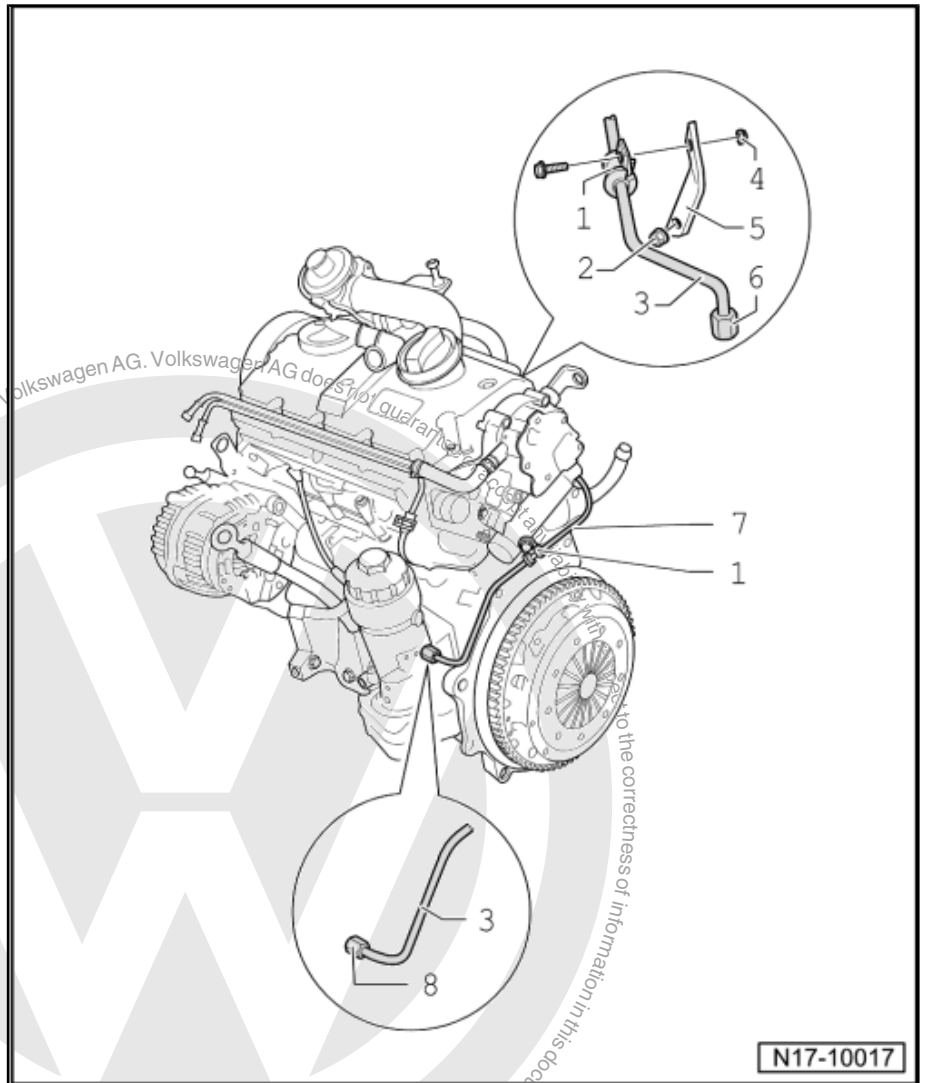


3.4.2 Installing



Note

The procedure must be adhered to, this will ensure that the 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.
- 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.

Further installation is basically the reverse of the removal procedure.



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 and 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 fitting 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).*



Perform leakage test of cooling system using cooling system tester -V.A.G 1274- and adapters adapter -V.A.G 1274/8- and adapter -V.A.G 1274/9- .

Parts of cooling system, body side (radiator with two radiator fans)
⇒ [page 115](#) .

Parts of cooling system, body side (radiator with one radiator fan)
⇒ [page 117](#)

Removing and installing fan support with fans (Golf, Golf Plus, Touran) ⇒ [page 117](#)

Removing and installing fan support with fans (Passat) ⇒ [page 119](#)

Parts of cooling system - engine side ⇒ [page 120](#) .

Coolant hose schematic diagram ⇒ [page 122](#) .

Draining and filling with coolant ⇒ [page 123](#) .

Removing and installing radiator (Golf, Golf Plus, Touran) ⇒ [page 126](#)

Removing and installing radiator (Passat) ⇒ [page 127](#)

Removing and installing coolant pump ⇒ [page 128](#) .

Removing and installing thermostat ⇒ [page 130](#) .

Checking cooling system for leaks ⇒ [page 132](#) .

Checking pressure relief valve in filler cap ⇒ [page 133](#) .

Checking engine oil cooler for leaks ⇒ [page 134](#)

1.1 Parts of cooling system, body side (radiator with two radiator fans)

1 - Upper coolant hose

- Coolant hose schematic

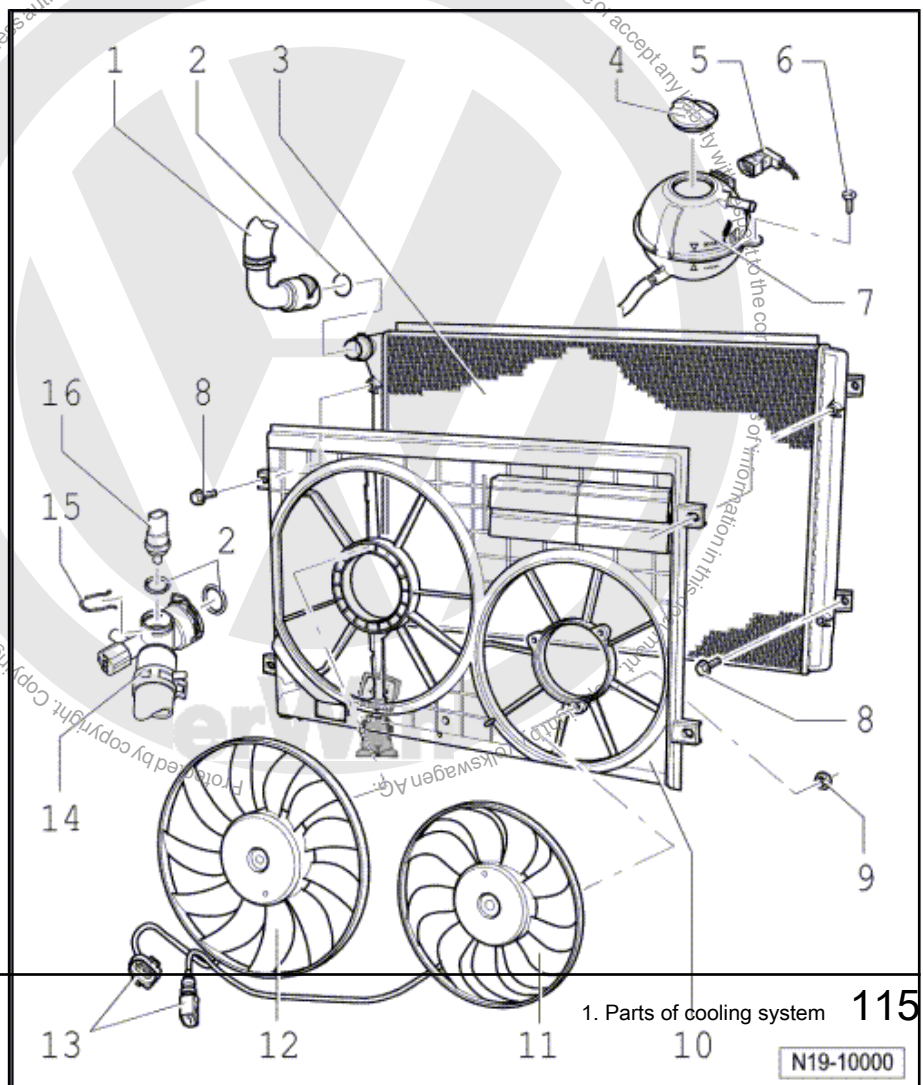




diagram ⇒ [page 122](#) .

2 - O-ring

- Renew if damaged.

3 - Cooler

- Removing and installing ⇒ [page 126](#)
- After renewing, renew entire coolant.

4 - Cap

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

5 - Connector

6 - 5 Nm

7 - Expansion tank

- Check using cooling system tester -V.A.G 1274- and adapter -V.A.G 1274/8- .

8 - 5 Nm

9 - 10 Nm

10 - Fan support

11 - Additional fan

- Vehicles with optional equipment only.

12 - Radiator fan

13 - Connector

14 - Lower coolant hose

- Coolant hose schematic diagram ⇒ [page 122](#) .

15 - Retaining clip

- Check for secure seating.

16 - Radiator outlet coolant temperature sender -G83-





1.2 Assembly overview - parts of cooling system, body side (radiator with one radiator fan)

1 - Upper coolant hose

- Coolant hose schematic diagram ⇒ [page 122](#) .

2 - O-ring

- Renew if damaged.

3 - Radiator

- Removing and installing ⇒ [page 126](#)
- After renewing, renew entire coolant.

4 - Seal

5 - Cap

- Check using cooling system tester - V.A.G 1274- and adapter - V.A.G 1274/9- .

6 - Connector

7 - 5 Nm

8 - Expansion tank

- Check using cooling system tester - V.A.G 1274- and adapter - V.A.G 1274/8- .

9 - Radiator mounting

10 - 5 Nm

11 - Mounting

12 - Radiator fan

13 - Fan support

14 - 5 Nm

15 - 5 Nm

16 - Connector

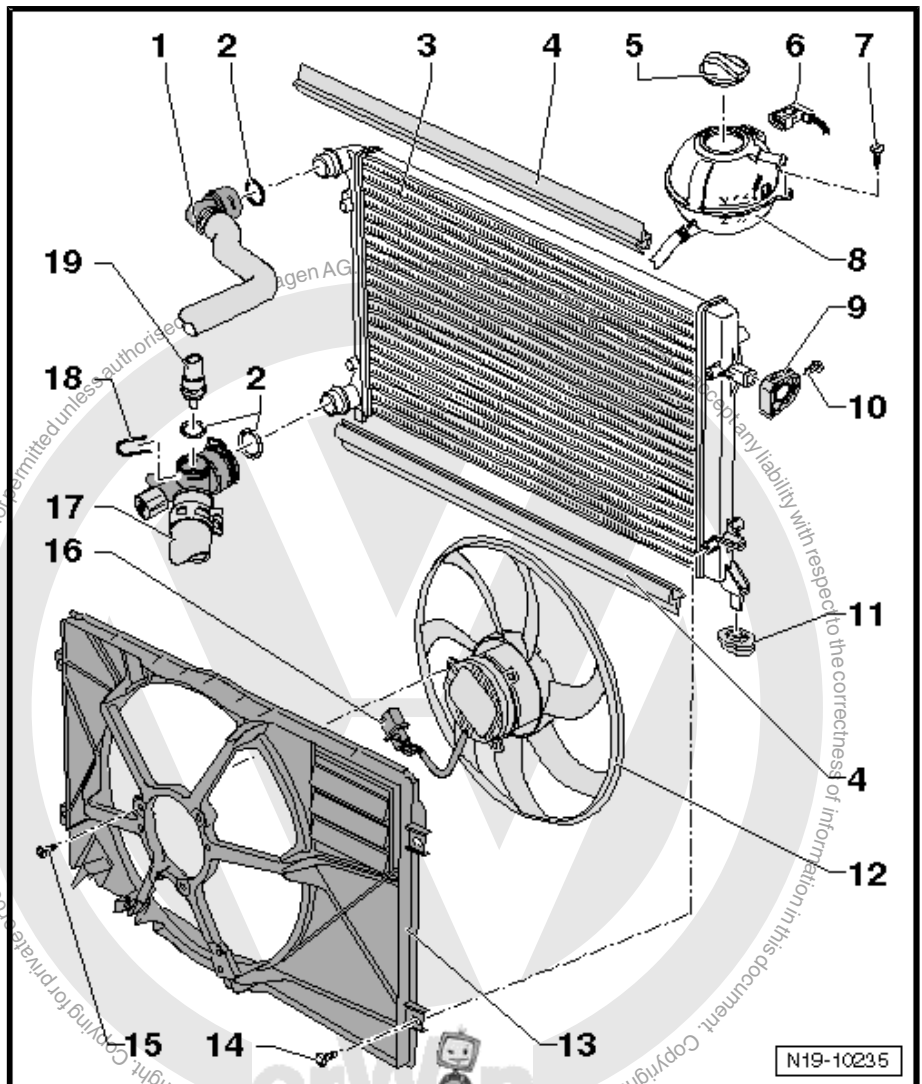
17 - Lower coolant hose

- Coolant hose schematic diagram ⇒ [page 122](#) .

18 - Retaining clip

- Check for secure seating.

19 - Radiator outlet coolant temperature sender -G83-

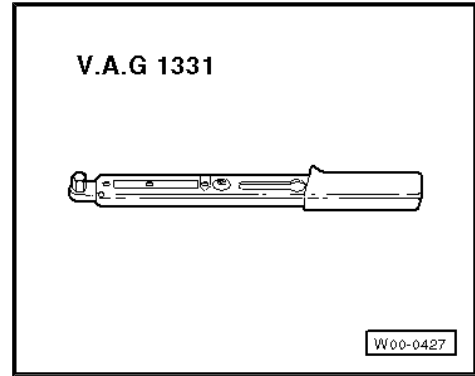


1.3 Removing and installing fan support with fans (Golf, Golf Plus, Touran)

Special tools and workshop equipment required



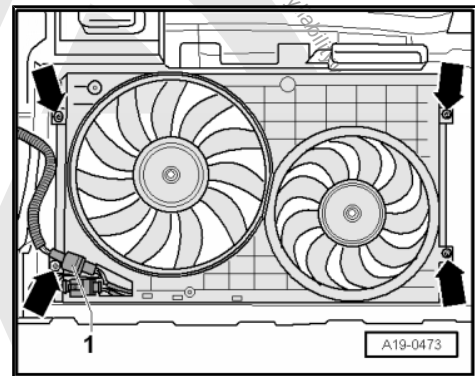
- ◆ Torque wrench (5... 50 Nm) -V.A.G 1331-



Removing

The procedure for the single fan is identical.

- Remove noise insulation => General body repairs, exterior; Rep. gr. 50 ; Assembly overview - Body - front
- Remove air intake duct from air filter.
- Bring lock carrier into service position => General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier - service position.
- Separate connector -1- and remove fan support securing bolts -arrows-.
- Remove fan support with fans upwards.



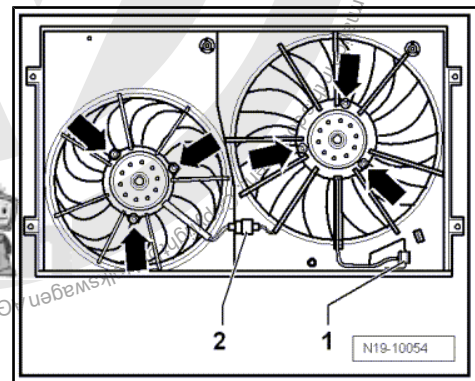
- Separate connection -2- and free wiring.
- Unclip connector -1- from fan support and free wiring.
- Remove securing nuts -arrows- and remove fans.

Installing

The procedure for the single fan is identical.

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

Specified torques: => [Item 15 \(page 117\)](#)



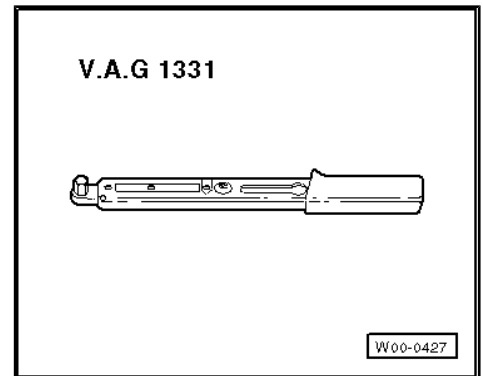
Component	Nm
Radiator fan to fan support (single fan)	5
Radiator fan to fan support (double fan)	10
Fan support to radiator	5



1.4 Removing and installing fan support with fans (Passat)

Special tools and workshop equipment required

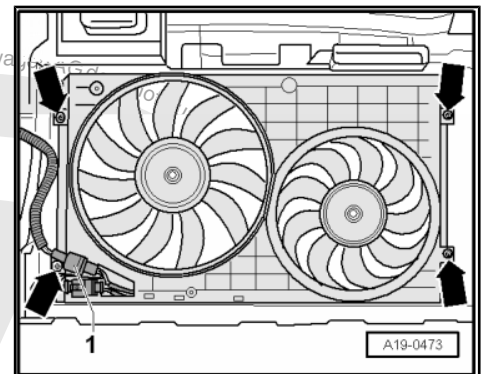
- ◆ Torque wrench (5... 50 Nm) -V.A.G 1331-



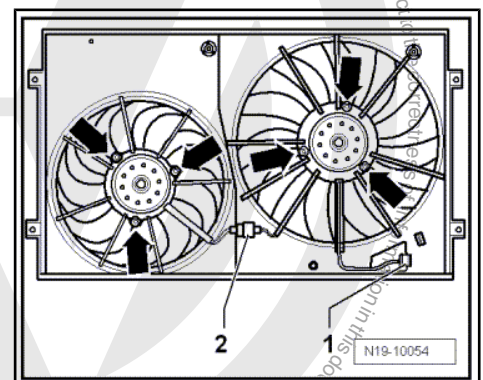
Removing

The procedure for the single fan is identical.

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Assembly overview - Body - front .
- Remove air intake duct from air filter.
- 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 free wiring.
- Remove securing nuts -arrows- and remove fans.



Installing

The procedure for the single fan is identical.

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

Specified torques: ⇒ [Item 15 \(page 117\)](#)

Component	Nm
Radiator fan to fan support (single fan)	5
Radiator fan to fan support (double fan)	10
Fan support to radiator	5



1.5 Parts of cooling system, engine side

1 - To top of expansion tank

- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

2 - Upper coolant pipe

- ❑ Bolted to cylinder head cover

3 - To bypass flap

- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

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 122](#) .

8 - Connection

9 - 10 Nm

10 - To heat exchanger

- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

11 - 40 Nm

12 - T-piece

13 - To bypass flap

- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

14 - T-piece

15 - To top of radiator

- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

16 - 15 Nm

17 - To bottom of expansion tank

- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

18 - Coolant pipe

19 - To bottom of radiator

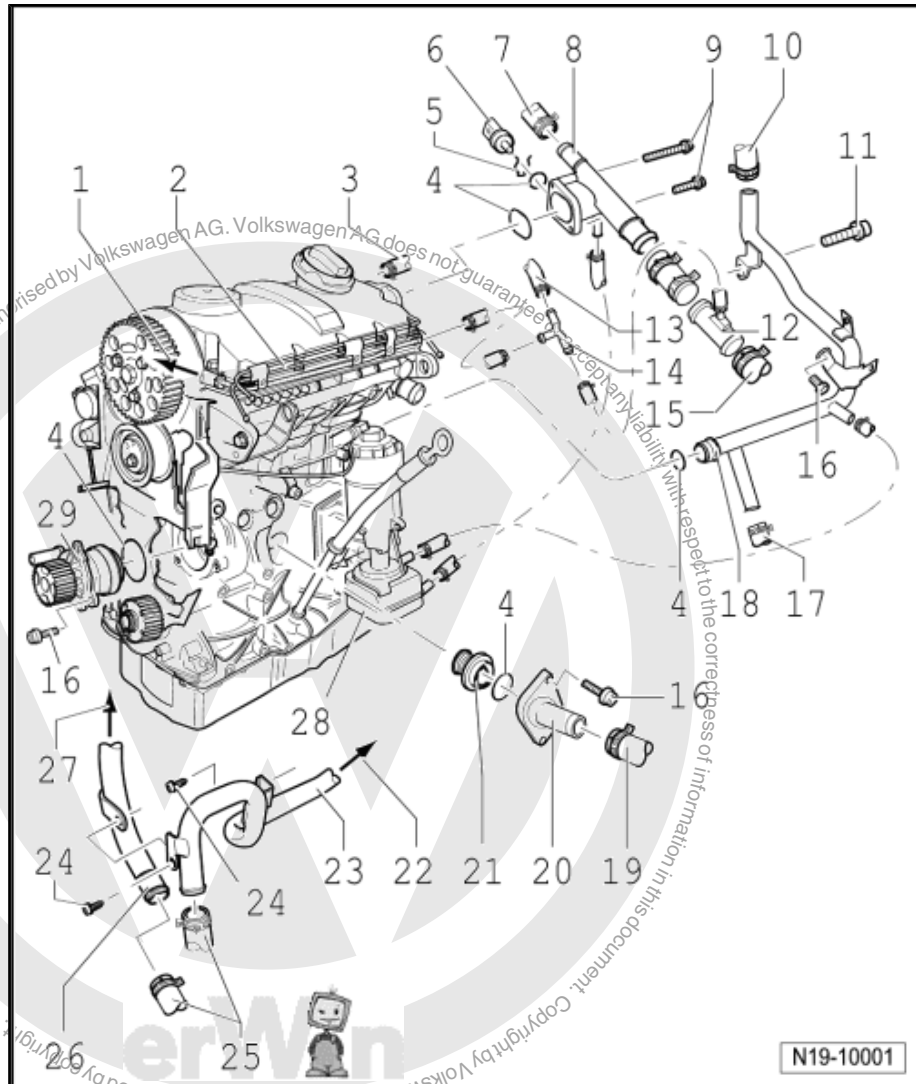
- ❑ Coolant hose schematic diagram ⇒ [page 122](#) .

20 - Connection

- ❑ For thermostat.

21 - Thermostat

- ❑ Removing and installing ⇒ [page 130](#)
- ❑ Observe installation position ⇒ [page 130](#) , removing and installing thermostat.





- 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 122](#)

23 - Rear coolant pipe

24 - 10 Nm

25 - To auxiliary heater

- Coolant hose schematic diagram ⇒ [page 122](#)

26 - Coolant pipe

27 - To exhaust gas recirculation cooler.

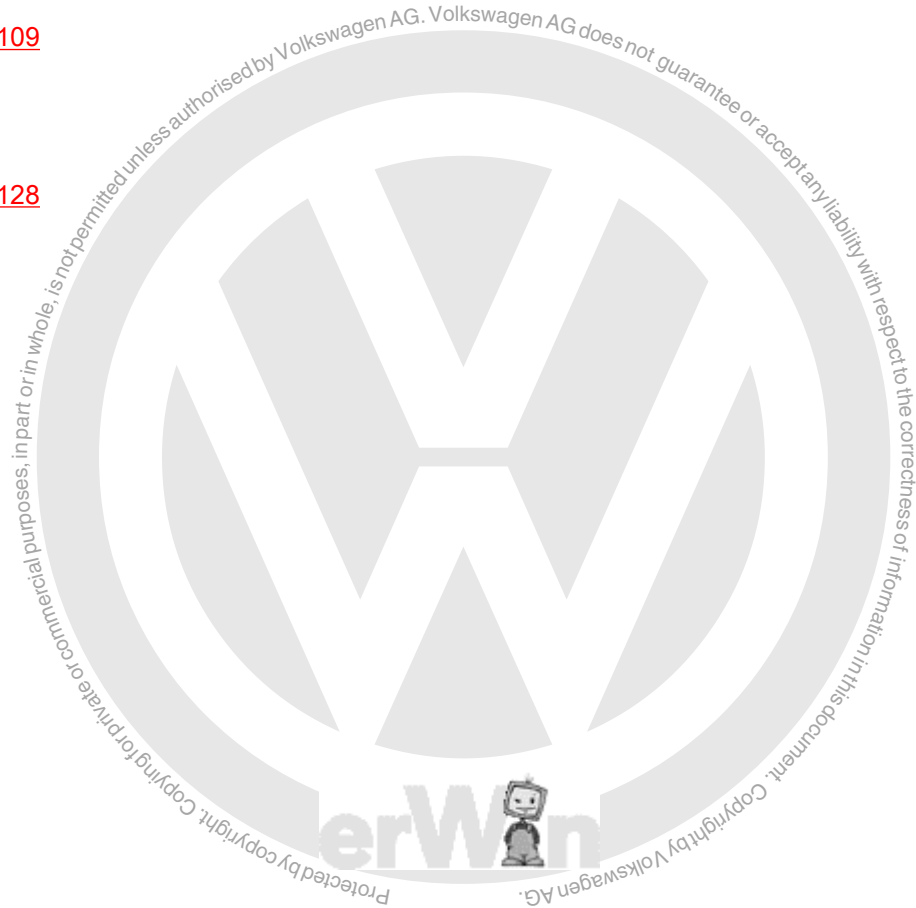
- Coolant hose schematic diagram ⇒ [page 122](#)

28 - Engine oil cooler

- Removing and installing ⇒ [page 109](#)

29 - Coolant pump

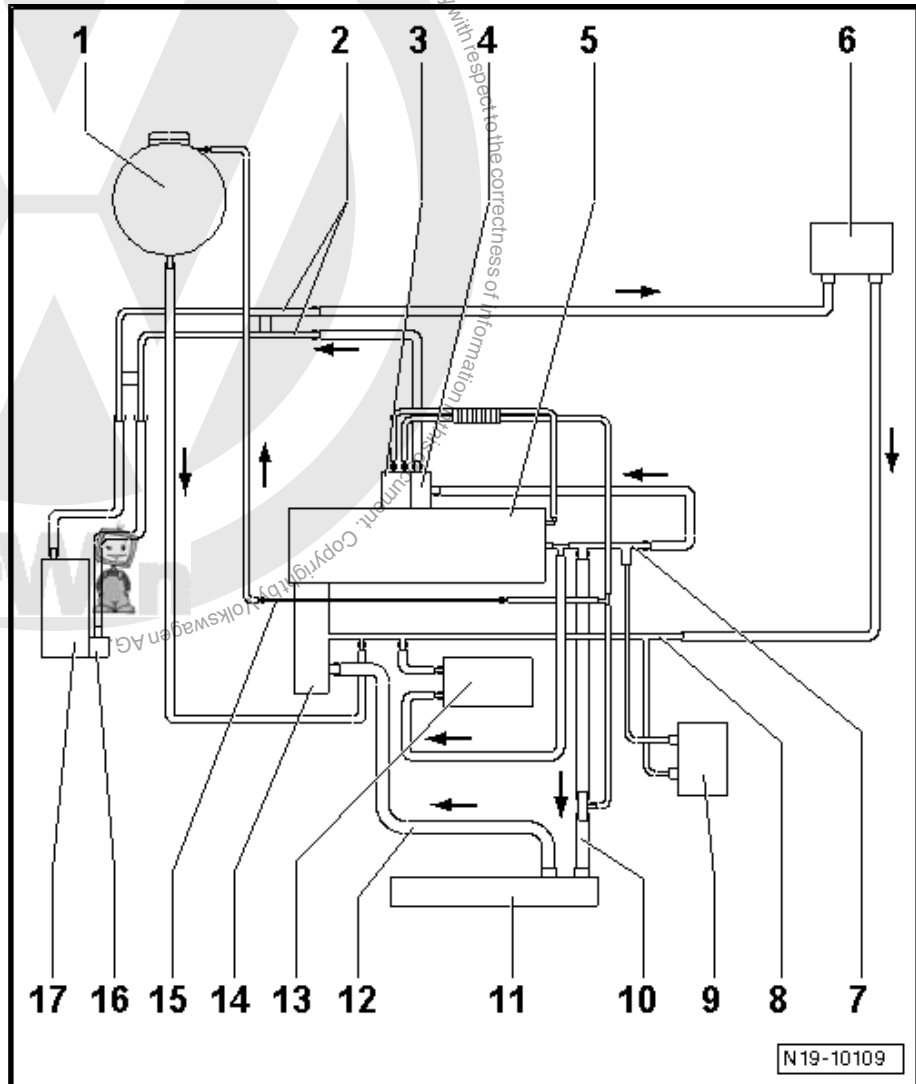
- Check for ease of movement.
- Note installation position.
- Removing and installing ⇒ [page 128](#)





1.6 Coolant hose schematic diagram

- 1 - Expansion tank
- 2 - Rear coolant pipe
- 3 - Bypass flap
- 4 - Exhaust gas recirculation cooler
- 5 - Cylinder head/cylinder block
- 6 - Heat exchanger for heater unit
- 7 - Connection
- 8 - Front coolant pipe
- 9 - Gearbox oil cooler
 - if fitted
 - Only on vehicles with automatic gearbox.
- 10 - Upper coolant hose
- 11 - Radiator
- 12 - Lower coolant hose
- 13 - Engine oil cooler
- 14 - Coolant pump and thermostat
- 15 - Upper coolant pipe
- 16 - Circulation pump -V55-
 - if fitted
- 17 - Auxiliary heater
 - Vehicles with optional equipment only.



Note

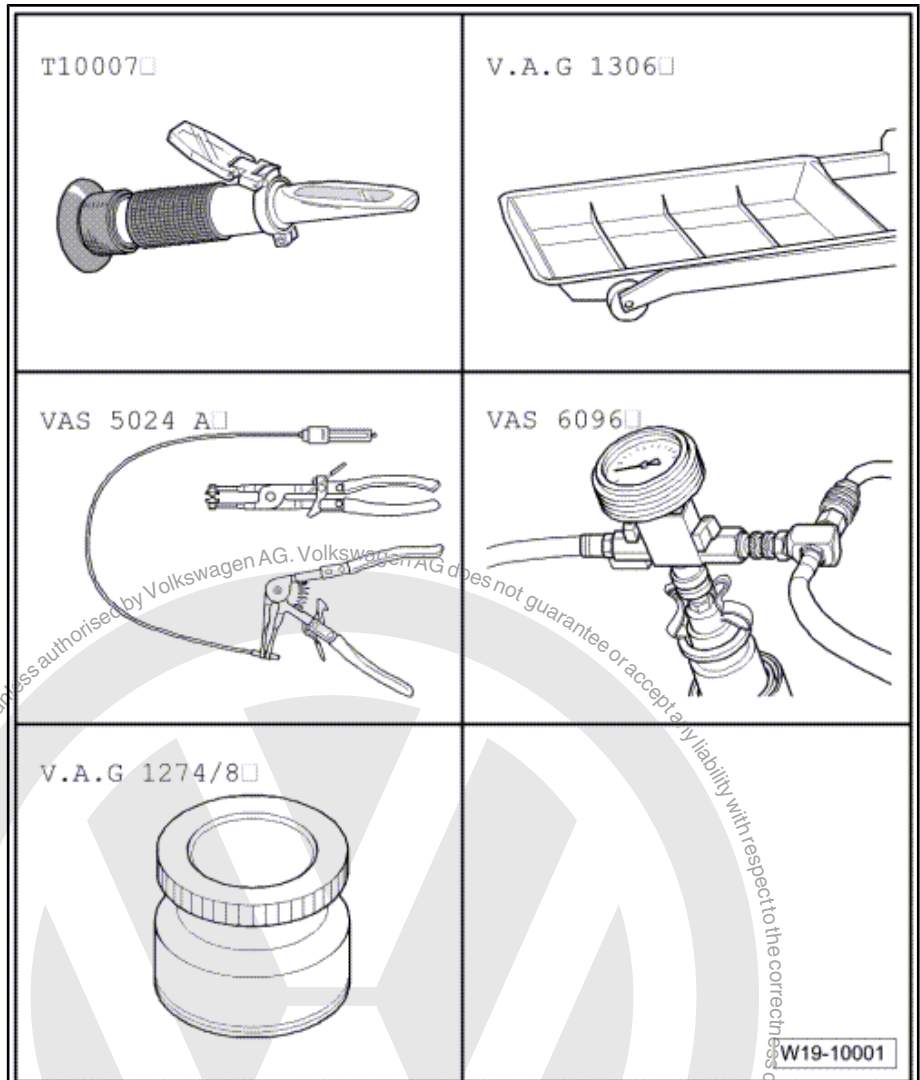
Coolant hose schematic diagram for vehicles with optional equipment ⇒ Heating, ventilation, air conditioning system; Rep. gr. 82 ; Connection diagram for coolant hoses in vehicles with auxiliary heater



1.7 Draining and filling coolant

Special tools and workshop equipment required

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



1.7.1 Draining

- Open cap on coolant expansion tank.



WARNING

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

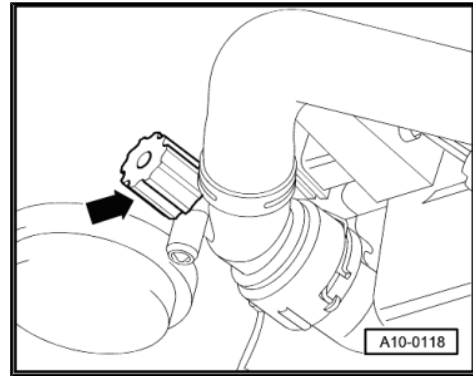
- Open cap on coolant expansion tank.
- Remove noise insulation. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .

If drain plug is fitted:

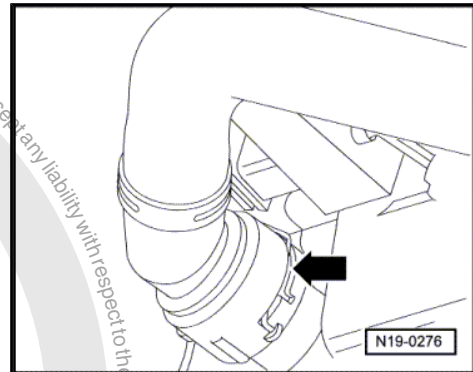


- To drain coolant from radiator, open drain plug -arrow-.

If drain plug is not fitted:



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

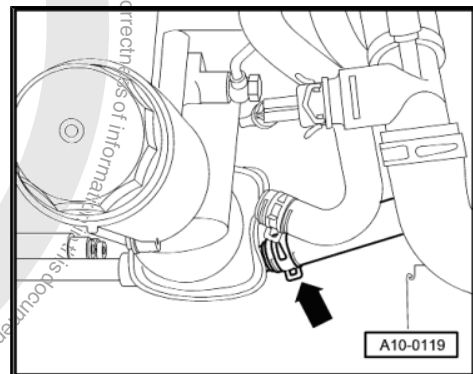


- To drain coolant from engine, also remove coolant hose from engine oil cooler -arrow-.



Note

Observe environmental regulations for disposal.





1.7.2 Filling



Note

- ◆ In vehicles as of model year 2008, only G 12 plus-plus according to TL VW 774 G may be used as coolant additive.
- ◆ For vehicles up to and including model year 2007 coolant additive G 12 plus according to TL VW 774 F and G 12 plus-plus according to TL VW 774 G can be used.
- ◆ The coolant additive G 12 plus-plus can be mixed with the previous coolant additive G 12 plus. Identification: both are coloured purple.
- ◆ Coolant additives marked „according to TL VW 774 G“ or „according to TL VW 774 F“ prevent frost and corrosion damage, scaling and also raise boiling point of coolant. Therefore, the cooling system must be filled all year round with coolant additive and corrosion protection additive.
- ◆ 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 coolant additive can be increased, but only up to 60 % (frost protection to about -40 °C). Otherwise frost protection and cooling effectiveness are reduced again.
- ◆ The refractometer -T10007- is recommended for determining the current anti-freeze concentration.
- ◆ If radiator, heat exchanger, cylinder head or cylinder head gasket is renewed, do not reuse old coolant.

Recommended mixture ratios:

Frost protection to	Anti-freeze proportion	G 12 plus ¹⁾ 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.

- Close coolant drain plug.
- Connect coolant hoses to engine oil cooler.
- Install noise insulation. ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview .
- Screw adapter -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- are enclosed with unit.

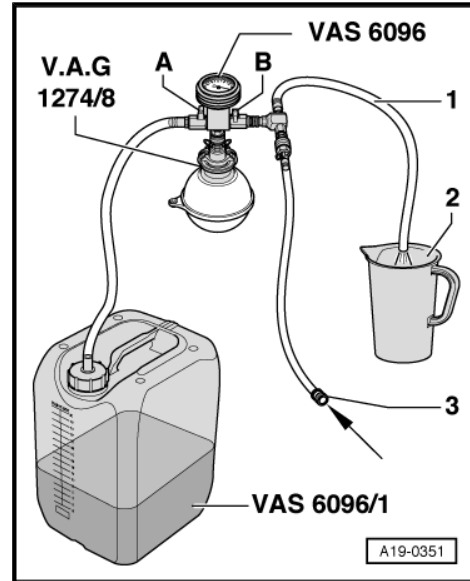


Fill coolant expansion tank of -VAS 6096- with at least 8 litres of pre-mixed coolant in correct mixture ratio.



Note

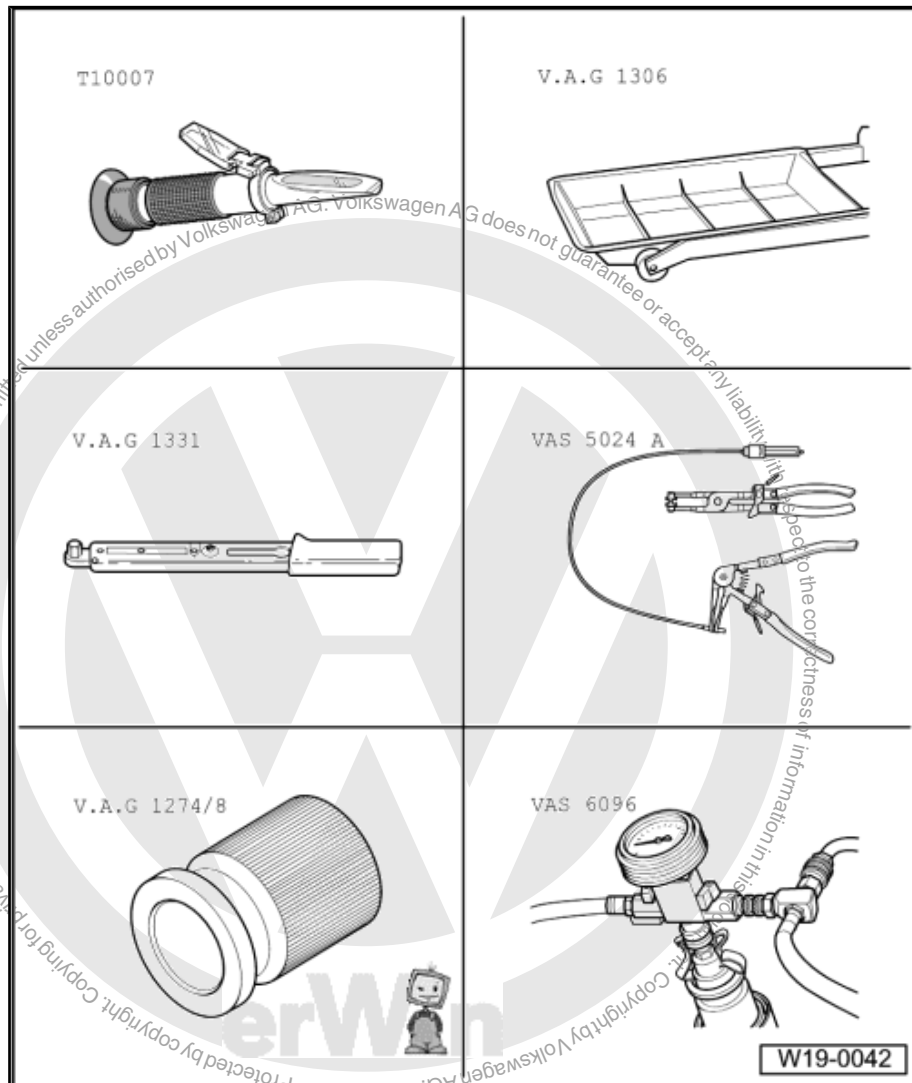
Exhaust air takes a slight quantity of coolant along with it; this should be collected -2-.



1.8 Removing and installing radiator (Golf, Golf Plus, Touran)

Special tools and workshop equipment required

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





1.8.1 Removing (Golf, Golf Plus, Touran)

- Bring lock carrier into service position. => General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier service position .
- Drain coolant => [page 123](#)
- Pull coolant hoses off radiator.
- Separate connector for radiator fan.
- Remove radiator securing bolts.
- Remove radiator downwards.

1.8.2 Installing (Golf, Golf Plus, Touran)

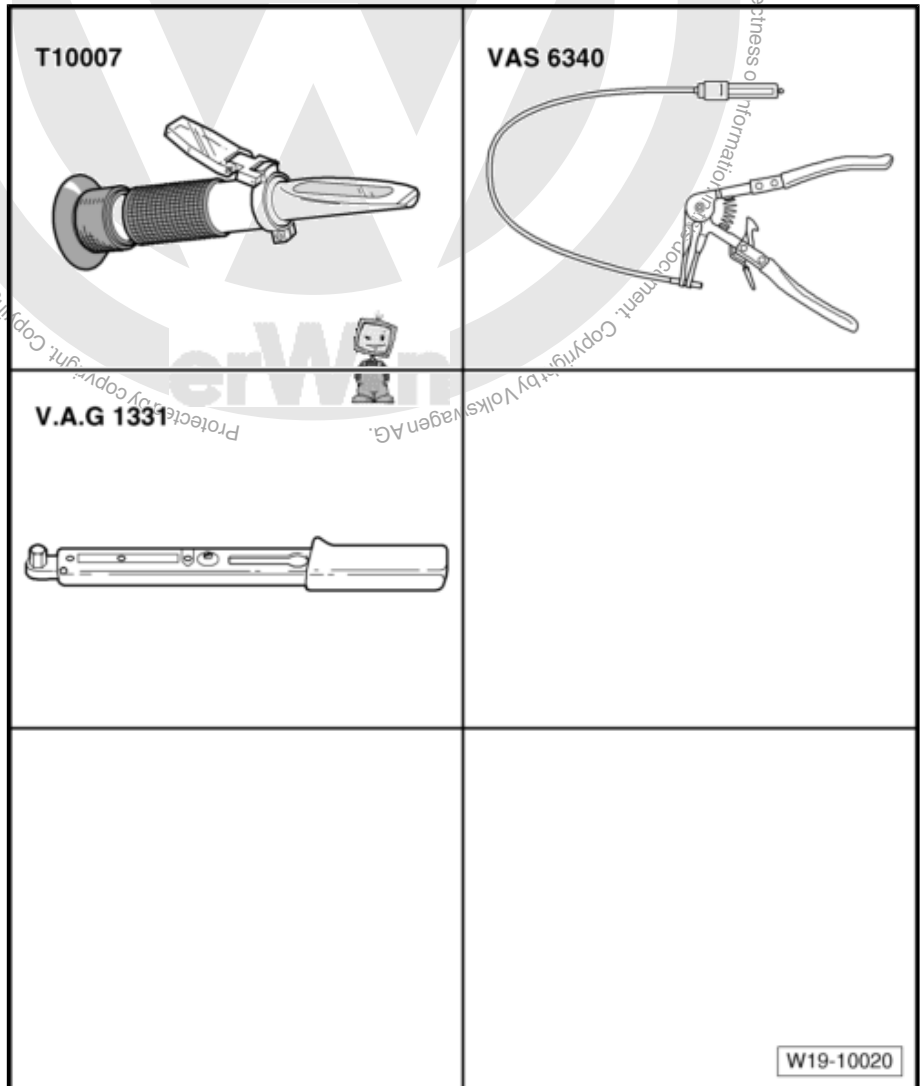
Installation is carried out in the reverse order. When installing, note the following:

- Fill with coolant. => [page 123](#)

1.9 Removing and installing radiator (Passat)

Special tools and workshop equipment required

- ◆ Refractometer -T10007-
- ◆ Torque wrench -V.A.G 1331/-
- ◆ Hose clip pliers -VAS 6340-





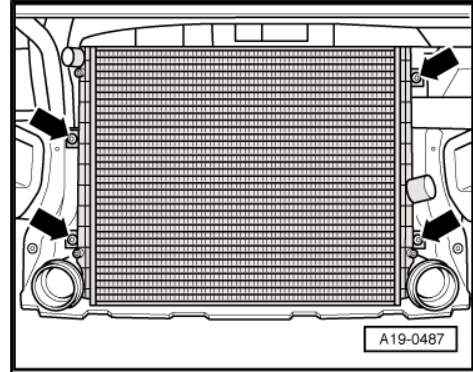
Removing

- Drain coolant ⇒ [page 123](#) .
- Pull coolant hoses off radiator.
- Pull off connector for radiator fan.
- Remove cowling together with fans ⇒ [page 119](#) .
- Remove bolts -arrow up- -arrow down- and lift radiator up and out.

Installing

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

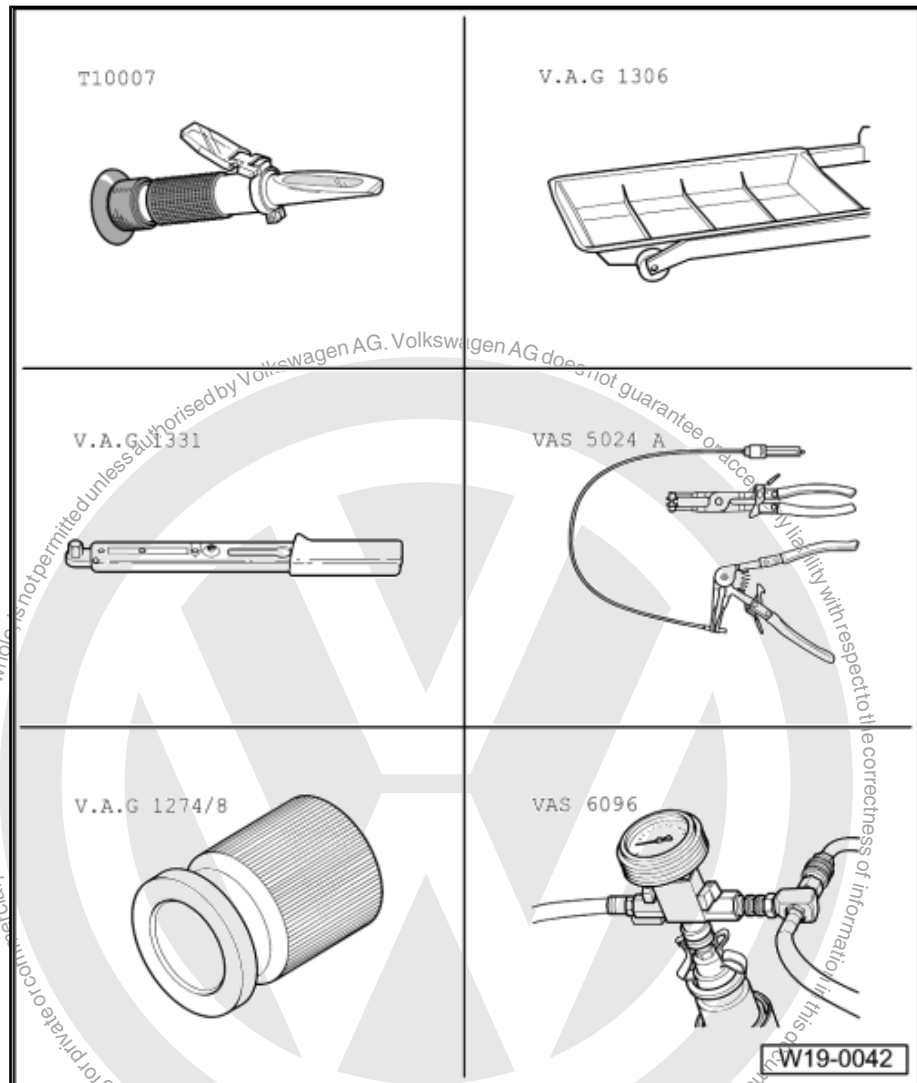
- Replenish coolant ⇒ [page 123](#) .



1.10 Removing and installing coolant pump

Special tools and workshop equipment required

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





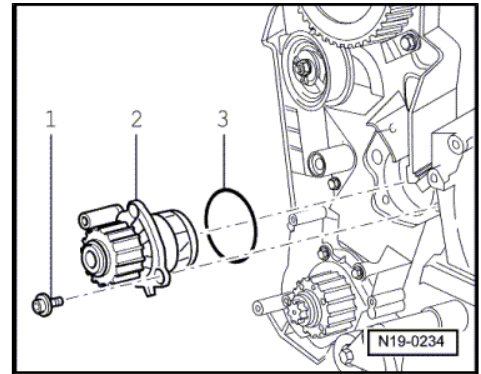
1.10.1 Removing



Note

Always renew seals and gaskets.

- Drain coolant ⇒ [page 123](#) .
- Remove poly V-belt ⇒ [page 25](#) .
- Remove toothed belt ⇒ [page 66](#) .
- Remove securing bolts -1- for coolant pump -2- and carefully remove coolant pump.



1.10.2 Installing

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

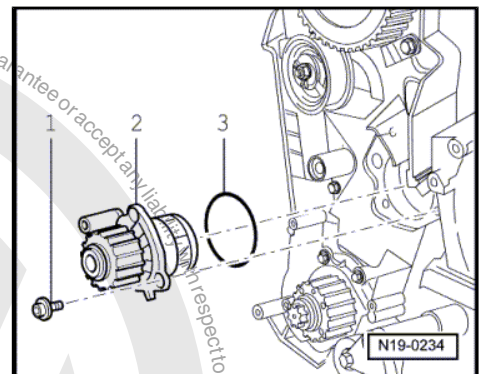
- Moisten new O-ring -3- with coolant.
- Insert coolant pump -2- in cylinder block and tighten securing bolts -1- to 15 Nm.



Note

The coolant pump plug faces downwards.

- Install toothed belt ⇒ [page 66](#) .
- Install poly V-belt ⇒ [page 26](#) .
- Fill coolant system with coolant ⇒ [page 123](#) .

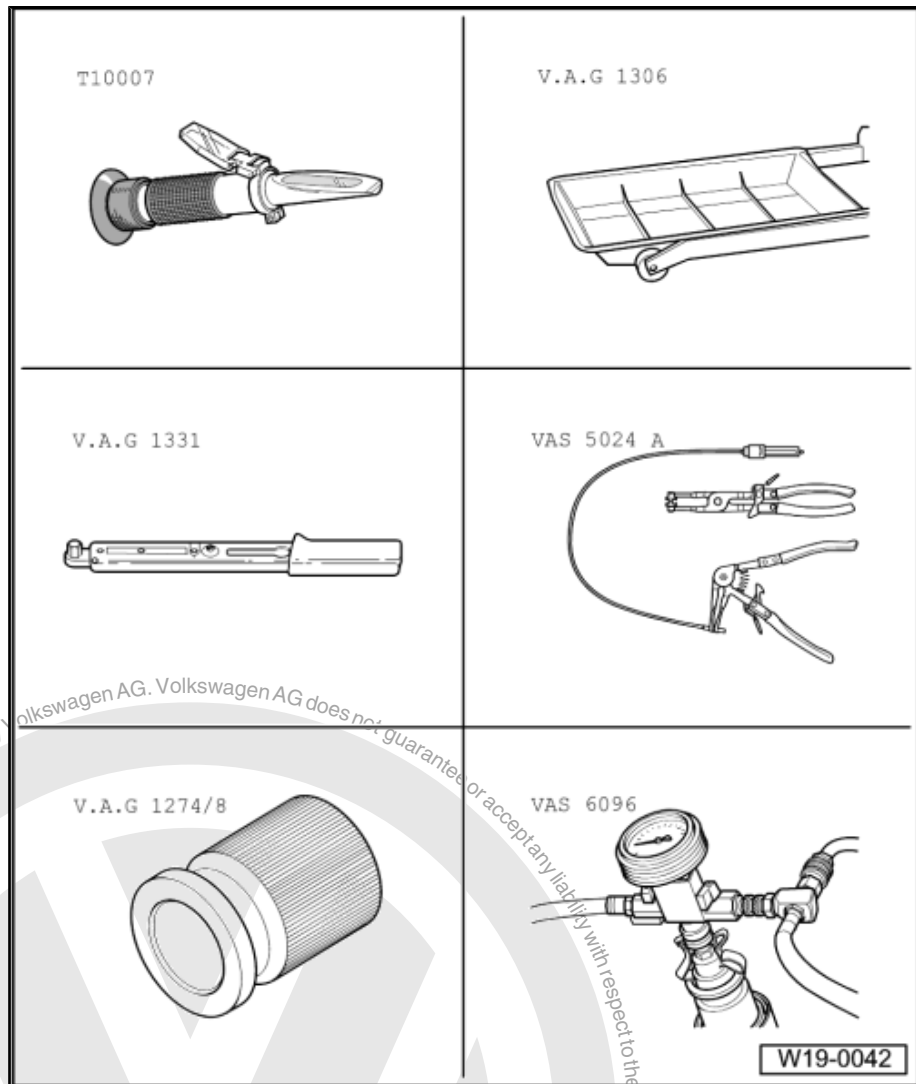




1.11 Removing and installing thermostat

Special tools and workshop equipment required

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



1.11.1 Removing



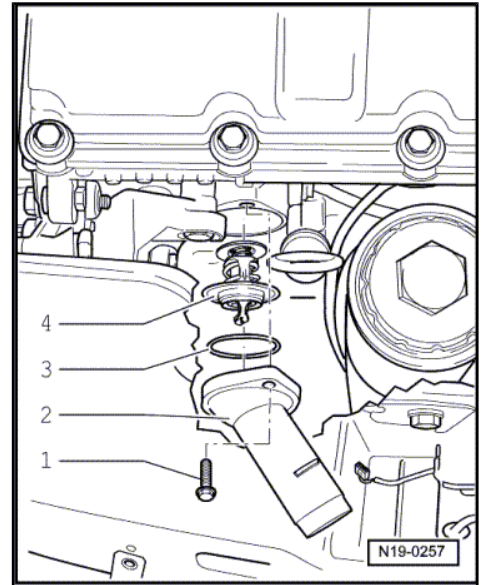
Note

Always renew seals and gaskets.

- Drain coolant ⇒ [page 123](#)
- Remove alternator. ⇒ Electrical system; Rep. gr. 27 ; Removing and installing alternator with poly V-belt
- Pull coolant hose off connection.



- Remove securing bolts -1- of connection -2- and remove connection -2- with thermostat -4-.
- Turn thermostat -4- 1/4 turn (90°) anticlockwise and remove it from connection -2-.



1.11.2 Installing

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

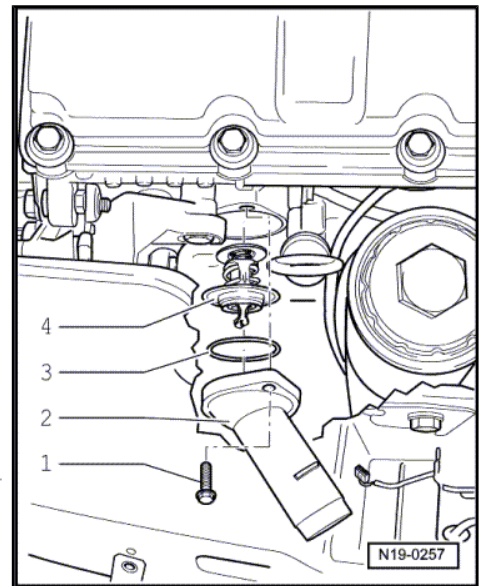
- Moisten new O-ring -3- with coolant.
- Insert thermostat -4- into connection -2- and turn 1/4 turn (90°) clockwise.



Note

The brace on the thermostat must be almost vertical.

- Insert connection -2- with thermostat -4- in cylinder block.
- Tighten securing bolts -1- to 15 Nm.
- Replenish coolant. ⇒ [page 123](#)

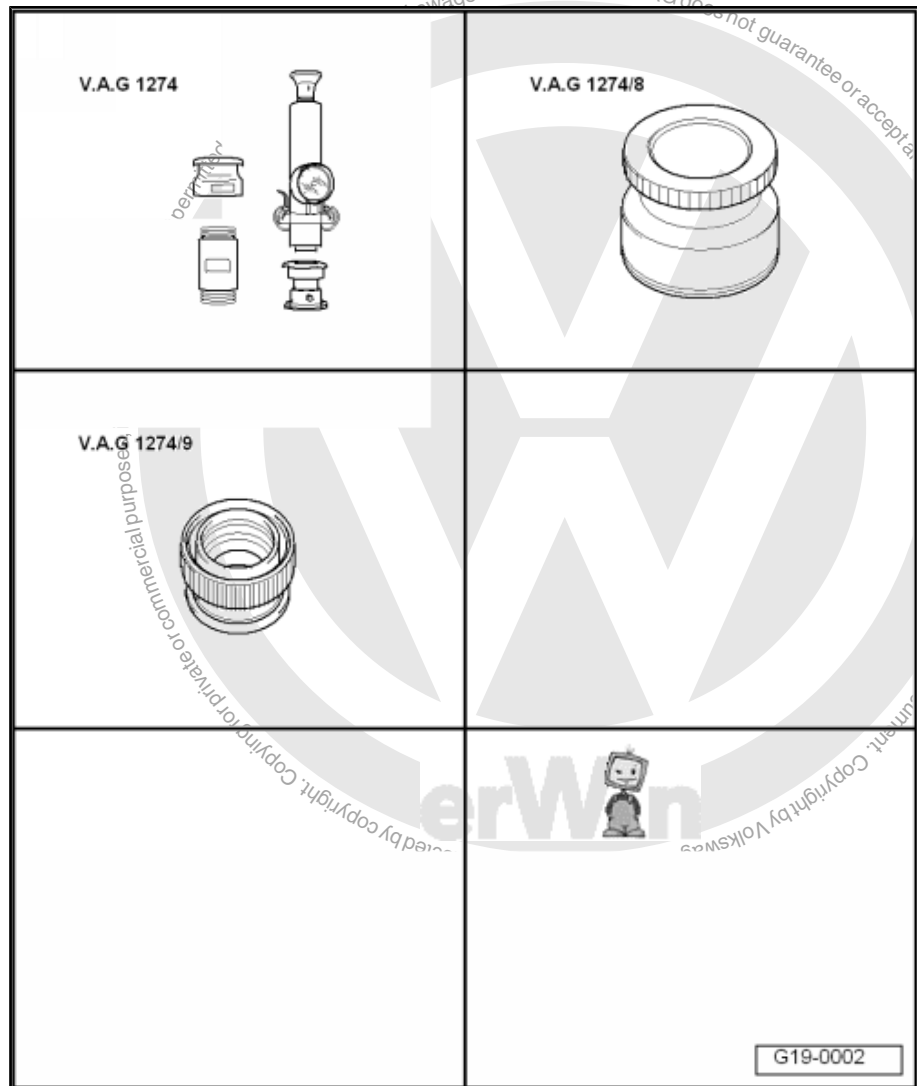




1.12 Checking cooling system for leaks

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 cloth over cap and open with caution.

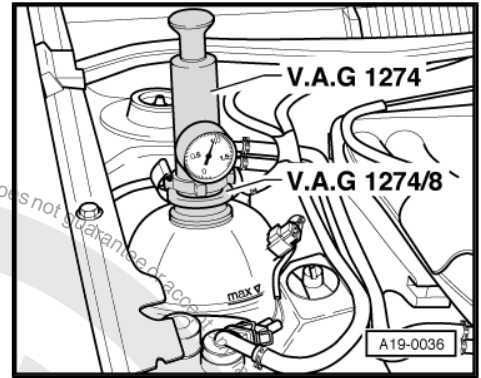
- Open cap on coolant expansion tank.



- 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.

If pressure drops:

- Find leaks and rectify.



1.12.1 Checking pressure relief valve in filler 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.

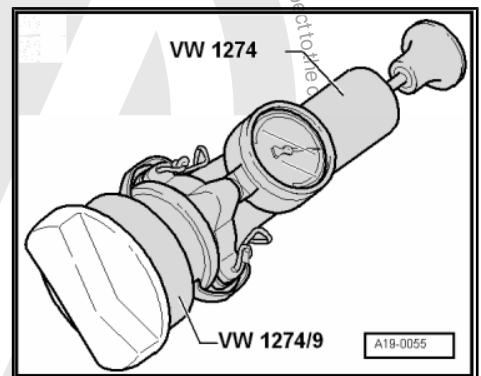
If the pressure relief valve opens prematurely:

- 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.

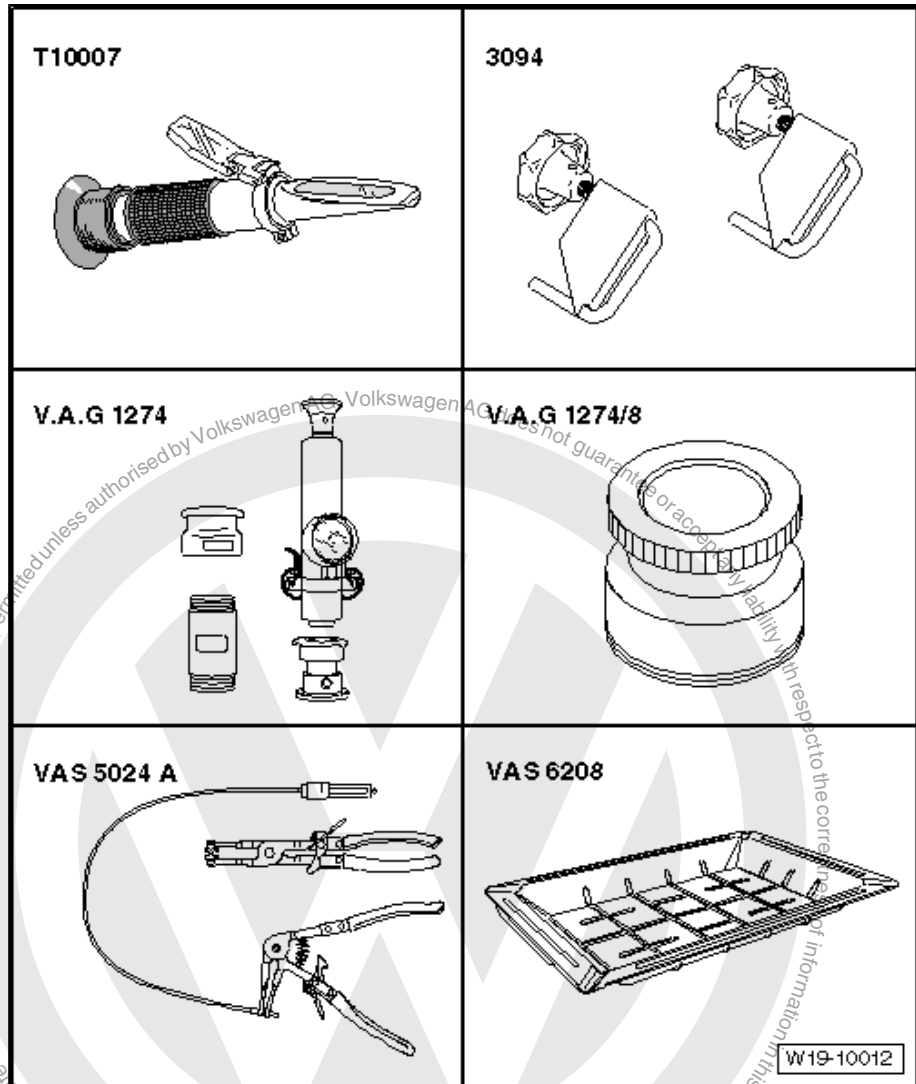




1.13 Checking engine oil cooler for leaks

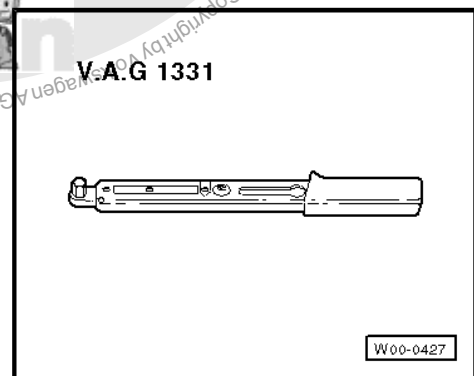
Special tools and workshop equipment required

- ◆ Refractometer -T10007-
- ◆ Hose clamps up to 25 mm -3094-
- ◆ Cooling system tester - V.A.G 1274-
- ◆ Adapter for cooling system tester -V.A.G 1274/8-
- ◆ Spring-type clip pliers -VAS 5024A-
- ◆ 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 -6Q0 121 407 A- or -1J0 121 407 B-
- ◆ Plug -191 211 343-



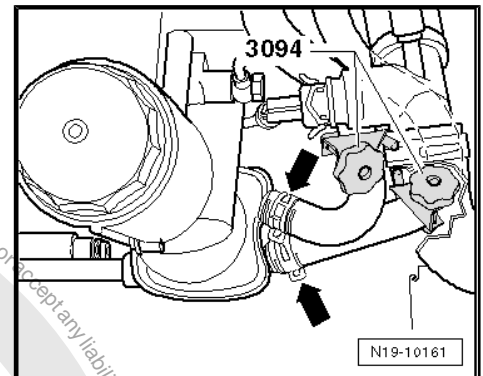
- ◆ Cap -1J0 121 324-
- ◆ Coolant hose -251 265 056-
- ◆ Screw clamp

Test prerequisite:

- Engine cold

Test procedure

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Assembly overview - noise insulation .
- Clamp supply line and return line off engine oil cooler using hose clips to Ø 25 mm -3094- .
- Loosen spring-type clips -arrows- using spring-type clip pliers -VAS 5024A- .



Note

Collect escaping coolant with drip tray -VAS 6208- .

- Pull coolant hoses off engine oil cooler.
- Push sealing cap -5- to rear connection of engine 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.

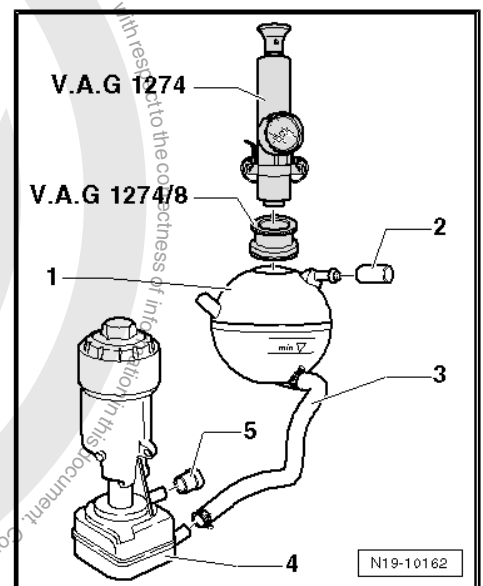
Watch pressure drop on pressure gauge. A pressure drop within 10 minutes is not permitted.

If pressure drops:

- Renew engine oil cooler.

Assembly is carried out in the reverse order, note the following:

- Check coolant level, if necessary replenish coolant.





20 – Fuel supply system

1 Safety precautions

1.1 Safety precautions when working on fuel supply system



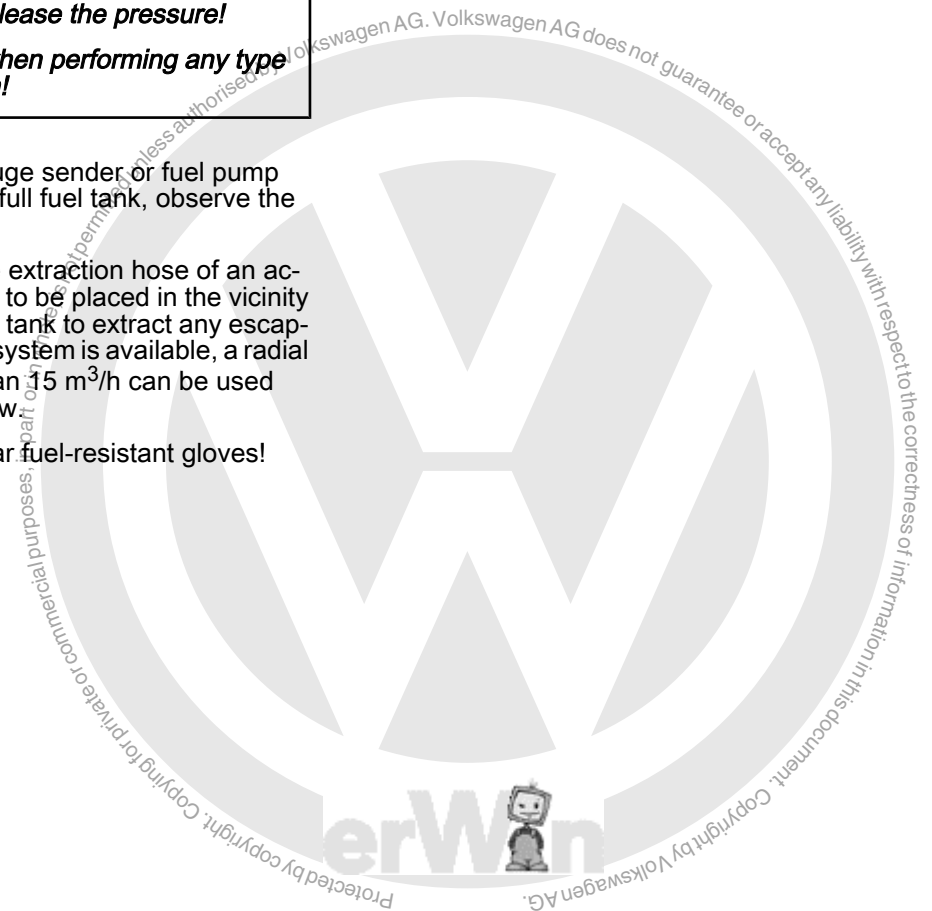
WARNING

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 and 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:

- ◆ Even before work commences, the extraction hose of an activated fume extraction system has to be placed in the vicinity of the assembly opening of the fuel tank to extract any escaping fumes. 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!



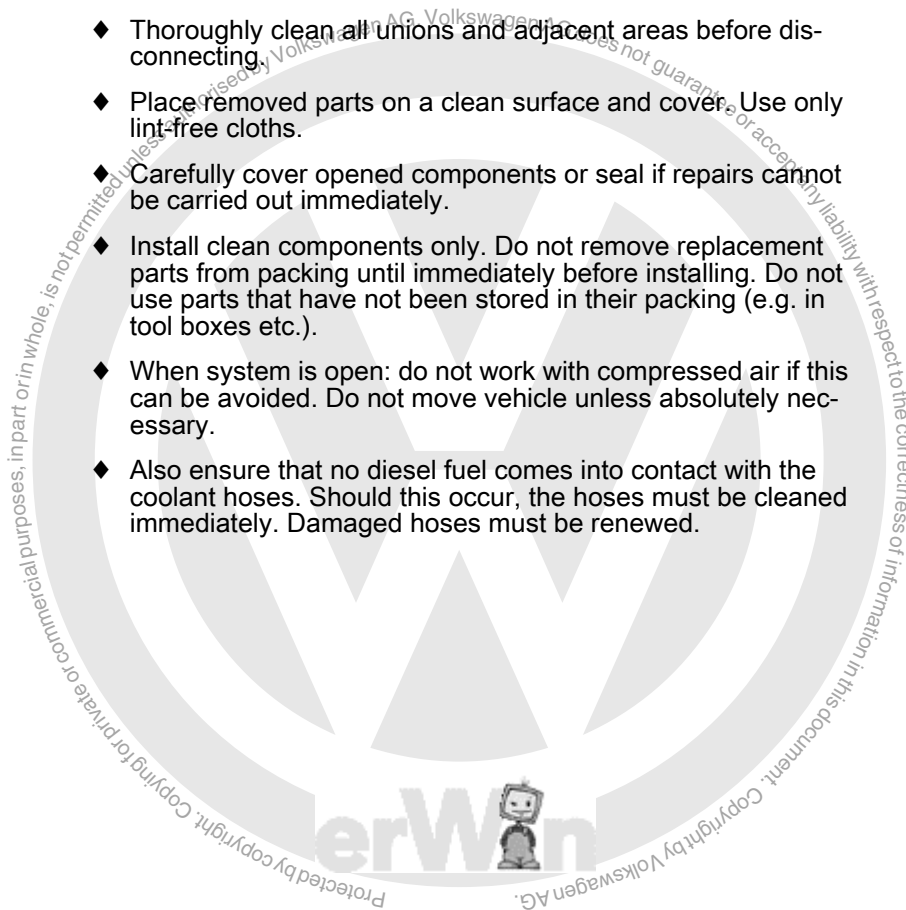


2 Rules for cleanliness

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 adjacent 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 comes into contact with 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 136](#) .

Rules for cleanliness ⇒ [page 137](#) .

Fuel tank, vehicles with front-wheel drive ⇒ [page 138](#) .

Fuel tank, vehicles with four-wheel drive ⇒ [page 142](#) .

Emptying fuel tank ⇒ [page 148](#) .

Removing and installing fuel delivery unit ⇒ [page 150](#) .

Removing and installing fuel gauge sender ⇒ [page 151](#) .

Checking fuel pump ⇒ [page 152](#) .

Assembly overview - fuel filter ⇒ [page 156](#) .

Removing and installing fuel cooler ⇒ [page 158](#) .

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 140](#)

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 162](#) .
- Removing and installing ⇒ [page 150](#)
- Checking fuel pump ⇒ [page 152](#) .
- Removing and installing fuel gauge sender ⇒ [page 170](#) .

13 - Locking ring

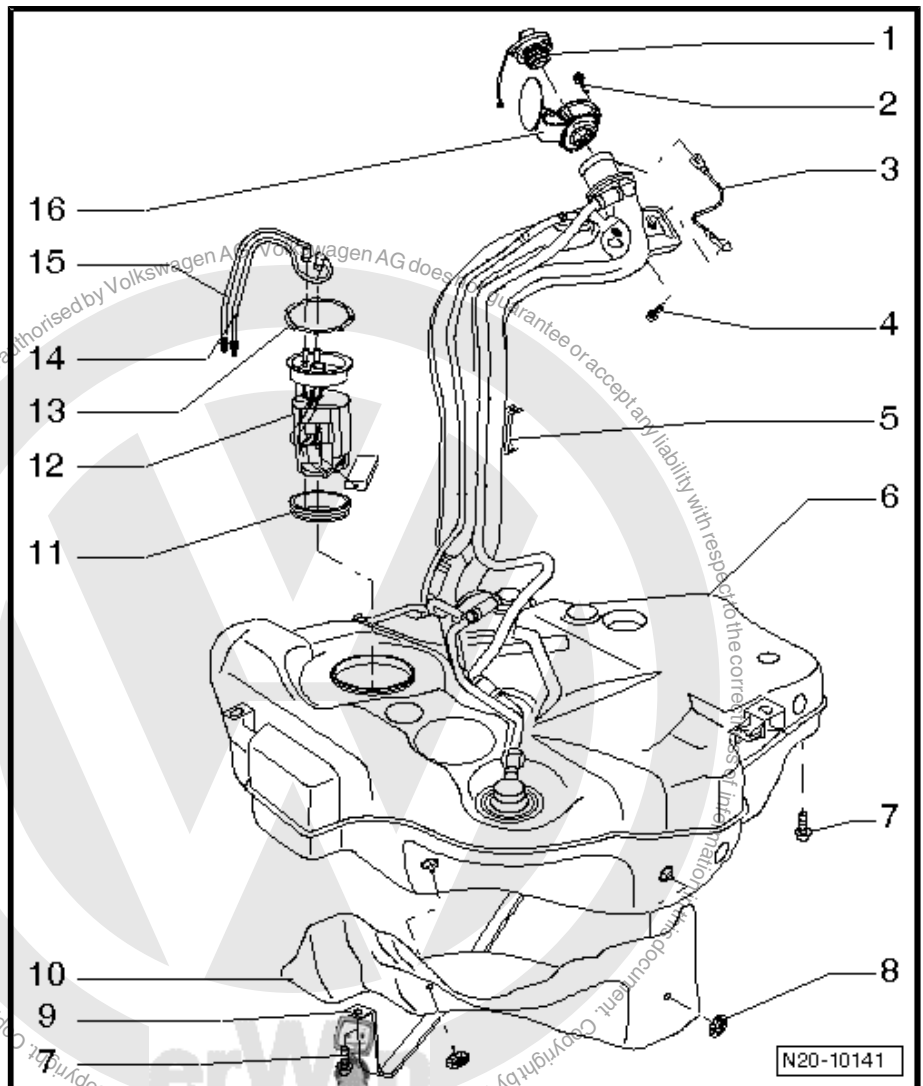
- Remove and install using wrench -T10202- .
- Specified torque: 110 Nm

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.

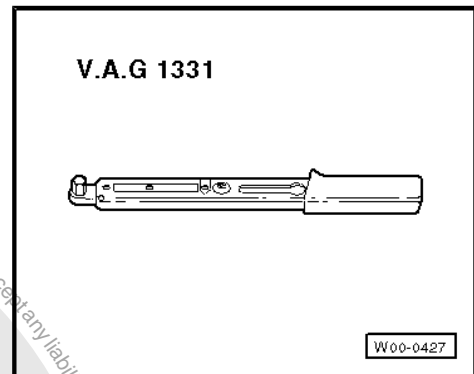
16 - Tank flap unit

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

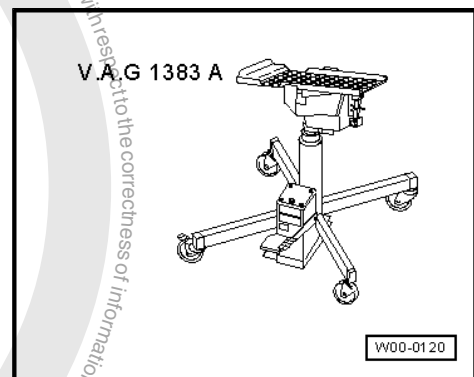
3.1.2 Removing and installing fuel tank

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 beginning work ⇒ [page 136](#) .

Observe rules for cleanliness ⇒ [page 137](#) .

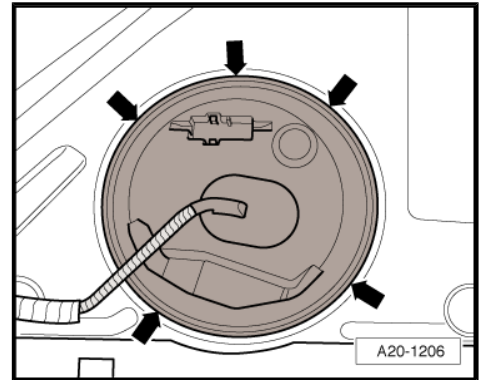


Note

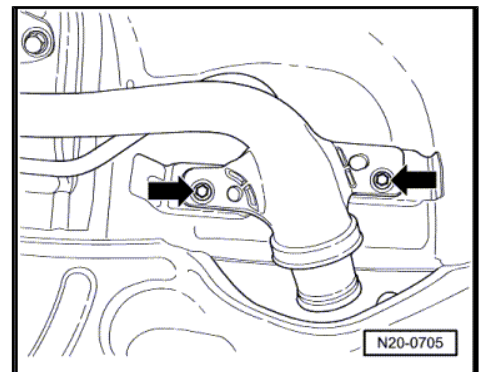
- ◆ *Before carrying out further work, disconnect battery earth strap. Check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.*
- ◆ *When lowering fuel tank, guide it carefully to prevent damage.*
- Disconnect earth strap from battery with ignition switched off ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
- Remove rear seat bench (Golf Plus: rear right seat) ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing seat bench .



- 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 148](#) .
- 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-.

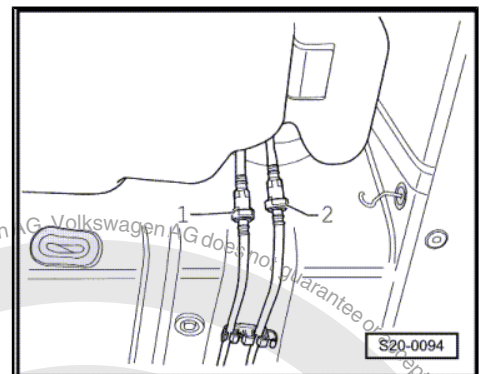


- Disconnect fuel lines at front right of fuel tank.

i Note

Press buttons on hose couplings to do this.

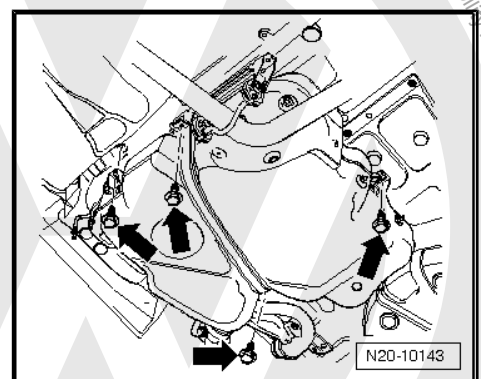
- If vehicle has supplementary heating, separate connector to metering pump and unclip wire. ⇒ Supplementary heating; Rep. gr. 82 ; Removing and installing metering pump V54
- Remove bolts -A- and remove heat shield for fuel tank.
- Support fuel tank using engine and gearbox jack -V.A.G 1383/ A- .
- 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 line and return line (return line blue or with blue marking, 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 150](#)
- Checking fuel pump
- Note installation position on fuel tank ⇒ [page 143](#).
- With fuel gauge sender -G- .
- Removing and installing fuel gauge sender ⇒ [page 170](#).

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.

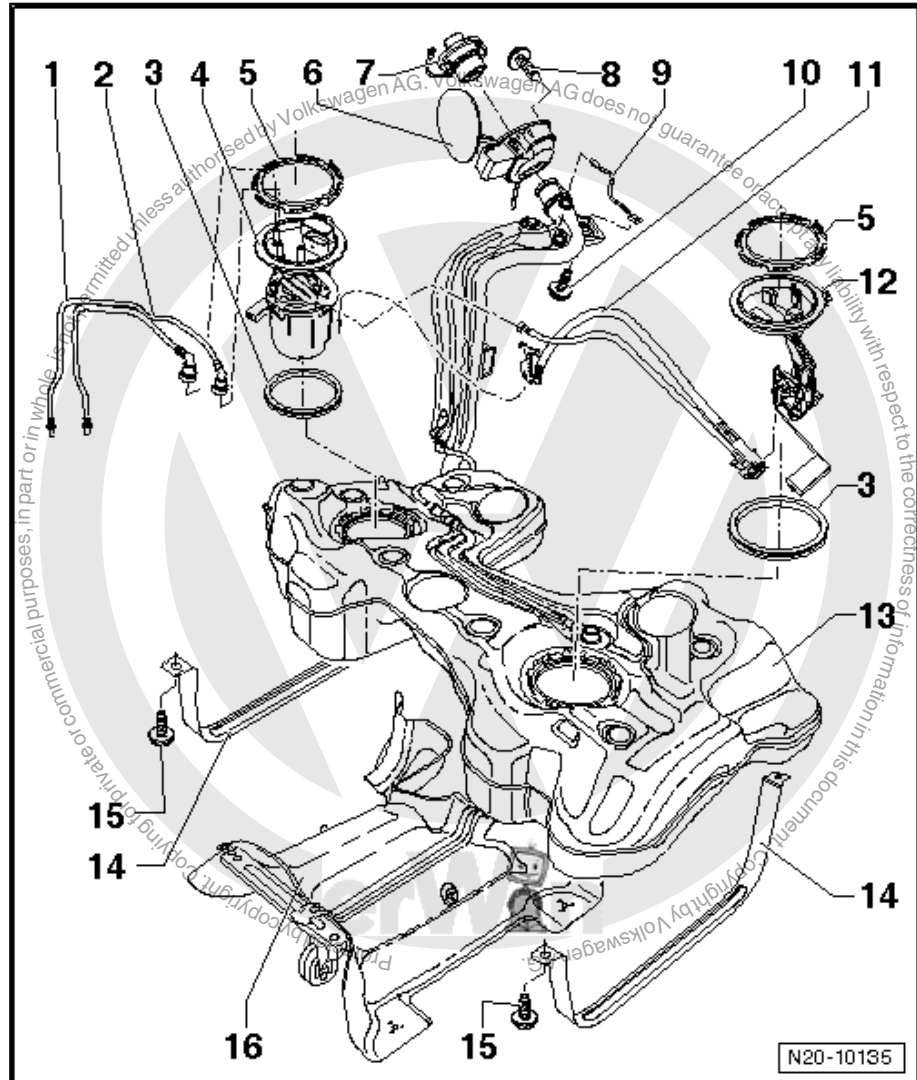
9 - Earth connection

- Check for secure seating.

10 - 10 Nm

11 - Suction-jet pump

- Clipped onto fuel gauge sender 2 -G169-
- Removing and installing ⇒ [page 147](#)



N20-10135



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 143](#)

14 - Securing strap

- Note installation position.

15 - 25 Nm

- Renew.

16 - Heat shield

- Riveted to exhaust pipe mounting

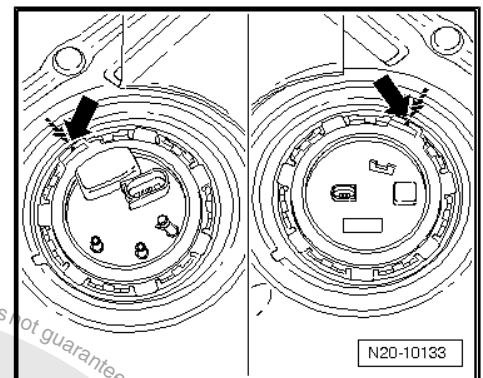
Installation position of flange for fuel delivery unit and fuel gauge sender 2 -G169-

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



Note

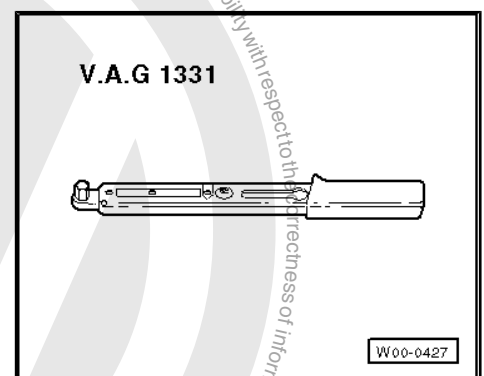
The marking on the fuel tank is not clearly visible.



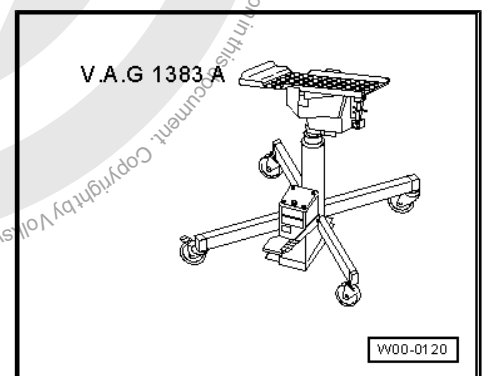
3.2.2 Removing and installing fuel tank

Special tools and workshop equipment required

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



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



- Note safety precautions before beginning work => [page 136](#) .



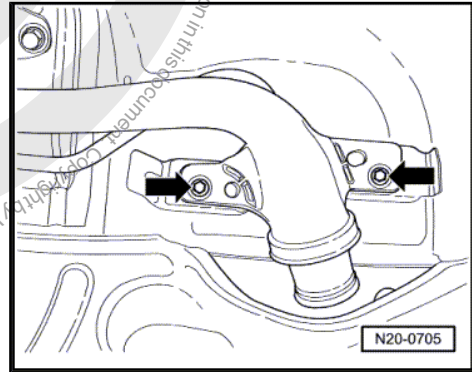
Note

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

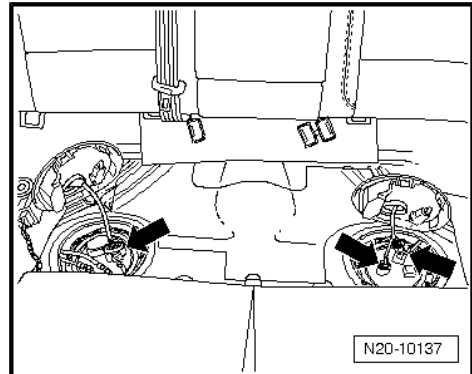
- First check whether a coded radio is fitted. If so, obtain anti-theft coding.
- Disconnect earth strap from battery with ignition switched off
⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

If necessary, drain fuel tank using fuel extractor -VAS 5190- ⇒ [page 148](#)

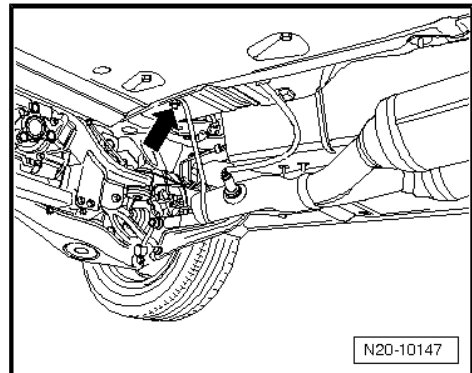
- Remove rear right wheel.
- Remove rear right wheel housing liner. ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .
- Unscrew securing bolts and remove tank flap unit. ⇒ General body repairs, exterior; Rep. gr. 55 ; Fuel flap unit
- 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

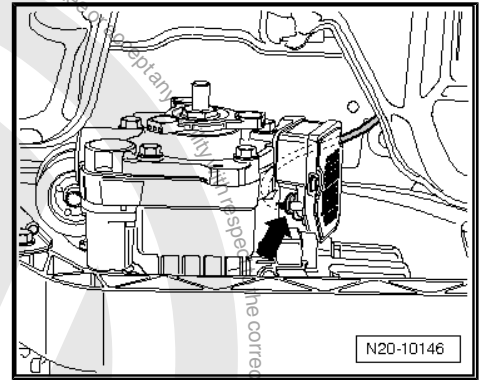


WARNING

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.



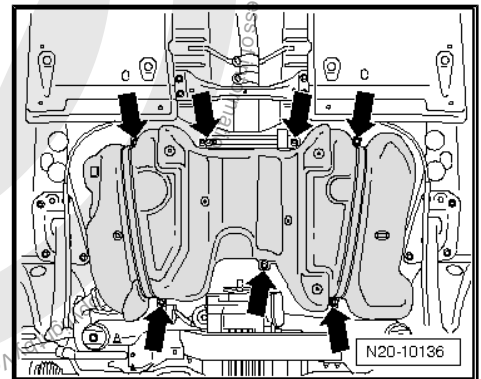
- Pull off adapter cable on four-wheel drive control unit -J492- .



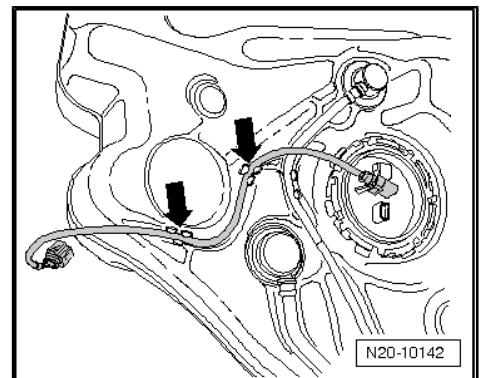
- Support fuel tank using engine and gearbox jack -V.A.G 1383 A- and unscrew tensioning straps and securing bolts.
- Slowly lower fuel tank.

i Note

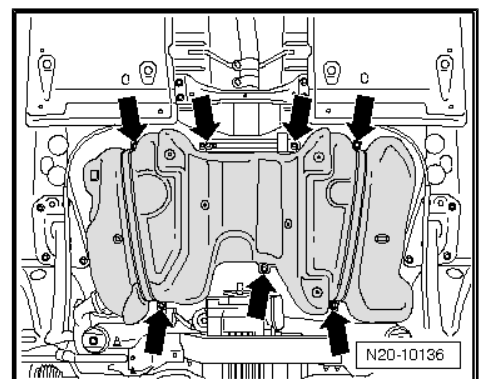
The filler neck must be "guided out" between body and rear axle. To do this, take the fuel tank off engine and gearbox jack -V.A.G 1383 A- with the assistance of a 2nd mechanic.



- 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.

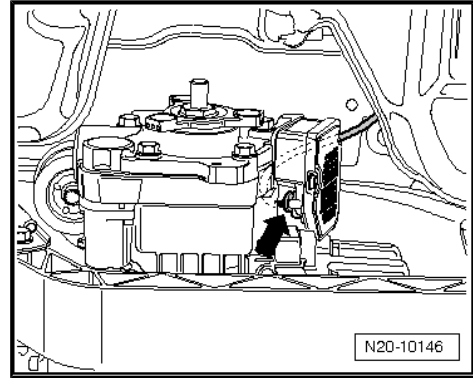




- Fit adapter cable on four-wheel drive control unit -J492- .

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 line and return line (return line blue or with blue marking, supply line black).
- ◆ Ensure that fuel line connections are tight.
- ◆ Check earth connection on fuel tank and body to filler neck.



3.2.3 Removing and installing fuel gauge sender 2 -G169-

- The fuel tank should be no more than half full

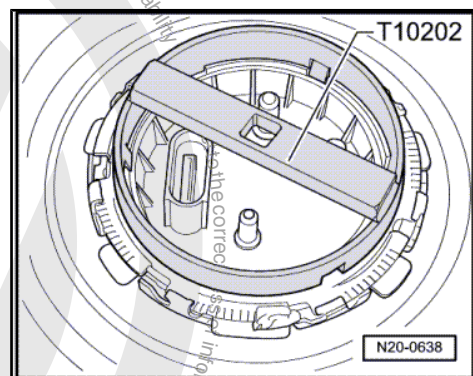


Note

- ◆ Ensure that the fuel gauge sender is not bent.
- ◆ If necessary, drain fuel tank using fuel extractor -VAS 5190- .
⇒ [page 148](#)
- ◆ Note safety precautions before beginning work ⇒ [page 136](#) .
- ◆ Observe rules for cleanliness ⇒ [page 137](#) .

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 -G 169- upwards slightly and unclip it from the suction-jet pump.

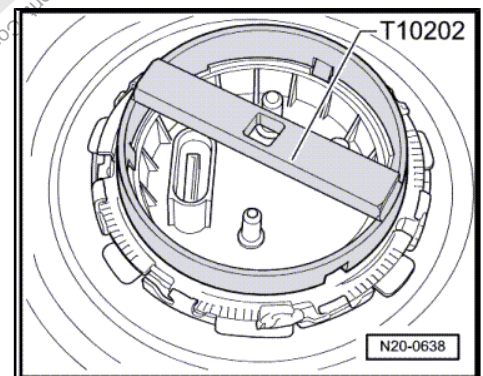
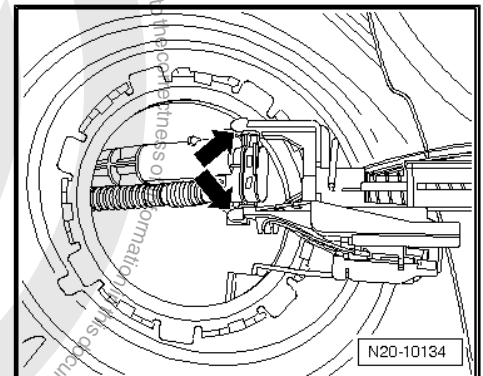
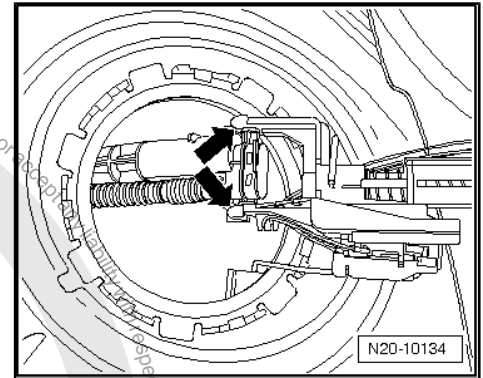
Installing:



Caution

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

- Place fuel gauge sender 2 -G 169- 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 aperture in fuel tank and moisten only inside (contact to flange) with fuel.
- Note installation position of fuel gauge sender 2 -G169- ⇒ [page 143](#)
- Check 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

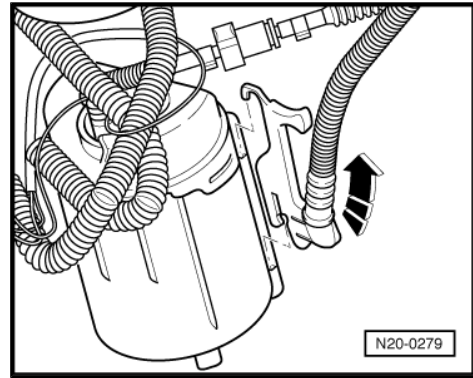
- ◆ On vehicles with four-wheel drive, fuel must be pumped from the area of fuel gauge sender 2 -G169- , to the fuel pump with a suction-jet pump due to the shape of the fuel tank.
- ◆ Checking is only necessary when the engine stops due to lack of fuel, even though the fuel gauge shows that the tank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

Procedure

- Remove fuel delivery unit ⇒ [page 150](#) .



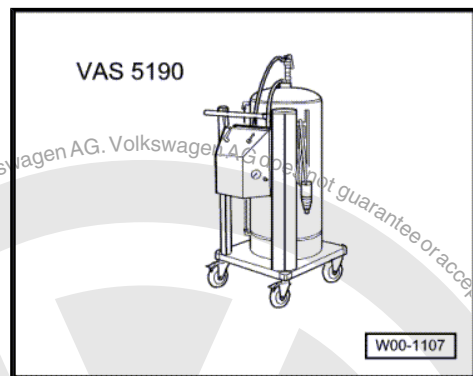
- Pull return hose of suction-jet pump out of fuel delivery unit -arrow-.
- Separate quick-release coupling of supply line from suction-jet pump on Y-piece of fuel delivery unit.
- Remove fuel gauge sender 2 -G 169- ⇒ [page 146](#) .
- Now the suction-jet pump can be pulled out from the side of the fuel 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.



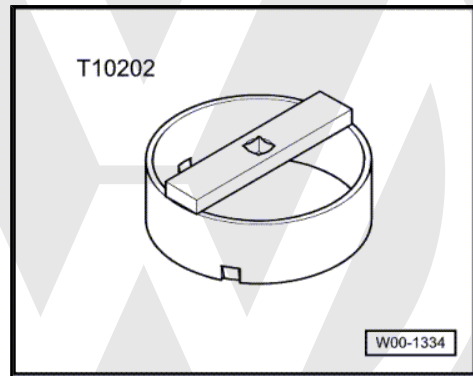
3.3 Emptying fuel tank

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 136](#) .

Emptying fuel tank if it is more than $\frac{3}{4}$ full ⇒ [page 148](#) .

Emptying fuel tank if it is less than $\frac{3}{4}$ full ⇒ [page 149](#) .

3.3.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full

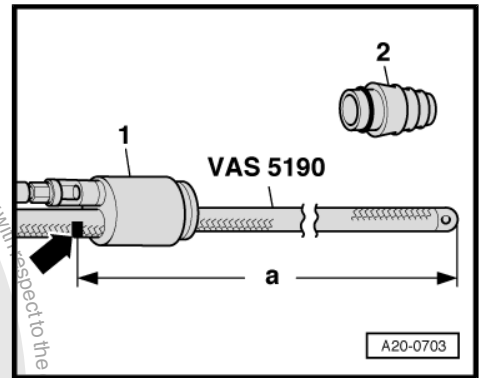


Caution

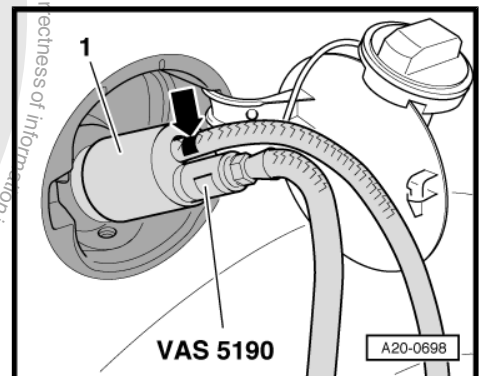
Secure earth wire of fuel extractor -VAS 5190- to a bare metal part of the body.



- 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.



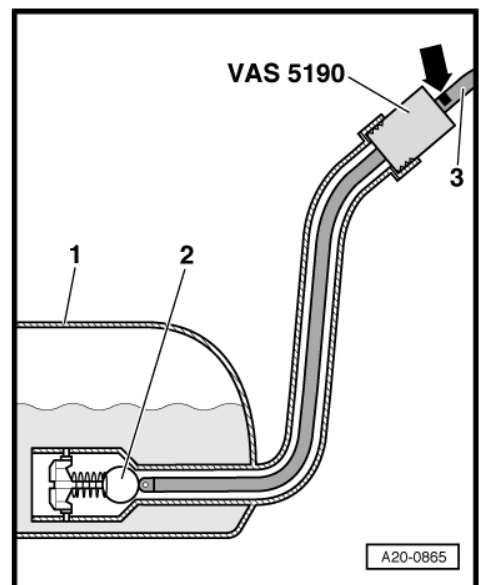
i Note

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-.

- Empty fuel tank as far as possible.
- 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.
- ◆ If the fuel tank has to be drained fully, proceed as follows: ⇒ [page 149](#)



3.3.2 Emptying fuel tank if it is less than 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.

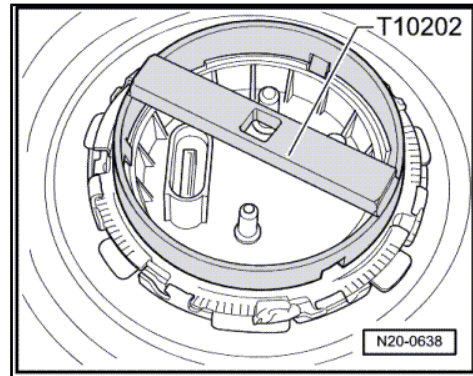


Note

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.

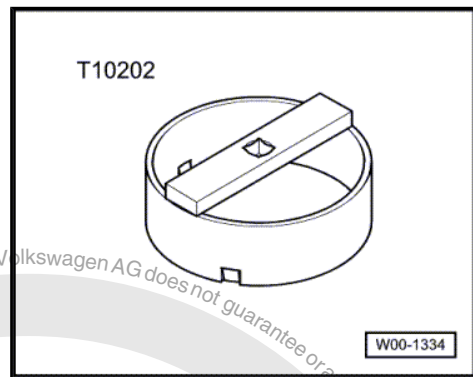
If fuel tank needed only to be emptied, reinstall sender flange.



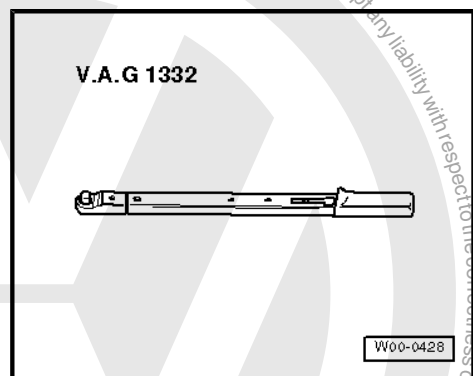
3.4 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Wrench -T10202-



- ◆ Torque wrench -V.A.G 1332-



Removing

Observe safety precautions ⇒ [page 136](#) .

Observe rules for cleanliness ⇒ [page 137](#) .

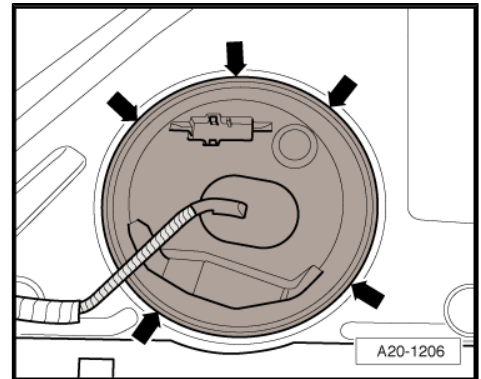
- First check whether a coded radio is fitted. If so, obtain anti-theft coding.
- Disconnect earth strap from battery with ignition switched off ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .



- Remove rear seat bench (Golf Plus: rear right seat) ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing seat bench .
- 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.



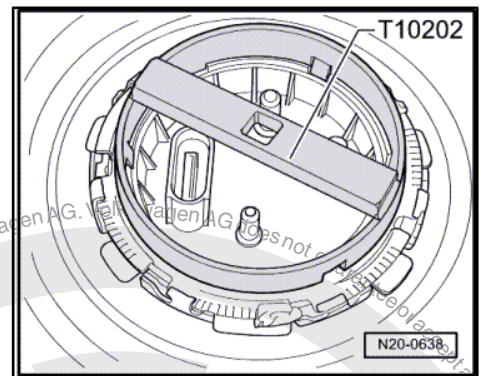
WARNING

- ◆ **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 the opening in fuel tank.

i Note

If delivery unit is to be renewed, drain old delivery unit before disposal.

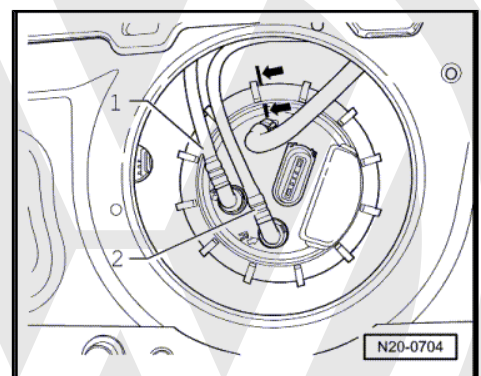


Installing

- Installing the fuel delivery unit is carried out in reverse order of removal.

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 the supply, return and breather lines are still clipped onto the fuel tank.**
- ◆ **Note installation position of fuel delivery unit flange: mark on flange must align with mark on fuel tank -arrows-.**



3.5 Removing and installing fuel gauge sender

Removing

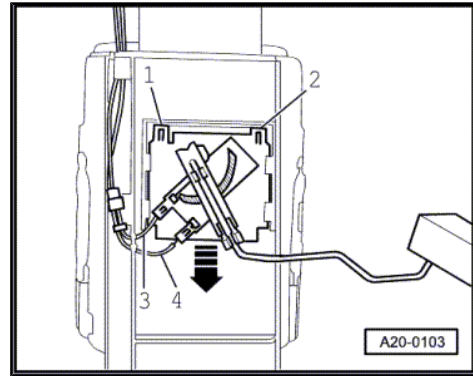
- Remove fuel delivery unit ⇒ [page 150](#) .



- 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 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 156](#)

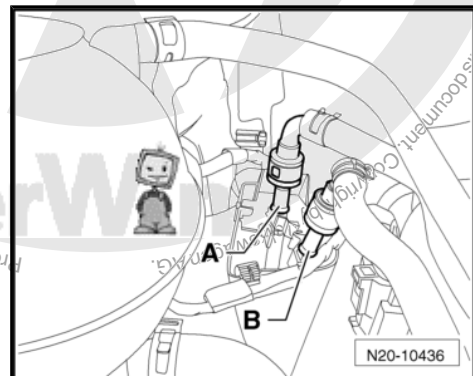
3.6.1 Checking delivery pressure of fuel pump

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- (completely black or with 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 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 180](#) .
- If the specifications are attained, check tandem pump to ensure the fuel filter is not blocked ⇒ [page 195](#) .
- If the tandem pump values are OK, check fuel pump delivery rate ⇒ [page 153](#) .





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- (completely black or with 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 vehicle diagnosis tester and perform guided function „checking electric fuel pump(s)“.

Note

The fuel pump is now activated for 30 seconds.

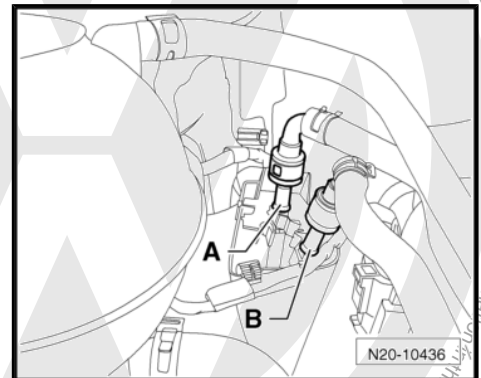
- After fuel flow, read quantity of fuel delivered on measuring container, specification: min. 1000 ml/30 s.

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)“.



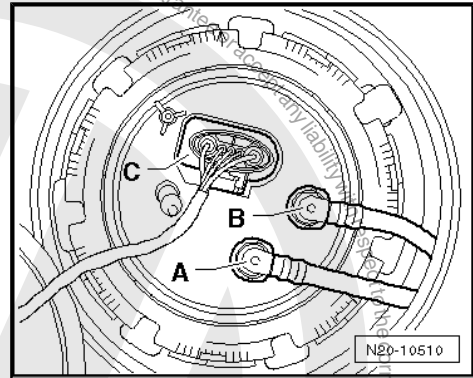
Note

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:

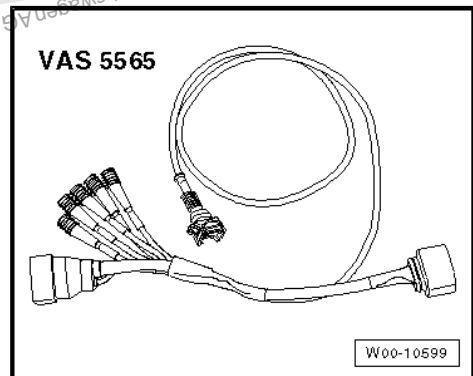
- Check voltage supply ⇒ [page 154](#) and current draw ⇒ [page 155](#) of fuel pump.



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 a 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 vehicle diagnosis tester and perform guided function „checking electric fuel pump(s)“.

i 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:

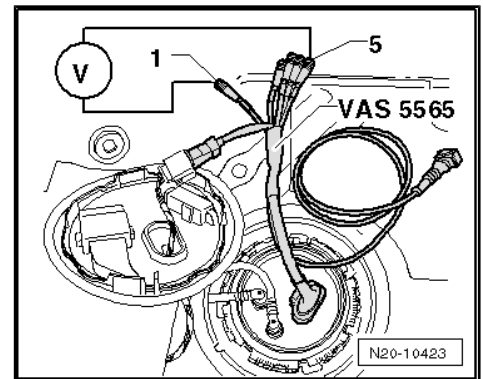
- Check activation of fuel pump relay and wiring for an open or short circuit ⇒ Vehicle diagnostic, testing and information system VAS 5051.

Voltage supply OK:

- Remove fuel delivery unit ⇒ [page 180](#) .
- 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

i Note

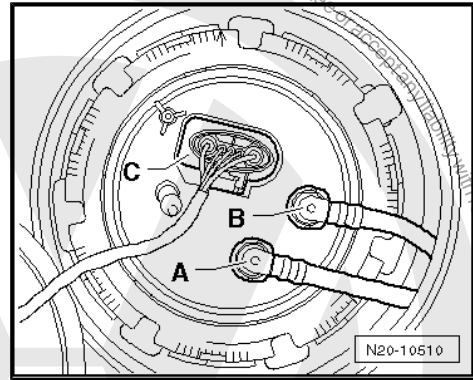
The battery voltage and the diesel fuel temperature have a great influence on the current draw of the fuel pump. For this reason ensure that the battery voltage is at least 12 V whilst checking and the diesel fuel temperature does not fall to the freezing point.

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.

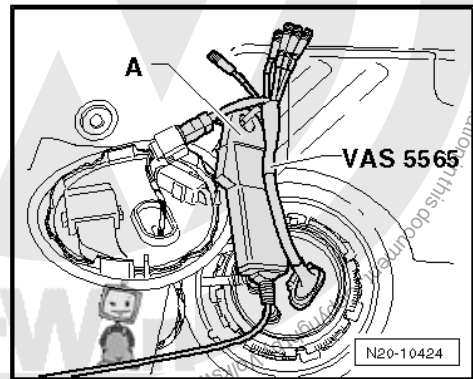


- Connect test instrument adapter/DSO (5-pin) -VAS 5565- to connector and fuel delivery unit.
- Connect pick-up clamp -A- to red terminal with lettering „pick-up clamp“ for test instrument adapter/DSO (5-pin) -VAS 5565- .



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 vehicle diagnosis tester and perform 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 180](#) .

3.7 Assembly overview - fuel filter



Note

Note that there are different versions of fuel filter upper part ⇒ [page 158](#) .



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 - Bracket

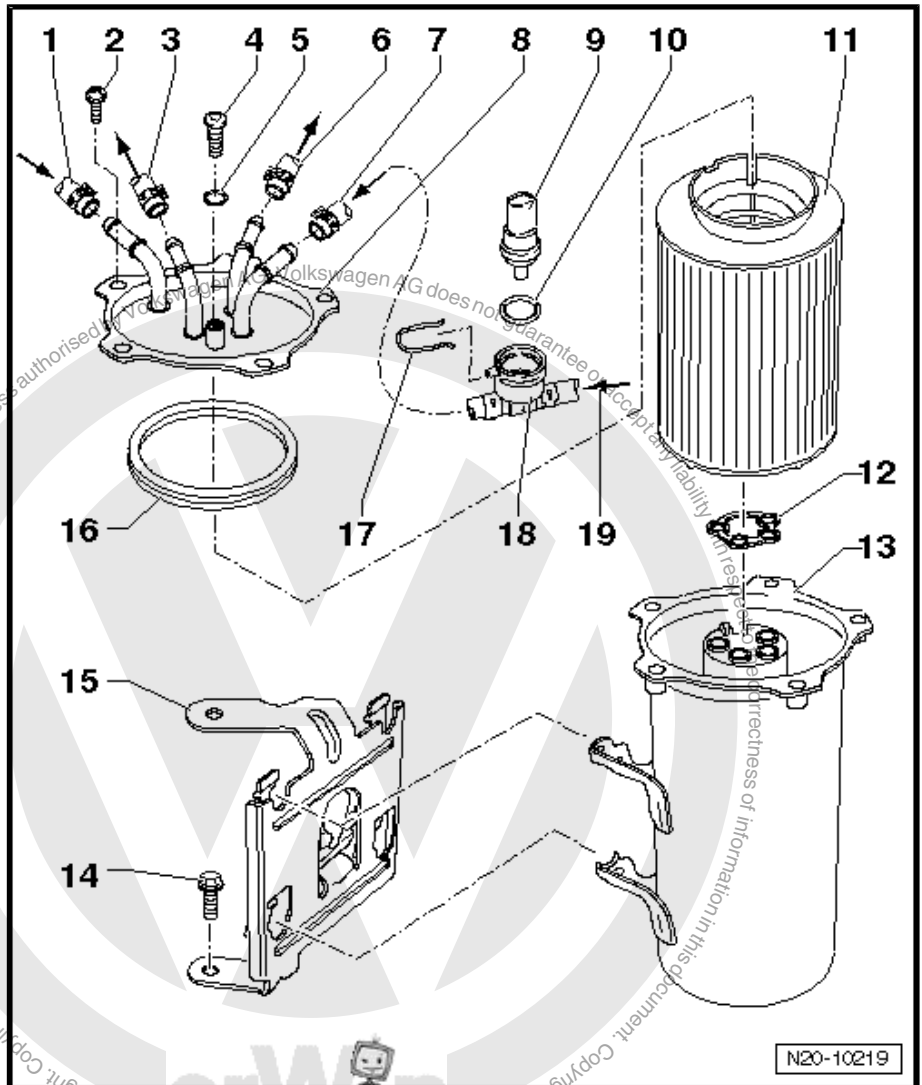
16 - Seal

- Renew.

17 - Retaining clip

18 - Connection

19 - From tandem pump.



N20-10219



3.7.1 Upper part of fuel filter

Type A ⇒ [page 158](#)

Type B ⇒ [page 158](#)

Upper part of fuel filter, type A

1 - 8 Nm

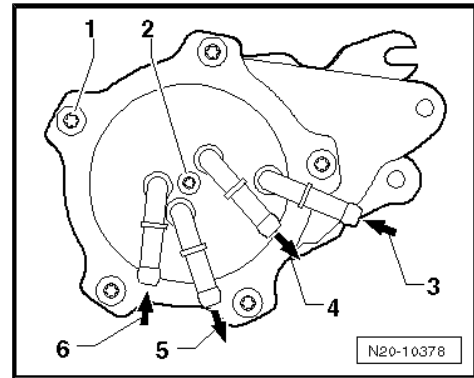
2 - Plug for water extraction (remove and extract about 100 cm³ liquid using hand-operated vacuum pump with accessories - V.A.G 1390- and water drainage container -V.A.G 1390/1- , renew seal)

3 - Fuel supply line from fuel tank, white or white marking. Check for secure seating.

4 - Fuel return line to fuel tank, 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.



Upper part of fuel filter, type B

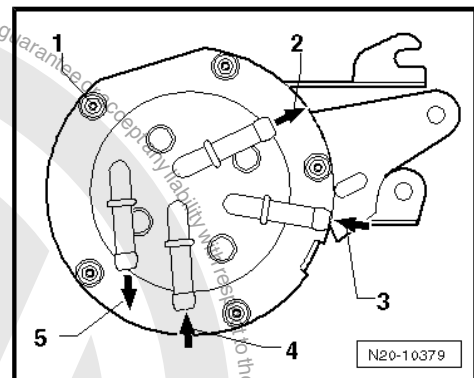
1 - 5 Nm

2 - Fuel return line to fuel tank, blue or blue marking. Check for secure seating.

3 - Fuel supply line from fuel tank, white or white marking. Check for secure seating.

4 - Fuel return line from engine, blue or blue marking. Check for secure seating.

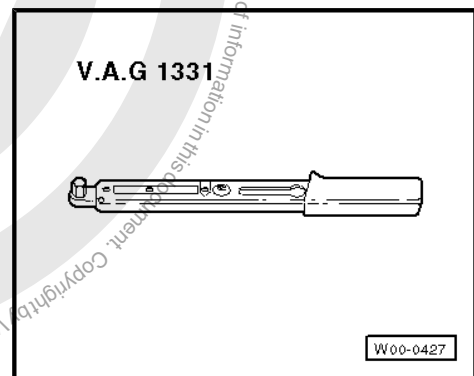
5 - Fuel supply line to engine, white or white marking. Check for secure seating.



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 136](#) .

Observe rules for cleanliness ⇒ [page 137](#) .



i Note

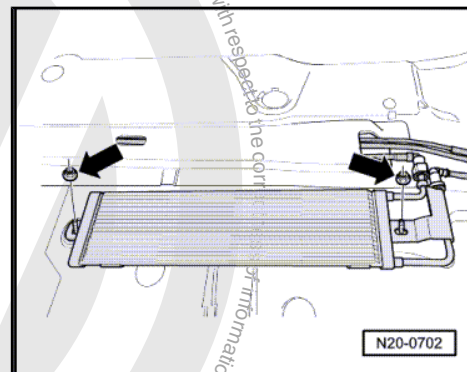
The fuel cooler is located in the return line to fuel tank. It is located on the vehicle underbody.

- 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 136](#) .

Rules for cleanliness ⇒ [page 137](#) .

Assembly overview - fuel tank with attachments ⇒ [page 161](#) .

Emptying fuel tank ⇒ [page 162](#) .

Removing and installing fuel tank ⇒ [page 165](#) .

Assembly overview - fuel filter ⇒ [page 167](#) .

Removing and installing fuel cooler ⇒ [page 168](#) .

Removing and installing fuel delivery unit ⇒ [page 169](#) .

Removing and installing fuel gauge sender ⇒ [page 170](#) .

Checking fuel pump ⇒ [page 171](#) .

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 165](#) .

9 - Heat shield

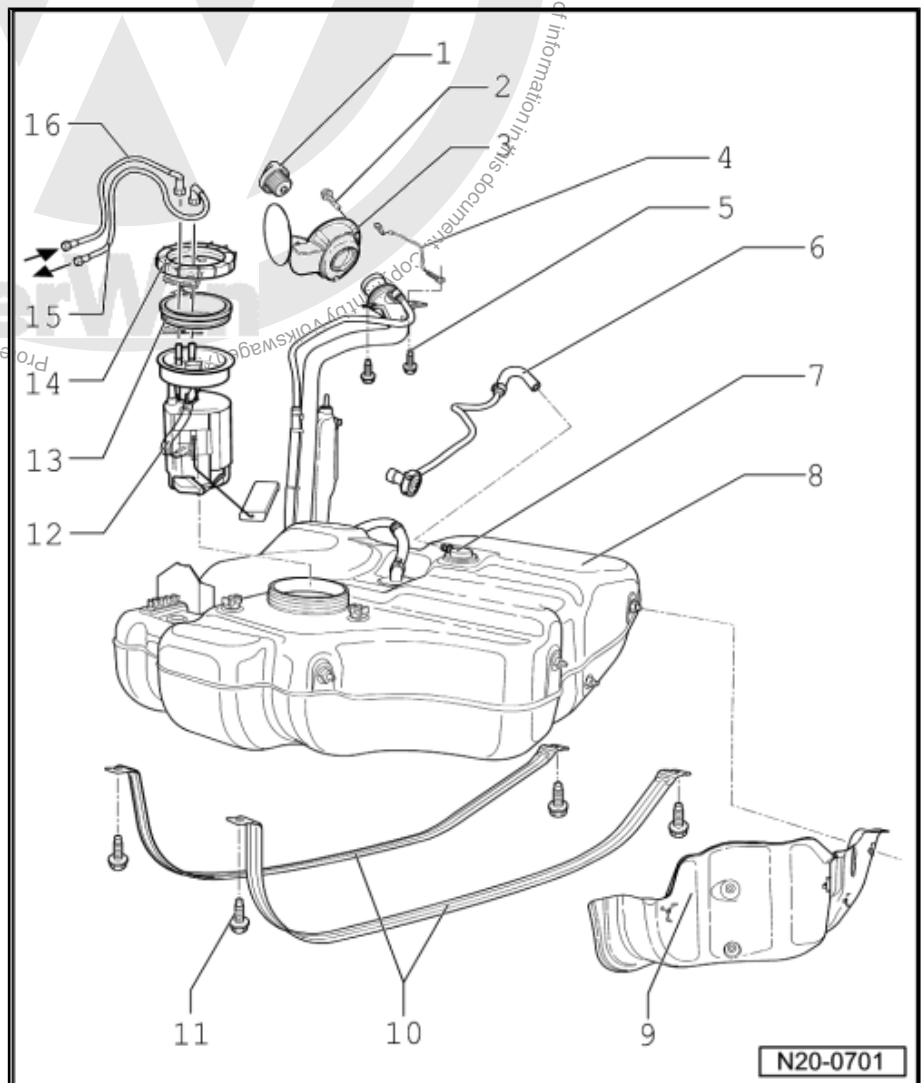
- For fuel tank.

10 - Securing strap

11 - 20 Nm + turn (90°)

12 - Fuel delivery unit

- With fuel gauge sender (G).
- Note installation position of flange on fuel tank ⇒ [page 162](#) .
- Removing and installing ⇒ [page 169](#)
- Checking fuel pump ⇒ [page 152](#) .
- Removing and installing fuel sender ⇒ [page 170](#) .
- 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

Marking on flange must align with marking on fuel tank -arrows-.

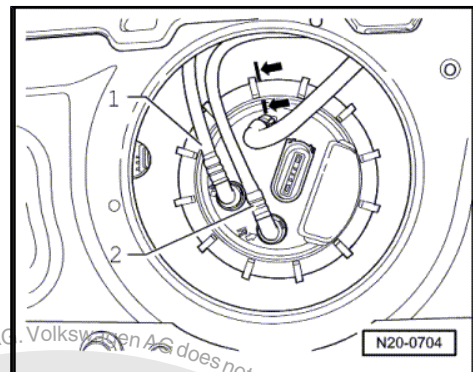
Black supply line -1- to connection marked -V-.

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

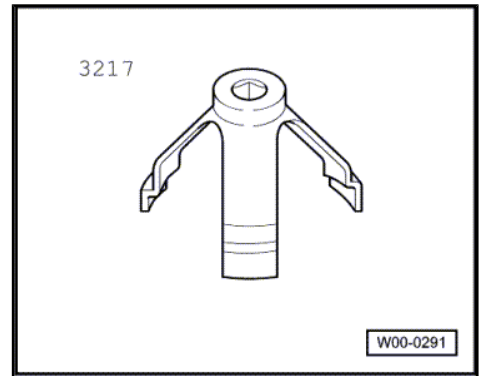
Special tools and workshop equipment required

- ◆ Fuel extractor -VAS 5190-

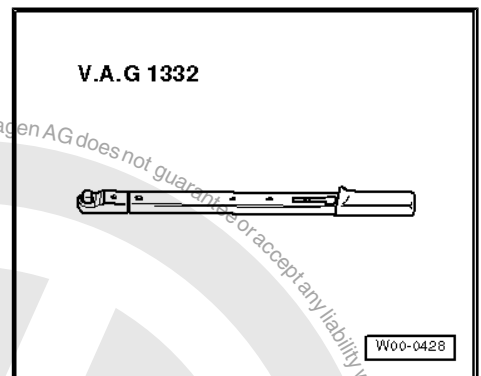




- ◆ Union nut tool -3217-



- ◆ Torque wrench (40... 200 Nm) -V.A.G 1332-



- Note safety precautions before beginning work ⇒ [page 136](#) .

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

Emptying fuel tank if it is less than $\frac{3}{4}$ full ⇒ [page 164](#) .

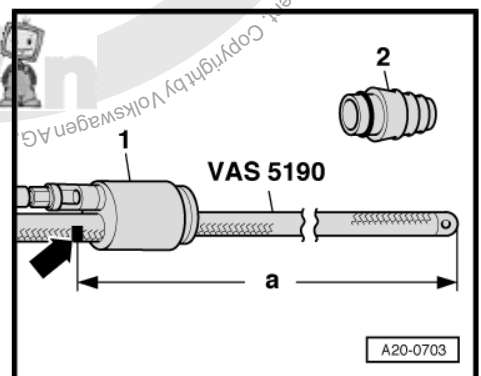
4.2.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full



Caution

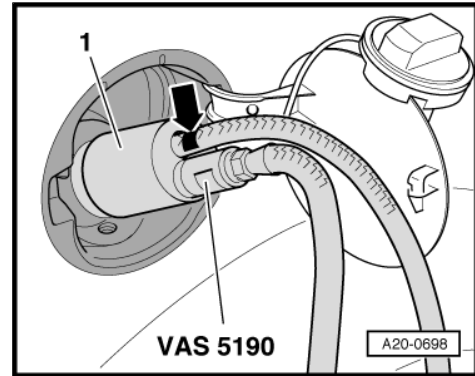
Secure earth wire of fuel extractor -VAS 5190- to a bare metal part of the body.

- 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.



Note

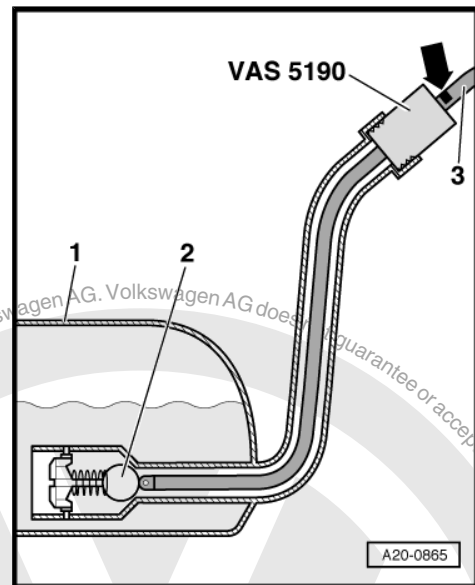
A ball valve -2- is located at the bottom of the filler neck in the fuel tank -1-; it must not be damaged by the extraction hose -3-. Therefore push hose into filler neck only as far as marking -arrow-.

- Drain fuel tank as much as possible through fuel filler neck.
- Carefully pull out extraction hose.



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.



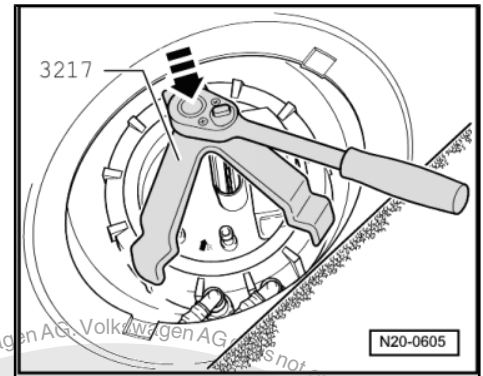
Note

Press buttons on hose couplings to do this.



- Open locking ring using union nut tool -3217- .
- Raise fuel delivery unit.
- Insert extraction hose of fuel extractor -VAS 5190- as deeply as possible into fuel tank and extract fuel.

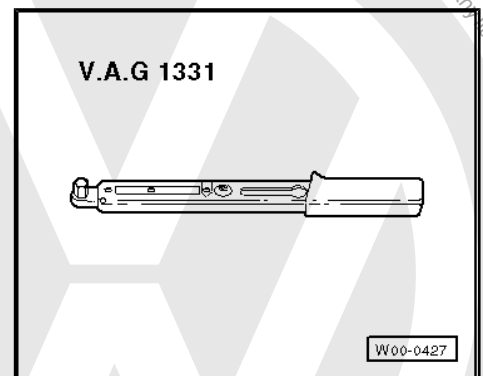
If fuel tank needed only to be emptied, install fuel delivery unit again ⇒ [page 169](#) .



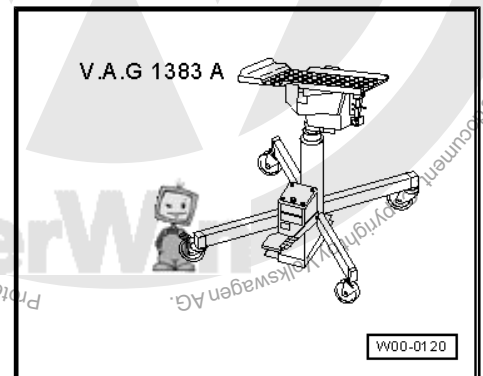
4.3 Removing and installing fuel tank

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 136](#) .
- Observe rules for cleanliness ⇒ [page 137](#) .

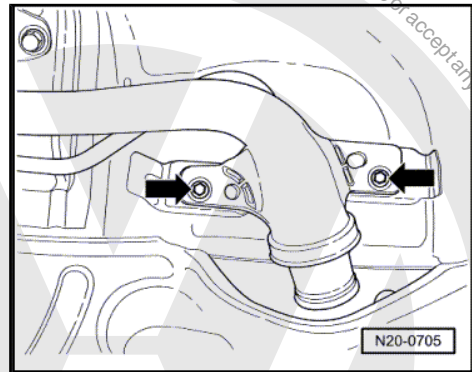


Note

- ◆ *Before carrying out further work, disconnect battery earth strap. 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
- Draining 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-.



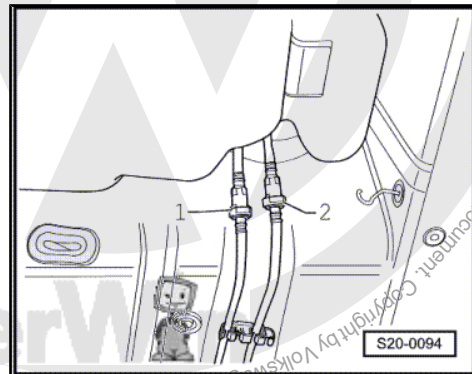
- Disconnect fuel lines at front right of fuel tank.



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- .

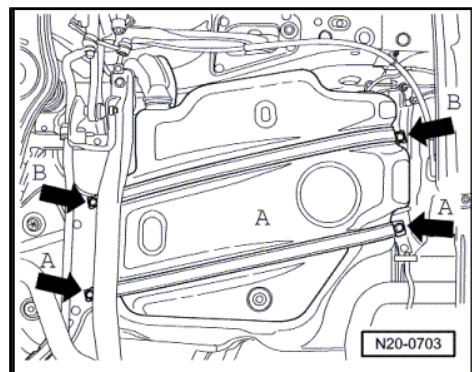


- Remove securing bolts -B- and remove retaining strap.
- Slowly lower fuel tank and pull it forwards.
- Tilt fuel tank to get it past rear axle.

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 line and return line (return line blue or with blue marking, supply line black).
- ◆ Clip supply and return lines onto fuel tank.





4.4 Assembly overview - fuel filter

1 - Upper part of fuel filter

- Observe various types
⇒ [page 167](#)

2 - Fuel temperature sender - G81-

- Installed in engine re-
turn line

3 - Seal

- Renew.

4 - Filter insert

- Observe change inter-
vals.

5 - Seal

- Renew.

6 - Fuel filter lower part

7 - 8 Nm

8 - Bracket

9 - Seal

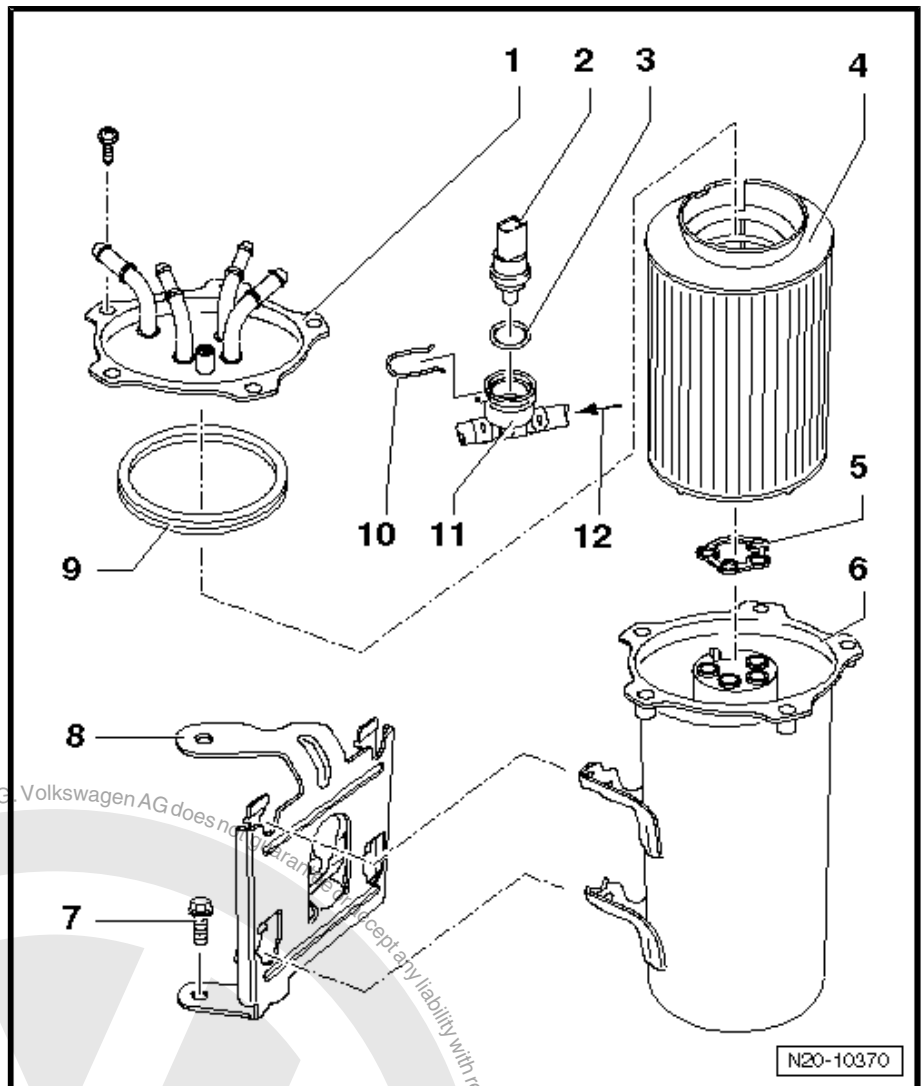
- Renew.

10 - Retaining clip

- Check for secure seat-
ing.

11 - Connection for fuel tem- perature sender -G81-

12 - From tandem pump.



4.4.1 Upper part of fuel filter

Type A ⇒ [page 167](#)

Type B ⇒ [page 168](#)

Upper part of fuel filter, type A

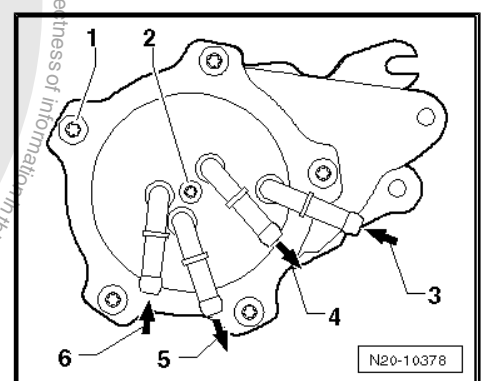
1 - 8 Nm

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 supply line from fuel tank, white or white marking. Check for secure seating.

4 - Fuel return line to fuel tank, 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.

Upper part of fuel filter, type B

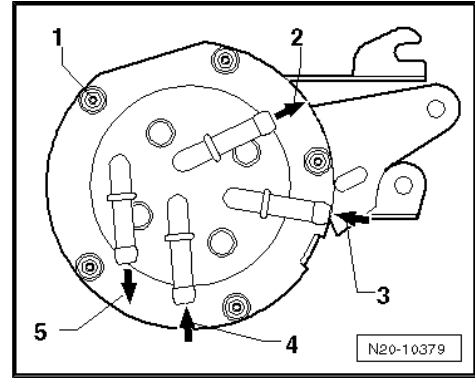
1 - 5 Nm

2 - Fuel return line to fuel tank, blue or blue marking. Check for secure seating.

3 - Fuel supply line from fuel tank, white or white marking. Check for secure seating.

4 - Fuel return line from engine, blue or blue marking. Check for secure seating.

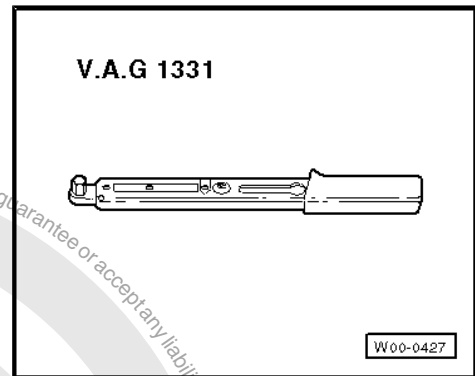
5 - Fuel supply line to engine, white or white marking. Check for secure seating.



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 136](#) .

Observe rules for cleanliness ⇒ [page 137](#) .



Note

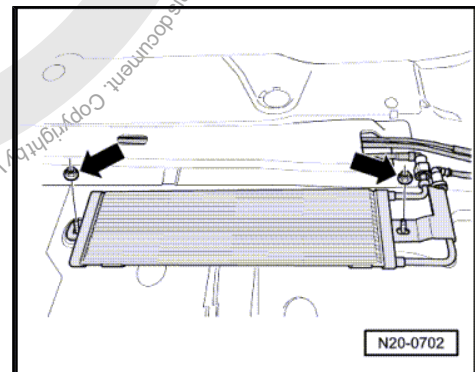
The fuel cooler is located in the return line to fuel tank. It is located on the vehicle underbody.

- 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.

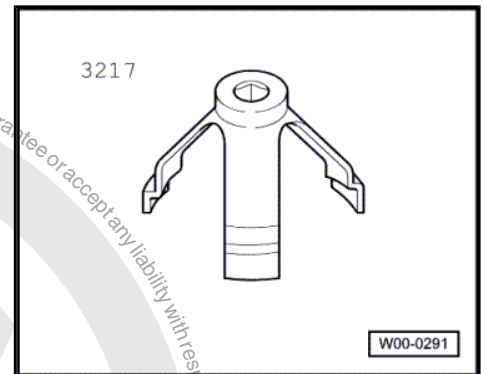




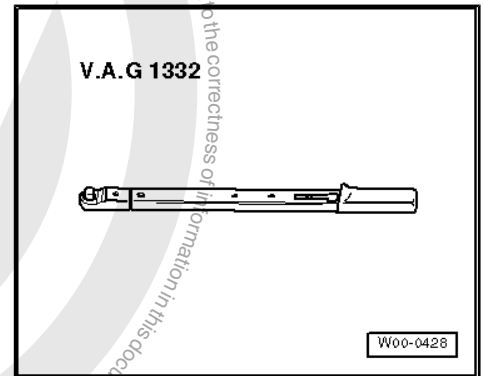
4.6 Removing and installing fuel delivery unit

Special tools and workshop equipment required

- ◆ Union nut tool -3217-



- ◆ Torque wrench -V.A.G 1332-



Removing

Observe safety precautions ⇒ [page 136](#) .

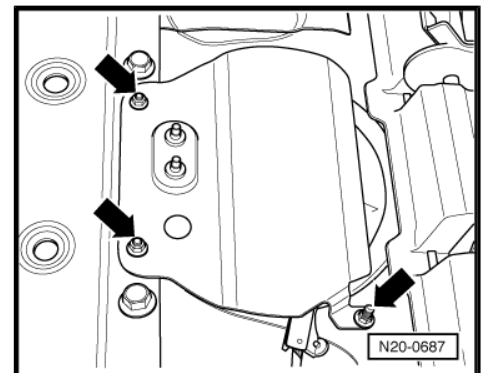
Observe rules for cleanliness ⇒ [page 137](#) .

- 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 the opening in fuel tank.

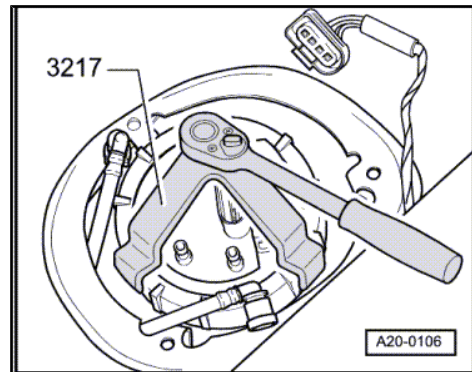


Note

If delivery unit is to be renewed, drain old delivery unit before disposal.

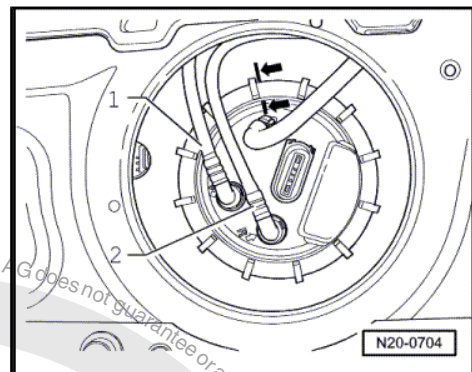
Installing

- Installing the fuel delivery unit is carried out in reverse order of removal.



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 the supply, return and breather lines are still clipped onto the fuel tank.*
- ◆ *Note installation position of fuel delivery unit flange: mark on flange must align with mark on fuel tank -arrows-.*



4.7 Removing and installing fuel gauge sender

Removing

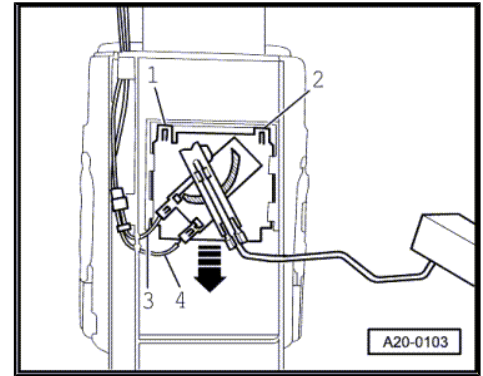
- Remove fuel delivery unit ⇒ [page 169](#) .



- 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 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 158](#)

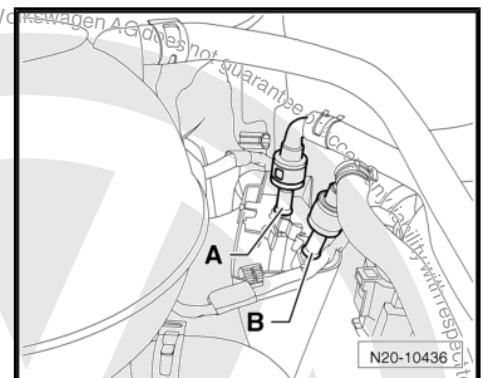
4.8.1 Checking delivery pressure of fuel pump

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- (completely black or with 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 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 180](#) .
- If the specifications are attained, check tandem pump to ensure the fuel filter is not blocked => [page 195](#) .
- If the tandem pump values are OK, check fuel pump delivery rate => [page 172](#) .





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:

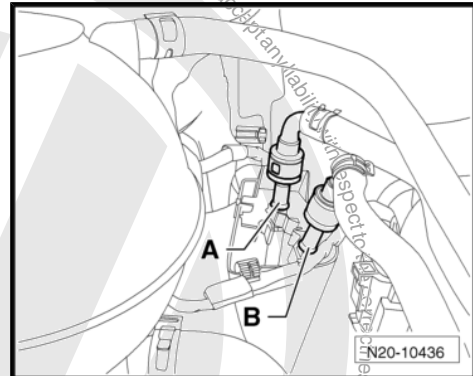
- Fuses must be OK.
- Battery voltage at least 12 V
- All electrical consumers, e.g. lights and rear window heating, must be switched off.



Note

The delivered fuel may be cloudy. This is normal and can be ignored.

- Separate quick-release coupling -A- (completely black or with 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 vehicle diagnosis tester and perform 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 vehicle diagnosis tester and perform guided function "checking electric fuel pump(s)".

i 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.

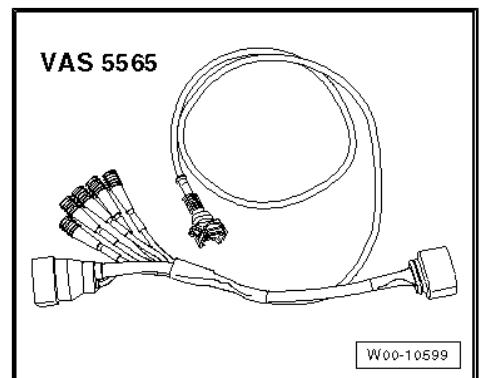
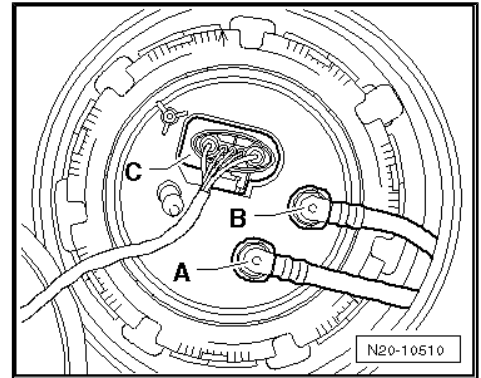
If the specification is not attained:

- Check voltage supply ⇒ [page 173](#) and current draw ⇒ [page 174](#) 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 a 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 vehicle diagnosis tester and perform 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:

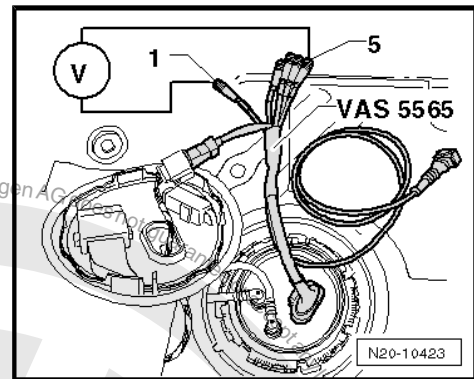
- Check activation of fuel pump relay and wiring for an open or short circuit ⇒ Vehicle diagnostic, testing and information system VAS 5051.

Voltage supply OK:

- Remove fuel delivery unit ⇒ [page 180](#) .
- 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

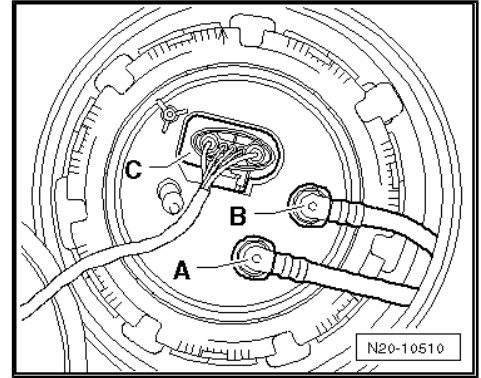
The battery voltage and the diesel fuel temperature have a great influence on the current draw of the fuel pump. For this reason ensure that the battery voltage is at least 12 V whilst checking and the diesel fuel temperature does not fall to the freezing point.

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.



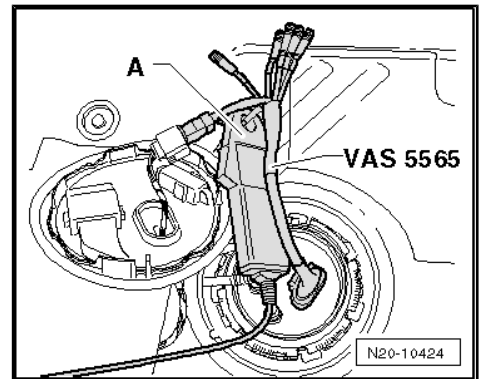
- Pull connector -C- off flange.



- 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- .

i 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- .

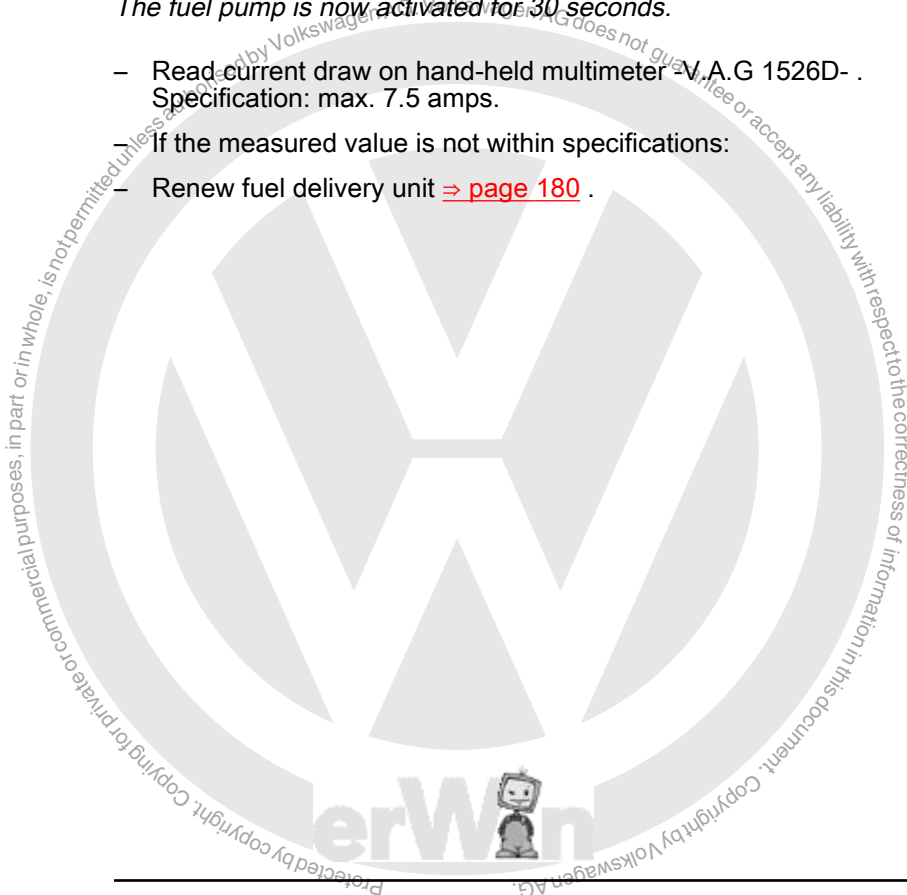


- Switch on ignition.
- Connect vehicle diagnosis tester and perform guided function „checking electric fuel pump(s)“.

i 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 180](#) .





5 Parts of fuel supply system (Passat)

Safety precautions ⇒ [page 136](#) .

Rules for cleanliness ⇒ [page 137](#) .

Fuel tank, vehicles with front-wheel drive ⇒ [page 176](#) .

Removing and installing fuel delivery unit ⇒ [page 180](#) .

Emptying fuel tank, vehicles with front-wheel drive ⇒ [page 183](#)

Checking fuel pump ⇒ [page 185](#) .

Assembly overview - fuel filter ⇒ [page 189](#) .

Removing and installing fuel cooler ⇒ [page 191](#) .

5.1 Fuel tank, vehicles with front-wheel drive

5.1.1 Assembly overview - fuel tank

1 - Cap

2 - 1.5 Nm

3 - Tank flap unit

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

4 - Earth connection

- Check for secure seating.

5 - Elbow

6 - 10 Nm

7 - Fuel tank

- When removing, support using engine and gearbox jack -V.A.G 1383/A- .
- Removing and installing ⇒ [page 178](#)
- Emptying fuel tank ⇒ [page 183](#) .

8 - Securing strap

- Note installation position.

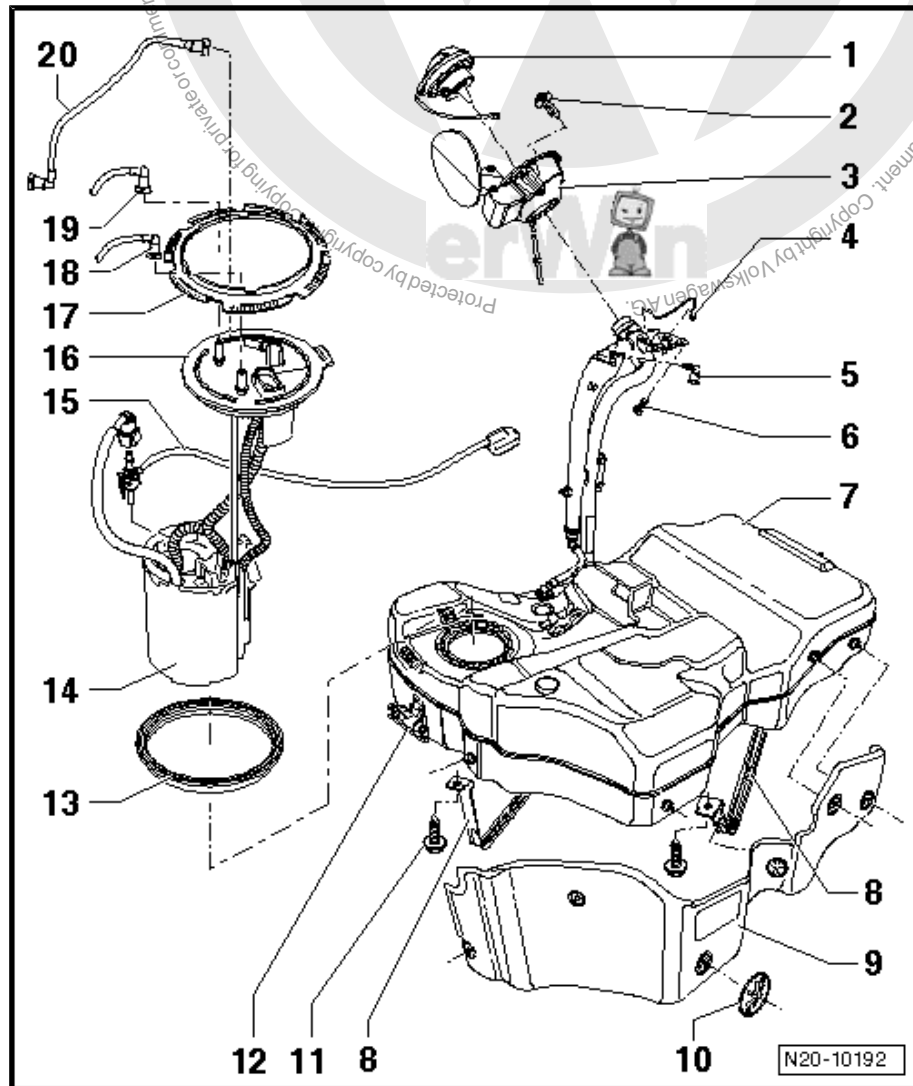
9 - Heat shield

- For fuel tank.

10 - Lock washer, 2.5 Nm

11 - 25 Nm

- Renew.





12 - Metering pump -V54-

For supplementary heater

- Removing and installing ⇒ Heating, air conditioning system; Rep. gr. 82 .

13 - Seal

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

14 - Fuel delivery unit

- With fuel gauge sender (G).
- Removing and installing ⇒ [page 180](#)
- Checking fuel pump ⇒ [page 185](#) .
- Removing and installing fuel gauge sender ⇒ [page 183](#) .

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 178](#) .

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

Marking -4- on flange points opposite direction of travel.



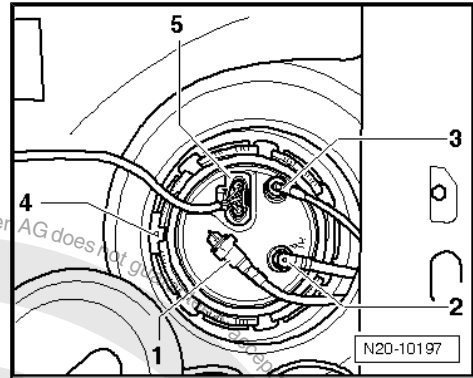
Note

The fuel delivery unit flange 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.



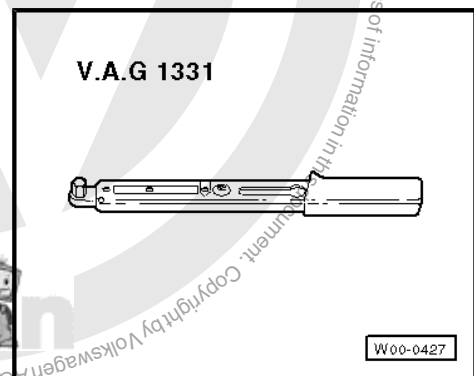
Note

After installing fuel delivery unit flange, check that fuel lines are still clipped onto fuel tank.

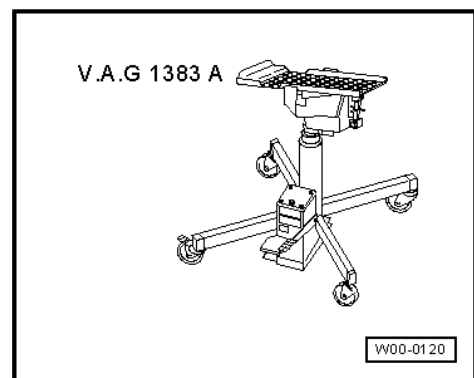
5.1.2 Removing and installing fuel tank

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.
- ◆ 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 136](#) .
- Observe rules for cleanliness ⇒ [page 137](#) .

i Note

- ◆ *Before carrying out further work, disconnect battery earth strap. 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.

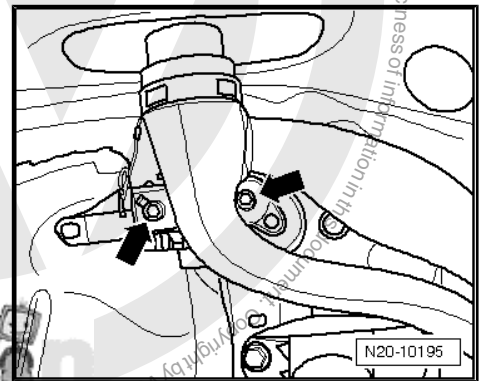
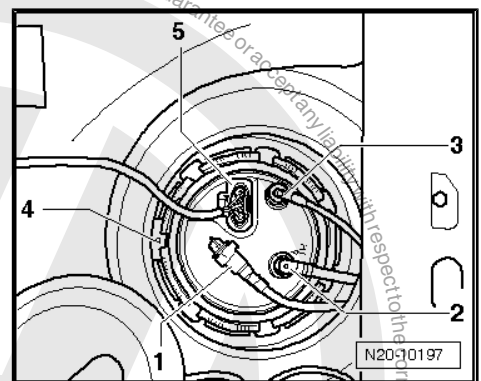
- Unscrew securing bolt and remove tank flap unit with rubber cup ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit .

- Empty fuel tank ⇒ [page 183](#) .

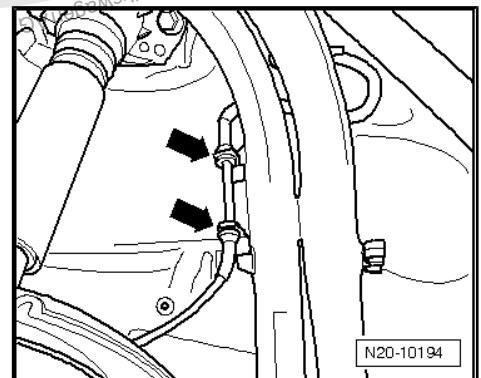
- Remove right rear wheel.

- 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!*



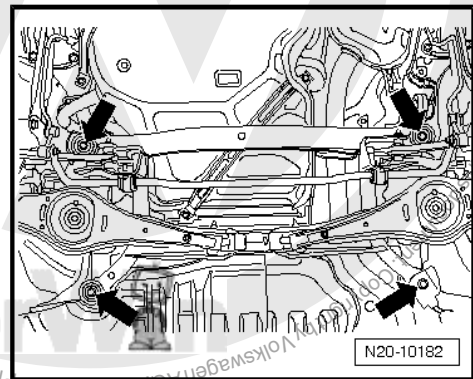
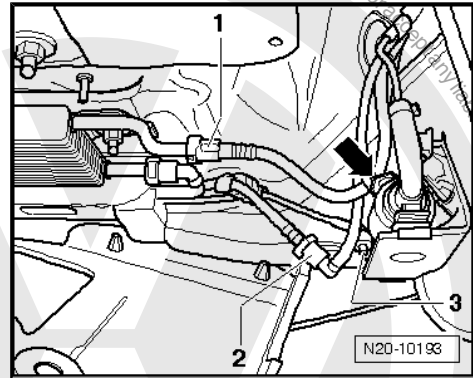
- Separate return line -1- and supply line -2- at connections.
- Separate fuel line -3- for metering pump -V54- at connections.



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- .

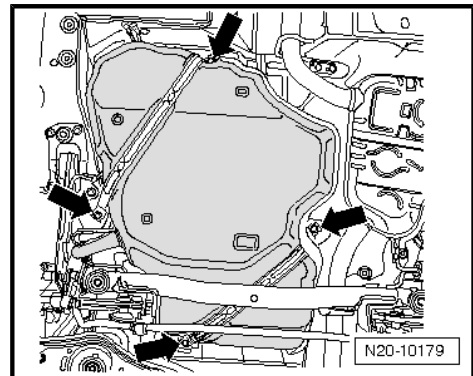


- Remove securing strap bolts.
- Slowly lower fuel tank. When doing this, pull fuel tank forwards, turn and guide filler neck between rear axle and body.

Installing

Install in reverse order. In the process, 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 line and return line (return line blue or with blue marking, 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.

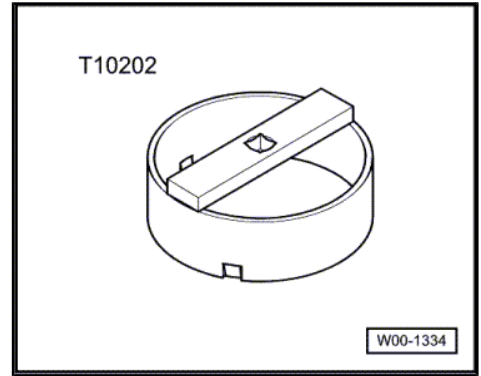


5.1.3 Removing and installing fuel delivery unit

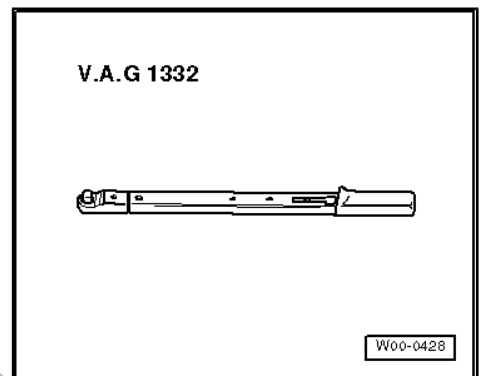
Special tools and workshop equipment required



◆ Fuel tank sender unit tool -T10202-



◆ Torque wrench (40... 200 Nm) -V.A.G 1332-



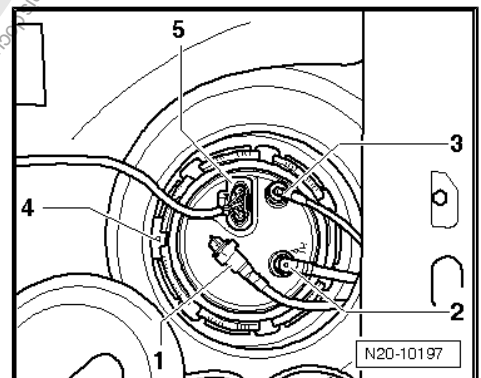
Removing

- Note safety precautions before beginning work ⇒ [page 136](#) .
- Observe rules for cleanliness ⇒ [page 137](#) .
- 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 1/2 full when removing the suction-jet pump. Empty fuel tank if necessary ⇒ [page 183](#) .
- 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 -4- and 5-pin connector -5- off fuel delivery unit flange.



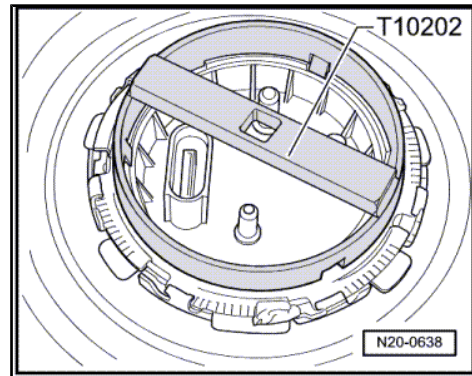
Note

Press in securing ring to release fuel lines.





- Open locking ring using fuel tank sender wrench -T10202- .
- Lift sender flange.



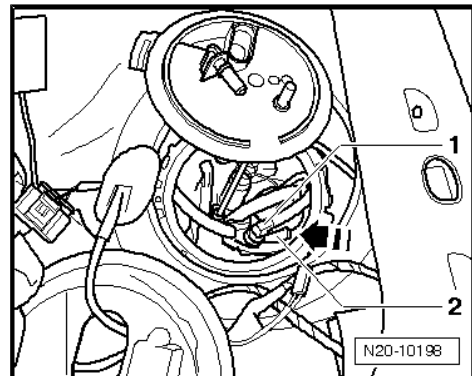
- Pull fuel line -1- off suction-jet pump (if fitted).



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

- Installing the fuel delivery unit is carried out in reverse order of removal.



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 line and return line (return line blue or with blue marking, 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 installation position of fuel delivery unit => [page 178](#) .



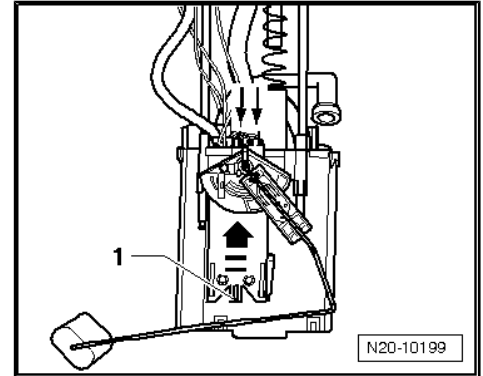
5.1.4 Removing and installing fuel gauge sender

Removing

- Remove fuel delivery unit => [page 180](#) .
- 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

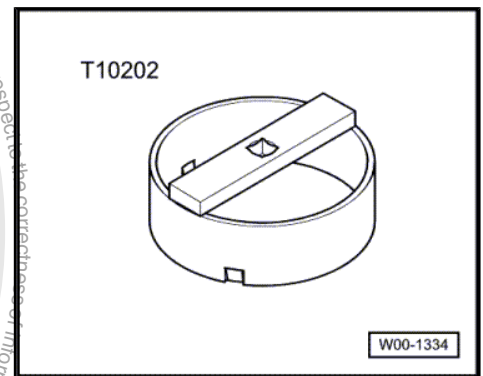
- Insert fuel gauge sender into guides on fuel delivery unit and press downwards until it engages.
- Install fuel delivery unit => [page 180](#) .



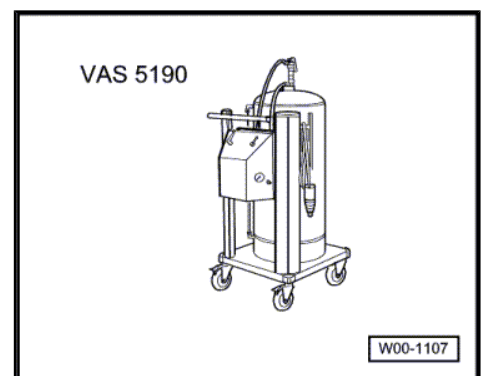
5.2 Emptying fuel tank, vehicles with front-wheel drive

Special tools and workshop equipment required

- ◆ Fuel tank sender unit tool -T10202-



- ◆ Fuel extractor -VAS 5190-



- ◆ Torque wrench (40... 200 Nm) -V.A.G 1332-



Emptying fuel tank if more than $\frac{3}{4}$ full ⇒ [page 184](#)

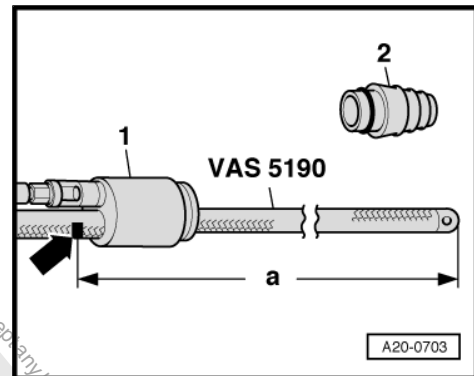
Emptying fuel tank if less than $\frac{3}{4}$ full ⇒ [page 184](#)

5.2.1 Emptying fuel tank if it is more than $\frac{3}{4}$ full

Procedure

Note safety precautions before beginning work ⇒ [page 136](#) .

- At distance -a- = 990 mm from end, mark extraction hose with insulating tape -arrow-.
- Open fuel tank filler flap.
- Push extraction hose of fuel extractor -VAS 5190- into fuel filler neck until the previously made marking aligns with 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.

5.2.2 Emptying fuel tank if it is less than $\frac{3}{4}$ full

Procedure

Note safety precautions before beginning work ⇒ [page 136](#) .

- 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!*

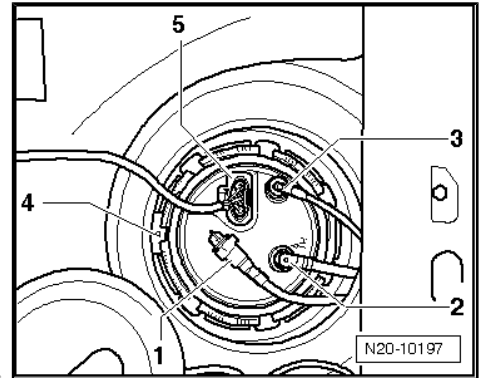


- Pull supply line -1-, return line -2-, supply line -3- to metering pump -V54- and 5-pin connector -5- off fuel delivery unit flange.



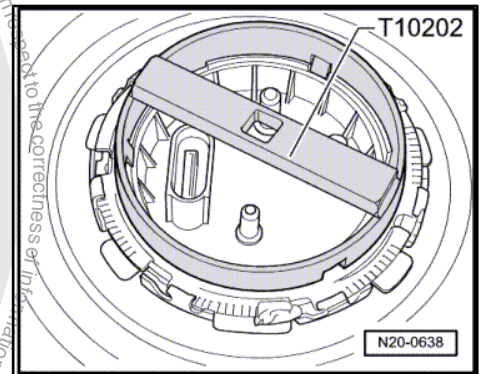
Note

Press in securing ring to release fuel lines.



- Open locking ring using fuel tank sender wrench -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 => [page 180](#) .



5.3 Checking fuel pump



Note

Check fuel filter connections for correct arrangement, before starting to check the fuel pump => [page 158](#)

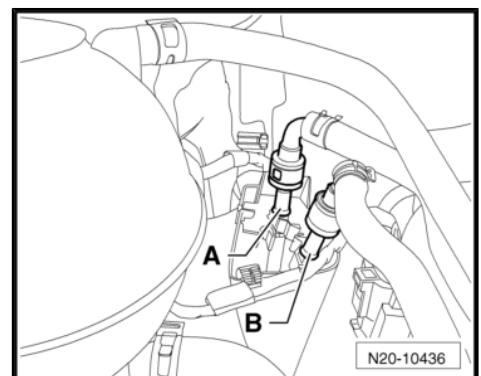
5.3.1 Checking delivery pressure of fuel pump

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- (completely black or with 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 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 180](#) .
- If the specifications are attained, check tandem pump to ensure the fuel filter is not blocked ⇒ [page 195](#) .
- If the tandem pump values are OK, check fuel pump delivery rate ⇒ [page 186](#) .

5.3.2 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- (completely black or with 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 vehicle diagnosis tester and perform guided function „checking electric fuel pump(s)“.



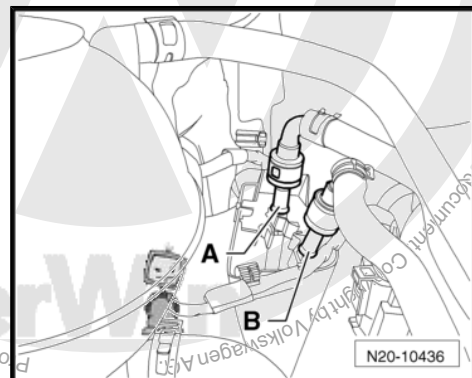
Note

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



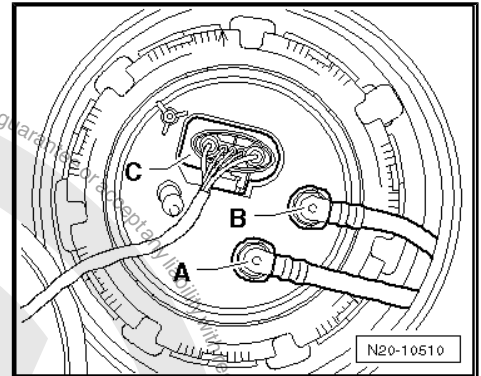


- Remove cover from fuel delivery unit.

i 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 vehicle diagnosis tester and perform guided function „checking electric fuel pump(s)“.



i 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.

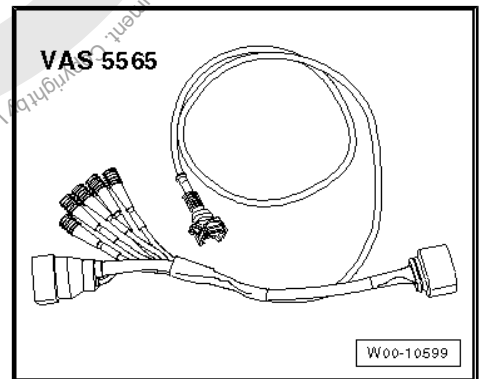
If the specification is not attained:

- Check voltage supply => [page 187](#) . Measure current draw => [page 188](#) of fuel pump.

5.3.3 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 a 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 vehicle diagnosis tester and perform 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, testing and information system VAS 5051.

Voltage supply OK:

- Remove fuel delivery unit ⇒ [page 180](#) .
- 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.

5.3.4 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

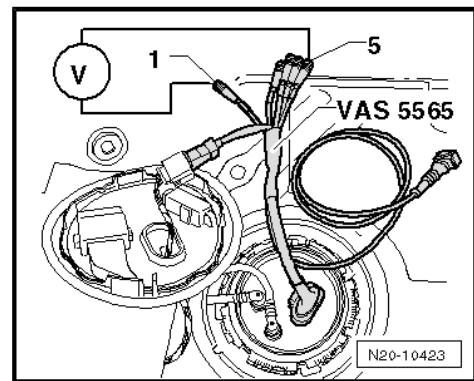


Note

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.

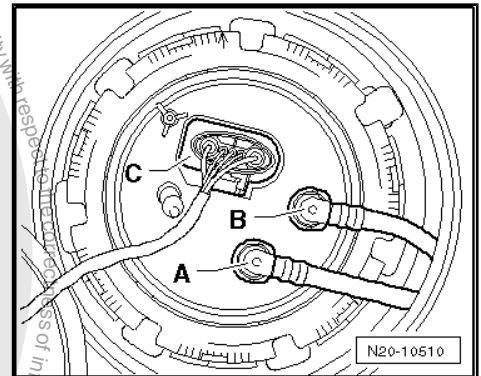
Test prerequisites

- Battery voltage at least 12 V
- Diesel fuel temperature above (10) C
- Remove seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats .



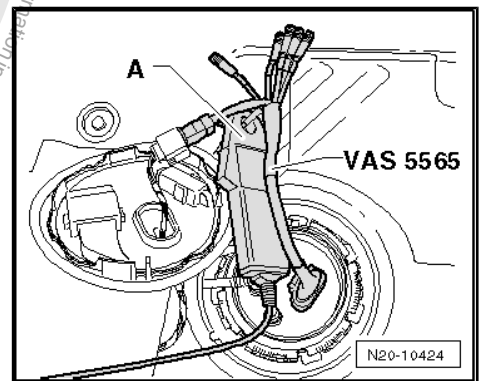


- Detach carpet under seats and fold it back. => General body repairs, interior; Rep. gr. 70 ; Load and luggage compartment trim; Removing and installing luggage compartment floor
- Remove cover from fuel delivery unit.
- Pull connector -C- off flange.



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 „pickup clamp“ of test instrument adapter/DSO (5-pin) -VAS 5565- .

- Switch on ignition.
- Connect vehicle diagnosis tester and perform 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 180](#) .

5.4 Assembly overview - fuel filter



Note

Note that there are different versions of fuel filter upper part => [page 191](#) .



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

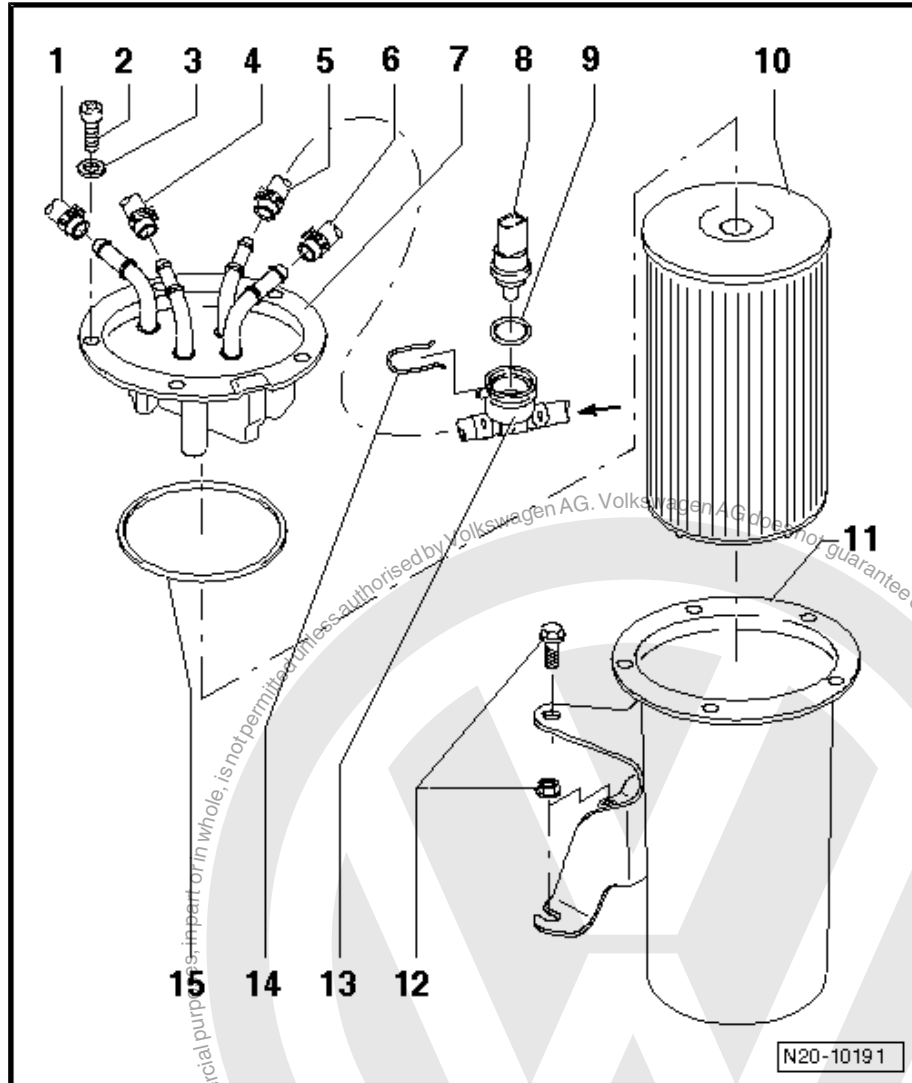
13 - Connection for fuel temperature sender -G81-

14 - Retaining clip

- Check for secure seating.

15 - O-ring

- Renew.



N20-10191



5.4.1 Upper part of fuel filter

Type A ⇒ [page 191](#)

Type B ⇒ [page 191](#)

Upper part of fuel filter, type A

1 - 8 Nm

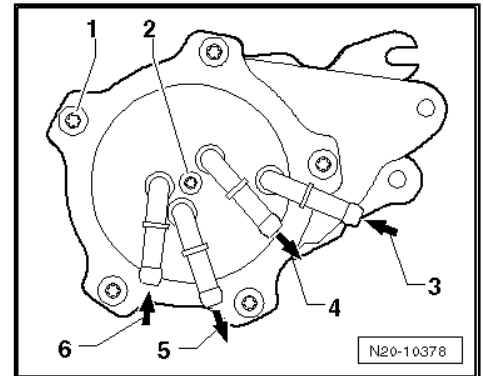
2 - Plug for water extraction (remove and extract about 100 cm³ liquid using hand-operated vacuum pump with accessories - V.A.G 1390- and water drainage container -V.A.G 1390/1- , renew seal)

3 - Fuel supply line from fuel tank, white or white marking. Check for secure seating.

4 - Fuel return line to fuel tank, 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.



Upper part of fuel filter, type B

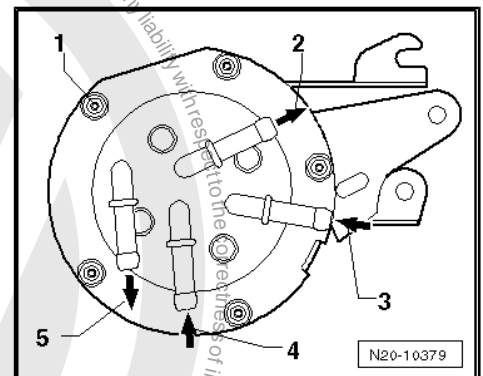
1 - 5 Nm

2 - Fuel return line to fuel tank, blue or blue marking. Check for secure seating.

3 - Fuel supply line from fuel tank, white or white marking. Check for secure seating.

4 - Fuel return line from engine, blue or blue marking. Check for secure seating.

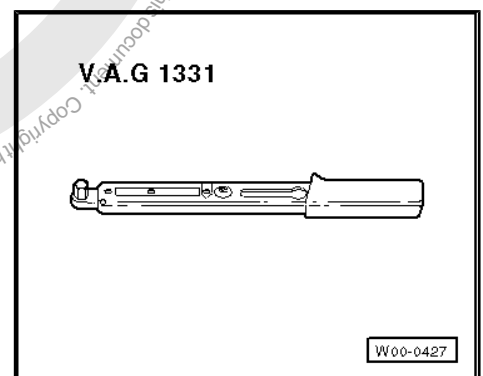
5 - Fuel supply line to engine, white or white marking. Check for secure seating.



5.5 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 136](#) .

Observe rules for cleanliness ⇒ [page 137](#) .



Note

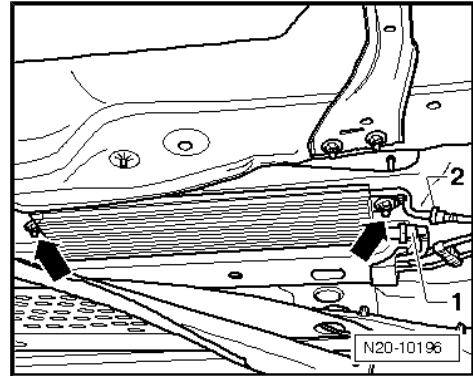
The fuel cooler is located in the return line to fuel tank. It is located on the vehicle underbody.

- Remove underbody panel.
- Pull fuel lines -1- and -2- off fuel cooler.
- Remove securing nuts -arrows-.

Installing

Install in reverse order. In the process, 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 193](#) .

1 - Connector

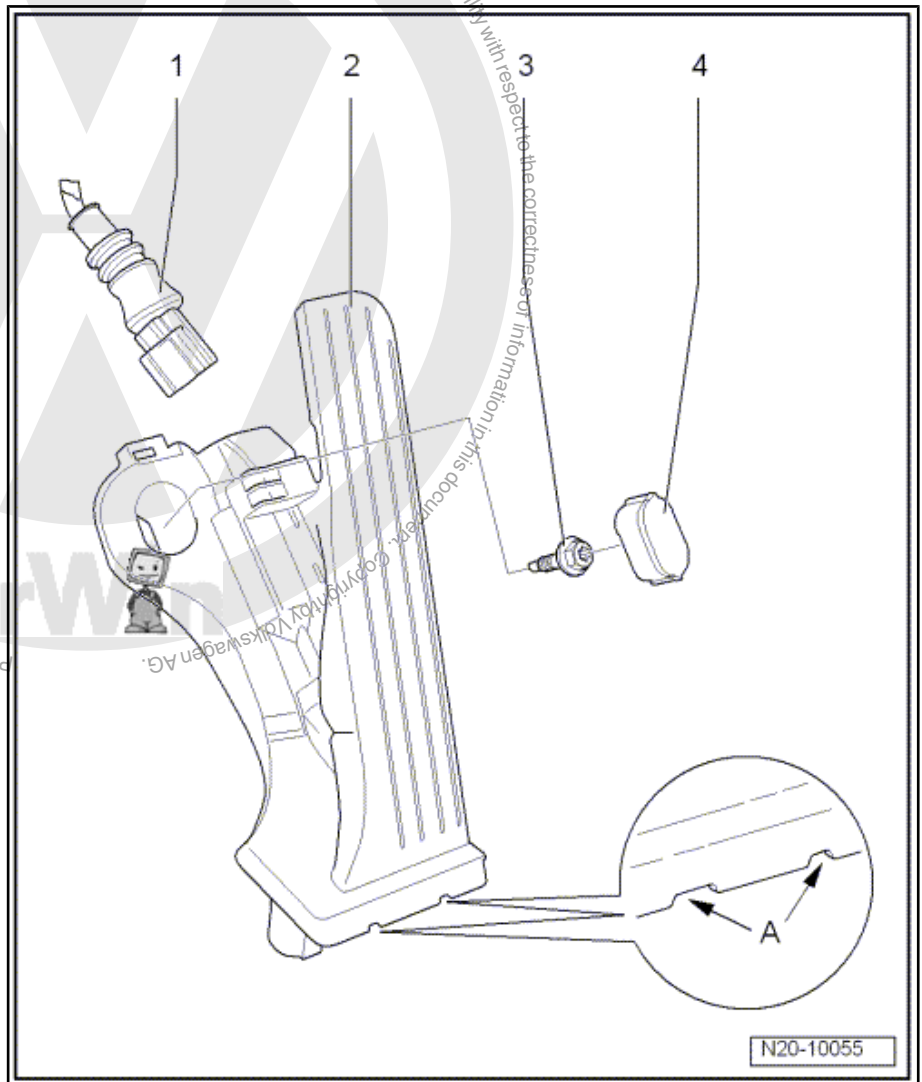
- ❑ Black, 6-pin.

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



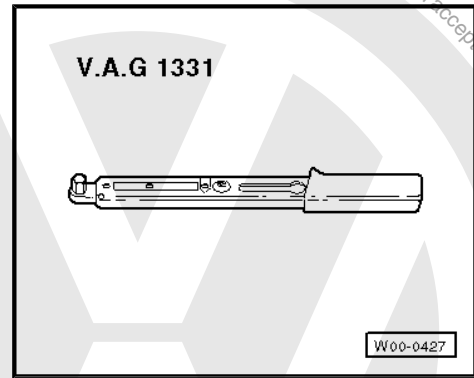
6.1.1 Removing and installing accelerator module

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-



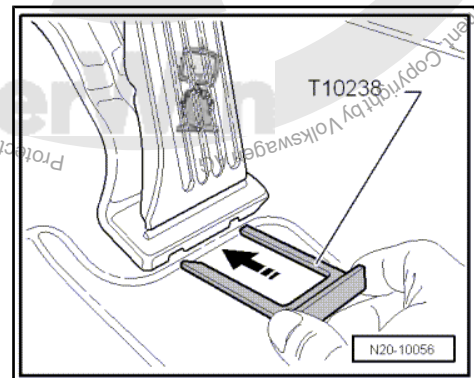
Removing

- Lever off cap ⇒ [Item 4 \(page 193\)](#) 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 models -T10240-) into openings provided to stop.

Touran:



- To remove accelerator module, push release tool -T 10269- (for right-hand drive models -T10297-) into openings provided to stop.

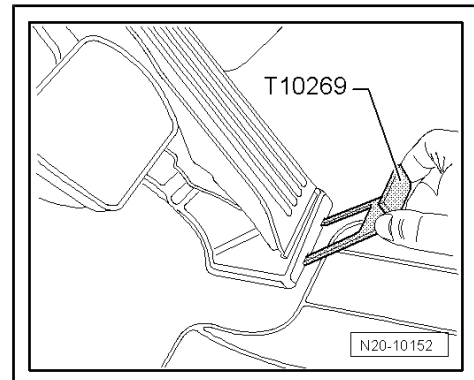
Continuation for all vehicle types:

- Pull connector off accelerator module.
- Pull wiring guide off accelerator pedal module.
- Pull out accelerator pedal module vertically.

Installing

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

- Attach connector and wiring guide to accelerator pedal module.
- Press accelerator pedal module onto securing pins.
- Insert centring pin into hole in vehicle underbody.
- Secure accelerator module with securing bolt -3-. Specified torque: 9 Nm.
- Attach cap.
- Install steering column cover.





7 Tandem pump

Checking tandem pump ⇒ [page 195](#) .

Removing and installing tandem pump ⇒ [page 198](#) .

7.1 Checking tandem pump

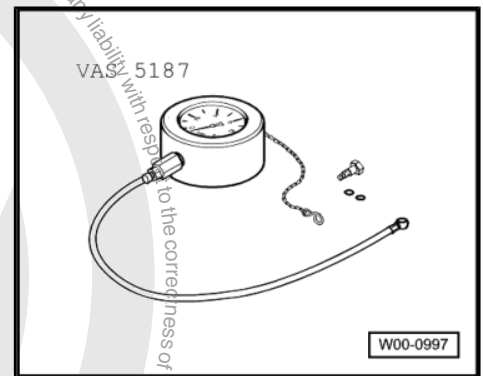
Checking delivery pressure ⇒ [page 195](#)

Checking for internal leaks ⇒ [page 196](#)

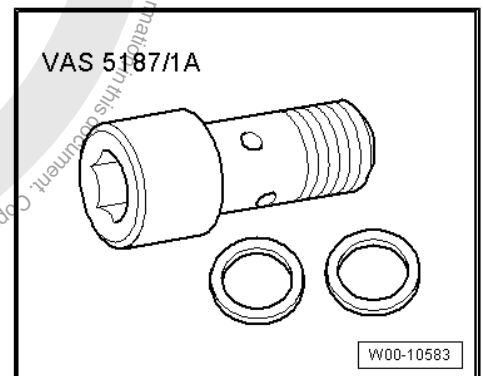
7.1.1 Checking delivery pressure

Special tools and workshop equipment required

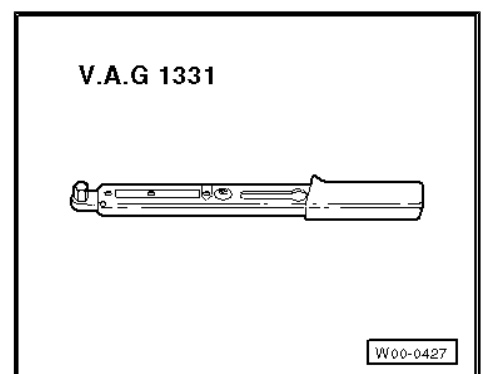
◆ Tandem pump tester -VAS 5187-



◆ Banjo bolt with seals -VAS 5187/1A-



◆ Torque wrench -V.A.G 1331-



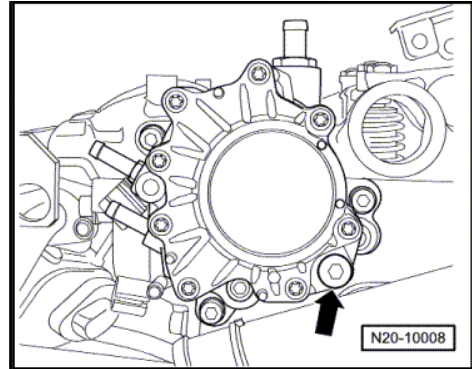
Test prerequisites

- 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 screw 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.

Install air filter housing again.

Start engine and raise engine speed to 4000 rpm.

- Observe pressure indicated on pressure gauge.

Specification: at least 7.5 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.

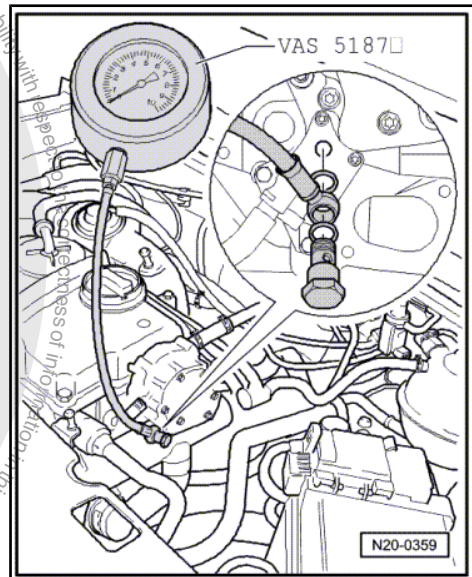
- Repeat check.

If specification is now obtained:

- Tandem pump is OK. Renew unit injector O-rings.

If the specification is not attained:

- Renew tandem pump ⇒ [page 198](#) .



Note

After removing pressure gauge, tighten plug to 25 Nm. Always renew seal.

7.1.2 Checking for internal leaks



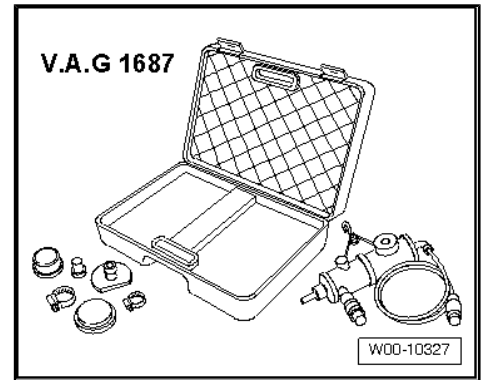
Note

The tandem pump must be checked for internal leaks between fuel side and oil side after reinstalling a used tandem pump, e.g. 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.

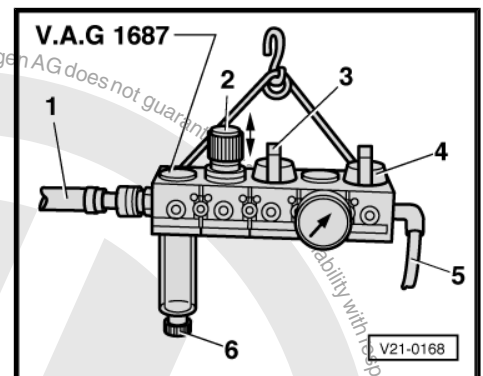
Prepare test unit -V.A.G 1687- as follows:

- 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.

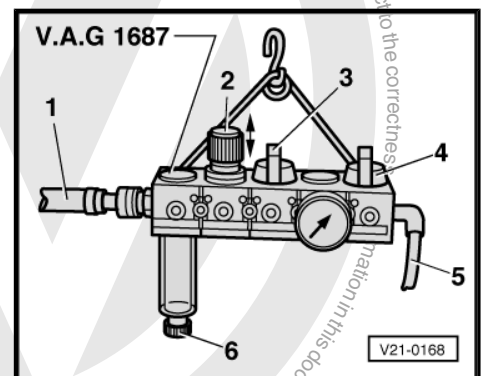


- Connect compressed air hose -1- (compressed air source) to charge air system tester -V.A.G 1687-.



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


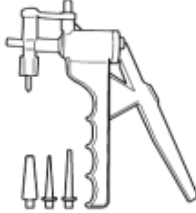

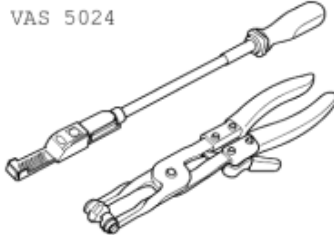


DANGER!

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-

<p>V.A.G 1331</p> 	<p>V.A.G 1390</p> 
<p>V.A.G 1390/1</p> 	<p>VAS 5024</p> 
<p>W20-0054</p>	

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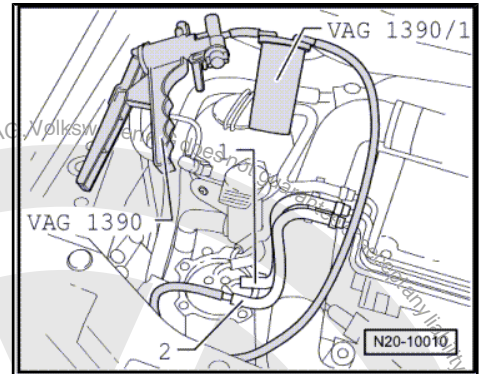


7.2.1 Removing

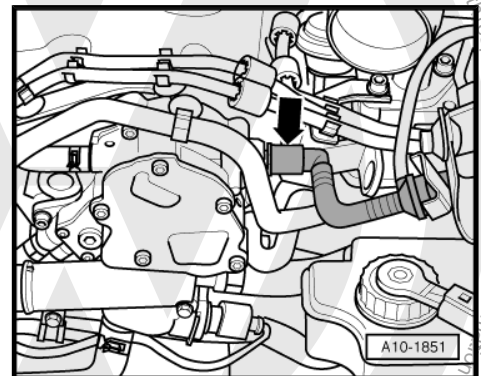
- Pull supply hose -1- (white marking) and return hose -2- (blue marking) off fuel filter.
- Connect hand vacuum pump with accessories -V.A.G 1390- and water drainage container -V.A.G 1390/1- to return hose -2-.

Be careful that no fuel is sucked into hand vacuum pump.

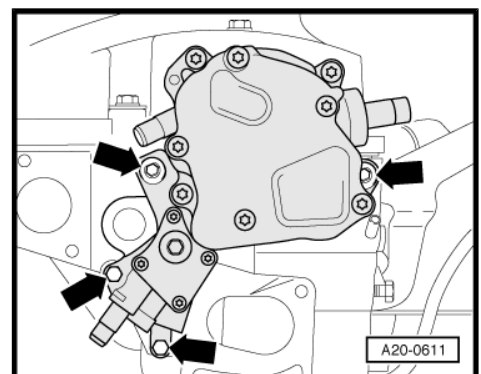
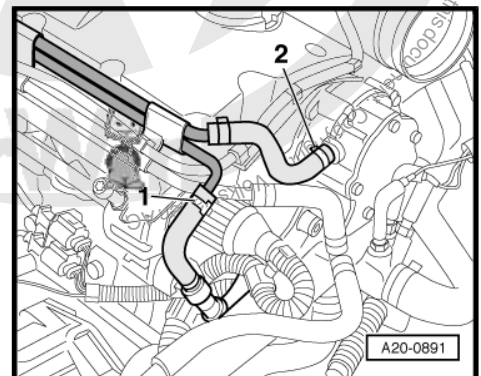
- Operate lever of hand vacuum pump until no more fuel comes out of return hose.
- Remove air filter housing ⇒ [page 238](#) .
- Pull vacuum hose -arrow- off tandem leading to brake servo.



- Disconnect fuel supply hose -2- from tandem pump.
- Disconnect fuel return hose -1- (blue marking) from fuel pipe.



- Unscrew bolts -arrows-.
- Remove tandem pump from cylinder head.



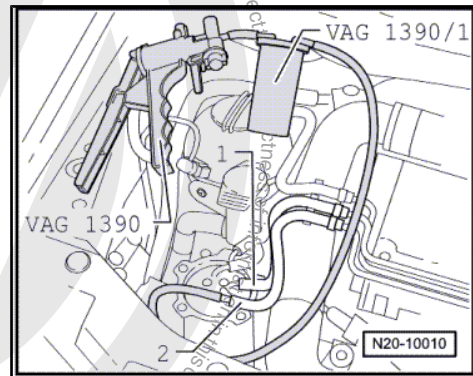
7.2.2 Installing

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



Note

- ◆ *Renew tandem pump gaskets.*
- ◆ *Ensure proper seating of tandem pump actuator in camshaft.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- Install tandem pump and tighten upper securing bolts to 20 Nm.
- Tighten lower securing bolts to 10 Nm.
- Attach return hose (blue marking) to return connection of tandem pump.
- Attach supply hose (white marking) to supply connection of tandem pump.
- Reconnect vacuum line to tandem pump leading from brake servo.
- 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.
- Carry out a leakage test ⇒ [page 196](#) .





21 – Turbocharging/supercharging

1 Charge air system with turbocharger

Safety precautions ⇒ [page 201](#) .

Rules for cleanliness ⇒ [page 201](#) .

Installing hose connections with connector couplings ⇒ [page 202](#)


Assembly overview - turbocharger ⇒ [page 203](#) .

Removing and installing turbocharger ⇒ [page 216](#) .

Assembly overview - parts of charge air cooling ⇒ [page 218](#) .

Checking charge air system for leaks ⇒ [page 221](#)

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 and 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 the following if testers and measuring instruments have to be used 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 adjacent 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

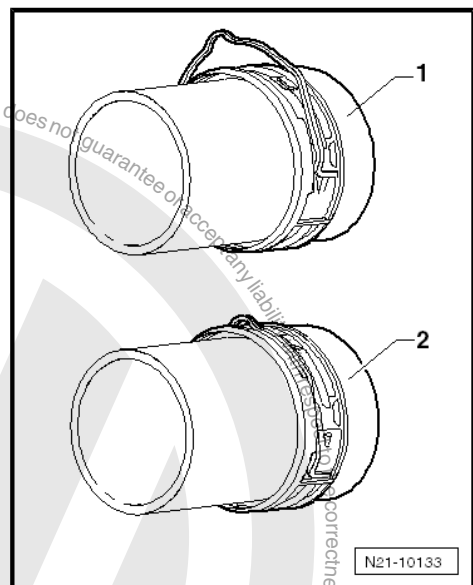
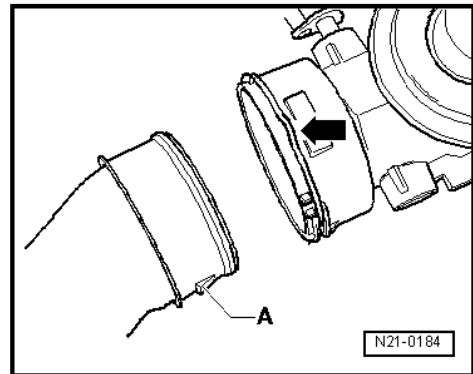
The seal in the plug-in connector can be damaged if the securing clip is in the locked position when fitting the connector. This can cause leakage. Observe installation instructions.

Removing

- Release plug-in connector by pulling out retaining clip -arrow-. Separate hose/pipe without tools.

Installing

- If renewed, place oil 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.

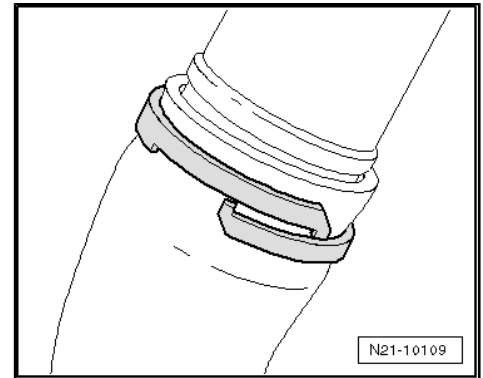




1.3.2 Hose connections with spring band ring

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. angle grinder) and must be renewed by a replacement part according to ⇒ ETKA (electronic parts catalogue) .



1.4 Assembly overview - turbocharger

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 201](#) .

Observe safety precautions ⇒ [page 201](#) .





Engine codes AVQ, BJB, BKC, BRU, BXE and BXF ⇒ [page 204](#)

Engine codes BLS and BXJ ⇒ [page 206](#)

Changing and adjusting vacuum unit on turbocharger - only vehicles with engine code: BLS from model year 2008 ⇒ [page 208](#)

1.4.1 Engine codes AVQ BJB, BKC, BRU, BXE and BXF

1 - 10 Nm

2 - Union nut, 22 Nm

3 - Oil supply line

- Before installing oil supply line, ensure that it is not blocked.
- Before installing, fill turbocharger with engine oil through oil supply line connection.
- Removing and installing ⇒ [page 112](#)

4 - Union nut, 22 Nm

5 - Seal

- Renew.
- Note installation position.

6 - Washer

7 - 25 Nm

- Renew.

8 - Support

- Between turbocharger and cylinder block.

9 - 40 Nm

- First hand tighten all bolts

10 - Connecting pipe

- Air filter/turbocharger

11 - Connecting piece

12 - Seal

- Renew.

13 - Seal

- Renew.

14 - Union, 40 Nm

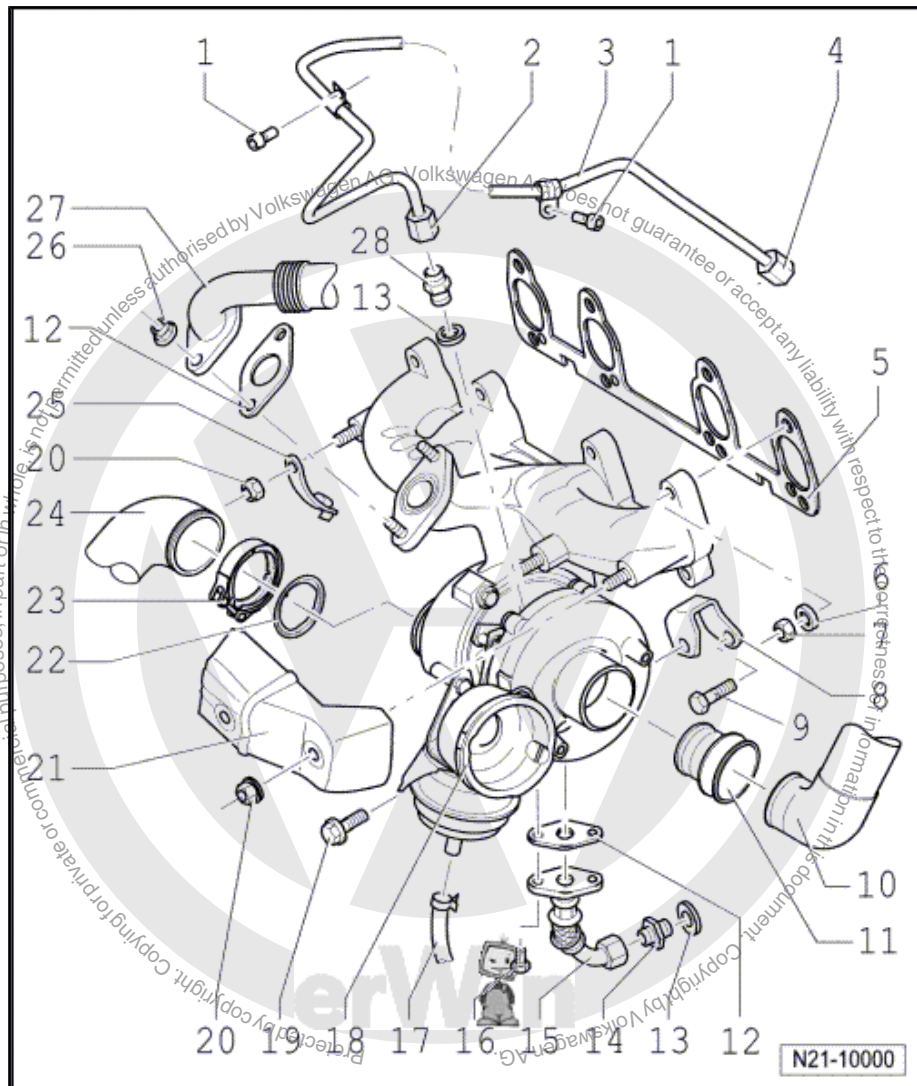
15 - Oil return line

- To cylinder block.
- Tighten union nut to 30 Nm.

16 - 17 Nm

17 - Vacuum hose

- To solenoid valve block





18 - Turbocharger

- Can only be renewed with exhaust manifold.
- To remove turbocharger, remove right drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shafts .

19 - 20 Nm

- First hand tighten all bolts

20 - 20 Nm

- Renew.

21 - Heat shield

22 - Seal

- Renew.
- Note installation position.

23 - Clamp, 7 Nm

24 - Front exhaust pipe

25 - Bracket

- For oil supply line ⇒ [Item 3 \(page 204\)](#) .
- Before installing, secure oil supply line.

26 - 22 Nm

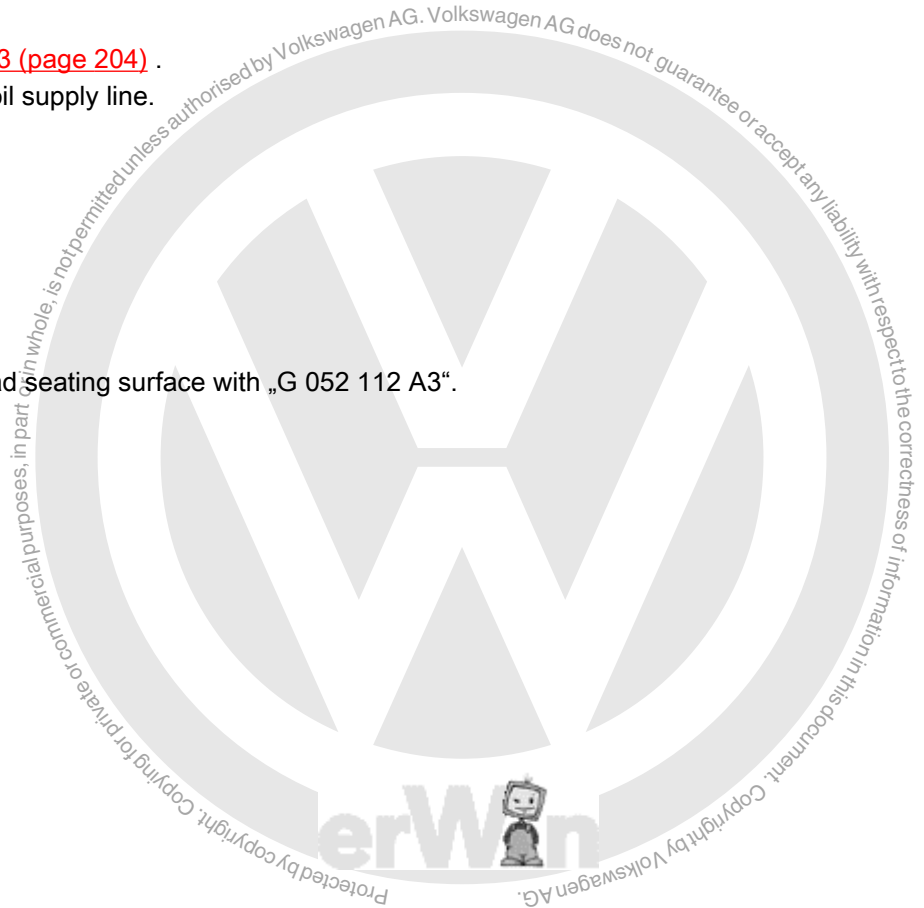
- Renew.

27 - Connecting pipe

- To bypass flap

28 - Union, 30 Nm

- Renew.
- Coat threads and bolt head seating surface with „G 052 112 A3“.





1.4.2 Engine codes BLS and BXJ

1 - 10 Nm

2 - Bracket

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

- Can only be renewed with exhaust manifold.
- Removing and installing ⇒ [page 216](#)

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 - 25 Nm

13 - Seal

- Renew.

14 - Connecting pipe

- For exhaust gas recirculation.
- Assembly overview - parts of exhaust gas recirculation ⇒ [page 267](#) .

15 - 25 Nm

- Renew.

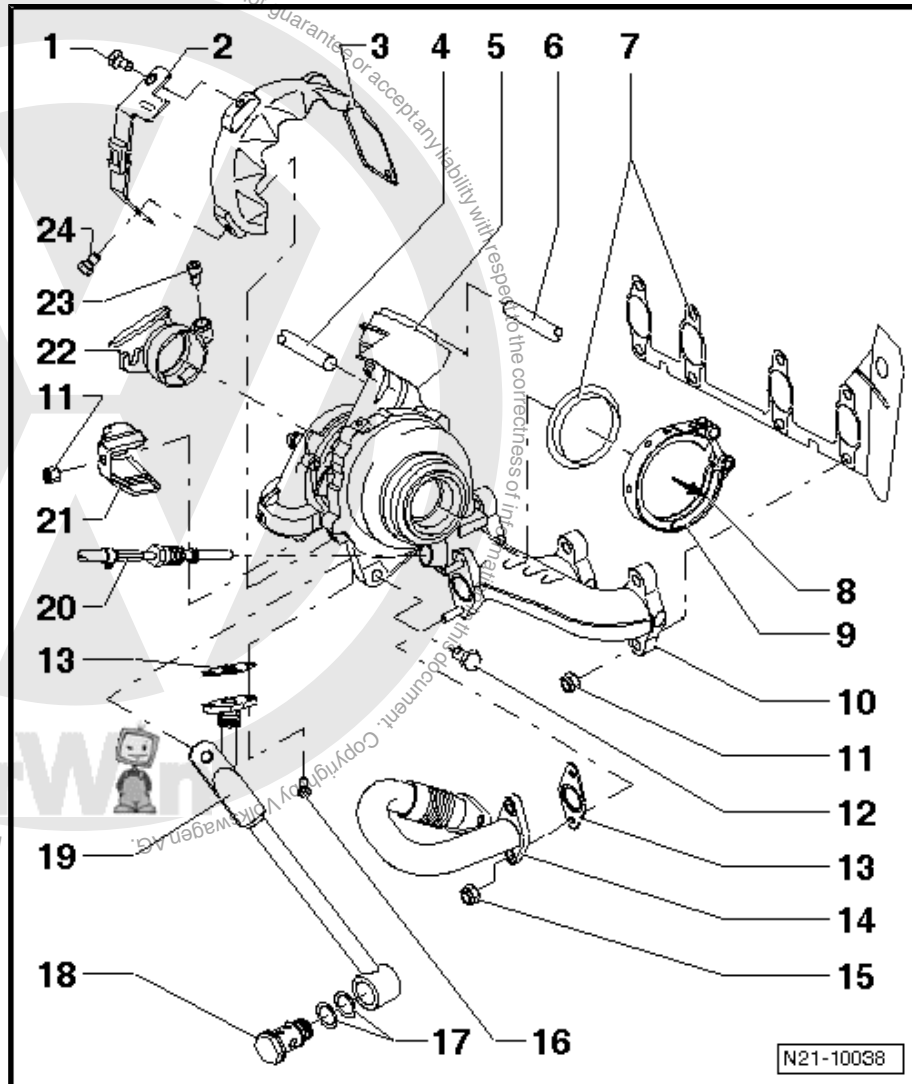
16 - 15 Nm

17 - O-ring

- Renew.

18 - Banjo bolt, 60 Nm

- Renew.





19 - Support

- For turbocharger
- With oil return line

20 - Exhaust gas temperature sender bank 1 -G235- , 45 Nm

- Lubricate thread of sender using high-temperature paste -G 052 112 A3-
- To remove and install, use wrench -T10395-

21 - Heat shield

22 - Connection

- For intake hose for air filter/turbocharger
- Assembly overview - air filter => [page 238](#) .

23 - 9 Nm

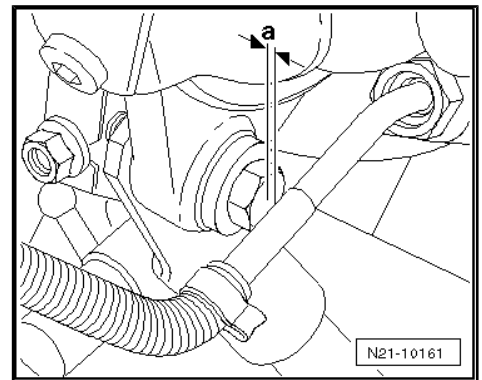
24 - 10 Nm

Installation position of exhaust gas temperature sender with angled cable guide



Note

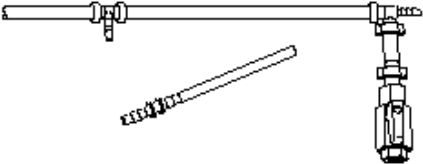
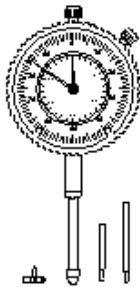
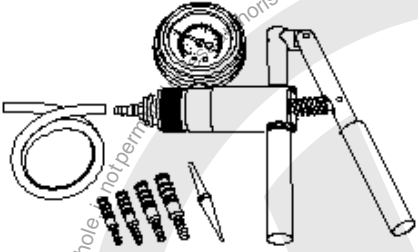
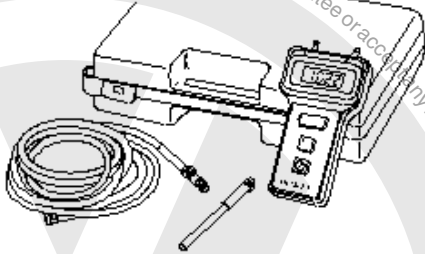
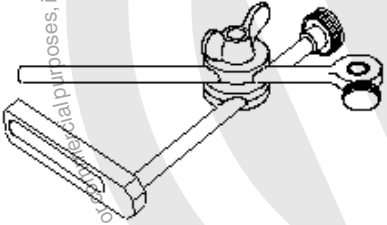
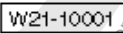

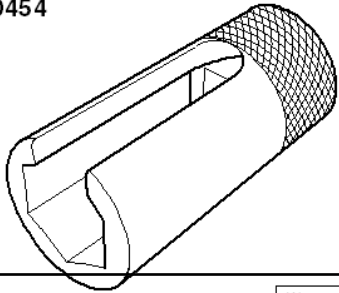
When the exhaust gas temperature sender with angled cable guide is being removed, the distance -a- of 3 ... 5 mm to screw support against turbocharger.





1.4.3 Changing and adjusting vacuum unit on turbocharger - only vehicles with engine code: BLS from model year 2008

Special tools and workshop

<p>VAS 6342</p> 	<p>VAS 6341</p> 
<p>VAS 6213</p> 	<p>V.A.G 1397 A</p> 
<p>VW 387</p> 	<p>W21-10001</p> 
<p>T10423</p> 	
<p>T10454</p> 	



equipment required

- ◆ Hand vacuum pump -VAS 6213-
- ◆ Turbocharger tester -V.A.G 1397A-
- ◆ Pressure regulating valve -VAS 6342-
- ◆ Ring spanner -T10423-
- ◆ Allen key, long reach -T10454-



Caution

The special tools indicated, in particular the socket inset, - T10454- is designed solely for use according to the following work instructions and must not be used for other threaded connections. There is a danger of deformation if high torques are applied.

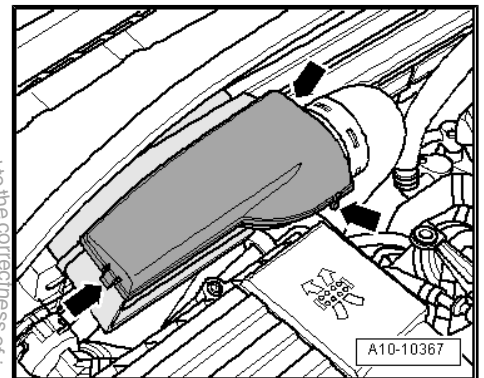


Note

A replacement parts kit is available when changing the vacuum unit => Electronic parts catalogue .

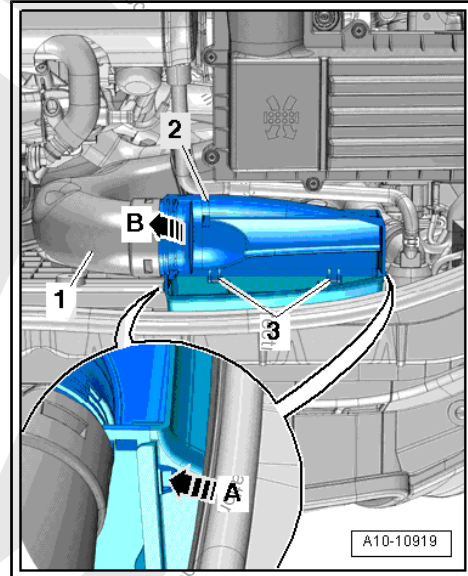
Removing

- Remove engine cover.
- Pull cover off air duct (release clips on sides) -arrows-.

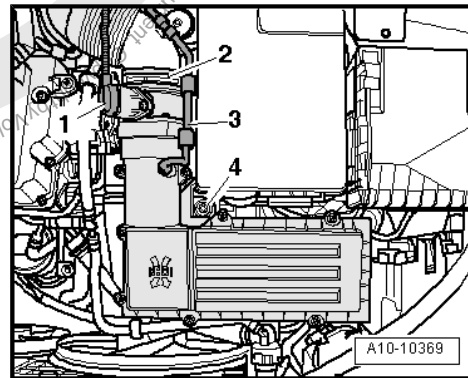




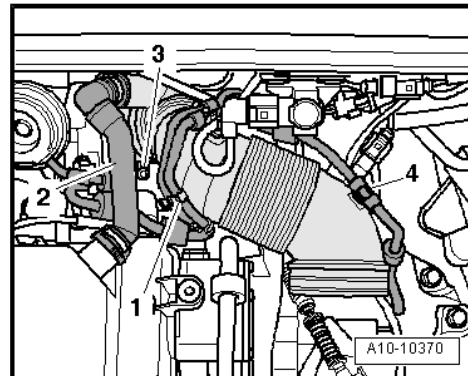
- Unclip lower air duct -2- by releasing retaining clips on left and right -arrow A-.
- Unclip air duct at mountings -3-.
- Swing air duct downwards and slightly to rear for this.
- Detach air pipe -1- from lower air duct -arrow B-.



- Disconnect electrical connector -1- from air mass meter -G70- .
- Pull off vent hose -3- and also air duct hose -2-.
- Remove bolt -4- and remove air filter housing.



- Detach hose -2- from crankcase breather.
- Lay aside ventilation hose -4- and vacuum hoses -1- at air hose.
- Unscrew bolt -3-.
- Swing air duct hose to rear and pull off of turbocharger.
- Seal opening in turbocharger with the plug from the spare-parts kit.
- Pull off vacuum hose on turbocharger.



Golf Plus, Touran

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

All other vehicles continued



- Depending on version, unscrew nut -arrow- where the oil supply line/vacuum line is connected to the cylinder head.



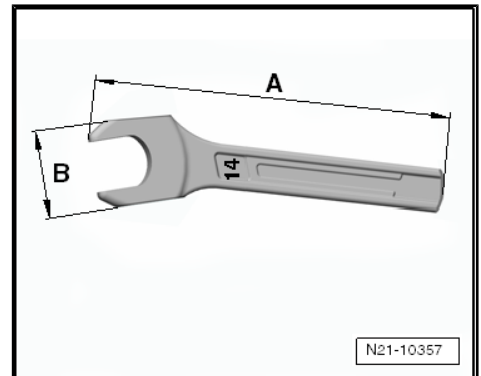
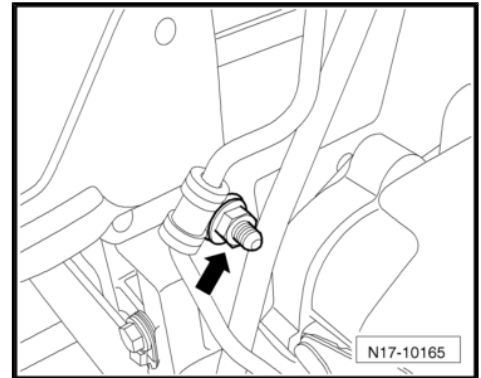
Caution

When detaching the oil supply line, counterhold the connection. Risk of damage as a consequence!

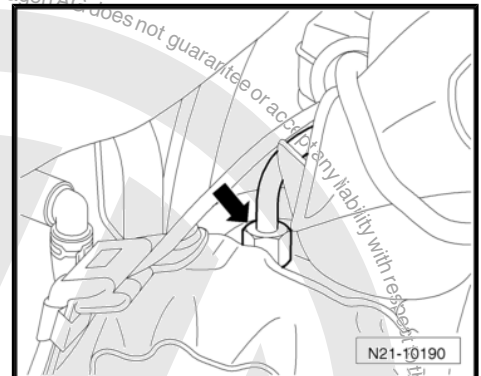
- Prepare a 14 mm open-ended wrench for counterholding.

14 mm tool for counterholding connection piece of oil supply line

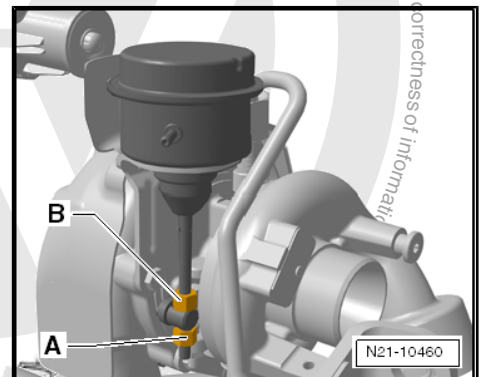
- ◆ A = 110 mm
- ◆ B = 25 mm



- Counterhold connection piece and unscrew oil supply line -arrow- from turbocharger.
- Seal oil supply opening in turbocharger with the plug from the spare-parts kit.



- Counterhold lock nut -B- with ring spanner -T10423- and unscrew securing nut -A- from the control rod using socket inset -T10454- .





- Remove bolt -1-, then bolt -2- and remove vacuum unit -A-.

Installing

- Colour mark vacuum unit and control rods -as shown-.



Note

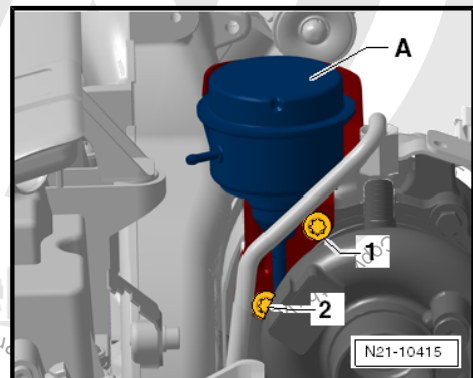
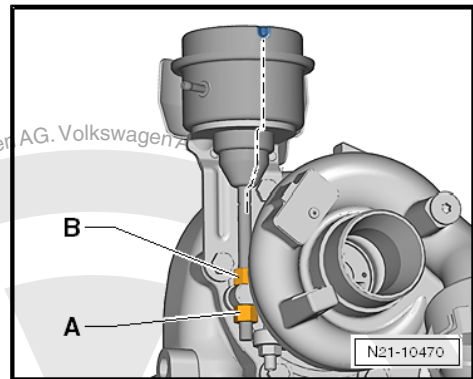
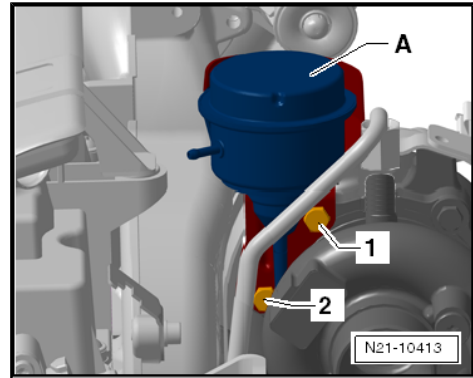
The colour marks show that the control rods are adjusted correctly, after tightening. Adjustments should then be made as necessary.



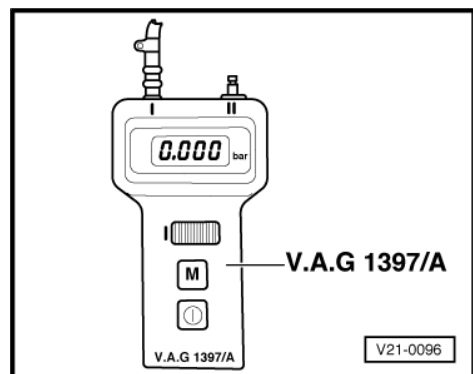
Caution

Only use new bolts and nuts from the spare-parts kit!

- If necessary, remove lower securing nut of the control rod from the new vacuum unit.
- Screw locknut by hand onto the control rod as far as possible in the direction of the vacuum unit.
- Push control rod through the adjusting lever on turbocharger, fit vacuum unit -A- and lock.
- Fit bolts -1- and -2- from repair kit.
- Tighten bolts -1- and -2- to 8 Nm.

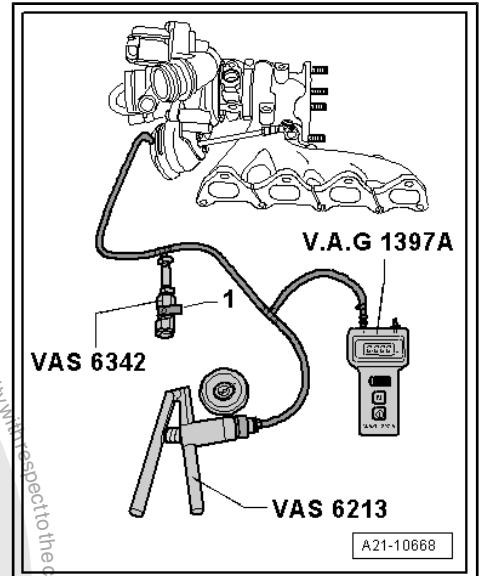


- Switch on turbocharger tester -V.A.G 1397A- and set sliding switch to position „I“.
- Subtract 600 mbar from atmospheric pressure displayed and note value. (Value 1)
- Subtract 650 mbar from atmospheric pressure displayed and note value. (Value 2)





- Connect test and measuring instruments together as illustrated and connect to connection „I“ -arrow- of turbocharger tester -V.A.G 1397A- and to turbocharger vacuum unit.
- Close lever -1- on pressure regulating valve -VAS 6342- .

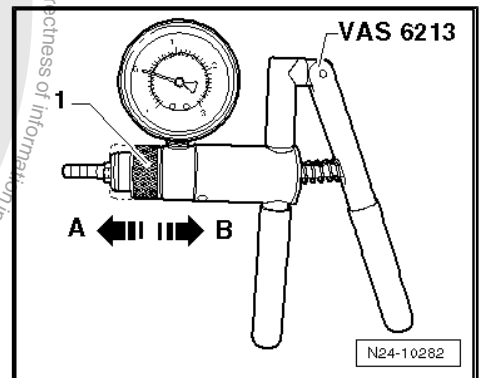


- Move slide ring -1- on hand vacuum pump -VAS 6213- to position -A- for „vacuum“.

⚠ Caution

Excessive pressure may damage the vacuum unit.

The pressure must not fall below the read atmospheric pressure minus 800 mbar.

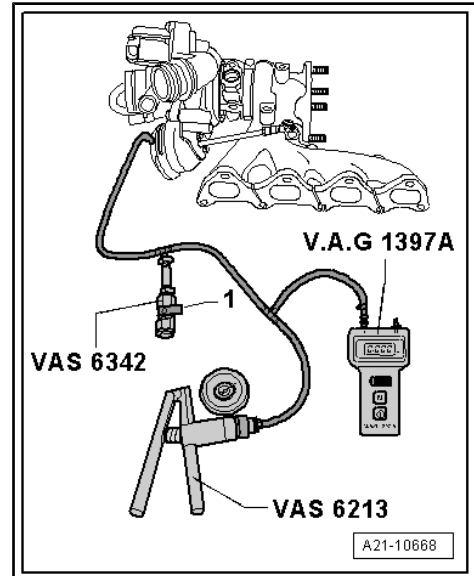


i Note

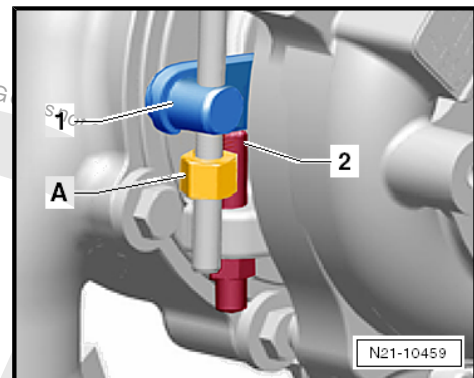
- ◆ An accuracy of ± 20 mbar is acceptable when setting value 2.
 - ◆ Make sure that the turbocharger adjusting lever moves easily on the control rod.
- Operate hand vacuum pump -VAS 6213- several times until noted value 2 is attained on turbocharger tester -V.A.G 1397A- .



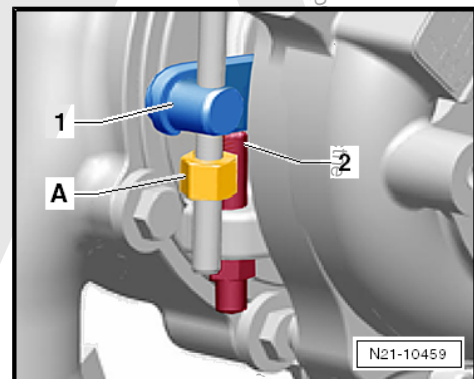
- Open pressure regulating valve -1- until value 1 is set exactly.



- Screw nut -A- up a couple of threads on control rod.

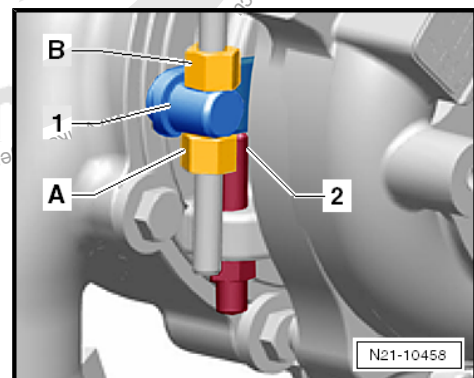


- Hold adjusting lever -1- on »stop« of adjustment screw -2- by hand.



i Note

- ◆ During next procedure, ensure adjusting lever -1- remains against stop screw -2- and is not already contacting the securing nut -A-.
- ◆ Screw securing nut -A- back if this occurs.



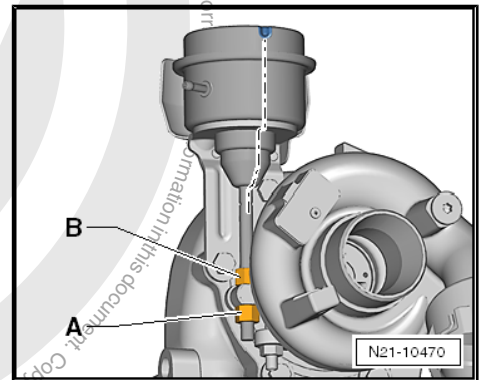
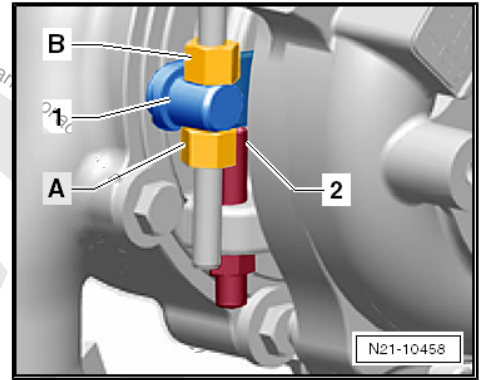


- Screw control rod lock nut -B- down slowly, by hand, until it contacts the adjusting lever -1-, do not turn further.
- Screw securing nut -A- up on control rod until it lies against adjusting lever.

i Note

Ensure control rod does not move while tightening securing nut -A-.

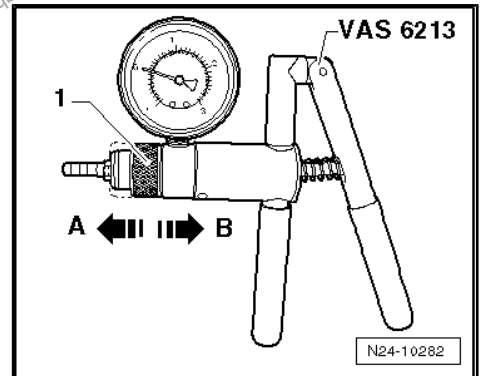
- Counterhold lock nut -B- with ring spanner -T10423- and tighten securing nut -A- using socket inset -T10454- .
- Check colour marks on control rod, the must align -as shown-.



- Release vacuum, move slide ring -1- on hand vacuum pump to position -B- for this, then move slide ring back to position -A- again.

i Note

There very little space between cylinder head and turbocharger. Ensure you are aware of where the feeler gauge (0.05 mm) is positioned.



- The feeler gauge (0.05 mm) must be positioned between adjusting lever and adjustment screw, as shown

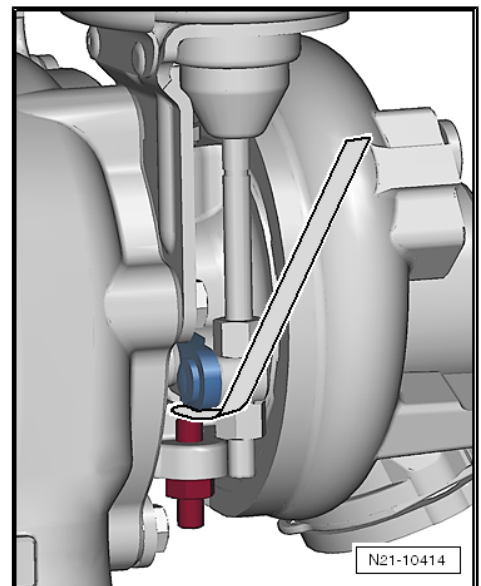
i Note

The feeler gauge (0.05 mm) has a part number and must be ordered from the => Electronic parts catalogue .

- Operate the hand vacuum pump -VAS 6213- until the feeler gauge (0.05 mm) is pinched between adjusting lever and adjustment screw.

Now the »noted value 1« +/- 20 mbar should appear on the turbocharger tester -V.A.G 1397A- .

Value OK.



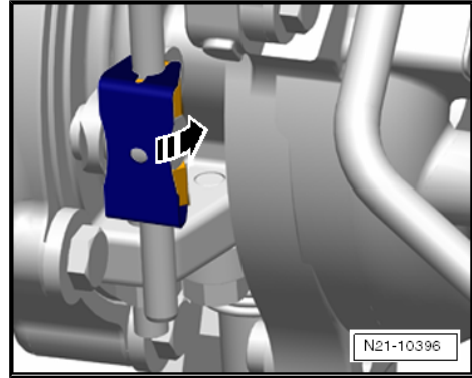


- Seal connection between control rod and securing nut with sealing paint from the spare-parts kit.
- Press locking plate by hand onto the control rod and turn 90° in the -direction of the arrow-

Value not OK.

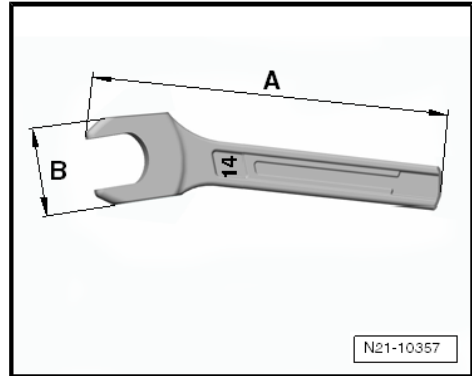
Repeat adjustment procedure again.

Continuation

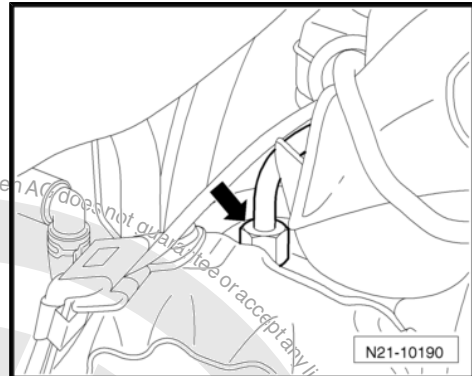


14 mm tool for counterholding connection piece of oil supply line

- ◆ A = 110 mm
- ◆ B = 25 mm



- Counterhold connection piece and tighten oil supply line -arrow- on turbocharger.



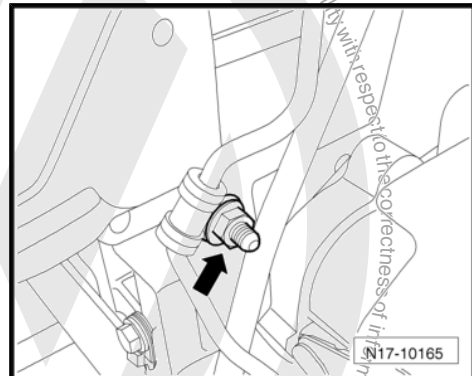
- Depending on version, reconnect oil supply line/vacuum line to the cylinder head and tighten nut -arrow-.

Golf Plus, Touran

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

All other vehicles continued

- Complete the engine.
- Start motor and delete event memory ⇒ Vehicle diagnostic, testing and information system VAS 5051.



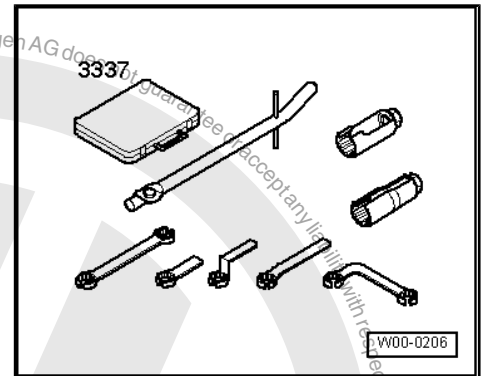
1.5 Removing and installing turbocharger

Special tools and workshop equipment required

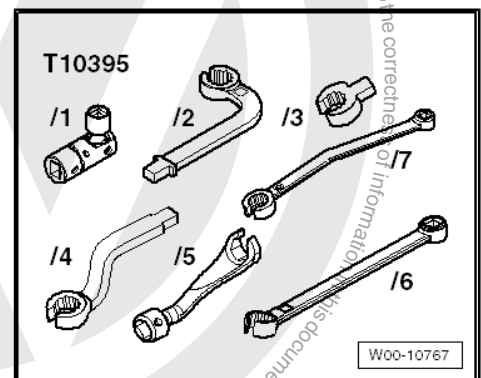
- ◆ Torque wrench -V.A.G 1331-



◆ Lambda probe open ring spanner set -3337-



◆ Tool set -T10395-



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 charge air routing and charge air cooler for foreign objects.**

If foreign objects are found in the charge air system, the charge air routing must be cleaned and the charge air cooler must be renewed, if necessary.

Removing

- Remove noise insulation ⇒ 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 .
- Remove right drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 .

Vehicles with particulate filter

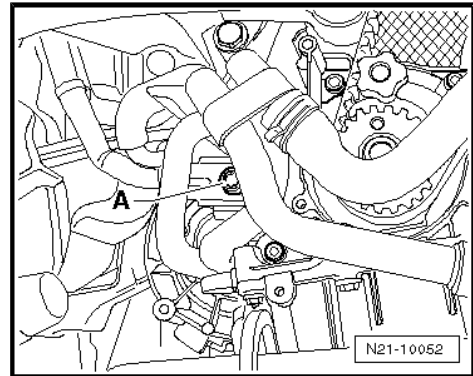
- Pull electrical connector off exhaust gas pressure sensor 1 - G450- in engine compartment and unscrew securing bolts.
- Separate electrical connectors to particulate filter.
- Remove subframe including steering and right drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 .



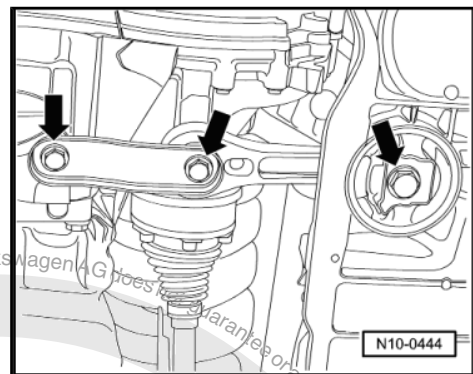
- Remove particulate filter.
- On vehicles with four-wheel drive remove the bevel box to reach the threaded connection for turbocharger support => 6-speed manual gearbox; Rep. gr. 34 ; Removing and installing bevel box .

Continuation for all vehicles:

- Disconnect fasteners -arrows- of coolant pipes for auxiliary heater, if part of original equipment.



- Unbolt pendulum support -arrows-.
- Remove support and oil return line or combi support => [Item 19 \(page 206\)](#) 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.



Note

Torque setting of pendulum support => [page 22](#) .

1.6 Assembly overview - parts of charge air cooling



Note

- ◆ Charge air system must be free of leaks.
- ◆ 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.
- ◆ Checking charge air system for leaks => [page 221](#)



Engine codes AVQ BJB, BKC, BRU, BXE and BXF ⇒ [page 219](#)

Engine codes BLS and BXJ ⇒ [page 220](#)

Installing hose connections with connector couplings ⇒ [page 202](#)

1.6.1 Engine codes AVQ BJB, BKC, BRU, BXE and BXF

1 - 8 Nm

- Fitting location ⇒ [page 220](#)

2 - Bracket

- Note installation position.

3 - Charge air cooler

4 - Connecting hose

5 - 8 Nm

6 - To turbocharger.

7 - Connecting pipe

8 - To intake connecting pipe.

9 - Vacuum reservoir

10 - 15 Nm

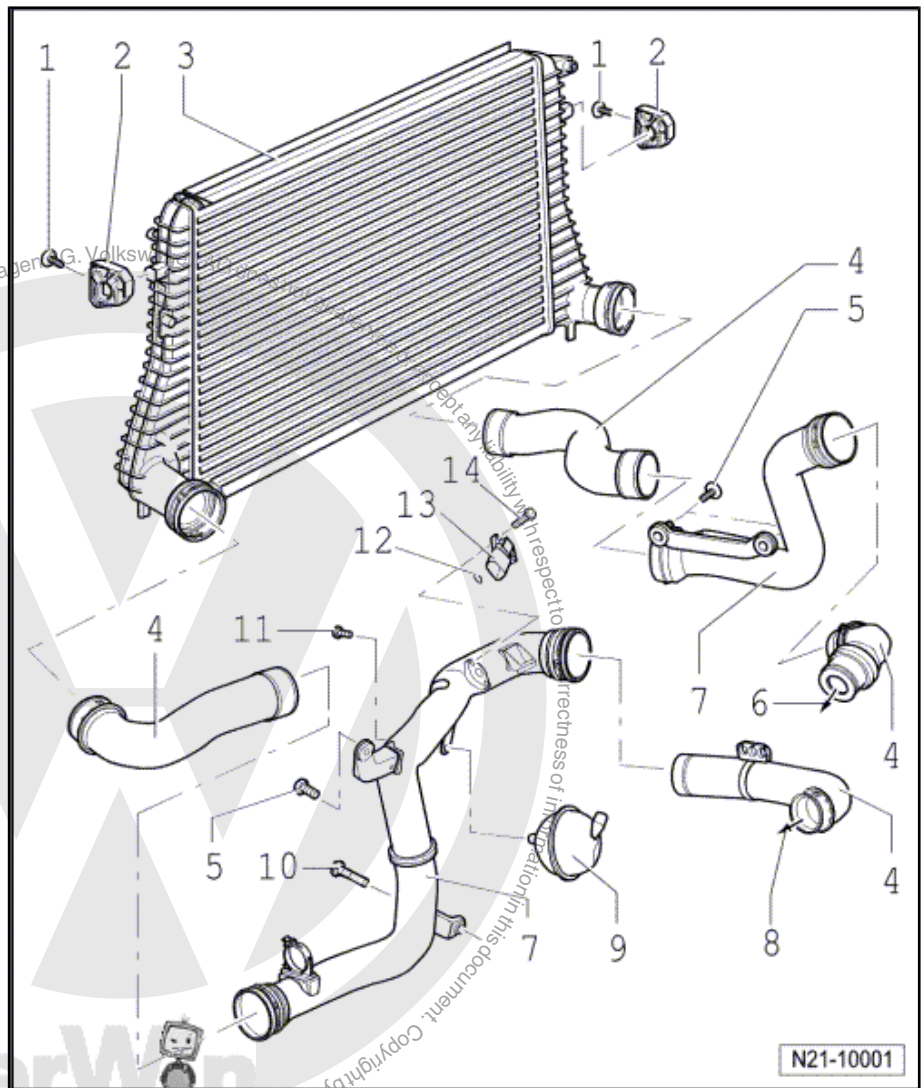
11 - 8 Nm

12 - O-ring

- Renew if damaged.

13 - Charge air pressure sender -G31- with intake air temperature sender -G42-

14 - 3 Nm





1.6.2 Engine codes BLS and BXJ

1 - 8 Nm

Fitting location => [page 220](#)

2 - Bracket

- Note installation position.

3 - Charge air cooler

- To remove, bring lock carrier into service position => General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier - service position

4 - Sealing strip

- Pushed onto top and bottom of charge air cooler

5 - 3 Nm

6 - Charge air pressure sender -G31- with intake air temperature sender -G42-

7 - O-ring

- Renew if damaged.

8 - Bracket

9 - 5 Nm

10 - Connecting hose

11 - Charge air pipe

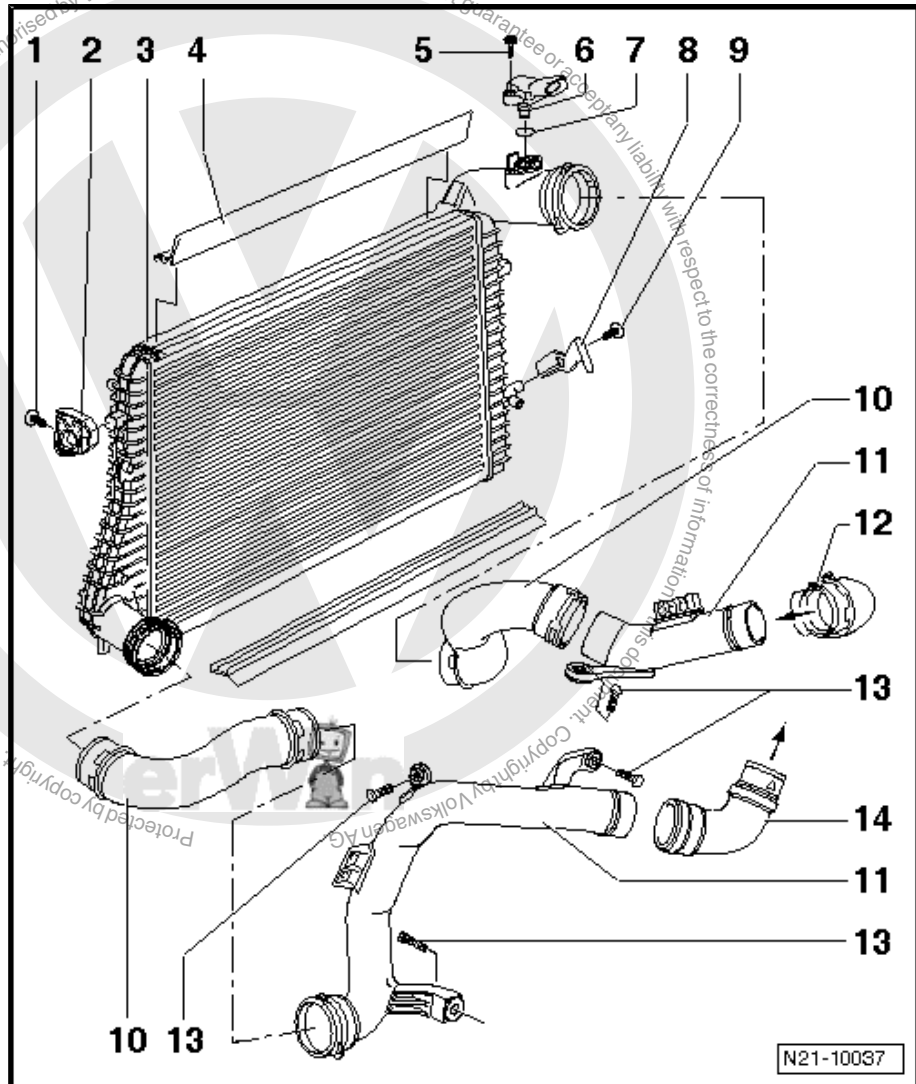
12 - Connecting hose

- To intake manifold flap motor -V157-
- Assembly overview - intake manifold => [page 235](#) .

13 - 8 Nm

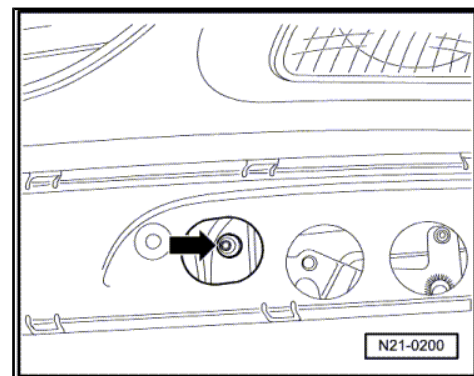
14 - Connecting hose

- To turbocharger.



Securing bolts for charge air cooler

To loosen or tighten securing bolts -arrows- remove bumper cover.

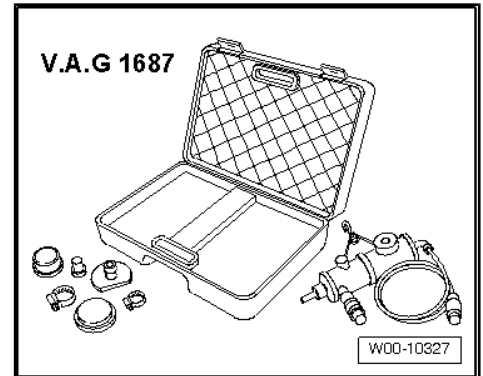




1.7 Checking charge air system for leaks

Special tools and workshop equipment required

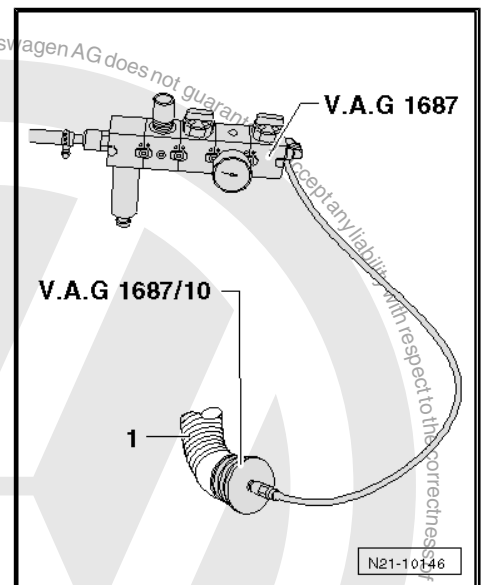
- ◆ Charge air system tester -V.A.G 1687-



- ◆ Adapter -V.A.G 1687/10-

- Remove intake hose -1- from air filter.
- Insert adapter -V.A.G 1687/10- in intake hose -1- and secure with clip.

Prepare charge air system tester -V.A.G 1687- as follows:

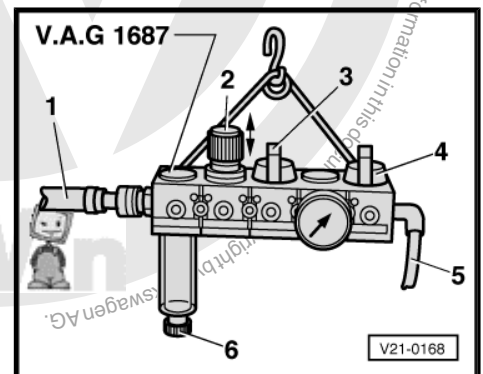


- Turn pressure regulating valve -2- anti-clockwise onto stop.
- Close valves -3- and -4-.



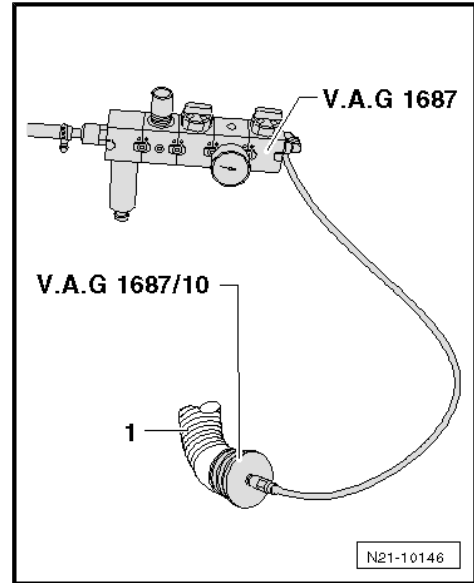
Note

To turn the pressure regulating valve -2- the knob must be pulled upwards.





- Connect charge air system tester -V.A.G 1687- to adapter -V.A.G 1687/10- as shown.



- Connect compressed air hose -1- (compressed air source) to charge air system tester -V.A.G 1687- .



Note

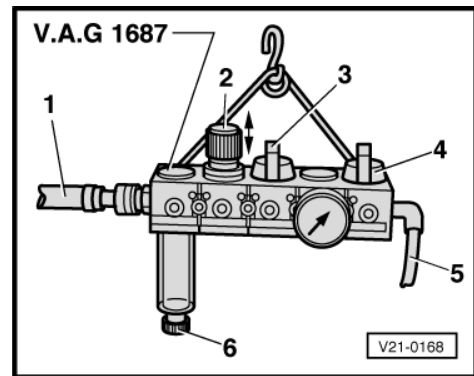
If there is water in the sight glass, drain at water drain screw -6-.

- 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 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 218](#) .
- ◆ Depressurise test circuit by detaching coupling from adapter -V.A.G 1687/10- before removing adapter.



1.8 Vacuum hose schematic diagram

Vehicles with particulate filter ⇒ [page 223](#)

Vehicles without particulate filter ⇒ [page 224](#)

1.8.1 Vehicles with particulate filter

1 - Turbocharger

2 - Connecting pipe air filter/
turbocharger

3 - Non-return valve

- Note installation position.

4 - To brake servo

5 - Charge pressure control
solenoid valve -N75-

6 - Air filter

7 - Cylinder head/cylinder
block

8 - Intake manifold

9 - Bypass flap

- For exhaust gas recirculation cooler.

10 - Radiator

- For exhaust gas recirculation.

11 - Exhaust gas recirculation
valve -N18-

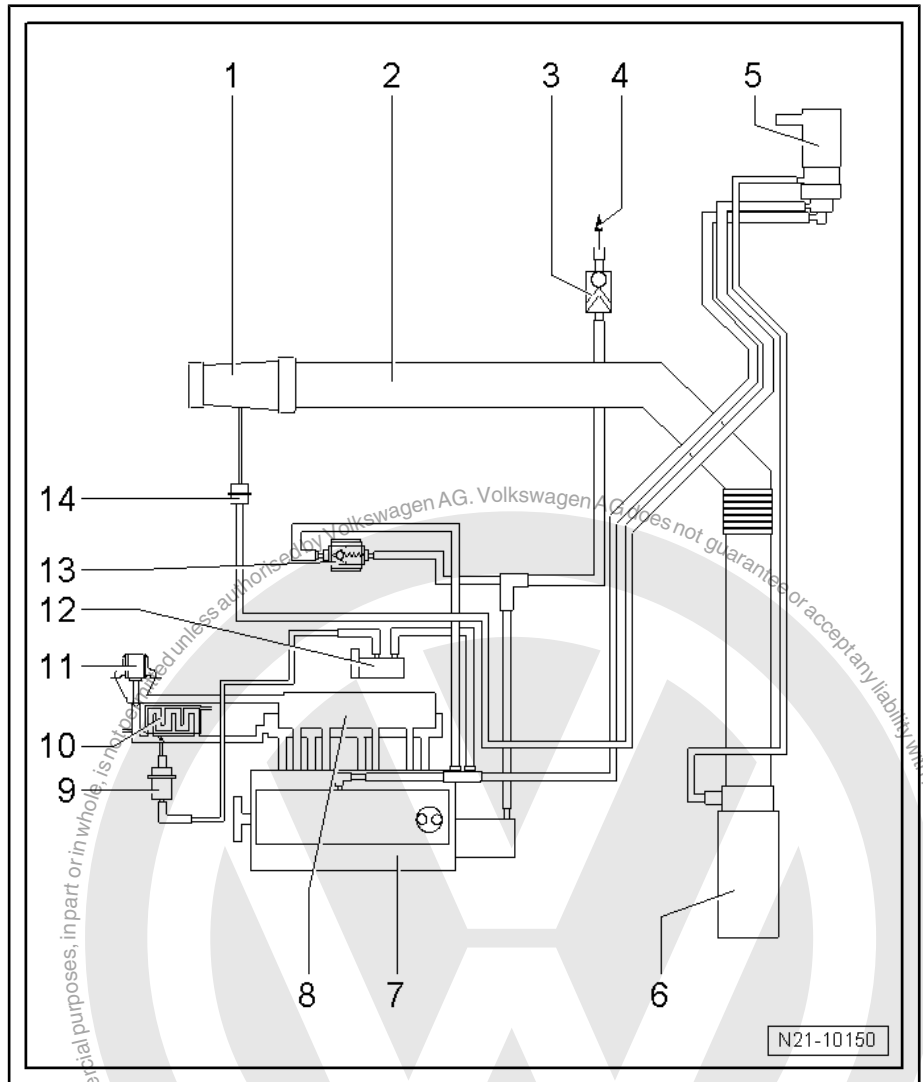
12 - Exhaust gas recirculation
cooler changeover valve -
N345-

13 - Non-return valve

- Note installation position.

14 - Vacuum unit

- Turbocharger





1.8.2 Vehicles without particulate filter

1 - Solenoid valve block

2 - Non-return valve

- Note installation position.

3 - To brake servo

4 - Connecting pipe air filter/ turbocharger

5 - Air filter

6 - Intake manifold

7 - Cylinder head/cylinder block

8 - Vacuum reservoir

9 - Bypass flap

- For exhaust gas recirculation cooler.

10 - Radiator

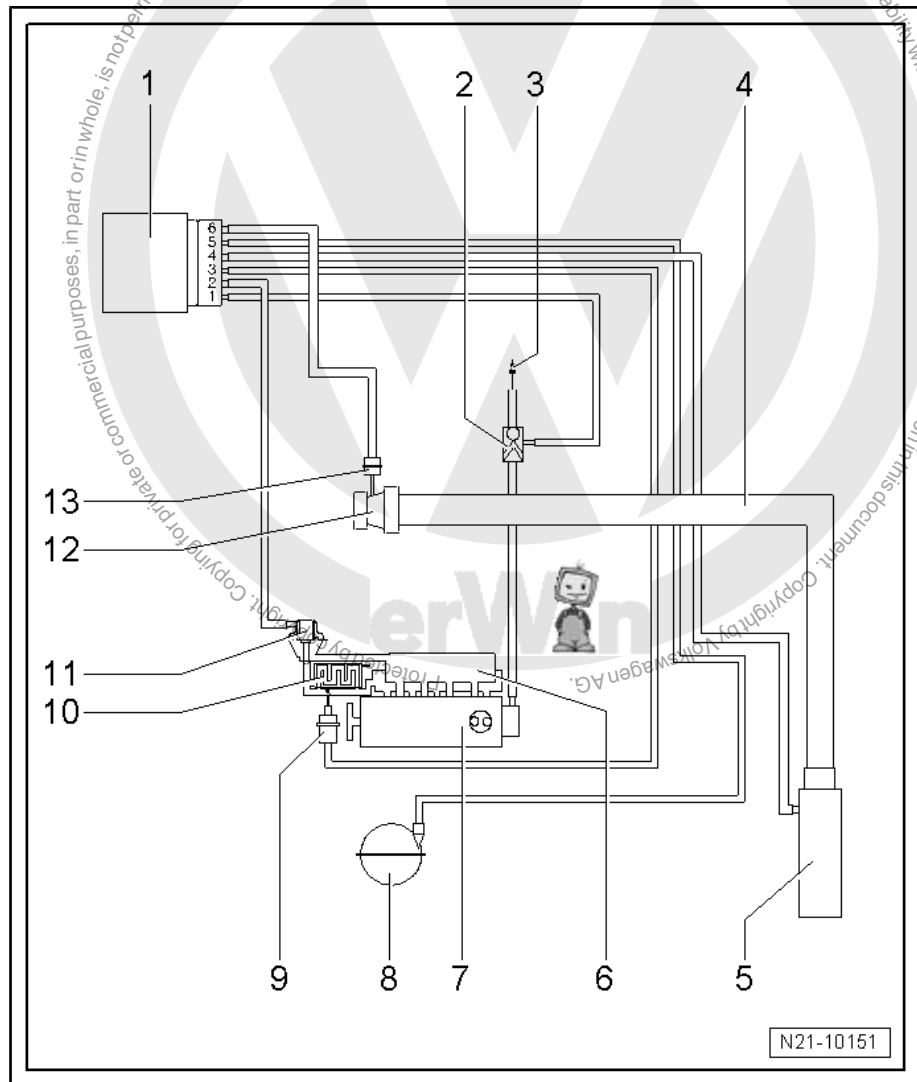
- For exhaust gas recirculation.

11 - Exhaust gas recirculation valve -N18-

12 - Turbocharger

13 - Non-return valve

- Note installation position.





23 – Mixture preparation - injection

1 Diesel direct injection system

The diesel direct injection system control unit is equipped with a fault memory. Read fault memory before and after making repairs or adjustments.

Safety precautions ⇒ [page 225](#) .

Rules for cleanliness ⇒ [page 226](#) .

Removing and installing pre-wired wiring harness for unit injectors and glow plugs ⇒ [page 226](#)

Assembly overview - unit injector ⇒ [page 229](#)

Removing and installing unit injector ⇒ [page 230](#)


Adjusting non-contact gap of unit injectors ⇒ [page 232](#)

Removing and installing O-rings for unit injector ⇒ [page 233](#) .

Repairing intake manifold flap ⇒ [page 235](#)

Assembly overview - air filter ⇒ [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 and 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 the following if testers and measuring instruments have to be used 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 destruction of 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.
- ◆ Before disconnecting battery, obtain radio code for radios with anti-theft coding.



- ◆ Disconnecting and connecting the battery must only be done with the ignition switched off, as otherwise the control unit for diesel direction injection system could become damaged.

1.2 Rules for cleanliness

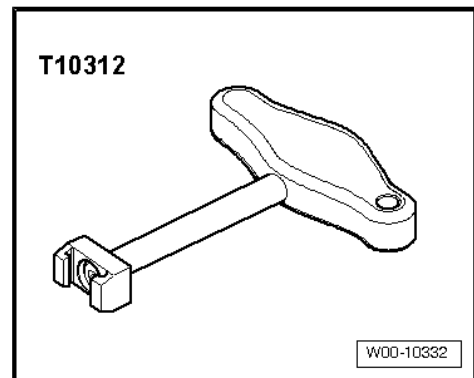
When working on fuel supply and injection system, pay careful attention to the following rules for cleanliness:

- ◆ Thoroughly clean all unions and adjacent 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 comes into contact with the coolant hoses. Should this occur, the hoses must be cleaned immediately. Damaged hoses must be renewed.

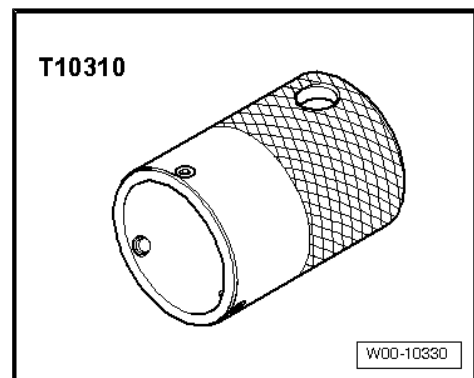
1.3 Removing and installing pre-wired wiring harness for unit injectors and glow plugs

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 to 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.



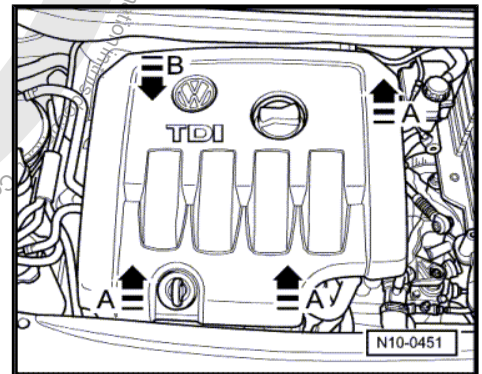
Note

Disconnecting connectors on piezo unit injectors may only be undertaken using special tool puller -T10312- .

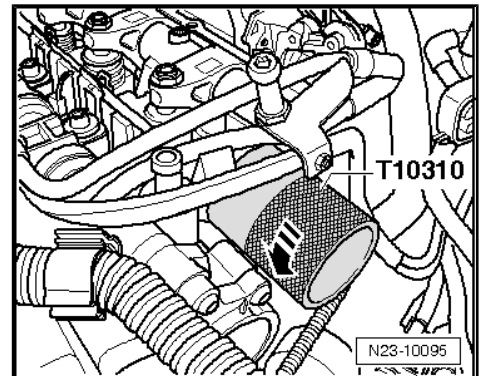
- Remove engine cover.

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

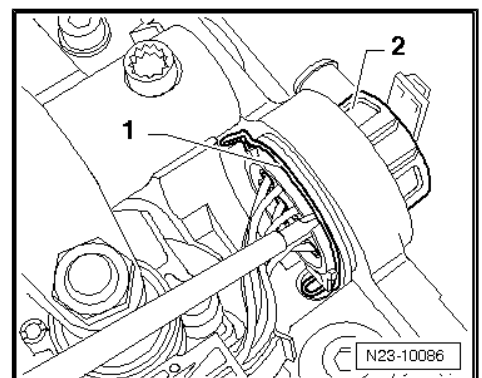
- Remove cylinder head cover ⇒ [page 64](#) .
- Disconnect central connector on cylinder head



- Fit special wrench -T10310- on adapter ring and release it by turning key through 90° (1/4 turn) in -direction of arrow-.

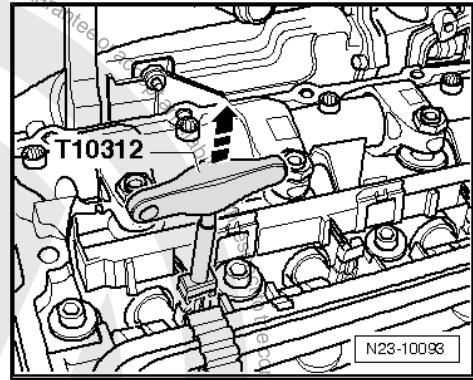


- Pull the securing clip -1- upwards lightly with a screwdriver and press the central connector -2- through inwards.





- 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.

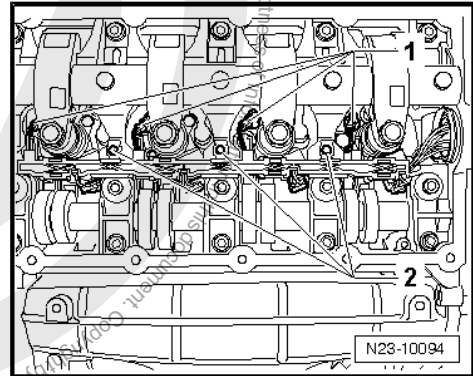


- Pull connectors off glow plugs -1- Unscrew securing bolts -2- of steel clips and remove complete pre-wired wiring harness.

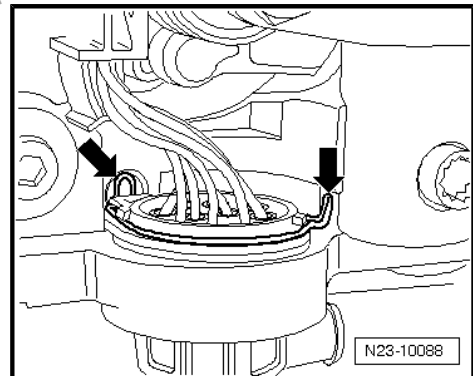
Installing

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

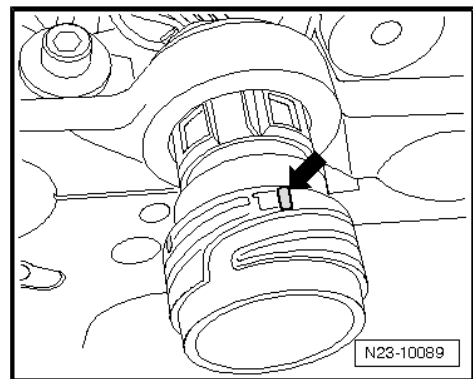
- Route pre-wired wiring harness and tighten securing bolts to 10 Nm.



- 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)





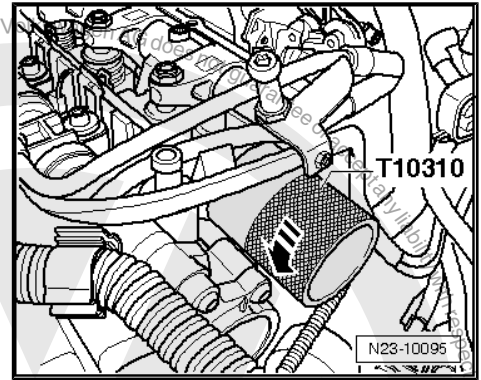
- Fit special wrench -T10310- on adapter ring and lock it by turning key through 90° (1/4 turn) in opposite -direction of arrow-.



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 64](#) .
- Fit engine cover.



1.4 Assembly overview - unit injector

- ◆ Observe rules for cleanliness => [page 226](#) .
- ◆ Always renew seals and O-rings

1 - 20 Nm + turn (90°)

- Renew.

2 - Rocker arm shaft

- With rocker arms
- Removing and installing
=> [page 230](#)

3 - Lock nut, 30 Nm

4 - Adjuster screw

- Renew.

5 - Ball stud

- Renew.

6 - Unit injector

- Removing and installing
=> [page 230](#)

7 - O-ring

- Renewing => [page 233](#) .

8 - O-ring

- Renewing => [page 233](#) .

9 - O-ring

- Renewing => [page 233](#) .

10 - Heat shield seal

- Renew.

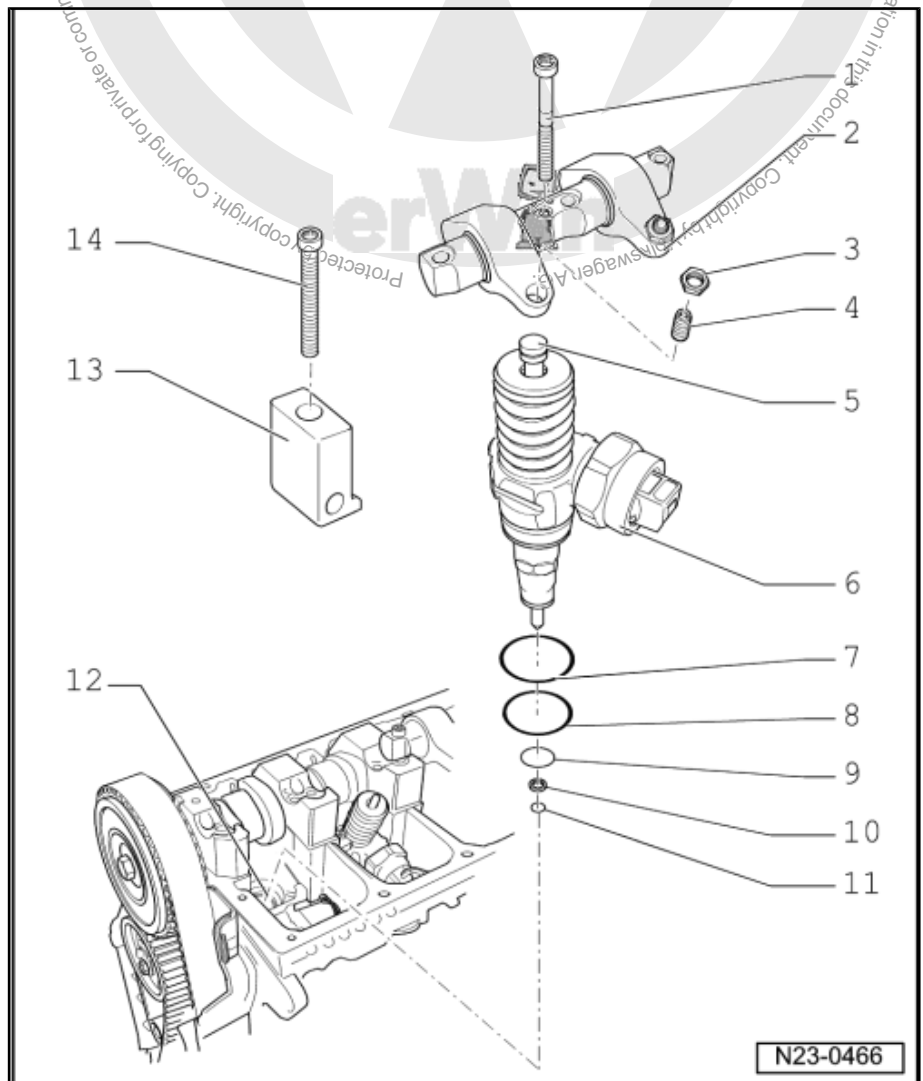
11 - Circlip

12 - Cylinder head

13 - Tensioning block

14 - 12 Nm + turn (270°)

- Renew.

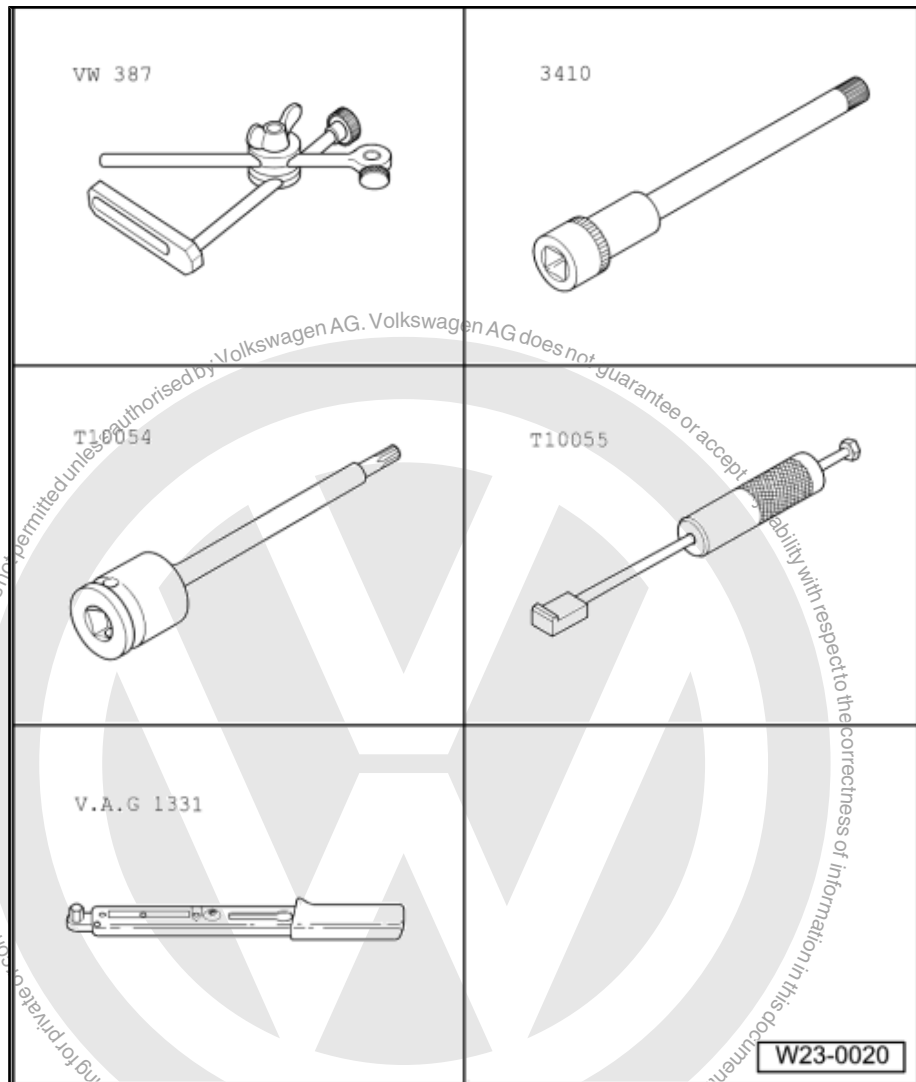




1.5 Removing and installing unit injector

Special tools and workshop equipment required

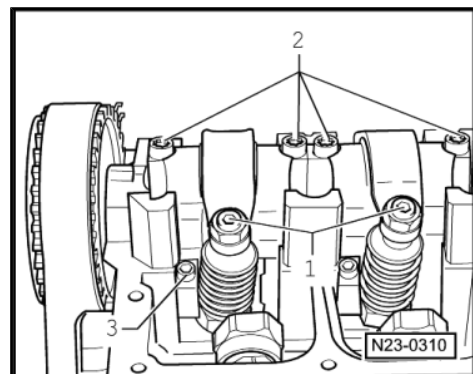
- ◆ Universal dial gauge bracket -VW 387-
- ◆ Special wrench, long reach -3410-
- ◆ Special wrench, long reach -T10054-
- ◆ Puller -T10055-
- ◆ Torque wrench - V.A.G 1331-



1.5.1 Removing

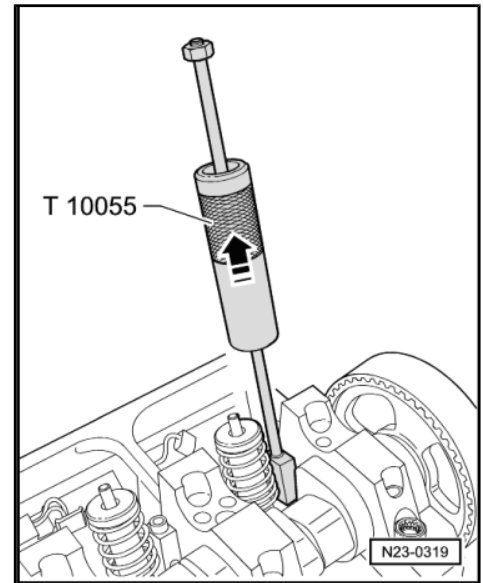
- Remove toothed belt guard upper part.
- Remove cylinder head cover. ⇒ [page 64](#)
- Turn crankshaft until the cam pair point evenly upwards for the unit injector which is to be removed.
- Loosen lock nuts of adjustment screws -1- and remove adjustment screws.
- Remove rocker arm securing bolts -2- (from outwards to inwards) with socket XZN 10 -3410- and remove rocker arm shaft.
- Remove tensioning block securing bolt -3- with special wrench, long reach -T10054- and remove the block.
- Lever connector off unit injector using a screwdriver. Support opposite side of connector with light finger pressure to prevent canting.

Observe unit injector cylinder allocation.





- Insert puller -T10055- in place of the clamping block in the slot on the side of the unit injector.
- Pull unit injector out of cylinder head seat by gently tapping upwards.



1.5.2 Installing

Note

◆ 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.

◆ New unit injectors are supplied with O-rings and heat shield seal.

Heat shield seal and O-rings must be renewed if old unit injector is reused. ⇒ [page 233](#)

- Check that the 3 O-rings and the heat shield seal along with securing clip are seated correctly before installing unit injector.

Note

The seals must not be twisted.

- Oil the seals and fit the unit injector into the seat in cylinder head with great care.
- Push the unit injector evenly into the cylinder head onto its limit stop.
- Insert tensioning block in slot on side of unit injector.

Note

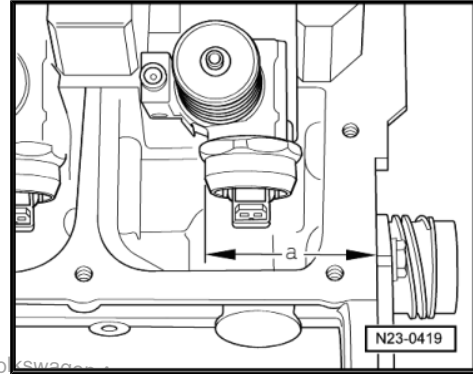
If the unit injector is not at right angles to the tensioning block the securing bolt may loosen and this can damage the unit injector or the cylinder head.

- Therefore align the unit injector as follows.
- Screw new securing bolt into clamping block, but do not tighten (it must still be possible to turn the unit injector slightly).
- Now align unit injector at right angles to camshaft bearing seat.

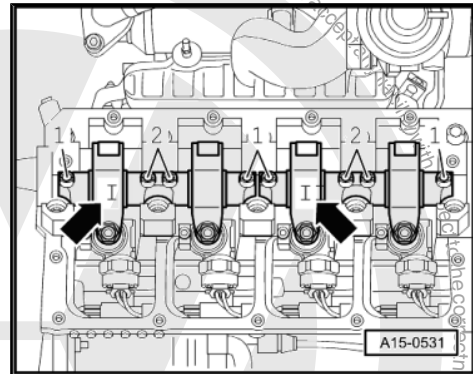


- Check dimension „a“ from outer edge of cylinder head to rounded edge of unit injector with a vernier gauge (measuring range at least 400 mm).

Cylinder	Dimension „a“
1	333.0 ± 0.8 mm
2	245.0 ± 0.8 mm
3	153.6 ± 0.8 mm
4	65.6 ± 0.8 mm

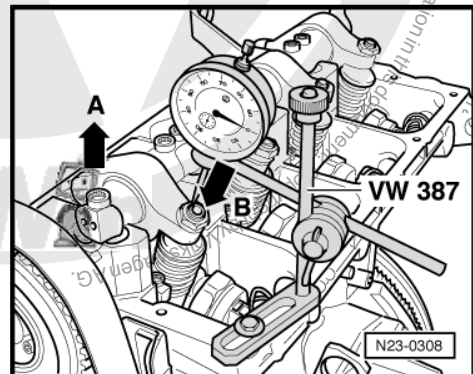


- If necessary, adjust the unit injector and tighten the securing bolt as follows:
- Tighten securing bolt to 12 Nm and turn 270° (3/4 turn) further (turning further can be done in several stages).
- Fit rocker arm shaft and tighten new securing bolts as follows:
- First evenly tighten inner bolts -2- and then outer bolts -1- hand-tight. Then using same sequence, tighten to 20 Nm and 90° (1/4 turn) further evenly.
- Adjust non-contact gap of unit injectors ⇒ [page 232](#) .

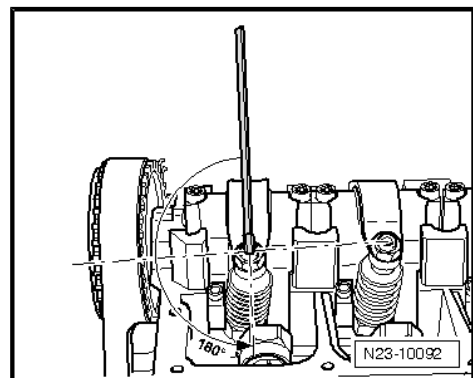


1.6 Adjusting non-contact gap of unit injectors

- Fit dial gauge onto adjustment screw of unit injector as shown.
- Turn crankshaft in direction of engine rotation until roller of rocker arm is located at tip of drive cam. Roller side -arrow A- positioned at highest point, dial gauge -arrow B- positioned at lowest point.
- Remove dial gauge.
- Now turn the adjuster screw into rocker arm until significant resistance can be felt (unit injector is at limit stop).



- Turn adjustment screw 180° back off stop.
- Hold adjuster screw in this position and tighten lock nut to 30 Nm.
- Connect unit injector connector.
- Install cylinder head cover ⇒ [page 64](#) .

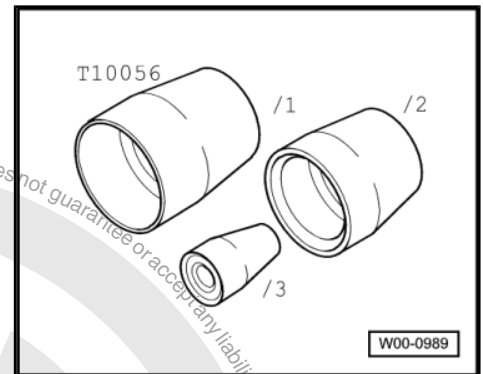




1.7 Removing and installing O-rings for unit injector

Special tools and workshop equipment required

- ◆ Assembly sleeves -T10056-



1.7.1 Removing

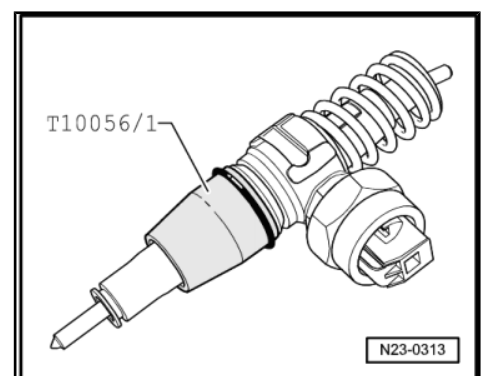
- Lever old O-rings very carefully out of unit injector.
- Above all ensure that burrs are not caused on O-ring seating.

1.7.2 Installing



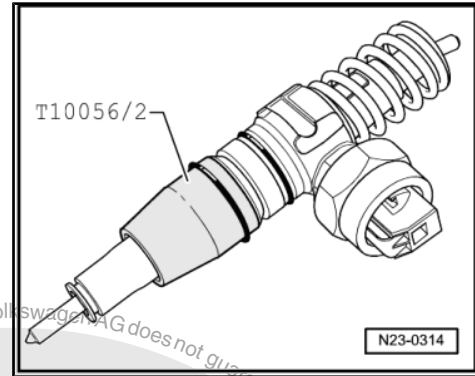
Note

- ◆ 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.
- ◆ Gradual introduction of O-rings without different coloured markings. Note the correct allocation of O-rings to grooves: the thickness of the rings reduces towards injector nozzle.
- ◆ Prevent O-rings from rolling when sliding them on. The O-rings must not be twisted in their seats in unit injector.
- Pull heat shield seal off together with securing clip.
- Clean seating surfaces for O-rings on unit injector very carefully.
- Place assembly sleeve -T10056/1- onto stop on unit injector.
- Push the upper, thicker O-ring carefully onto assembly sleeve and into seat on unit injector.
- Remove assembly sleeve.

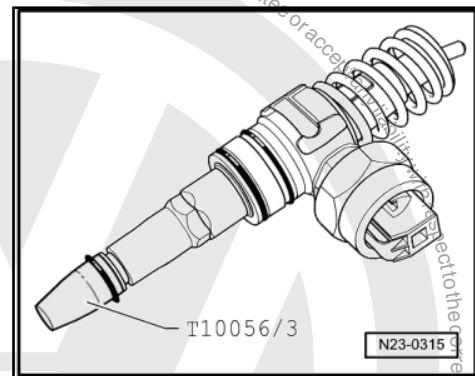




- Place assembly sleeve -T10056/2- onto stop on unit injector.
- Slide the middle, thinner O-ring carefully onto assembly sleeve and into seat on unit injector.
- Remove assembly sleeve.



- Place assembly sleeve -T10056/3- onto stop on unit injector.
- Push the lower O-ring carefully onto the assembly sleeve and into the seat of the unit injector.
- Remove assembly sleeve.
- Fit new heat shield seal together with securing clip.





1.8 Assembly overview - intake manifold

Engine codes AVQ BKC, BRU, BXE and BXF ⇒ [page 235](#)

Engine code BJB ⇒ [page 236](#)

Engine codes BLS and BXJ ⇒ [page 237](#)

1.8.1 Engine codes AVQ, BKC, BRU, BXE and BXF

1 - Intake manifold

- Tighten securing bolts to 22 Nm.

2 - O-ring

- Renew.

3 - Intake connecting pipe

- With exhaust gas recirculation valve

4 - 10 Nm

5 - 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.

6 - 10 Nm

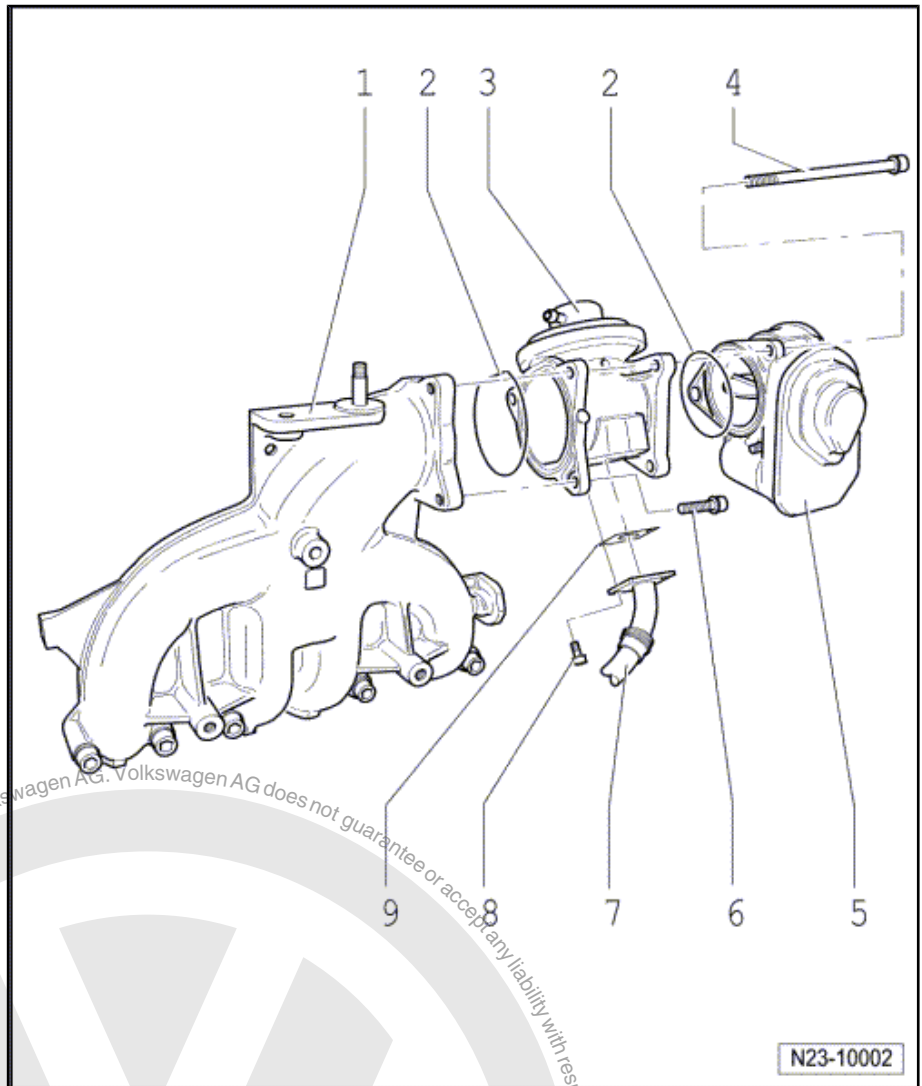
7 - Connecting pipe

- To exhaust gas recirculation cooler.

8 - 22 Nm

9 - Seal

- Renew.





1.8.2 Engine code BJB

1 - Intake manifold

- Tighten securing bolts to 22 Nm.

2 - O-ring

- Renew.

3 - Intake connecting pipe

- With exhaust gas recirculation valve and intake manifold flap

4 - 10 Nm

5 - Seal

- Renew.

6 - Connecting pipe

- To exhaust gas recirculation cooler.

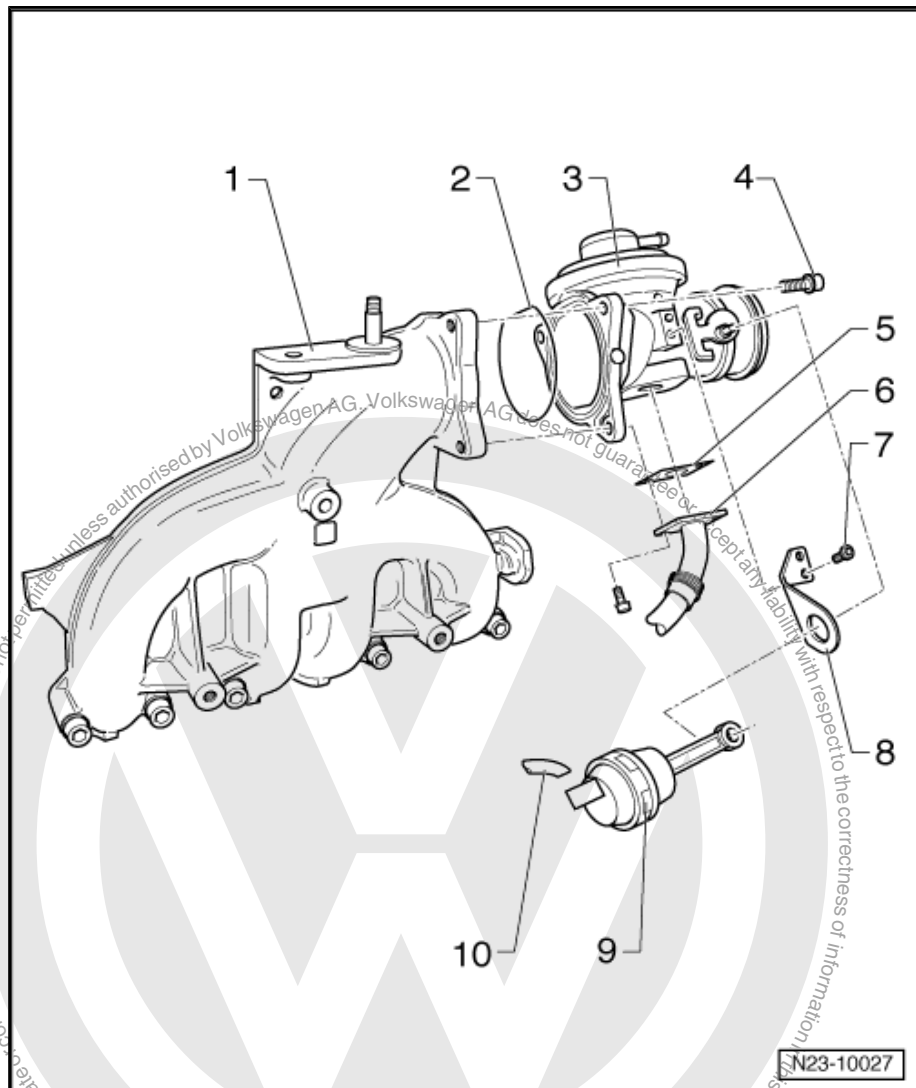
7 - 10 Nm

8 - Bracket

9 - Vacuum actuator

10 - To solenoid valve block

11 - 22 Nm





1.8.3 Engine codes BLS and BXJ

1 - Seal

- Renew.

2 - Intake manifold

- Tighten securing bolts to 22 Nm

3 - Seal

- Renew.

4 - Connection

5 - 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.

6 - From charge air cooler

7 - 10 Nm

8 - Exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer - G212-

- Assembly overview - exhaust gas recirculation ⇒ [page 267](#)

9 - Seal

- Renew.

10 - Connecting pipe

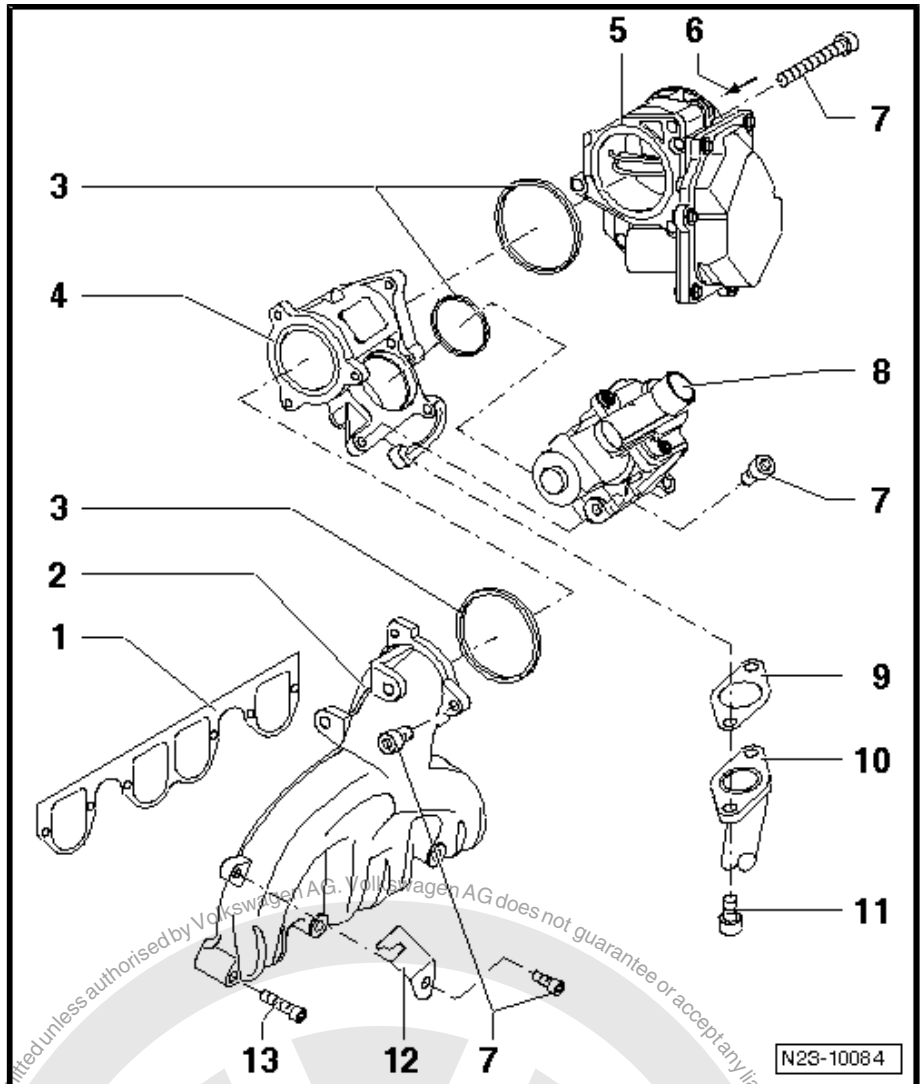
- For exhaust gas recirculation cooler.
- Assembly overview - parts of exhaust gas recirculation

⇒ [page 264](#)

11 - 22 Nm

12 - Bracket

13 - 22 Nm



1.9 Cleaning the intake manifold flap support, Engine code BLS and BXJ



Note

Carbon deposits can occur in the throttle valve support through the combination of unfavourable factors. If these are found, e.g. when disassembling the exhaust gas recirculation valve -N18- or the intake manifold flap motor -V157,-, the support will have to be cleaned.



WARNING

Acetone is highly inflammable. Please observe the accidental regulations and safety notes when handling with highly inflammable fluids. Wear eye protection and protective clothing to avoid possible injury and skin contact.

- Remove intake manifold flap connection.
- Remove the exhaust gas recirculation valve -N18- and the intake manifold flap motor -V157- .
- Thoroughly clean intake manifold flap support, especially around exhaust gas return valve, using commercially available acetone according to DIN 53247 and cleaning brush.
- Wipe off intake manifold flap support using a lint-free cloth.
- Allow the acetone to evaporate fully, assemble the cleaned intake manifold flap support, replace the seals and insert it back in position.

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 - Air filter upper part

6 - 8 Nm

7 - Vacuum hose

- To solenoid valve block

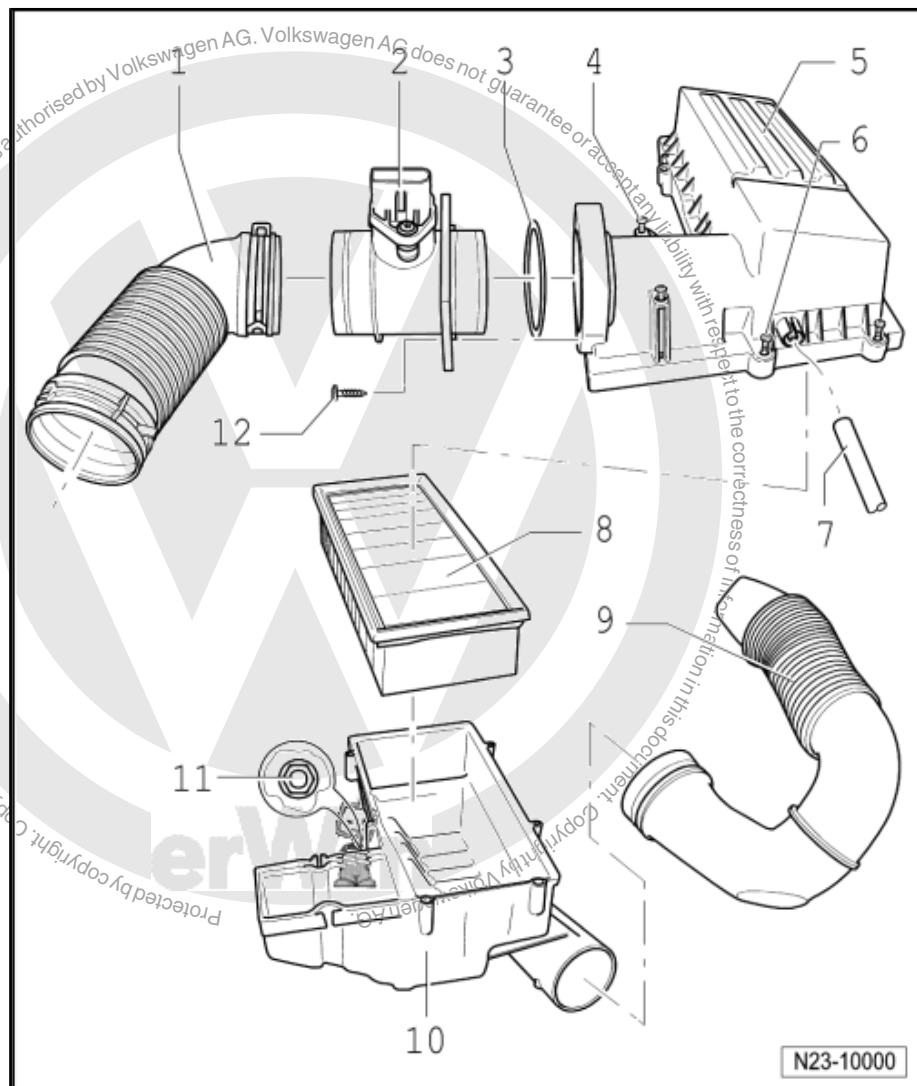
8 - Filter element

9 - Air duct

- To lock carrier.

10 - Air filter lower part

11 - 10 Nm





2 Engine control unit

Reading and clearing engine control unit fault memory ⇒ [page 239](#) .

Adapting functions and components ⇒ [page 240](#) .

Removing and installing engine control unit (Golf) ⇒ [page 240](#)

Removing and installing anti-theft engine control unit (Golf) ⇒ [page 241](#)

Removing and installing engine control unit (Golf Plus) ⇒ [page 243](#)

Removing and installing anti-theft engine control unit (Golf Plus) ⇒ [page 244](#)

Removing and installing engine control unit (Touran) ⇒ [page 240](#)

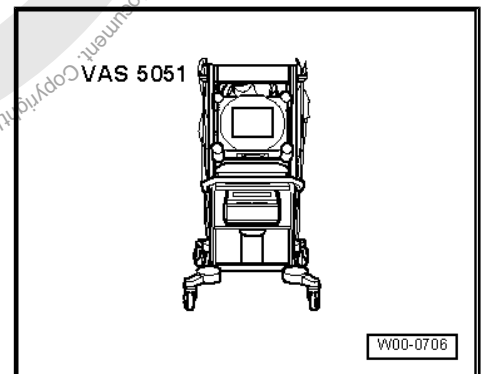
Removing and installing anti-theft engine control unit (Touran) ⇒ [page 247](#)

Removing and installing engine control unit (Passat)

2.1 Reading and clearing engine control unit fault memory

Special tools and workshop equipment required

- ◆ Vehicle diagnostic, testing and information system -VAS 5051-



- Connect vehicle diagnostic, testing and information system - VAS 5051- as follows:
- Push diagnosis cable connector onto diagnosis connector.
- Start engine and run at idling speed.

Only when engine does not start:

- Switch on ignition.

Select operating mode

- Press button on display for „Vehicle self-diagnosis“.

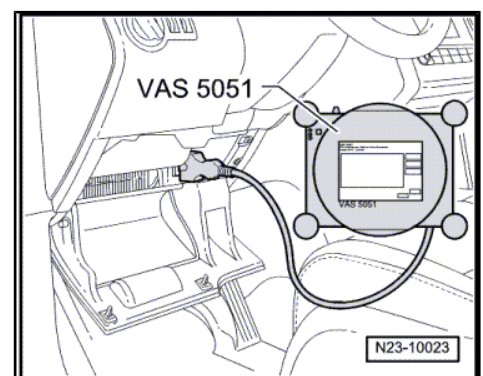
Select vehicle system

- Press button „01 - Engine electronics“ on display.


The control unit identification and engine control unit coding are indicated on display.

Select diagnostic function

- Press button „02 - Read fault memory“ on display.



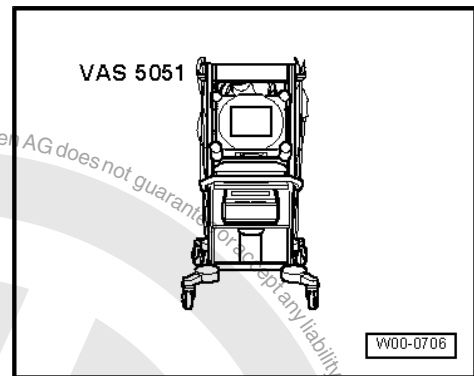


- If no fault is stored in engine control unit „0 fault detected“ is displayed.
- If faults are stored in the engine control unit, these are shown one below the other on the display.
- Press the  button.
- Press button „05 - Clear fault memory“ on display.
- Press function „06-End output“.

2.2 Adapting functions and components

Special tools and workshop equipment required

- ◆ Vehicle diagnostic, testing and information system -VAS 5051-



Select „guided fault finding“ in vehicle diagnostic, testing and information system -VAS 5051- .

When all control units have been read:

- Press „GoTo“ button.
- Select „Function/component selection“.
- Select „Drive train“.
- Select „Engine code“.
- Select „01 Systems capable of self-diagnosis“.
- Select „Engine management“.
- Select „Functions“.
- Select „Function or component“.

2.3 Removing and installing engine control unit (Golf)

- Before removing engine control unit, read control unit identification and, with it, coding of current control unit as well => [page 240](#) .

Removing

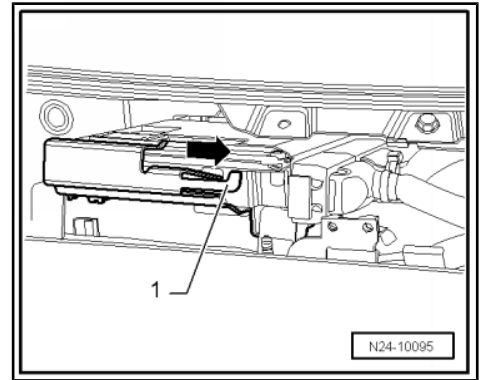
- Switch off ignition.
- Remove wiper arms, plenum chamber cover and plenum chamber bulkhead: => Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .



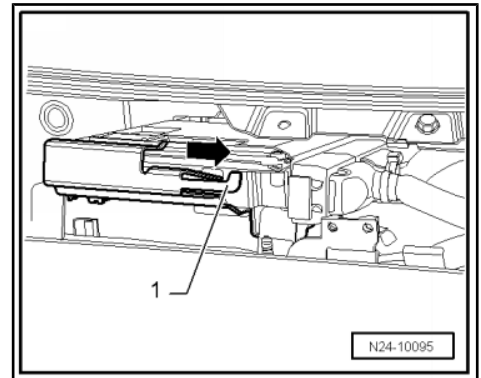
- Bend catch open slightly -1-.
- Then push engine control unit out of retainer -arrow-.
- Release now connector from engine control unit, disconnect connector.

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 .

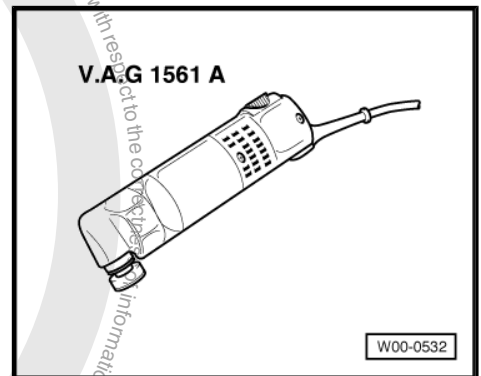


2.4 Removing and installing anti-theft engine control unit (Golf)

Removing and installing anti-theft engine control unit Golf Plus → [page 244](#) .

Special tools and workshop equipment required

- ◆ Electric cutter -V.A.G 1561 A-
- ◆ Saw set -V.A.G 1561/14-
- ◆ Grippers



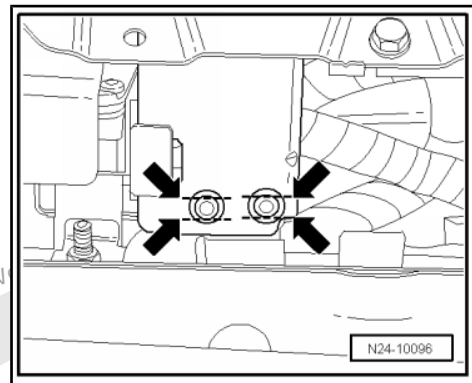


Note

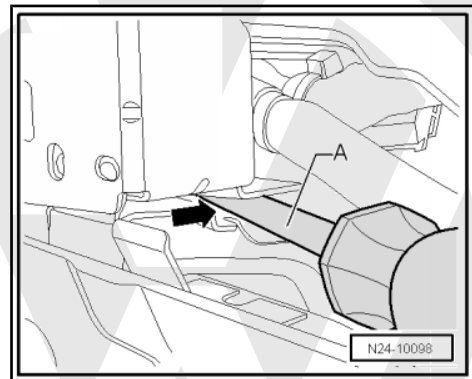
- ◆ If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.
- ◆ The shear-head bolt threads are coated with locking compound. To simplify removing, the shear-head bolts can be heated using hot air blower -VAS 1978/14- . When doing this, ensure that no adjacent cables, connectors or components are damaged!

Removing

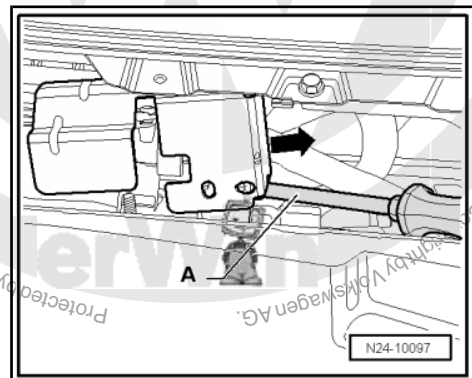
- Switch off ignition.
- Remove wiper arms, plenum chamber cover and plenum chamber bulkhead: ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .
- Cut into heads of shear-head bolts so that 2 parallel surfaces are created -arrows-.
- Remove bolts with grip pliers .



- Insert a screwdriver between protective housing -A- and bracket -arrow-.



- Lever up protective housing using screwdriver -A- and pull to side off bracket -arrow-.

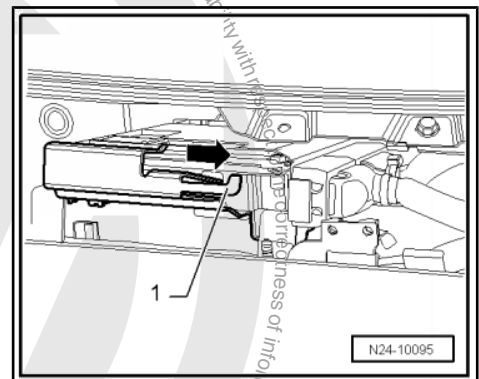
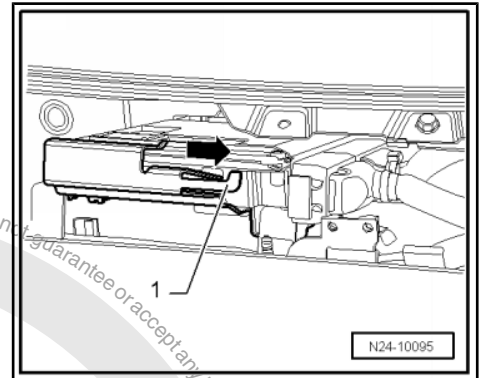




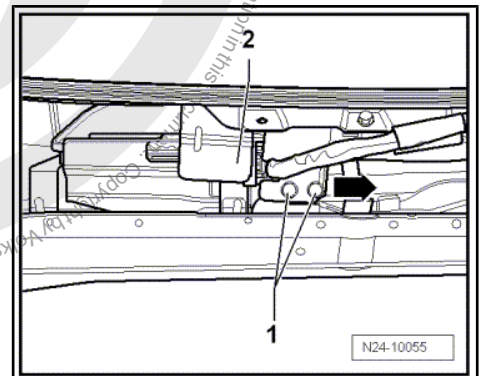
- Bend catch open slightly -1-.
- Then push engine control unit out of retainer -arrow-.
- Release now connector from engine control unit, disconnect connector.

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 .



2.5 Removing and installing engine control unit (Golf Plus)

Note

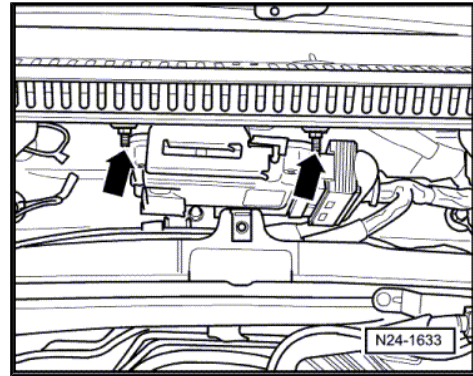
If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.

Removing:

- Switch off ignition.
- Remove plenum chamber bulkhead => General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .



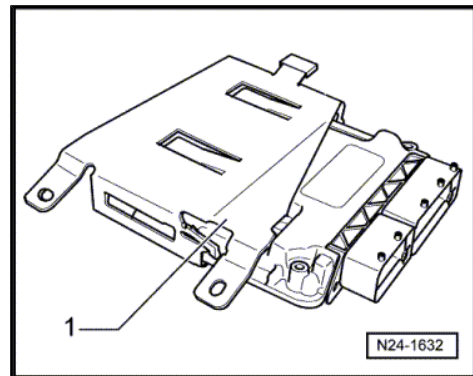
- Loosen securing nuts -arrows-.
- Release connector from engine control unit, disconnect connector.



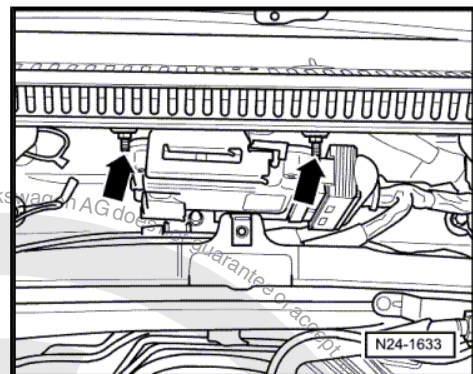
- Push bracket -1- off engine control unit in direction of arrow.

Installing:

- Push bracket onto engine control unit.



- Tighten securing nuts -arrows- to 10 Nm.
- Fit connectors and lock in position.
- Install plenum chamber bulkhead => General body repairs;
Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .



2.6 Removing and installing anti-theft engine control unit (Golf Plus)

Special tools and workshop equipment required

- ◆ Grip pliers



Note

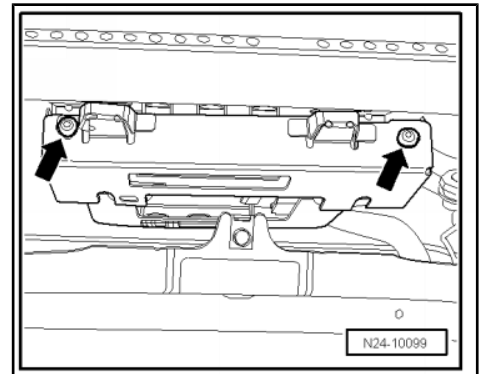
- ◆ *If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system -VAS 5051B- and perform „Renewing engine control unit“ in guided functions.*
- ◆ *The shear-head bolt threads are coated with locking compound. To simplify removing, the shear-head bolts can be heated using hot air blower -VAS, 1978/14- . When doing this, ensure that no adjacent cables, connectors or components are damaged!*

Removing

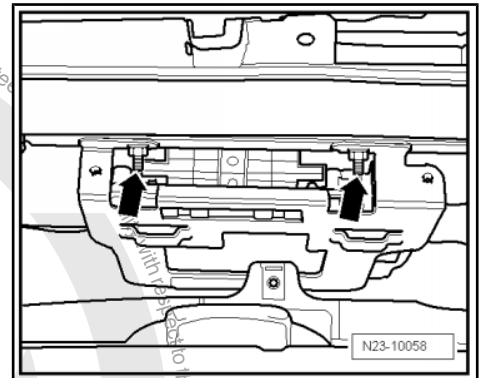
- Switch off ignition.



- Remove plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
- Twist shear-head bolts -arrows- out using grip pliers and remove cover from protective housing.
- Then remove securing nuts for control unit bracket -arrows-.



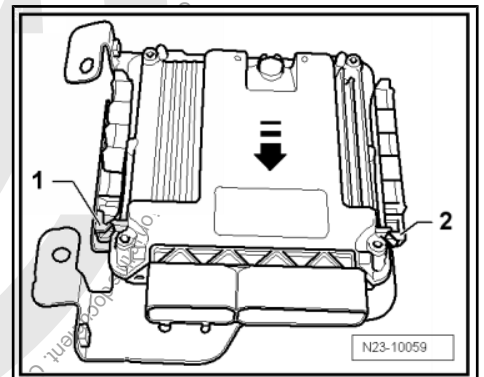
- Release connector from engine control unit, disconnect connector.



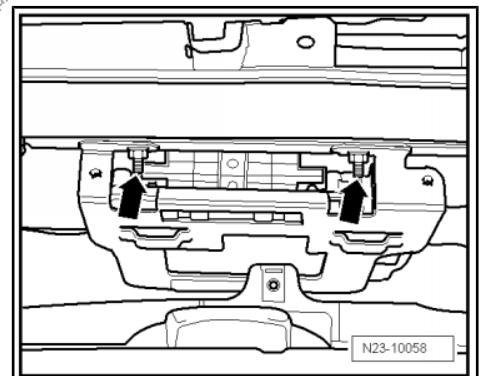
- Press catches -1- and -2- outwards. Then pull engine control unit off control unit bracket in direction of arrow.

Installing

- Push engine control unit onto control unit bracket until it engages in catches.
- Fit connectors to engine control unit and lock in position.

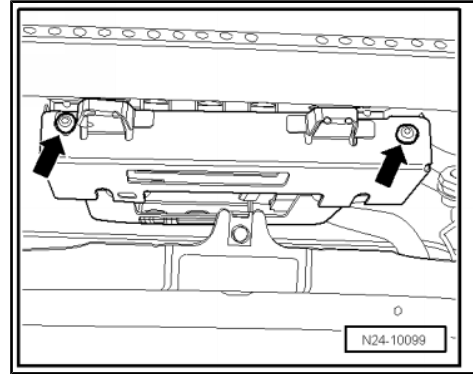


- Tighten securing bolts -arrows- to 10 Nm.
- Install cover of protective housing





- Tighten new shear-head bolts -arrows- evenly until heads shear off.

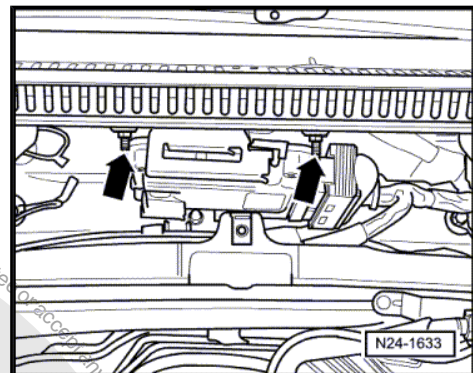


2.7 Removing and installing engine control unit (Touran)

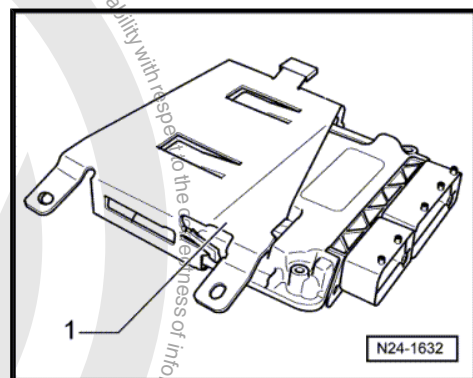
- Before removing engine control unit, read control unit identification and, with it, coding of current control unit as well => [page 240](#) .

2.7.1 Removing

- Switch off ignition.
- Remove plenum chamber bulkhead. => General body repairs; Rep. gr. 50 ; Body - front, plenum chamber bulkhead .
- Loosen securing nuts -arrows-.
- Release connector from engine control unit, disconnect connector.



- Push bracket -1- off engine control unit in direction of arrow.

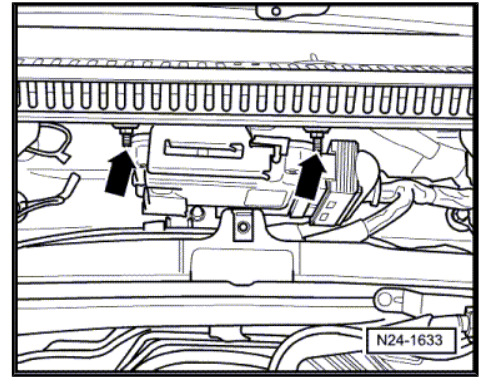


2.7.2 Installing

- Push bracket onto engine control unit.



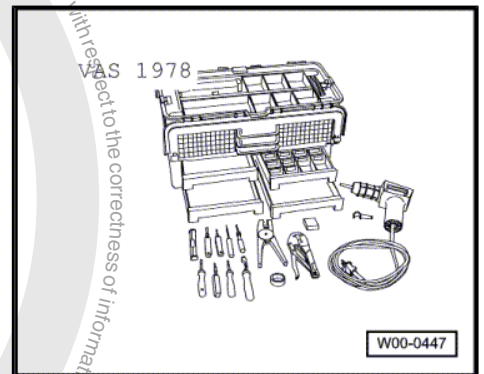
- Tighten securing nuts -arrows- to 10 Nm.
- Fit connectors and lock in position.
- Check previous coding and adapt coding of the new control unit => [page 240](#) .
- Read fault memory of new engine control unit and erase fault memory if necessary. => [page 239](#)
- Carry out a road test.
- Read control unit fault memory again.



2.8 Removing and installing anti-theft engine control unit (Touran)

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.

Removing

- Switch off ignition.
- Remove plenum chamber bulkhead => General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .



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.

Perform settings on hot air blower -4- as shown:



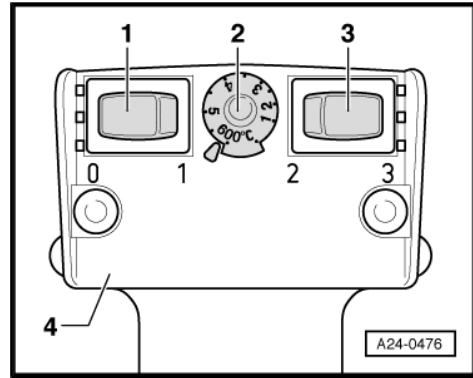
- Turn temperature settings potentiometer -2- to a maximum heat output of 600 °C.
- Set two-stage switch for volume of air -3- to position 3.



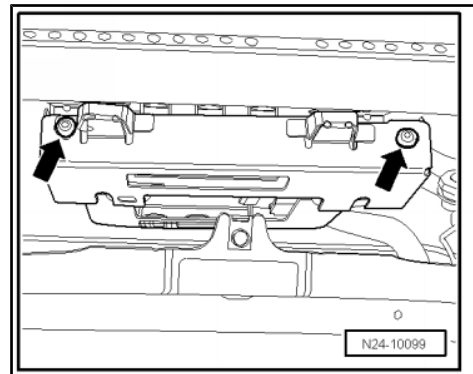
WARNING

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.

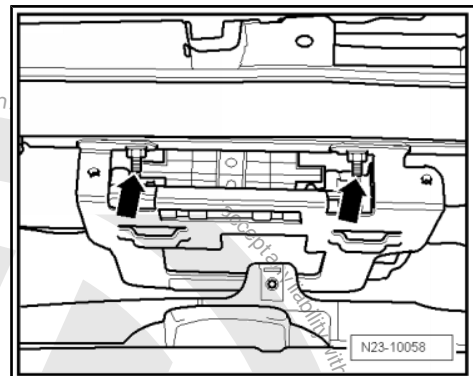
- Place nozzle of hot air blower close to shear bolt.
- Switch on hot air blower and heat the bolts.
- Unscrew shear-head bolts -arrows- out using pliers and remove cover from protective housing.
- Then remove securing nuts for control unit bracket -arrows-.



- Release connector from engine control unit, disconnect connector.

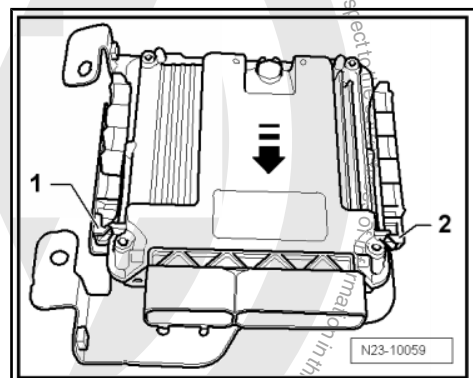


- Press catches -1- and -2- outwards. Then pull engine control unit off control unit bracket -in direction of arrow-.



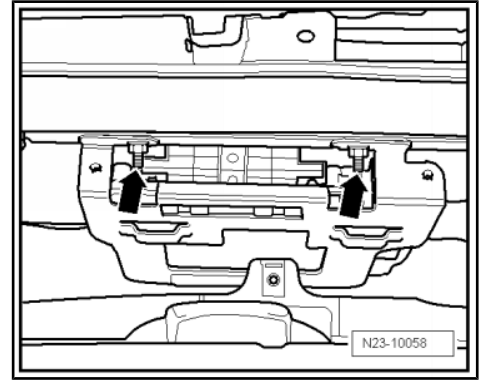
Installing

- Push engine control unit onto control unit bracket until it engages in catches.
- Fit connectors to engine control unit and lock in position.

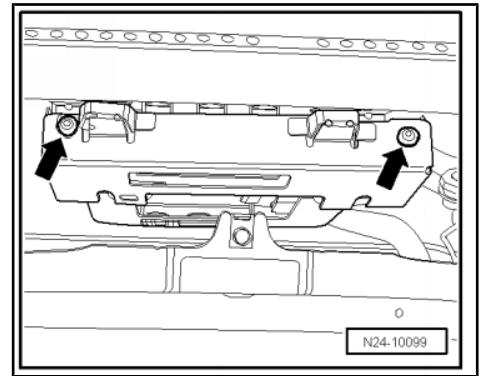




- Tighten securing bolts -arrows- to 10 Nm.
- Install cover of protective housing.



- 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 .





3 Engine control unit (Passat)

Removing and installing engine control unit ⇒ [page 250](#) .

Removing and installing anti-theft engine control unit ⇒ [page 251](#) .

3.1 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 guided functions „Renewing control unit“.

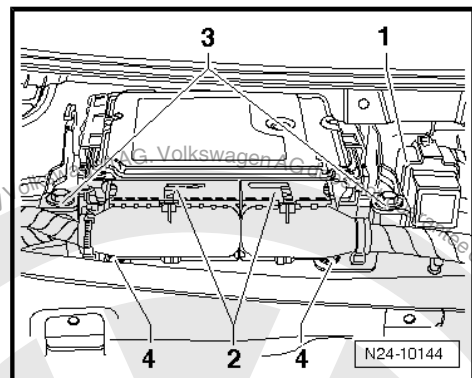


DANGER!

For 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- .

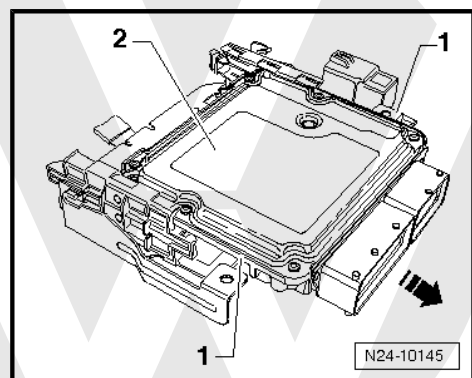
Removing

- 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.



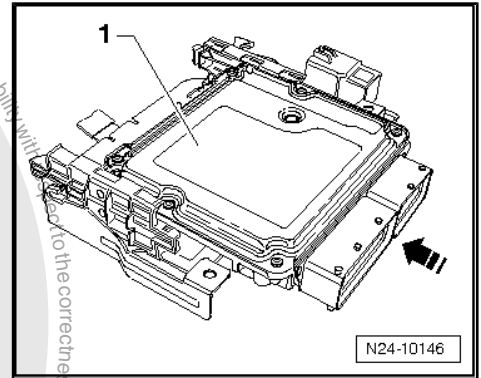
- Press locking device -1- outwards and slide engine control unit -2- in -direction of arrow-.

Installing



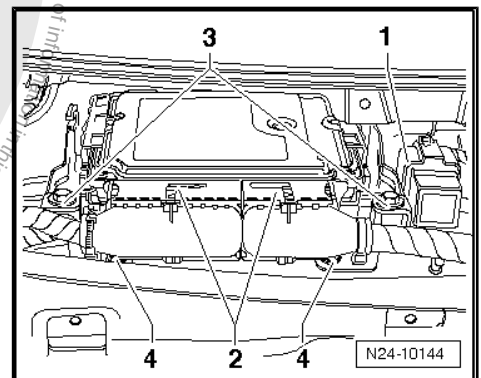


- Slide engine control unit -1- into retaining frame in direction of arrow-.



- Fit retainer frame with engine control unit onto retainer -4-.
- Specified torque of securing nuts for retainer -4-: 6 Nm.

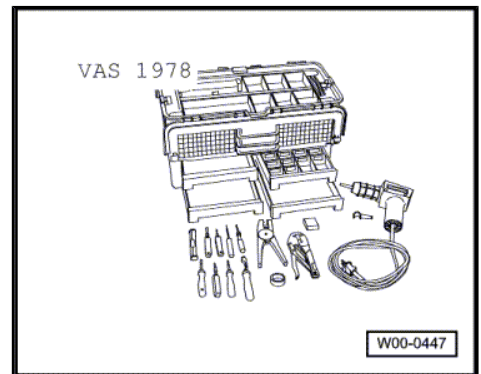
- Tighten securing bolts -3- to 7 Nm.
- Fit connectors to engine control unit and slide locking devices -2- inwards.
-
- Fit connector -1- to heated windscreen control unit -J505-.
- Install plenum chamber cover => Rep. gr. 64 .
- Install wiper arms => Rep. gr. 92 .



3.2 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 attachment 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 guided functions „Renewing control unit“.



DANGER!

For 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.

Perform settings on hot air blower -4- as shown:

- Turn temperature setting potentiometer -2- to maximum heat output (600 °C).
- Set two-stage switch for volume of air -3- to position 3.



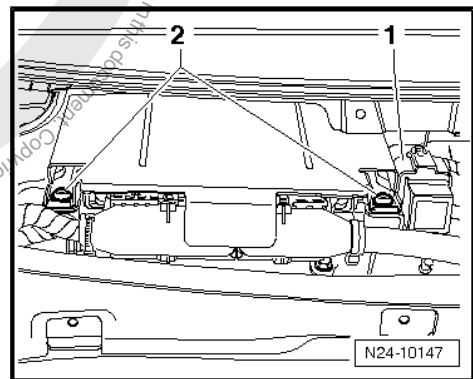
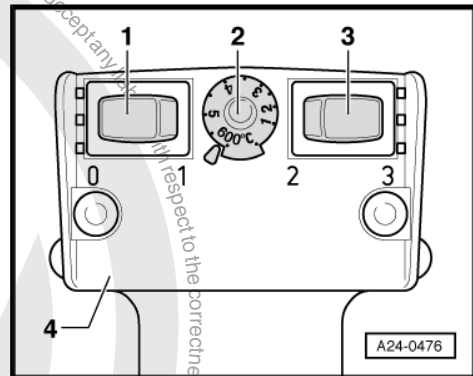
WARNING

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.

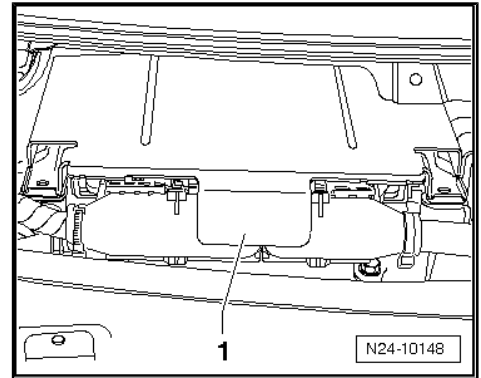
The procedure for the second shear-head bolt is exactly the same.

- Pull connector -1- off heated windscreen control unit -J505- .

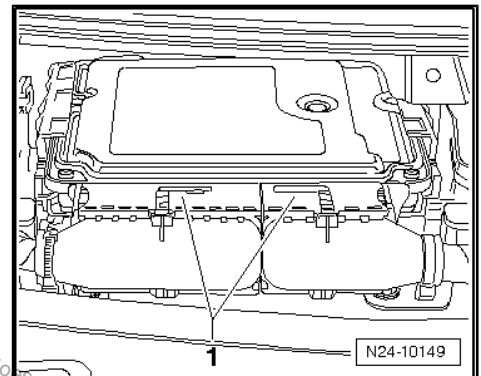




- Lift cover -1- and pull it forwards.

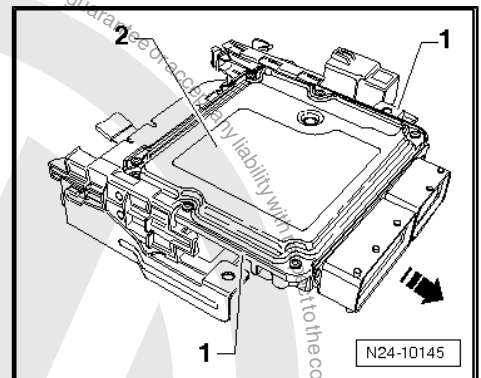


- Slide connector locking devices -1- on engine control unit outwards and pull off both connectors.
- Remove retainer frame with engine control unit from plenum chamber.

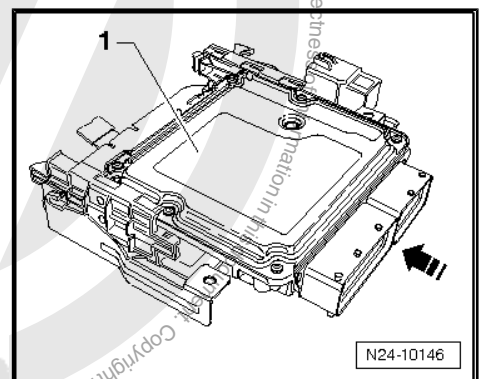


- Press locking device -1- outwards and slide engine control unit -2- in -direction of arrow-.

Installing



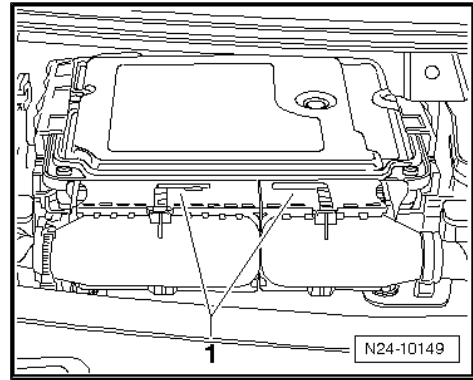
- Slide engine control unit -1- into retaining frame in -direction of arrow-.
- Fit retainer frame with engine control unit onto retainer in plenum chamber.



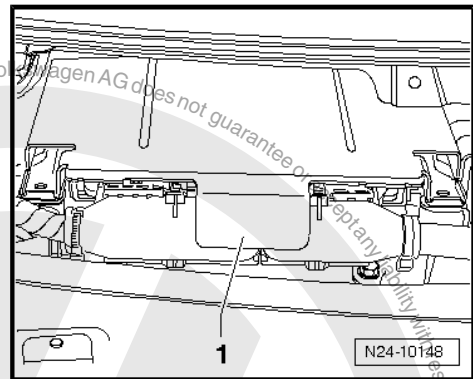
Specified torque of securing nuts for retainer: 6 Nm.



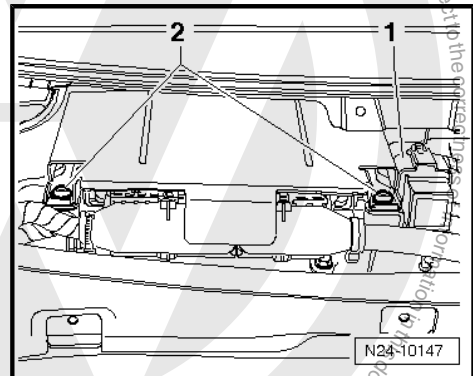
- Fit connectors to engine control unit and slide locking devices
-1- inwards.



- 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 Exhaust system

Assembly overview - front exhaust pipe with catalytic converter
Golf, Golf Plus, Touran, Passat ⇒ [page 255](#) .

Assembly overview - front exhaust pipe with particulate filter Golf,
Golf Plus, Touran, Passat ⇒ [page 256](#) .

Assembly overview - silencers (vehicles with front-wheel drive)
Golf, Golf Plus, Touran ⇒ [page 258](#) .

Assembly overview - silencer with mountings (vehicles with four-
wheel drive) ⇒ [page 262](#) .

Assembly overview - silencers (Passat) ⇒ [page 261](#) .

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.
- Installation position of clamp ⇒ [page 256](#) .

5 - To front silencer

6 - 25 Nm

7 - Mounting

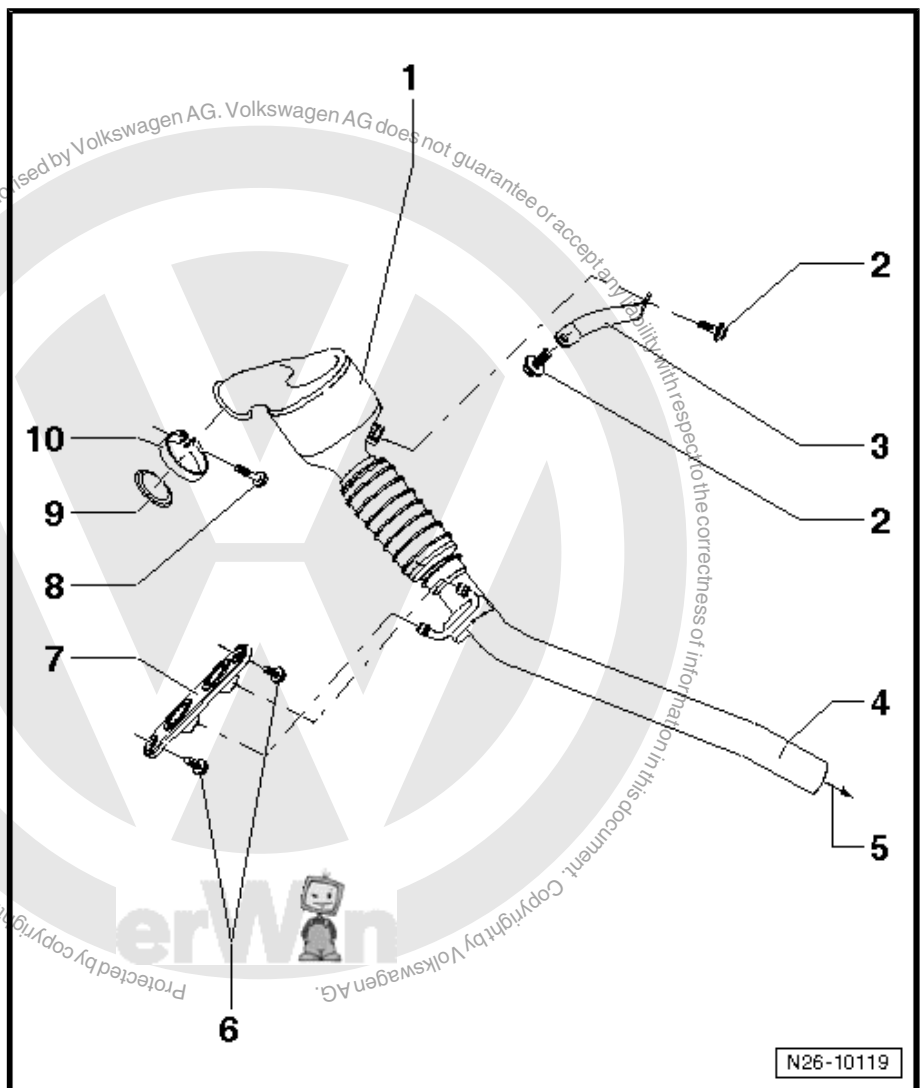
- Renew if damaged.

8 - 7 Nm

9 - Seal

- Note installation position.

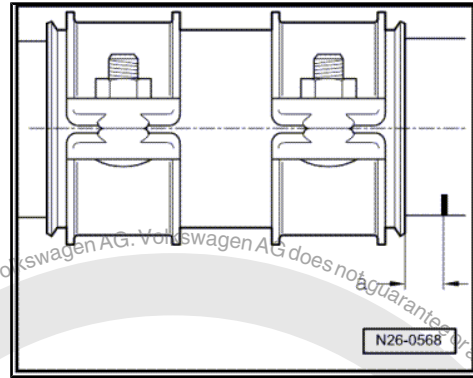
10 - Clip





Installation position of clamp

Position clamp at distance -a- = 5 mm from marking on front exhaust pipe.



1.2 Assembly overview - front exhaust pipe with particulate filter

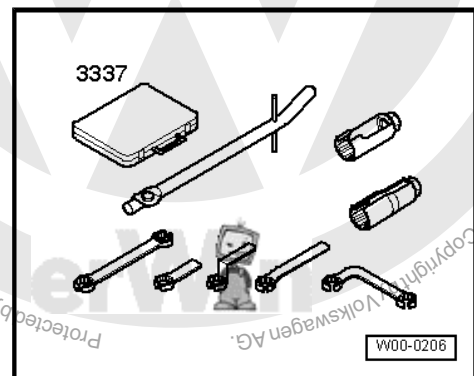


Note

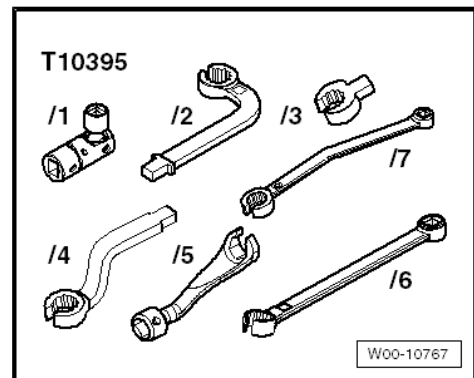
If the particulate filter or the exhaust gas pressure sensor 1 - G450- is changed, the exhaust gas pressure sensor 1 -G450- must always be adapted using diagnosis tester : Guided functions; adapting exhaust pressure sensor 1 -G450- .

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set -3337



- ◆ Tool set -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 - Bracket

- For control lines

4 - 10 Nm

5 - Control line, 45 Nm

6 - Lambda probe -G39- , 50 Nm

- Grease only the threads 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 bank 2 -G448- , 45 Nm

- Lubricate thread of sender using high-temperature paste -G 052 112 A3-

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 .

9 - Front exhaust pipe

10 - Marking

- For clamp.
- Installation position of clamp ⇒ [page 258](#) .

11 - To front silencer

12 - 25 Nm

13 - Mounting

- Renew if damaged.

14 - Temperature sender after particulate filter -G527-

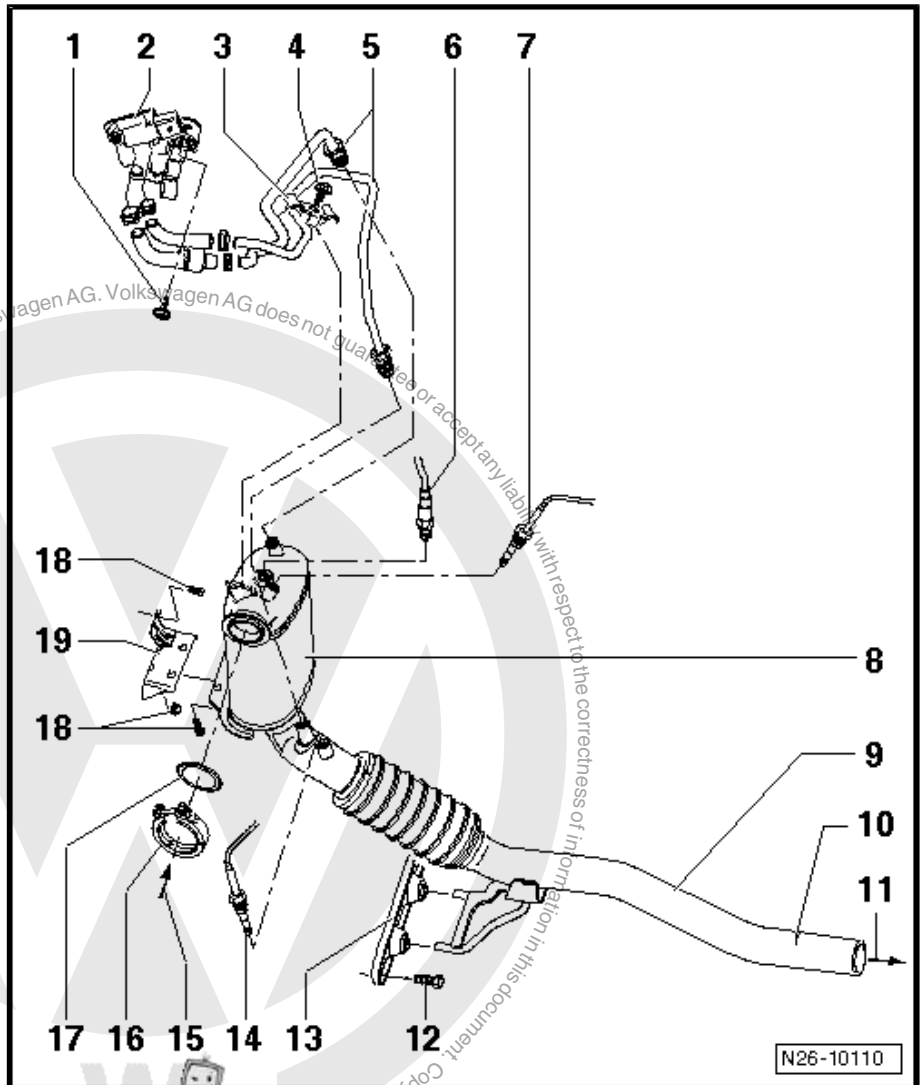
- 45 Nm
- Lubricate thread of sender using high-temperature paste -G 052 112 A3-

15 - From turbocharger

16 - Clamp, 7 Nm

17 - Seal

- Renew.
- Note installation position.





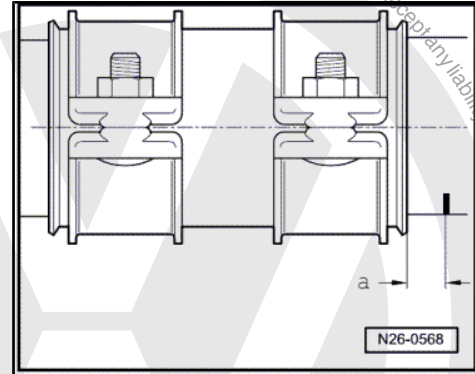
18 - 40 Nm

19 - Bracket

- Bolted to cylinder head.

Installation position of clamp

- Position double clamp -a- = 5 mm from marking on front exhaust pipe of particulate filter.



1.3 Assembly overview silencer with mountings (vehicles with front wheel drive)

1 - 25 Nm

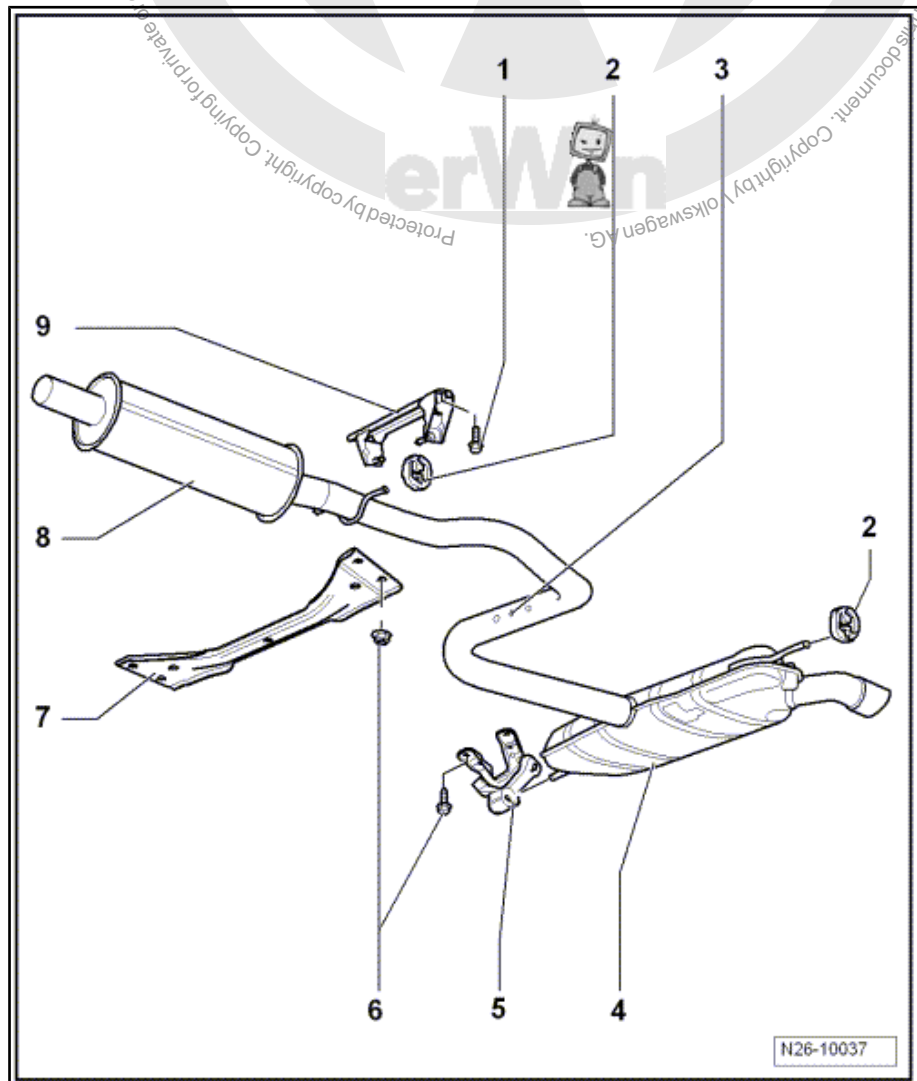
- Renew.

2 - Retaining ring

- Renew if damaged.

3 - Separating point

- Marked by indentation on exhaust pipe
- During production, front and rear silencers are installed as a single component. For repairs, front and rear silencers are supplied separately.
- The connection is made with a clamp.
- Separating exhaust end pipe ⇒ [page 259](#)
- Installation position of rear clamp (repair double clamp) ⇒ [page 259](#).
- Evenly tighten threaded connections of clamping sleeve (repair double clamp)
- Specified torques for clamp (repair double clamp): M8 = 25 Nm, M10 = 40 Nm
- Before tightening, align cold exhaust system free of tension ⇒ [page 262](#)





4 - Rear silencer

5 - Mounting

- Renew if damaged.

6 - 25 Nm

7 - Tunnel bridge

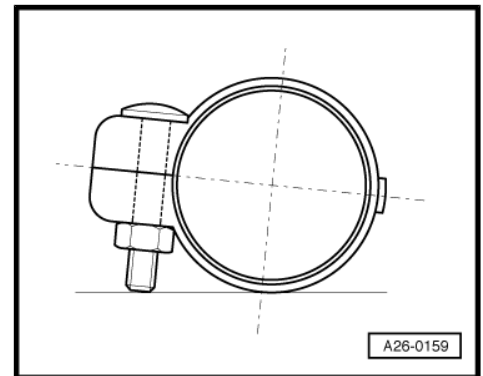
8 - Front silencer

9 - Mounting

- Renew if damaged.

Installation position of rear clamp (repair double clamp)

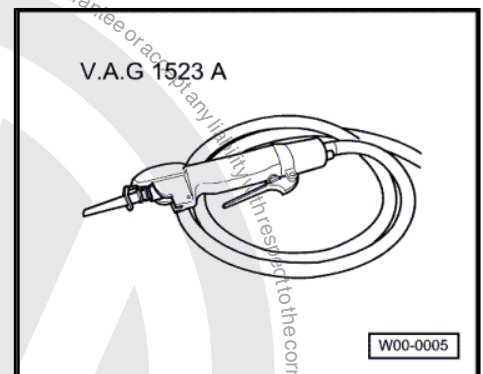
- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.
- Bolt connection faces to left.



1.3.1 Separating front and rear silencers

Special tools and workshop equipment required

- ◆ Pneumatic sabre saw -V.A.G. 1523 A-



- ◆ Eye protection

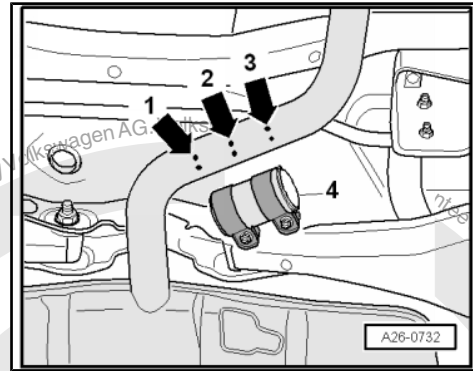
Procedure



WARNING
Wear eye protection.



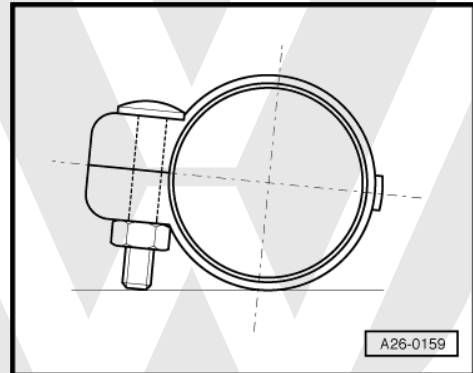
- Cut exhaust end pipe at right angles at separating point -arrow 2-.
- When installing, position repair double clamp -4- at side markings -arrow 1- and -arrow 3-.



- Install repair double clamp so that end of bolt does not extend beyond lower edge of clamp.
- Bolted connection faces rear.
- Align cold exhaust system free of stress => [page 262](#) .
- Tighten bolts on repair double clamp.

Tightening torque M8: 25 Nm

Specified torque, M10: 40 Nm





1.4 Assembly overview - silencers (Passat)

1 - From front exhaust pipe

2 - Clamp

- Before tightening, align cold exhaust system free of tension ⇒ [page 262](#)
- Tighten bolted connections evenly.
- Specified torque: M8 = 25 Nm, M10 = 40 Nm.

3 - Front silencer

4 - Mounting

- Renew if damaged.

5 - 25 Nm

- Renew.

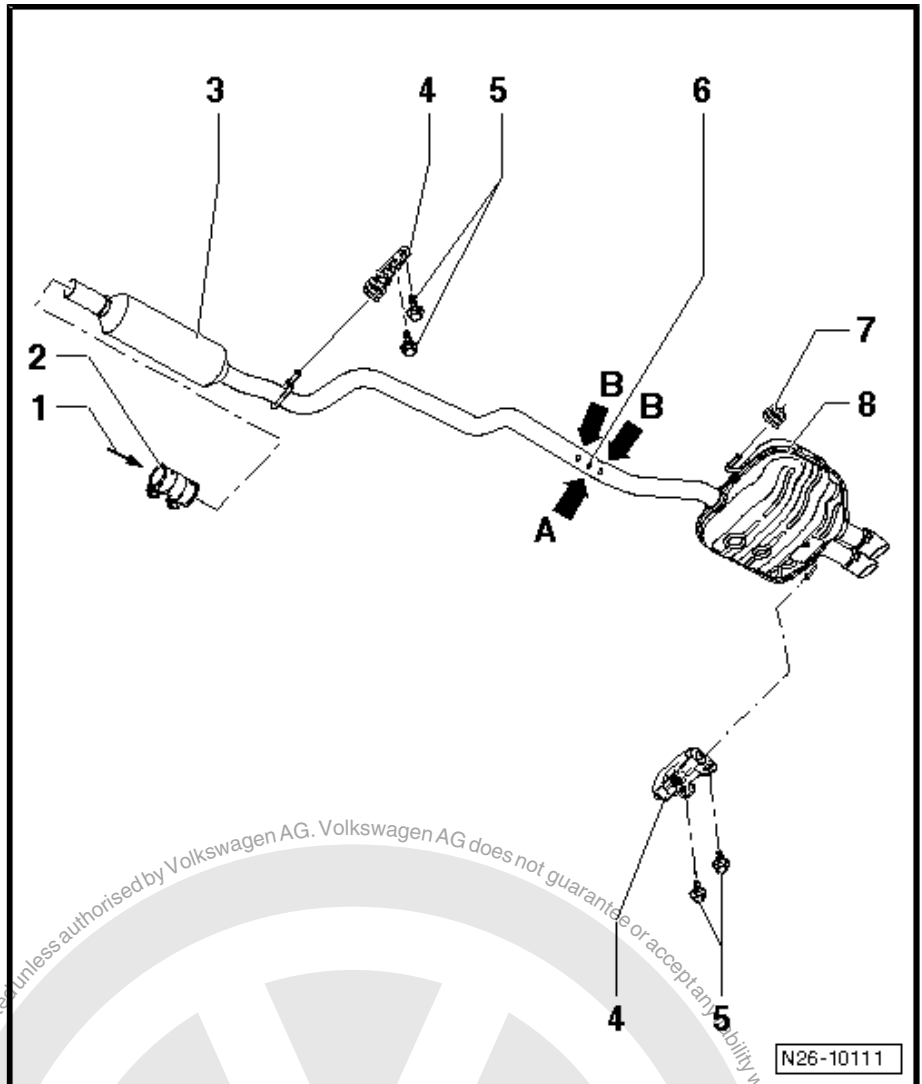
6 - Separating point

- Marked by impressions on exhaust pipe.
- During production, front and rear silencers are installed as a single component. In event of repair, front and rear silencers are supplied individually and with a clamping sleeve for purposes of connection
- Cut through exhaust pipe at right angles at separating point -arrow A- using e.g. body saw -V.A.G 1523- (wear eye protection)
- During installation, position repair double clamp at side markings -arrows B-
- Evenly tighten threaded connections of clamping sleeve (repair double clamp)
- Specified torques for clamp (repair double clamp): M8 = 25 Nm, M10 = 40 Nm.
- Before tightening, align cold exhaust system free of tension ⇒ [page 262](#)

7 - Retaining ring

- Renew if damaged.

8 - Rear silencer



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1.5 Assembly overview - silencer with mountings (vehicles with four-wheel drive)

1 - From particulate filter

2 - Clamp

- Align exhaust system free of stress before tightening clamp ⇒ [page 262](#) .

- Installation position ⇒ [page 262](#) .

- Tighten bolted connections evenly.

3 - Bracket

- For retaining ring

4 - 25 Nm

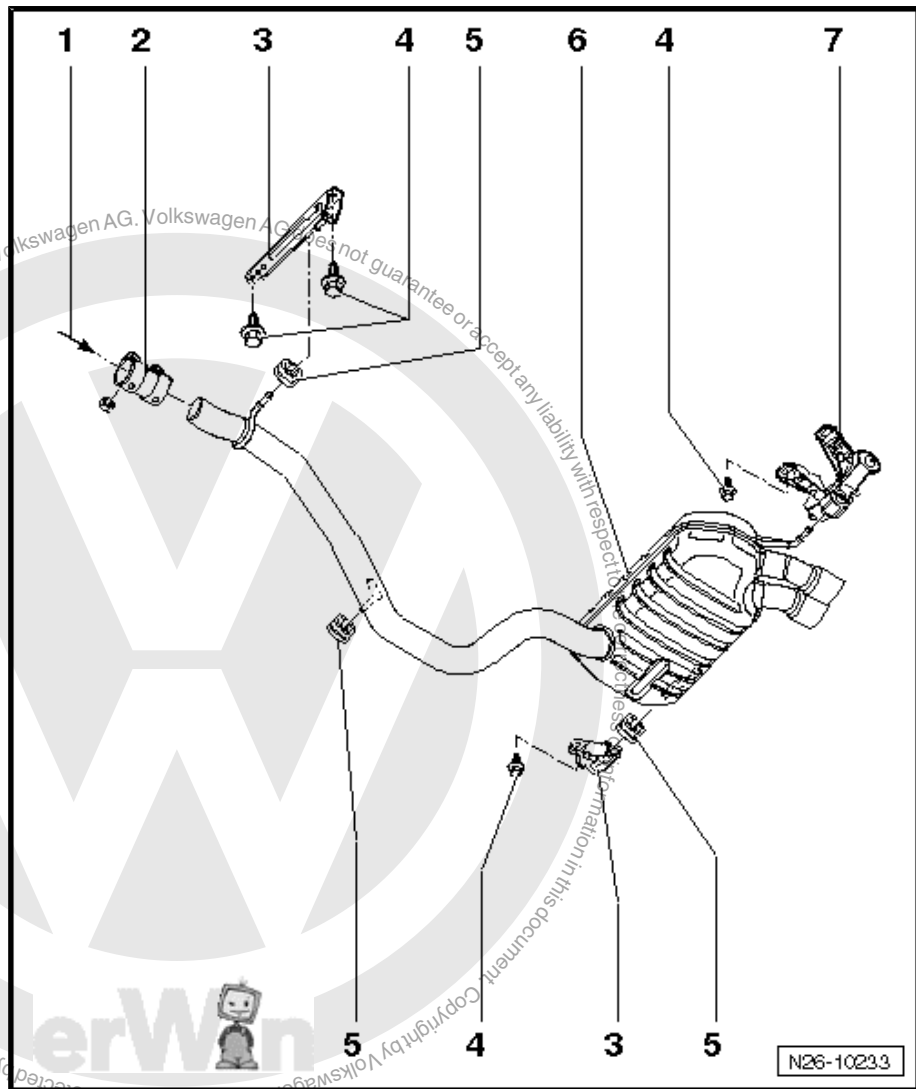
5 - Retaining ring

- Renew if damaged.

6 - Rear silencer

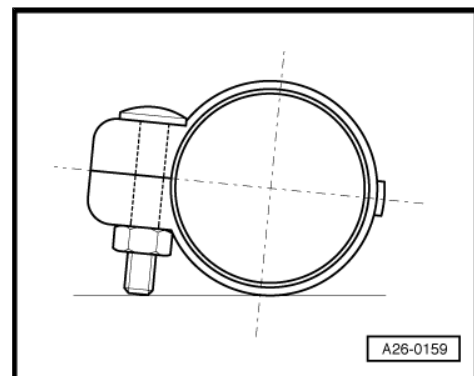
7 - Mounting

- Renew if damaged.



Installation position of clamp

- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.



1.6 Aligning exhaust system free of stress

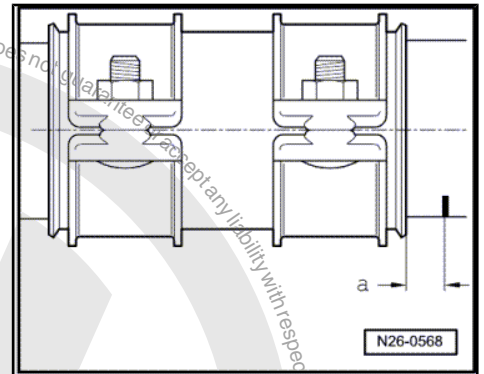
Prerequisite

- Engine must be cold



Procedure

- Loosen bolted connection of clamp between front exhaust pipe and silencer.
- Position clamp at distance -a- = 5 mm from marking on front exhaust pipe and lightly tighten front bolted connection.

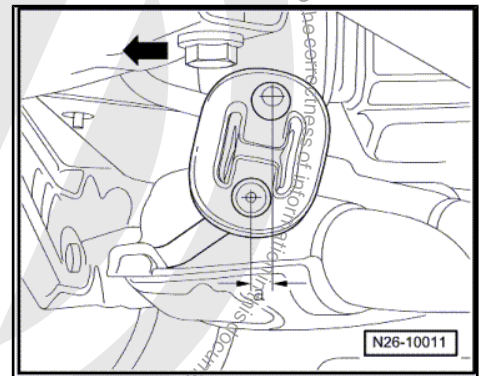


- Push exhaust end pipe with silencer forwards into clamp until dimension -a- 15...17 mm is attained between mounting attachment points for body and rear silencer. -Arrow- points in direction of travel.
- Align rear silencer horizontally.
- With parts in this position, tighten bolted connections of clamp.

Specified torque, M8: 25 Nm

Specified torque, M10: 40 Nm

- Once clamp has been tightened, check distance -a- and correct if necessary.





2 Exhaust gas recirculation system

2.1 Assembly overview - parts of exhaust gas recirculation

Engine codes AVQ, BKC, BRU, BXE, BXF ⇒ [page 264](#)

Engine code BJB ⇒ [page 266](#)

Engine codes BLS and BXJ ⇒ [page 267](#)

Check mechanical exhaust gas recirculation valve AVQ, BKC, BRU, BXE, BXF ⇒ [page 268](#) .

2.1.1 Engine codes AVQ, BKC, BRU, BXE and BXF



Note

- ◆ *The exhaust gas recirculation system is activated by the diesel direct injection system control unit -J248- via exhaust gas recirculation valve -N18- (electric-pneumatic) to the exhaust gas recirculation valve (mechanical).*
- ◆ *The electro-pneumatic exhaust gas recirculation valve -N18- 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.*





1 - 22 Nm

2 - Intake manifold

- With exhaust gas recirculation valve and intake manifold flap motor -V157- .
- Tighten securing bolts to 22 Nm.

3 - Seal

- Renew.

4 - Connecting pipe

5 - Radiator

- For exhaust gas recirculation.

6 - 10 Nm

7 - Exhaust manifold

8 - Connecting pipe

Tightening sequence:

- 1. Attach to bypass flap
- 2. Attach to manifold
- 3. Tighten to bypass flap
- 4. Tighten to manifold

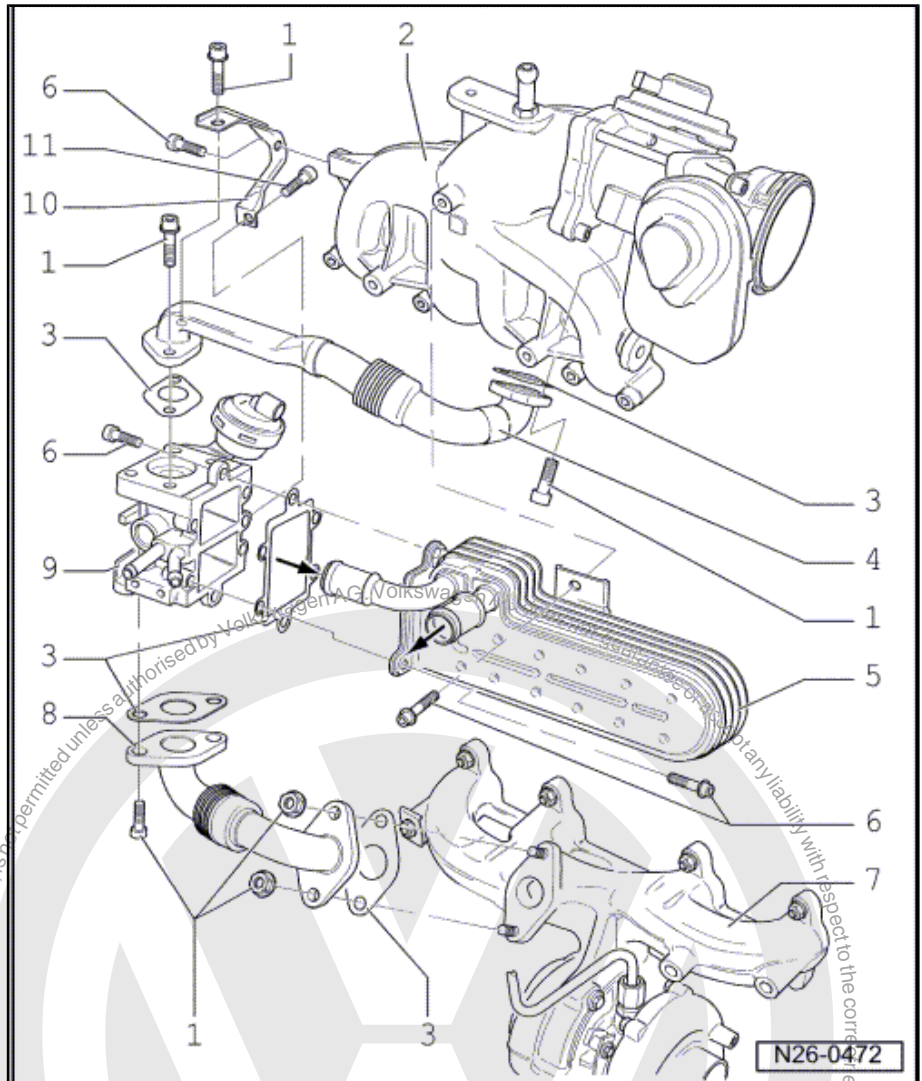
9 - Bypass flap

- When activated, directs exhaust gas to exhaust gas recirculation cooler via the electro-pneumatic exhaust gas recirculation valve -N18-

10 - Bracket

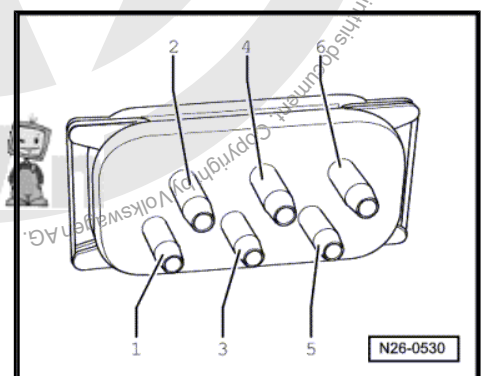
- For bypass flap

11 - 5 Nm



Connector assignment on solenoid valve block, engine codes BKC, BRU, BXE and BXF

- 1 - Vacuum connection (on non-return valve for brake servo)
- 2 - Exhaust gas recirculation valve
- 3 - Bypass flap
- 4 - Air filter
- 5 - Vacuum reservoir
- 6 - Vacuum unit on turbocharger





2.1.2 Engine code BJB



Note

- ◆ The exhaust gas recirculation system is activated by the diesel direct injection system control unit -J248- via exhaust gas recirculation valve -N18- (electric-pneumatic) to the exhaust gas recirculation valve (mechanical).
- ◆ The electro-pneumatic exhaust gas recirculation valve -N18- 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.

1 - Intake manifold

- With exhaust gas recirculation valve and intake manifold flap.
- Tighten securing bolts to 22 Nm.

2 - From charge air cooler

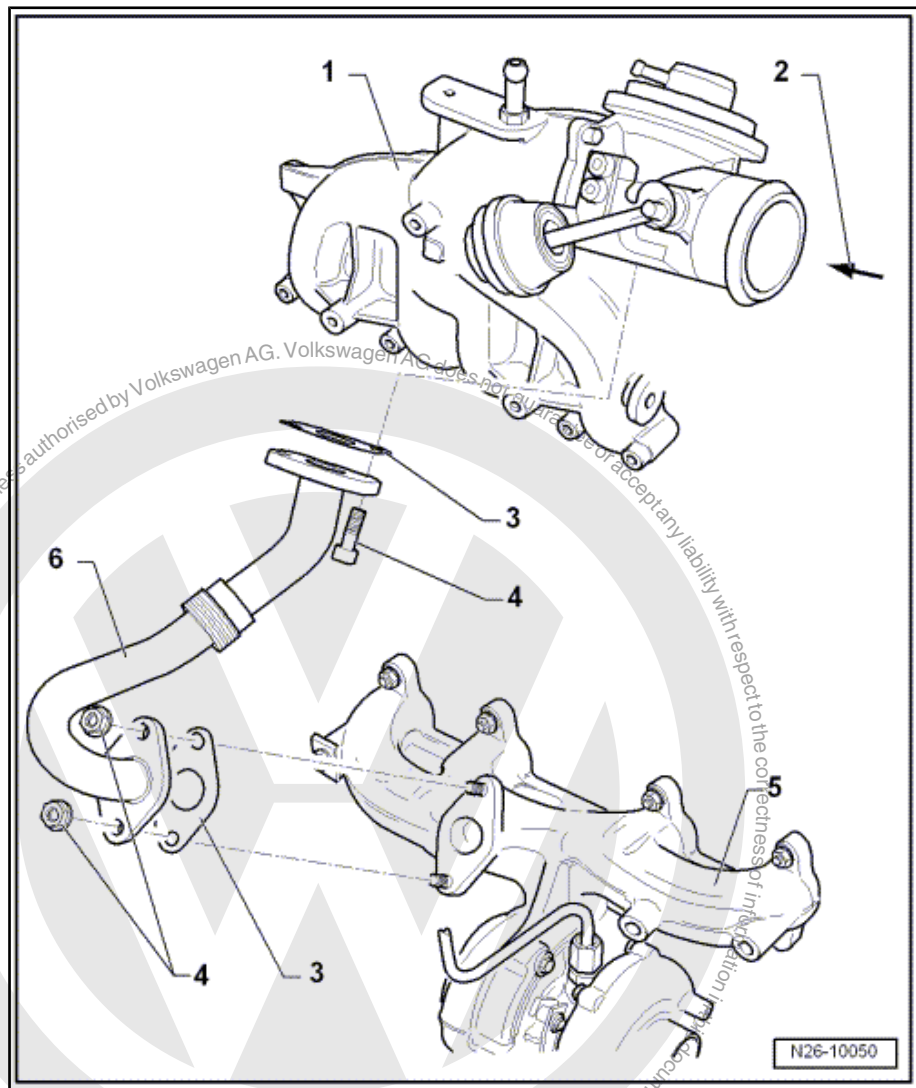
3 - Seal

- Renew.

4 - 22 Nm

5 - Exhaust manifold

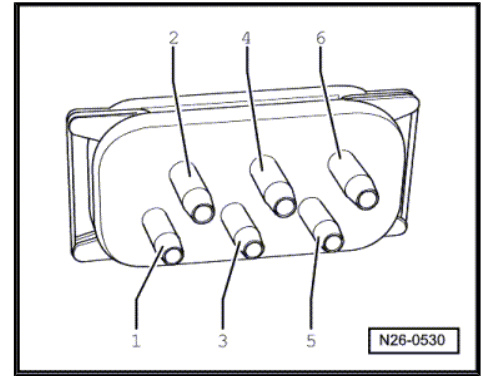
6 - Connecting pipe





Pin assignment on solenoid valve block for engine code BJB

- 1 - Vacuum connection (on non-return valve for brake servo)
- 2 - Exhaust gas recirculation valve
- 3 - Intake manifold flap
- 4 - Air filter
- 5 - Vacuum reservoir
- 6 - Vacuum unit on turbocharger



2.1.3 Engine codes BLS and BXJ

Note

- ◆ The exhaust gas recirculation system is activated by the diesel direct injection system control unit -J248- via the exhaust gas recirculation potentiometer -G212- .
- ◆ Renew self-locking nuts.

- 1 - Coolant hose
 - To connection

- 2 - Seal
 - Renew.

- 3 - 22 Nm

- 4 - Connecting pipe

- 5 - From exhaust manifold

- 6 - 25 Nm
 - Renew.

- 7 - To connection for exhaust gas recirculation valve -N18- with exhaust gas recirculation potentiometer -G212-
 - Assembly overview - intake manifold => [page 237](#) .

- 8 - Exhaust gas recirculation cooler

- 9 - 10 Nm

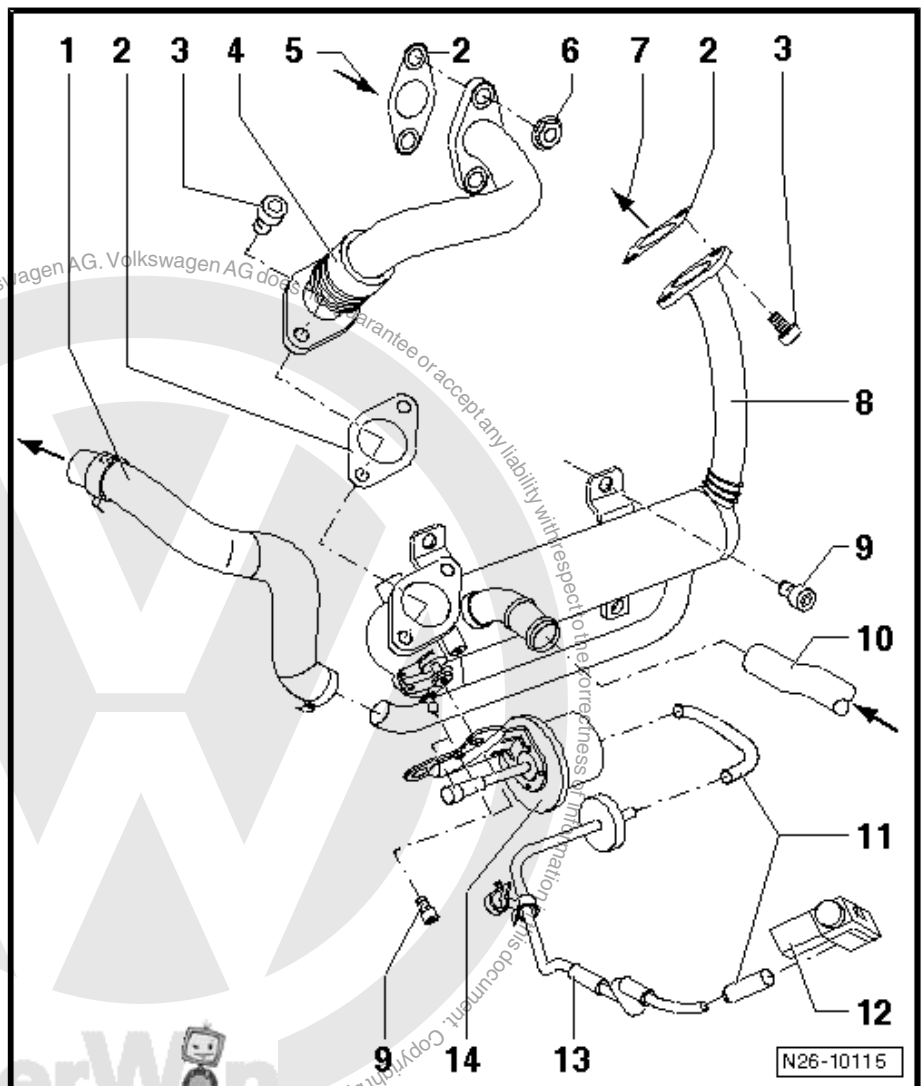
- 10 - Coolant hose
 - From rear coolant pipe

- 11 - Connecting hose

- 12 - Exhaust gas recirculation cooler changeover valve - N345-

- 13 - Connecting pipe

- 14 - Vacuum actuator
 - For bypass flap.
 - Renew only together



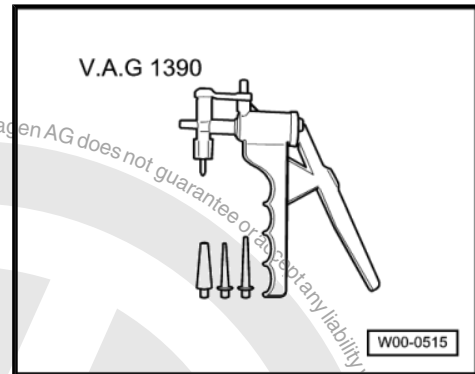


with exhaust gas recirculation cooler

2.2 Checking mechanical exhaust gas recirculation valve

Special tools and workshop equipment required

- ◆ Hand vacuum pump with accessories -V.A.G 1390-



Test procedure

- Pull vacuum hose off exhaust gas recirculation valve.
- Connect hand vacuum pump with accessories -V.A.G 1390- to valve.
- Operate hand vacuum pump a few times.
- Pull hand vacuum pump hose off exhaust gas recirculation valve. The diaphragm rod must audibly return to its original position.



28 – Glow plug system

1 Checking glow plug system

Removing, installing and checking glow plugs ⇒ [page 269](#)

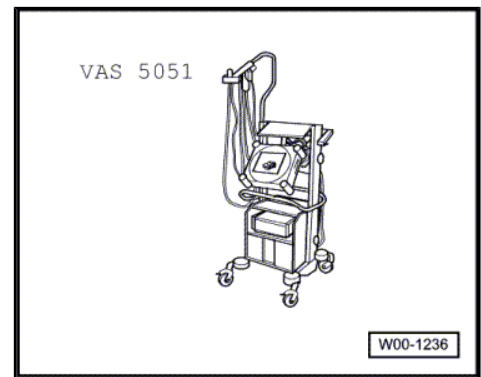
Characteristics of ceramic glow plugs ⇒ [page 270](#)

Removing, installing and checking ceramic glow plugs ⇒ [page 271](#)

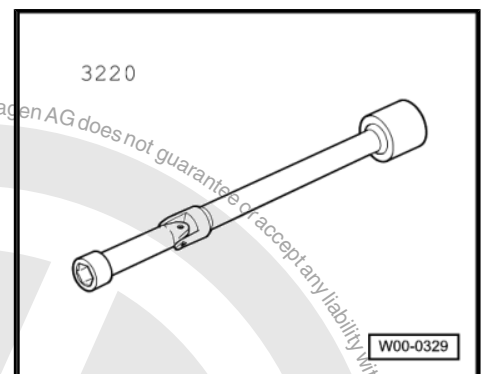
1.1 Removing, installing and checking glow plugs

Special tools and workshop equipment required

- ◆ Vehicle diagnosis tester



- ◆ Jointed spanner -3220-



Test requirements

- Battery voltage at least 11.5 V
- Ignition switched on

Checking

The glow plug system is monitored by the engine control unit's self-diagnosis system.

The necessary checks are performed with Guided fault finding.

Removing glow plugs

- Remove glow plugs using U/J extension and socket -3220- .

Installing glow plugs

- Install glow plugs using jointed extension and socket -3220- .
Specified torque: 15 Nm



1.2 Characteristics of ceramic glow plugs



WARNING

The ceramic glow plugs ⇒ [page 270](#) 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 no damage is apparent. It is absolutely necessary to follow the installation instructions, otherwise the heater pin of the glow plug can break and cause engine damage.

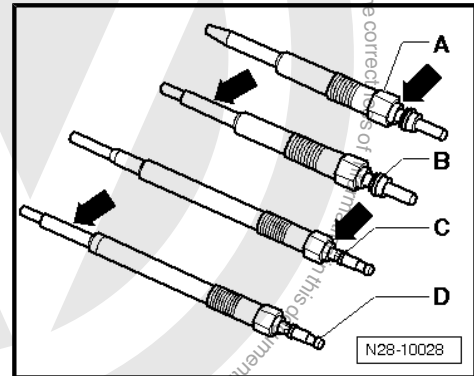
Visual features of ceramic glow plugs

Vehicles with 2 valves per cylinder head

- A- = Metal glow plug, colour-coded -arrow-.
- B- = Ceramic glow 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 plug with support tube -arrow-, not colour-coded.



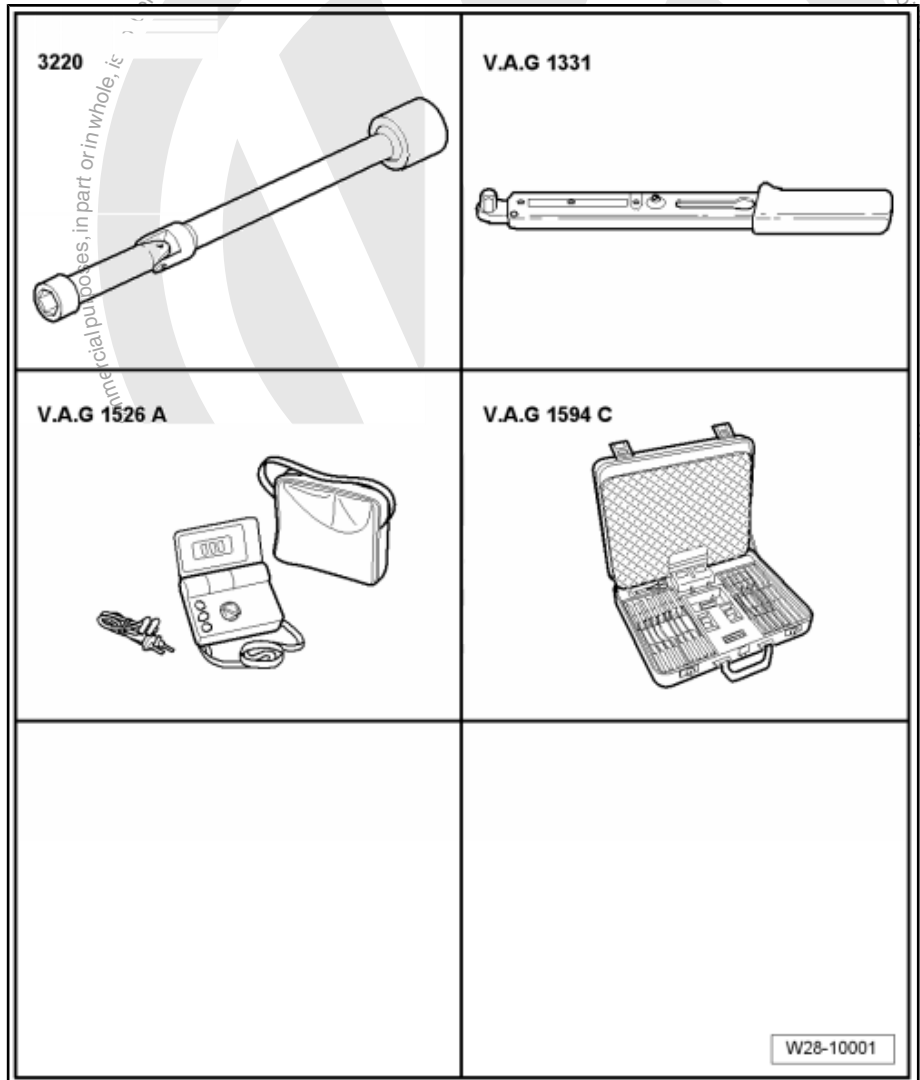
Remove and install or check ceramic glow plugs ⇒ [page 271](#) .



1.3 Removing, installing and checking ceramic glow plugs

Special tools and workshop equipment required

- ◆ Jointed spanner -3220-
- ◆ Torque wrench (5... 50 Nm) -V.A.G 1331-
- ◆ Hand-held 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.*

- Pull connectors off ceramic glow plugs.
- Remove ceramic glow plugs using U/J extension and socket, 10 mm -3220- .

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

Do not oil or grease thread of cylinder head bore or of ceramic glow plugs.

- Screw ceramic glow plugs into cylinder head by hand using U/ J extension and socket, 10 mm -3220- .
- Then tighten the ceramic glow plugs. Specified torque: 15 Nm.



WARNING

- ◆ ***After installing and before the engine is started, perform a resistance test on all ceramic glow plugs when engine is cold.***
- ◆ ***If the defective ceramic glow plug is broken, remove all fragments from the engine, otherwise these can cause damage to the engine.***

- ◆ Specification: max. 1 Ω
- If the specification is exceeded, renew the defective ceramic glow plug.

