Workshop Manual

Eos 2006 ➤ , Golf 2004 ➤ , Golf 2009 ➤ , Golf Plus 2005 ➤ , Golf Plus 2009 ➤ , Passat 2006 ➤ , Passat 2011 ➤ , Passat Variant 2011 ➤ , Scirocco 2009 ➤ , Tiguan 2008 ➤

4-cylinder injection engine (1.4 l direct injection engine, turbocharger)									
Engine ID	CAX A	CMS B							

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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

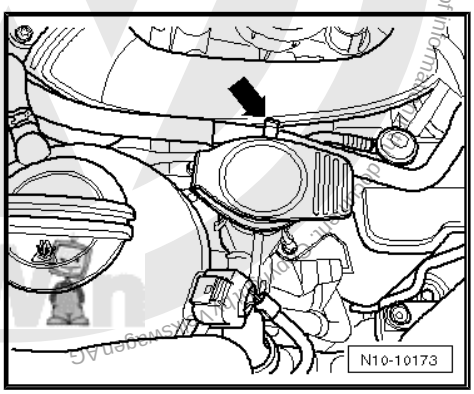
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Engine number ⇒ page 1

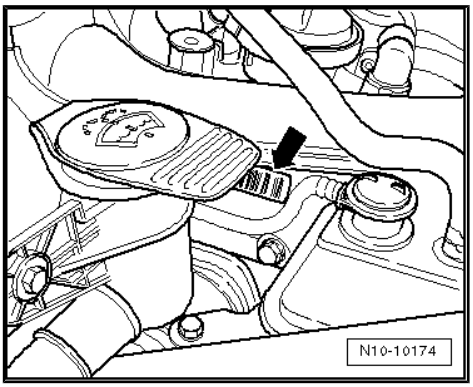
Engine data ⇒ page 1

1.1 Engine number

– Detach hose from activated charcoal filter at hose clip -arrow-.



Engine code and engine number can be found on the sticker -arrow- on the control housing.



The engine code is also on the vehicle data sticker and on the crankcase above the gearbox.

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

Vehicles with four digit engine codes

Starting with the letter “C”, new four digit engine codes have been introduced. The first 3 digits denote the mechanical design of the engine and are stamped on the engine as before. The fourth digit denotes the performance and torque rating of the engine and depends on the engine control unit - J623- . The four digit engine code can be found on the identification plate, the vehicle data sticker and on the engine control unit.

Note

Fitting locations of vehicle data sticker ⇒ Maintenance ; Booklet ; Vehicle data sticker.

1.2 Engine data

Engine codes		CAXA
Manufactured		
	Golf 2004►	07.07►
	Golf Plus 2005►	07.07►
	Passat 2006►	11.07►
	Eos 2006► (up to to 10.09 EU4)	11.07►
Emission standards		EU4

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Engine codes		CAXA
Capacity	cm^3	1390
Output	kW at rpm	90/5000
Torque	Nm at rpm	200/1500-4000
Bore	Diameter, mm	76.5
Stroke	mm	75.6
Compression ratio		10
RON	min.	95 unleaded
Injection, ignition		Motronic MED 17
Firing order		1-3-4-2
Type of mixture formation		Homogeneous
Turbocharging/supercharging		Turbocharger

Engine codes		CAXA	CMSB
Manufactured			
	Golf 2009►	07.08►	---
	Golf Plus 2009►	02.09►	---
	Scirocco 2009►	11.08►	06.11►
	Eos 2006► (from 11.09 EU5)	11.07►	---
	Tiguan 2008►	07.10►	---
	Passat 2006►	11.07►	---
	Passat 2011►	11.10►	---
Emission standards		EU5	EU4
Capacity	cm^3	1390	1390
Output	kW at rpm	90/5000	90/5000
Torque	Nm at rpm	200/1500-4000	200/1500-4000
Bore	Diameter, mm	76.5	76.5
Stroke	mm	75.6	75.6
Compression ratio		10	10
RON	min.	95 unleaded	95 unleaded
Injection, ignition		Motronic MED 17	Motronic MED 17
Firing order		1-3-4-2	1-3-4-2
Type of mixture formation		Homogeneous	Homogeneous
Turbocharging/supercharging		Turbocharger	Turbocharger

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10 – Removing and installing engine

1 Removing and installing engine (Golf, Golf Plus, Eos, Scirocco)

Removing engine ⇒ page 3 .

Securing engine to assembly stand ⇒ page 11 .

Installing engine ⇒ page 11 .

Specified torques ⇒ page 14 .

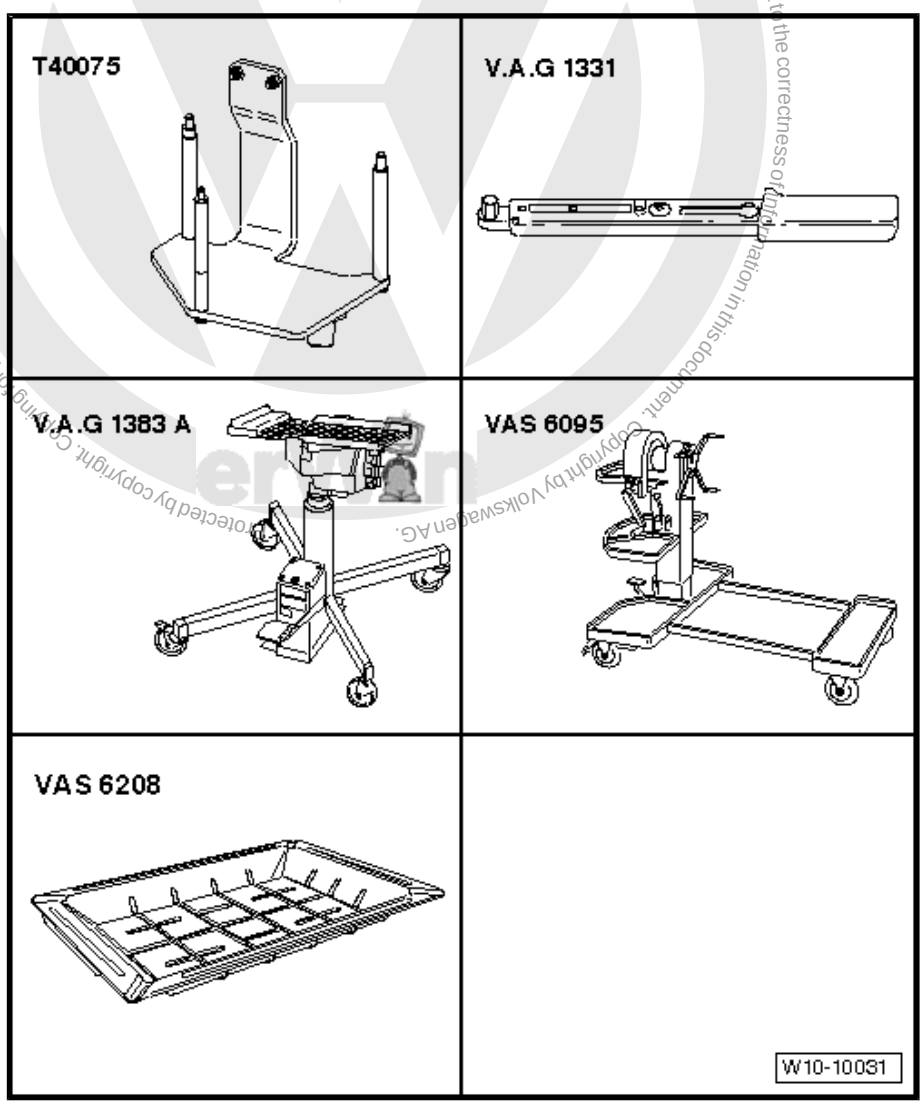
Assembly mountings ⇒ page 14

Additional information and assembly work for vehicles with air conditioner ⇒ page 15 .

1.1 Removing engine

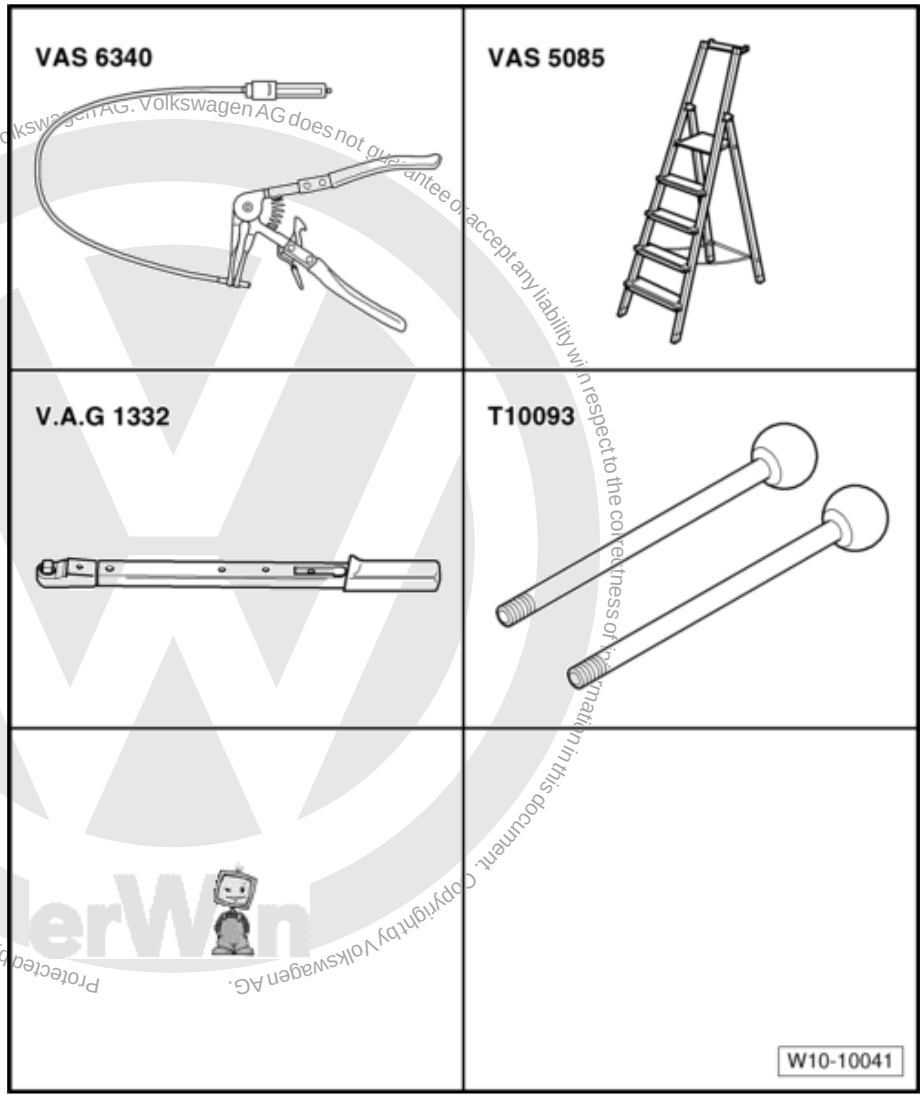
Special tools and workshop equipment required

- Engine support - T40075- with adapters /1, /2, /3
- Torque wrench (5…50 Nm) - V.A.G 1331-
- Engine and gearbox jack - V.A.G 1383 A-
- Engine and gearbox support - VAS 6095-
- Drip tray for workshop hoist - VAS 6208-



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- Hose clip pliers - VAS 6340-
- Stepladder - VAS 5085-
- Torque wrench (40…200 Nm) - V.A.G. 1332-
- Guide rods - T10093-



Note

Before carrying out further work, disconnect battery earth strap. Check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.

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– Remove securing bolts -1- from engine cover panel.

– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.

– Remove air filter ⇒ page 303 .

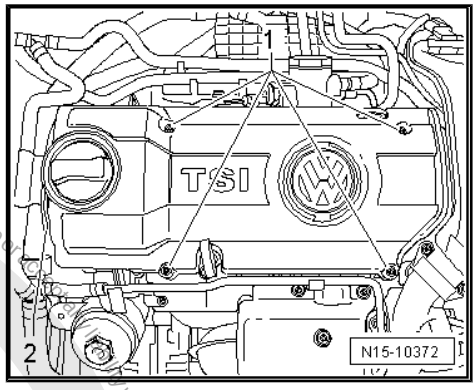
– Open and close expansion tank cap to release pressure in cooling system.

– Drain coolant ⇒ page 157 .

– Observe rules for cleanliness ⇒ page 211 .

– Separate fuel supply line -1- and line to activated charcoal filter -2-.

– Separate push-on couplings ⇒ page 178 .



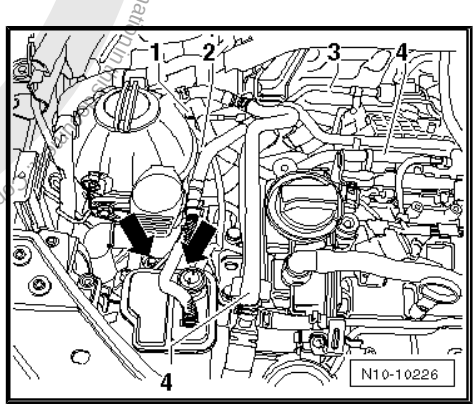
WARNING

Fuel supply lines are under pressure! Wear eye protection and gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

Golf, Golf Plus, Eos, Scirocco

– Remove hose -3- from activated charcoal filter system solenoid valve 1 - N80- to activated charcoal filter.

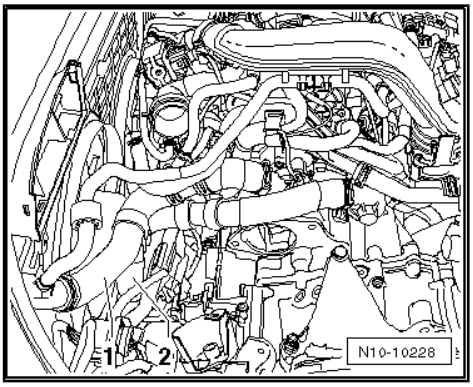
– Pull activated charcoal filter upwards and remove securing bolts -arrows- from bracket.



Continuation for all vehicles

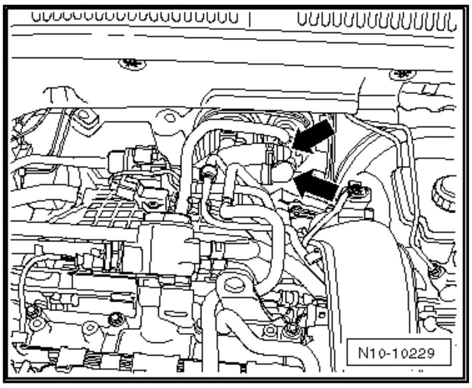
– Remove coolant hoses -4-.

– Release coolant hoses -1- and -2- at radiator and pull them off.

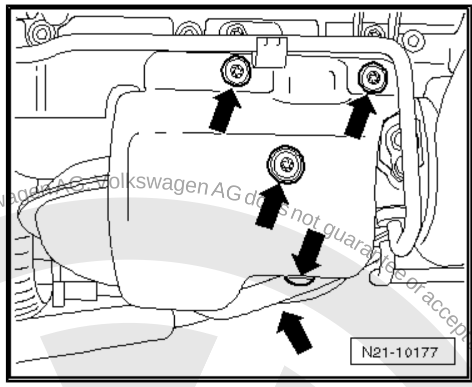


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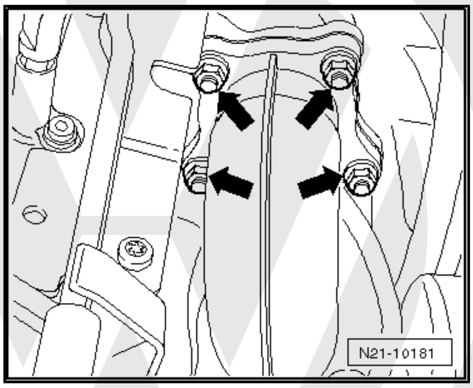
– Release coolant hoses at heat exchanger -arrows- and pull them off.



– Unscrew securing bolts -arrows- and remove heat shield from turbocharger.

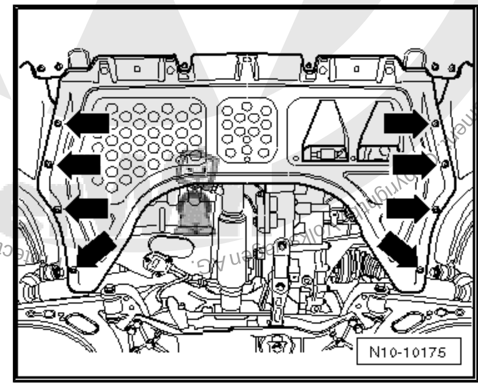


– Unbolt securing nuts at turbocharger -arrows-.



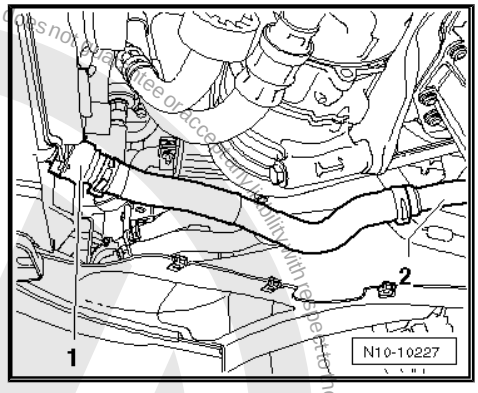
– Remove securing bolts -arrows- of engine splash protection.

– Remove front left and right wheel housing liners ⇒ General body repairs; Rep. gr. 66 ; Wheel housing liner; Removing and installing front wheel housing liner .

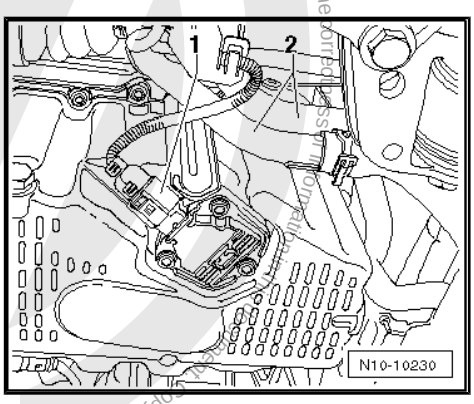


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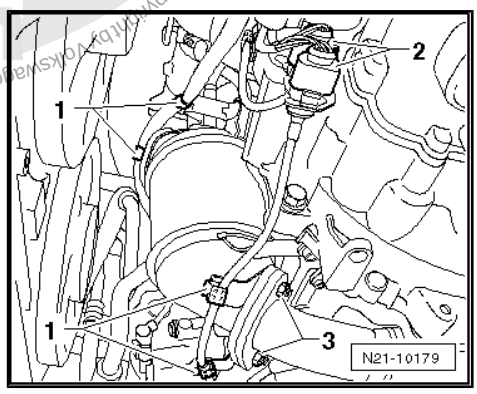
– Release coolant hose -1- at auxiliary radiator for charge air system and remove coolant pipe -2-.



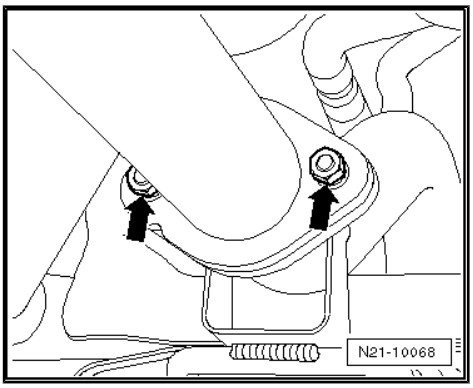
– Pull connector -1- off oil level and oil temperature sender - G266- .
– If an auxiliary heater is fitted, remove coolant pipes -2-.
– Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Lock carrier - service position .
– Unclip wiring -1- from catalytic converter.



– Disconnect connectors -2-.
– Unscrew securing nuts -3- and remove seal.
– Remove catalytic converter downwards.

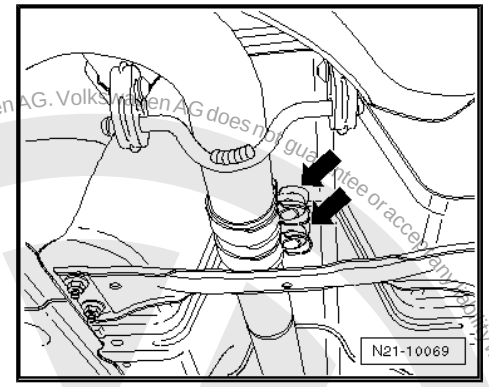


– Unbolt exhaust pipe together with decoupling element -arrows-.



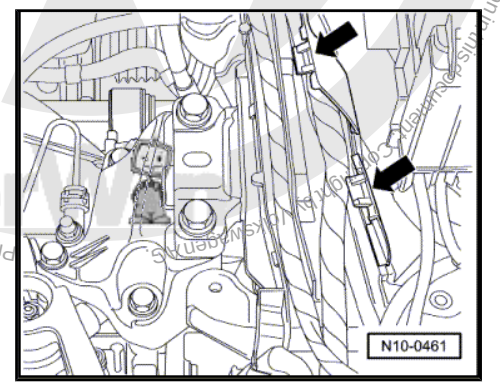
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– Loosen securing bolts of double clamp -arrows- and pull exhaust pipe to rear.



The engine is removed downwards together with the gearbox.

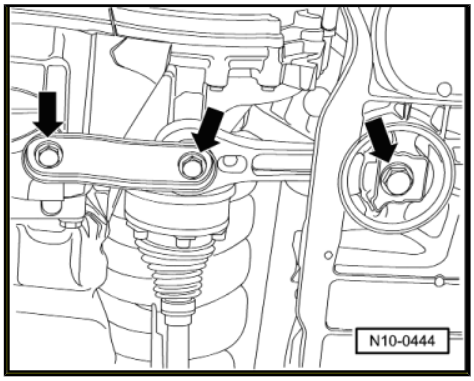
– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Removing and installing battery .
– All cable ties that are opened or cut through when the engine is removed must be renewed/replaced in the same position when the engine is installed.
– Disconnect all electrical wiring from gearbox, alternator and starter and lay to side.
– Pull off or disconnect all other electrical connections as necessary from engine and lay to side.
– Pull vacuum and breather hoses off engine.
– Pull connectors off thermal switch and radiator fan.
– Remove plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
– Remove engine control unit ⇒ page 326 .



– Open all line guide fasteners -arrows-.
– Remove wiring from engine control unit.
– Secure lines/wiring to engine with a cable tie.

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– Disconnect pendulum support -arrows-.



Vehicles with manual gearbox

– Unbolt selector mechanism from gearbox ⇒ 6-speed manual gearbox 02S; Rep. gr. 34 ; Repairing selector mechanism .

– Remove hydraulic clutch slave cylinder: ⇒ 6-speed manual gearbox 02S; Rep. gr. 30 ; Repairing clutch mechanism

Note

Do not depress clutch pedal.

– Remove right drive shaft, and unscrew left drive shaft from gearbox and tie up: ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with automatic gearbox

– Remove selector lever cable ⇒ 7-speed dual clutch gearbox 0AM; Rep. gr. 34 ; Removing and installing selector lever cable .

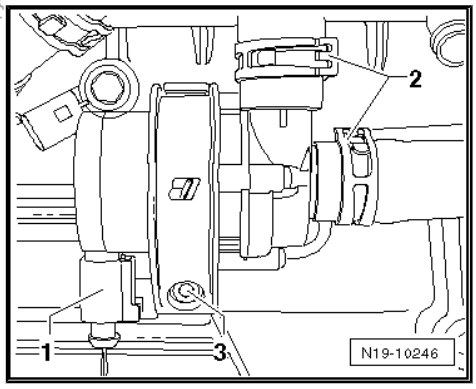
– Removing both drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Continuation for all vehicles

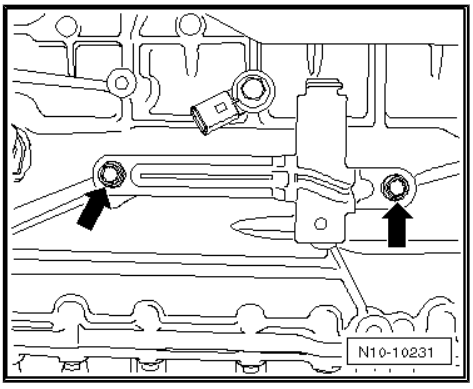
– Disconnect connector -1- from coolant circulation pump - V50- .

– Detach spring-type clips -2- and pull coolant hoses off.

– Unscrew securing bolt -3- and remove pump from bracket.



– Remove bracket for coolant circulation pump - V50- from crankcase -arrows-.



– Remove poly V-belt ⇒ page 51 .

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87

Note

The air conditioning system lines must not be opened.

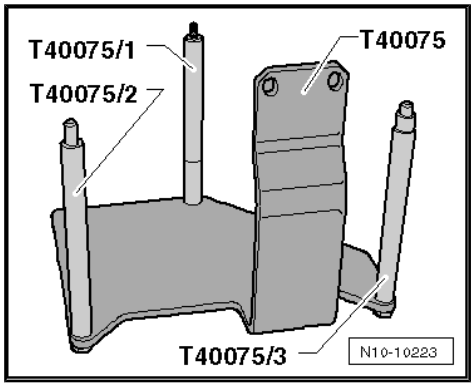
– Secure air conditioner compressor to lock carrier.

– Ensure that lines are not kinked.

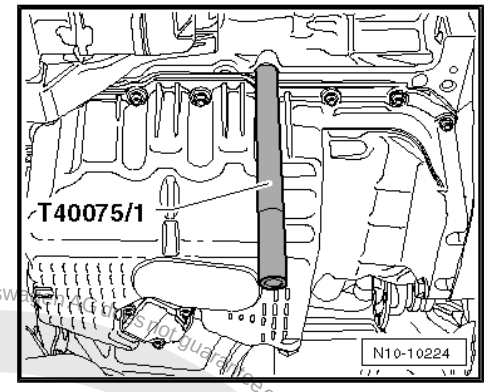
– Observe additional information and installation work ⇒ page 15 .

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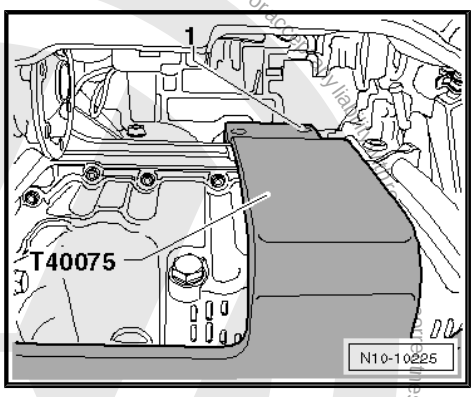
Engine support - T40075- with adapters -/1-, -/2- and -/3- is required to to lower engine with gearbox.



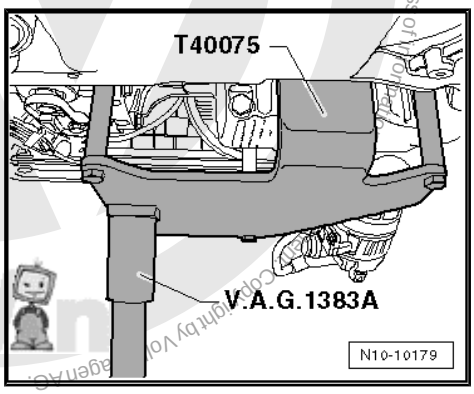
– Screw adapter - T40075/1- to stop into crankcase.
– Position the engine support - T40075- with adapters -/2- and -/3- on crankcase.
– Insert 2 x M10 nuts between crankcase and engine support - T40075- .



– Secure engine support - T40075- hand-tight to crankcase using an M8x35 bolt -1-.

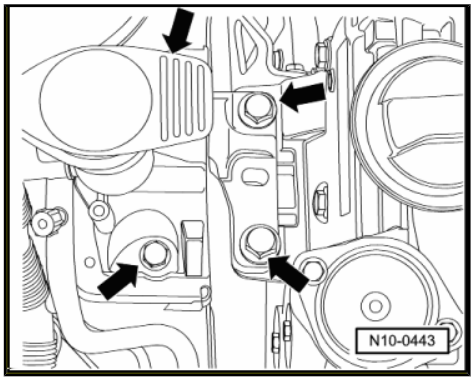


– Tighten all bolts on engine support - T40075- to 20 Nm.
– Lift engine and gearbox lightly using engine and gearbox jack - V.A.G 1383 A- .

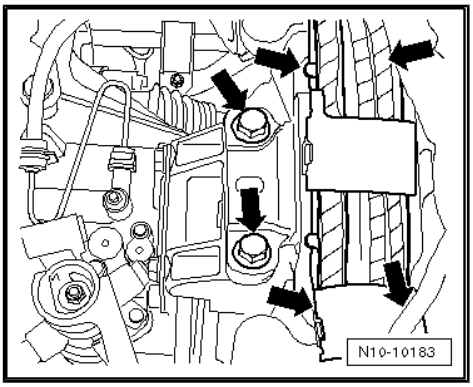


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– Unbolt engine side of assembly mounting from above -arrows-.



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



Note

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

– Carefully lower engine and gearbox.

1.2 Securing engine to assembly stand

Secure engine to engine and gearbox support - VAS 6095- to carry out repairs.

Procedure

– Unbolt gearbox.

– Secure engine on engine and gearbox support - VAS 6095- .

1.3 Installing engine

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

Caution

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.***
- ***To avoid damage to lines, ensure sufficient clearance from all moving or hot components.***

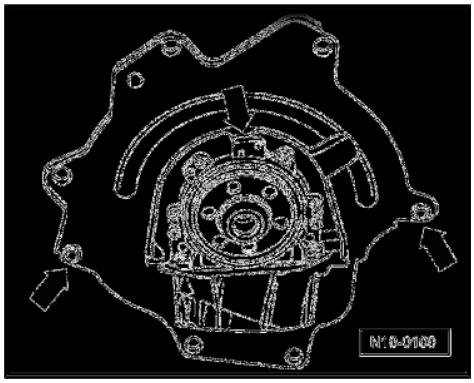
– Check clutch release bearing for wear and renew if necessary (vehicles with manual gearbox).

– Lightly grease clutch release bearing, release bearing guide sleeve and splines on input shaft with G 000 100 (vehicles with manual gearbox).

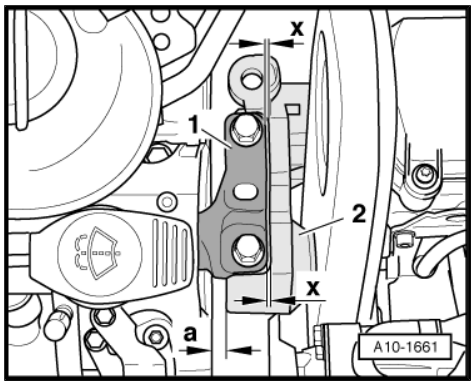
– Check whether dowel sleeves for centring engine/gearbox have been fitted in cylinder block, insert if necessary.

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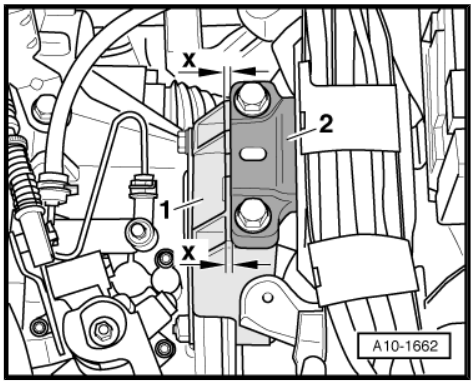
– Hook intermediate plate onto sealing flange and slide onto dowel sleeves -arrows-.



Align engine mountings as follows:



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- There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
- The side surface of the engine support -2- should be located parallel to the support arm -1-.
- Ensure that edges of support arm on gearbox assembly mounting -2- and gearbox console -1- are parallel on gearbox side.

– Install pendulum support.

Note

Specified torques for assembly mountings ⇒ page 14 .

Vehicles with manual gearbox

– Install hydraulic clutch slave cylinder: ⇒ 6-speed manual gearbox 02S; Rep. gr. 30 ; Repairing clutch mechanism .

– Attach selector mechanism: ⇒ 6-speed manual gearbox 02S; Rep. gr. 34 ; Repairing selector mechanism .

– Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with automatic gearbox

– Installing selector lever cable ⇒ 7-speed dual clutch gearbox 0AM; Rep. gr. 34 ; Removing and installing selector lever cable .

– Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

– Install air conditioner compressor ⇒ Heating, air conditioning system; Rep. gr. 87 .

– Install poly V-belt ⇒ page 51 .

– Install catalytic converter and exhaust pipe.

Specified torques for exhaust system: ⇒ page 346 .

– Electrical connections and routing: ⇒ Electrical system; Rep. gr. 97 .

– Install engine splash protection.

– Replenish coolant ⇒ page 157 .

– Install air filter ⇒ page 303 .

– Install battery and battery carrier ⇒ Electrical system; Rep. gr. 27 ; Removing and installing battery .

– Connect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

– Connect ⇒ Vehicle diagnosis tester .

– Erase learnt values and adapt engine control unit to throttle valve module ⇒ vehicle diagnostic tester “Guided functions”.

– Carry out vehicle system test: ⇒ Vehicle diagnosis tester “Guided fault finding”.

– Finish the vehicle system test so that any event memory entries stored during assembly can be deleted automatically.

Observe applicable safety precautions during road test.

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– Carry out a road test.
– Then carry out vehicle system test again and rectify any faults which may have occurred.

1.4 Specified torques

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

Note

Specified torques for assembly mountings ⇒ page 14 .

1.5 Assembly mountings

Specified torques

Note

Securing bolts for assembly mountings are stretch bolts and must be renewed.

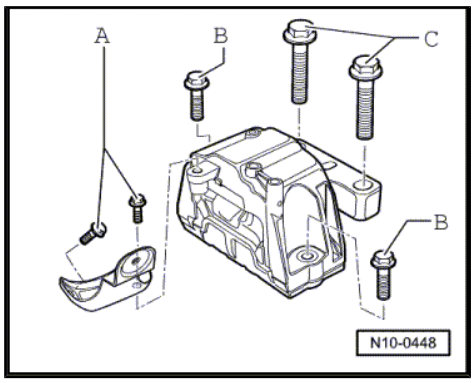
Engine assembly mountings

A [1] = 20 Nm + 90° further

B [1] = 40 Nm + 90° further

C [1] = 60 Nm + 90° further

[1] Renew.

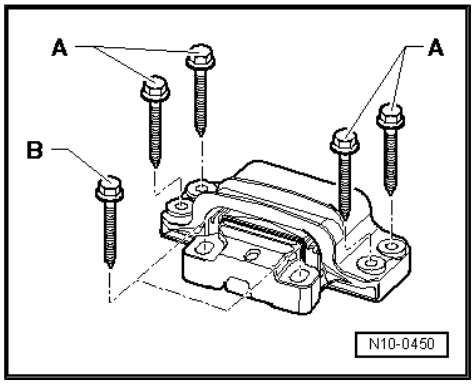


Gearbox assembly mounting

A [1] = 40 Nm + 90° further

B [1] = 60 Nm + 90° further

[1] Renew.



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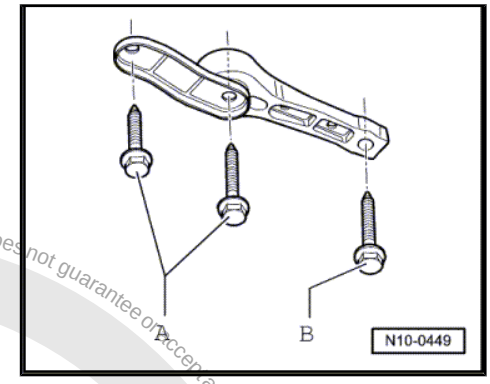
Pendulum support

A [1] = property class 8.8 = 40 Nm + 90° (1/4 turn) further

A [1] = property class 10.9 = 50 Nm + 90° (1/4 turn) further

B [1] = 100 Nm + 90° ($^1/_4$ turn) further

[1] Renew.



1.6 Additional information and assembly work for 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 retaining clamp(s) for refrigerant lines.

– Remove poly V-belt ⇒ page 51 .

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

– Remove air conditioner compressor ⇒ Heating, air conditioning system; Rep. gr. 87 .

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2 Removing and installing engine (Tiguan)

Removing engine ⇒ page 16 .

Securing engine to assembly stand ⇒ page 24 .

Installing engine ⇒ page 25 .

Specified torques ⇒ page 27 .

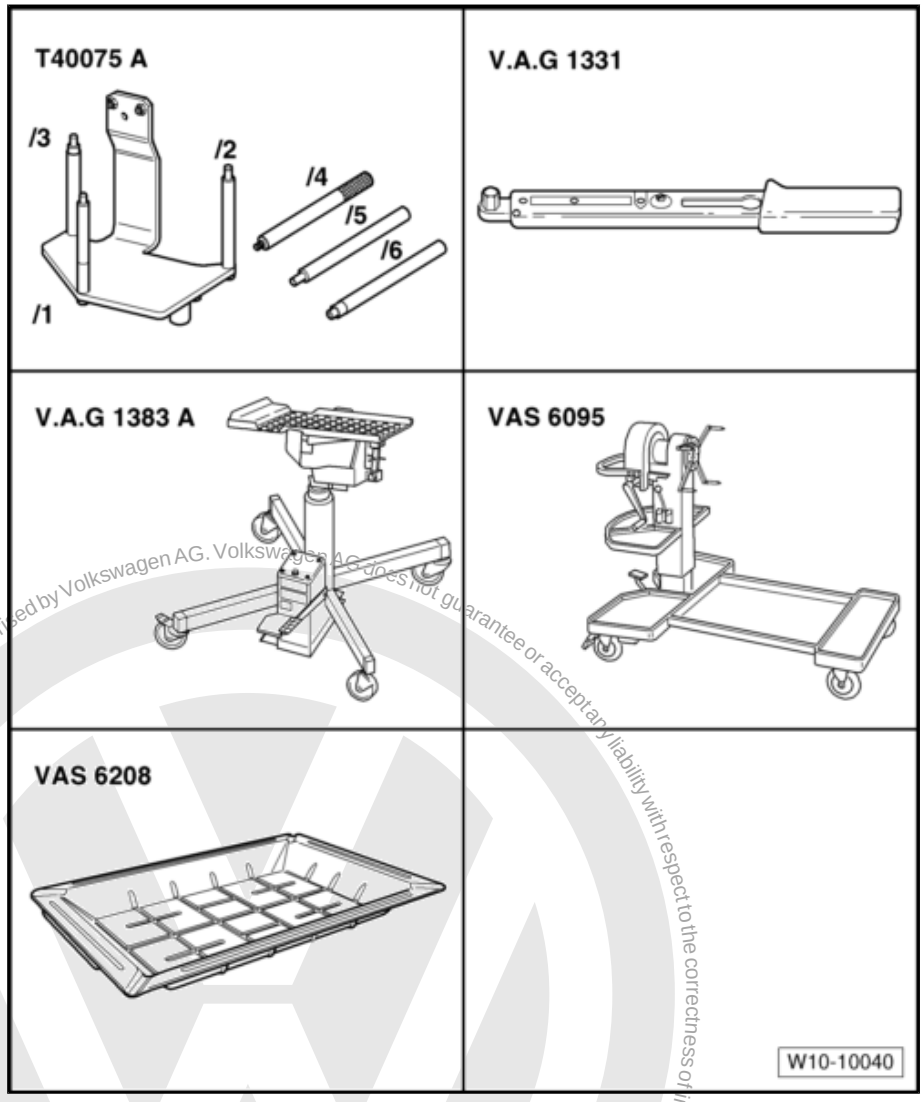
Assembly mountings ⇒ page 28

Additional information and assembly work for vehicles with air conditioner ⇒ page 29 .

2.1 Removing engine

Special tools and workshop equipment required

- Engine support - T40075 A- with adapters /4, /5, /6
- Torque wrench - V.A.G 1331-
- Engine and gearbox jack - V.A.G 1383 A-
- Engine and gearbox support - VAS 6095-
- Drip tray for workshop hoist - VAS 6208-



Note

The engine support - T40075- can continue to be used if converted as described in the respective work sequence.

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Converting engine support - T40075-

– Mark dimensions -a- and -b- as shown.

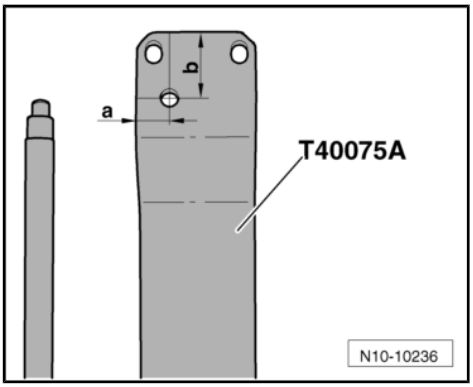
Dimension -a-: 24.5 mm

Dimension -b-: 49.0 mm

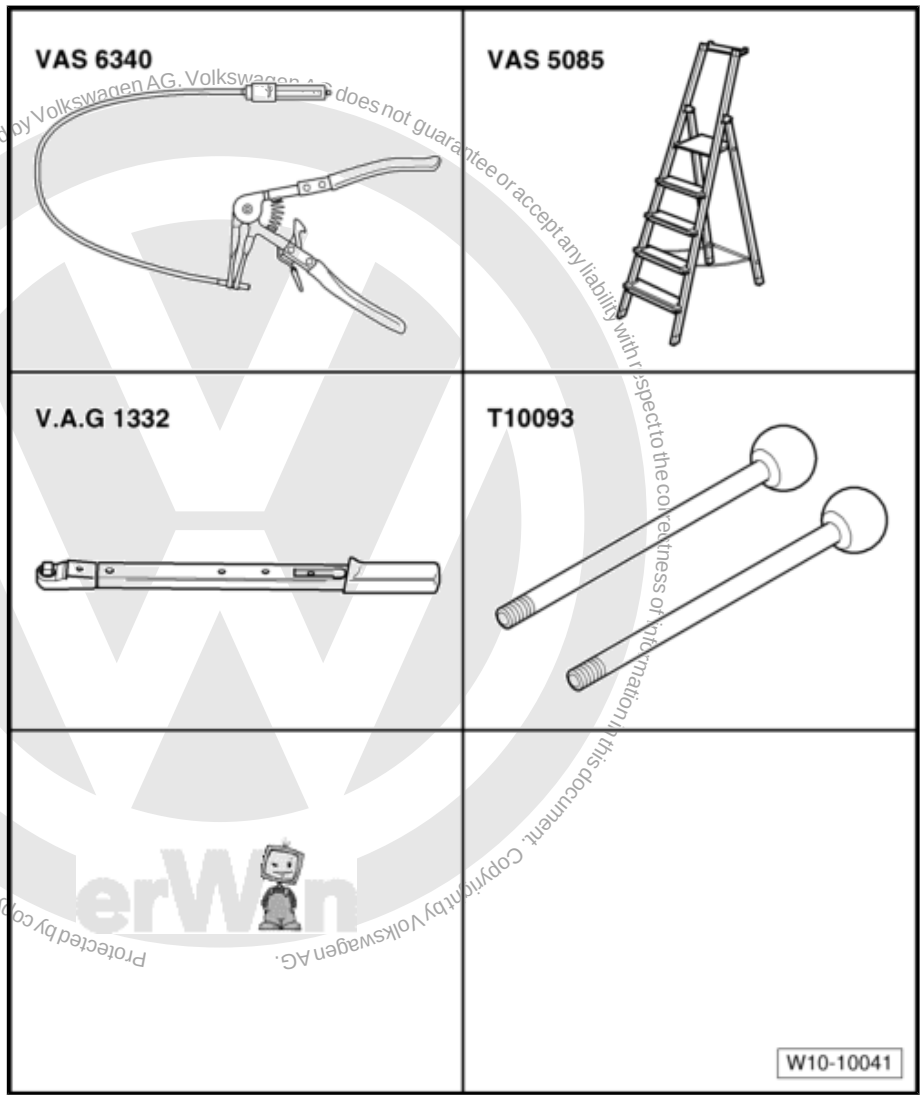
– Mark position with a centre punch.

– Drill hole all the way through with a 13.0 mm drill.

– Mark engine support after the tool designation with an -A-.



- Hose clip pliers - VAS 6340-
- Stepladder - VAS 5085-
- Torque wrench (40…200 Nm) - V.A.G. 1332-
- Guide rods - T10093-



Note

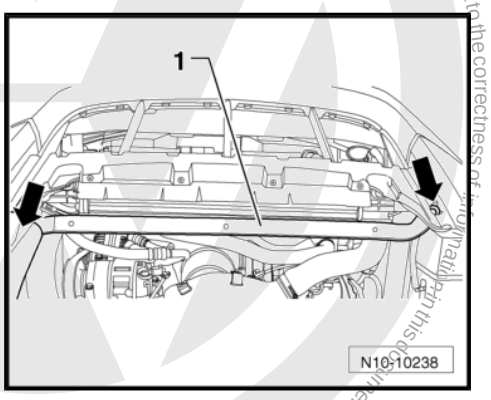
Before carrying out further work, disconnect battery earth strap. Check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.

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– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Remove front left and right wheel housing liners ⇒ General body repairs; Rep. gr. 66 ; Wheel housing liner; Removing and installing front wheel housing liner .

– Remove transverse member -1- by undoing the bolts -arrows-.



– Unscrew bolts -1- securing engine cover panel.

– Pull oil dipstick out.

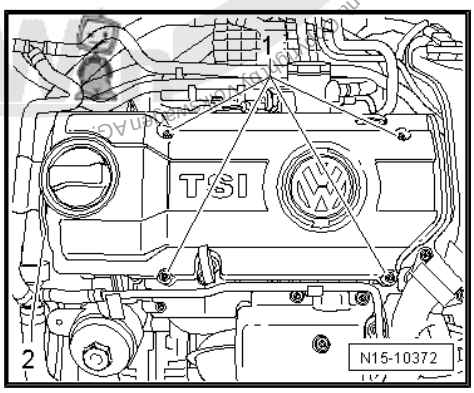
– Detach coolant hoses -2- from engine cover panel and pull engine cover panel upwards.

– Remove air filter ⇒ page 303 .

– Open and close expansion tank cap to release pressure in cooling system.

– Drain coolant ⇒ page 157 .

– Observe rules for cleanliness ⇒ page 242 .

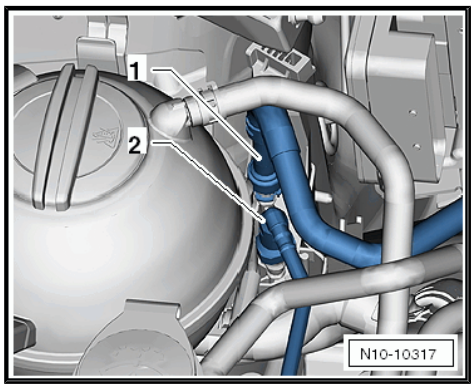


WARNING

Fuel supply lines are under pressure! Wear eye protection and protective gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

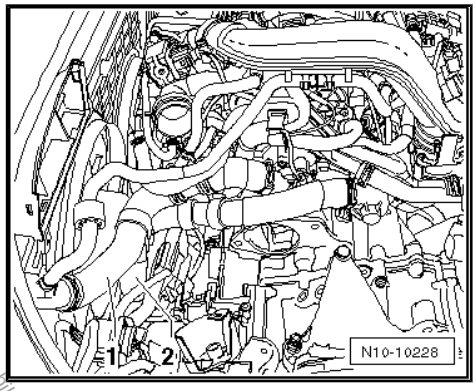
– Detach fuel supply line -1- and line leading to activated charcoal filter -2- by pressing the release tabs.

– Separate push-on couplings ⇒ page 178 .

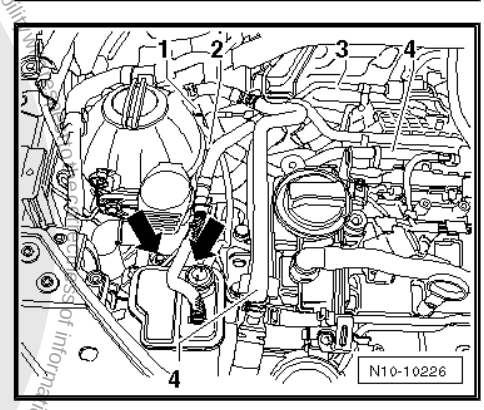


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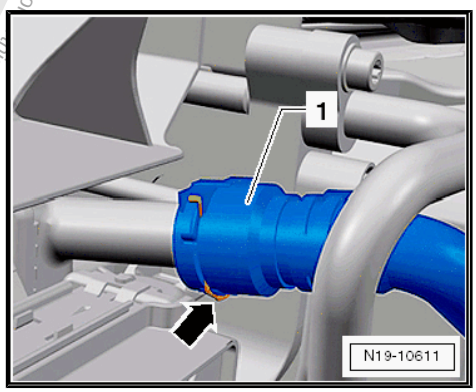
– Release and pull coolant hoses -2- and -3- off radiator.



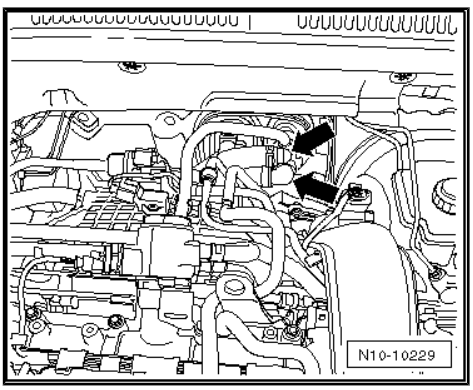
– Remove coolant hoses -4-.



– Pull off coolant hose -1-, first releasing the retaining clip -arrow-.

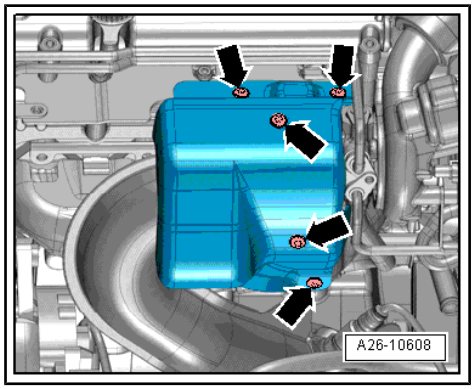


– Release coolant hoses and pull them off heat exchanger -arrows-.

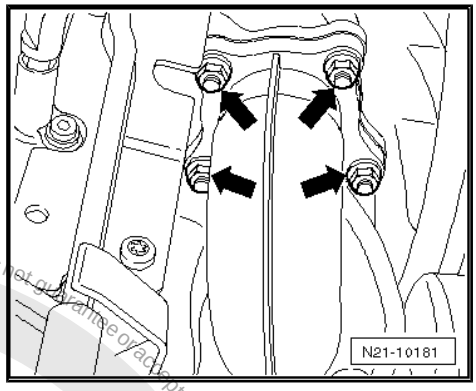


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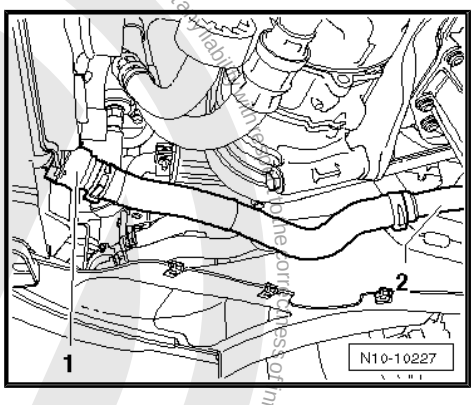
– Undo bolts -arrows- and remove heat shield from turbocharger.



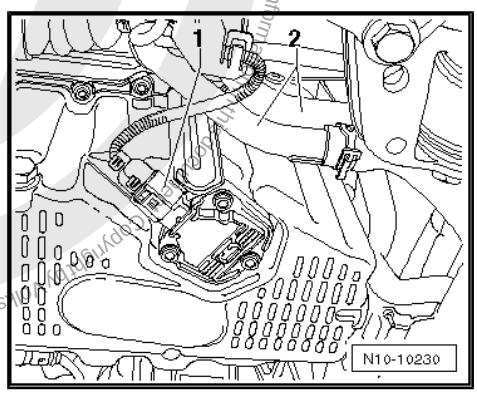
– Undo nuts securing turbocharger -arrows-.



– Release coolant hose -1- at auxiliary radiator for charge air system and pull hose off.
– Remove coolant pipe -2-.



– Release connector -1- and pull it off oil level and oil temperature sender - G266- .



Vehicles with auxiliary heater

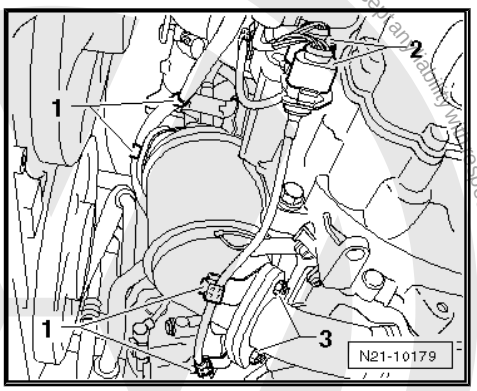
– Remove coolant pipes -2-.

Continuation for all vehicles

– Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Front body; Lock carrier - service position .

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– Unclip lines -1- at catalytic converter.
– Release and unplug connectors -2-.
– Undo nuts -3- and remove seal.
– Remove catalytic converter downwards.

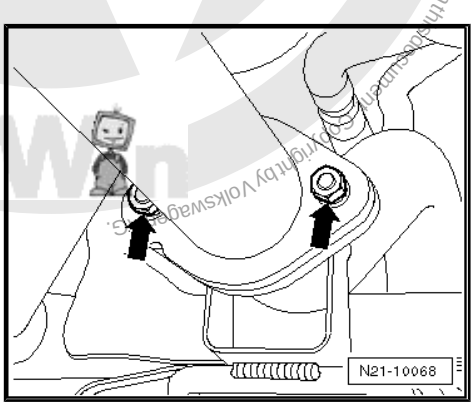


Caution

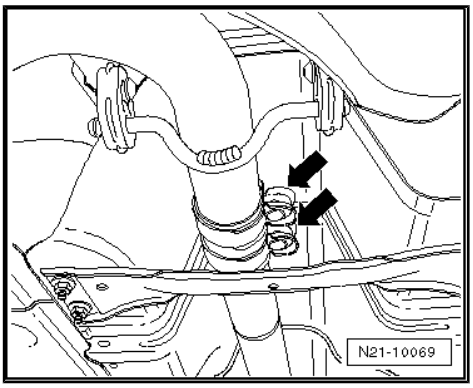
Avoid damage to the flexible joint.

- *Do not bend decoupling element more than 10°.*
- *Install decoupling element so that it is not under tension.*
- *Take care not to damage wire mesh on decoupling element.*

– Unscrew exhaust pipe together with decoupling element -arrows-.



– Undo bolts -arrows- of double clamp and pull exhaust pipe towards the rear.

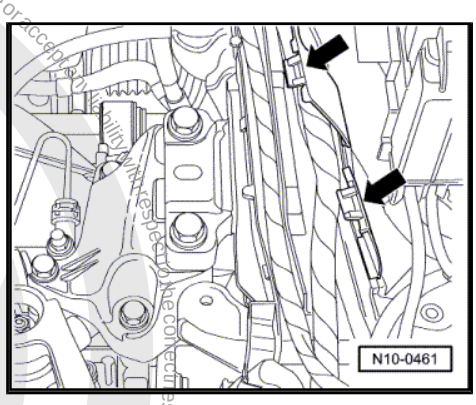


The engine is removed downwards together with the gearbox.

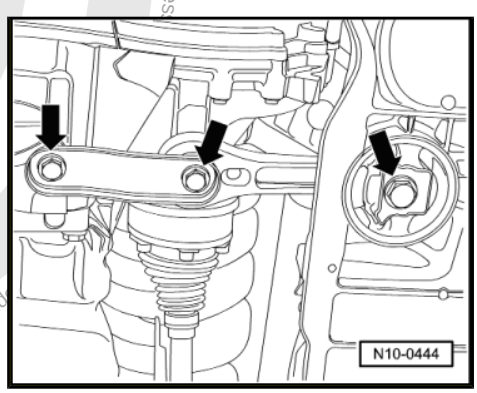
– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery
– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Removing and installing battery .
– All cable ties which are opened or cut through when engine is removed must be fastened in the same position when engine is installed.
– Disconnect all electrical wiring from gearbox, alternator and starter and lay to side.
– Pull off or disconnect all other electrical connections as necessary from engine and lay to side.
– Pull vacuum and breather hoses off engine.
– Release and detach connectors from coolant temperature sender at radiator outlet - G83- , from radiator fan - V7- , and from radiator fan 2 - V177- s.
– Remove engine control unit ⇒ page 326 .

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– Open cable guide fasteners -arrows-.
– Remove cable from engine control unit.
– Secure cables to engine with cable tie.

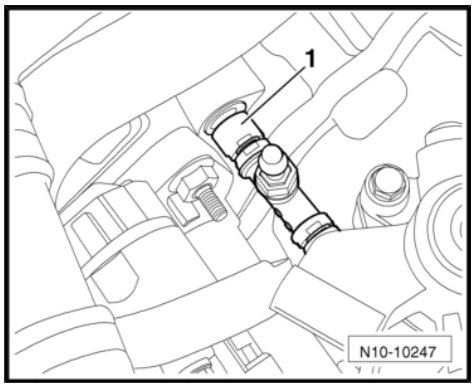


– Disconnect pendulum support -arrows-.



Vehicles with manual gearbox

– Unbolt selector mechanism from gearbox ⇒ 6-speed manual gearbox 0BB; Rep. gr. 34 ; Repairing selector mechanism .
– Remove hydraulic clutch slave cylinder hose -1-: ⇒ 6-speed manual gearbox 0BB; Rep. gr. 30 ; Assembly overview - hydraulic system .



Note

Clutch pedal must not be depressed.

– Remove right drive shaft, and unscrew left drive shaft from gearbox and tie up: ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with automatic gearbox

– Remove selector lever cable ⇒ Automatic gearbox 09M; Rep. gr. 34 ; Removing and installing selector lever cable .
– Remove drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

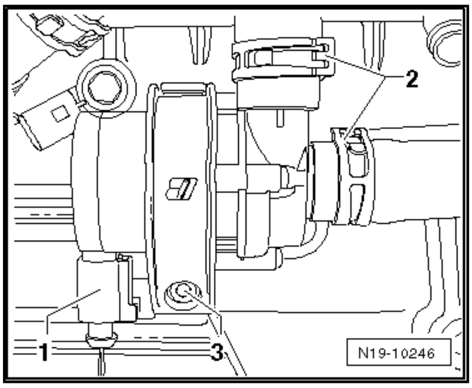
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Continuation for all vehicles

– Release and pull connector -1- off coolant circulation pump - V50- .

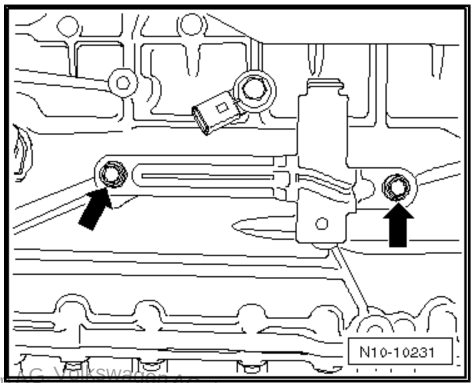
– Release spring-type clips -2- and pull coolant hoses off.

– Undo bolt -3- and remove pump from bracket.



– Remove bracket for coolant circulation pump - V50- from crankcase -arrows-.

– Remove poly V-belt ⇒ page 51 .



Vehicles with air conditioner

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87

Note

The air conditioning system lines must not be opened.

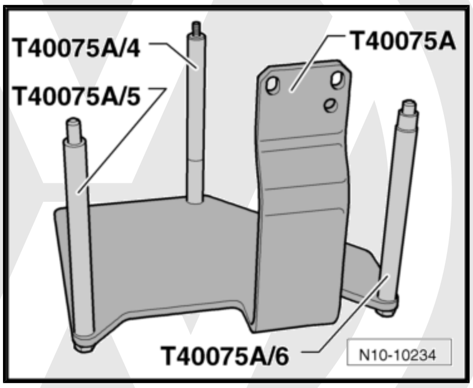
– Secure AC compressor to lock carrier.

– Make sure lines are not kinked.

– Observe additional information and installation work ⇒ page 29 .

Continuation for all vehicles

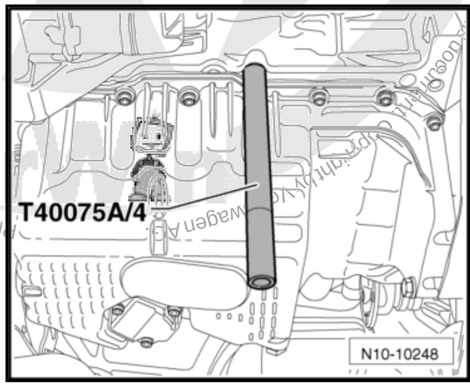
Use engine support - T40075A- with adapters -/4-, -/5- and -/6- to to lower engine with gearbox.



– Screw adapter - T40075/4- to stop into crankcase.

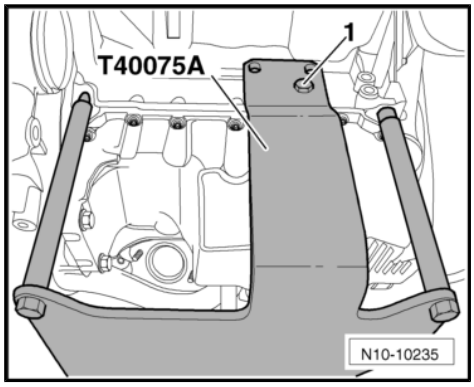
– Position engine support - T40075A- with adapters -/5- and -/6- on crankcase.

– Insert two M10 nuts between crankcase and engine support - T40075A- .



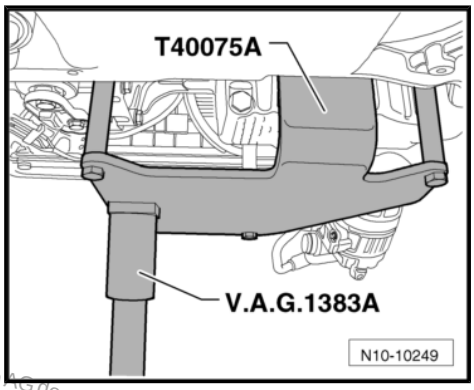
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– Secure engine support - T40075A- hand-tight to crankcase using an M8x35 bolt -1-.

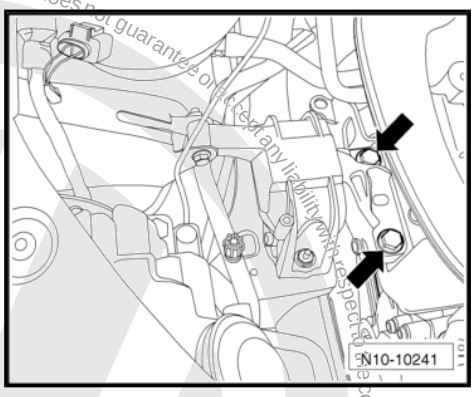


– Tighten bolts attached to engine support - T40075A- to 20 Nm.

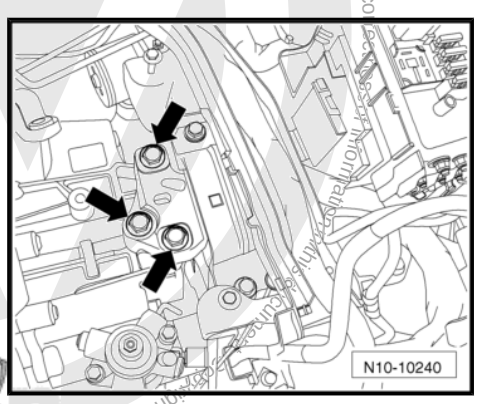
– Lift engine and gearbox lightly using engine and gearbox jack - V.A.G 1383 A- .



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



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



Note

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

– Carefully lower engine and gearbox.

2.2 Securing engine to assembly stand

Secure engine to engine and gearbox support - VAS 6095- to carry out repairs.

Procedure

– Unbolt gearbox.

– Secure engine on engine and gearbox support - VAS 6095- .

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2.3 Installing engine

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

Caution

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 and electrical wiring so that they are in their original positions.***
- ***Ensure clearance between lines and moving or hot components.***

Vehicles with manual gearbox

– Check clutch release bearing for wear and renew if necessary.

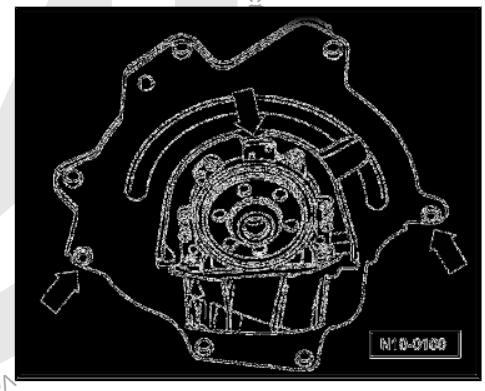
– Lightly grease clutch release bearing, release bearing guide sleeve and splines on input shaft with G 000 100.

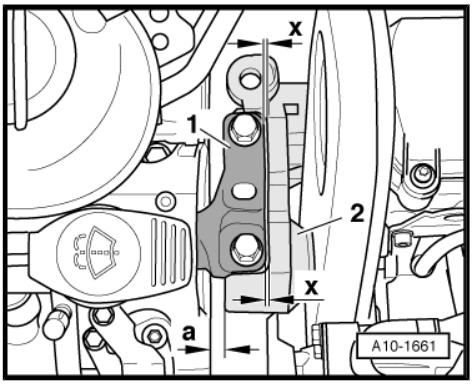
Continuation for all vehicles

– Check whether dowel sleeves for centring engine/gearbox have been fitted in cylinder block, insert if necessary.

– Hook intermediate plate onto sealing flange and slide onto dowel sleeves -arrows-.

Align engine mountings as follows:

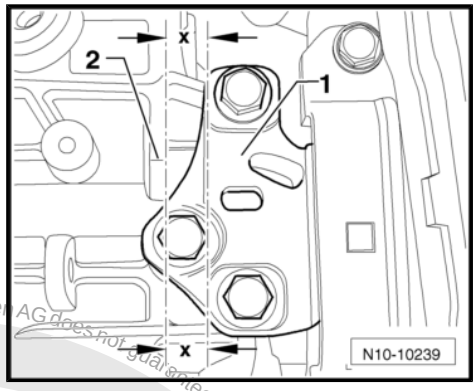




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- There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
- The side surface of the engine support -2- should be located parallel to the support arm -1-.
- On gearbox side, ensure that edges of support arm -1- and gearbox bracket -2- are parallel.

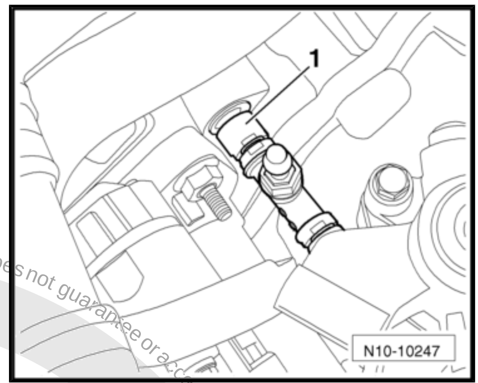
– Install pendulum support.



Note

Specified torques for assembly mountings ⇒ page 28 .

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Vehicles with manual gearbox

– Install hydraulic clutch slave cylinder hose -1-: ⇒ 6-speed manual gearbox 0BB; Rep. gr. 30 ; Repairing clutch mechanism .

– Attach selector mechanism ⇒ 6-speed manual gearbox 0BB; Rep. gr. 34 ; Repairing selector mechanism .

– Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with automatic gearbox

– Install selector lever cable: ⇒ Automatic gearbox 09M; Rep. gr. 34 ; Removing and installing selector lever cable

Continuation for all vehicles

– Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with air conditioner

– Install air conditioner compressor: ⇒ Heating, air conditioning system; Rep. gr. 87 .

Continuation for all vehicles

– Install poly V-belt ⇒ page 51 .

– Install catalytic converter and exhaust pipe.

Specified torques for exhaust system: ⇒ page 346 .

– Electrical connections and routing: ⇒ Electrical system; Rep. gr. 97 .

– Install noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Replenish coolant ⇒ page 157 .

– Install battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Removing and installing battery .

– Install air filter ⇒ page 303 .

– Connect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

– Connect ⇒ vehicle diagnostic tester .

– Erase learnt values and adapt engine control unit to throttle valve module ⇒ vehicle diagnostic tester “Guided functions”.

– Perform vehicle system test ⇒ Vehicle diagnostic tester “Guided fault finding”.

– Finish vehicle system test; any fault entries recorded in the memory during assembly will be deleted automatically.

Observe applicable safety measures when carrying out a road test.

– Perform road test.

– Perform vehicle system test and rectify any faults found.

2.4 Specified torques

Threaded connection		Specified torque
Bolts, nuts	M6	10 Nm

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Threaded connection	Specified torque
M8	20 Nm
M10	45 Nm
M12	60 Nm

Note

Specified torques for assembly mountings ⇒ page 28 .

2.5 Assembly mountings

Specified torques

Note

Securing bolts for assembly mountings are stretch bolts and must be renewed.

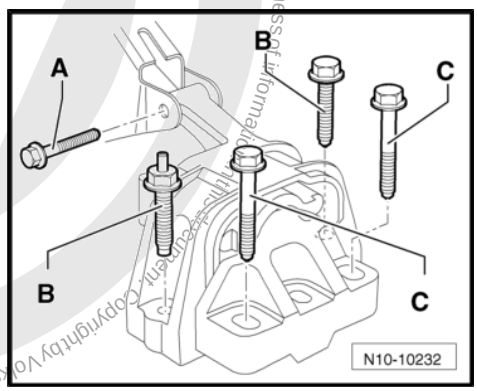
Engine assembly mountings

A [1] = 20 Nm + 90° (1/4 turn) further

B [1] = 40 Nm + 90° (1/4 turn) further

C [1] = 60 Nm + 90° (1/4 turn) further

[1] Renew.

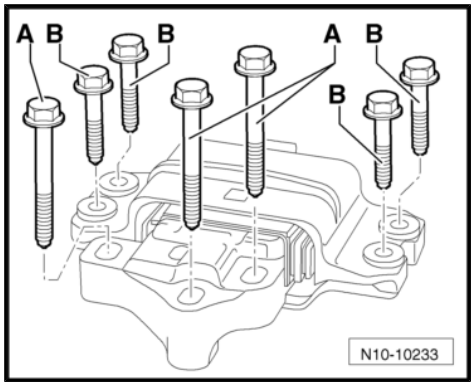


Gearbox assembly mounting

A [1] = 60 Nm + 90° (1/4 turn) further

B [1] = 40 Nm + 90° (1/4 turn) further

[1] Renew.



Pendulum support

A Bolt M10 [1] = 50 Nm + 90° (1/4 turn) further

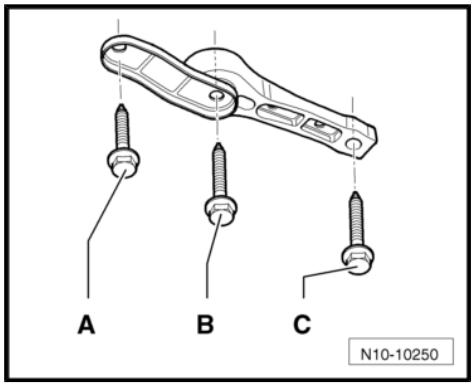
A Bolt M12 [1] = 60 Nm + 90° (1/4 turn) further

B Bolt M10 [1] = 50 Nm + 90° (1/4 turn) further

B Bolt M12 [1] = 60 Nm + 90° (1/4 turn) further

C [1] = 100 Nm + 90° (1/4 turn) further

[1] Renew.



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2.6 Additional information and assembly work for vehicles with air conditioner

Note

Make sure that the coolant lines/hoses are not excessively stretched, kinked or bent.

To facilitate removing and installing engine without opening refrigerant circuit:

- Remove retaining clamp(s) for refrigerant lines.
- Remove poly V-belt ⇒ page 51 .
- Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Front body: Lock carrier - service position .
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87

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3 Removing and installing engine (Passat)

Removing engine ⇒ page 30 .

Securing engine to assembly stand ⇒ page 41 .

Installing engine ⇒ page 41 .

Specified torques ⇒ page 44 .

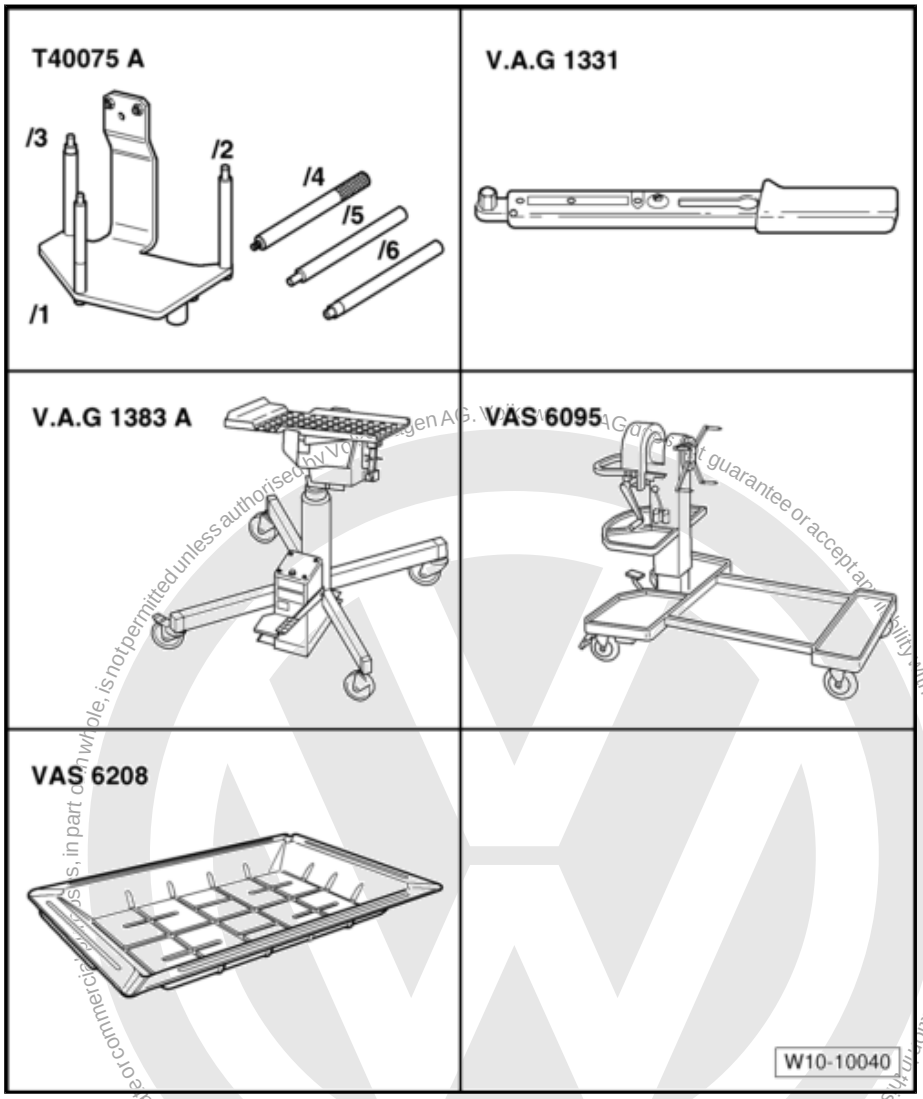
Assembly mountings ⇒ page 44

Additional information and assembly work for vehicles with air conditioner ⇒ page 45 .

3.1 Removing engine

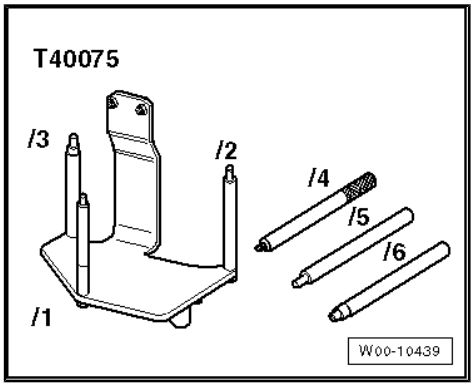
Special tools and workshop equipment required

- Engine support - T40075 A- with adapters /4, /5, /6
- Torque wrench - V.A.G 1331-
- Engine and gearbox jack - V.A.G 1383 A-
- Engine and gearbox support - VAS 6095-
- Drip tray for workshop hoist - VAS 6208-



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- Engine support - T40075 A- with adapters /1, /2, /3



Note

- *Crankcases were installed with different size threaded holes.*
- *Before installation, take note of these holes and use the appropriate engine support.*
- *The engine support - T40075- can continue to be used if converted as described in the respective work sequence.*
- *The fitting of engine support - T40075- and engine support - T40075A- on the crankcase is described in the respective work sequence ⇒ page 38 .*

Converting engine support - T40075-

– Mark dimensions -a- and -b- as shown.

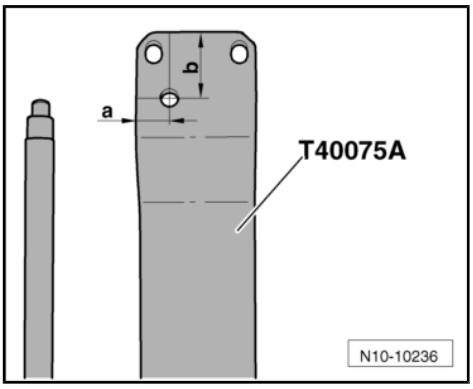
Dimension -a-: 24.5 mm

Dimension -b-: 49.0 mm

– Mark position with a centre punch.

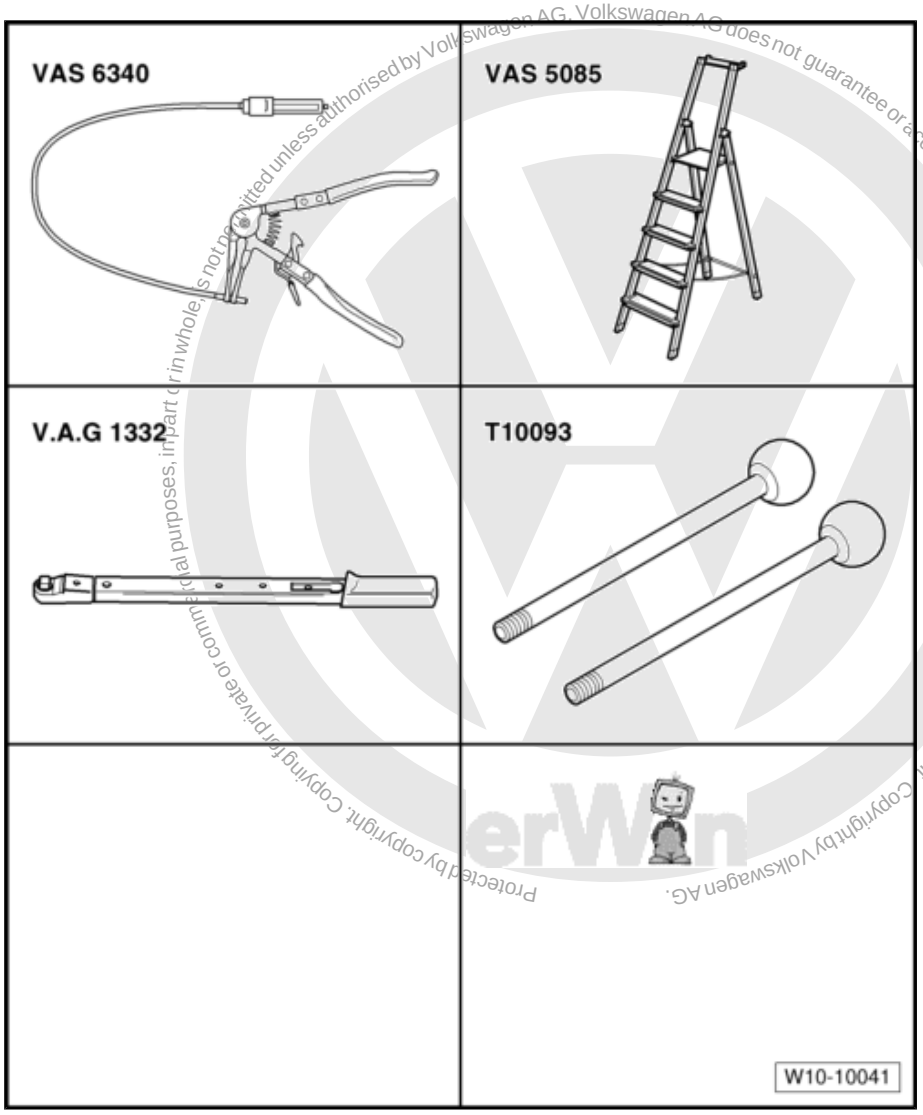
– Drill hole all the way through with a 13.0 mm drill.

– Mark engine support after the tool designation with an -A-.



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- Hose clip pliers - VAS 6340-
- Stepladder - VAS 5085-
- Torque wrench (40…200 Nm) - V.A.G. 1332-
- Guide rods - T10093-



Note

Before carrying out further work, disconnect battery earth strap. Check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Remove front left and right wheel housing liners ⇒ General body repairs; Rep. gr. 66 ; Wheel housing liner; Removing and installing front wheel housing liner .

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– Unscrew bolts -1- securing engine cover panel.

– Pull oil dipstick out.

– Detach coolant hoses -2- from engine cover panel and pull engine cover panel upwards.

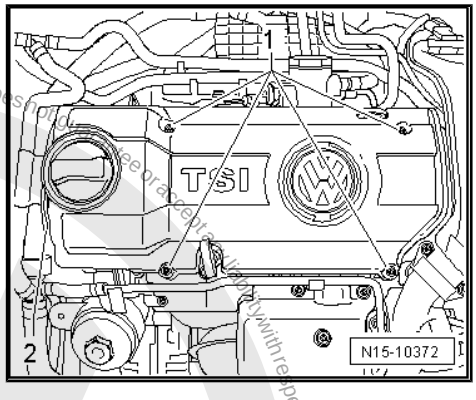
– Remove air filter ⇒ page 303 .

– Remove intake air duct .

– Open and close expansion tank cap to release pressure in cooling system.

– Drain coolant ⇒ page 157 .

– Observe rules for cleanliness ⇒ page 211 .

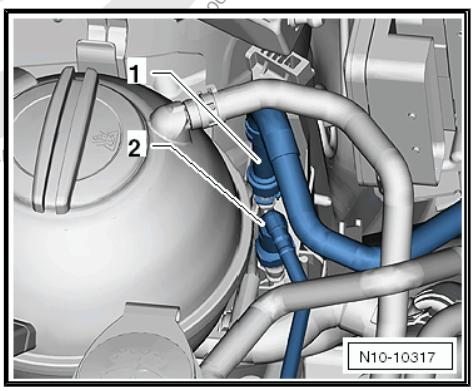


WARNING

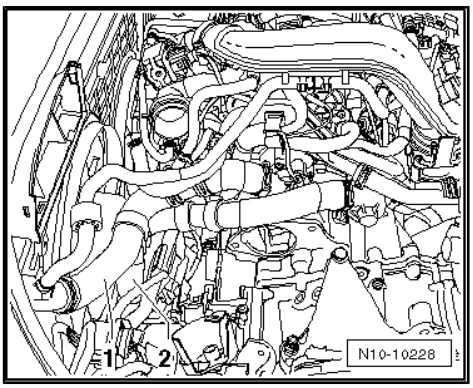
Fuel supply lines are under pressure! Wear eye protection and protective gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

– Detach fuel supply line -1- and line leading to activated charcoal filter -2- by pressing the release tabs.

– Separate push-on couplings ⇒ page 178 .

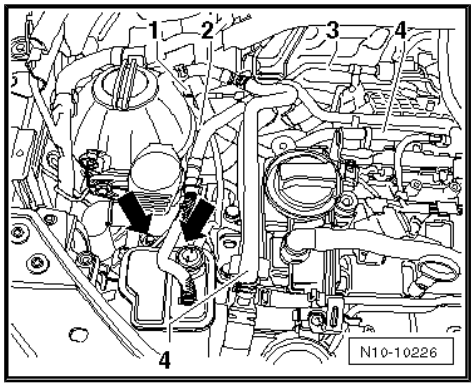


– Release and pull coolant hoses -2- and -3- off radiator.

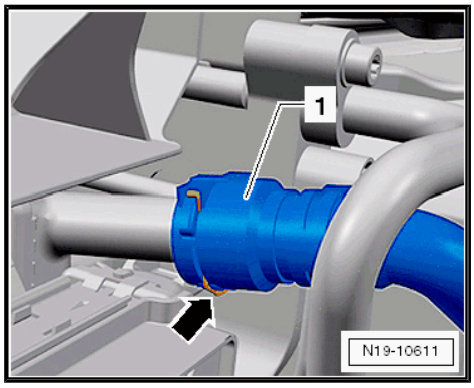


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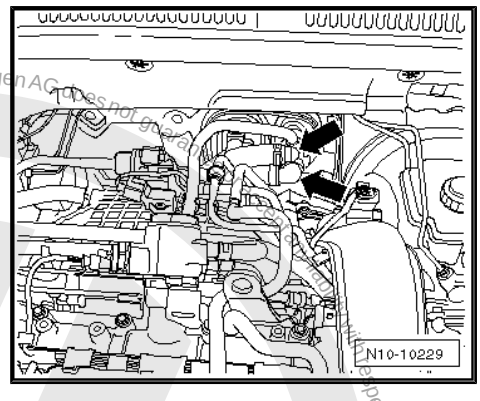
– Remove coolant hoses -4-.



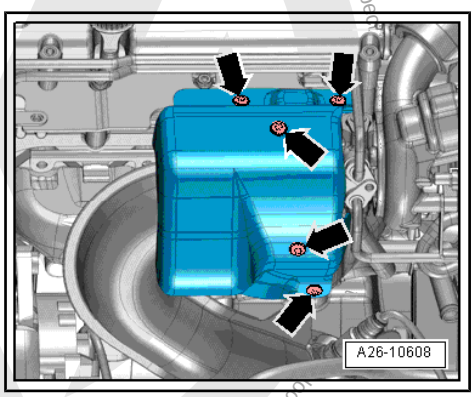
– Pull off coolant hose -1-, first releasing the retaining clip -arrow-.



– Release coolant hoses and pull them off heat exchanger -arrows-.

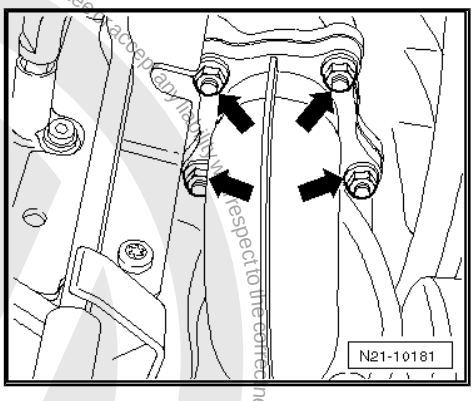


– Undo bolts -arrows- and remove heat shield from turbocharger.

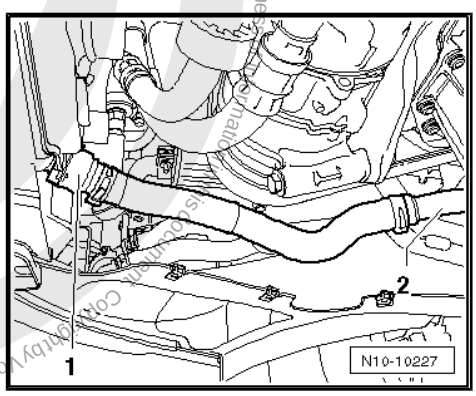


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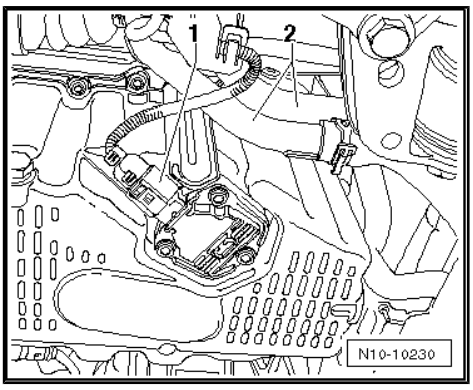
– Undo nuts securing turbocharger -arrows-.



– Release coolant hose -1- at auxiliary radiator for charge air system and pull hose off.
– Remove coolant pipe -2-.



– Release connector -1- and pull it off oil level and oil temperature sender - G266- .



Vehicles with auxiliary heater

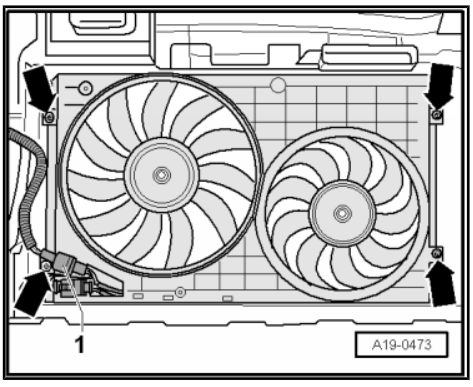
– Remove coolant pipes -2-.

Vehicles up to 10.2010

– Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Front body: Lock carrier - service position .

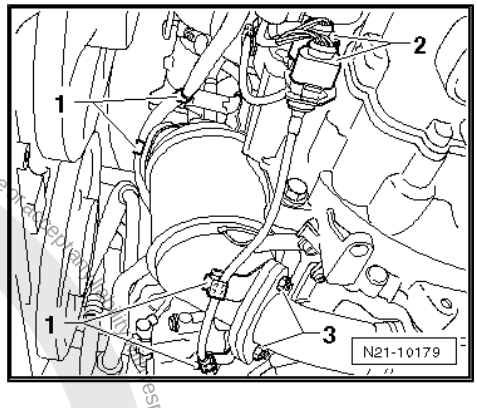
Vehicles from 11.2010

– Undo and remove bolts -arrows- of cowling.
– Release connector -1- and pull off.
– Remove cowling downwards.



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Continuation for all vehicles

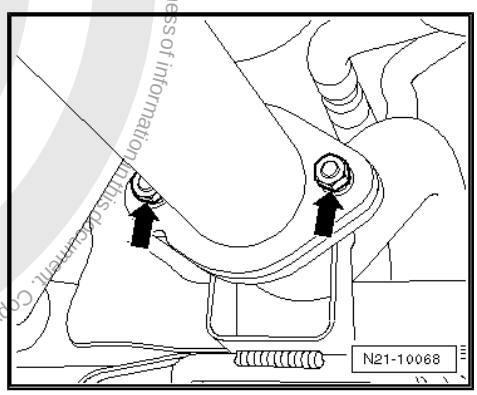


– Unclip lines -1- at catalytic converter.
– Release and unplug connectors -2-.
– Undo nuts -3- and remove seal.
– Remove catalytic converter downwards.

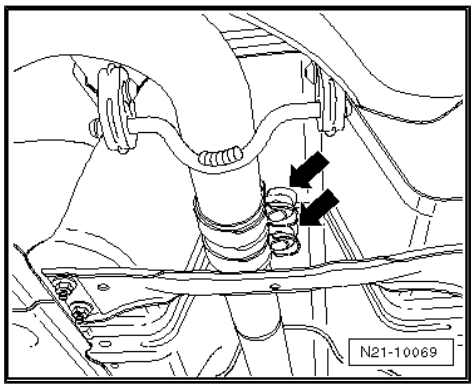
Caution

Avoid damage to the flexible joint.

- *Do not bend decoupling element more than 10°.*
- *Install decoupling element so that it is not under tension.*
- *Take care not to damage wire mesh on decoupling element.*



– Unscrew exhaust pipe together with decoupling element -arrows-.



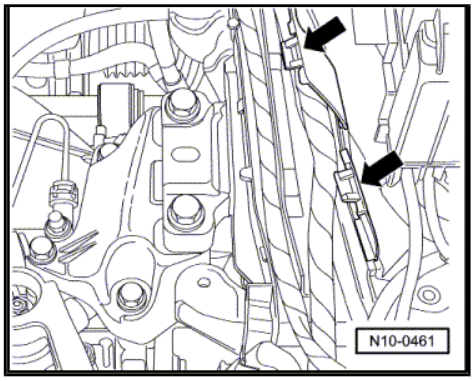
– Undo bolts -arrows- of double clamp and pull exhaust pipe towards the rear.

The engine is removed downwards together with the gearbox.

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery
– Remove battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Removing and installing battery .
– All cable ties which are opened or cut through when engine is removed must be fastened in the same position when engine is installed.
– Disconnect all electrical wiring from gearbox, alternator and starter and lay to side.
– Pull off or disconnect all other electrical connections as necessary from engine and lay to side.
– Pull vacuum and breather hoses off engine.
– Release and detach connectors from coolant temperature sender at radiator outlet - G83- , from radiator fan - V7- , and from radiator fan 2 - V177- s.
– Remove engine control unit ⇒ page 326 .

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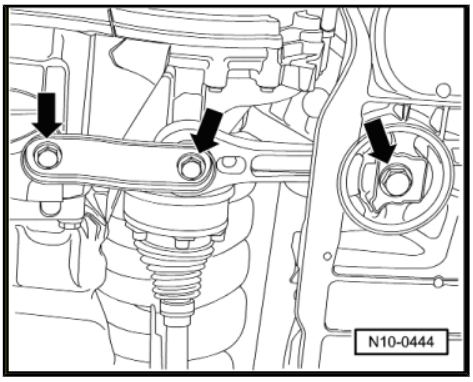
– Open cable guide fasteners -arrows-.
– Remove cable from engine control unit.
– Secure cables to engine with cable tie.



– Disconnect pendulum support -arrows-.

Vehicles with manual gearbox

– Unbolt selector mechanism from gearbox: ⇒ Rep. gr. 34 ; Repairing selector mechanism
– Remove slave cylinder of hydraulic clutch: ⇒ Rep. gr. 30 ; Repairing clutch mechanism



Note

Clutch pedal must not be depressed.

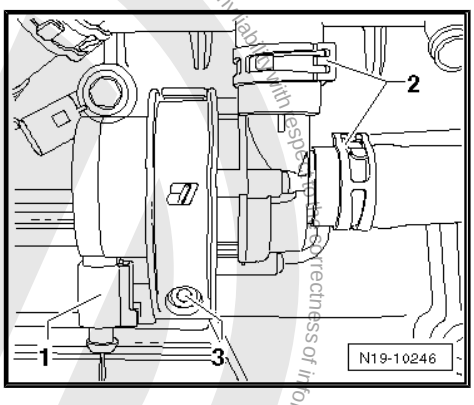
– Remove right drive shaft, unscrew left drive shaft at gearbox and tie up ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts

Vehicles with automatic gearbox

– Remove selector lever cable ⇒ Rep. gr. 34 ; Removing and installing selector lever cable .
– Remove drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

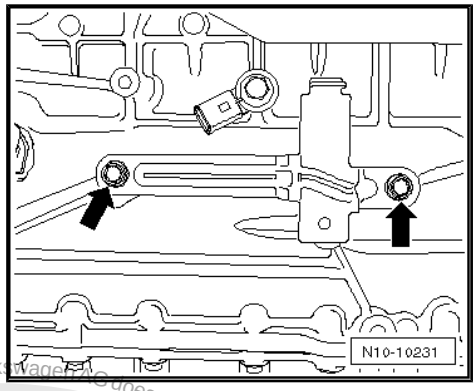
Continuation for all vehicles

– Release and pull connector -1- off coolant circulation pump -V50- .
– Release spring-type clips -2- and pull coolant hoses off.
– Undo bolt -3- and remove pump from bracket.



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– Remove bracket for coolant circulation pump - V50- from crankcase -arrows-.



– Remove poly V-belt ⇒ page 51 .

Vehicles with air conditioner

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87

Note

The air conditioning system lines must not be opened.

– Secure AC compressor to lock carrier.

– Make sure lines are not kinked.

– Observe additional information and installation work ⇒ page 45 .

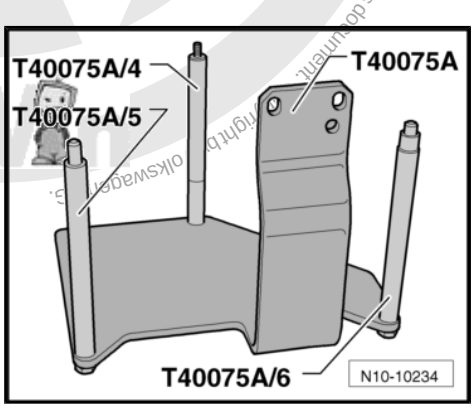
Continuation for all vehicles

Note

- *Crankcases were installed with different size threaded holes.*
- *Before installation, take note of these holes and use the appropriate engine support.*
- *The engine support - T40075- can continue to be used when work has been done on it ⇒ page 31 .*
- *The fitting of engine support - T40075- and engine support - T40075A- on the crankcase is described in the respective work sequence.*

Attachment of engine support - T40075A- to crankcase

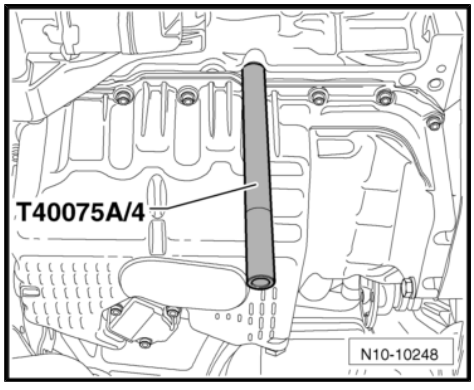
Engine support - T40075A- with adapters -/4-, -/5- and -/6- is required to to lower engine with gearbox.



– Screw adapter - T40075/4- to stop into crankcase.

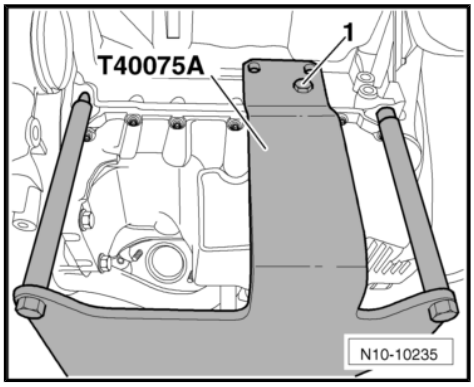
– Position engine support - T40075A- with adapters -/5- and -/6- on crankcase.

– Insert two M10 nuts between crankcase and engine support - T40075A- .

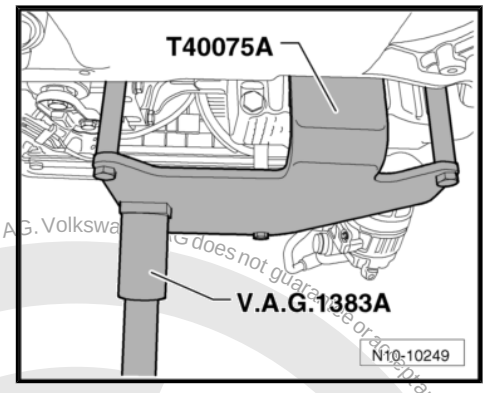


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– Secure engine support - T40075A- hand-tight to crankcase using an M8x35 bolt -1-.

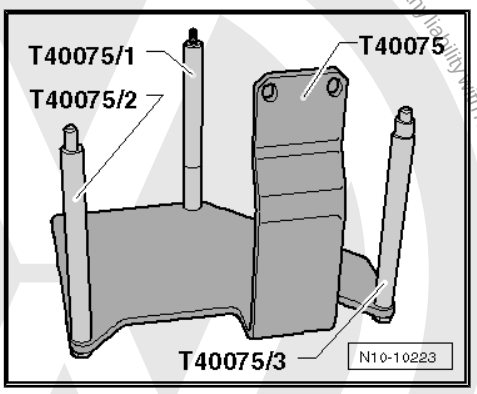


– Tighten bolts attached to engine support - T40075A- to 20 Nm.
– Lift engine and gearbox lightly using engine and gearbox jack - V.A.G 1383 A- .

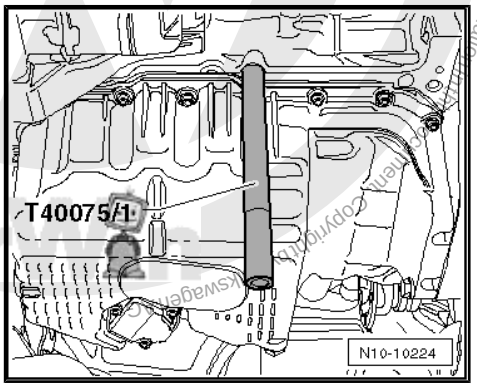


Attachment of engine support - T40075- to crankcase

Engine support - T40075- with adapters -/1-, -/2- and -/3- is required to to lower engine with gearbox.

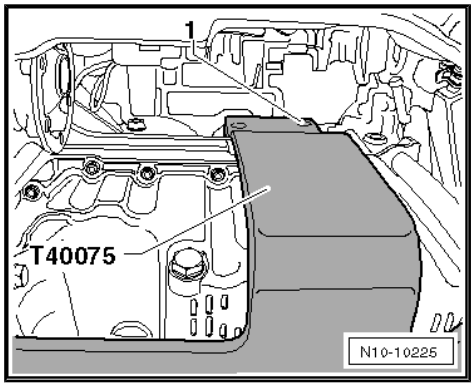


– Screw adapter - T40075/1- to stop into crankcase.
– Position the engine support - T40075- with adapters -/2- and -/3- on crankcase.
– Insert two M10 nuts between crankcase and engine support - T40075- .



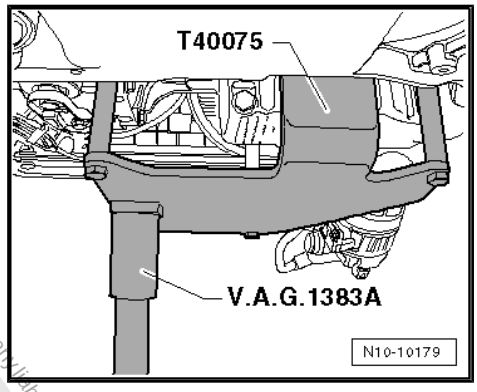
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– Secure engine support - T40075- hand-tight to crankcase using an M8x35 bolt -1-.



– Tighten bolts attached to engine support - T40075- to 20 Nm.

– Lift engine and gearbox lightly using engine and gearbox jack - V.A.G 1383 A- .

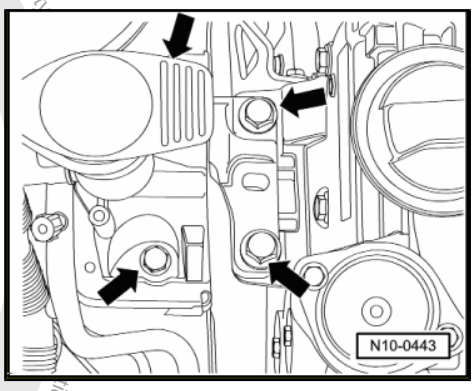


Continuation for all vehicles

Note

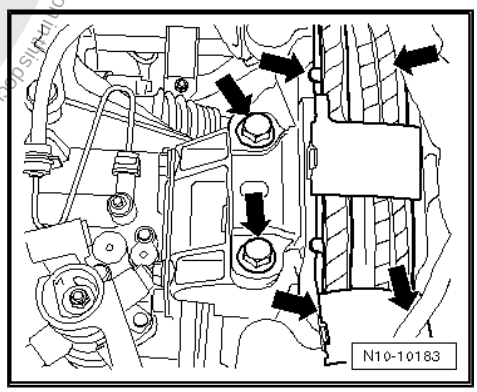
- *To remove securing bolts of assembly mountings, use a step-ladder - VAS 5085- .*
- *Take different mountings of gearbox into account.*

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



Assembly mountings on the gearbox side with 2 bolts at gearbox

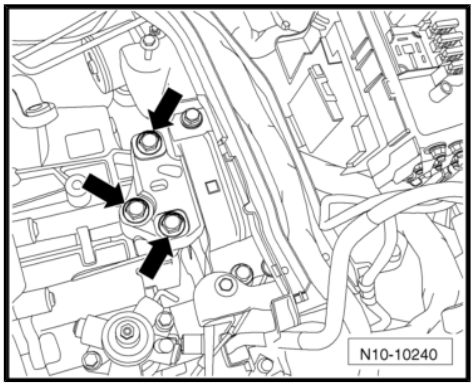
– Unbolt gearbox side of assembly mounting from above -arrows-.



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Assembly mountings on the gearbox side with 3 bolts at gearbox

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



Note

When lifted out, the assembly must be carefully guided to prevent damage to the bodywork.

– Carefully lower engine and gearbox.

3.2 Securing engine to assembly stand

Secure engine to engine and gearbox support - VAS 6095- to carry out repairs.

Procedure

– Unbolt gearbox.

– Secure engine on engine and gearbox support - VAS 6095- .

3.3 Installing engine

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

Caution

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 and electrical wiring so that they are in their original positions.***
- ***Ensure clearance between lines and moving or hot components.***

Vehicles with manual gearbox

– Check clutch release bearing for wear and renew if necessary (vehicles with manual gearbox).

– Lightly grease clutch release bearing, release bearing guide sleeve and splines on input shaft with G 000 100 (vehicles with manual gearbox).

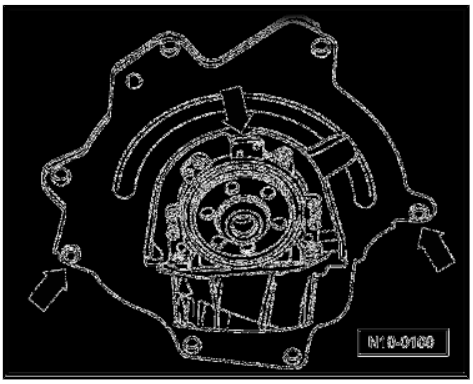
Continuation for all vehicles

– Check whether dowel sleeves for centring engine/gearbox have been fitted in cylinder block, insert if necessary.

– Hook intermediate plate onto sealing flange and slide onto dowel sleeves -arrows-.

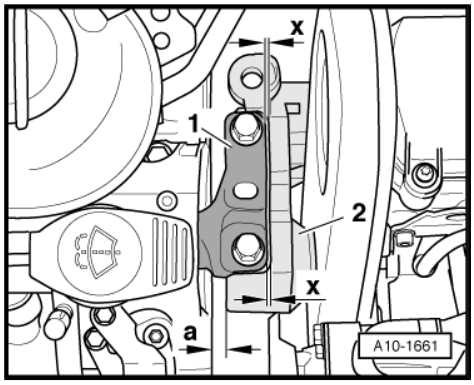
– Bolt on gearbox.

Align engine mountings as follows



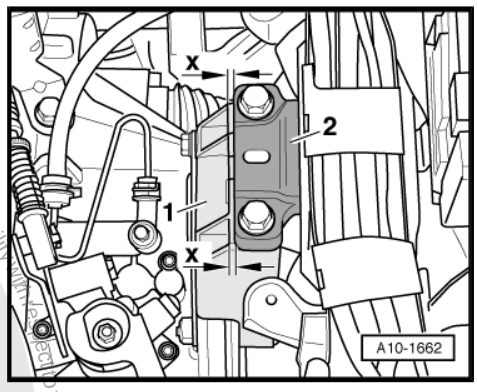
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- There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
- The side surface of the engine support -2- should be located parallel to the support arm -1-.



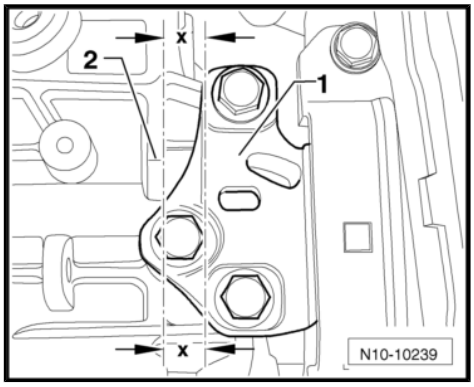
Align gearbox mountings as follows in the case of a gearbox brackets with 2 bolts on the gearbox

- Ensure that edges of support arm -2- and gearbox bracket -1- are parallel.



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Align gearbox mountings as follows in the case of a gearbox brackets with 3 bolts on the gearbox



- ♦ Ensure that edges of support arm -2- and gearbox console -1- are parallel.
- – Install pendulum support.

Note

Specified torques for assembly mountings ⇒ page 44 .

Vehicles with manual gearbox

- – Install slave cylinder of hydraulic clutch: ⇒ Rep. gr. 30 ; Repairing clutch mechanism .
- – Mount selector mechanism: ⇒ Rep. gr. 34 ; Repairing selector mechanism .
- – Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with automatic gearbox

- – Install selector lever cable: ⇒ Automatic gearbox 09M; Rep. gr. 34 ; Removing and installing selector lever cable

Continuation for all vehicles

- – Install drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts; Removing and installing drive shafts .

Vehicles with air conditioner

- – Install air conditioner compressor: ⇒ Heating, air conditioning system; Rep. gr. 87 .

Continuation for all vehicles

- – Install poly V-belt ⇒ page 51 .
- – Install catalytic converter and exhaust pipe.

Specified torques for exhaust system: ⇒ page 346 .

- – Electrical connections and routing: ⇒ Electrical system; Rep. gr. 97 .
- – Install noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .
- – Replenish coolant ⇒ page 157 .
- – Install battery and battery tray ⇒ Electrical system; Rep. gr. 27 ; Removing and installing battery .
- – Install air filter ⇒ page 303 .
- – Connect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .
- – Connect ⇒ vehicle diagnostic tester .
- – Erase learnt values and adapt engine control unit to throttle valve module ⇒ vehicle diagnostic tester “Guided functions”.
- – Perform vehicle system test ⇒ Vehicle diagnostic tester “Guided fault finding”.
- – Finish vehicle system test; any fault entries recorded in the memory during assembly will be deleted automatically.

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Observe applicable safety measures when carrying out a road test.

– Perform road test.

– Perform vehicle system test and rectify any faults found.

3.4 Specified torques

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

Note

Specified torques for assembly mountings ⇒ page 44 .

3.5 Assembly mountings

Specified torques

Note

Securing bolts for assembly mountings are stretch bolts and must be renewed.

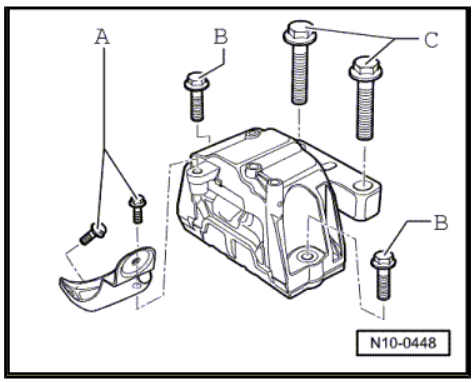
Engine assembly mountings

A [1] = 20 Nm + 90° further

B [1] = 40 Nm + 90° further

C [1] = 60 Nm + 90° further

[1] Renew.

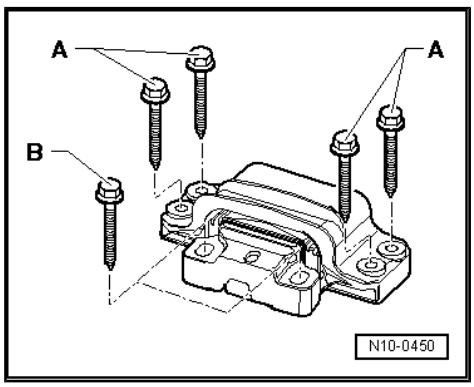


Gearbox assembly mounting

A [1] = 40 Nm + 90° further

B [1] = 60 Nm + 90° further

[1] Renew.



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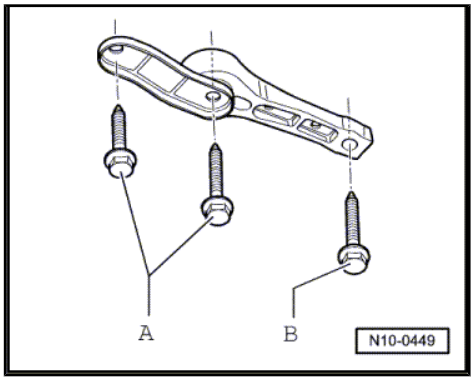
Pendulum support

A [1] = property class 8.8 = 40 Nm + 90° (1/4 turn) further

A [1] = property class 10.9 = 50 Nm + 90° (1/4 turn) further

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

[1] Renew.



3.6 Additional information and assembly work for vehicles with air conditioner

Note

Make sure that the coolant lines/hoses are not excessively stretched, kinked or bent.

To facilitate removing and installing engine without opening refrigerant circuit

– Remove retaining clamp(s) for refrigerant lines.

– Remove poly V-belt ⇒ page 51 .

Vehicles up to 10.2010

– Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Front body: Lock carrier - service position .

Vehicles from 11.2010

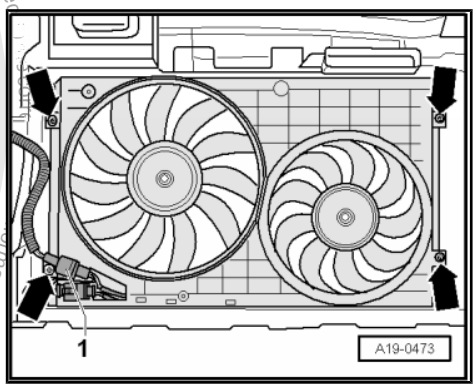
– Undo and remove bolts -arrows- of cowling.

– Release connector -1- and pull off.

– Remove cowling downwards.

Continuation for all vehicles

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87



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13 – Crankshaft group

1 Dismantling and assembling engine

Note

- *If metal shavings or larger quantities of metal particles or other deposits (caused for example, by partial seizure of the conrod bearings) are found in the engine oil when making repairs, clean the oil passages thoroughly and renew the oil filter in order to prevent further damage from occurring later.*
- *All bearing and running surfaces must be oiled before assembly.*

Assembly overview - parts I and II ⇒ page 46 .

Assembly overview - part I, belt drive ⇒ page 48 .

Assembly overview - part II, cylinder block ⇒ page 49 .

Removing and installing poly V-belt ⇒ page 51 .

Removing and installing valve timing housing (Golf, Golf Plus, Eos, Scirocco) ⇒ page 52

Removing and installing valve timing housing (Tiguan) ⇒ page 57 .

Removing and installing valve timing housing (Passat) ⇒ page 61 .

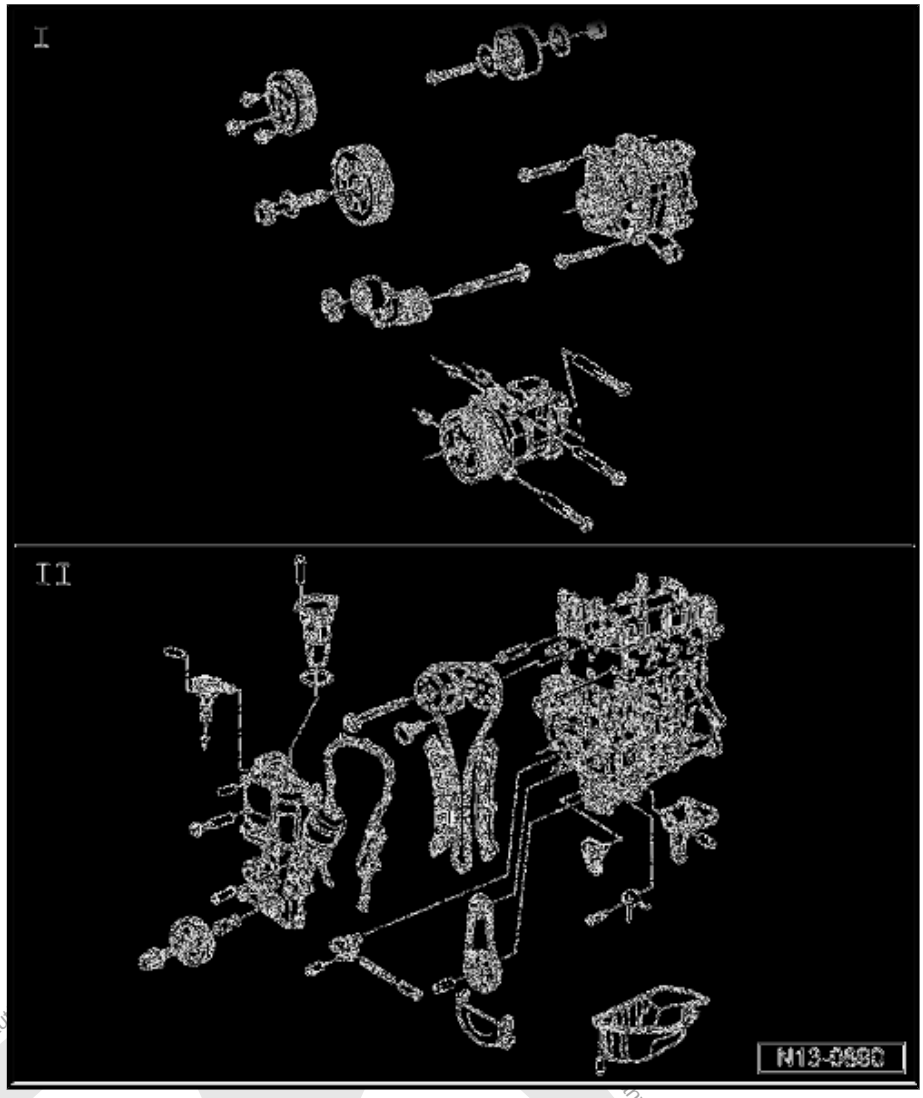
Removing and installing ancillary bracket ⇒ page 66 .

Note

Secure engine to engine and gearbox support - VAS 6095- to carry out repairs.

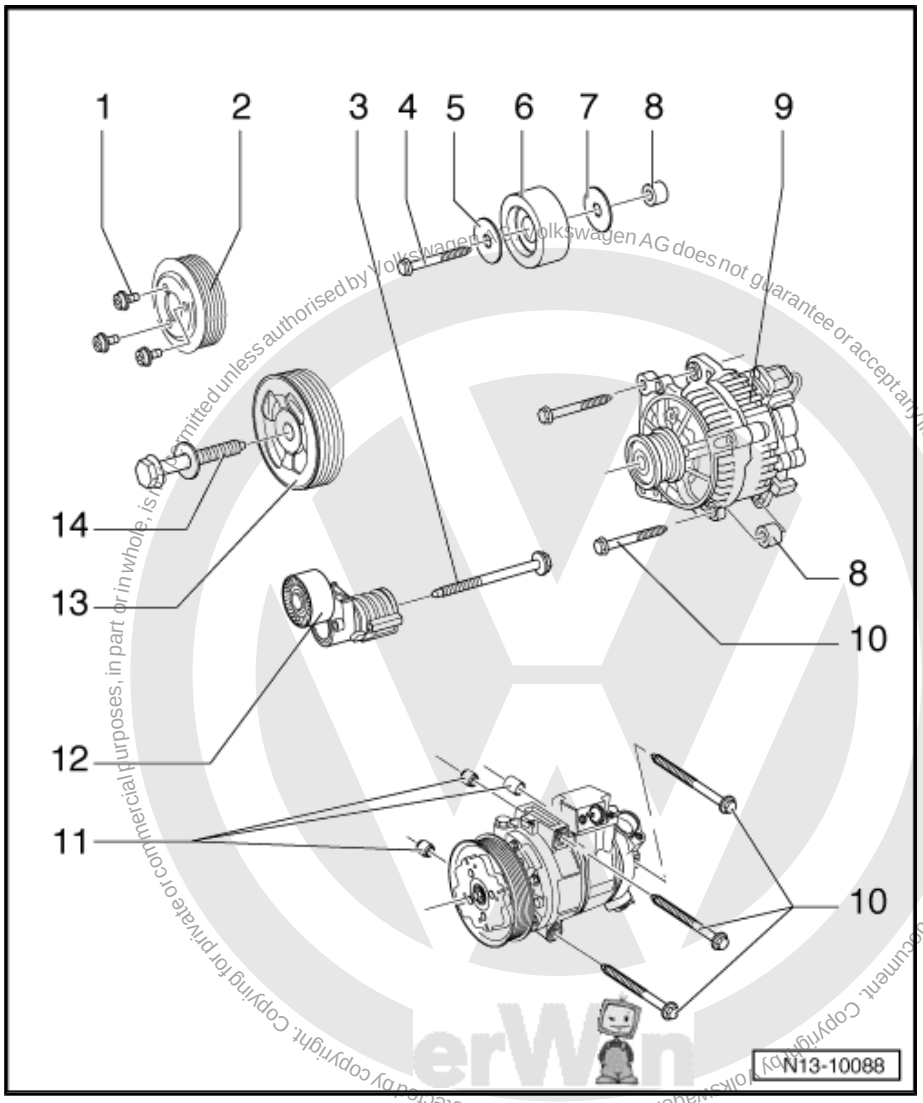
1.1 Assembly overview - parts I and II

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1.2 Assembly overview - part I, belt drive



1 - 20 Nm

2 - Belt pulley

- ❑ For coolant pump.
- ❑ Use water pump wrench - V.A.G 1590- to loosen and tighten.

3 - 40 Nm + 1/4 turn (90°) further

- ❑ Renew
- ❑ Removing and installing with vehicle raised.

4 - 40 Nm

5 - Washer

6 - Idler roller

7 - Washer

8 - Spacer sleeve

9 - Alternator

10 - 25 Nm

11 - Centring sleeve

12 - Tensioning element

13 - Belt pulley

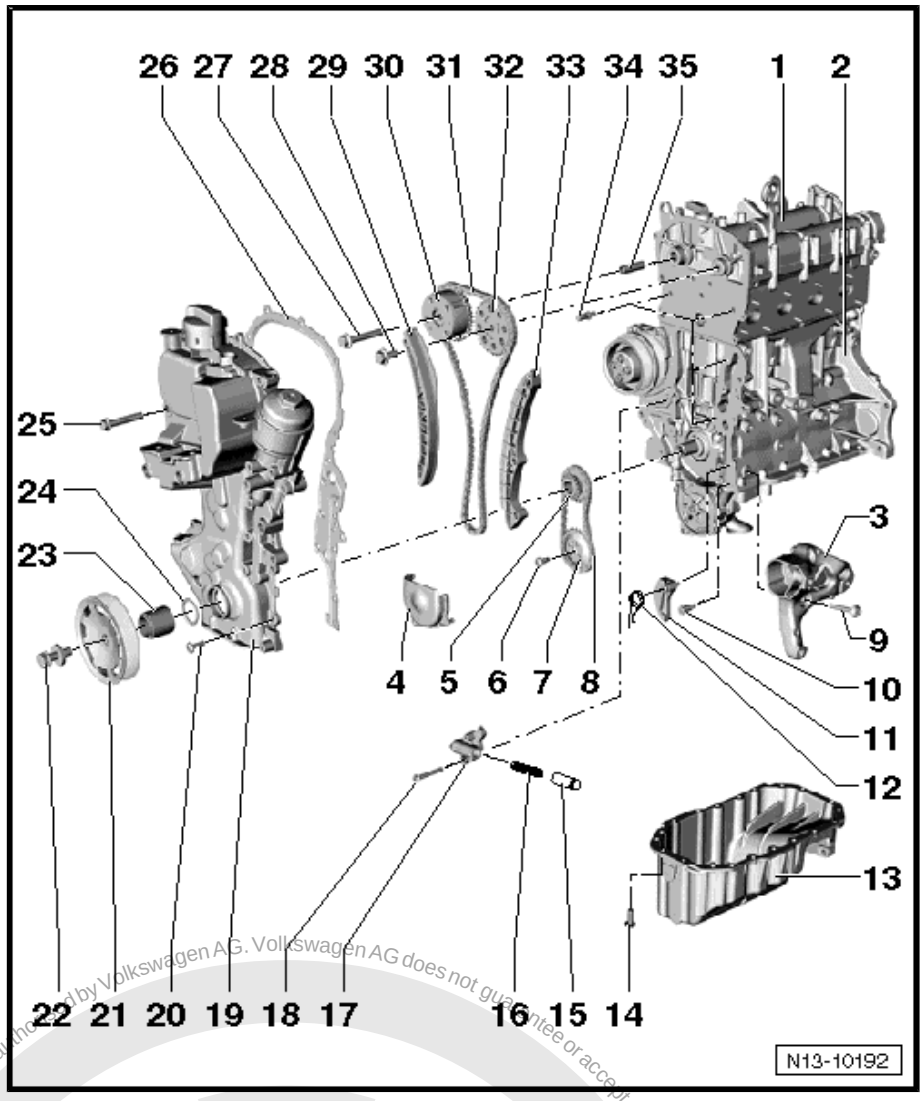
- ❑ For crankshaft.
- ❑ Contact surfaces must be free of oil and grease.

14 - 150 Nm + 1/2 turn (180°) further

- ❑ Observe tightening procedure ⇒ page 72 .
- ❑ Renew
- ❑ Contact surface for securing bolt must be free of oil and grease.
- ❑ Oil threads before inserting.
- ❑ Secure belt pulley against turning with counterhold - 3415-
- ❑ Turning further can be done in several stages.
- ❑ The turning further angle can be measured with a commercial protractor.

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1.3 Assembly overview - part II, cylinder block



1 - Cylinder head with camshaft housing

- ❑ Removing and installing ⇒ page 127
- ❑ Sealing surface must not be reworked.
- ❑ With integrated camshaft bearings.
- ❑ Remove sealant residue.
- ❑ Coat with AMV 188 001 02 before fitting.
- ❑ When installing, insert vertically from above so that dowel pins fit into holes in cylinder head

2 - Cylinder block

- ❑ Dismantling and assembling cylinder block ⇒ page 68 .
- ❑ Dismantling and assembling pistons and conrods ⇒ page 87

3 - Bracket for ancillaries

- ❑ For tensioning element and air conditioner compressor.
- ❑ Removing and installing ⇒ page 66 .

4 - Cover

5 - Chain sprocket

- ❑ For oil pump drive and timing chain.
- ❑ Contact surfaces must be free of oil and grease.

6 - 20 Nm + 1/4 turn (90°) further

- ❑ Renew

7 - Chain sprocket

- ❑ Lock sprocket using counterhold -T10172- .

8 - Drive chain

- ❑ Before removing, mark direction of rotation (installation position).

9 - 25 Nm

10 - Locating pin for chain tensioner

- ❑ Specified torque: 8 Nm

11 - Chain tensioner with tensioning plate

- ❑ For oil pump drive.
- ❑ Specified torque: 8 Nm

12 - Tensioning spring

13 - Oil sump

- ❑ Removing and installing ⇒ page 145

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

14 - 13 Nm

- ❑ Renew

15 - Piston

- ❑ For drive chain tensioner.

16 - Spring

17 - Chain tensioner

18 - 9 Nm

19 - Valve timing housing

- ❑ Removing and installing ⇒ page 52
- ❑ Removing and installing in the Tiguan ⇒ page 57 .
- ❑ Install with sealant D 176 501 A1.
- ❑ When installing, screw 2 -M6x80- stud bolts into camshaft housing and cylinder block for better guidance.
- ❑ For better guidance of valve timing housing, secure sump in position with 2 bolts.

20 - 10 Nm

21 - Belt pulley

- ❑ Observe tightening procedure ⇒ page 72 .
- ❑ Contact surfaces must be free of oil and grease.
- ❑ Secure belt pulley against turning with counterhold - 3415-
- ❑ Removing and installing poly V-belt ⇒ page 51.

22 - 150 Nm + 1/2 turn (180°) further

- ❑ Removing and installing crankshaft pulley ⇒ page 72 .
- ❑ Renew
- ❑ Contact surface for securing bolt must be free of oil and grease.
- ❑ Oil threads before inserting.
- ❑ Secure belt pulley against turning with counterhold - 3415-
- ❑ The turning further angle can be measured with a commercial protractor.

23 - Bearing bush

- ❑ Contact surfaces must be free of oil and grease.

24 - O-ring

- ❑ Renew

25 - 50 Nm

26 - Gasket

27 - 40 Nm + 1/4 turn (90°) further

- ❑ Lock chain sprockets using counterhold - T10172- .
- ❑ Bolt with left-hand thread.
- ❑ Renew

28 - 50 Nm + 1/4 turn (90°) further

- ❑ Renew

29 - Tensioning plate

30 - Camshaft adjuster

- ❑ Removing and installing ⇒ page 113
- ❑ Must not be dismantled.
- ❑ Removing and installing ⇒ page 99 .

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31 - Timing chain

- ❑ Removing and installing ⇒ page 113

32 - Chain sprocket

- ❑ Removing and installing ⇒ page 113
- ❑ For exhaust camshaft.
- ❑ Lock chain sprockets using counterhold -T10172- .

33 - Guide rail

- ❑ For timing chain.

34 - Guide pins

- ❑ Specified torque: 20 Nm

35 - Bearing bush

1.4 Removing and installing poly V-belt

Special tools and workshop equipment required

- ♦ 16 mm spanner

Removing

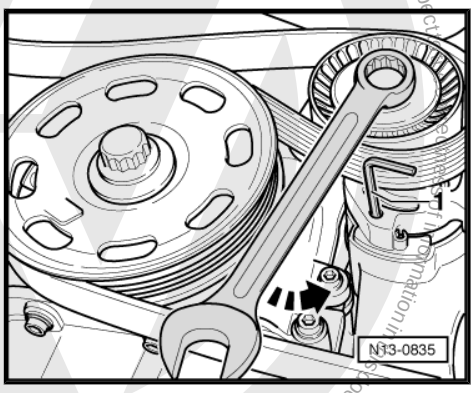
– Install noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Mark direction of rotation of poly V-belt.

– Swing poly V-belt tensioning element with a 16 mm spanner in -direction of arrow- to slacken belt.

– Lock tensioning element with a 4 mm Allen key -1-.

– Remove poly V-belt.



Installing

– First fit poly V-belt onto vibration dampers. Finally, push belt onto tensioning roller.

Further assembly is basically the reverse of the dismantling sequence.

Note

- ♦ *Ensure, before installing poly V-belt, that all ancillaries (alternator, air conditioner compressor) are secured tightly.*
- ♦ *When installing poly V-belt, check direction of belt rotation and proper seating of belt in pulleys.*

After completing repair:

– Start engine and check that belt runs properly.

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1.4.1 Poly V-belt routing

Belt drive with air conditioner compressor

1 - Coolant pump pulley

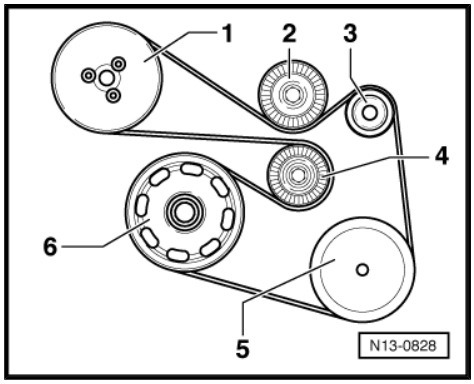
2 - Idler roller

3 - Alternator pulley

4 - Tensioning roller

5 - Air conditioner compressor pulley

6 - Crankshaft pulley



Belt drive without air conditioner compressor

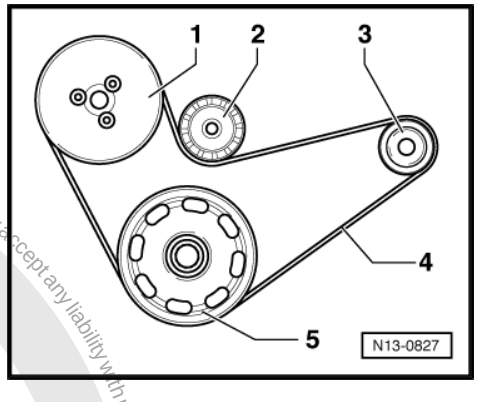
1 - Coolant pump pulley

2 - Tensioning roller

3 - Alternator pulley

4 - Poly V-belt

5 - Crankshaft pulley

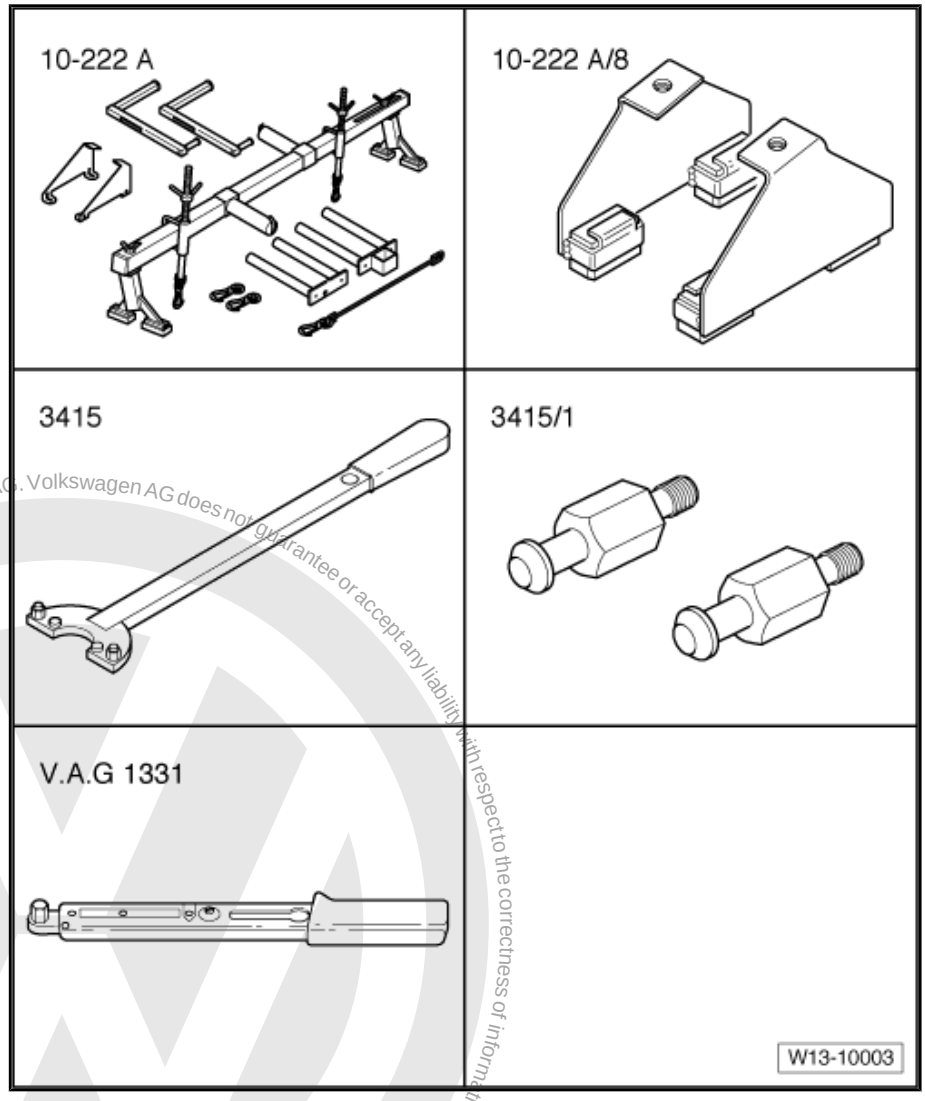


1.5 Removing and installing valve timing housing (Golf, Golf Plus, Eos, Scirocco)

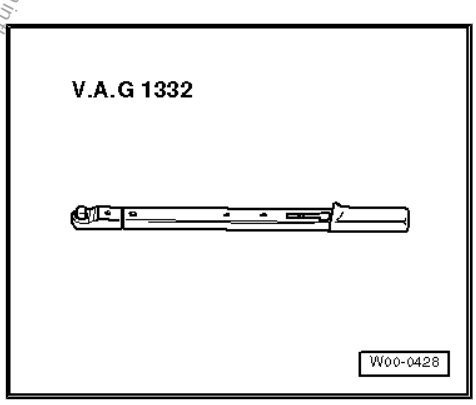
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Special tools and workshop equipment required

- Support bracket - 10-222A-
- Adapter - 10 - 222 A /8-
- Counterhold - 3415-
- Pins - 3415/1-
- Torque wrench (5…50 Nm) - V.A.G. 1331-

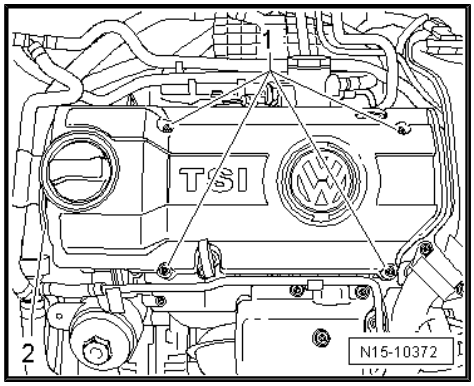


- Torque wrench (40…200 Nm) - V.A.G. 1332-
- Sealant D 176 501 A1



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1.5.1 Removing



– Remove securing bolts -1- from engine cover panel.
– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.
– Remove engine splash protection.
– Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .
– Mark the direction of rotation of the poly V-belt and remove belt ⇒ page 51 .
– Turn crankshaft in direction of engine rotation to TDC for no. 1 cylinder ⇒ page 96 .
– Remove coolant pump pulley ⇒ page 171 .

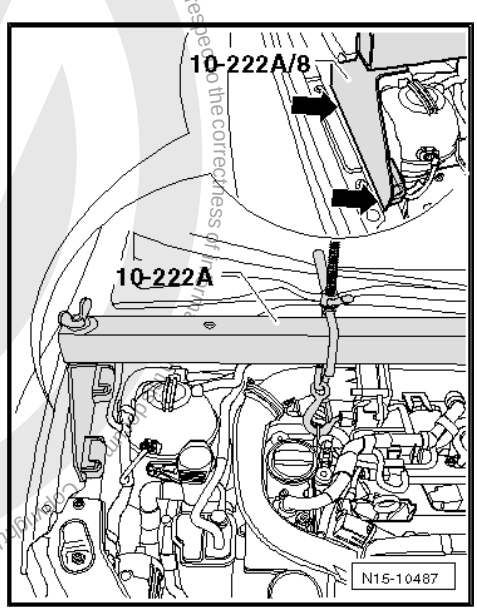
Vehicles from model year 2009 ►

– Remove banjo bolt from oil supply pipe to turbocharger.

Continuation for all vehicles

– Remove air conditioner compressor from bracket with refrigerant lines still connected ⇒ Heating, air conditioning; Rep. gr. 87 .
– Remove ancillary bracket.
– Remove alternator.

Scirocco

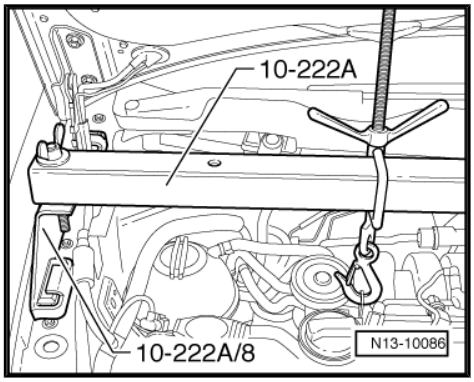


– Install support device - 10 - 222 A- with adapter - 10 - 222 A / 8- as shown and hook into lifting eye.
– Position adapter - 10 - 222 A /8- on vehicle front end -arrows- as shown.

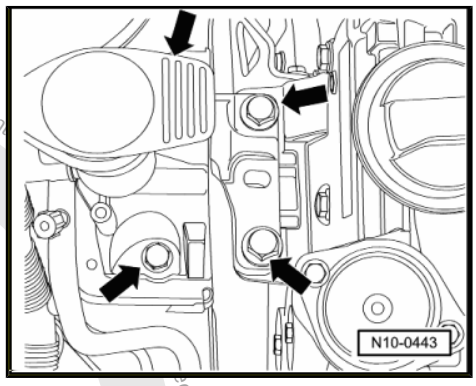
All vehicles

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– Install support device - 10 - 222 A- with adapter - 10 - 222 A / 8- as shown and hook into lifting eye.

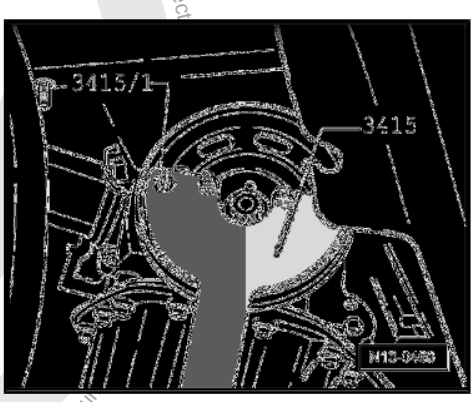


– Take up weight of engine and remove securing bolts -arrows-.

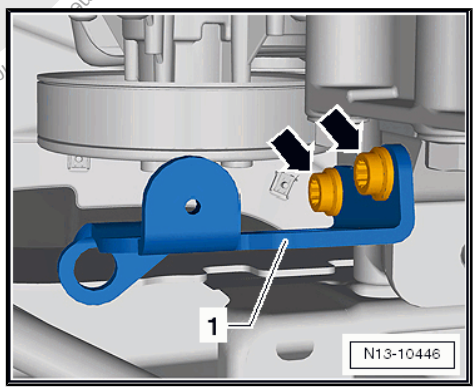


– Remove sump ⇒ page 145 .

– Now remove pulley securing bolt. Hold pulley with counterhold - 3415- and -3415/1- .

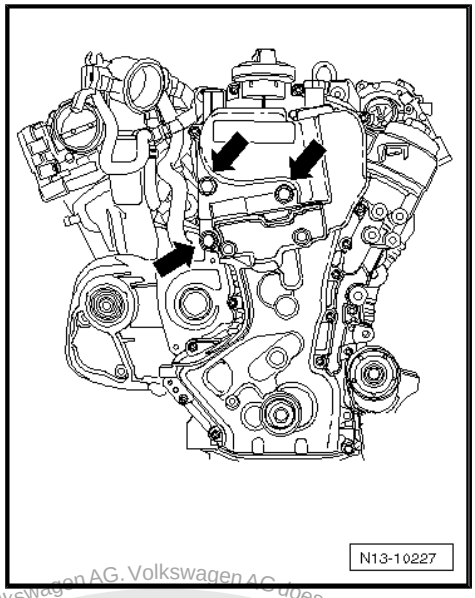


– Remove bracket -1- by undoing the bolts -arrows-.



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– Remove Allen head bolts for timing housing and hexagon bolts indicated by -arrows-.
– Remove valve timing housing.



Note

Note that crankshaft bearing bush remains in sealing flange.

1.5.2 Installing

Note

Note that belt pulley contact surfaces, securing bolt, bearing bush and crankshaft chain sprocket must be free of oil and grease.

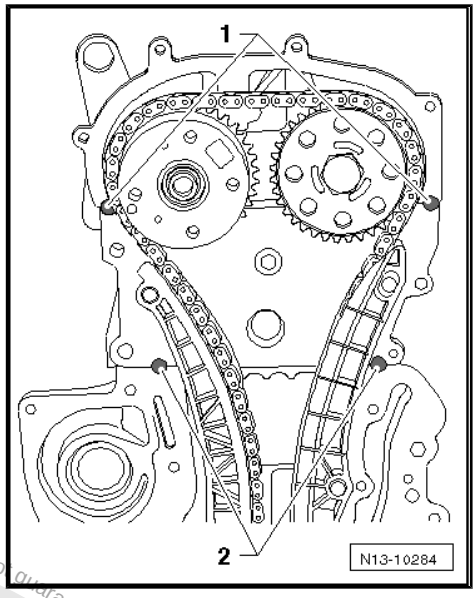
– Clean sealing surfaces carefully. They must be free of oil and grease.

Note

- *The valve timing housing is still sealed to the engine with a seal and also sealant D 176 501 A1.*
- *The sealant D 176 501 A1 is used to prevent leaks between the valve timing housing and the joints -1- and -2-.*
- *Sealant spots must have a diameter of 10 mm and a thickness of approx. 1 mm.*
- *Do not apply sealant until directly before the valve timing housing is fitted.*

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– Apply sealant D 176 501 A1 to the joints camshaft housing/ cylinder head -1- and cylinder head/cylinder block -2-.
– Fit new gasket onto dowel pins.
– When fitting, install two -M6x80- studs into cylinder head and cylinder block as a guide.
– Fit valve timing housing with crankshaft bearing bush simultaneously onto studs, dowel pins and crankshaft journal.
– Tighten valve timing housing securing bolts evenly and diagonally.



Ensure that timing housing is not canted.

Specified torque:

M6 bolt to 10 Nm.

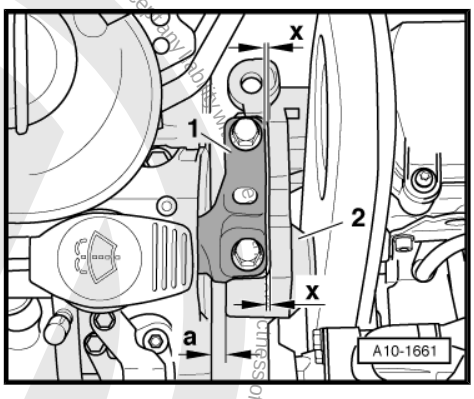
M8 bolt to 20 Nm

M10 bolt to 50 Nm.

Engine mountings ⇒ page 14

Align engine mountings as follows:

♦ There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
♦ The side surface of the engine support -2- should be located parallel to the support arm -1-.



Install crankshaft belt pulley ⇒ page 72 .

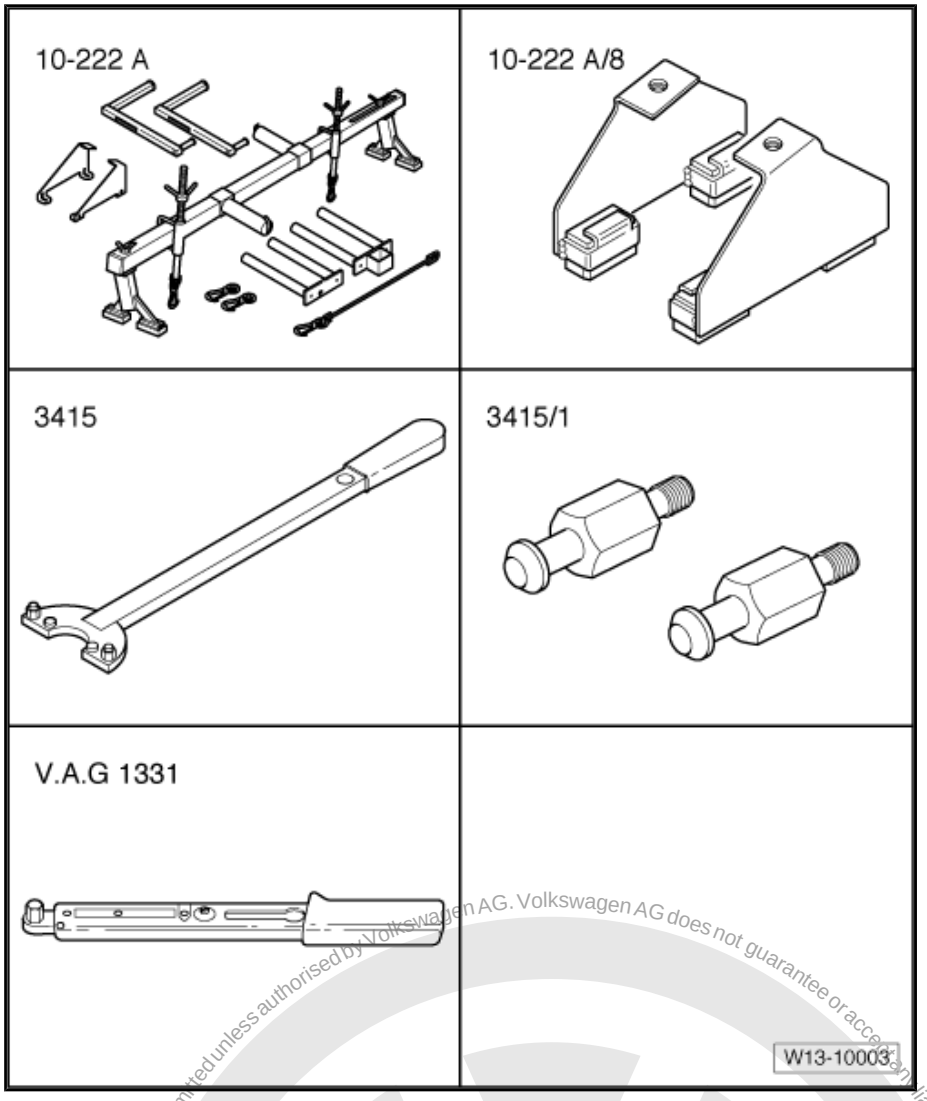
Further assembly is basically the reverse of the dismantling sequence.

1.6 Removing and installing valve timing housing (Tiguan)

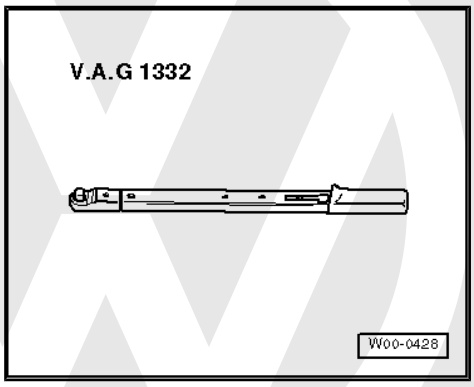
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Special tools and workshop equipment required

- Support bracket - 10-222A-
- Adapter - 10 - 222 A /22-
- Counterhold - 3415-
- Pins - 3415/1-
- Torque wrench (5…50 Nm) - V.A.G. 1331-



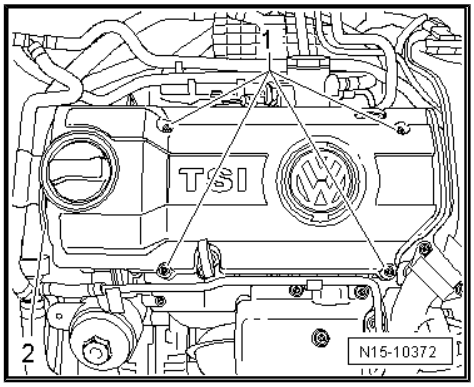
- Torque wrench (40…200 Nm) - V.A.G. 1332-
- Sealant - D 176 501 A1-



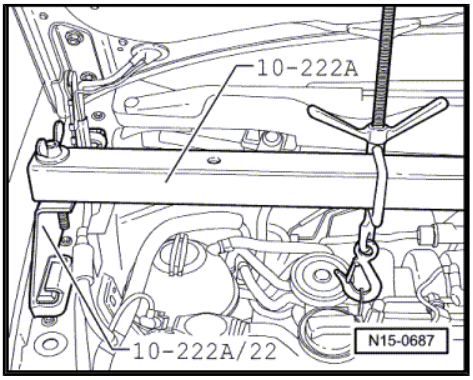
Removing

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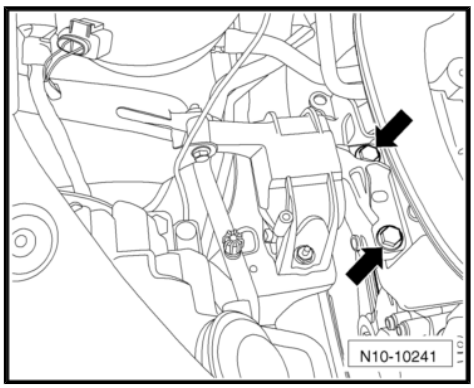
– Unscrew bolts -1- securing engine cover panel.



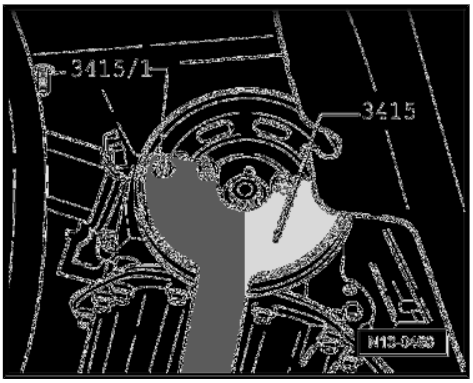
– Pull oil dipstick out.
– Detach coolant hoses -2- from engine cover panel and pull engine cover panel upwards.
– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .
– Remove front right wheel housing liner: ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .
– Mark direction of rotation of poly V-belt.
– Remove poly V-belt ⇒ page 51 .
– Turn crankshaft in engine direction of rotation to TDC for No. 1 cylinder ⇒ page 96 .
– Remove poly V-belt of coolant pump ⇒ page 171 .
– Remove banjo bolt of oil supply pipe for turbocharger.
– Remove bracket for ancillaries ⇒ page 66 .
– Support bracket - 10 - 222 A- with adapter - 10 - 222 A /22-



– Take up weight of engine and remove securing bolts -arrows-.
– Remove sump ⇒ page 145 .

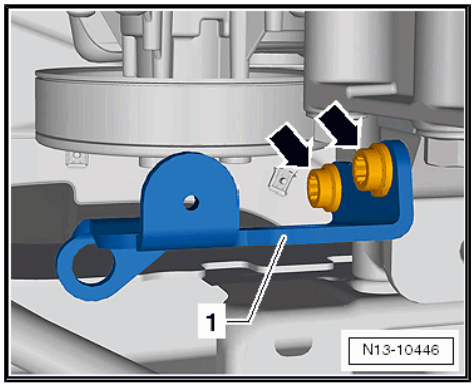


– Undo bolt for poly V-belt. Hold pulley with counterhold - 3415- and -3415/1- .

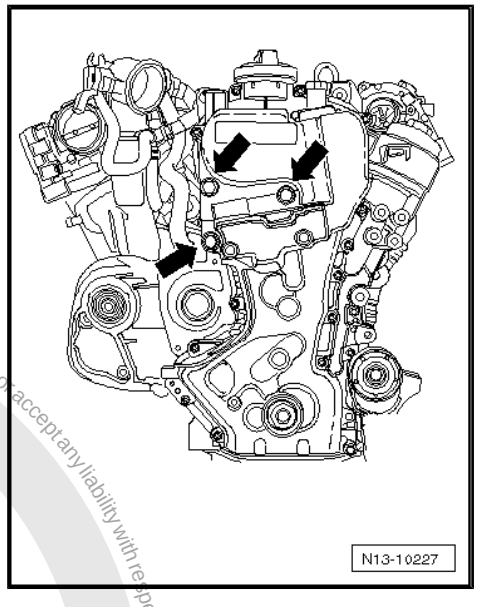


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– Remove bracket -1- by undoing the bolts -arrows-.



– Undo socket bolts of valve timing housing.
– Undo the marked socket bolts -arrows-.
– Remove valve timing housing.



Note

Note that crankshaft bearing bush remains in sealing flange.

Installing

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

Note

The pulley contact surfaces, securing bolt, bearing bush and crankshaft chain sprocket must be free of oil and grease.

Clean sealing surfaces carefully.

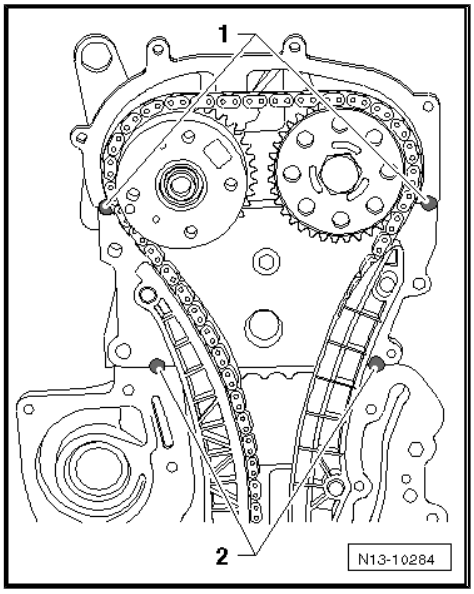
Sealing surfaces must be free of oil and grease.

Note

- *The valve timing housing is still sealed to the engine with a seal and also sealant D 176 501 A1.*
- *The sealant D 176 501 A1 is used to prevent leaks between the valve timing housing and the joints -1- and -2-.*
- *Sealant spots must have a diameter of 10 mm and a thickness of approx. 1 mm.*
- *Do not apply sealant until directly before the valve timing housing is fitted.*

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– Apply sealant D 176 501 A1 to the joints camshaft housing/ cylinder head -1- and cylinder head/cylinder block -2-.
– Fit new gasket onto dowel pins.
– Screw two -M6x80- studs into cylinder head and cylinder block to improve guidance.
– Fit timing case with crankshaft bearing bush simultaneously onto studs, dowel pins and crankshaft journal.
– Tighten valve timing housing securing bolts evenly and diagonally.



Ensure that timing case is not canted.

Specified torque

M6 bolt to 10 Nm.

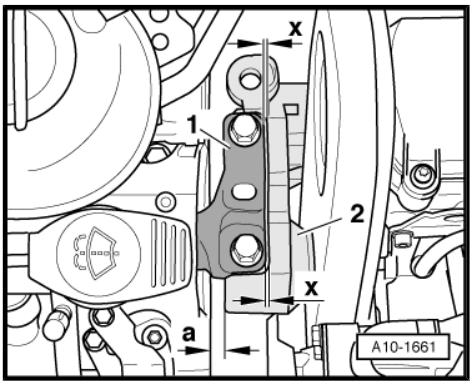
M8 bolt to 20 Nm

M10 bolt to 50 Nm.

Engine mountings ⇒ page 28

Align engine mountings as follows:

♦ There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
♦ The side surface of the engine support -2- should be located parallel to the support arm -1-.



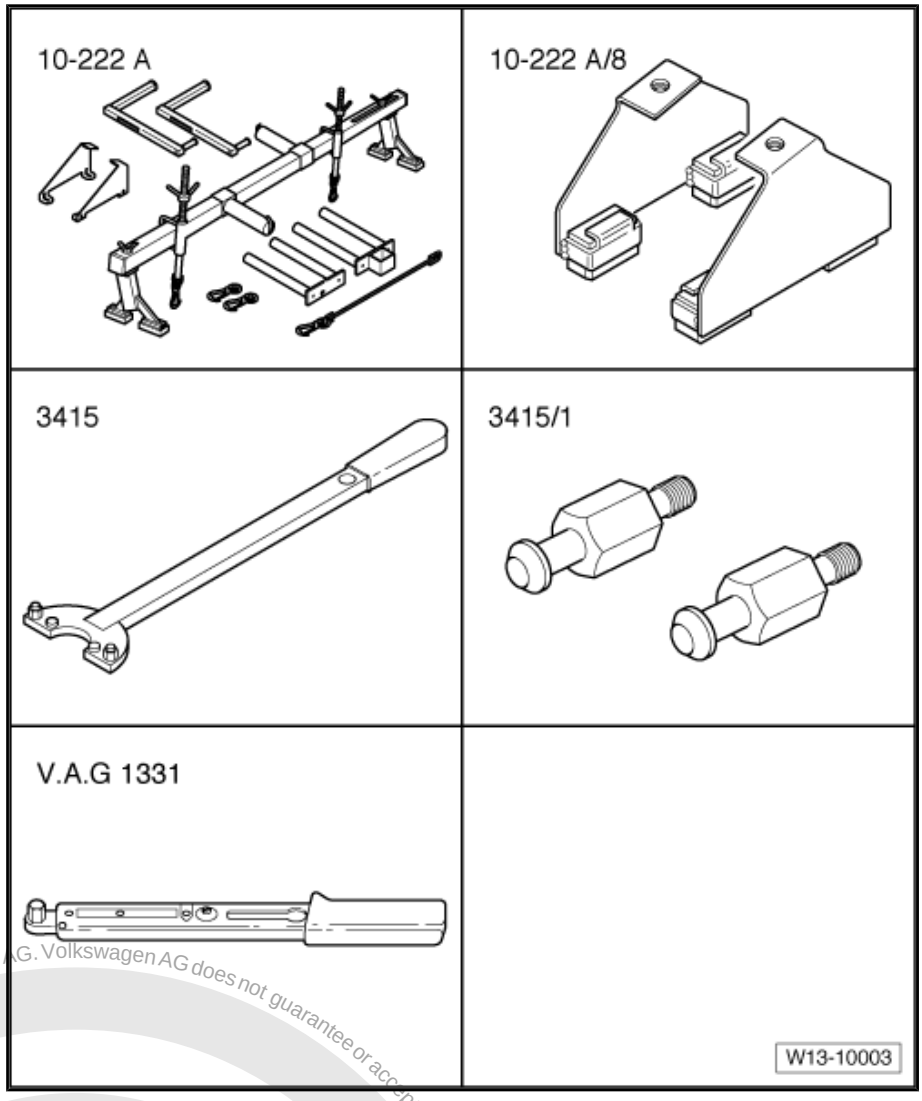
Install crankshaft belt pulley ⇒ page 72 .

1.7 Removing and installing valve timing housing (Passat)

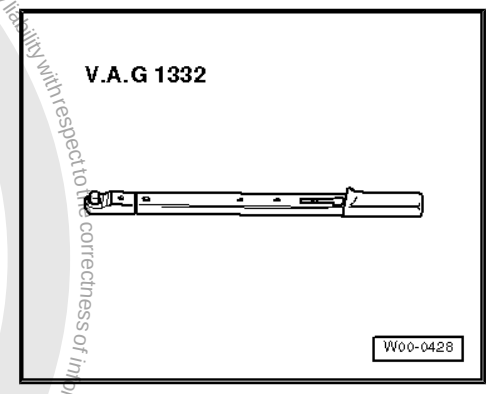
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Special tools and workshop equipment required

- Support bracket - 10-222A-
- Adapter - 10 - 222 A /22-
- Counterhold - 3415-
- Pins - 3415/1-
- Torque wrench (5…50 Nm) - V.A.G. 1331-



- Torque wrench (40…200 Nm) - V.A.G. 1332-
- Sealant - D 176 501 A1-



Removing

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– Unscrew bolts -1- securing engine cover panel.

– Pull oil dipstick out.

– Detach coolant hoses -2- from engine cover panel and pull engine cover panel upwards.

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .

– Mark direction of rotation of poly V-belt.

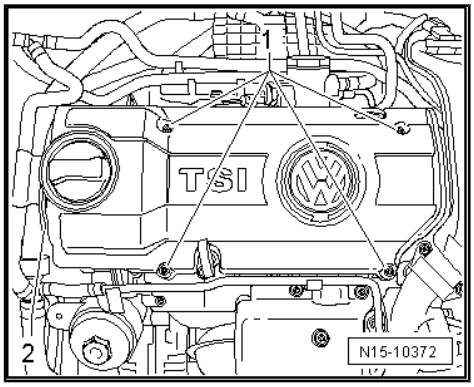
– Remove poly V-belt ⇒ page 51 .

– Turn crankshaft in engine direction of rotation to TDC for No. 1 cylinder ⇒ page 96 .

– Remove poly V-belt of coolant pump ⇒ page 171 .

– Remove banjo bolt of oil supply pipe for turbocharger.

– Remove bracket for ancillaries ⇒ page 66 .



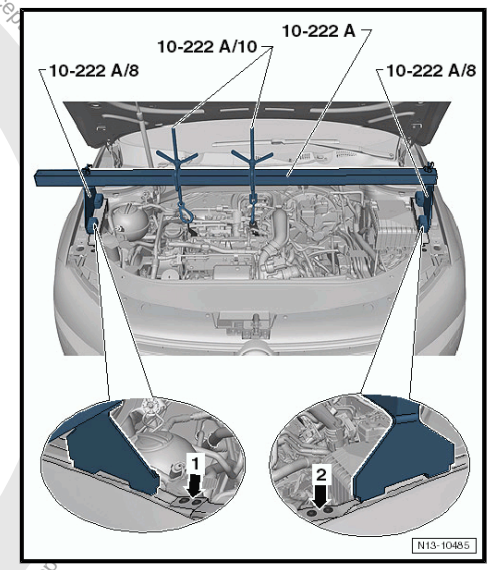
– Position support bracket - 10 - 222 A- with adapter - 10 - 222 A /8- and hook - 10 - 222 A /10- as shown in illustration.

– Fit adapter - 10 - 222 A /8- behind bolts -arrow 1- and -arrow 2-.

WARNING

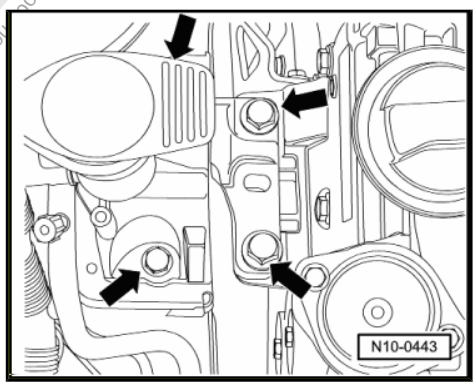
Not not fit adapter - 10 - 222 A /8- on edges of wing.

The wing will otherwise be damaged.



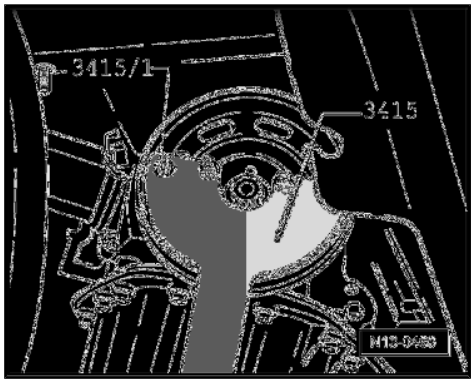
– Take up weight of engine and remove securing bolts -arrows-.

– Remove sump ⇒ page 145 .

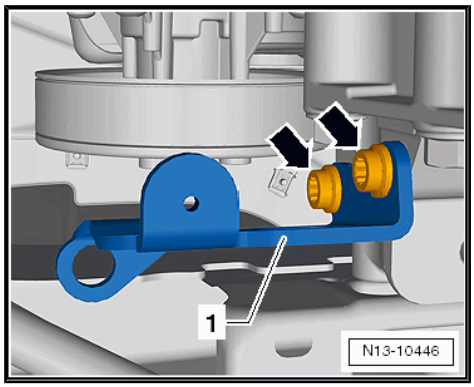


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– Undo bolt for poly V-belt. Hold pulley with counterhold - 3415- and -3415/1- .

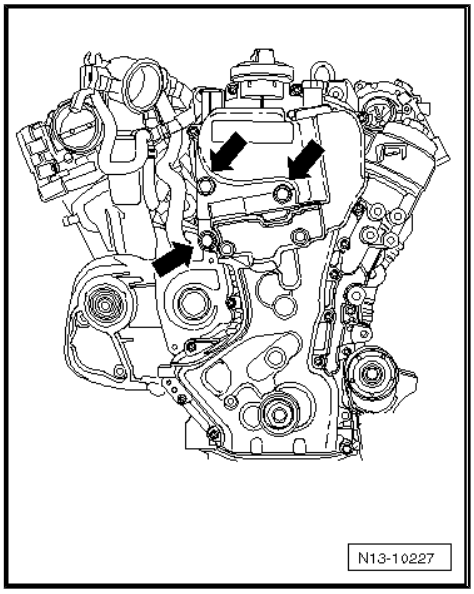


– Remove bracket -1- by undoing the bolts -arrows-.



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– Undo socket bolts of valve timing housing.
– Undo the marked socket bolts -arrows-.
– Remove valve timing housing.



Note

Note that crankshaft bearing bush remains in sealing flange.

Installing

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

Note

The pulley contact surfaces, securing bolt, bearing bush and crankshaft chain sprocket must be free of oil and grease.

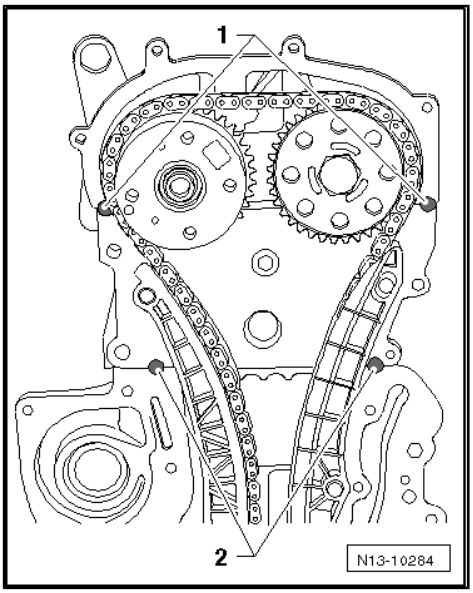
Clean sealing surfaces carefully.

Sealing surfaces must be free of oil and grease.

Note

- *The valve timing housing is still sealed to the engine with a seal and also sealant D 176 501 A1.*
- *The sealant D 176 501 A1 is used to prevent leaks between the valve timing housing and the joints -1- and -2-.*
- *Sealant spots must have a diameter of 10 mm and a thickness of approx. 1 mm.*
- *Do not apply sealant until directly before the valve timing housing is fitted.*

– Apply sealant D 176 501 A1 to the joints camshaft housing/ cylinder head -1- and cylinder head/cylinder block -2-.
– Fit new gasket onto dowel pins.
– Screw two -M6x80- studs into cylinder head and cylinder block to improve guidance.
– Fit timing case with crankshaft bearing bush simultaneously onto studs, dowel pins and crankshaft journal.
– Tighten valve timing housing securing bolts evenly and diagonally.



Ensure that timing case is not canted.

Specified torque

M6 bolt to 10 Nm.

M8 bolt to 20 Nm

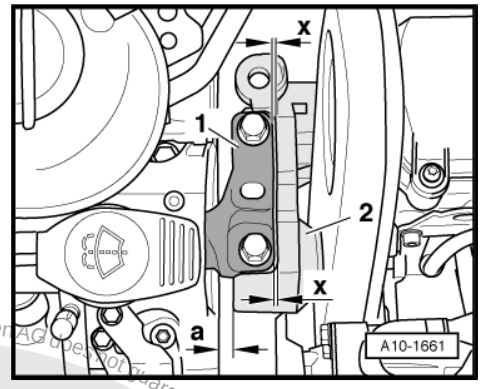
M10 bolt to 50 Nm.

Engine mountings ⇒ page 44

Align engine mountings as follows:

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- There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
- The side surface of the engine support -2- should be located parallel to the support arm -1-.

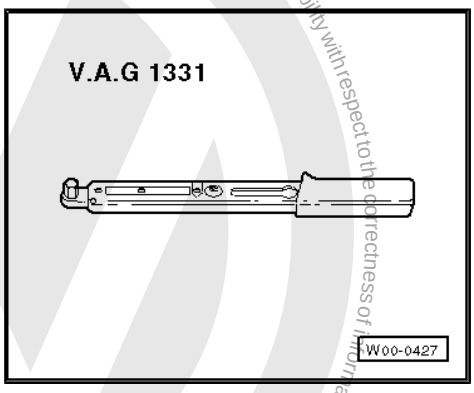


Install crankshaft belt pulley ⇒ page 72 .

1.8 Removing and installing ancillary bracket

Special tools and workshop equipment required

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



Removing

– Install noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Remove poly V-belt ⇒ page 51 .

– Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Removing and installing alternator .

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87

Note

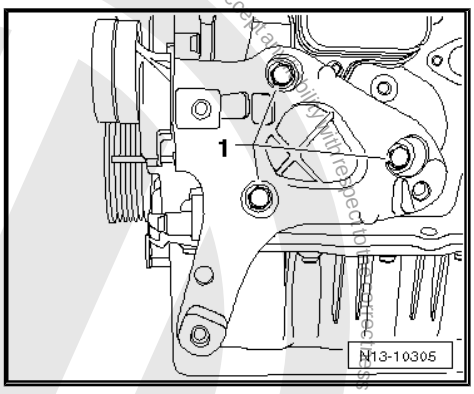
The air conditioning system lines must not be opened.

– Secure air conditioner compressor to lock carrier.

– Ensure that lines are not kinked.

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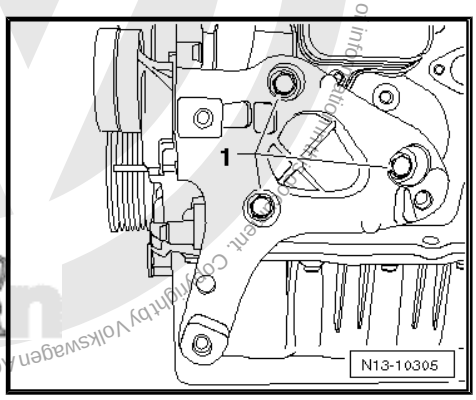
– Unscrew securing bolts -1- and remove bracket.



Installing

– Fit ancillary bracket to cylinder block.

– Tighten securing bolts -1- to 25 Nm.



Specified torque for tensioning element ⇒ Item 3 (page 48)

Further assembly is basically the reverse of the dismantling sequence.

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2 Removing and installing sealing flanges and flywheel or drive plate

Assembly overview ⇒ page 68 .

Removing and installing engine speed sender - G28- ⇒ page 69 .

Renewing crankshaft oil seal on belt pulley end ⇒ page 70 .

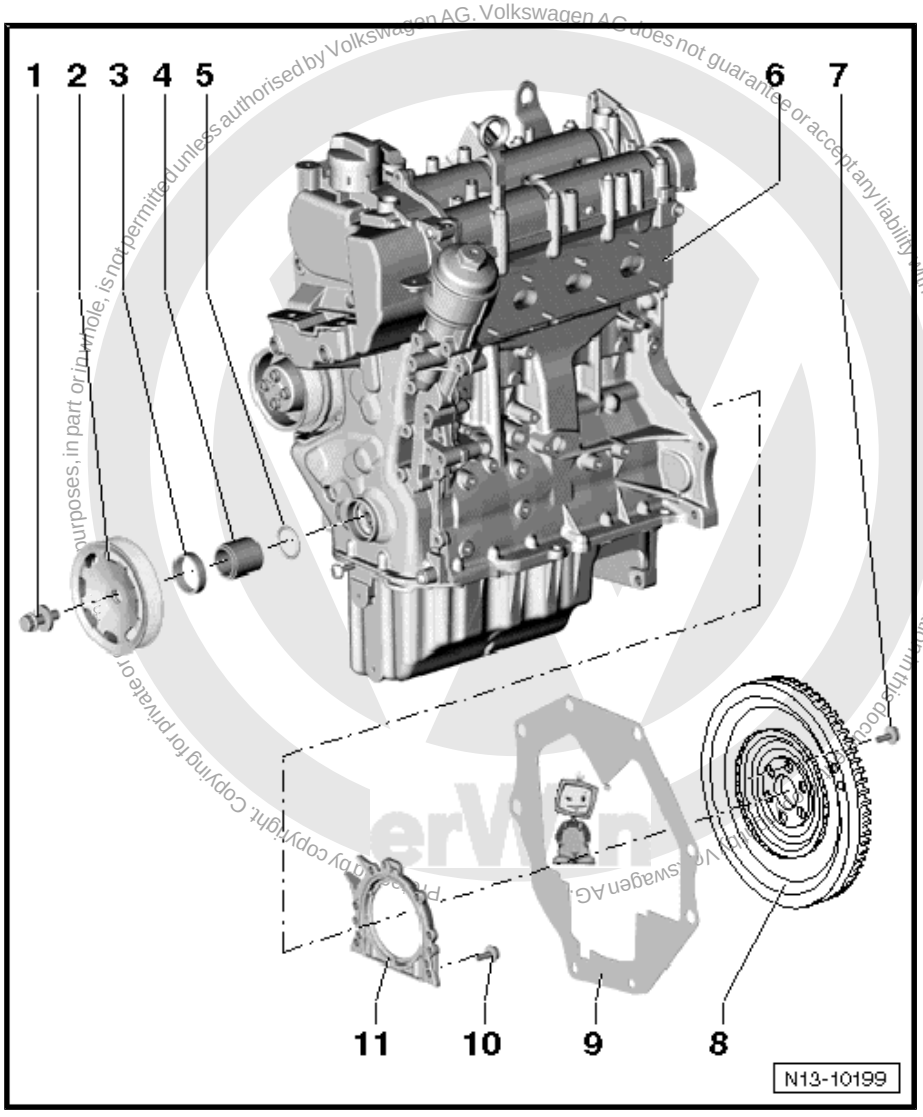
Removing and installing crankshaft pulley ⇒ page 72 .

Renewing crankshaft sealing flange - flywheel end ⇒ page 75 .

2.1 Assembly overview

Note

Repairing clutch ⇒ Repairing clutch; Rep. gr. 30 ; Removing and installing clutch .



1 - 150 Nm + 1/2 turn (180°) further

- ❑ Renew
- ❑ Removing and installing crankshaft pulley ⇒ page 72 .
- ❑ Contact surface for securing bolt must be free of oil and grease.
- ❑ Oil threads before inserting.
- ❑ Secure pulley against turning with counterhold 3415.
- ❑ The turning further angle can be measured with a commercial protractor.

2 - Belt pulley

- ❑ Contact surfaces must be free of oil and grease.
- ❑ Secure against turning with counterhold - 3415- when removing and installing
- ❑ Removing and installing poly V-belt ⇒ page 51 .

3 - Seal

- ❑ Renew

4 - Bearing bush

- ❑ Contact surfaces must be free of oil and grease.

5 - O-ring

- ❑ Renew

6 - Cylinder block

- ❑ Removing and installing ⇒ page 127

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7 - 60 Nm + 1/4 turn (90°) further

- ❑ Renew

8 - Flywheel/drive plate

- ❑ When removing and installing flywheel, lock with counterhold - T10044- .

9 - Intermediate plate

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

10 - 10 Nm

- ❑ Renew

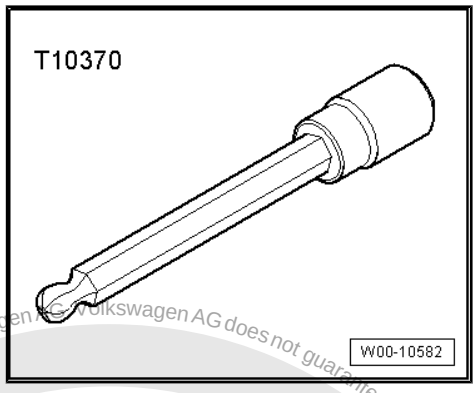
11 - Sealing flange with sender wheel and oil seal

- ❑ Removing and installing engine speed sender - G28- (not shown) ⇒ page 69 .
- ❑ Specified torque for engine speed sender - G28- : 5 Nm.
- ❑ Renew sealing flange complete with oil seal and sender wheel only.
- ❑ Renewing crankshaft sealing flange - flywheel end ⇒ page 75 .

2.2 Removing and installing engine speed sender - G28-

Special tools and workshop equipment required

- ♦ Socket 4mm - T10370-

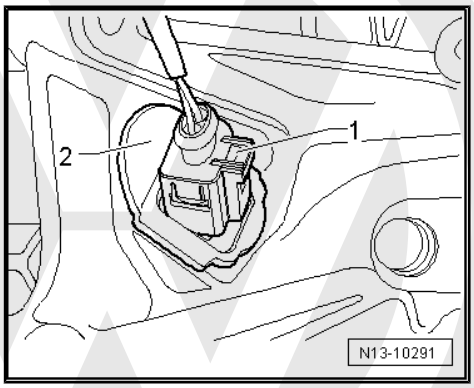


Removing

Engine speed sender is located under intake manifold on sealing flange on flywheel end of crankcase.

– Pull off connector -1- from engine speed sender - G28- .

– Remove gasket -2- from cylinder block and remove engine speed sender - G28- with socket - T10370- .



Installing

– Install engine speed sender - G28- and tighten securing bolt to 5 Nm.

Further assembly is basically the reverse of the dismantling sequence.

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2.3 Renewing crankshaft oil seal - belt pulley end

Special tools and workshop equipment required

- Oil seal extractor - 3203-
- Torque wrench - V.A.G 1332-
- Assembly sleeve - T10117/2-
- Assembly tool - T10053-



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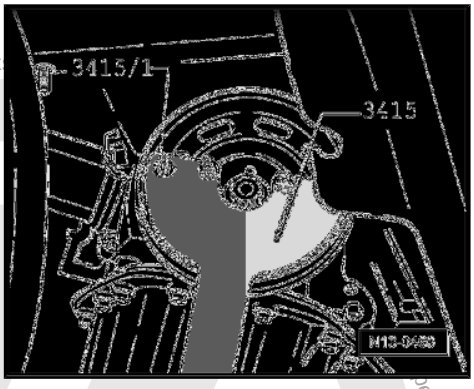
Removing

– Remove front right wheel housing liner ⇒ General body repairs; Rep. gr. 66 ; Removing and installing wheel housing liner; Front wheel housing liner .

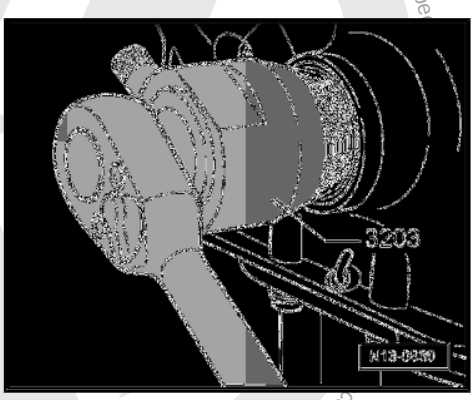
– Remove poly V-belt ⇒ page 51 .

– Turn crankshaft in direction of engine rotation to TDC for no. 1 cylinder ⇒ page 96 .

– Now remove pulley securing bolt. Hold pulley with counterhold -3415- and -3415/1- .



– Unscrew inner part of oil seal extractor - 3203- 3 turns (approx. 5 mm) from the outer part and lock in position with the knurled screw.
– Lubricate threaded head of oil seal extractor, place it in position and, exerting firm pressure, screw it into oil seal as far as possible.
– Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.
– Remove bearing bush from crankshaft journal and clean contact surfaces of crankshaft chain sprocket and bearing bush.

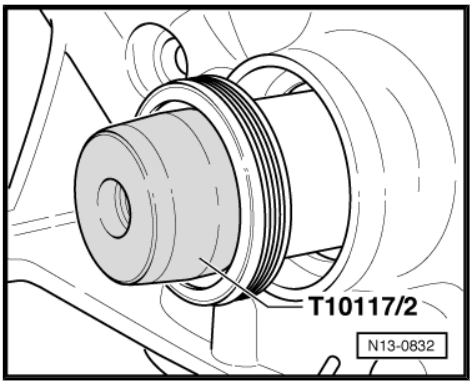


Installing

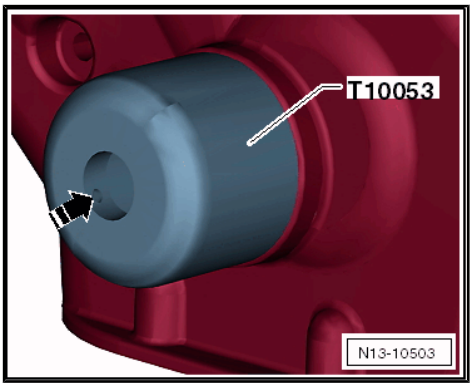
Note

Note that pulley contact surfaces, securing bolt, bearing bush and crankshaft chain sprocket must be free of oil and grease.

– Push bearing bush onto crankshaft journal.
– Fit sleeve -T10117/2- onto bush and slide oil seal onto bush.
– Remove sleeve -T10117/2- from bush.



– Drive oil seal into valve timing housing to stop using assembly tool -T10053- and striking evenly with a hammer.



Install crankshaft belt pulley ⇒ page 72 .

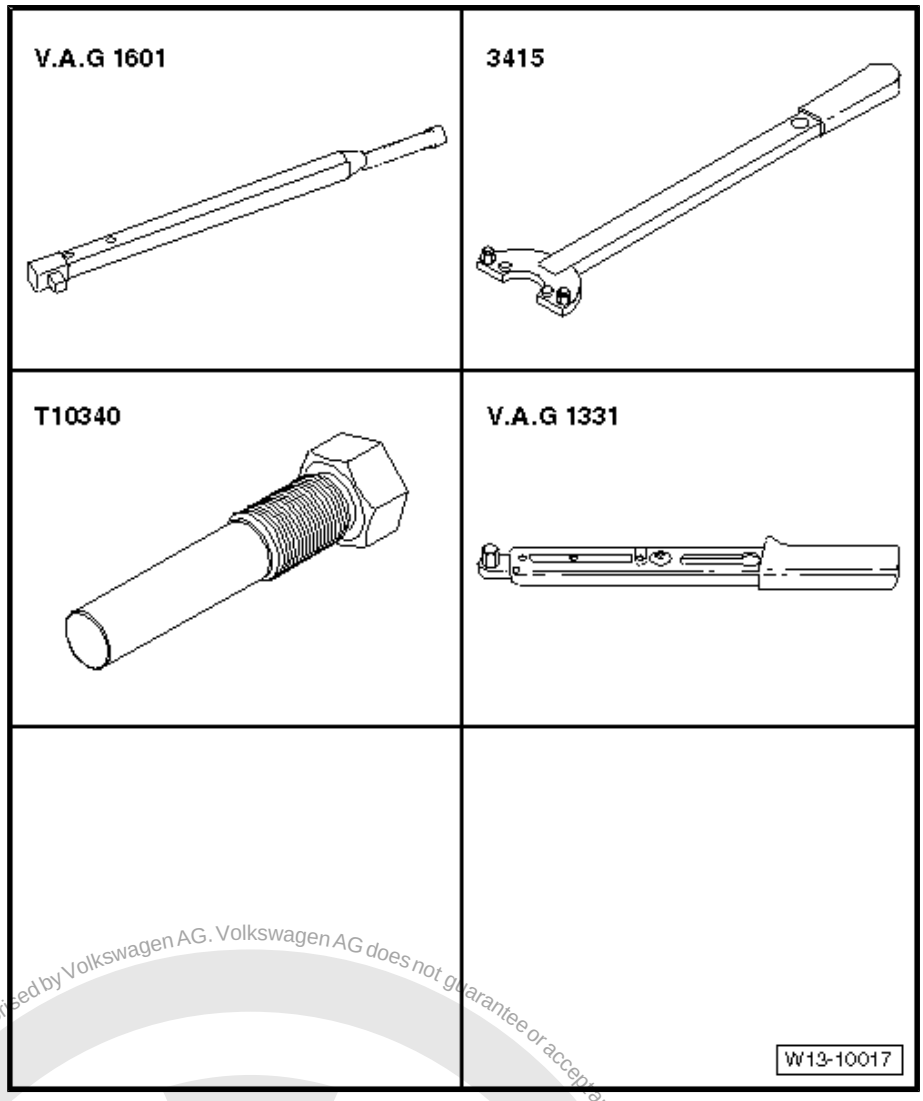
Further assembly is basically the reverse of the dismantling sequence.

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2.4 Removing and installing crankshaft pulley

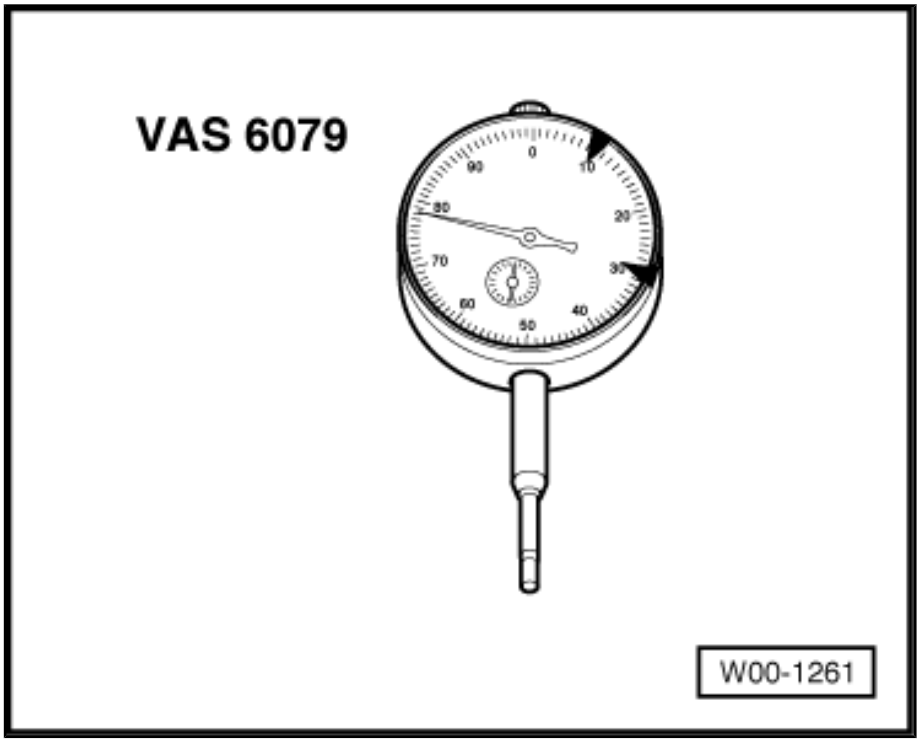
Special tools and workshop equipment required

- Torque wrench - V.A.G 1601-
- Counterhold - 3415-
- Pin - 3415/1- (not illustrated)
- Locking pin - T10340-
- Torque wrench (5…50 Nm) - V.A.G 1331-

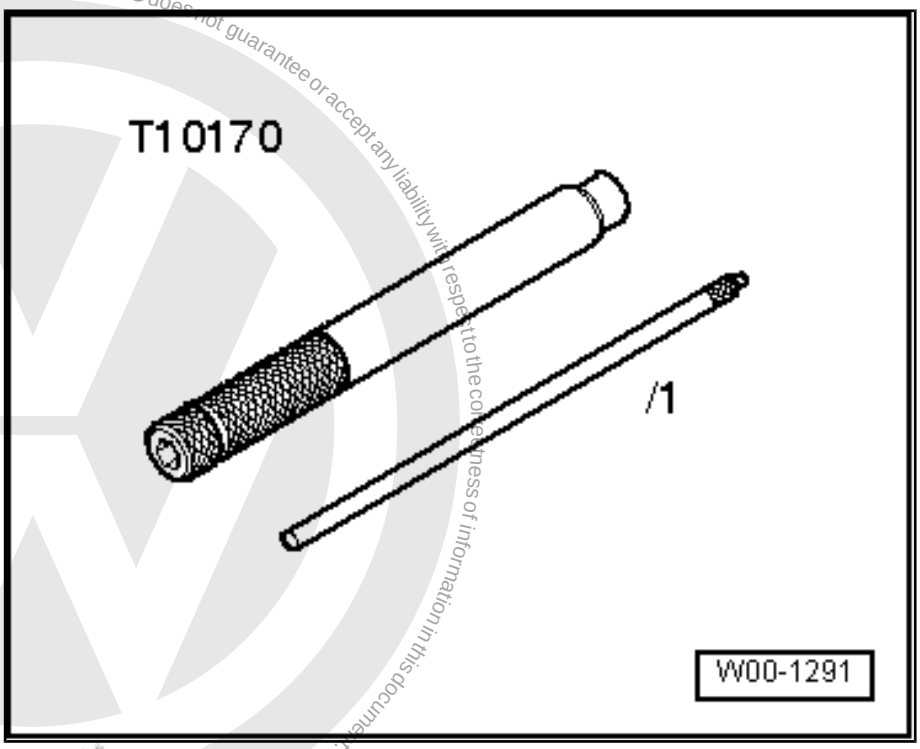


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- Dial gauge - VAS 6079-



- Dial gauge adapter - T10170-

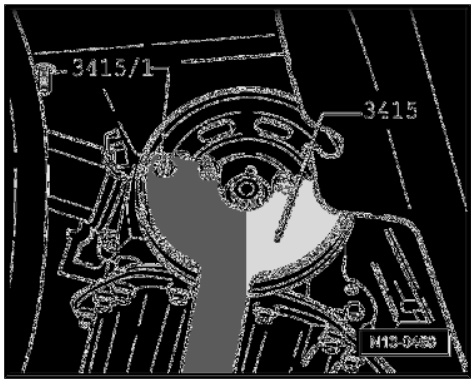


Removing

– Remove poly V-belt ⇒ page 51 .

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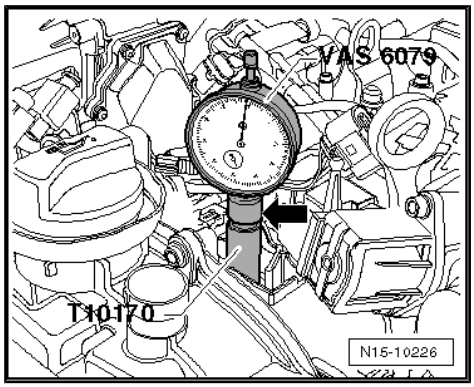
– Loosen pulley securing bolt. Hold pulley with counterhold - 3415- and -3415/1- .



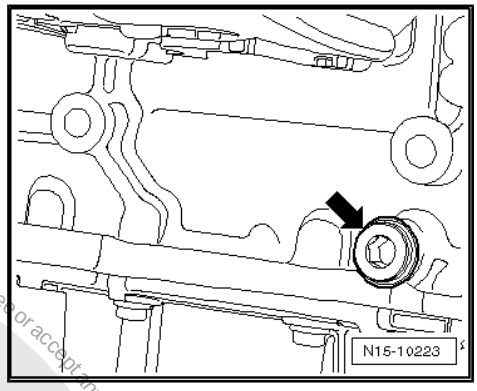
Installing

– Tighten pulley hand-tight using a new securing bolt.

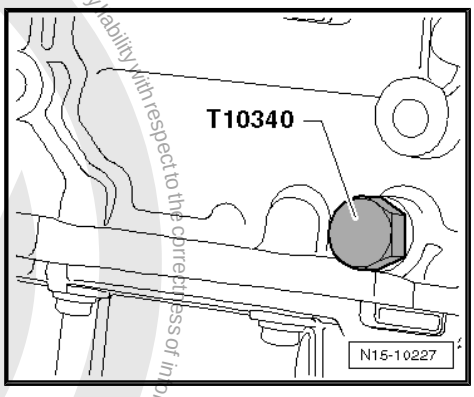
– Turn crankshaft in direction of engine rotation to TDC for no. 1 cylinder ⇒ page 96 .



– Unscrew plug from crankcase.
– Screw locking pin - T10340- to stop into crankcase.
– Tighten locking pin - T10340- to 30 Nm.



Locking pin - T10340- locks crankshaft in direction of engine rotation.



Note

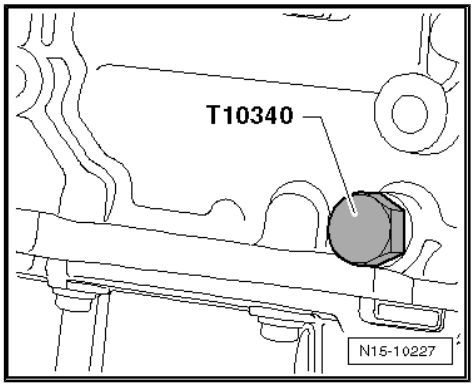
- *Note that all contact surfaces from the securing bolt to the crankshaft chain sprocket must be free of oil and grease.*
- *Always use a new bolt.*

Specified torque: 150 Nm + 1/2 turn (180°) further.

Hold pulley with counterhold - 3415- and -3415/1- .

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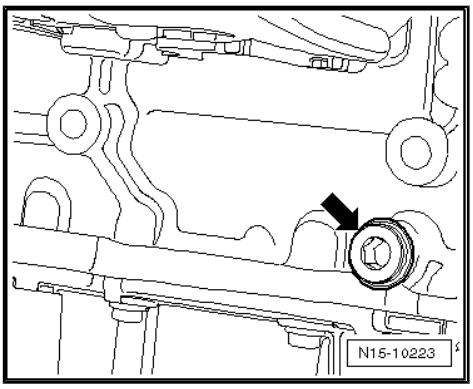
– Unscrew locking pin - T10340- from crankcase.
– Screw plug into crankcase.



Specified torque: 30 Nm

– Install poly V-belt ⇒ page 51 .

Further assembly is basically the reverse of the dismantling sequence.

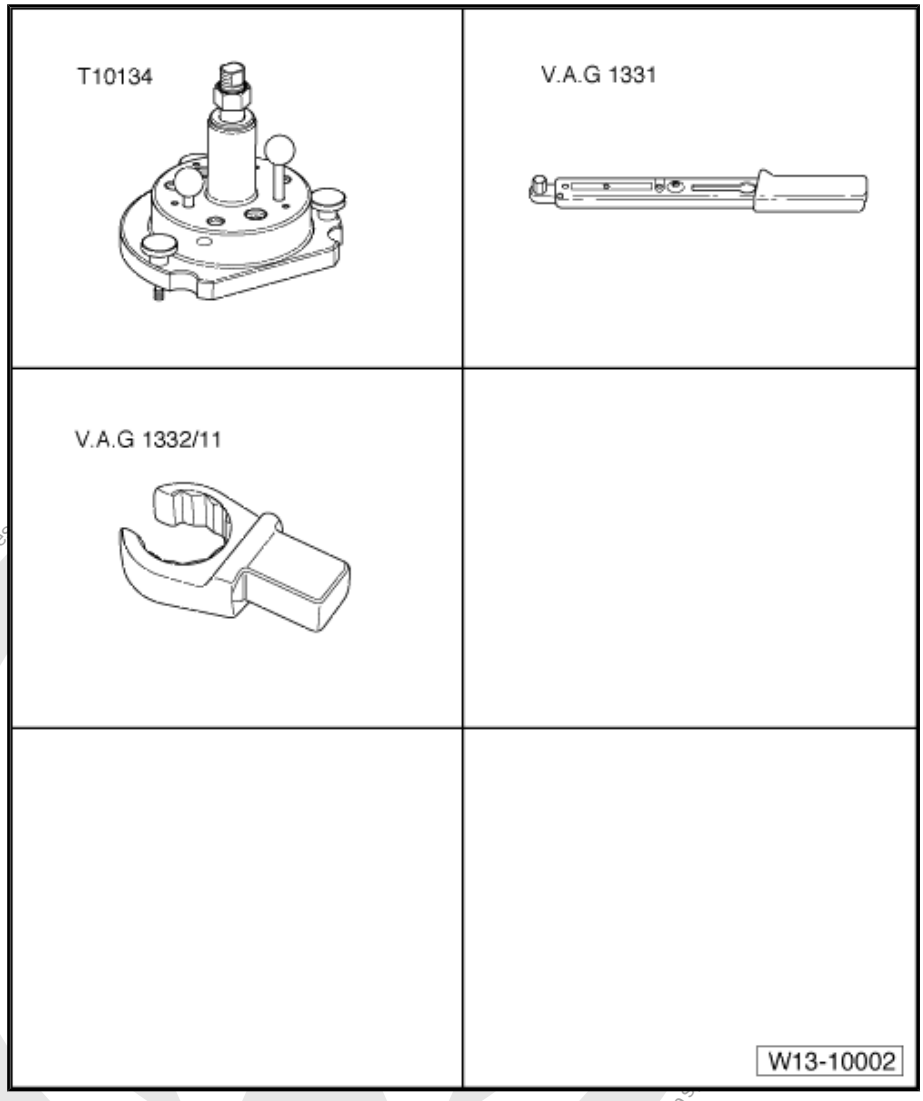


2.5 Renewing crankshaft sealing flange - flywheel end

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Special tools and workshop equipment required

- Assembly tool - T10134-
- Torque wrench (5…50 Nm) - V.A.G 1331-
- Tool insert 24 mm - V.A.G 1332/11-
- Hexagon bolts (Qty. 3) M6×35 mm
- Feeler gauges
- Vernier gauge



2.5.1 Pressing sealing flange with sender wheel off crankshaft

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.*

Procedure

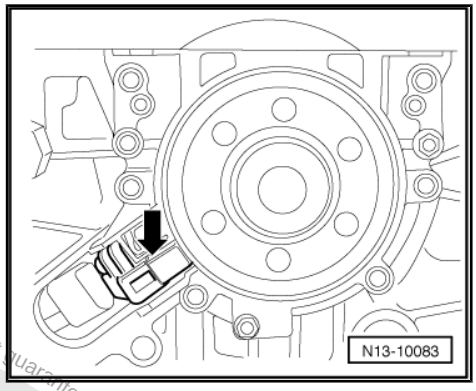
– Remove flywheel or drive plate as applicable.

– Set engine to TDC No. 1 cylinder ⇒ page 96

– Remove sump ⇒ page 145 .

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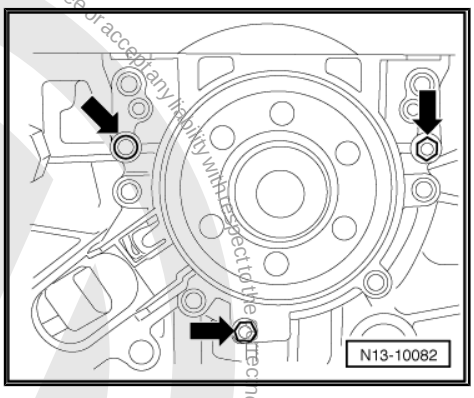
– Remove engine speed sender - G28- -arrow-.
– Unscrew sealing flange securing bolts.



Note

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

– Screw three M6×35 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 sealing flange with sender wheel onto crankshaft

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

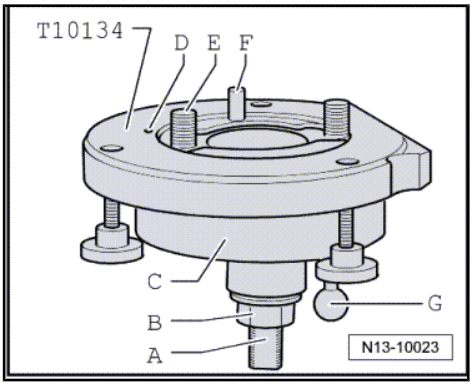
C - Assembly housing

D - Locating pin

E - Hexagon socket head bolt

F - Guide pin for diesel engines (black knob)

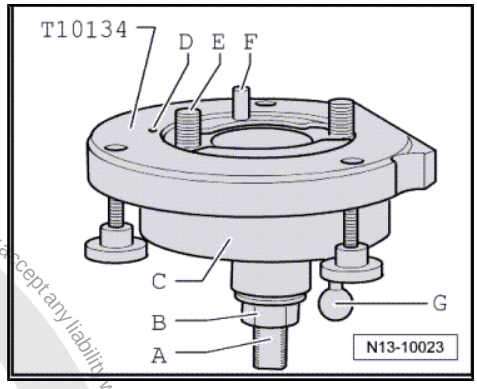
G - Guide pin for petrol engines (red knob)



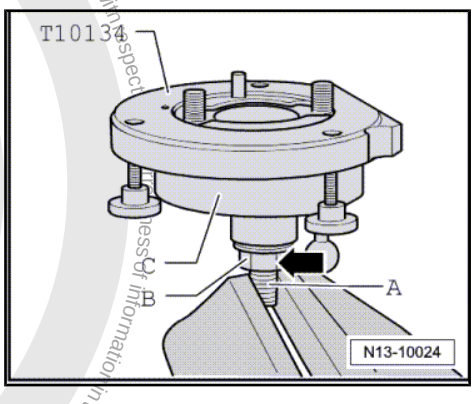
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2.5.3 A - Assembling seal with sender wheel on assembly tool - T10134-

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



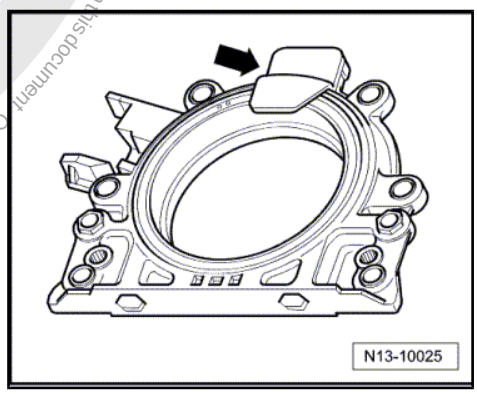
– Clamp assembly device - T10134- in a vice on clamping surface -A- of threaded spindle.
– Press assembly housing -C- downwards until it lies on hexagon nut -B- -arrow-.
– Screw hexagon nut onto threaded spindle until inner part of assembly device and assembly housing are at same height.



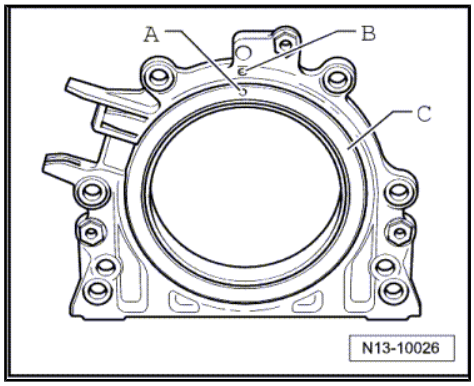
– Remove securing clip -arrow- from new sealing flange.

Note

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

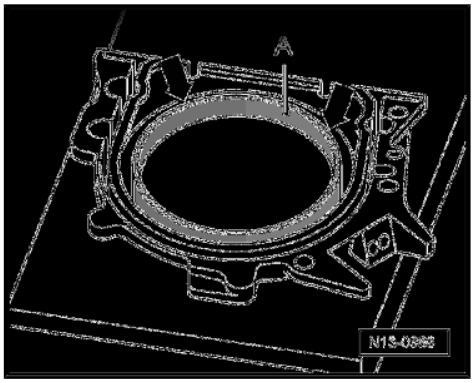


– Locating hole -A- on sender wheel -C- must align with marking -B- on sealing flange.
– Place sealing flange with front side downwards on a clean flat surface.

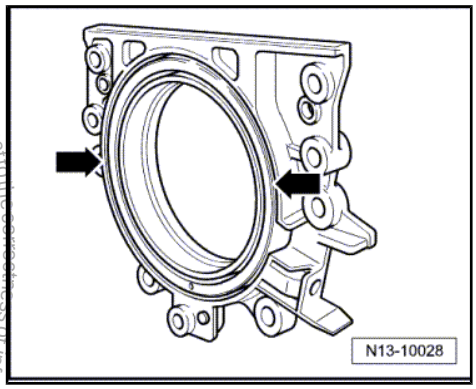


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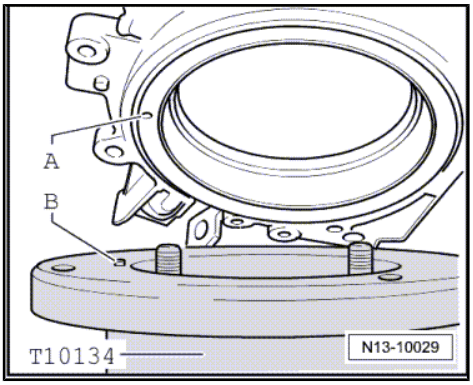
– Push sealing lip support ring -A- downwards in direction of arrow until it lies on flat surface.



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



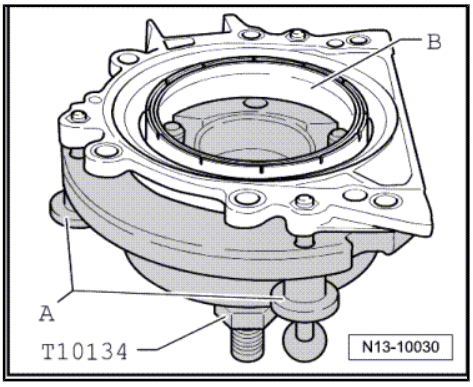
– Place sealing flange with front side on assembly tool - T10134- so that locating pin -A- can be inserted in sender wheel hole -A-.



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 3 knurled screws -A- so that locating pin cannot slide out of sender wheel hole.



Note

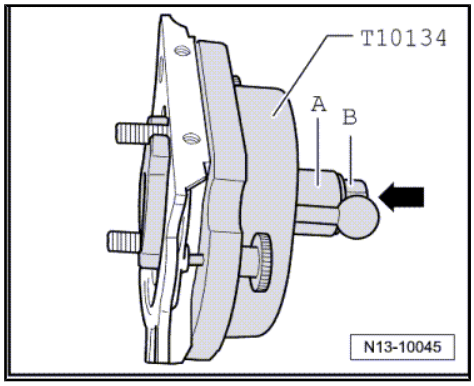
When installing sealing flange, ensure that sender wheel remains fixed in assembly device.

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.

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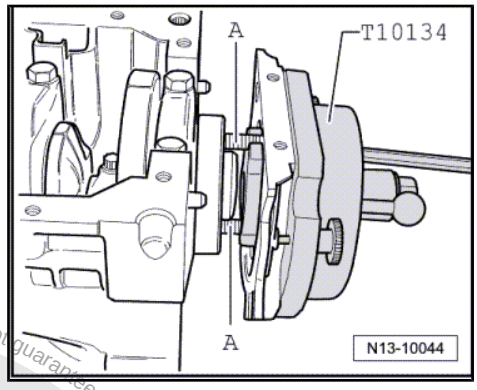
– Screw hexagon nut -B- to end of threaded spindle.
– Press threaded spindle of assembly tool - T10134- in direction of arrow, until hexagon nut -B- lies against assembly housing -A-.
– Align flat side of assembly housing on sump side of crankcase sealing surface.



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

Note

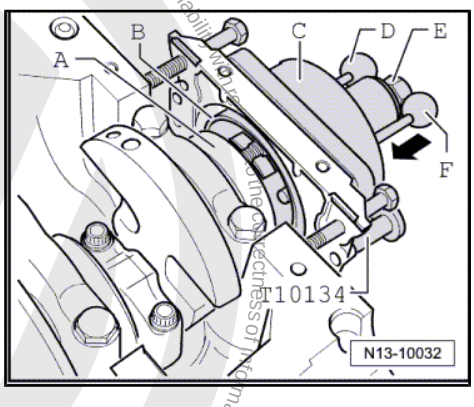
Screw hexagon socket head bolts -A- into crankshaft flange (approx. 5 full turns).



– To guide sealing flange, screw two M6x35 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 petrol engines (red knob) -F- into hole in crankshaft. This ensures that the sender wheel reaches its final installation position.



Note

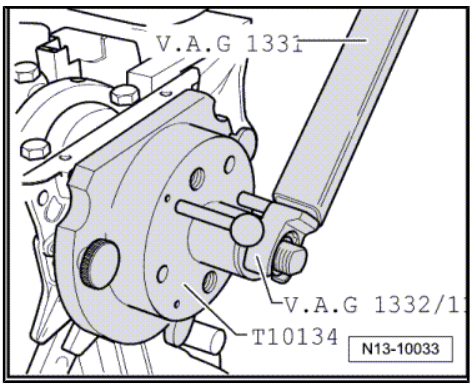
The guide pin for diesel engines (black knob) -D- must not be inserted in threaded hole of crankshaft.

– 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-.

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

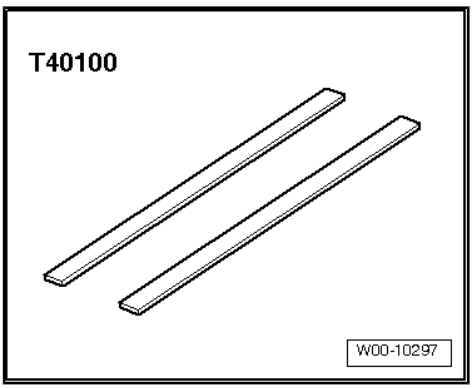
– Tighten hexagon nut of assembly tool - T10134- to 35 Nm using torque wrench - V.A.G 1331- and tool insert 24 mm - V.A.G 1332/11- .



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



Special tools and workshop equipment required

- Ruler - T40100-

– Screw hexagon nut -E- to end of threaded spindle.

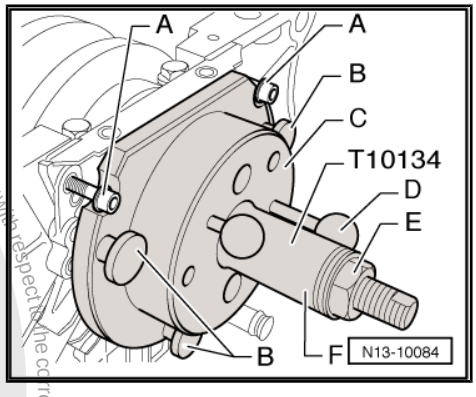
– Remove the two bolts -A- from cylinder block.

– Screw the three knurled screws -B- out of sealing flange.

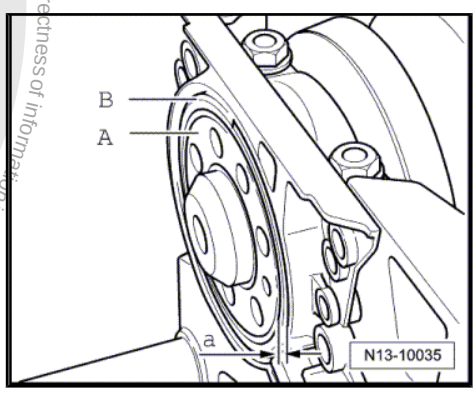
– Unscrew the two hexagon socket head bolts on the assembly device again.

– Remove assembly tool - T10134- .

– Remove sealing lip support ring.

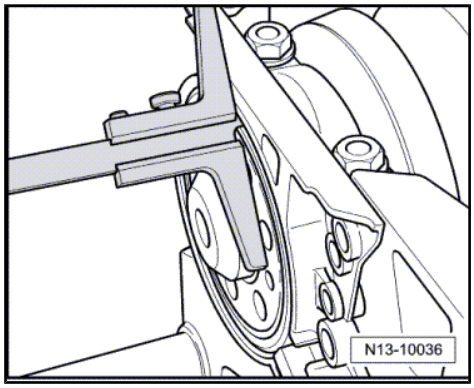


– The sender wheel is in the correct installation position on the crankshaft if a gap -a- = 0.5 mm exists between crankshaft flange -A- and sender wheel -B-.



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– Set vernier gauge on crankshaft flange.
– Measure the distance »a« between crankshaft flange and sender wheel.



Note

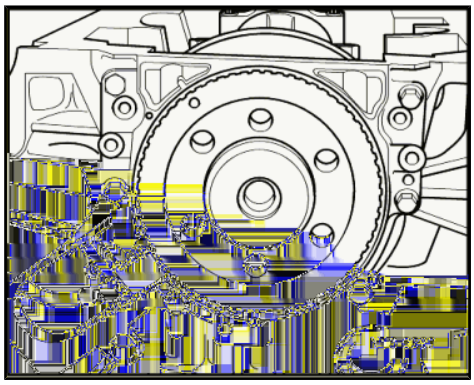
If the engine and gearbox support - VAS 6095- does not provide the necessary space, the ruler - T40100- should be placed on the crankshaft flange and the distance determined with a feeler gauge.

If dimension »a« is too small:

– Re-press sender wheel ⇒ page 82 .

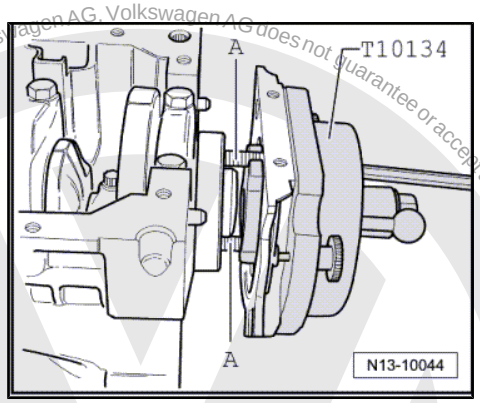
If dimension »a« is achieved:

– Tighten new securing bolts for sealing flange to 10 Nm using alternate and diagonal sequence.
– Install engine speed sender - G28- -arrow- and tighten securing bolt to 5 Nm.
– Install sump ⇒ page 145 .
– Install intermediate plate.
– Install flywheel using new bolts. Tighten securing bolts to 60 Nm + $^1/_4$ turn (90°).

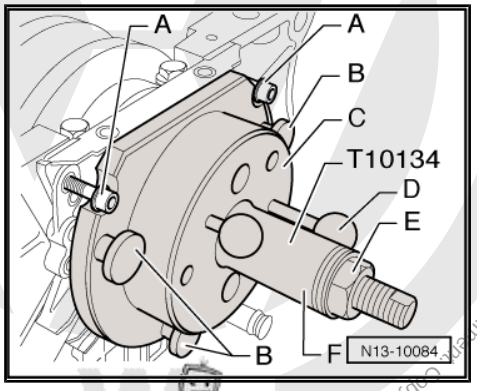


2.5.8 F - Re-pressing sender wheel

– 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.

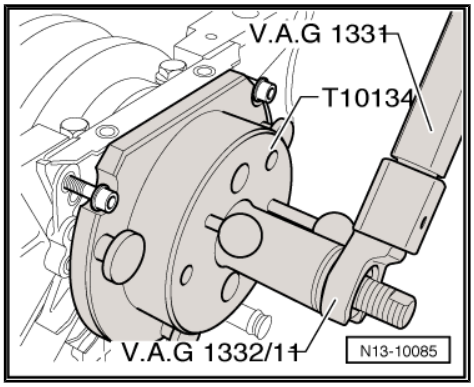


– Screw hexagon nut -E- onto threaded spindle by hand until it lies on assembly housing -C-.



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– 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 81 .



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 81 .

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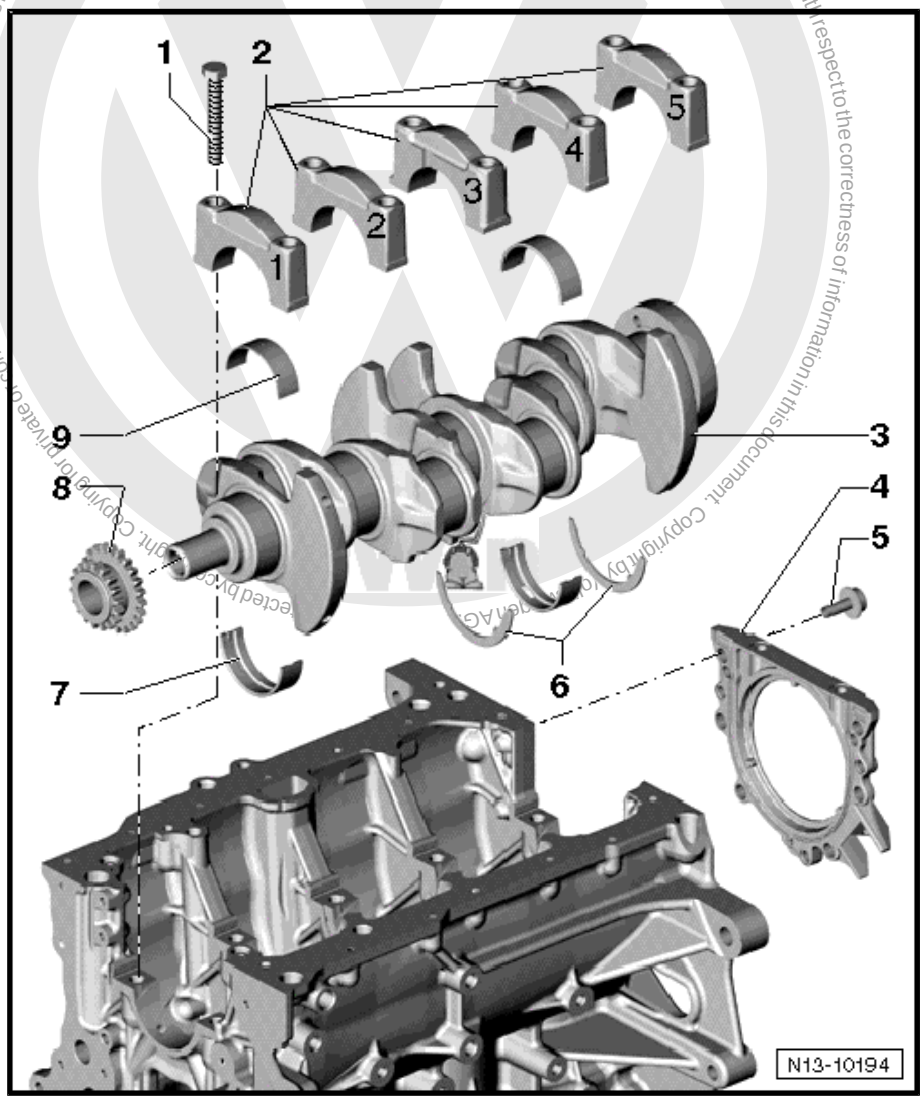
3 Crankshaft

Assembly overview ⇒ page 84 .

Pulling needle bearing out of and driving into crankshaft ⇒ page 85 .

Crankshaft dimensions ⇒ page 86 .

3.1 Assembly overview



1 - 50 Nm + 1/4 turn (90°) further

- ❑ Renew
- ❑ Only tighten to 50 Nm when measuring crankshaft radial clearance. Do not turn further.

2 - Bearing cap

- ❑ Do not interchange bearing caps (mark positions).
- ❑ Bearing cap 3 with recesses for thrust washers.
- ❑ Bearing shell retaining lugs in cylinder block and bearing caps must align.

3 - Crankshaft

- ❑ Axial clearance new: 0.07…0.24 mm
- ❑ Wear limit: 0.26 mm

Check radial clearance with Plastigage.

- ❑ New: 0.03 … 0.05 mm
- ❑ Wear limit: 0.13 mm
- ❑ Do not rotate crankshaft when checking radial clearance.
- ❑ Pulling needle bearing out of and driving into crankshaft ⇒ page 85 .
- ❑ Crankshaft dimensions ⇒ page 86 .

4 - Sealing flange with sender wheel and oil seal

- ❑ With engine speed sender - G28- (not illustrated).
- ❑ Specified torque for engine speed sender - G28- : 5 Nm.
- ❑ Renew sealing flange complete with oil seal and sender wheel only.
- ❑ Renewing crankshaft sealing flange - flywheel end ⇒ page 75 .

5 - 10 Nm

- ❑ Renew

6 - Thrust washers

- ❑ For bearing cap 3.

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❑ Note fixing arrangement.

7 - Bearing shell

❑ In cylinder block.

8 - Chain sprocket

❑ Removing and installing ⇒ page 113
❑ For oil pump drive and timing chain.
❑ Contact surfaces must be free of oil and grease.

9 - Bearing shell

❑ In bearing cap.
❑ Do not interchange used bearing shells (mark).

3.2 Pulling needle bearing out of and driving into crankshaft

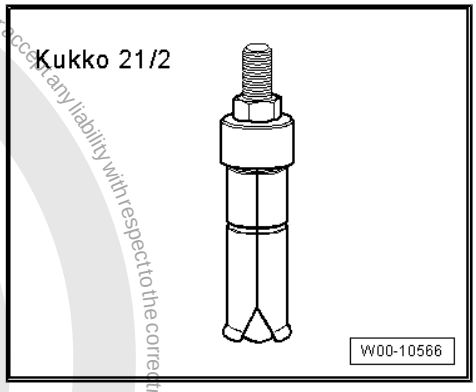
Only vehicles with a dual clutch gearbox

Special tools and workshop equipment required

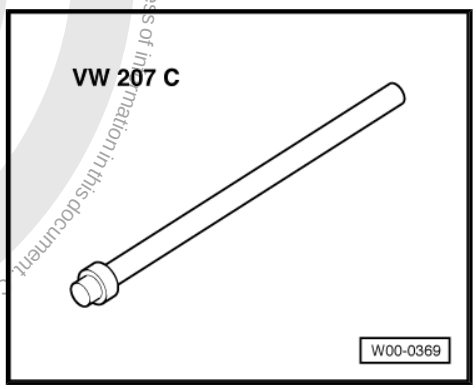
♦ Adapter - 22/1- from Kukko



♦ Puller - Kukko 21/2-



♦ Drift - VW 207 C-



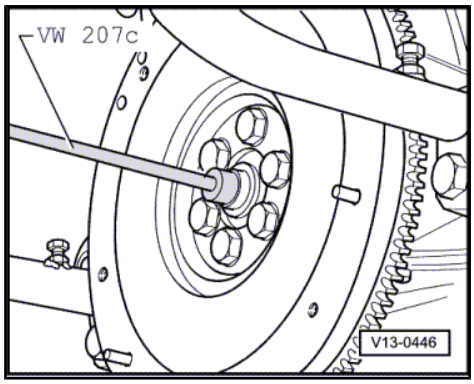
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Removing

– Pull out needle bearing using commercially available puller, e.g. Kukko - 21/2- and Adapter Kukko - 22/1- .

Installing

– Drive in with drift - VW 207 C- so that it is flush.



3.3 Crankshaft dimensions

Honing dimension in mm	Crankshaft bearing journal diameter	Conrod journal diameter
Basic dimension	-0.022 54.00 -0.037	-0.022 47.80 -0.037
Stage I	-0.022 53.75 -0.037	-0.022 47.55 -0.037
Stage II	---	-0.022 47.30 -0.037

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4 Dismantling and assembling pistons and conrods

Assembly overview ⇒ page 87 .

Checking piston ⇒ page 89 .

Checking cylinder bores ⇒ page 90 .

Piston and cylinder dimensions ⇒ page 90 .

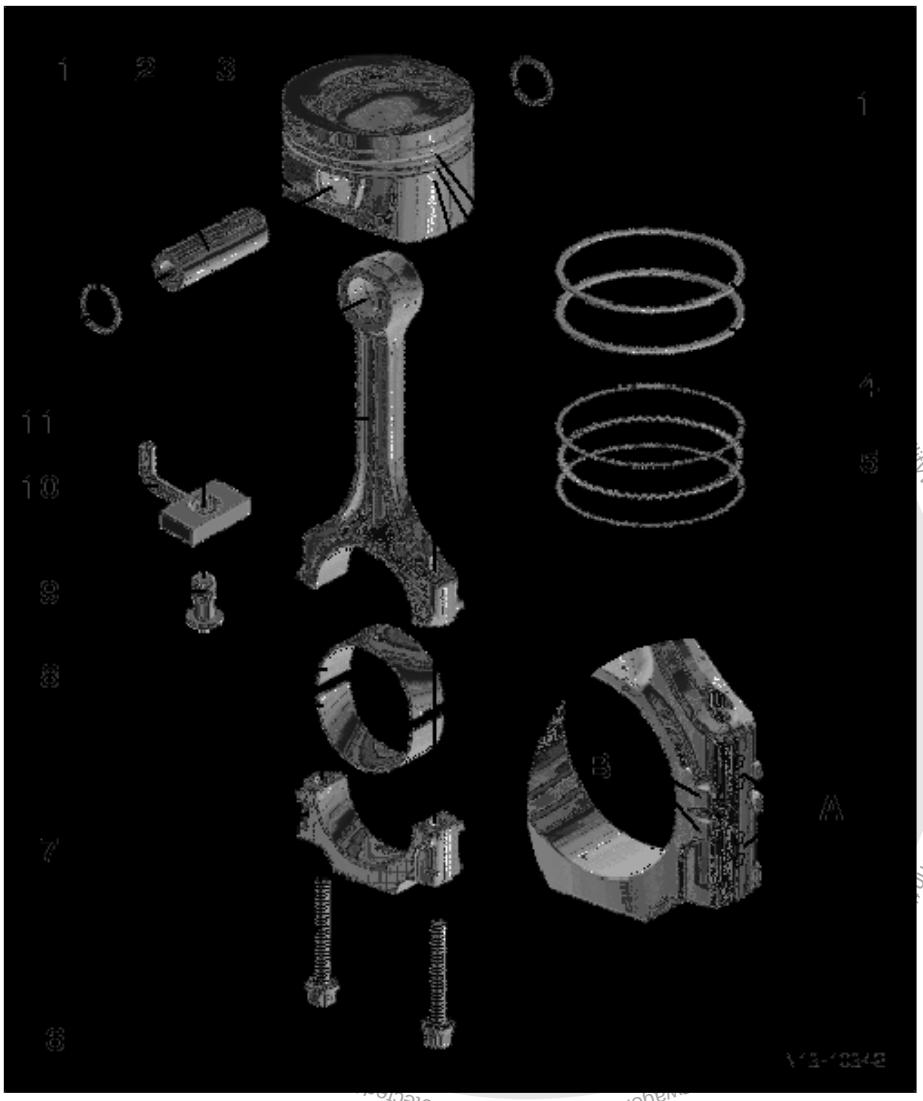
Removing and installing pistons ⇒ page 91 .

Removing and installing oil spray jets ⇒ page 92 .

4.1 Assembly overview

Note

All bearing and running surfaces must be oiled before assembly.



1 - Circlip

2 - Piston pin

- ❑ If difficult to remove, heat piston to 60 °C.
- ❑ Remove and install with drift - 10 - 14- .

3 - Piston

- ❑ Checking ⇒ page 89 .
- ❑ Mark installation position and cylinder number.

Caution

Arrow on piston crown points to belt pulley end.

- ❑ Install using piston ring clamp.

4 - Compression rings

- ❑ Offset gaps by 120°.
- ❑ Remove and install compression rings with piston ring pliers.
- ❑ “TOP” faces towards piston crown.
- ❑ Checking ring gap ⇒ page 89 .
- ❑ Checking ring-to-groove clearance ⇒ page 89 .

5 - Oil scraper rings

- ❑ Carefully remove and install 3-part oil scraper rings by hand.
- ❑ Checking ring gap ⇒ page 89 .
- ❑ Ring-to-groove clearance not measurable.

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6 - Conrod bolt

- ❑ M7×0.75: 20 Nm + 1/4 turn (90°) further.
- ❑ M8×1: 30 Nm + 1/4 turn (90°) further.
- ❑ Renew
- ❑ Oil threads and contact surface.
- ❑ To measure radial clearance, tighten to corresponding specified torque but not further.

7 - Conrod bearing cap

- ❑ 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.
- ❑ Markings -A-: mark with cylinder number
- ❑ Markings -B-: mark paired conrods and conrod bearing caps

8 - Bearing shell

- ❑ Do not interchange used bearing shells.
- ❑ Insert bearing shells centrally.

Checking radial clearance with Plastigage:

- ❑ New: 0.020…0.060 mm
- ❑ Wear limit: 0.090 mm
- ❑ Do not rotate crankshaft when checking radial clearance.

9 - 27 Nm

- ❑ Opening pressure of pressure relief valve: 1.8…2.2 bar.

10 - Oil spray jet

- ❑ For piston cooling

11 - Conrod

- ❑ Renew as set only.
- ❑ Markings -A-: mark with cylinder number
- ❑ Markings -B-: mark paired conrods and conrod bearing caps
- ❑ Separating new conrod ⇒ page 90 .

Caution

The conrod must be re-installed in exactly the same position as it was previously installed.

If new conrods are fitted, then the choice of position is arbitrary.

- ❑ Guided axially by piston.

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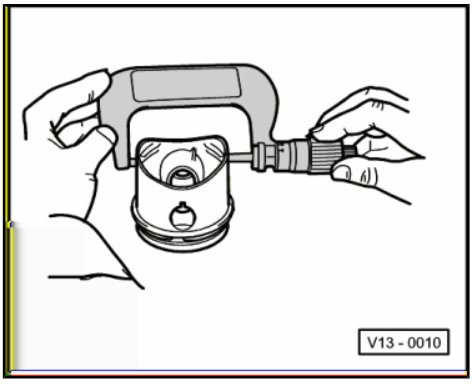
4.2 Checking piston

Special tools and workshop equipment required

- External micrometer 75…100 mm - VAS 6071-

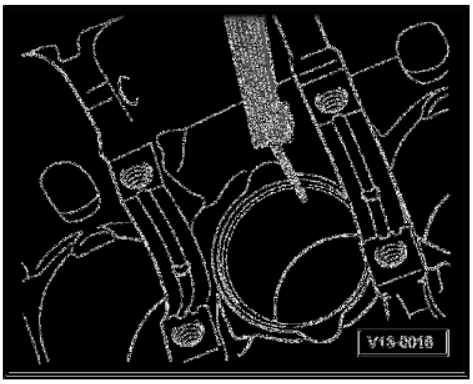
Checking piston

– Measure pistons approx. 12 mm from the lower edge of skirt, at 90° to the piston pin axis. Difference between actual and nominal diameter: not more than 0.04 mm. Nominal dimension ⇒ page 90



Checking piston ring gap

– Push ring squarely from above down into cylinder bore to approx. 15 mm from bottom end of cylinder.

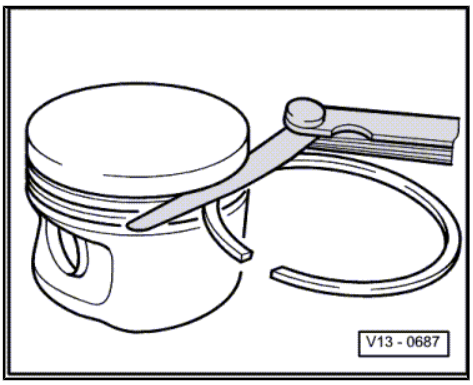


Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.20 … 0.40	1.0
2nd compression ring	0.40 … 0.60	1.0
Oil scraper ring	0.20 … 0.80	---[1]

1) No wear limit details available

Checking ring-to-groove clearance

Clean annular groove before check.



Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.04 … 0.08	0.15
2nd compression ring	0.02 … 0.06	0.15
Oil scraper ring	Not measurable	

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4.2.1 Checking cylinder bores

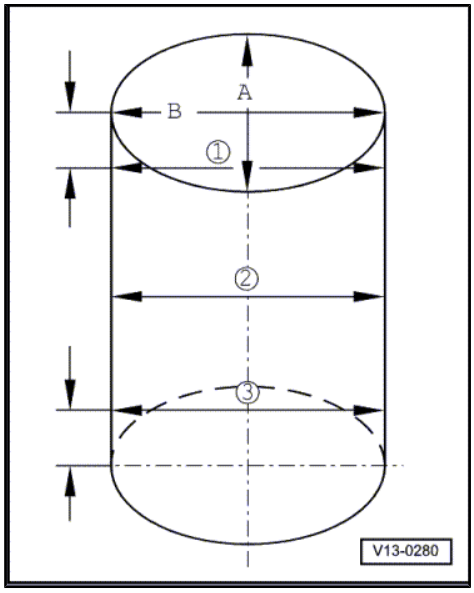
Special tools and workshop equipment required

- Cylinder gauge - VAS 6078-

Checking cylinder bores

– Take measurements at 3 positions in both lateral direction -A- and longitudinal direction -B-. Difference between actual and nominal diameter max. 0.08 mm.

– Nominal dimension ⇒ page 90



Note

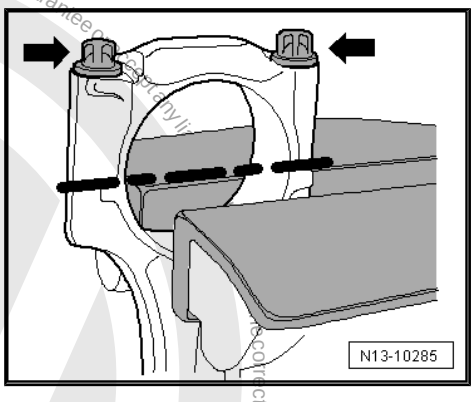
Cylinder bores must not be measured when cylinder block is mounted on engine and gearbox support - VAS 6095- , as measurements may be incorrect.

4.3 Separating new conrod

On a new conrod, it is possible that the breaking point has not fully separated. Proceed as follows, when the conrod bearing cap cannot be removed by hand:

– Mark cylinder allocation of conrod ⇒ Item 11 (page 88)

– Gently clamp conrod, as shown in illustration, in a vice with soft aluminium jaws.

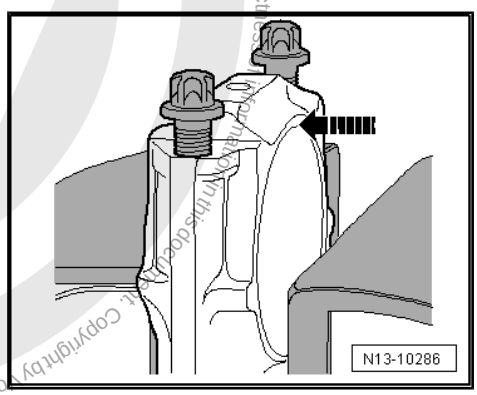


Note

- *To prevent damage to the conrod, only clamp conrod in lightly.*
- *Conrod is clamped below the dashed line.*

– Unscrew the two bolts -arrows- approx. 5 turns.

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



4.4 Piston and cylinder dimensions

Honing dimension		Piston diameter[2)]	Cylinder bore diameter
Basic dimension	mm	76.475	76.51

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Honing dimension		Piston diameter[2)]	Cylinder bore diameter
Stage III	mm	76.495	76.53

2) Measure pistons approx. 12 mm from lower edge.

4.5 Removing and installing pistons

Special tools and workshop equipment required

- Drift - VW 222 A-



- Piston ring clamp, commercially available

Removing

- Remove cylinder head ⇒ page 127 .
- Remove sump ⇒ page 145 .
- Mark piston installation position and corresponding cylinder number ⇒ Item 3 (page 87) .
- Mark installation position of conrod and corresponding cylinder and conrod bearing cap ⇒ Item 7 (page 88) .
- Remove conrod bearing cap and withdraw piston and conrod upwards.

Note

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

- Remove circlip from piston pin eye.
- Drive out piston pin using drift - VW 222 A- .

Installing

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

Note

Renew bolts that are tightened with specified tightening angle.

- Oil running surfaces of bearing shells.
- Install piston with commercially available piston ring clamp, noting installation position ⇒ Item 3 (page 87) .
- Install conrod bearing cap, noting installation position ⇒ Item 7 (page 88) .
- Installing cylinder head ⇒ page 127 .

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– Install sump ⇒ page 145 .

Specified torques

♦ ⇒ “4.1 Assembly overview”, page 87

4.6 Removing and installing oil spray jets

Special tools and workshop equipment required

♦ Socket Torx T40 - T10545-

Removing

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

– Remove sump ⇒ page 145 .

– Remove oil pump ⇒ page 147 .

Note

♦ *The crank web of the respective cylinder must be positioned so that the socket - T10545- can be inserted in the pressure relief valve as close to vertical as possible.*

♦ *Furthermore, the corners of the socket - T10545- and of the pressure relief valve must engage well.*

– Turn crankshaft via vibration damper securing bolt in direction of engine rotation until the respective bolt is accessible.

– Unscrew pressure relief valve -1- using bit - T10545- .

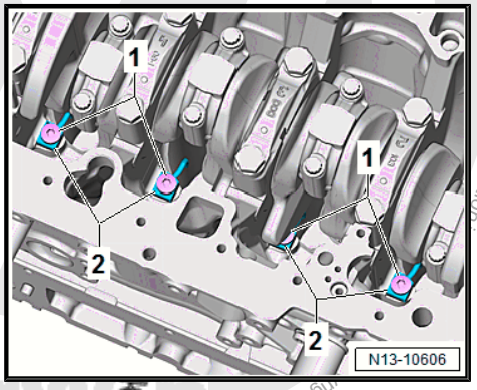
– Remove oil spray jets -2-.

Installing

Caution

Risk of damage to oil spray jets.

- ***Do not bend oil spray jets.***
- ***Check that oil spray jets can operate freely after reinstallation of pistons.***
- ***Bent oil spray jets must be renewed.***



1 - Pressure relief valve - 27 Nm

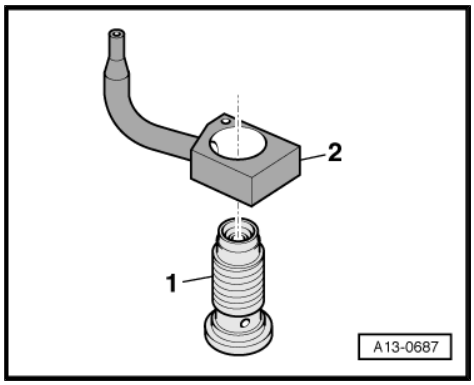
2 - Oil spray jet

• Installation position: align leading edge of oil spray jet arrow with machined surface of cylinder block.

– Install oil pump ⇒ page 147

– Install sump ⇒ page 145 .

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



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15 – Cylinder head, valve gear

1 Cylinder head

Note

- *When installing an exchange cylinder head, all the contact surfaces between the support elements, roller rocker arms and the cams must be oiled before installing the camshaft housing.*
- *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.*
- *All bearing and running surfaces must be oiled before assembly.*
- *Removing and installing intake manifold* ⇒ *page 308* .

Assembly overview ⇒ page 93 .

Checking valve timing ⇒ page 96 .

Adjusting valve timing ⇒ page 99 .

Checking timing chain ⇒ page 107

Removing and installing timing chain and drive chain for oil pump ⇒ page 113

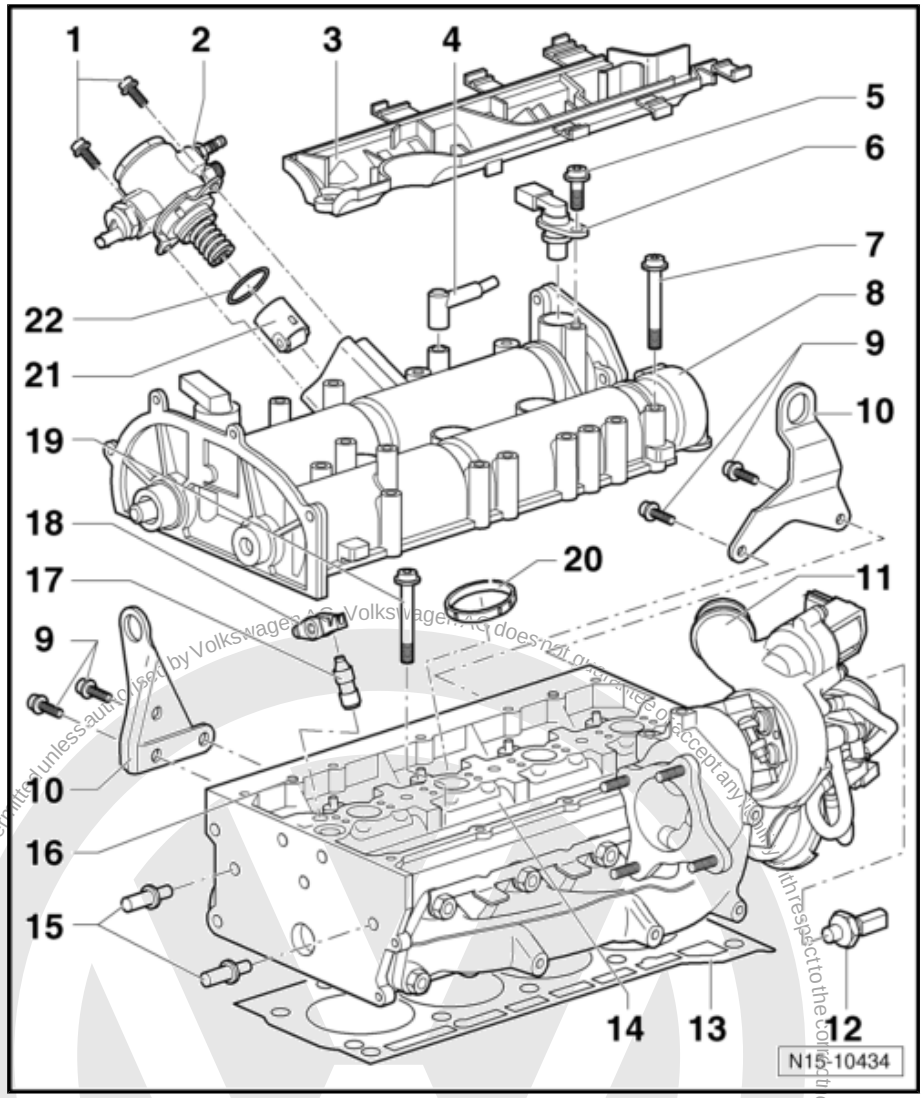
Removing and installing camshaft housing ⇒ page 121 .

Removing and installing cylinder head ⇒ page 127 .

Checking compression ⇒ page 130 .

1.1 Assembly overview

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1 - 20 Nm

2 - High-pressure pump

- ❑ For fuel supply.
- ❑ With fuel pressure regulating valve - N276- .
- ❑ Removing and installing ⇒ page 309

3 - Cable guide

- ❑ Bolt to camshaft housing with 8 Nm torque.

4 - To air filter.

5 - 10 Nm

6 - Hall sender - G40-

- ❑ With O-ring.
- ❑ Renew O-ring if damaged.

7 - 10 Nm + 1/4 turn (90°) further

- ❑ Renew
- ❑ Tighten from inside outwards.

8 - Camshaft housing

> **Caution**
>
> ***The studs (M6x80) must be screwed into cylinder head before installing camshaft housing.***
>
> ***The camshaft housing is guided by the studs, so that the roller rocker fingers do not slip off the supporting elements.***

- ❑ Removing and installing ⇒ page 121
- ❑ Remove sealant residue.
- ❑ Carefully clean sealing surfaces. They must be oil and grease free.
- ❑ Coat with D 154 103 A1 before fitting.
- ❑ When installing, fit vertically from above onto studs and dowel pins.

9 - 20 Nm

10 - Lifting eye

11 - Turbocharger

12 - Oil pressure switch - F1- , 20 Nm

- ❑ Checking ⇒ page 149 .
- ❑ Remove old seal and renew ⇒ Electronic Parts Catalogue (ETKA)

13 - Cylinder head gasket

- ❑ Renew
- ❑ Metal gasket.
- ❑ After renewing, renew entire coolant.

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14 - Cylinder head

- ❑ Removing and installing ⇒ page 127
- ❑ Check for distortion ⇒ page 95 .
- ❑ Sealing surfaces to camshaft housing must be oil and grease free.
- ❑ After renewing, renew entire coolant.

15 - Guide pins

- ❑ Specified torque: 20 Nm

16 - Dowel pin

17 - Support element

- ❑ Do not interchange.
- ❑ With hydraulic valve clearance compensation.
- ❑ Oil contact surface.

18 - Roller rocker finger

- ❑ Check roller bearing for ease of movement.
- ❑ Oil contact surface.
- ❑ When installing, secure to supporting element using securing clip.

19 - Cylinder head bolt

- ❑ Renew
- ❑ Follow installation instructions and sequence when loosening and tightening ⇒ page 127 .

20 - Seal



Note

Note the different sealing types when removing and installing the camshaft housing ⇒ page 121 .

- ❑ Renew
- ❑ Qty. 4
- ❑ Inserted into cylinder head.

21 - Roller tappet

- ❑ Lightly coat contact surface with engine oil.

22 - O-ring

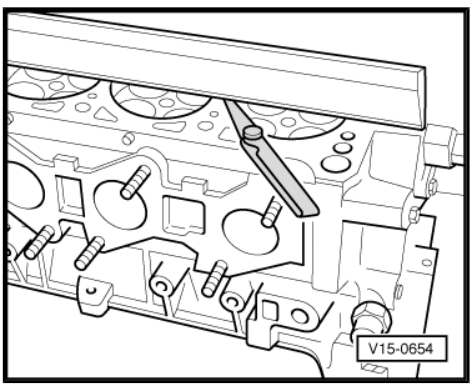
- ❑ Renew
- ❑ Moisten with oil before inserting.

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Checking cylinder head for distortion

Check with 500 mm straight edge - VAS 6075- and feeler gauge.

Max. permissible distortion: 0.05 mm.

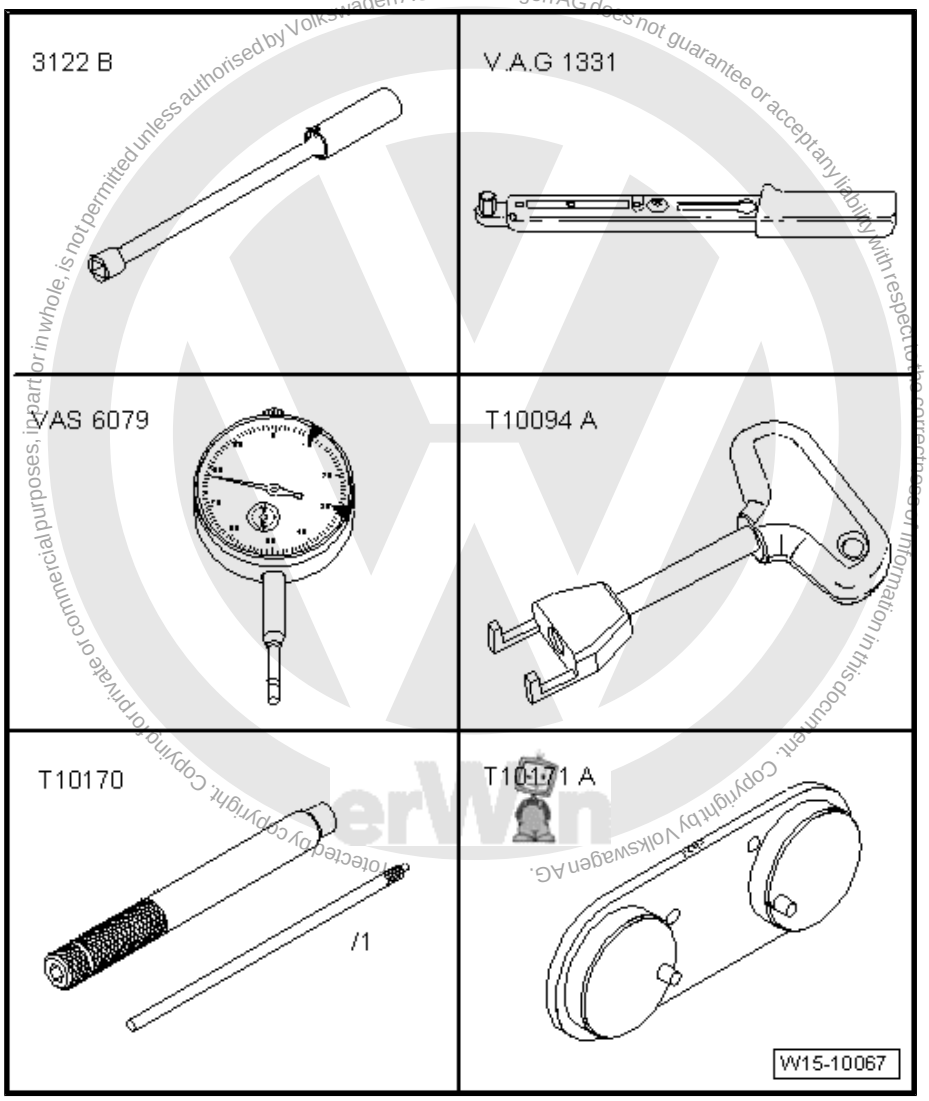


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1.2 Checking valve timing

Special tools and workshop equipment required

- Spark plug socket and extension - 3122 B-
- Torque wrench (5…50 Nm) - V.A.G 1331-
- Dial gauge - VAS 6079-
- Puller - T10094 A-
- Dial gauge adapter - T10170- or dial gauge adapter - T10170 A-
- Camshaft clamp - T10171 A-

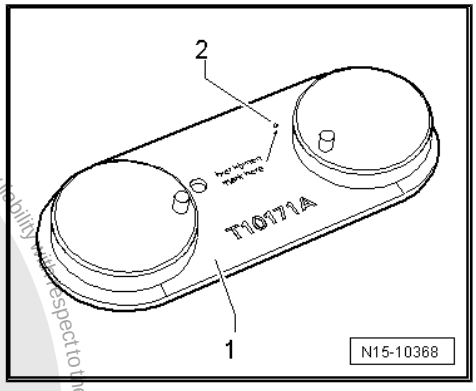


Note

The mounting points for securing the camshaft clamp were modified. A new special tool designated camshaft clamp - T10171 A- has been introduced. Previous camshaft clamp - T10171- can continue to be used if modified as described below.

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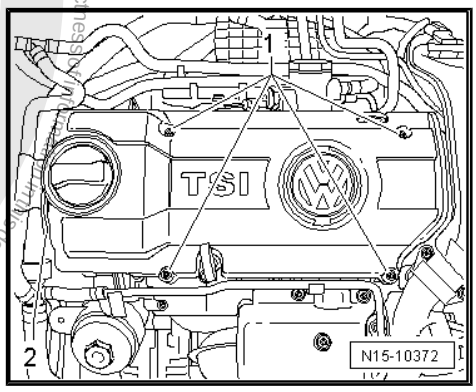
– Place template -1- onto camshaft clamp - T10171- as shown.



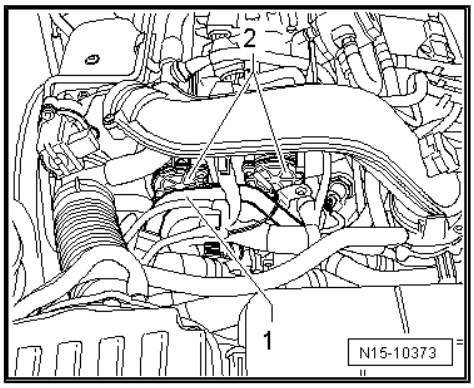
– Mark camshaft clamp - T10171- at mark -2- using a centre punch.
– Drill through camshaft clamp - T10171- using a 7 mm bit.
– Deburr hole on both sides.
– Additionally mark tool designation -T10171- with an »A«.

Test procedure

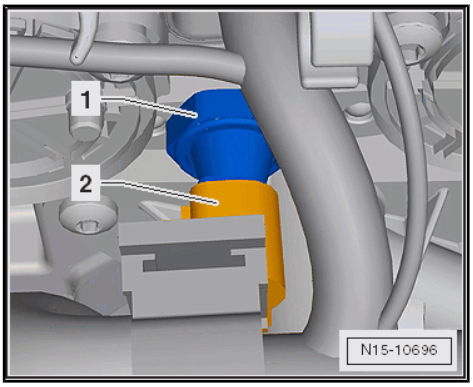
– Remove lower part of front right wheel housing liner ⇒ General body repairs; Rep. gr. 66 ; Wheel housing liner; Removing and installing front wheel housing liner .
– Drain coolant ⇒ page 157 .
– Remove securing bolts -1- from engine cover panel.
– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.



– Pull coolant hoses off coolant pipe -1- and unscrew coolant pipe from camshaft housing and from cylinder block from below.

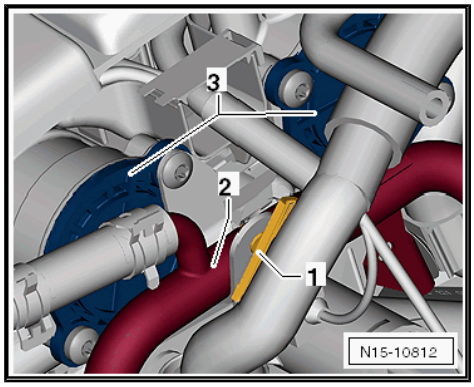


– Release and pull off connector -2-.
– Remove oil pressure switch - F1- -1-.
– Then remove bolts for both camshaft covers -3-.

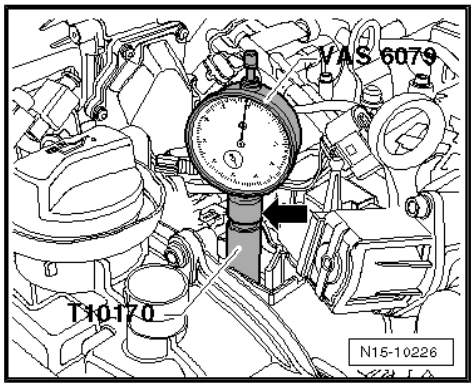


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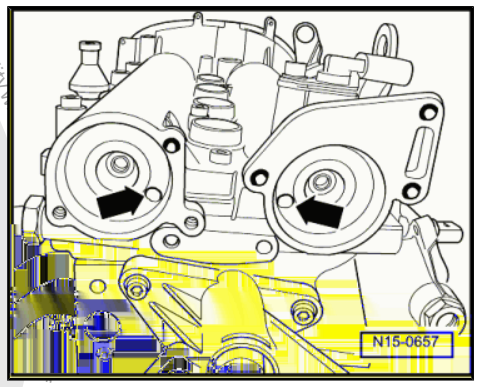
– Unclip engine pre-wiring harness -1-.
– Pull coolant pipe -2- and engine pre-wiring harness -1- away from cylinder head.
– Remove both bolts -3- from cylinder head.
– Remove spark plug from No. 1 cylinder. Use puller -T10094 A- and spark plug socket and extension 3122 B
⇒ page 361 .



– Screw dial gauge adapter -T10170- into spark plug hole to stop.
– Screw dial gauge - VAS 6079- and extension -T10170/1- in to stop and lock in position with lock nut -arrow-.
– Turn crankshaft in direction of engine rotation, to TDC for No. 1 cylinder. Note position of small needle on dial gauge.



The holes -arrows- in the camshaft must align as shown. Otherwise turn crankshaft one rotation (360°) further.



Note

- *If crankshaft is turned 0.01 mm passed TDC, turn crankshaft two full turns in engine direction of rotation to set crankshaft at TDC for No. 1 cylinder.*
- *Permissible deviation from TDC for No. 1 cylinder: ± 0.01 mm.*

Caution

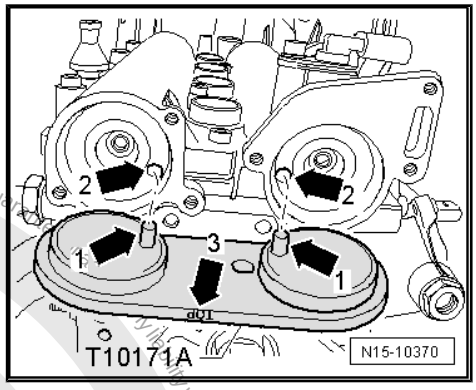
Before using camshaft clamp - T10171 A- you must check that the pins on the tool project by at least 7 mm.

If this is not the case, the camshaft clamp is defective and must be renewed.

The camshaft clamp must not be positioned using any kind of hammer.

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– Insert camshaft clamp -T10171- to stop in camshaft openings.



Locking pins -arrows 1- must engage in holes -arrows 2-. Inscription “TOP” -arrow 3- must be readable from above.

If camshaft clamp -T10171 A- cannot be fitted into camshaft openings to stop, then timing is incorrect and must be readjusted ⇒ page 99 .

Timing is OK if camshaft clamp -T10171 A- can be fitted into camshaft openings to stop.

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

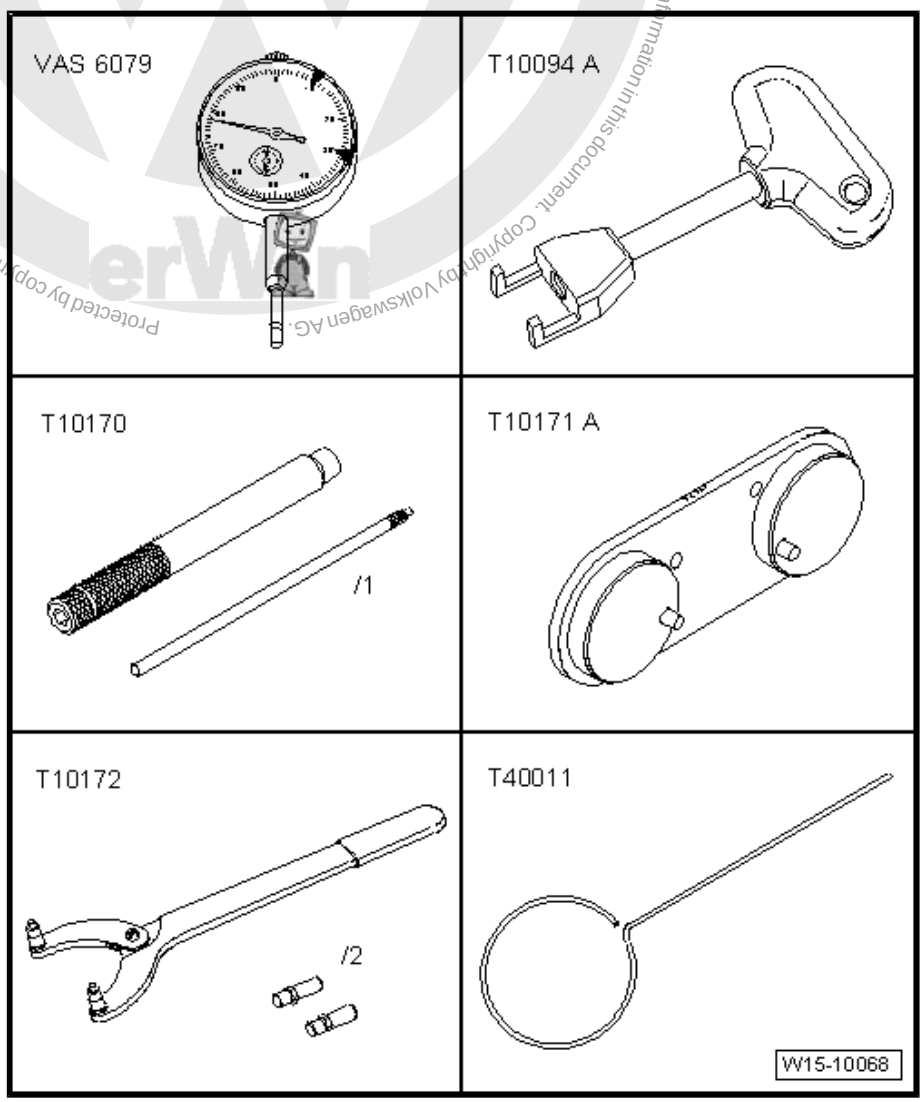
- Renew oil seals for camshaft sealing cover and oil them before fitting.
- Since the seal cannot be renewed individually, the oil pressure switch needs to be renewed following removal.
- Specified torque for oil pressure switch - F1- : 20 Nm.

– Fill coolant system with coolant ⇒ page 157 .

1.3 Adjusting valve timing

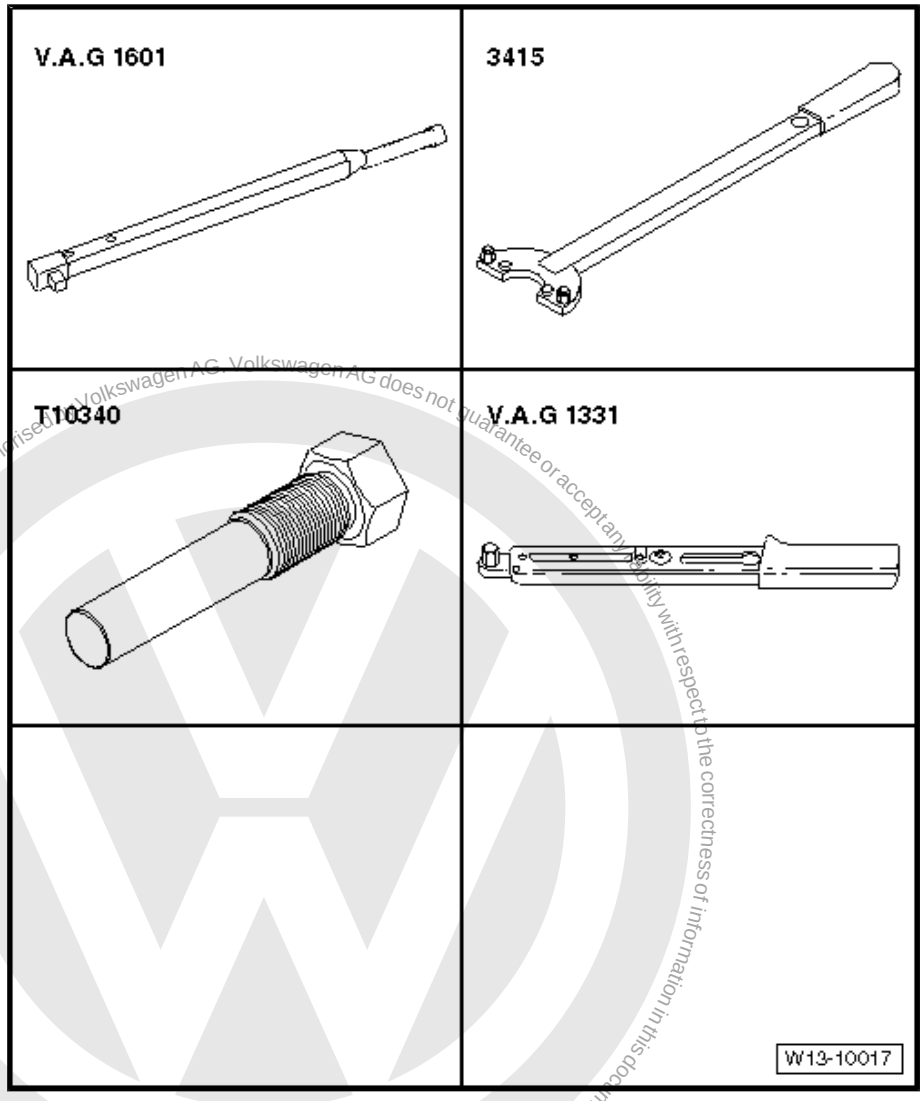
Special tools and workshop equipment required

- Dial gauge - VAS 6079-
- Puller - T10094 A-
- Dial gauge adapter - T10170- or dial gauge adapter - T10170 A-
- Camshaft clamp - T10171 A-
- Counterhold - T10172-
- Locking pin - T40011-



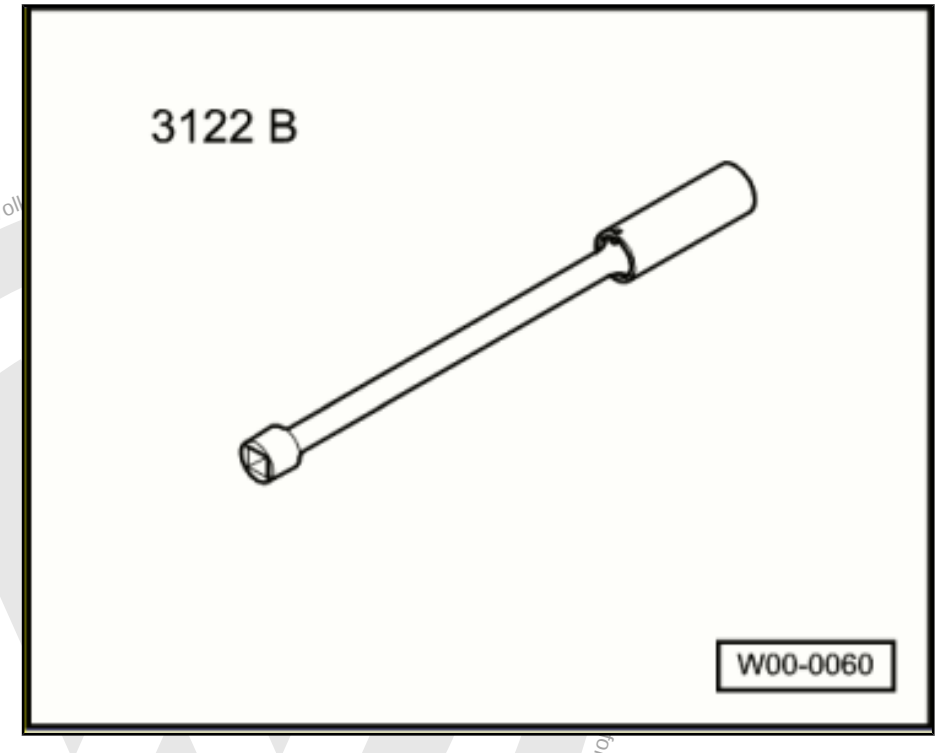
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- Torque wrench - V.A.G 1601-
- Counterhold - 3415-
- Locking pin - T10340-
- Torque wrench (5…50 Nm) - V.A.G 1331-



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♦ Spark plug socket and extension - 3122 B-

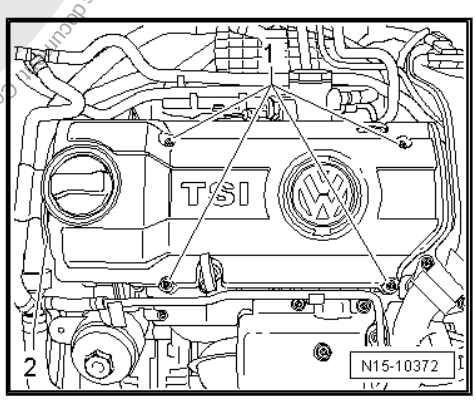


Procedure

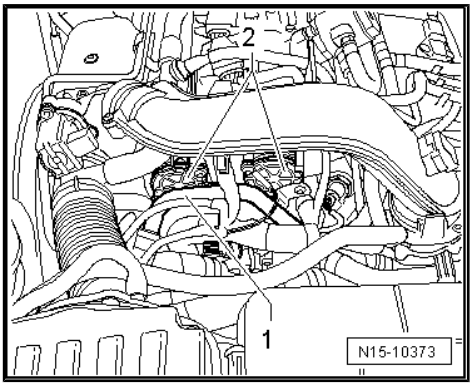
– Drain coolant ⇒ page 157 .

– Remove securing bolts -1- from engine cover panel.

– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.

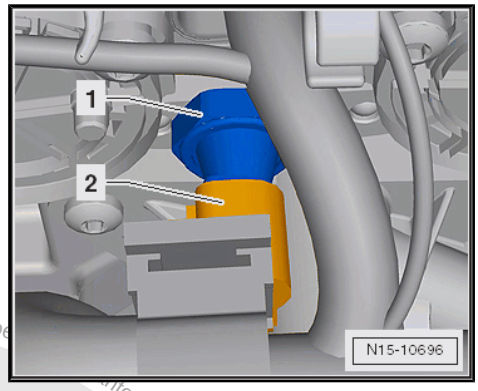


– Pull coolant hoses off coolant pipe -1- and unscrew coolant pipe from camshaft housing and from cylinder block from below.

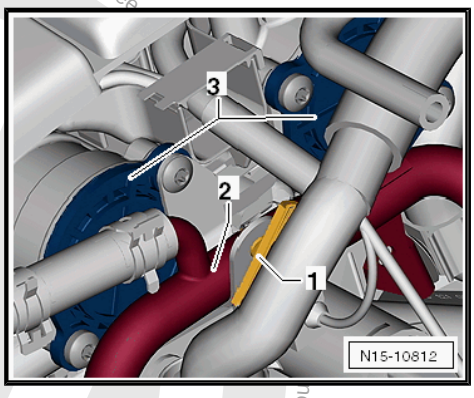


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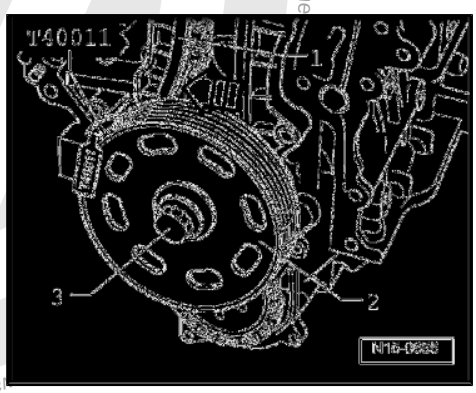
– Release and pull off connector -2-.
– Remove oil pressure switch - F1- -1-.
– Then remove bolts for both camshaft covers -3-.



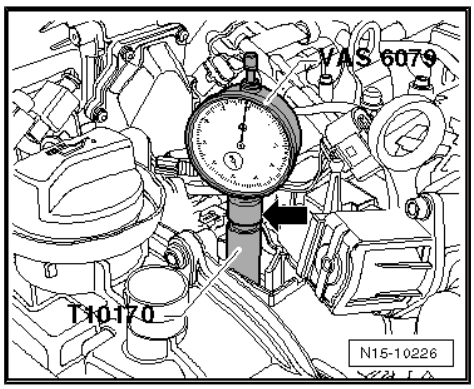
– Unclip engine pre-wiring harness -1-.
– Pull coolant pipe -2- and engine pre-wiring harness -1- away from cylinder head.
– Remove both bolts -3- from cylinder head.
– Remove valve timing housing ⇒ page 52 .



– To turn crankshaft, reinstall bearing bush, crankshaft pulley -2- and crankshaft bolt -3- and securely tighten crankshaft bolt (use counterhold 3415).
– Remove spark plug from No. 1 cylinder. Use puller -T10094 A- and spark plug socket and extension 3122 B ⇒ page 361 .

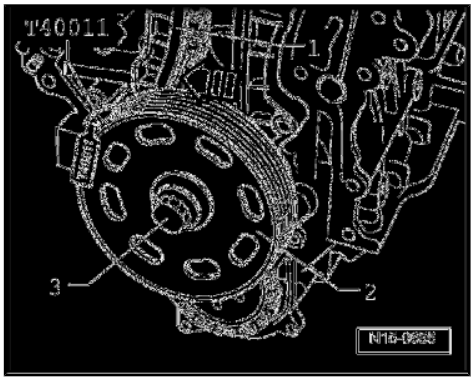


– Screw dial gauge adapter - T10170- into spark plug hole to stop.
– Screw dial gauge -VAS 6079- and extension -T10170/1- in to stop and lock in position with lock nut -arrow-.
– Turn crankshaft in direction of engine rotation, to TDC for No. 1 cylinder. Note position of small needle on dial gauge.
– Then turn crankshaft 2 revolutions in engine direction of rotation.

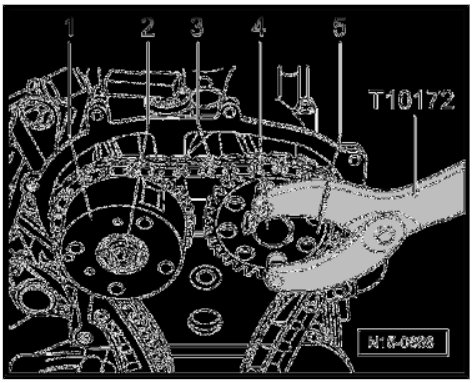


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– Press tensioning guide rail -1- in direction of arrow and lock piston with locking pin -T40011- .



– Mark direction of rotation of timing chain -3- using coloured felt tip marker pen.



Caution

Camshaft adjuster centre bolt -2- has a left-hand thread.

– Unscrew bolts -2- and -4- and remove camshaft adjuster -1- together with timing chain -3-. Counterhold using counterhold -T10172- .

– Install camshaft adjuster -1- again.

– Renew bolts -2- and -4-. Tighten bolt -2- to 40 Nm and bolt -4- to 50 Nm (use counterhold -T10172-).

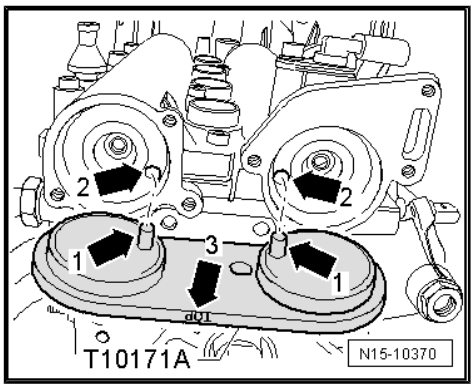
Caution

Before using camshaft clamp - T10171 A- you must check that the pins on the tool project by at least 7 mm.

If this is not the case, the camshaft clamp is defective and must be renewed.

The camshaft clamp must not be positioned using any kind of hammer.

– Turn inlet and exhaust camshafts until camshaft clamp - T10171 A- can be pushed into holes in camshaft to stop.



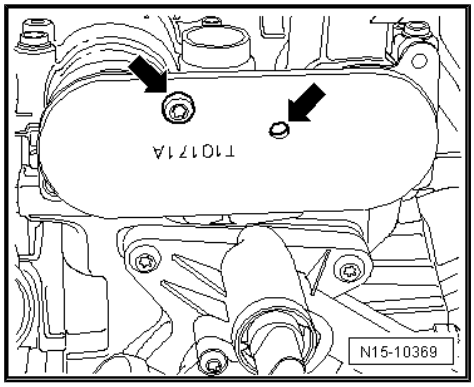
Locking pins -arrows 1- must engage in holes -arrows 2-. Inscription “TOP” -arrow 3- must be readable from above.

Note

Camshafts must not be pushed axially whilst turning.

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– Screw an M6 bolt hand-tight into corresponding bore -arrows- (but do not tighten) to secure camshaft clamp - T10171 A- .



Note

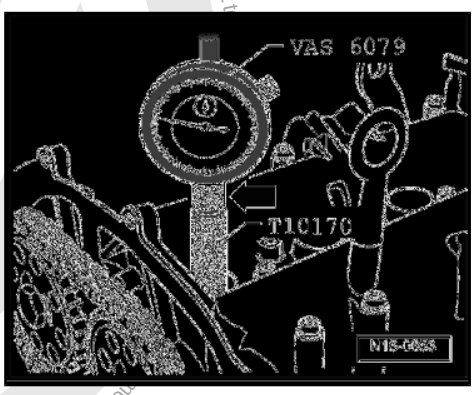
Note that there are different securing points for the camshaft clamp - T10171 A- .

– Remove camshaft sprocket bolts. It is absolutely necessary to use counterhold -T10172- for this.

Note

The camshaft clamp - T10171 A- must not be used as a counterhold.

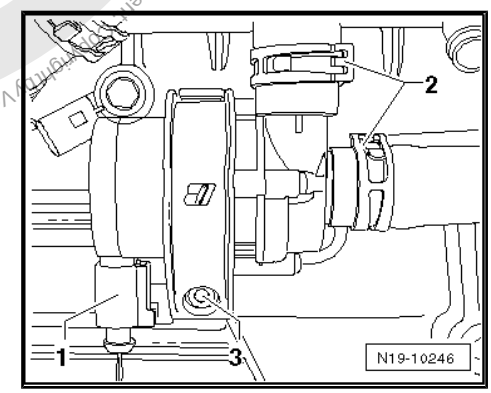
– Remove one camshaft sprocket.
– Place timing chain over camshaft sprockets, observing chain direction of rotation, and install camshaft sprocket again.
– Tighten camshaft bolts until camshaft sprockets can still just be turned on camshafts.
– Tension timing chain by removing locking pin - T40011- .
– Turn crankshaft in engine direction of rotation to TDC for No. 1 cylinder. Permissible deviation from TDC for No. 1 cylinder: ± 0.01 mm.



Note

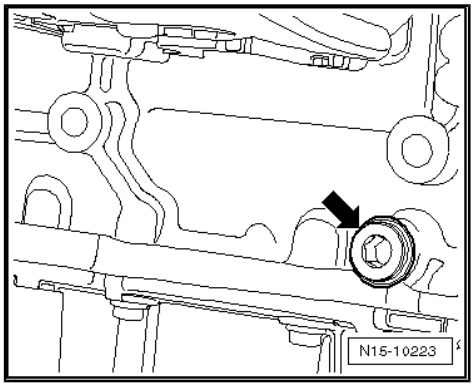
If crankshaft is turned 0.01 mm passed TDC, turn crankshaft two full turns in engine direction of rotation to set crankshaft at TDC for No. 1 cylinder.

– Release and pull off connector -1-.
– Remove bolt -3- and detach continued coolant circulation pump - V50- .

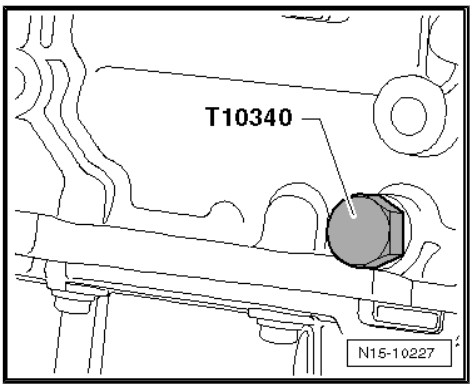


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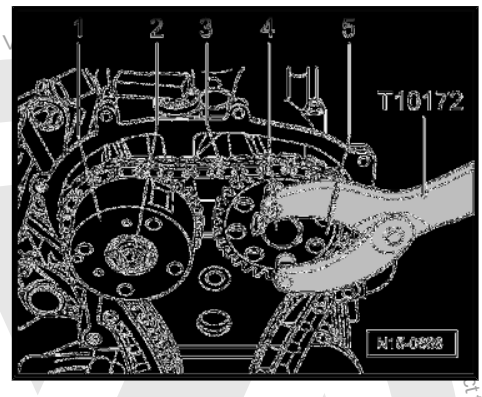
– Unscrew plug -arrow- from crankcase.
– Screw locking pin - T10340- to stop into crankcase.
– Tighten locking pin - T10340- to 30 Nm.



Locking pin - T10340- locks crankshaft in direction of engine rotation.



– Hold camshaft sprockets -1- and -5- in this position with counterhold -T10172- then tighten bolt -2- (left-hand thread) to 40 Nm and bolt -4- to 50 Nm.

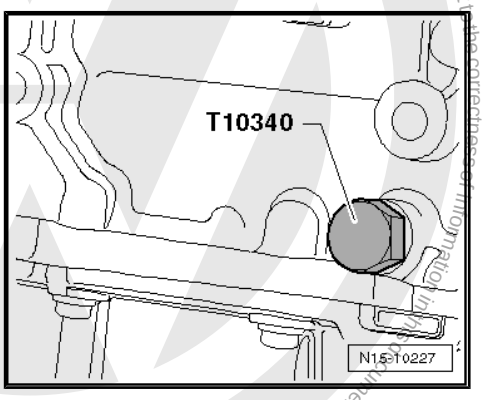


Note

Crankshaft must not move and timing chain -3- must remain tensioned on both sides when tightening camshaft bolts.

– Remove camshaft clamp -T10171 A- .

– Unscrew locking pin - T10340- from crankcase.
– Turn crankshaft 2 turns in engine direction of rotation to TDC for No. 1 cylinder. Permissible deviation from TDC for No. 1 cylinder: ± 0.01 mm.



Caution

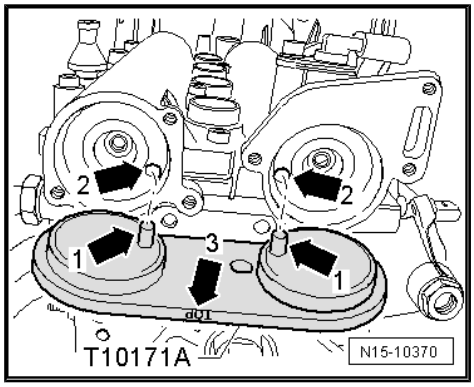
Before using camshaft clamp - T10171 A- you must check that the pins on the tool project by at least 7 mm.

If this is not the case, the camshaft clamp is defective and must be renewed.

The camshaft clamp must not be positioned using any kind of hammer.

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– Insert camshaft clamp -T10171 A- to stop in camshaft openings.

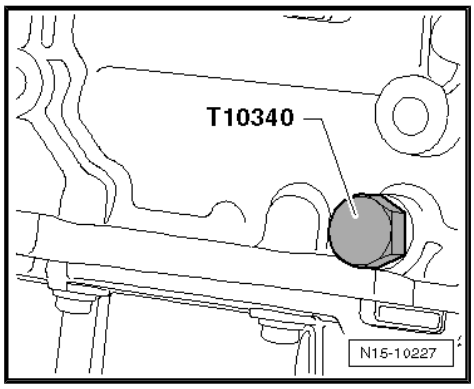


If camshaft clamp -T10171 A- cannot be fitted:

– Repeat adjustment.

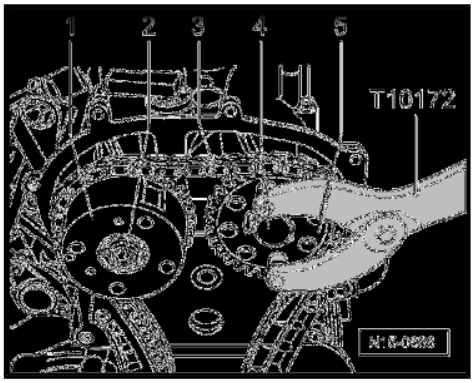
If camshaft clamp -T10171 A- can be fitted:

– Screw locking pin - T10340- to stop into crankcase.
– Tighten locking pin - T10340- to 30 Nm.



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– Remove camshaft clamp -T10171 A- , hold camshaft sprockets with counterhold -T10172- and tighten bolts -2- (left-hand thread) and -4- a 1/4 turn (90°) further with a rigid wrench.



Note

Camshaft adjuster centre bolt -2- has a left-hand thread.

Note

Camshaft sprockets must not move on camshaft whilst tightening.

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

Note

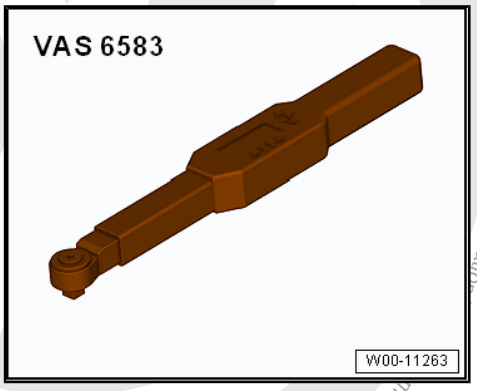
The locking pin - T10340- remains in the crankcase until the crankshaft pulley is installed.

- Install control housing ⇒ page 46 .
- Installing crankshaft pulley ⇒ page 72 .
- Install poly V-belt ⇒ page 51 .
- Renew oil seals for camshaft sealing cover and oil them before fitting.
- Specified torque for continued coolant circulation pump - V50- : 10 Nm
- Since the seal cannot be renewed individually, the oil pressure switch needs to be renewed following removal.
- Specified torque for oil pressure switch - F1- : 20 Nm.
- Fill coolant system with coolant ⇒ page 157 .

1.4 Checking timing chain

Special tools and workshop equipment required

- Torque wrench - VAS 6583-



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♦ Test tool - T10550-



♦ Camshaft clamp - T10550/1-

♦ Indicator - T10550/2-

♦ Scale sleeve - T10550/3-

• The engine oil temperature must be at least 40°C ⇒ Vehicle diagnostic tester.

• The engine must not necessarily be at »TDC« position.

– Remove right front wheel ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .

– Remove noise insulation ⇒ Body, front; Rep. gr. 50 ; Noise insulation; Assembly overview - noise insulation .

– Remove front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .

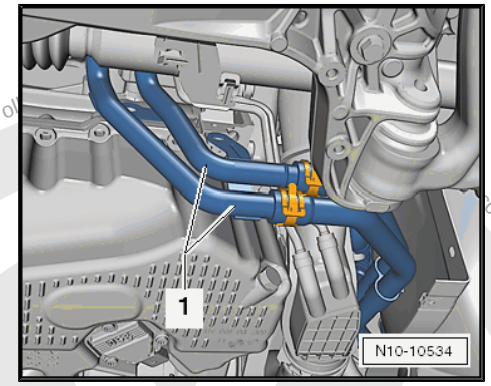
– Remove poly V-belt ⇒ page 51 .

– Drain coolant ⇒ page 157 .

Vehicles with auxiliary heater:

– Open clamps, and pull coolant hoses off coolant pipes -1-.

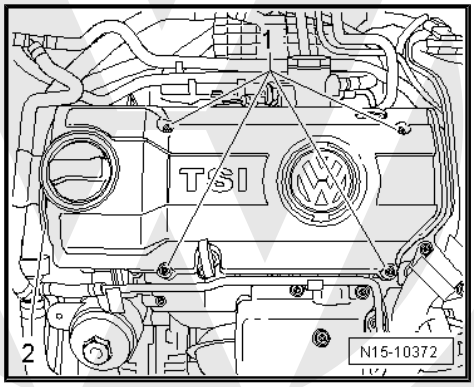
– Remove auxiliary heater with exhaust pipe and coolant hoses still connected ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Auxiliary heater, supplementary heater; Removing and installing auxiliary/supplementary heater .



Continuation for all vehicles:

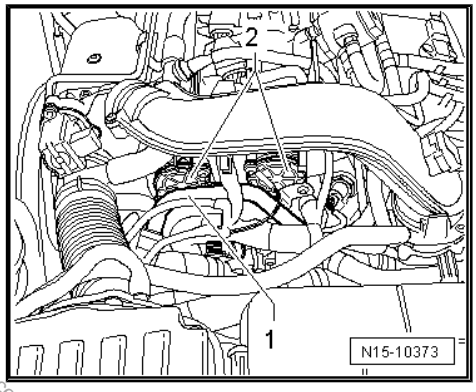
– Remove securing bolts -1- from engine cover panel.

– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.

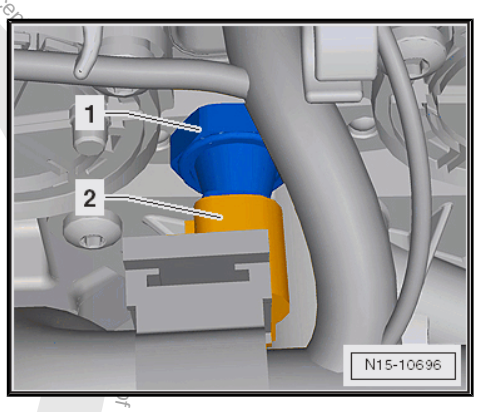


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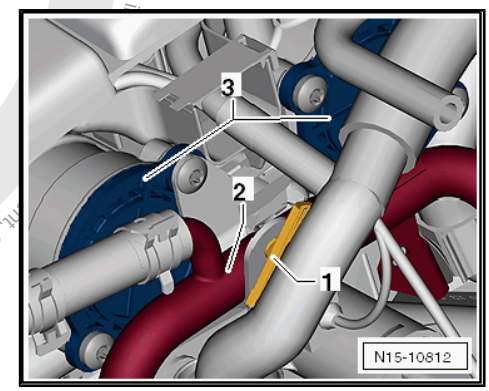
– Pull coolant hoses off coolant pipe -1- and unscrew coolant pipe from camshaft housing and from cylinder block from below.
– Release and pull off connector -2-.



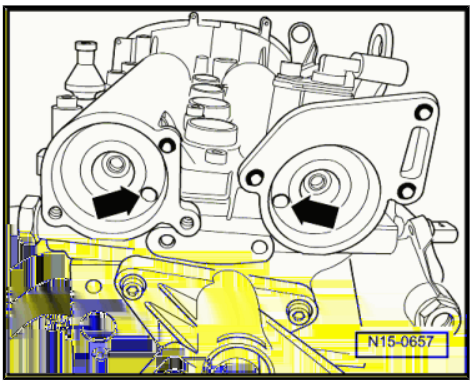
Disregard item -1-.



– Then remove bolts for both camshaft covers -3-.
– Unclip wiring harness -1-.
– Pull coolant pipe -2- and wiring harness -1- away from cylinder head.
– Lever both camshaft covers -3- out of cylinder head.

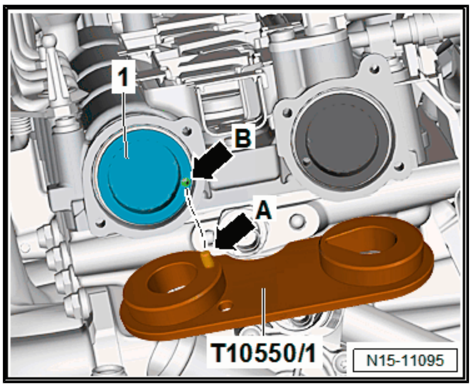


– The hole in the exhaust camshaft -left arrow- must be positioned as shown in the illustration.
– If necessary, turn crankshaft in direction of engine rotation.

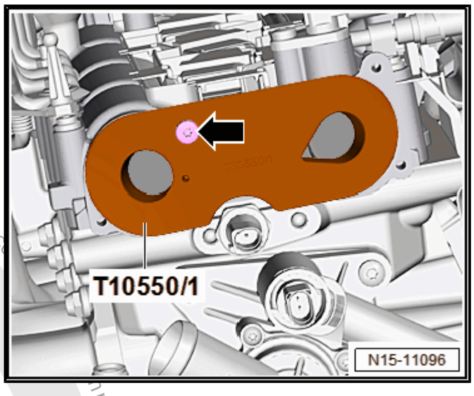


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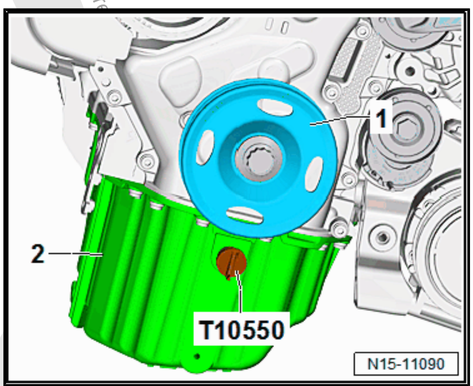
– Insert camshaft clamp - T10550/1- to stop in camshaft openings.
– The locking pin -arrow A- must engage in hole -arrow B- in exhaust camshaft.
– Inscription “TOP” must be readable from above.



– Bolt on camshaft clamp - T10550/1- hand-tight.
– Use one bolt of the camshaft covers for this purpose -arrow-.



– Screw indicator - T10550/2- into hole in sump.
– Align centring point vertically so that the tip faces upwards.
– Tighten centring point with knurled nut.



– Position scale sleeve - T10550/3- on belt pulley.

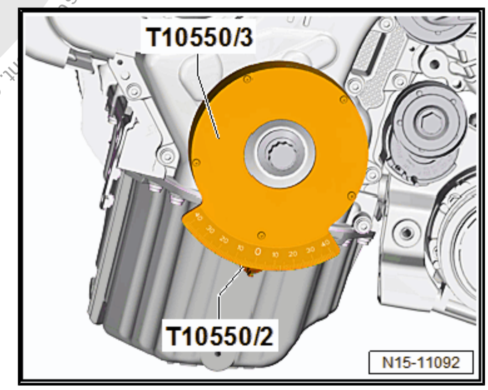
Caution

There is a risk of injury caused by trapping fingers.

The scale sleeve - T10550/3- is equipped with magnets.

Proceed with great care when joining the components.

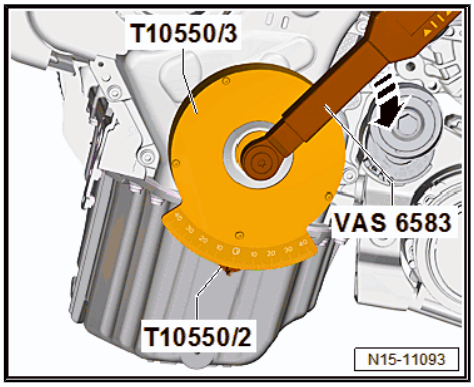
Note that the components are joined quickly by the magnetic force.



– Align scale sleeve - T10550/3- with indicator - T10550/2- as shown in illustration.

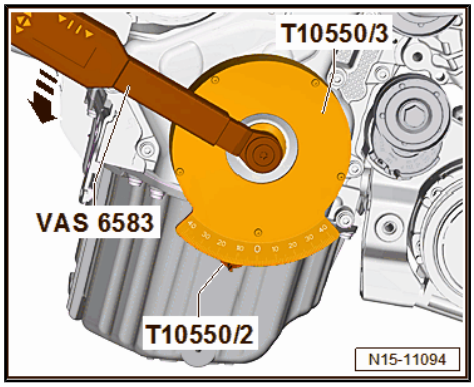
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– Fit torque wrench - VAS 6583- with a suitable socket to crankshaft bolt.
– Push torque wrench - VAS 6583- clockwise and keep it pushed with a torque of 40 Nm.
– Set scale sleeve - T10550/3- and indicator - T10550/2- to »0«.



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– Switch setting of torque wrench - VAS 6583- , and push it slowly anti-clockwise.
– Keep torque wrench - VAS 6583- pushed with a torque of 40 Nm.
– Read value on the scale.
– If the chain skips during the test, renew timing chain ⇒ page 113 .
– If the chain skips, it can be heard and felt clearly.



Conclusions after the test

– If a chain elongation of up to 28° has been determined during the test, the timing chain is OK.
– If a chain elongation of 29° and more has been determined, the timing chain is not OK and must be renewed ⇒ page 113 .

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

Note

- *The scale sleeve - T10550/3- is equipped with magnets.*
- *Do not use any levers for removing the scale sleeve - T10550/3- from the belt pulley!*

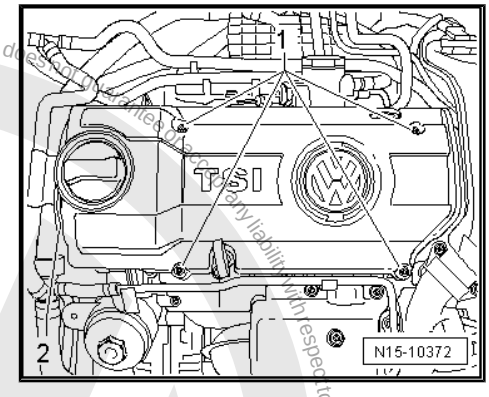
– Turn scale sleeve - T10550/3- towards right by approx. 45° so that the indicator - T10550/2- is not positioned within the range of the scale anymore.
– Grasp behind scale sleeve - T10550/3- with both hands.
– Push your thumbs onto the bolt of the belt pulley, and pull off scale sleeve - T10550/3- .
– Renew oil seals for camshaft sealing cover and oil them before fitting.
– Replenish coolant ⇒ page 157 .

Specified torques

- ⇒ “2.1 Assembly overview”, page 133
- ⇒ “1.4 Removing and installing poly V-belt”, page 51
- ⇒ Body, front; Rep. gr. 50 ; Noise insulation, Assembly overview - noise insulation
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner .
- ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres

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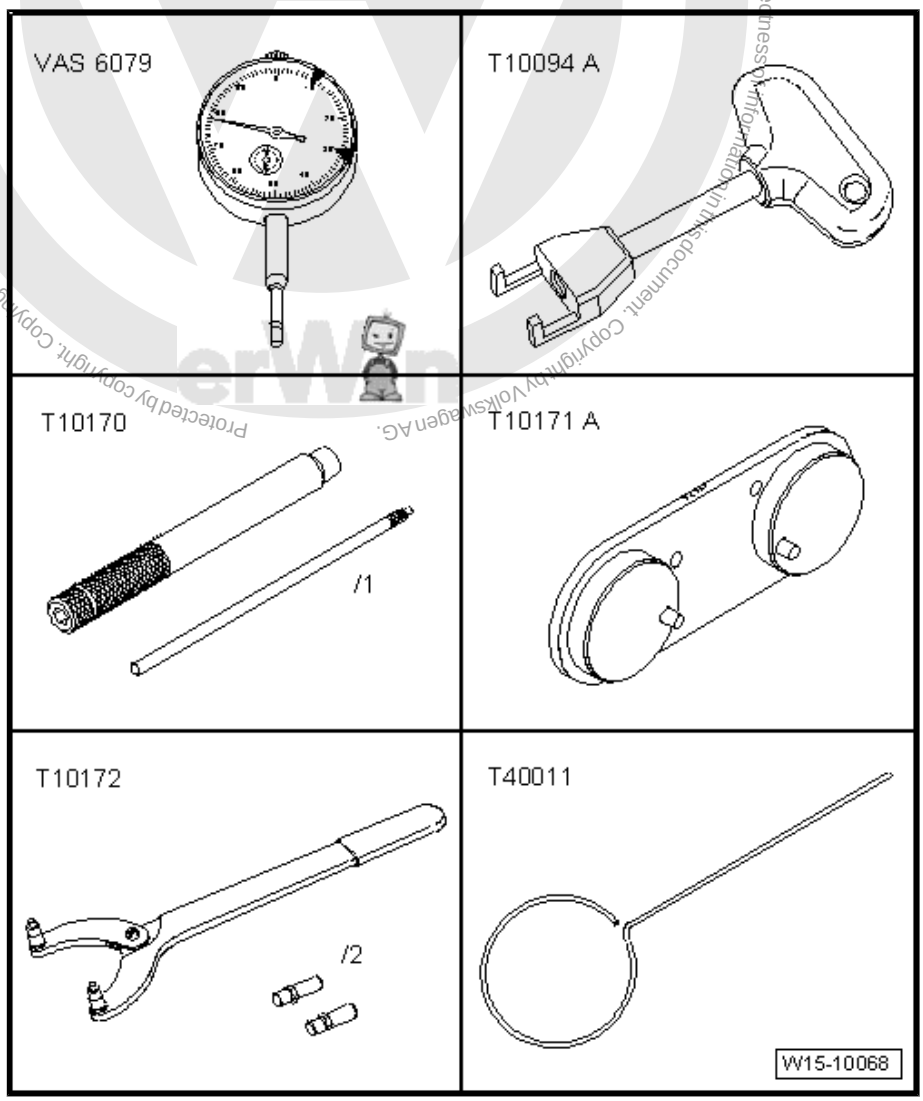
– Place engine cover panel on camshaft housing and engage coolant hoses -2- in bracket.
– Tighten securing bolts -1- to 8 Nm.



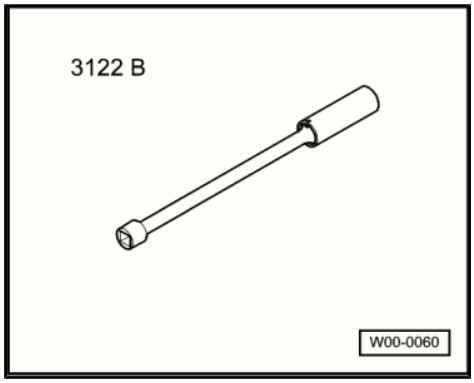
1.5 Removing and installing timing chain and chain drive for oil pump

Special tools and workshop equipment required

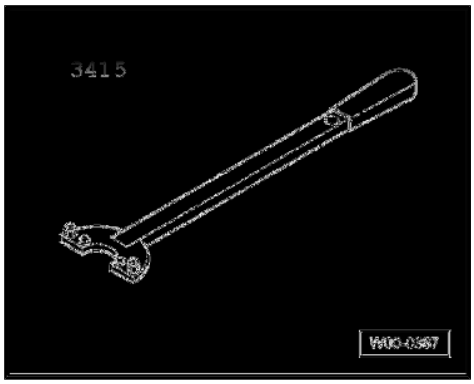
- Dial gauge - VAS 6079-
- Puller - T10094 A-
- Dial gauge adapter - T10170- or dial gauge adapter - T10170 A-
- Camshaft clamp - T10171 A-
- Counterhold - T10172-
- Locking pin - T40011-



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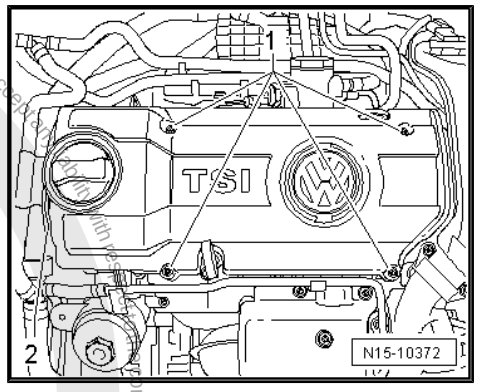
- Spark plug socket and extension - 3122 B-
- Counterhold - 3415-
- Torque wrench (5…50 Nm) - V.A.G 1331-



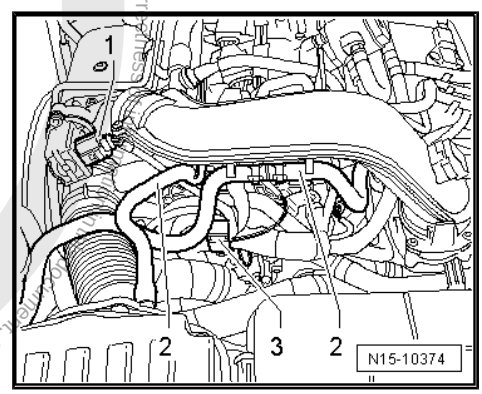
Removing

– Drain coolant ⇒ page 157 .

– Remove securing bolts -1- from engine cover panel.
– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.

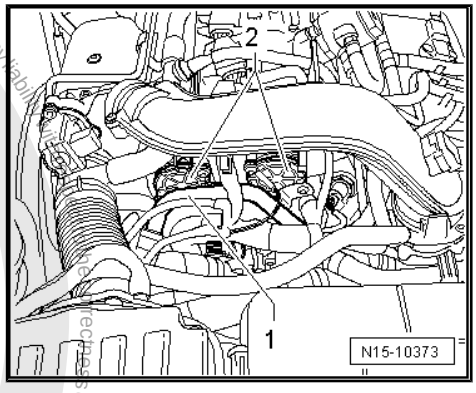


– Pull connector -1- off turbocharger air recirculation valve - N249- .
– Detach hoses -2- at pressure pipe and open wiring guide -3-.

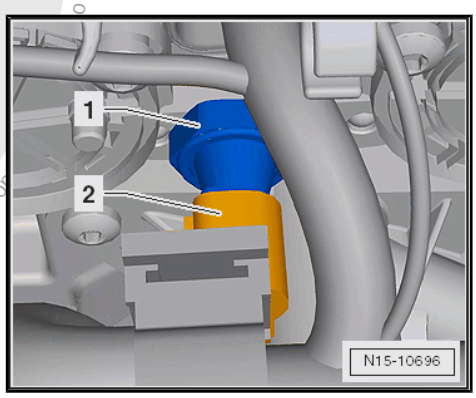


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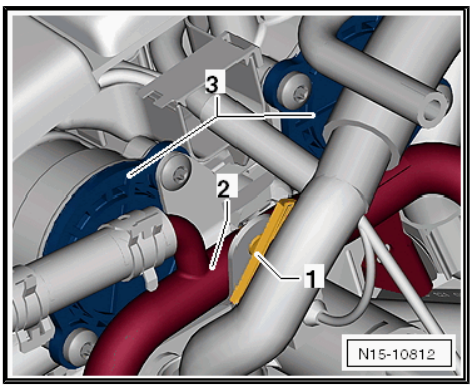
– Pull coolant hoses off coolant pipe -1- and unscrew coolant pipe from camshaft housing and from cylinder block from below.



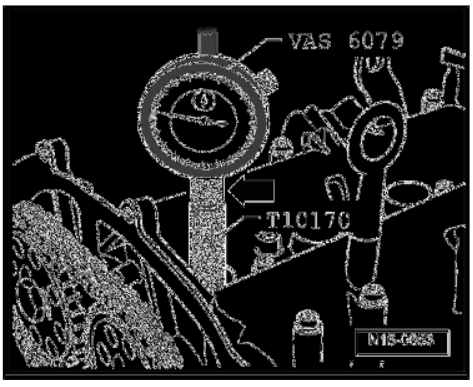
– Release and pull off connector -2-.
– Remove oil pressure switch - F1- -1-.
– Then remove bolts for both camshaft covers -3-.



– Unclip engine pre-wiring harness -1-.
– Pull coolant pipe -2- and engine pre-wiring harness -1- away from cylinder head.
– Remove both bolts -3- from cylinder head.
– Remove spark plug from No. 1 cylinder. To do this, use puller - T10094 A- and spark plug socket and extension - 3122 B- ⇒ page 361 .

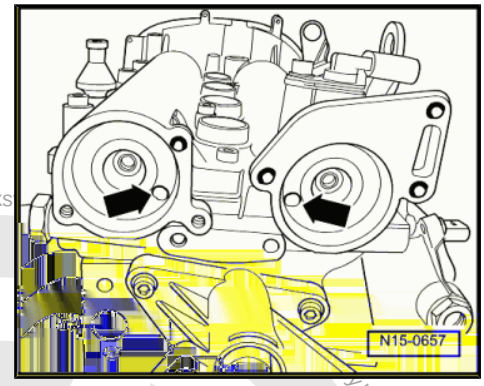


– Screw dial gauge adapter - T10170- into spark plug hole to stop.
– Screw dial gauge - VAS 6079- and extension -T10170/1- in to stop and lock in position with lock nut -arrow-.
– Turn crankshaft in direction of engine rotation, to TDC for No. 1 cylinder. Note position of small needle on dial gauge.



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The holes -arrows- in the camshaft must align as shown. Otherwise turn crankshaft one rotation (360°) further.



Note

- *If crankshaft is turned 0.01 mm passed TDC, turn crankshaft two full turns in engine direction of rotation to set crankshaft in engine direction of rotation at TDC for No. 1 cylinder.*
- *Permissible deviation from TDC for No. 1 cylinder: ± 0.01 mm.*

Caution

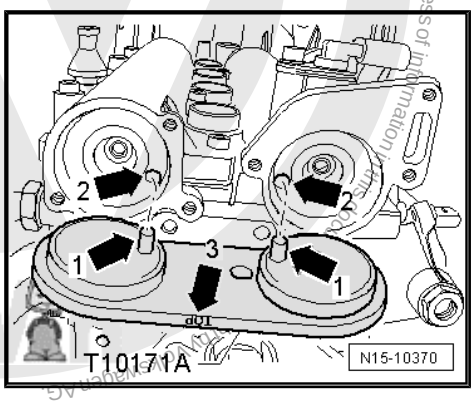
Before using camshaft clamp - T10171 A- you must check that the pins on the tool project by at least 7 mm.

If this is not the case, the camshaft clamp is defective and must be renewed.

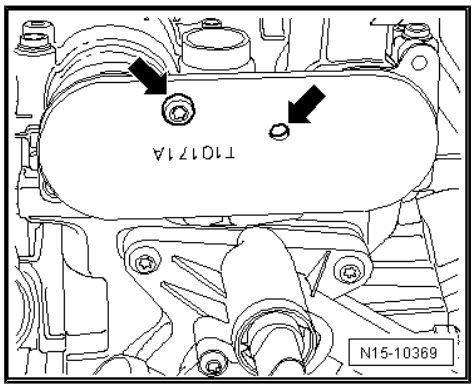
The camshaft clamp must not be positioned using any kind of hammer.

– Insert camshaft clamp - T10171 A- to stop in camshaft openings.

Locking pins -arrows 1- must engage in holes -arrows 2-. Inscription “TOP” -arrow 3- must be readable from above.



– Screw an M6 bolt hand-tight into corresponding bore -arrows- (but do not tighten) to secure camshaft clamp - T10171 A- .



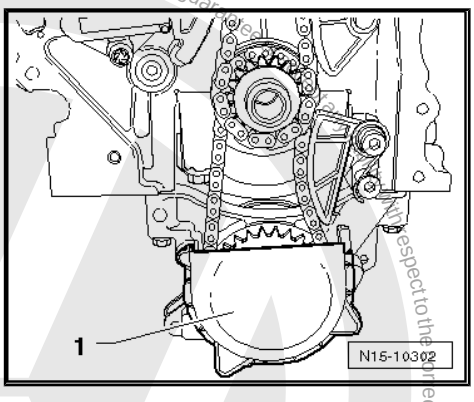
Note

Note that there are different securing points for the camshaft clamp - T10171 A- .

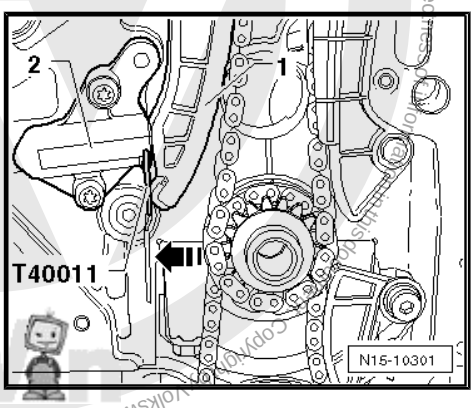
– Remove valve timing housing ⇒ page 46 .

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– Pull cover -1- off chain sprocket for oil pump.



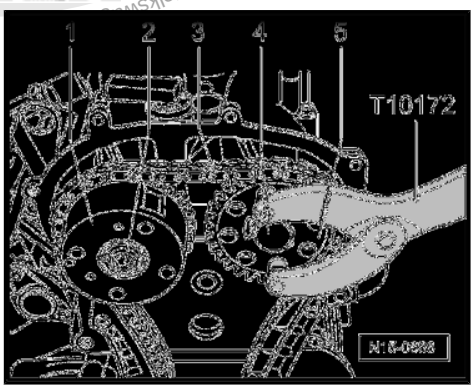
– Press tensioning rail in -direction of arrow- by hand and lock piston of chain tensioner with locking pin - T40011- .



– Mark direction of rotation of timing chain -3- using coloured felt tip marker pen.

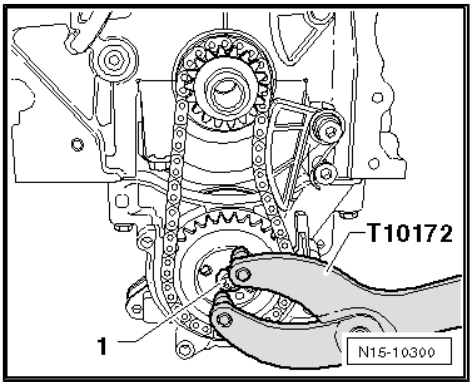
Caution

Camshaft adjuster securing bolt -2- has a left-hand thread.



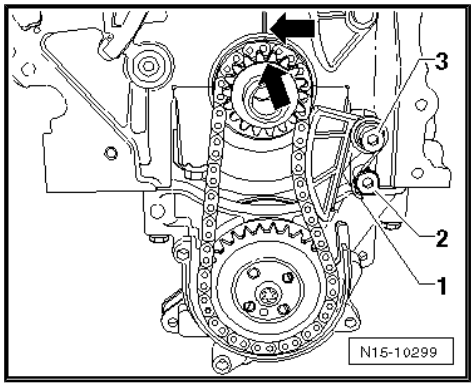
– Unscrew bolts -2- and -4- and remove camshaft adjuster -1- together with timing chain -3-. Counterhold using counterhold - T10172- .

– Hold oil pump chain sprocket with counterhold - T10172- and loosen securing bolt -1-.



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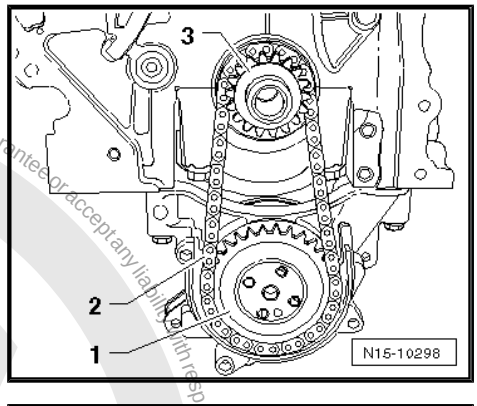
– Use a screwdriver on bolt -2- to release tensioning spring -1- then remove tensioning spring -1-.
– Unscrew securing bolt -3- and remove chain tensioner.
– Mark direction of rotation of oil pump drive chain -2- using felt-tip marker.



– Unscrew securing bolt for chain sprocket -1- and remove chain sprockets -1- and -3- together with drive chain for oil pump -2-.

Installing

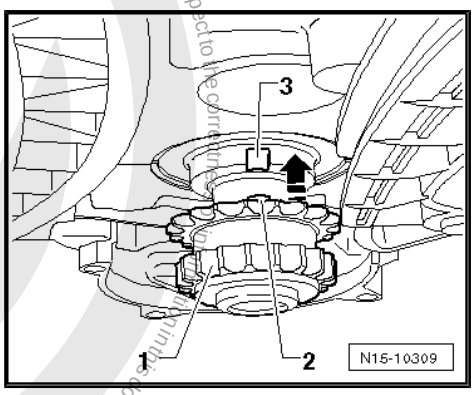
- The crankshaft must be positioned at TDC for No. 1 cylinder.



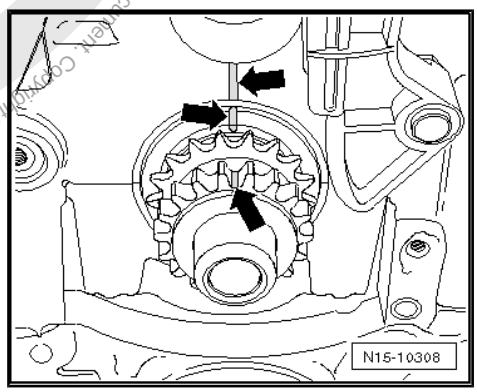
– Push chain sprocket -1- in -direction of arrow- onto crankshaft journal as far as the stop.

Caution

Cast lug -2- on chain sprocket -1- must seat in groove -3- on crankshaft journal.

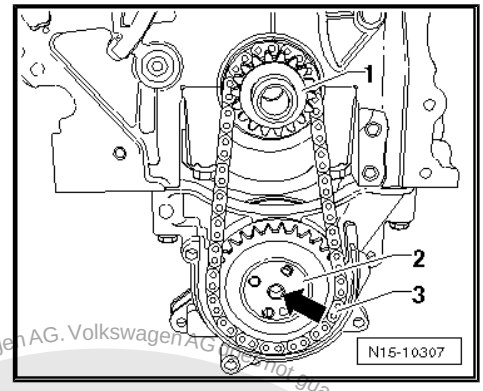


– Mark position of chain sprocket and crankshaft to cylinder block using a felt-tip marker.



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– Place oil pump drive chain -3- onto drive chain sprocket -1- and position drive chain sprocket -2- onto oil pump drive shaft at same time.

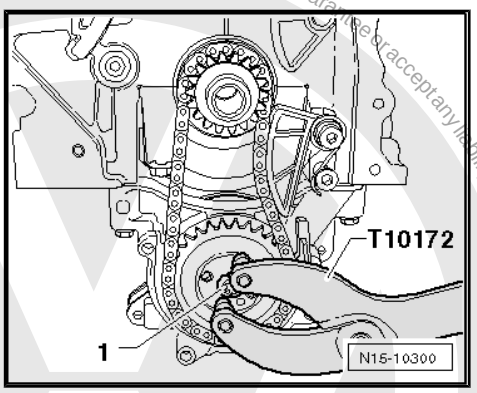


Note

- *Note running direction mark on oil pump drive chain.*
- *Oil pump drive sprocket only fits on oil pump drive shaft in one position -arrow-.*

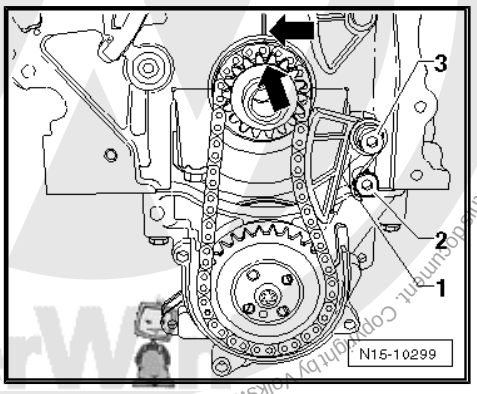
– Hold oil pump drive sprocket with counterhold - T10172- .

– Tighten new securing bolt -1- to 20 Nm + $^{1}/_{4}$ turn (90°) further.



– Position chain tensioner on oil pump drive chain and tighten securing bolt -3- to 8 Nm.

– Lever tensioning spring -1- onto bolt -2- using a screwdriver.

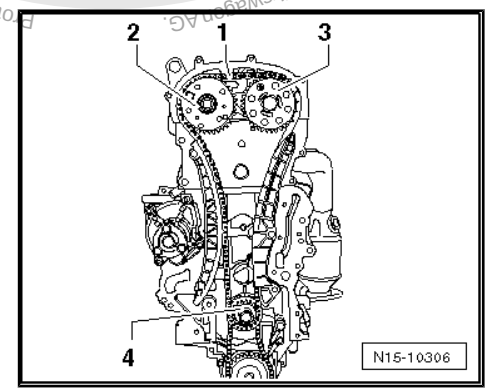


Note

- *Note marks -arrows-.*
- *The crankshaft must not rotate.*

– Tighten chain sprocket -3- hand-tight with new securing bolt.

– Place timing chain -1- on crankshaft chain sprocket -4-, exhaust camshaft chain sprocket -3-, and tighten camshaft adjuster -2- hand-tight using a new securing bolt.

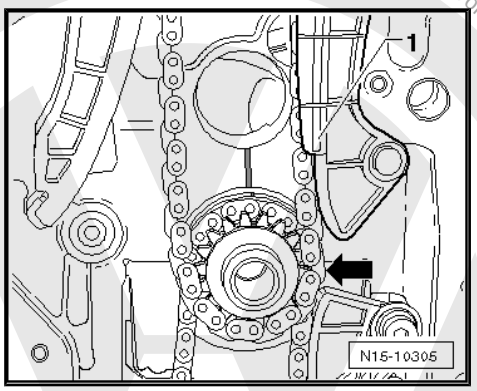


Note

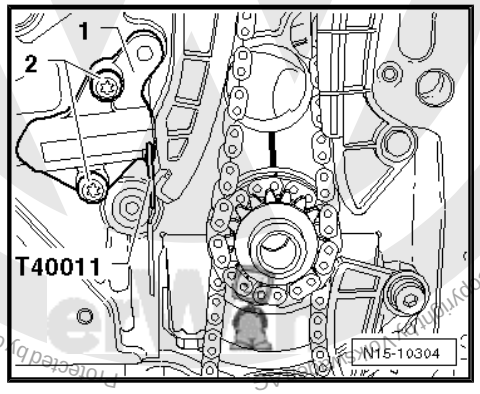
- *Note running direction mark on timing chain -1-.*
- *Ensure guide sleeve is installed between inlet camshaft and camshaft adjuster.*
- *Camshaft adjuster securing bolt -2- has a left-hand thread.*

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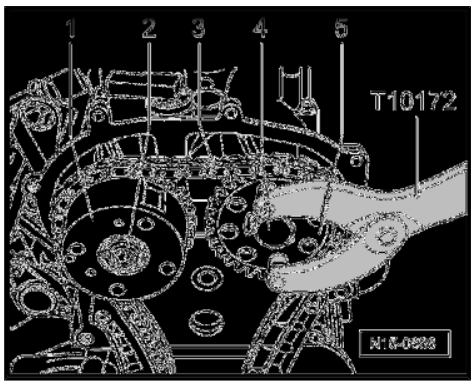
Timing chain must lie on guide rail -1- and crankshaft chain sprocket -arrow-.



– Install chain tensioner -1- and tighten securing bolts -2- to 9 Nm.
– Tension timing chain by pulling locking pin - T40011- from chain tensioner.
– Check marks on crankshaft chain sprocket and cylinder block; they must align.



– Tighten securing bolt -2- to 40 Nm and bolt -4- to 50 Nm (use counterhold -T10172-).

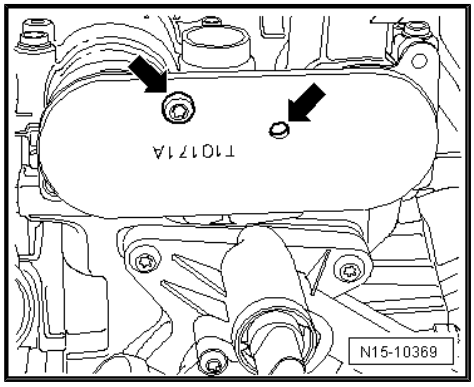


Note

- *Securing bolts -2- and -4- are only tightened 90° further once timing has been checked.*
- *The camshaft adjuster securing bolt -2- has a left-hand thread.*

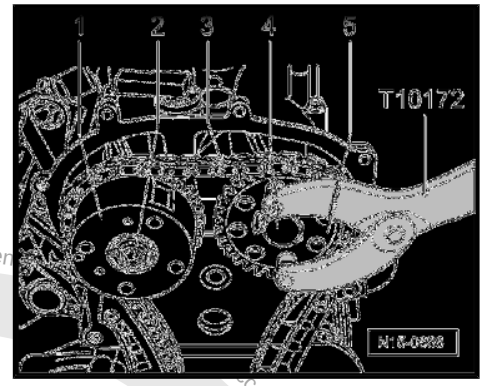
– Unscrew bolt -arrow- and remove camshaft clamp - T10171 A- from camshaft housing.
– Check valve timing ⇒ page 96

If valve timing is OK:



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– Hold camshaft wheels with counterhold -T10172- and tighten bolts -2- (left-hand thread) and -4- a 1/4 turn (90°) further with a rigid wrench.



Note

Camshaft adjuster securing bolt -2- has a left-hand thread.

Note

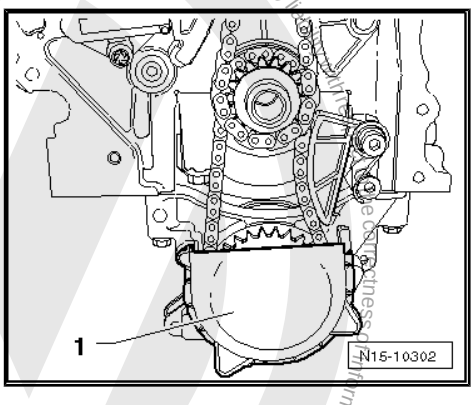
Camshaft sprockets must not move on camshaft whilst tightening.

– Install oil pump wheel cover -1-.
– Install timing housing ⇒ page 46 .
– Install crankshaft pulley ⇒ page 72 .
– Install poly V-belt ⇒ page 51 .
– Fill coolant system with coolant ⇒ page 157 .

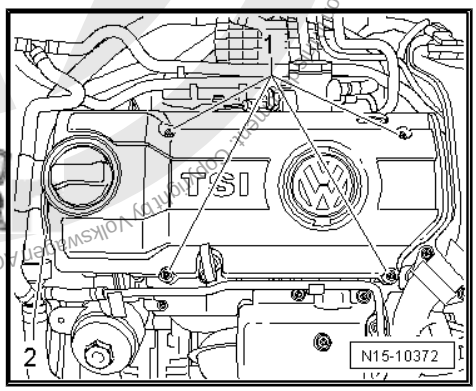
Further assembly is basically the reverse of the dismantling sequence.

Since the seal cannot be renewed individually, the oil pressure switch needs to be renewed following removal.

Specified torque for oil pressure switch - F1- : 20 Nm.



– Place engine cover panel on camshaft housing and engage coolant hoses -2- in bracket.
– Tighten securing bolts -1- to 8 Nm.

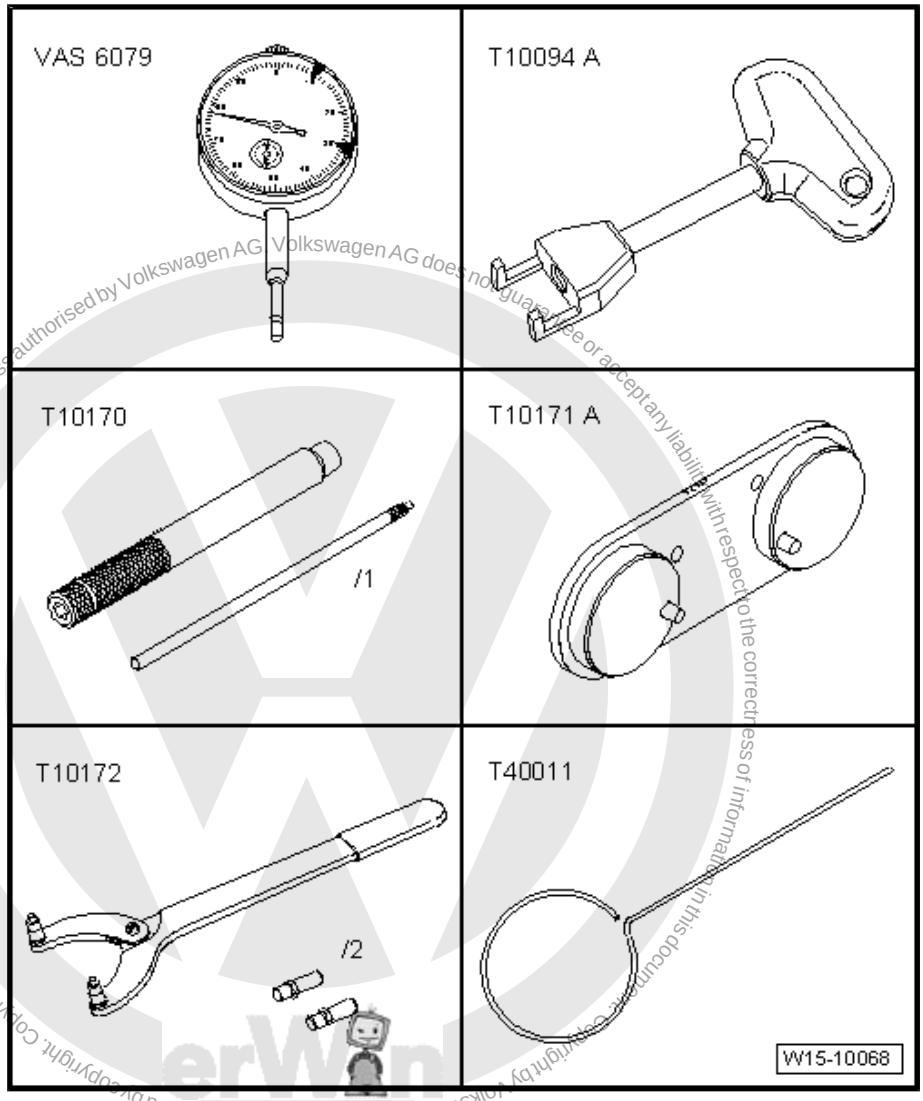


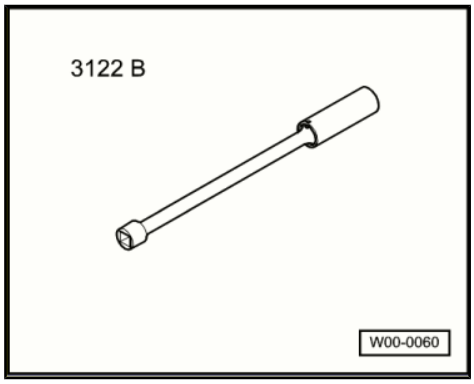
1.6 Removing and installing camshaft housing

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Special tools and workshop equipment required

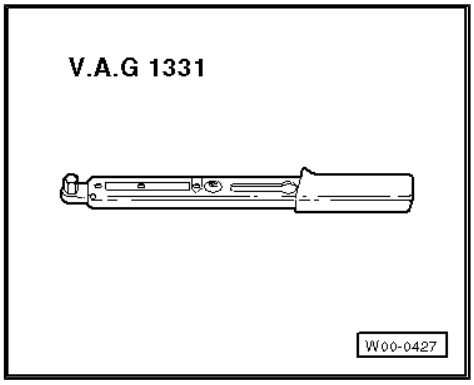
- Dial gauge - VAS 6079-
- Puller - T10094 A-
- Dial gauge adapter - T10170- or dial gauge adapter - T10170 A-
- Camshaft clamp - T10171 A-
- Counterhold - T10172-
- Locking pin - T40011-





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- Spark plug socket and extension - 3122 B-
- Torque wrench (5…50 Nm) - V.A.G 1331-
- Two studs (M6x80)
- D 154 103 A1 Sealant

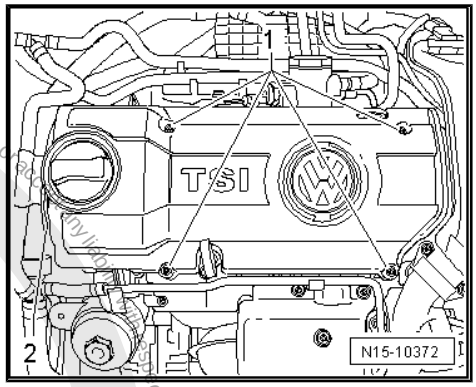


1.6.1 Removing

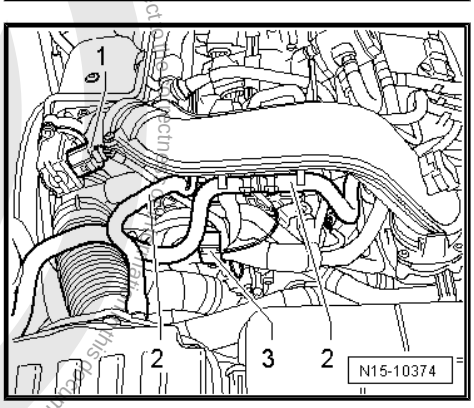
Note

- *The camshafts are mounted in the camshaft housing on this engine. Before removing camshaft housing, first remove valve timing housing ⇒ page 46 .*
- *The camshaft housing sealing surface must not be reworked.*

– First check whether a coded radio is fitted. If so, obtain anti-theft coding.
– With ignition switched off, disconnect battery earth strap.
– Drain coolant ⇒ page 157 .
– Remove securing bolts -1- from engine cover panel.
– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.

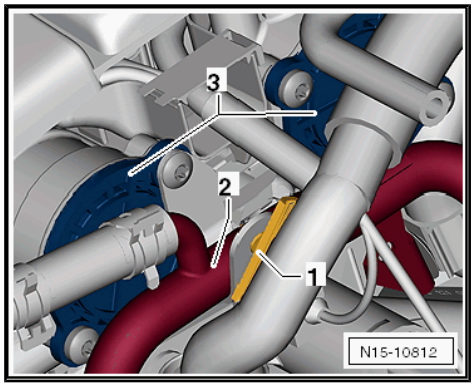


– Pull connector -1- off turbocharger air recirculation valve - N249- .
– Detach hoses -2- at pressure pipe and open wiring guide -3-.
– Unscrew bolts of both camshaft covers -3-.



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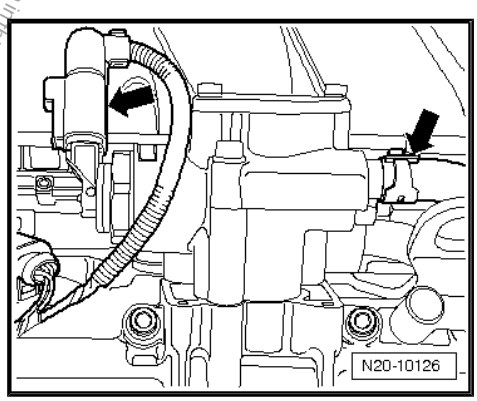
– Unclip engine pre-wiring harness -1-.
– Pull coolant pipe -2- and engine pre-wiring harness -1- away from cylinder head.
– Remove both bolts -3- from cylinder head.
– Remove turbocharger ⇒ page 275 .
– Remove valve timing housing ⇒ page 46 .
– Turn crankshaft to TDC for No. 1 cylinder. Then turn crankshaft 45° in engine direction and remove camshaft timing chain sprockets with timing chain ⇒ page 99 .
– Unbolt camshaft sealing covers.
– Pull connectors off fuel pressure sender for low-pressure - G410- and off high-pressure pump.
– Unscrew earth cable from camshaft housing.
– Remove ignition coils. Use puller -T10094 A- for this purpose ⇒ page 361 .
– Remove cable guide with wiring harness from camshaft housing.



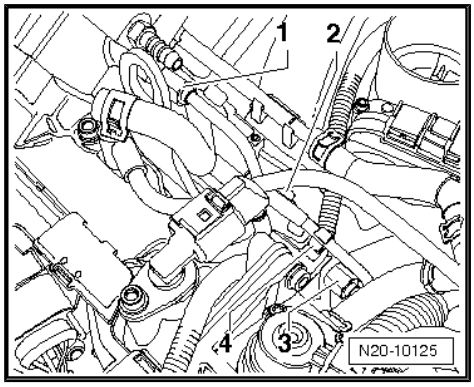
WARNING

Fuel supply lines are under pressure! Wear eye protection and gloves to avoid injuries 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 supply line -arrows- off high-pressure pump.

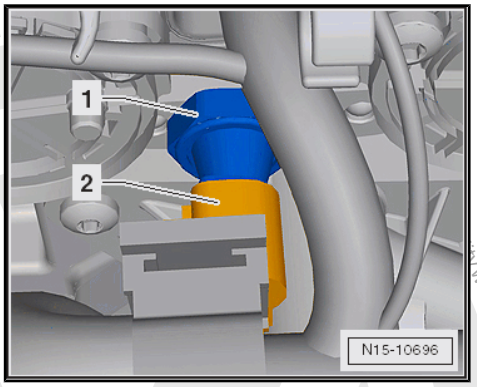


– Remove wiring guide -2- and take clip -4- off high-pressure line.



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– Release and pull off connector -2-.
– Remove oil pressure switch - F1- -1-.



Note

Use a spanner to counterhold threaded connections on high pressure pump and on lower part of intake manifold when loosening union nuts.

– Loosen union nuts -3- and -1- of high-pressure line.
– Disconnect connector off Hall sender - G40- .
– Pull out oil dipstick.
– Remove lower part of intake manifold ⇒ Item 17 (page 301) .
– Unbolt left lifting eye.
– Loosen camshaft housing bolts from outside to inside, alternately and diagonally and remove.
– Carefully lift camshaft housing off.

1.6.2 Installing

Caution

The studs (M6x80) must be screwed into cylinder head before installing camshaft housing.

The camshaft housing is guided by the studs, so that the roller rocker fingers do not slip off the supporting elements.

Prerequisite

- The pistons must not be positioned at TDC.

– Remove sealant residues from cylinder head and camshaft housing with a rotating brush, e.g. a hand drill with a plastic brush (wear eye protection).
– Clean sealing surfaces carefully. They must be free of oil and grease.
– Also prevent dirt and residual sealant from entering cylinder head.

Caution

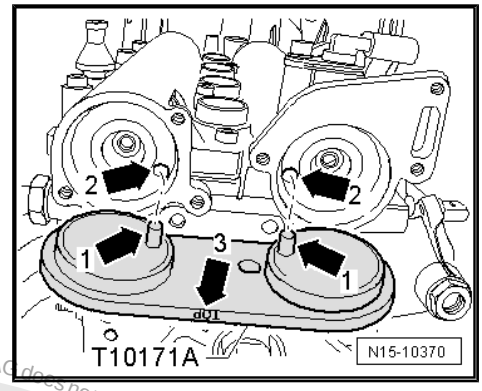
Before using camshaft clamp - T10171 A- you must check that the pins on the tool project by at least 7 mm.

If this is not the case, the camshaft clamp is defective and must be renewed.

The camshaft clamp must not be positioned using any kind of hammer.

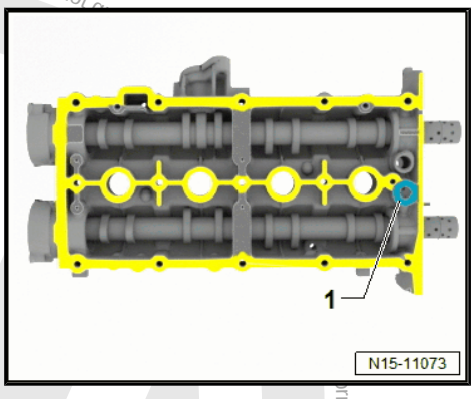
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with respect to the correctness of information in this document.

– Turn inlet and exhaust camshafts until camshaft clamp -T10171 A- can be pushed into holes in camshaft to stop.
– Secure camshaft clamp -T10171 A- hand-tight with an M6 bolt (do not tighten).



Sealing on cylinder head with no sealing ring in area of spark plug recess

– Apply thin, even coat of sealant on clean camshaft housing sealing surface. See yellow area in illustration.

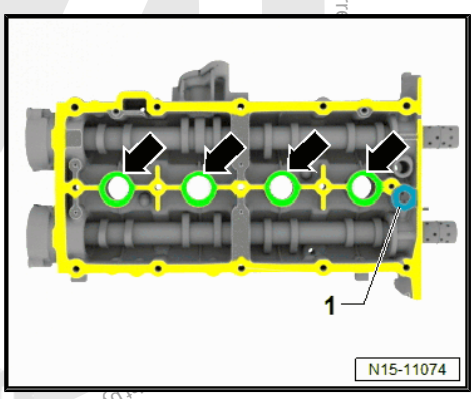


Note

Sealant must not be applied too thickly; otherwise excess sealant can enter oil channels and cause damage to engine.

Sealing on cylinder head with sealing ring in area of spark plug recess

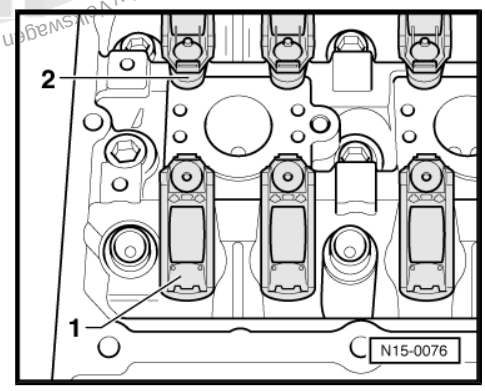
– Place 4 new sealing rings into grooves in cylinder head.
– Apply thin, even coat of sealant on clean camshaft housing sealing surface. See yellow area in illustration.
– Do not apply sealant in area of -arrows-.



Note

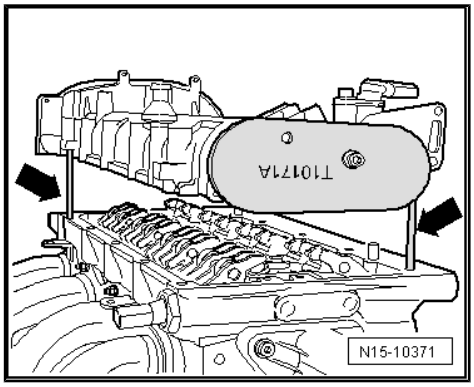
Sealant must not be applied too thickly; otherwise excess sealant can enter oil channels and cause damage to engine.

– Ensure that all roller rocker fingers contact valve stem ends -1- correctly and that they are clipped into their respective support elements -2-.
– Screw two studs (M6x80) into cylinder head before installing camshaft housing.



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– Carefully fit camshaft housing vertically onto studs -arrows- and dowel pins of cylinder head from above.



Note

Ensure that no oil residue can drip onto sealing surfaces.

– Evenly tighten new camshaft housing securing bolts from inside to outside alternately and diagonally.

Ensure that camshaft housing is not canted. Specified torque: 10 Nm + 1/4 turn (90°) further.

Note

After installing the camshaft housing, wait about 30 minutes for the sealant to dry.

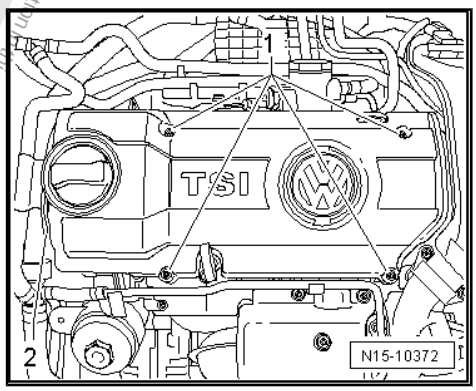
– Adjust valve timing ⇒ page 99 .

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

- Since the seal cannot be renewed individually, the oil pressure switch needs to be renewed following removal.
- Specified torque for oil pressure switch - F1- : 20 Nm.
- Install control housing ⇒ page 46 .
- Install turbocharger ⇒ page 275 .
- Installing crankshaft pulley ⇒ page 72 .
- Attaching fuel lines ⇒ page 309 .

– Place engine cover panel on camshaft housing and engage coolant hoses -2- in bracket.

– Tighten securing bolts -1- to 8 Nm.

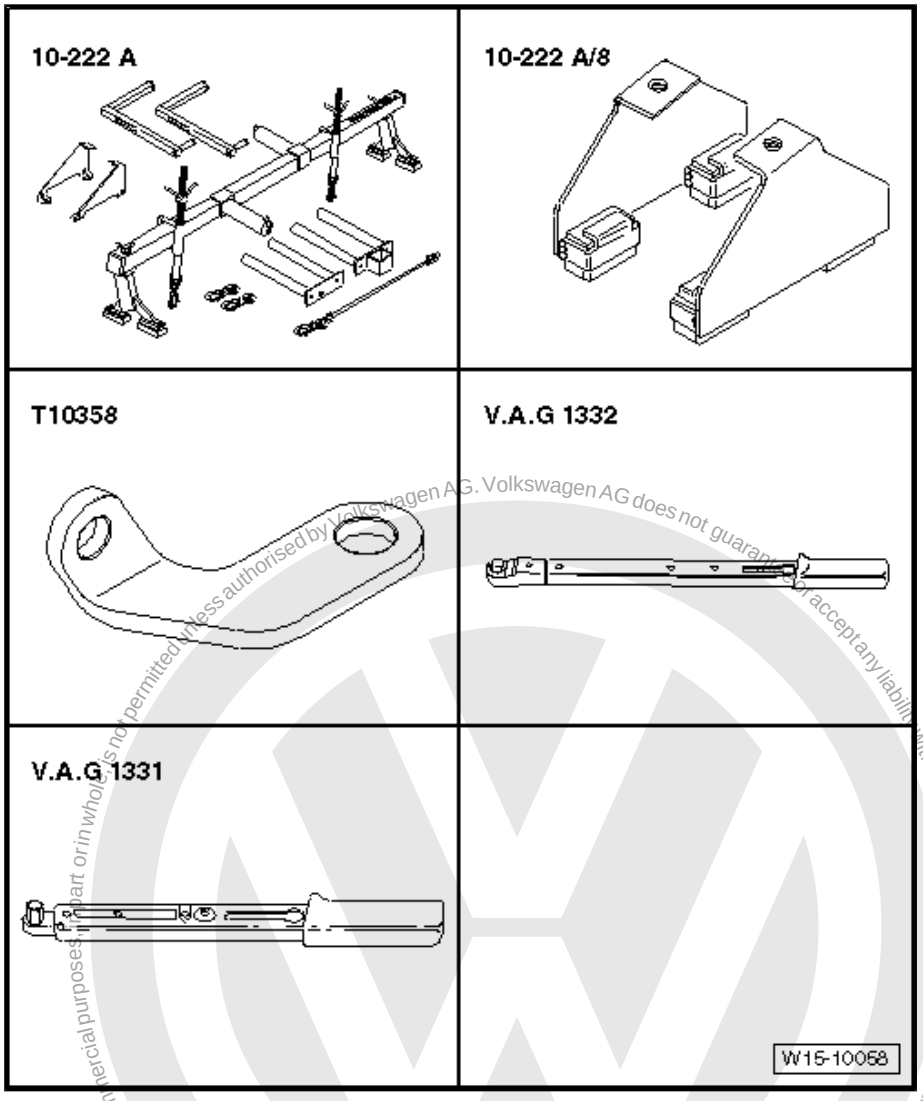


1.7 Removing and installing cylinder head

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Special tools and workshop equipment required

- Support bracket - 10 - 222 A-
- Adapter - 10 - 222 A /8- (Golf, Golf Plus)
- Adapter - 10 - 222 A /22- (Touran, Tiguan)
- Bracket - T10358-
- Torque wrench (40…200 Nm) - V.A.G 1332-
- Torque wrench (5…50 Nm) - V.A.G 1331-



Removing

Remove following components:

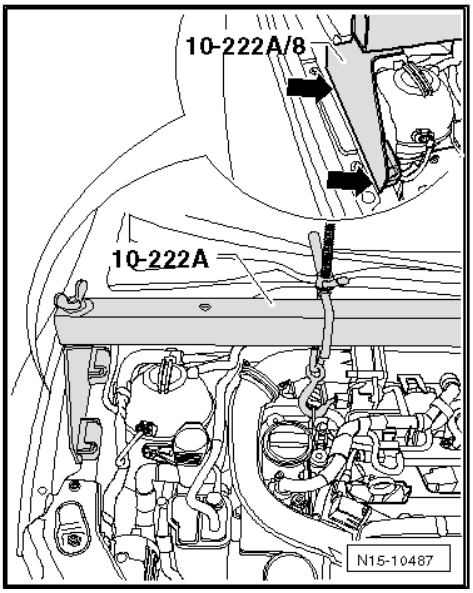
- Removing and installing valve timing housing ⇒ page 46 .
- Remove thermostat housing from cylinder head.
- Remove camshaft adjuster ⇒ page 99 .
- Remove tensioning and guide rail for timing chain.
- Removing and installing turbocharger ⇒ page 275 .
- Removing and installing intake manifold ⇒ page 308 .

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Scirocco

– Fit support bracket - 10 - 222 A- with adapter - 10 - 222 A /8- as shown.

– Position adapter - 10 - 222 A /8- on vehicle front end -arrows- as shown.

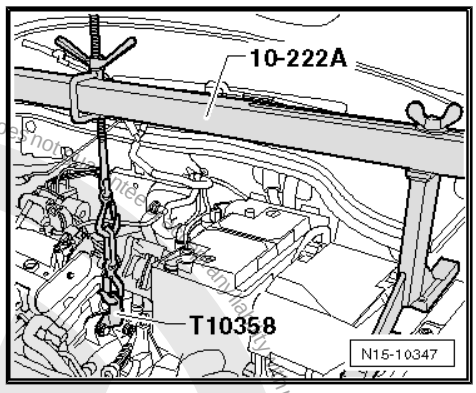


All vehicles

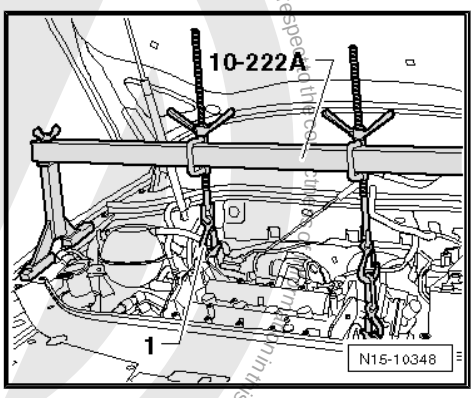
– Unscrew securing bolt for gearbox and attach bracket - T10358- as shown.

– Attach hooks of support bracket - 10 - 222 A- to bracket - T10358- as shown.

– Turn spindle until the hooks are lightly tensioned.



– Unhook hook -1- from left lifting eye and push spindle onto left side of support bracket - 10 - 222 A- .



Removing and installing camshaft housing ⇒ page 121 .

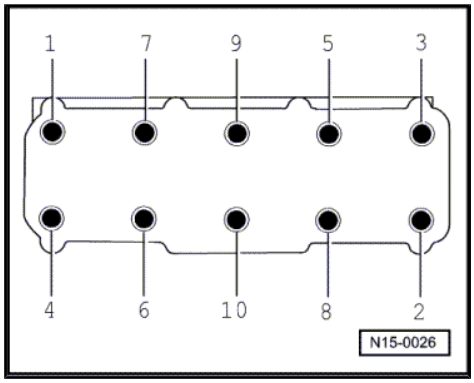
– Remove roller rocker fingers together with support elements and lay aside on a clean surface.

– Ensure that roller rocker fingers and support elements are not interchanged.

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– Loosen cylinder head bolts in sequence given and then remove completely.

– Carefully remove cylinder head.



Installing

Prerequisite

- The pistons must not be positioned at TDC.

Note

♦ *Do not remove new cylinder head gasket from its packing until immediately before installing.*

♦ *Handle new gasket with extreme care. Damage will cause leakage.*

– Place clean cloths in cylinders so that no dirt or emery cloth particles can get in between cylinder wall and piston.

– Now carefully clean sealing surfaces of cylinder head and cylinder block. Ensure thereby that surfaces are not scored or scratched (if abrasive paper is used, grade must not be less than 100).

– Carefully remove metal particles, emery residue and cloths.

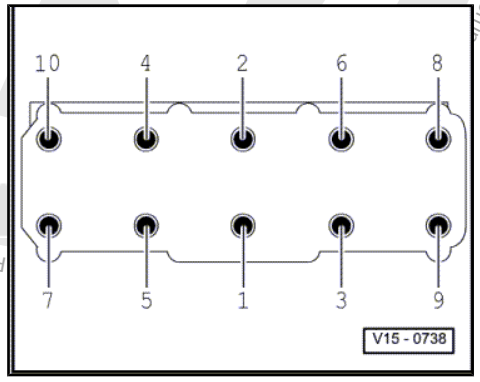
– Set No. 1 cylinder piston to top dead centre and then turn crankshaft approx. 45° in engine direction of rotation.

– Fit new cylinder head gasket. Inscription (Part No.) must be readable.

– Fit cylinder head. When doing this, observe centring pins in cylinder block.

– Insert new cylinder head bolts and tighten hand-tight.

– Tighten cylinder head bolts in tightening sequence as follows:



Specified torque/ additional specified angle

Stage	Specified torque
1	30 Nm
2	Turn 90° further using rigid wrench
3	Turn 90° further using rigid wrench
4	Turn 90° further using rigid wrench

– Install supporting elements in cylinder head and fit respective roller rocker finger onto respective valve stem end or supporting element.

– Install camshaft housing.

Removing and installing camshaft housing ⇒ page 121 .

– Adjust valve timing ⇒ page 99 .

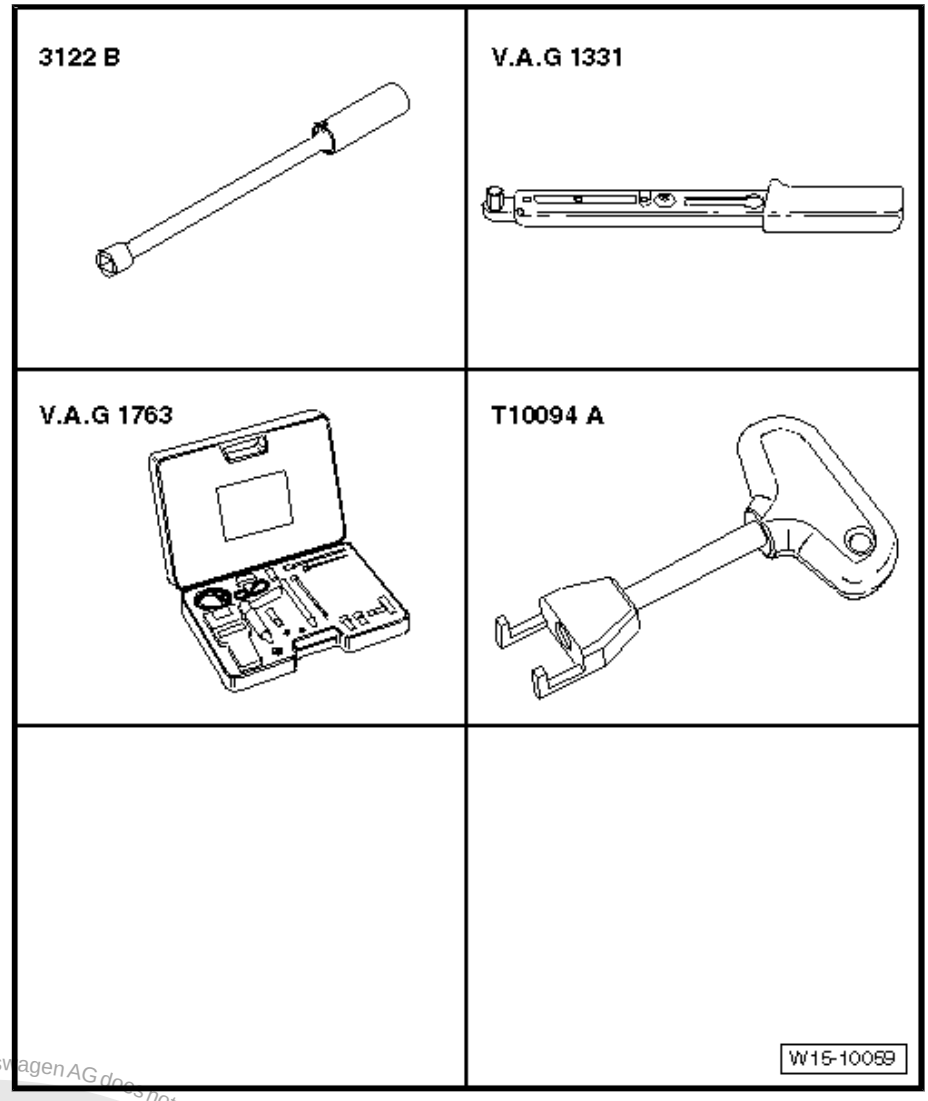
Further assembly is basically the reverse of the dismantling sequence.

1.8 Checking compression

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Special tools and workshop equipment required

- Spark plug socket and extension - 3122 B-
- Torque wrench (5…50 Nm) - V.A.G 1331-
- Compression tester - V.A.G 1763-
- Puller - T10094 A-



Test prerequisite

• Engine oil temperature must be at least 30°C.

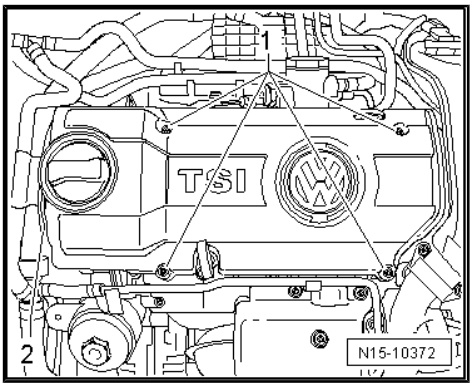
Procedure

– Remove securing bolts -1- from engine cover panel.

– Remove ignition coils. Use puller -T10094 A- for this purpose.

– Unscrew spark plugs with spark plug socket and extension - 3122 B- ⇒ page 361 .

– Remove fuse for fuel pump control unit from fuse holder. Fuse assignment ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

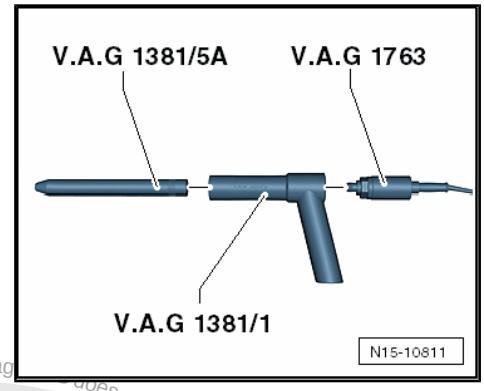


Note

Removing fuse interrupts voltage supply for fuel pump control unit.

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– Check compression using compression tester - V.A.G 1763- , adapter - V.A.G 1381/1- and adapter - V.A.G 1381/5A- .



Note

Using compression tester: ⇒ Operating instructions .

– Operate starter until tester shows no further pressure increase.

Compression pressures:

New bar pressure	Wear limit bar pressure	Difference between cylinders bar pressure
10.0 … 15.0	7.0	max. 3.0

– Insert spark plugs using spark plug socket and extension - 3122 B- and tighten to 30 Nm.

Further assembly is basically the reverse of the dismantling sequence.

– Read event memory, rectify any faults and then clear fault memory: ⇒ Vehicle diagnostic tester “Guided Fault Finding”.

The readiness code must be generated if the event memory has been cleared.

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2 Repairing valve gear

Assembly overview ⇒ page 133 .

Checking camshaft axial clearance ⇒ page 135 .

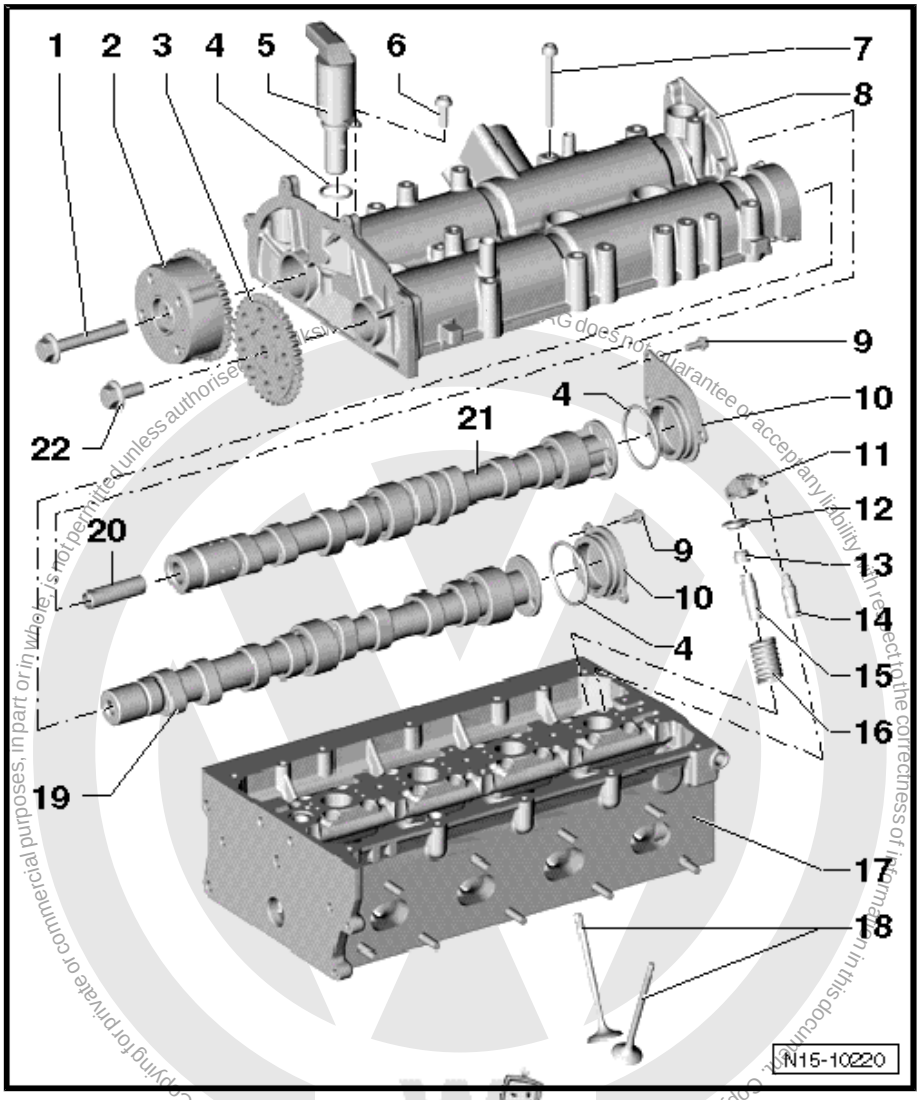
Removing and installing camshaft ⇒ page 135 .

Reworking valve seats ⇒ page 136 .

Checking valve guides ⇒ page 137 .

Renewing valve stem seals ⇒ page 138 .

2.1 Assembly overview



1 - 40 Nm + 1/4 turn (90°) further

- ❑ Left-hand thread.
- ❑ Renew

2 - Camshaft adjuster

- ❑ Must not be dismantled.
- ❑ Removing and installing ⇒ page 99 .

3 - Camshaft pulley

- ❑ Note position when installing timing chain.

4 - O-ring

- ❑ Renew if damaged.
- ❑ Before installing, coat lightly with engine oil.

5 - Inlet camshaft control valve 1 - N205-

6 - 10 Nm

7 - 10 Nm + 1/4 turn (90°) further

- ❑ Renew
- ❑ Tighten from inside outwards.

8 - Camshaft housing

Caution

The studs (M6x80) must be screwed into cylinder head before installing camshaft housing.

The camshaft housing is guided by the studs, so that the roller rocker fingers do not slip off the supporting elements.

- ❑ Removing and installing ⇒ page 121
- ❑ Remove sealant residue.
- ❑ Coat with D 154 103 A1 before fitting.

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- ❑ When installing, fit vertically from above onto studs and dowel pins.

9 - 10 Nm

10 - Cap

- ❑ For inlet camshaft.
- ❑ For exhaust camshaft.

11 - Roller rocker finger

- ❑ Check roller bearing.
- ❑ Oil contact surface.
- ❑ When installing, secure to supporting element using securing clip.

12 - Valve cotters

13 - Valve stem seal

- ❑ Renew

14 - Support element

- ❑ Check oil spray holes.
- ❑ With hydraulic valve clearance compensation.
- ❑ Do not interchange.
- ❑ Before installing, check camshaft axial clearance ⇒ page 135 .
- ❑ Oil contact surface.

15 - Valve guide

- ❑ Checking ⇒ page 137 .

16 - Valve spring

- ❑ To remove and install with cylinder head removed, use valve spring tool - 3362- .
- ❑ With cylinder head installed ⇒ page 138 .

17 - Cylinder head

- ❑ Removing and installing ⇒ page 127
- ❑ Reworking valve seat ⇒ page 136 .
- ❑ Reworking sealing surface ⇒ page 135 .

18 - Valves

- ❑ Do not rework, only lapping-in is permitted.
- ❑ Valve dimensions ⇒ page 135

19 - Exhaust camshaft

- ❑ Do not interchange with inlet camshaft.
- ❑ Checking axial clearance ⇒ page 135 .
- ❑ Coat with oil before inserting (also axial bearing shoulder).

20 - Guide sleeve

21 - Inlet camshaft

- ❑ With cam for high-pressure pump -arrow-.
- ❑ Before removing, remove and renew bucket tappet for high-pressure pump.
- ❑ Do not interchange with exhaust camshaft.
- ❑ Checking axial clearance ⇒ page 135 .
- ❑ Coat with oil before inserting (also axial bearing shoulder).

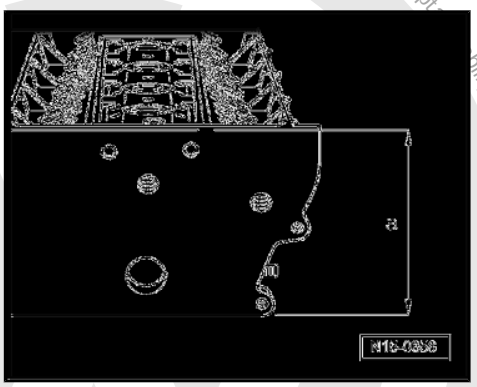
22 - 50 Nm + 1/4 turn (90°) further

- ❑ Always renew after removing.

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Reworking cylinder head sealing surface

Cylinder head reworking dimension: a = at least 108.25 mm.



Note

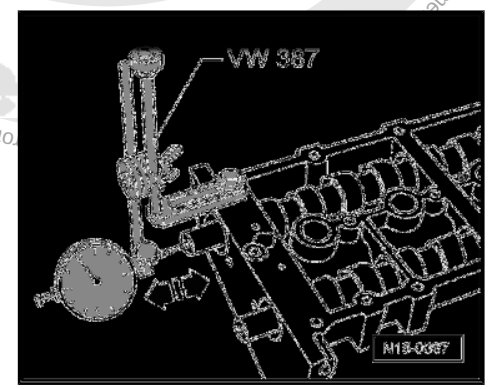
When the sealing surface has been reworked, the valves must be set deeper by the same amount (valve seat inserts reworked) or valves will contact pistons. When doing this, ensure that the permissible minimum dimension is maintained ⇒ page 136 .

2.2 Checking camshaft axial clearance

Special tools and workshop equipment required

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

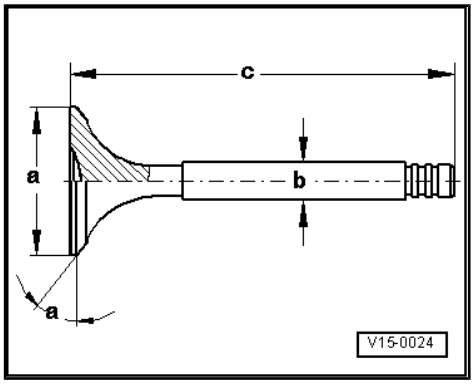
Perform measurements with camshaft housing removed and cap fitted.



Checking camshaft axial clearance

Wear limit: max. 0.40 mm

Valve dimensions



Note

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

Dimension		Inlet valve	Exhaust valve
Diameter a	mm	29.5	26.0
Diameter b	mm	5.973	5.953
c	mm	100.9	100.5
α	∠°	45	45

2.3 Removing and installing camshaft

Removing

– Remove high-pressure pump ⇒ page 313 .
– Remove camshaft housing ⇒ page 121 .
– Place camshaft housing down on a clean surface so that camshafts face upwards.

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Note

- *Camshafts must not be interchanged.*
- *Mark inlet camshaft and exhaust camshaft with a pen.*

– Carefully pull out camshafts from camshaft housing.

Installing

– Before installing, coat camshaft bearings lightly with clean engine oil.

– Carefully push camshafts into camshaft housing as far as they will go.

When installing new camshafts:

Observe allocation of exhaust camshaft and inlet camshaft according to part number ⇒ Electronic Parts Catalogue (ETKA) .

Inlet camshaft can also be identified by cam for high-pressure pump.

Installation is performed in the reverse order of removal.

– Install camshaft housing ⇒ page 121 .

– Installing high-pressure pump ⇒ page 313 .

2.4 Reworking valve seats

Special tools and workshop equipment required

- Depth gauge
- Valve seat refacing tool

Note

- *When repairing engines with leaking valves, it is not sufficient to rework or renew valve seats and valves. Particularly on high mileage engines, it is necessary also to check valve guides for wear ⇒ page 137 .*
- *Valve seats are only to be reworked to the extent required to yield a proper surface appearance. Before beginning to rework valve seats, calculate the maximum permissible reworking dimensions. If the reworking dimension is exceeded, the hydraulic valve clearance compensation can no longer be guaranteed and the cylinder head must be renewed.*

The max. permissible reworking dimension is calculated as follows:

– Insert valve and press firmly against seat.

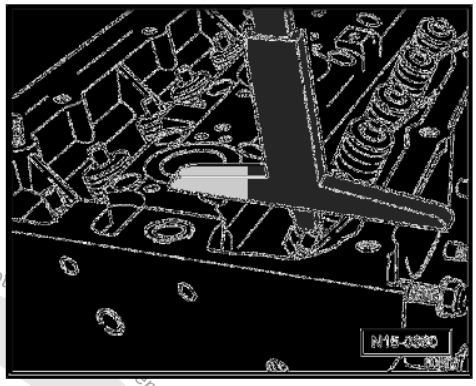
Note

If the valve is to be renewed as part of a repair, use a new valve for the calculation.

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– Measure distance between end of valve stem and upper edge of cylinder head.

– Calculate maximum permissible reworking dimension from measured distance and minimum dimension.



Minimum dimension: inlet valve 7.6 mm, exhaust valve 7.6 mm.

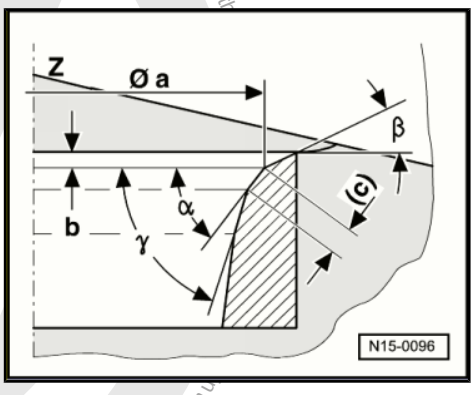
Measured distance minus minimum dimension = max. permissible reworking dimension.

Example:

-Measured distance	8.0	mm
Minimum dimension	7.6	mm
=max. perm. rework dimension [3]	0.4	mm

3) The max. permissible reworking dimension is shown as dimension “b” in the illustrations for reworking valve seats.

Reworking inlet valve seat



a = 28.7 mm in diameter
b = max. permissible reworking dimension[1]
c = 1.5…1.8 mm
Z = cylinder head lower edge
α = 45° valve seat angle
β = 30° upper correction angle
γ = 60° lower correction angle

4) Calculating max. permissible reworking dimension ⇒ page 136 .

Reworking exhaust valve seat

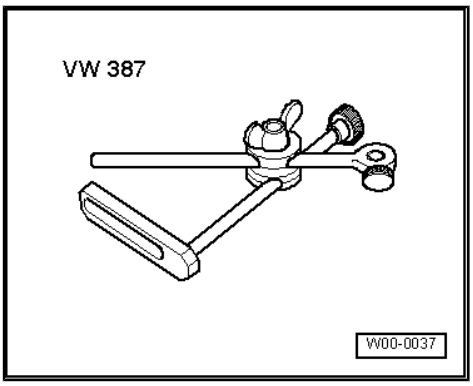
a = 25.0 mm in diameter
b = max. permissible reworking dimension[1]
c = approx.1.8 mm
Z = Cylinder head lower edge
α = 45° valve seat angle
β = 30° upper correction angle
γ = 60° lower correction angle

5) Calculating max. permissible reworking dimension ⇒ page 136 .

2.5 Checking valve guides

Special tools and workshop equipment required

♦ Universal dial gauge bracket - VW 387-



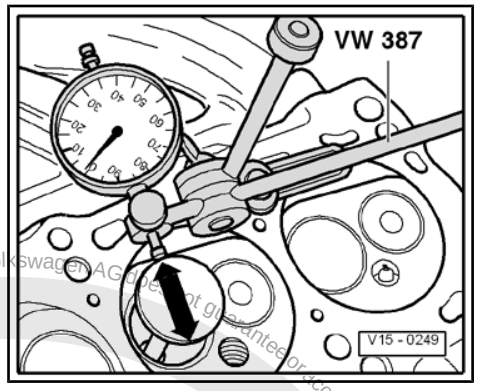
♦ Dial gauge

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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 by moving valve in direction of -arrow-.



Wear limit: 0.8 mm

If rock tolerance is exceeded:

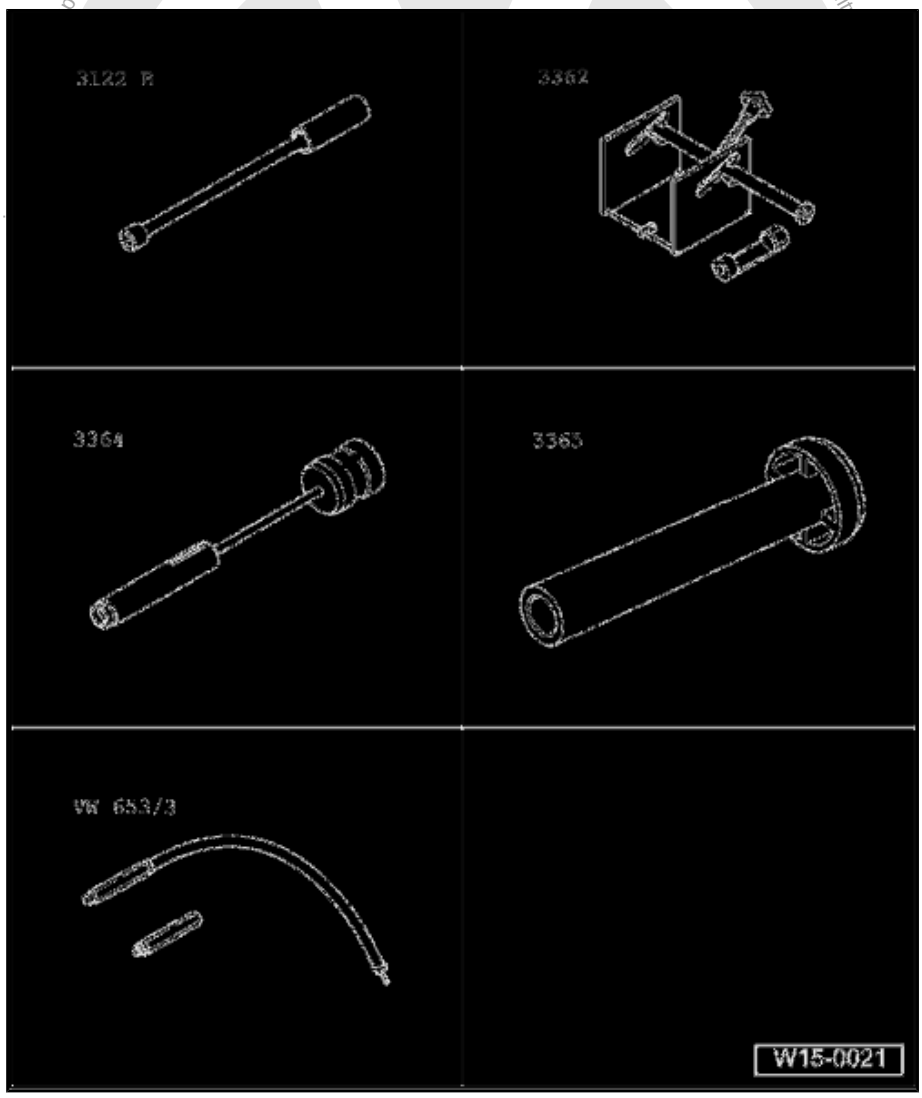
– Renew cylinder head.

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2.6 Renewing valve stem seals

Special tools and workshop equipment required

- Spark plug socket and extension - 3122B-
- Valve spring tool - 3362- with thrust piece - 3362/1-
- Valve stem seal puller - 3364-
- Valve stem seal fitting tool - 3365-
- Pressure hose - VW 653/3-



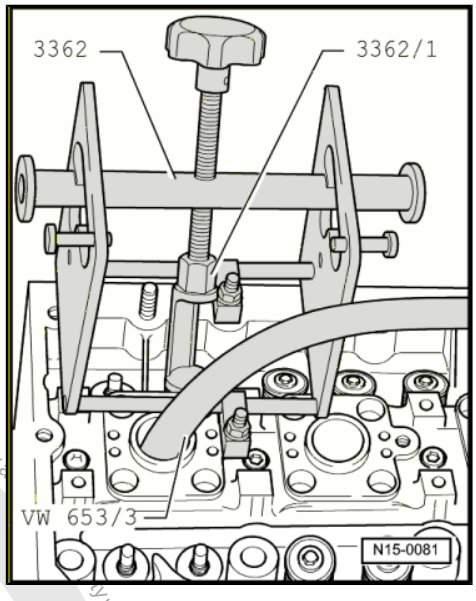
Removing

(With cylinder head installed)

– Remove camshaft housing ⇒ page 121 .

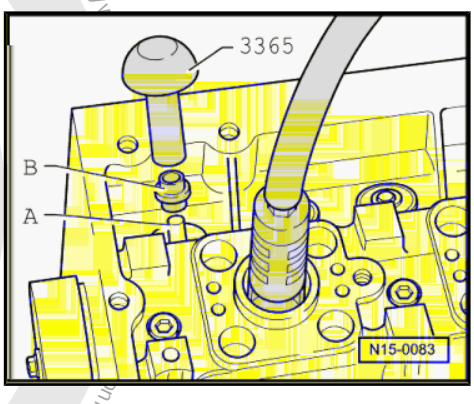
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– Remove roller rocker fingers and place onto a clean surface. When doing this, ensure that the roller rocker fingers are not interchanged.
– Remove spark plugs with spark plug spanner -3122B- .
– Set piston of respective cylinder to “bottom dead centre”.
– Attach valve spring tool - 3362- with thrust piece - 3362/1- .
– Now screw pressure hose -VW 653/3- into spark plug hole.
– Connect pressure hose to compressed air system supplying at least 6 bar and remove valve springs.
– Pull off valve stem seals with 3364.



Installing

– Place plastic sleeve supplied on respective valve stem. This will prevent damage to new valve stem seal.
– Place new valve stem seal in valve stem seal fitting tool - 3365- .
– Oil valve stem seal sealing lip and press carefully onto the valve guide.
– Install camshaft housing ⇒ page 121 .
– Adjust valve timing ⇒ page 99 .



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

♦ Install valve timing housing ⇒ page 46 .
♦ Installing fuel lines ⇒ page 313 .

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17 – Lubrication

1 Removing and installing parts of lubrication system

Note

- *Finding metal shavings or a large quantity of small metal particles during engine repair could indicate that the conrod bearings are damaged. To prevent this from causing further damage, perform the following repairs:*
- *Thoroughly clean oil channels.*
- *Renew oil filter.*
- *The oil level must not be above the max. mark - danger of damage to catalytic converter! Markings ⇒ page 143 .*

Engine oil, oil capacities, engine oil specification ⇒ page 140 .

Assembly overview (► model year 2008) ⇒ page 140 .

Assembly overview (model year 2009 ►) ⇒ page 143 .

Removing and installing sump ⇒ page 145 .

Removing and installing oil pump ⇒ page 147 .

Checking oil pressure and oil pressure switch ⇒ page 149 .

1.1 Engine oil, oil capacities, engine oil specification

Oil capacities (Golf, Golf Plus, Passat, Passat Estate, Scirocco, Eos)

With oil filter, 3.6 l

Oil capacities (Tiguan)

With oil filter, 4.0 l

Engine oil specifications

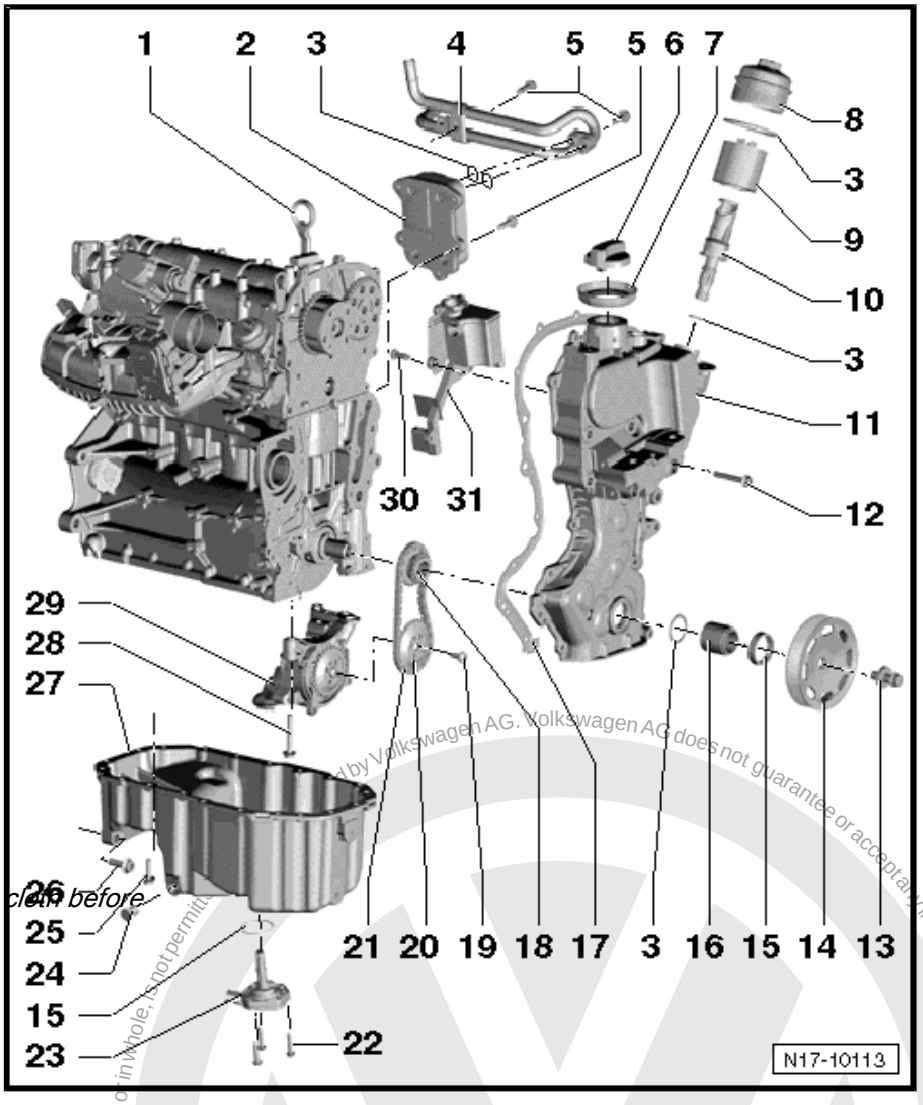
⇒ Maintenance ; Booklet ; Service tables

Changing engine oil: “Engine oil: Drain or extract”

⇒ Maintenance ; Booklet ; Service tables .

1.2 Assembly overview (► model year 2008)

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1 - Oil dipstick

- ❑ The oil level must not be above the max. mark!
- ❑ Markings ⇒ page 143 .

2 - Engine oil cooler

3 - O-ring

- ❑ Renew

4 - Coolant pipe

- ❑ For engine oil cooler
- ❑ Specified torque, bracket to crankcase: 20 Nm.

5 - 8 Nm

- ❑ Engine oil cooler torque setting: 8 Nm + 90°.
- ❑ Renew engine oil cooler bolts.

6 - Cap

- ❑ Renew seal if damaged.

7 - Seal

- ❑ Renew if damaged.

8 - Oil filter cover, 25 Nm

Note

Cover alternator with a cloth before removing

- ❑ With bypass valve opening pressure: 2.50 bar.
- ❑ With non-return valve.

9 - Filter element

10 - Valve

11 - Valve timing housing

- ❑ Install with sealant D 176 501 A1.
- ❑ Removing and installing control housing ⇒ page 46 .
- ❑ When installing, install two -M6x80- studs in cylinder block and camshaft housing as a guide.
- ❑ To guide valve timing housing, secure sump in position with two bolts.

12 - 10 Nm

13 - 150 Nm + 1/2 turn (180°) further

- ❑ Renew
- ❑ Removing and installing crankshaft pulley ⇒ page 72 .
- ❑ Contact surface for securing bolt must be free of oil and grease.
- ❑ Oil threads before inserting.
- ❑ Secure pulley against turning with counterhold 3415.
- ❑ The turning further angle can be measured with a commercial protractor.

14 - Belt pulley

- ❑ Contact surfaces of pulley must be free of oil and grease.
- ❑ Removing and installing poly V-belt ⇒ page 51 .
- ❑ Secure pulley against turning with counterhold -3415- .

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15 - Seal

- ❑ Renew

16 - Bearing bush

- ❑ Contact surfaces of bearing bush must be free of oil and grease.

17 - Gasket

- ❑ Renew if damaged.

18 - Chain sprocket

- ❑ Removing and installing ⇒ page 113
- ❑ For oil pump drive.

19 - 20 Nm + 1/4 turn (90°) further

- ❑ Renew

20 - Chain sprocket

- ❑ Removing and installing ⇒ page 113
- ❑ For oil pump.
- ❑ Lock with counterhold -T10172- .

21 - Drive chain

- ❑ Removing and installing ⇒ page 113
- ❑ For oil pump.
- ❑ Before removing, mark direction of rotation (installation position).

22 - 10 Nm

23 - Oil level and oil temperature sender - G266-

- ❑ Renew if damaged.
- ❑ Checking: ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

24 - Oil drain plug, 30 Nm

- ❑ With attached seal.
- ❑ Renew

25 - 13 Nm

- ❑ Renew
- ❑ Loosen and tighten flywheel end bolts only with socket insert -T10058- .

26 - 45 Nm

27 - Oil sump

- ❑ Removing and installing ⇒ page 145
- ❑ Clean sealing surface before fitting.
- ❑ Install with silicone sealant D 176 600 A1.

28 - 14 Nm + 1/4 turn (90°) further

29 - Oil pump

- ❑ Renew complete only.

30 - 5 Nm

31 - Oil separator

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Markings on oil dipstick

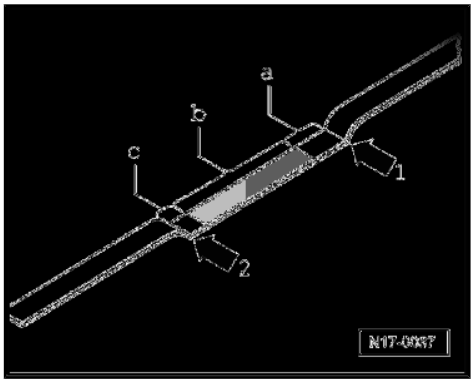
1 - Max. mark

2 - Min. mark

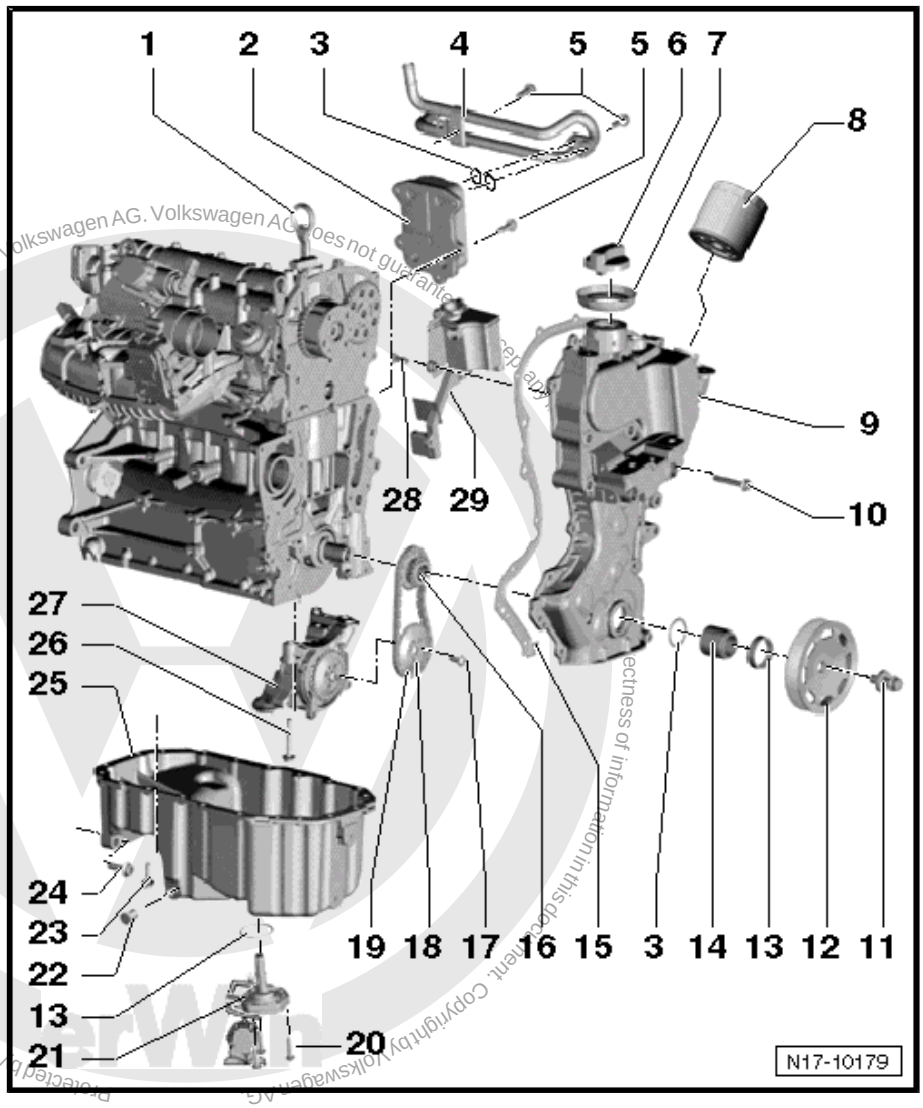
a - Area above hatched field up to max. mark: Do not top up with engine oil!

b - Oil level within hatched zone: can be topped up with engine oil

c - Area from min. mark up to hatched field: top up with max. 0.5 l of engine oil!



1.3 Assembly overview (model year 2009 ►)



1 - Oil dipstick

- ❑ The oil level must not be above the max. mark!
- ❑ Markings ⇒ page 145 .

2 - Engine oil cooler

3 - O-ring

- ❑ Renew

4 - Coolant pipe

- ❑ For engine oil cooler
- ❑ Specified torque, bracket to crankcase: 20 Nm.

5 - 8 Nm

- ❑ Engine oil cooler torque setting: 8 Nm + 90°.
- ❑ Renew engine oil cooler bolts.

6 - Cap

- ❑ Renew seal if damaged.

7 - Seal

- ❑ Renew if damaged.

8 - Oil filter, 20 Nm

- ❑ Loosen with oil filter tool - 3417- .
- ❑ Observe installation instructions on oil filter.
- ❑ With non-return valve.

9 - Valve timing housing

- ❑ Additionally install with silicone adhesive sealant - D 176 501 A1- .
- ❑ Removing and installing control housing ⇒ page 46 .
- ❑ When installing, install two -M6x80- studs in cylinder block and camshaft housing as a guide.
- ❑ To guide valve timing housing, secure sump in position with two bolts.

10 - 10 Nm

11 - 150 Nm + 1/2 turn (180°) further

- ❑ Renew
- ❑ Removing and installing crankshaft pulley ⇒ page 72 .

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- ❑ Contact surface for securing bolt must be free of oil and grease.
- ❑ Oil threads before inserting.
- ❑ Secure belt pulley against turning with counterhold - 3415-
- ❑ The turning further angle can be measured with a commercial protractor.

12 - Belt pulley

- ❑ Contact surfaces of pulley must be free of oil and grease.
- ❑ Removing and installing poly V-belt ⇒ page 51 .
- ❑ Secure belt pulley against turning with counterhold - 3415-

13 - Seal

- ❑ Renew

14 - Bearing bush

- ❑ Contact surfaces of bearing bush must be free of oil and grease.

15 - Gasket

- ❑ Renew if damaged.

16 - Chain sprocket

- ❑ Removing and installing ⇒ page 113
- ❑ For oil pump drive.

17 - 20 Nm + 1/4 turn (90°) further

- ❑ Renew

18 - Chain sprocket

- ❑ For oil pump.
- ❑ Removing and installing ⇒ page 113
- ❑ Lock with counterhold - T10172- .

19 - Drive chain

- ❑ For oil pump.
- ❑ Removing and installing ⇒ page 113
- ❑ Before removing, mark direction of rotation (installation position).

20 - 10 Nm

21 - Oil level and oil temperature sender - G266-

- ❑ Renew if damaged.
- ❑ Checking: ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

22 - Oil drain plug, 30 Nm

- ❑ With attached seal.
- ❑ Renew

23 - 13 Nm

- ❑ Renew
- ❑ Loosen and tighten flywheel end bolts only with long-reach Allen key - T10058- .

24 - 40 Nm

25 - Oil sump

- ❑ Removing and installing ⇒ page 145
- ❑ Clean sealing surface before fitting.
- ❑ Install with silicone sealant - D 176 600 A1- .

26 - 14 Nm + 1/4 turn (90°) further

27 - Oil pump

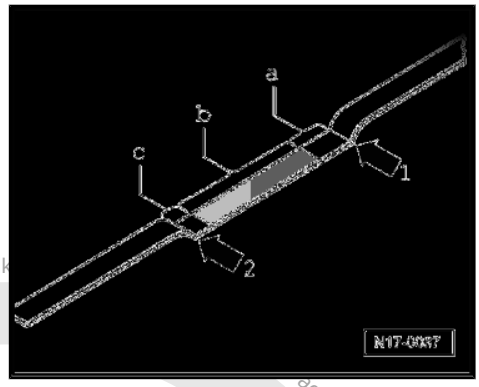
- ❑ Renew complete only.

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28 - 5 Nm

29 - Oil separator

Markings on oil dipstick



1 - Max. mark

2 - Min. mark

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

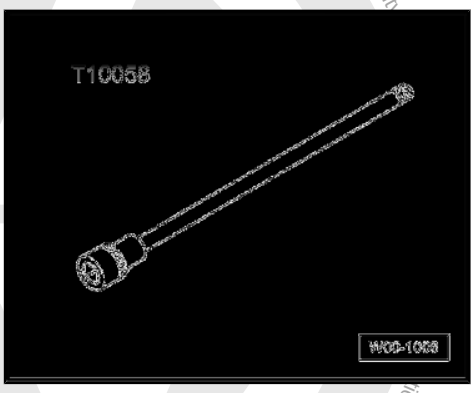
b - Oil level within hatched zone: can be topped up with engine oil

c - Area from min. mark up to hatched field: top up with max. 0.5 l of engine oil!

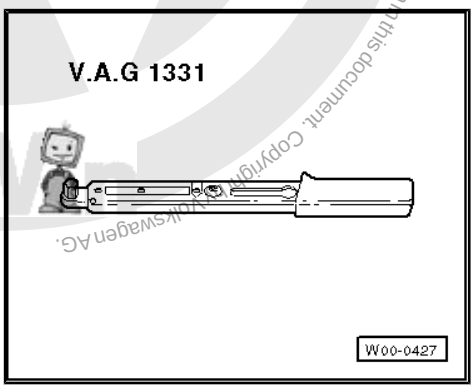
1.4 Removing and installing oil sump

Special tools and workshop equipment required

- Allen key, long reach - T10058-



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



- Hand drill with plastic brush
- Flat scraper
- Eye protection
- Silicone sealant D 176 600 A1

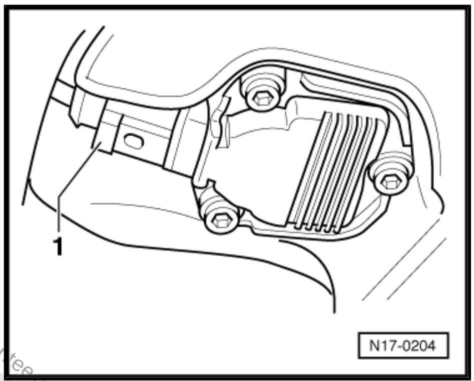
Removing

– Remove noise insulation.

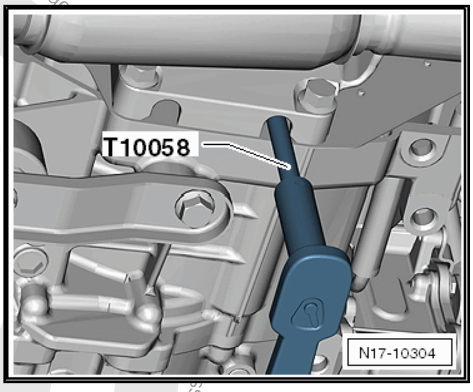
– Disconnect front exhaust pipe from catalytic converter ⇒ page 346 .

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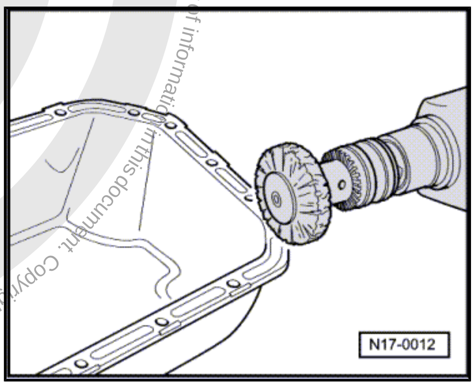
– Pull 3-pin connector off oil level and oil temperature sender - G266- -1-.
– Drain engine oil.



– Unbolt sump sealed with liquid gasket.
– On the gearbox side, two screws may not be immediately accessible. If the bolt heads cannot be reached with Allen key, long reach 5 mm - T10058- , turn the crankshaft in the engine direction of rotation until the bolts are accessible. The flywheel is provided with cut-outs.
– Remove sump, it may be necessary to release sump by tapping lightly with a rubber head hammer.
– Remove sealant residue from cylinder block with a flat scraper.



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



Installing

Note

- ♦ *Observe expiry date of sealing compound.*
- ♦ *The sump must be installed within 5 minutes of applying silicone sealing compound.*
- ♦ *Sump can be positioned more easily and with greater security if M6 studs are inserted into the cylinder block flange at two positions as guides.*

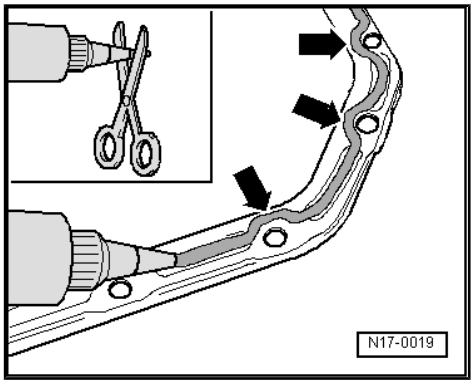
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– Cut off tube nozzle at forward marking (diameter of nozzle approx. 3 mm).

– Apply silicone sealing compound, as shown, to clean sealing surface on sump. Sealant bead must be:

♦ 2…3 mm thick.

♦ Run bead along inner side of bolt holes -arrows-.



Note

♦ *The sealing compound bead must not be thicker, otherwise excessive sealing compound will enter the sump and may block the oil suction pipe strainer.*

♦ *Use new bolts for oil sump.*

– Install sump immediately and tighten all sump bolts lightly.

– Tighten oil sump bolts to 13 Nm.

– Tighten sump securing bolts on gearbox to 40 Nm.

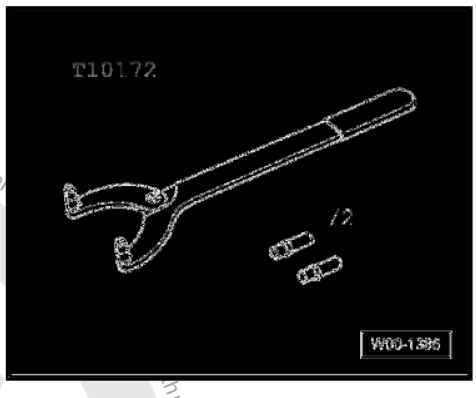
Note

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

1.5 Removing and installing oil pump

Special tools and workshop equipment required

♦ Counterhold - T10172-

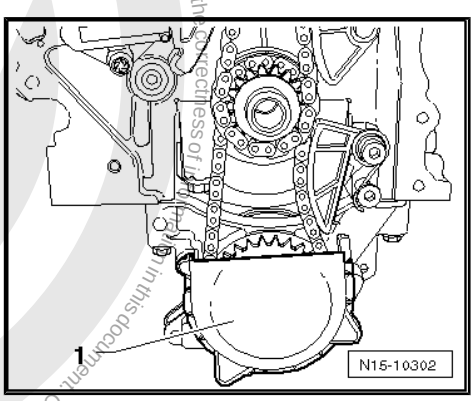


Removing

– Remove sump ⇒ page 145 .

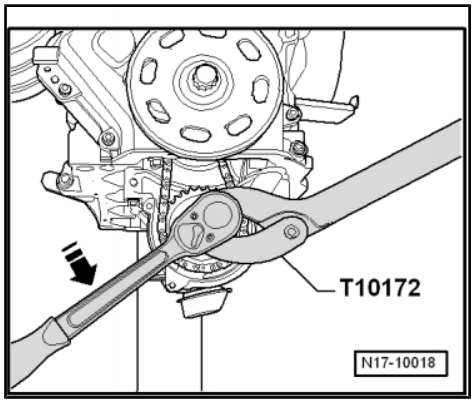
– Pull cover -1- off chain sprocket for oil pump.

– Hold oil pump chain sprocket with counterhold - T10172- .



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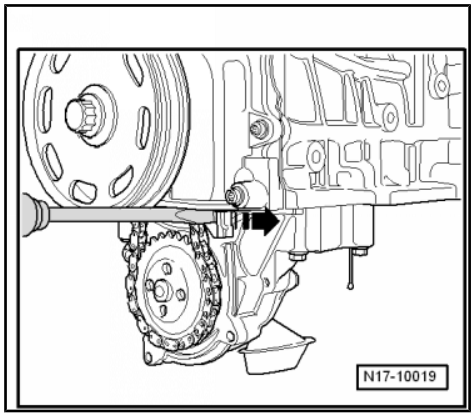
– Loosen chain sprocket securing bolt.



Note

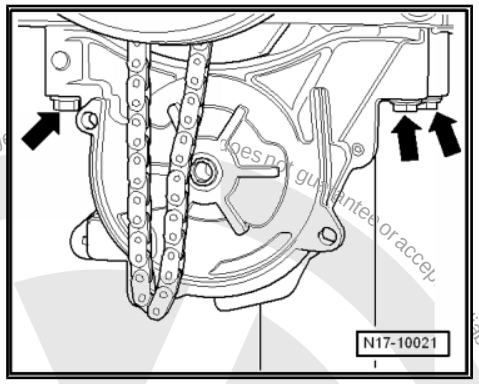
Do not remove bolt completely.

– Press chain tensioner in direction of arrow with a screwdriver.
– Remove chain sprocket securing bolt.
– Take chain sprocket off oil pump and out of chain.

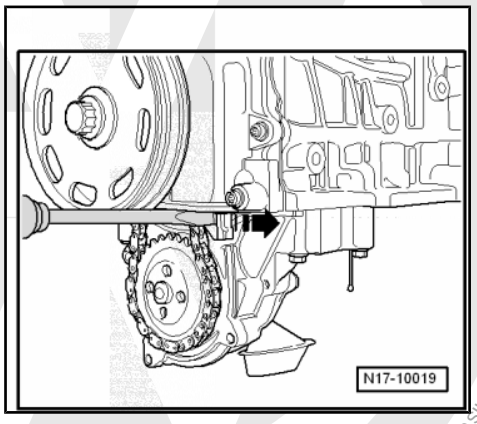


– Loosen oil pump securing bolts -arrows- and remove them.
– Remove oil pump from cylinder block.

Installing

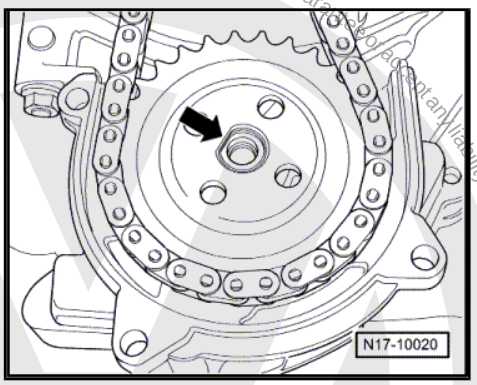


– Press chain tensioner in direction of arrow with a screwdriver.
– Seat chain sprocket in chain and fit chain sprocket onto oil pump shaft.

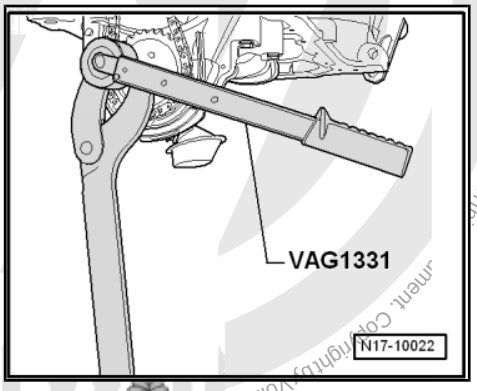


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– Observe installation position of chain sprocket on oil pump shaft -arrows-.
– Screw in chain sprocket securing bolt.
– Hold chain sprocket with counterhold - T10172- .



– Fit torque wrench (5…50 Nm) - V.A.G. 1331- as shown.
– Tighten securing bolt to 20 Nm +$^{1}/_{4}$ turn (90°) further.
– Install sump ⇒ page 145 .



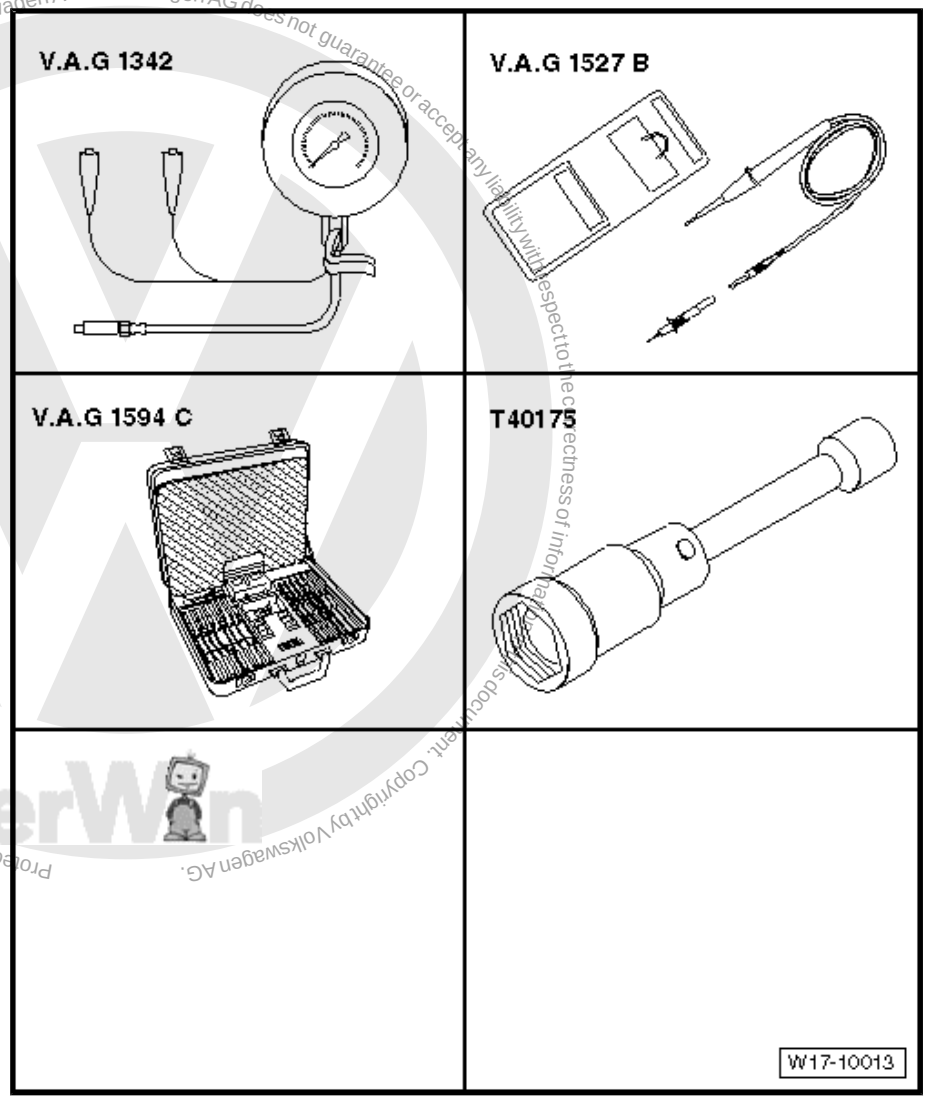
1.6 Checking oil pressure and oil pressure switch

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Special tools and workshop equipment required

- Oil pressure tester - V.A.G 1342-
- Voltage tester - V.A.G 1527B-
- Auxiliary measuring set - V.A.G 1594C-
- 24 mm jointed spanner - T40175-



Note

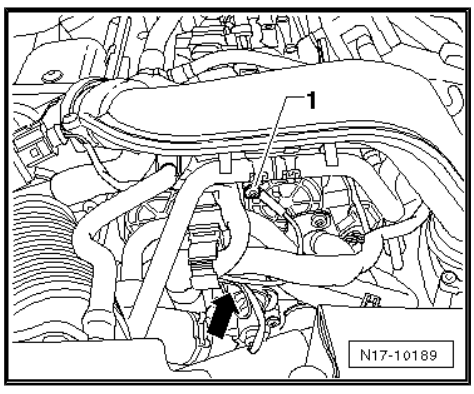
Functional check and repair of the optical and acoustic oil pressure warning: ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

Test procedure

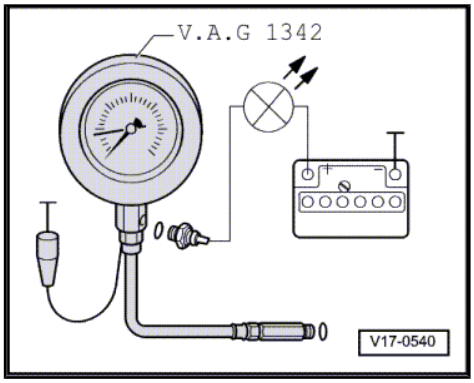
The oil pressure switch is located on the gearbox side beneath the two camshaft covers.

– Remove bolt -1- on coolant pipe bracket.

– Pull connector off oil pressure switch -arrow-.



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– Remove oil pressure switch - F1- using 24 mm jointed spanner - T40175- and screw it into oil pressure tester - V.A.G 1342- .
– Screw tester into cylinder head in place of oil pressure switch.
– Connect brown wire of tester to earth (-).
– Connect voltage tester - V.A.G 1527B- to battery positive (+) and oil pressure switch using cables from auxiliary measuring set - V.A.G 1594C- .
– If LED lights up, renew oil pressure switch -F1- .

If LED does not light up:

– Start engine and increase speed slowly. At 0.3…0.7 bar the LED must light up, otherwise renew oil pressure switch.
– Increase engine speed further. At 2,000 rpm and an oil temperature of 80°C the oil pressure should be at least 2.0 bar.

At higher engine speeds, the oil pressure must not exceed 7.0 bar.

If oil pressure switch is OK, remove old seal and renew ⇒ Electronic Parts Catalogue (ETKA) .

Specified torque for oil pressure switch: 20 Nm.

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19 – Cooling

1 Removing and installing parts of cooling system

Caution

- *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.*
- *To avoid damage to lines, ensure sufficient clearance from 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.*
- *Hose clip pliers - VAS 6340- or spring-type clip pliers - VAS 5024A- are recommended for use in installing spring-type clips.*
- *When installing coolant hoses, route stress-free so that they do not come into contact with other components (observe markings on coolant connection and hose).*

Test for leaks in cooling system using cooling system tester - V.A.G 1274 B- and adapters -V.A.G 1274/8- and -V.A.G 1274/9- .

Assembly overview - parts of cooling system, body side ⇒ page 153 .

Assembly overview - parts of cooling system, engine side ⇒ page 155 .

Coolant hose schematic diagram ⇒ page 156 .

Draining and filling with coolant ⇒ page 157 .

Checking cooling system for leaks ⇒ page 162 .

Removing and installing radiator fan - V7- and radiator fan 2 - V177- ⇒ page 160 .

Removing and installing radiator fan - V7- and radiator fan 2 - V177- (Tiguan) ⇒ page 161

Removing and installing radiator ⇒ page 163 .

Removing and installing radiator (Tiguan, Passat) ⇒ page 165

Removing and installing auxiliary radiator (Tiguan, Passat) ⇒ page 167

Removing and installing coolant pump ⇒ page 171 .

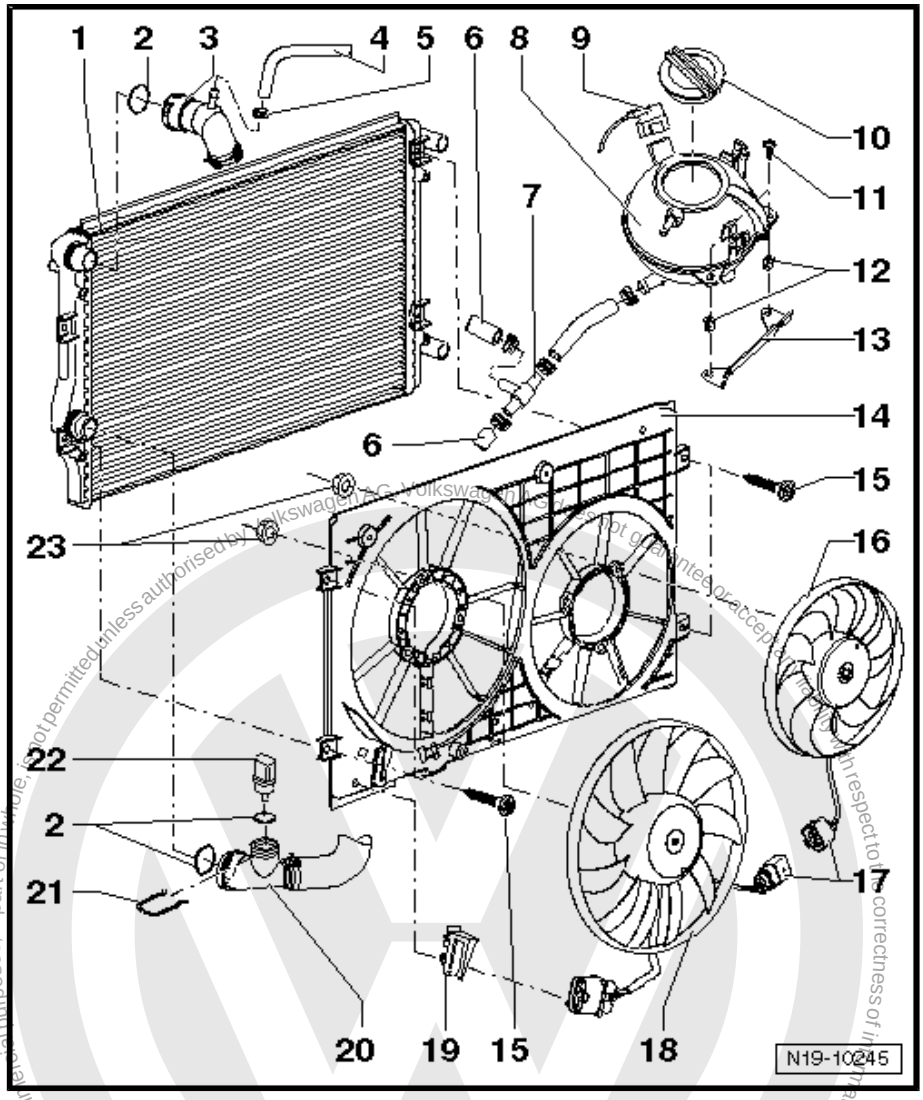
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Removing and installing coolant circulation pump - V50-
⇒ page 173 .

1.1 Assembly overview - parts of cooling system, body side

Note

This engine is equipped with an auxiliary radiator for charge air system ⇒ page 295 .



1 - Radiator/cooler

- ❑ Removing and installing ⇒ page 163
- ❑ Removing and installing in the Tiguan and Passat ⇒ page 165 .
- ❑ After renewing, renew entire coolant.

2 - O-ring

- ❑ Renew if damaged.

3 - Upper coolant hose

- ❑ To connection on cylinder head.
- ❑ Coolant hose schematic diagram ⇒ page 156 .

4 - Coolant hose

- ❑ To expansion tank.

5 - Spring-type clip

- ❑ Removing and installing with hose clip pliers - VAS 6340- .

6 - Coolant hose

- ❑ To coolant pipe for auxiliary radiator for charge air system.

7 - Connecting pipe

8 - Expansion tank

- ❑ Test cooling system for leaks using cooling system tester - V.A.G 1274 B- and adapter for cooling system tester - V.A.G 1274/8- .

9 - Connector

10 - Cap

- ❑ Check using cooling system tester - V.A.G 1274 B- and adapter for cooling system tester - V.A.G 1274/9- .
- ❑ Pressure relief valve must open at between 1.4 and 1.6 bar.

11 - Bolt

- ❑ 5 Nm
- ❑ Qty. 2

12 - Plastic inserts

- ❑ For securing bolts.

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13 - Bracket

14 - Cowling

- ❑ Removing and installing ⇒ page 160
- ❑ Removing and installing in the Tiguan and Passat ⇒ page 161 .

15 - Bolt

- ❑ 5 Nm
- ❑ Qty. 4

16 - Radiator fan 2 - V177-

- ❑ Removing and installing ⇒ page 160
- ❑ Removing and installing in the Tiguan and Passat ⇒ page 161 .

17 - Connector

18 - Radiator fan - V7-

- ❑ With radiator fan control unit - J293- .
- ❑ Removing and installing ⇒ page 160
- ❑ Removing and installing in the Tiguan and Passat ⇒ page 161 .

19 - Bracket

- ❑ For connector.

20 - Lower coolant hose

- ❑ To connection for thermostat.

21 - Retaining clip

22 - Radiator outlet coolant temperature sender - G83-

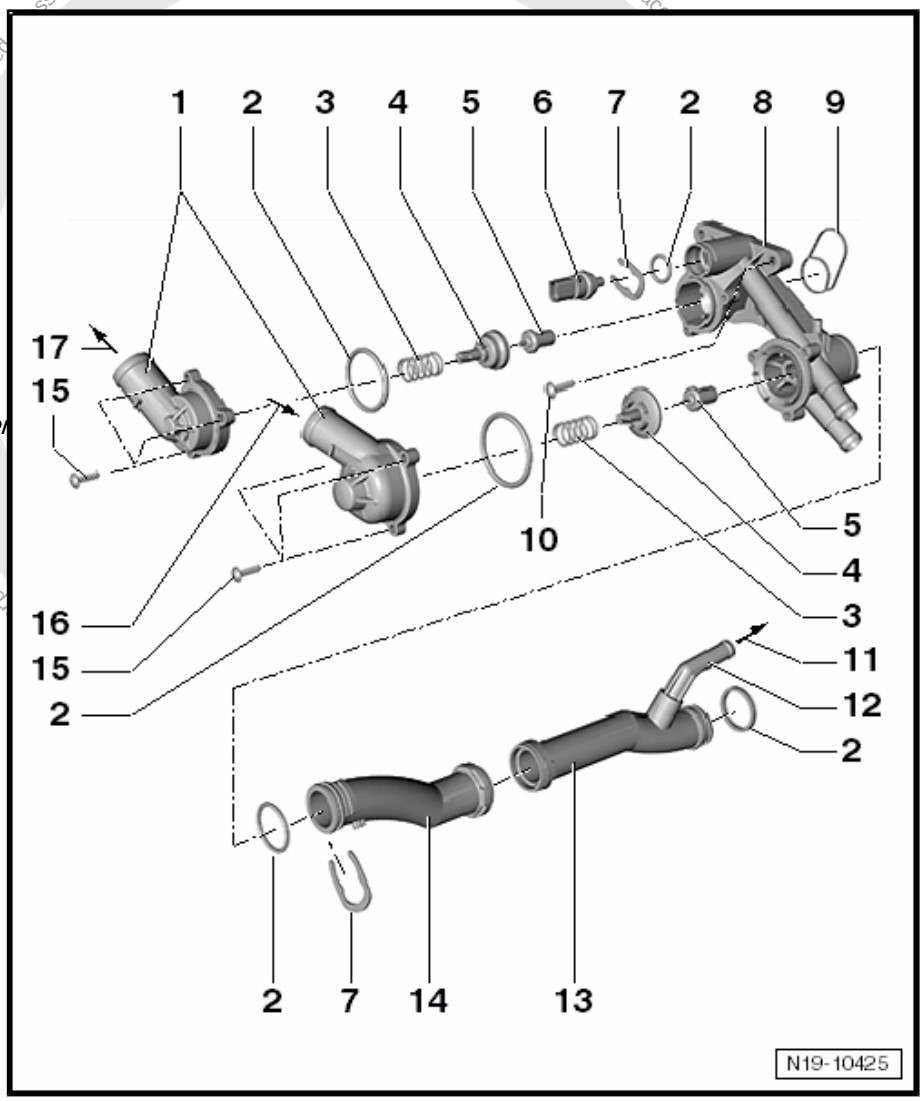
23 - Bolt

- ❑ 5 Nm
- ❑ Qty. 6

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1.2 Assembly overview - parts of cooling system, engine side

Thermostat side



1 - Connection

2 - O-ring

- ❑ Renew

3 - Spring

4 - Plunger

- ❑ Do not cant when installing.

5 - Thermostat

Note

Do not interchange ther ments.

Starts to open

- ❑ Thermo element (bottom of illustration): 83° C.
- ❑ Thermo element (top of illustration): 105°C.

6 - Coolant temperature sender - G62-

- ❑ Before removing, release pressure in cooling system if necessary.

7 - Retaining clip

- ❑ Check for secure seating.

8 - Thermostat housing

9 - Seal

- ❑ Renew

10 - 11 Nm

11 - To expansion tank.

- ❑ Coolant hose schematic diagram ⇒ page 156 .

12 - Connection

13 - Coolant pipe

- ❑ Coolant hose schematic diagram ⇒ page 156 .

14 - Coolant pipe

- ❑ Coolant hose schematic diagram ⇒ page 156 .

15 - 5 Nm

16 - From bottom of radiator.

- ❑ Coolant hose schematic diagram ⇒ page 156 .

17 - To top of radiator

- ❑ Coolant hose schematic diagram ⇒ page 156 .

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1.3 Coolant hose schematic diagram

1 - Expansion tank

2 - Coolant circulation pump - V50-

- ❑ Removing and installing ⇒ page 173

3 - Intake manifold

4 - Non-return valve

5 - Heat exchanger for heater unit

6 - Thermostat housing

7 - Restrictor

8 - Engine oil cooler

9 - Radiator/cooler

10 - Auxiliary radiator for charge air system

- ❑ Removing and installing, Golf, Golf Plus, Scirocco, Eos ⇒ page 163
- ❑ Removing and installing in the Tiguan and Passat ⇒ page 167

11 - Turbocharger

- ❑ Removing and installing ⇒ page 275

12 - Cylinder head/cylinder block

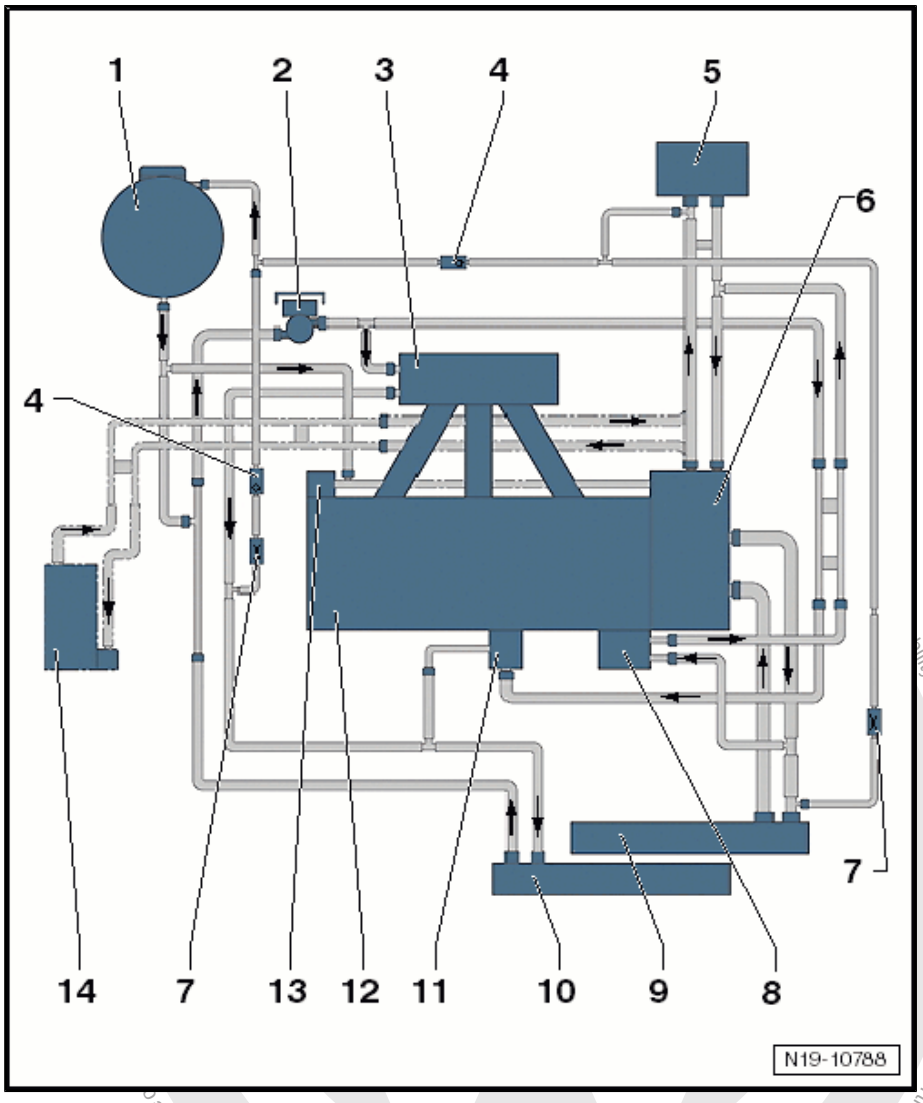
- ❑ If renewed, refill system with fresh coolant.

13 - Coolant pump

- ❑ Removing and installing ⇒ page 171

14 - Auxiliary heater

- ❑ Optional equipment.

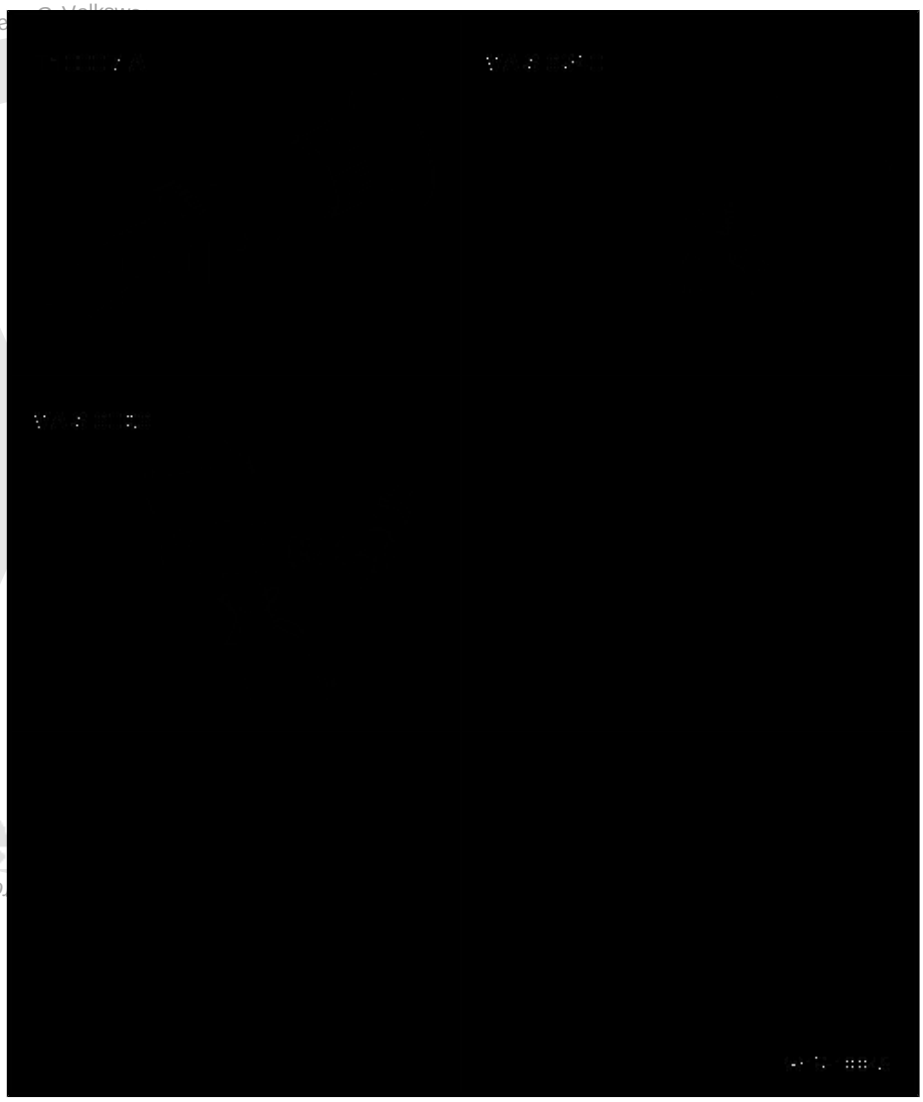


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1.4 Draining and filling coolant

Special tools and workshop equipment required

- Refractometer - T10007 A-
- Hose clip pliers - VAS 6340-
- Cooling system charge unit - VAS 6096-



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Draining

WARNING

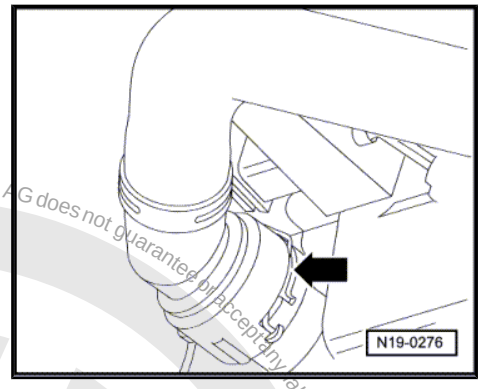
Steam may escape when expansion tank is opened. Wear eye protection and protective clothing to avoid eye injuries and scalding. Cover cap with cloth and open carefully.

– Open filler cap on coolant expansion tank.

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

Drain coolant from engine cooling system

– Pull off retaining clip -arrow- and remove coolant hose from radiator.

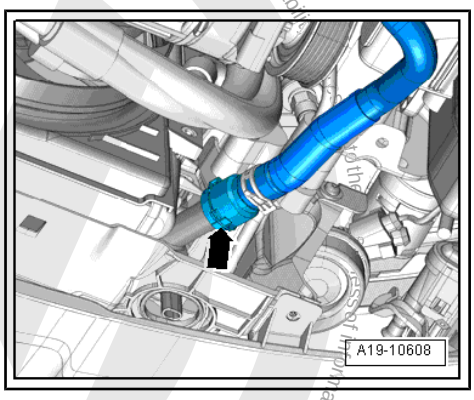


Note

Observe environmental regulations for disposal.

Draining coolant from charge air cooling system

– Pull coolant hose (quick-release coupling) -arrow- off lower connection of auxiliary radiator for charge air system.



Note

Observe environmental regulations for disposal.

Filling

Caution

Only distilled water may be used for mixing with coolant additives. The use of distilled water ensures optimum protection against corrosion.

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Note

- *The amount of water used in the coolant mixture has a great influence on its effectiveness. Because the water quality differs from country to country and even region to region, the quality of the water to be used has been defined. Distilled water fulfils all requirements. For this reason, we recommend using distilled water when mixing coolant for topping up or replacing coolant.*
- *Use only coolant additives in accordance with the ⇒ Electronic parts catalogue (ETKA) . Other coolant additives may reduce corrosion protection substantially. The resulting damage could lead to loss of coolant and subsequent severe damage to the engine.*
- *The correct coolant solution ratio helps prevent damage due to freezing and corrosion as well as scaling. Moreover, the boiling temperature is raised. Therefore, the cooling system must be filled all year round with coolant additive.*
- *Because of its higher boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- *ONLY refractometer - T10007A- may be used for determining current anti-freeze value.*
- *The normal frost protection must be to at least -25°C, in countries with arctic conditions to -36°C. When climatic conditions require a stronger frost protection, only then may the frost protection be increased. But only to -48 °C. Otherwise, the cooling effect of the coolant will be impaired.*
- *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The frost protection must be at least -25 °C.*
- *Read off anti-freeze figures for respective replenished anti-freeze.*
- *The temperature read off the refractometer - T10007A- equates to the »ice flocculation point«. Flakes of ice can start forming in the coolant below this temperature.*
- *Do not reuse old coolant.*
- *Use only a water/anti-freeze mixture as a slip agent for coolant hoses.*

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

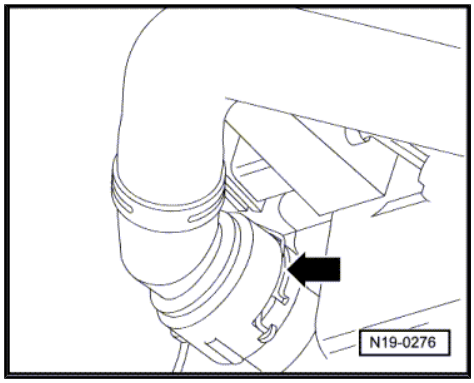
Frost protection to	Amount of anti-freeze	Coolant additive [6]	Distilled water [6]
-25 °C	40%	2.25 l	3.35 l
-36 °C	50%	2.8 l	2.8 l

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

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– Press connection against radiator and slide retaining clip -arrow- into groove.

– Install noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .



With cooling system charge unit - VAS 6096-

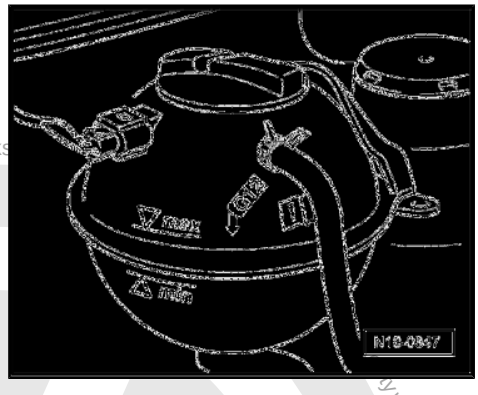
– Fill coolant circuit using cooling system charge unit - VAS 6096- ⇒ Operating instructions for cooling system charge unit VAS 6096 .

Without cooling system charge unit - VAS 6096-

– Switch off heating and air conditioning system.

– Fill with coolant up to max. mark on expansion tank.

– Connect ⇒ Vehicle diagnostic tester and perform guided function “Filling and bleeding cooling system”.



WARNING

Steam may escape when expansion tank is opened. Wear eye protection and protective clothing to avoid eye injuries and scalding. Cover cap with cloth and open carefully.

– Check coolant level and top-up if necessary. When the engine is at normal operating temperature, the coolant level must be at the max. mark; when the engine is cold, between the min. and max. marks.

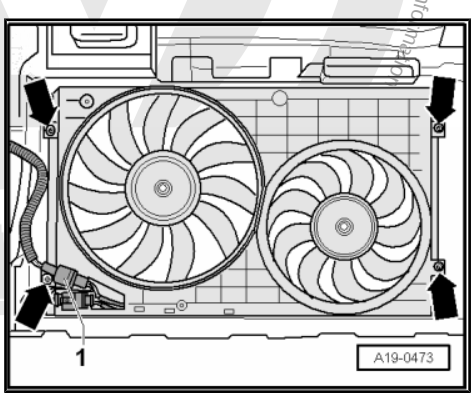
1.5 Removing and installing radiator fan - V7- and radiator fan 2 - V177- (Golf, Golf Plus, Eos, Scirocco)

Removing radiator fan

– Remove engine cover panel.

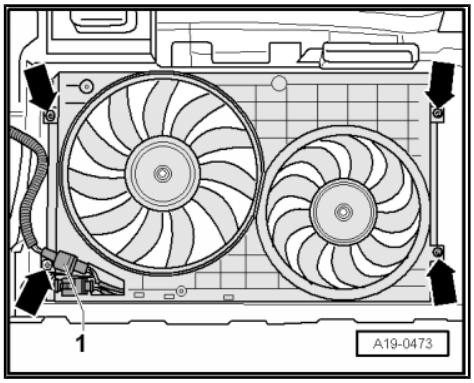
– Remove upper securing bolts of cowling -arrows-.

– Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .



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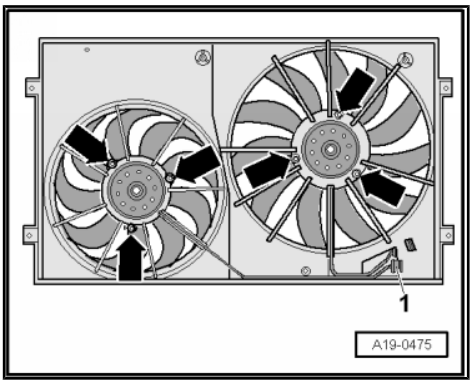
– Separate connector -1- and unscrew lower cowling securing bolts -arrows-.
– Remove cowling downwards.



– Separate electrical connector -1- and free wiring.
– Unscrew nuts -arrows- and remove fan.

Installing radiator fan

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



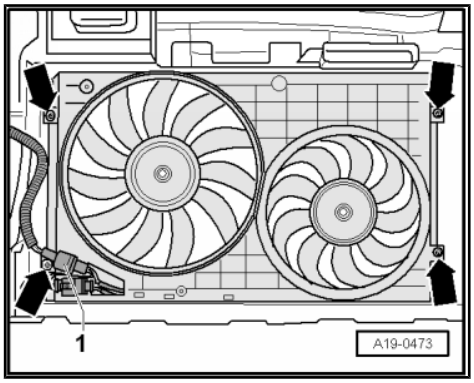
Specified torque

Component	Nm
Radiator fan to cowling	10
Cowling to radiator	5

1.6 Removing and installing radiator fan - V7- and radiator fan 2 - V177- (Tiguan, Passat)

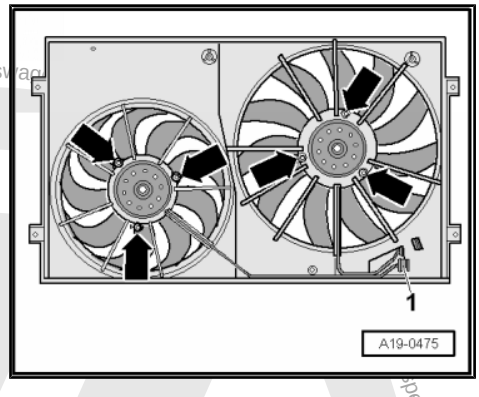
Removing radiator fan

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .
– Remove engine cover panel.
– Undo and remove bolts -arrows- of cowling.
– Release connector -1- and pull off.
– Remove cowling downwards.



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– Uncover cables -1-.
– Unscrew nuts -arrows- and remove fan.



Installing radiator fan

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

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

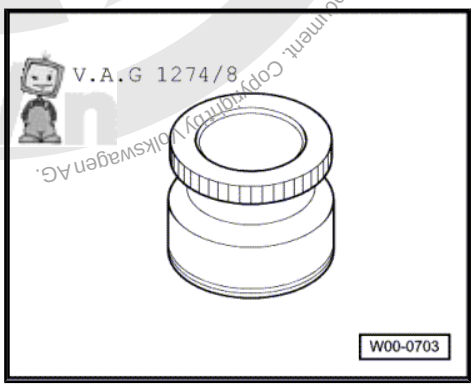
Specified torque

Component	Nm
Radiator fan to cowling	10
Cowling to radiator	5

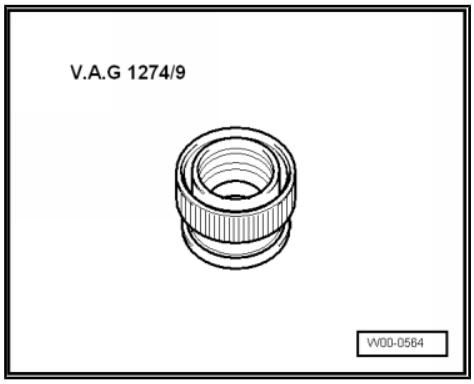
1.7 Checking cooling system for leaks

Special tools and workshop equipment required

- Cooling system tester - V.A.G 1274 B-
- 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.

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Test procedure



WARNING

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

– Open cap on coolant expansion tank.
– Screw adapter for cooling system tester - V.A.G 1274/8- onto expansion tank.
– Clamp connector - V.A.G 1274 B/1- into adapter for cooling system tester - V.A.G 1274/8- .
– Join connection piece - V.A.G 1274 B/1- to cooling system tester - V.A.G 1274 B- using connecting hose supplied.
– Use hand pump on tester to create a pressure of about 1.0 bar.



WARNING

Risk of scalding! Before disconnecting cooling system tester - V.A.G 1274 B- from connecting hose or connector - V.A.G 1274 B/1- , always relieve existing pressure. To do this, press pressure relief valve on cooling system tester - V.A.G 1274 B- until pressure gauge displays value of »0«.

If pressure drops:

– Find leaks and rectify.

Check pressure relief valve in cap.

– Screw cap into adapter for cooling system tester - V.A.G 1274/9- .
– Clamp connector - V.A.G 1274 B/1- into adapter for cooling system tester - V.A.G 1274/9- .
– Join connection piece - V.A.G 1274 B/1- to cooling system tester - V.A.G 1274 B- using connecting hose supplied.
– 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:

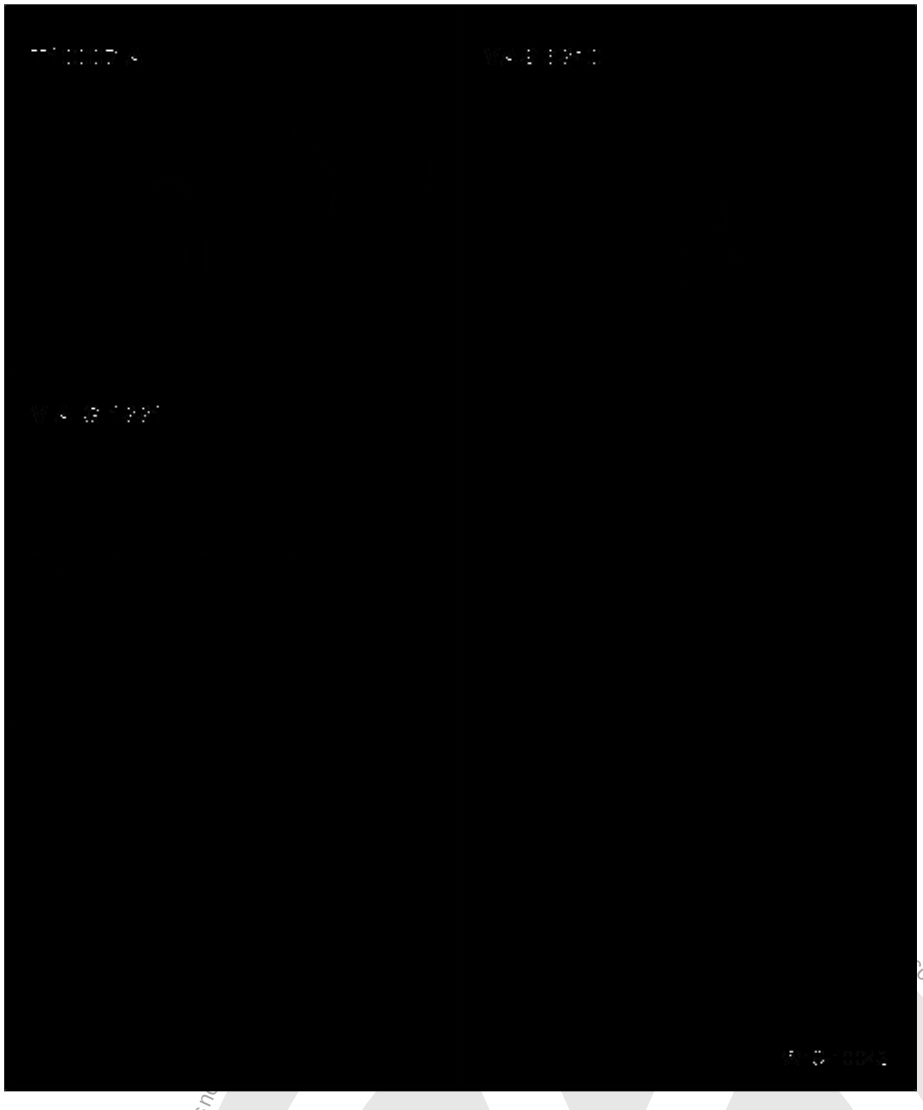
– Renew sealing cap.

1.8 Removing and installing radiator (Golf, Golf Plus, Scirocco, Eos)

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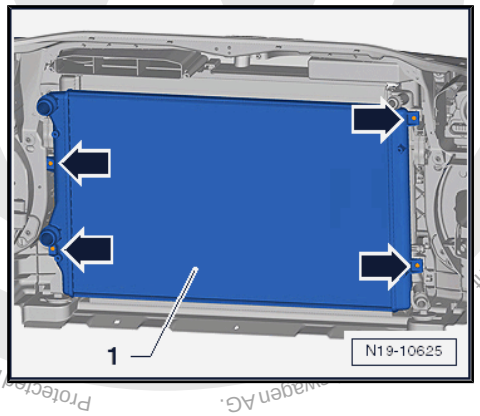
Special tools and workshop equipment required

- Refractometer - T10007 A-
- Hose clip pliers - VAS 6340-
- Torque wrench (5…50 Nm) - V.A.G 1331-



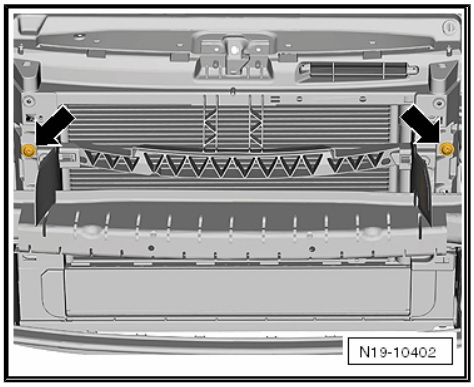
Removing

– Drain coolant ⇒ page 157 .
– Pull coolant hoses off radiator.
– Pull connectors off thermal switch and radiator fan.
– Remove radiator securing bolts -arrows-.
– Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Front bumper; Assembly overview .



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– Undo and remove coolant pump bolts -arrows- of the radiator support.



Removing auxiliary radiator

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

Note

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

– Remove retaining clamp(s) for refrigerant lines.

– Unbolt condenser from radiator and secure to lock carrier.

Installing

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

Filling with new coolant ⇒ page 157 .

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Specified torque

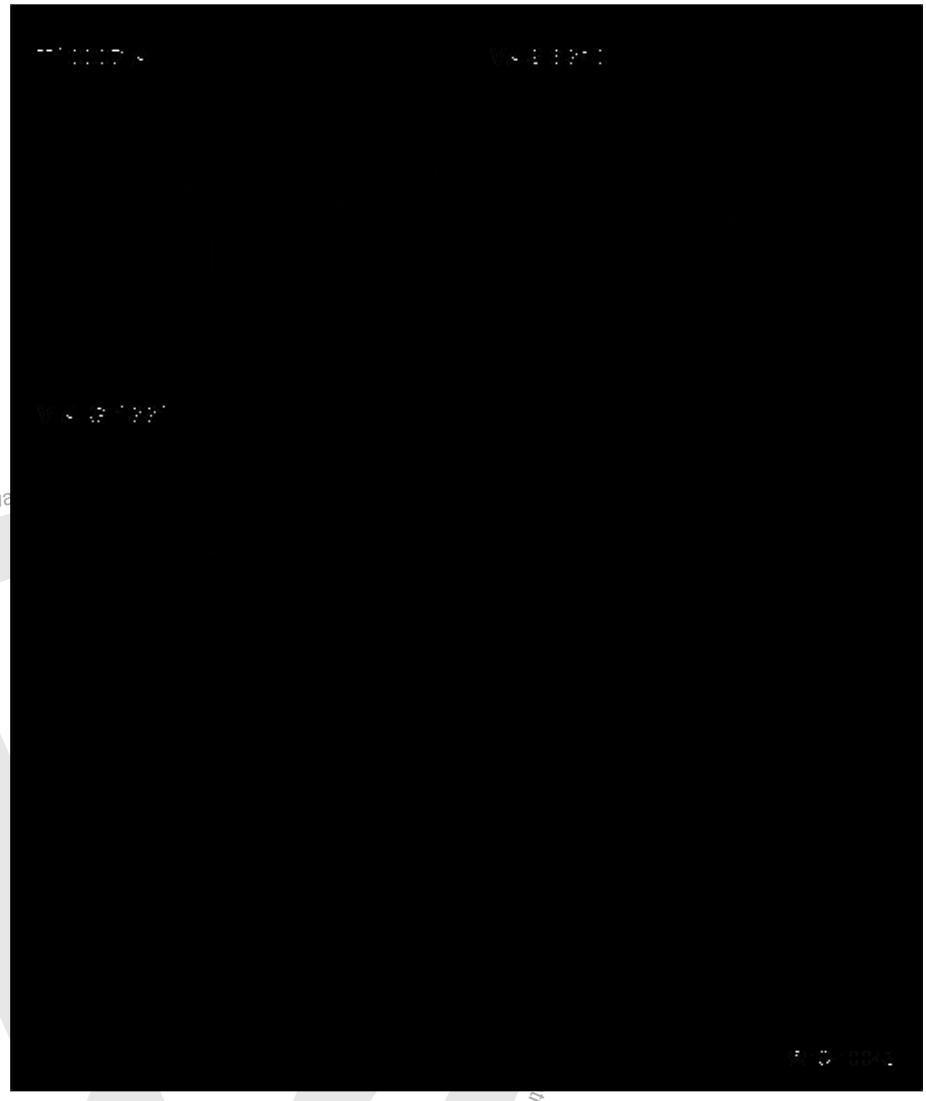
Component	Nm
Radiator to auxiliary radiator	5
Cowling to radiator	5

1.9 Removing and installing radiator (Tiguan, Passat)

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Special tools and workshop equipment required

- Refractometer - T10007 A-
- Hose clip pliers - VAS 6340-
- Torque wrench (5…50 Nm) - V.A.G 1331-

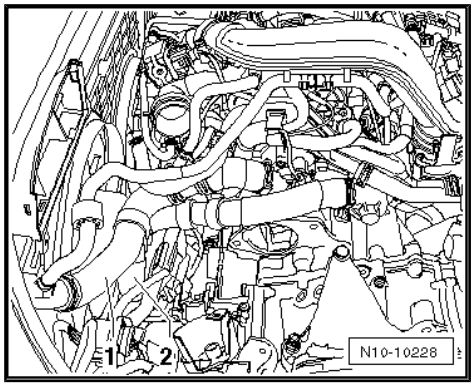


Removing

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

– Drain coolant ⇒ page 157 .

– Pull coolant hoses -1- and -2- off radiator.

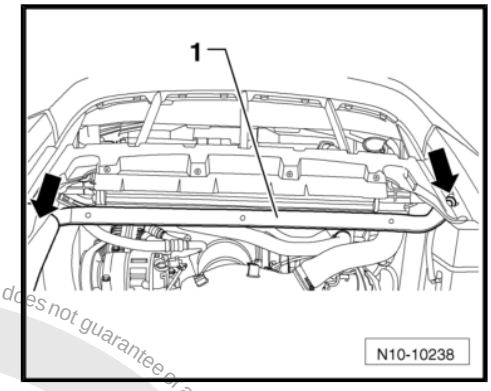


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Tiguan

– Remove front right wheel housing liner ⇒ General body repairs; Rep. gr. 66 ; Removing and installing wheel housing liner; Front wheel housing liner .

– Remove transverse member -1- by undoing the bolts -arrows-.

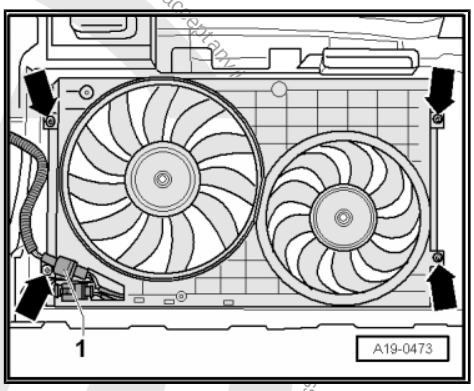


Continuation for all vehicles

– Undo and remove bolts -arrows- of cowling.

– Release connector -1- and pull off.

– Remove cowling downwards.



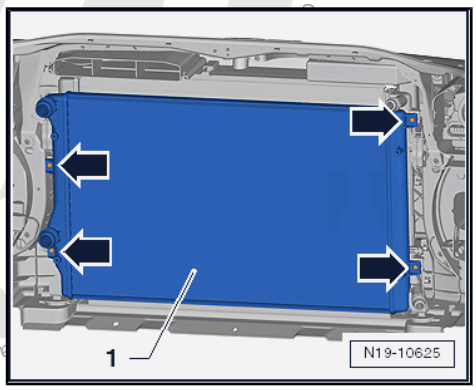
– Remove radiator securing bolts -arrows- and take out radiator downwards.

Installing

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

Fill with coolant ⇒ page 157

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



Specified torques:

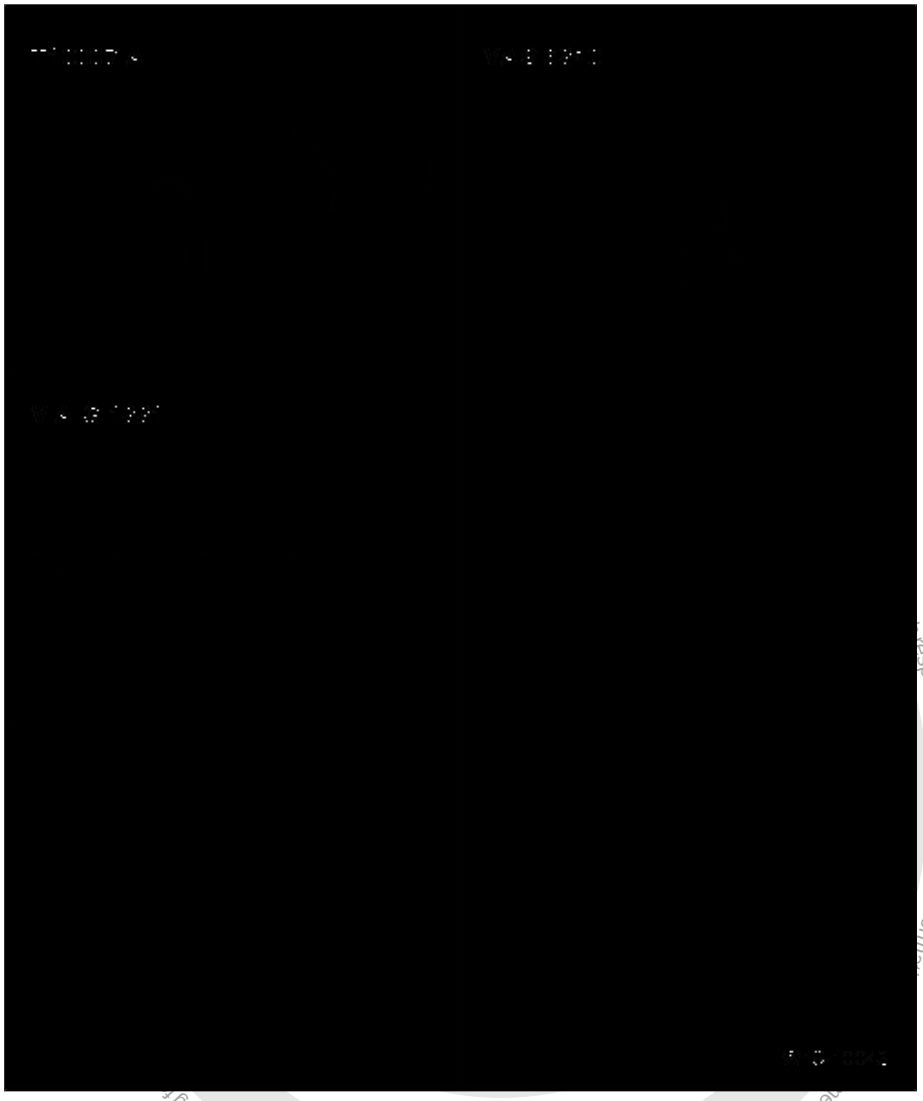
Component	Nm
Radiator to auxiliary radiator for charge air system	5
Cowling to radiator	5

1.10 Removing and installing auxiliary radiator for charge air system (Tiguan, Passat)

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Special tools and workshop equipment required

- Refractometer - T10007 A-
- Hose clip pliers - VAS 6340-
- Torque wrench (5…50 Nm) - V.A.G 1331-



Note

The auxiliary radiator cools the charge air cooler *⇒ page 295* *.*

Removing

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .

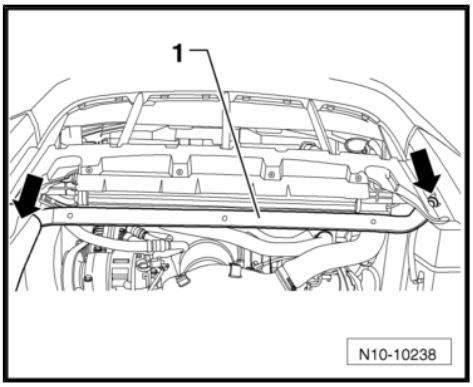
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Tiguan

– Remove front right wheel housing liner ⇒ General body repairs; Rep. gr. 66 ; Removing and installing wheel housing liner; Front wheel housing liner .

– Bring lock carrier into service position: ⇒ General body repairs, exterior; Rep. gr. 50 ; Front body: Lock carrier - service position .

– Remove transverse member -1- by undoing the bolts -arrows-.



Passat up to 10.2010

– Bring lock carrier into service position: ⇒ General body repairs, exterior; Rep. gr. 50 ; Front body: Lock carrier - service position .

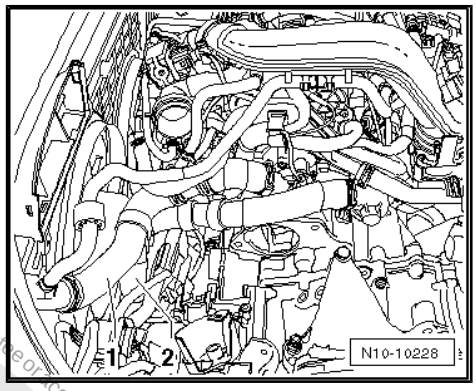
Passat from 11.2010

– Remove front bumper ⇒ General body repairs, exterior; Rep. gr. 63 ; Assembly overview - front bumper .

Continuation for all vehicles

– Drain coolant ⇒ page 157 .

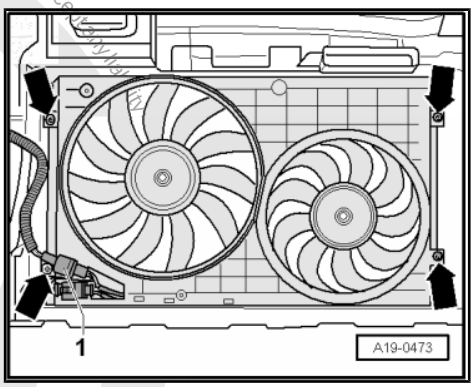
– Pull coolant hoses -1- and -2- off radiator.



– Undo and remove bolts -arrows- of cowling.

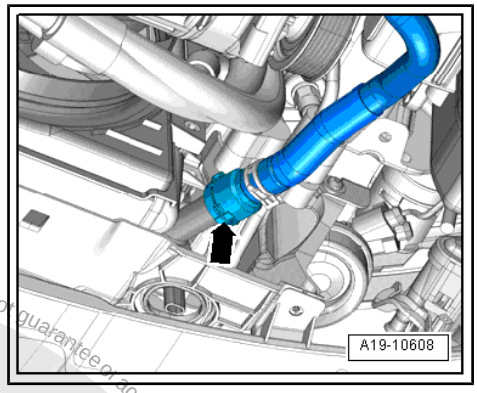
– Release connector -1- and pull off.

– Remove cowling downwards.

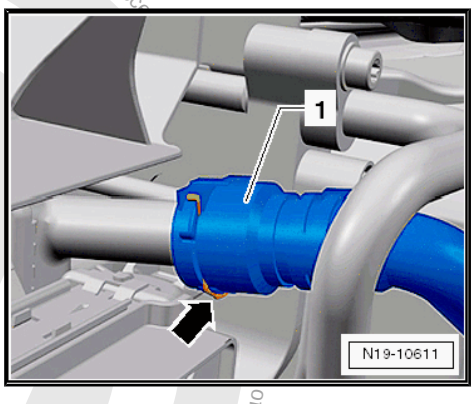


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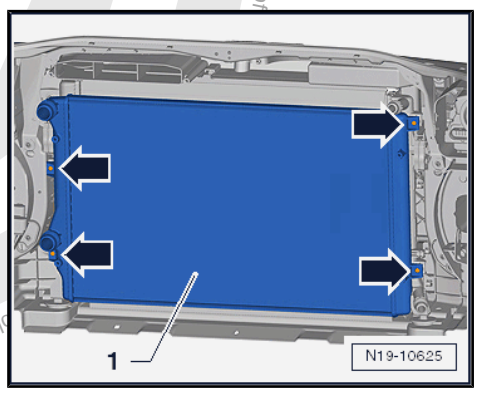
– Drain coolant from chair air system by detaching the coolant hose -arrow- from the lower connection of the auxiliary radiator for coolant.



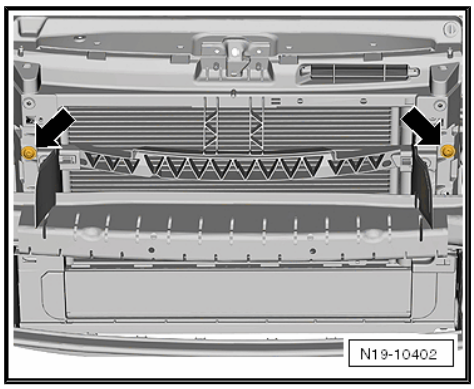
– Pull off coolant hose -1- after first releasing the retaining clip.



– Remove radiator securing bolts -arrows- and take out radiator downwards.



– Undo and remove coolant pump bolts -arrows- of the radiator support.



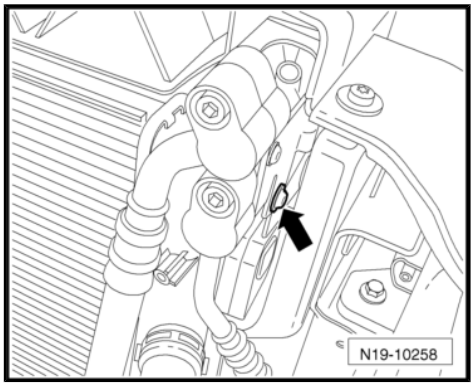
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Vehicles with air conditioner

– Undo bolt -arrow-.

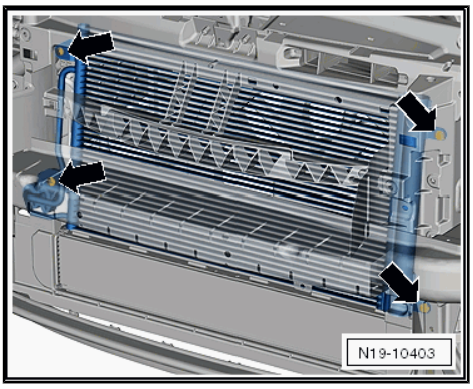
– Pull auxiliary radiator for charge air system out of its support from below.

– Swivel auxiliary radiator for charge air system towards the rear.



– Undo and remove condenser bolts -arrows-.

– Secure condenser to lock carrier.



Note

Make sure that the coolant lines/hoses are not excessively stretched, kinked or bent.

Continuation for all vehicles

– Pull auxiliary radiator for charge air system out of its support from below.

– Take out auxiliary radiator for charge air system downwards.

Installing

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

Fill with new coolant ⇒ page 157 .

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Specified torque

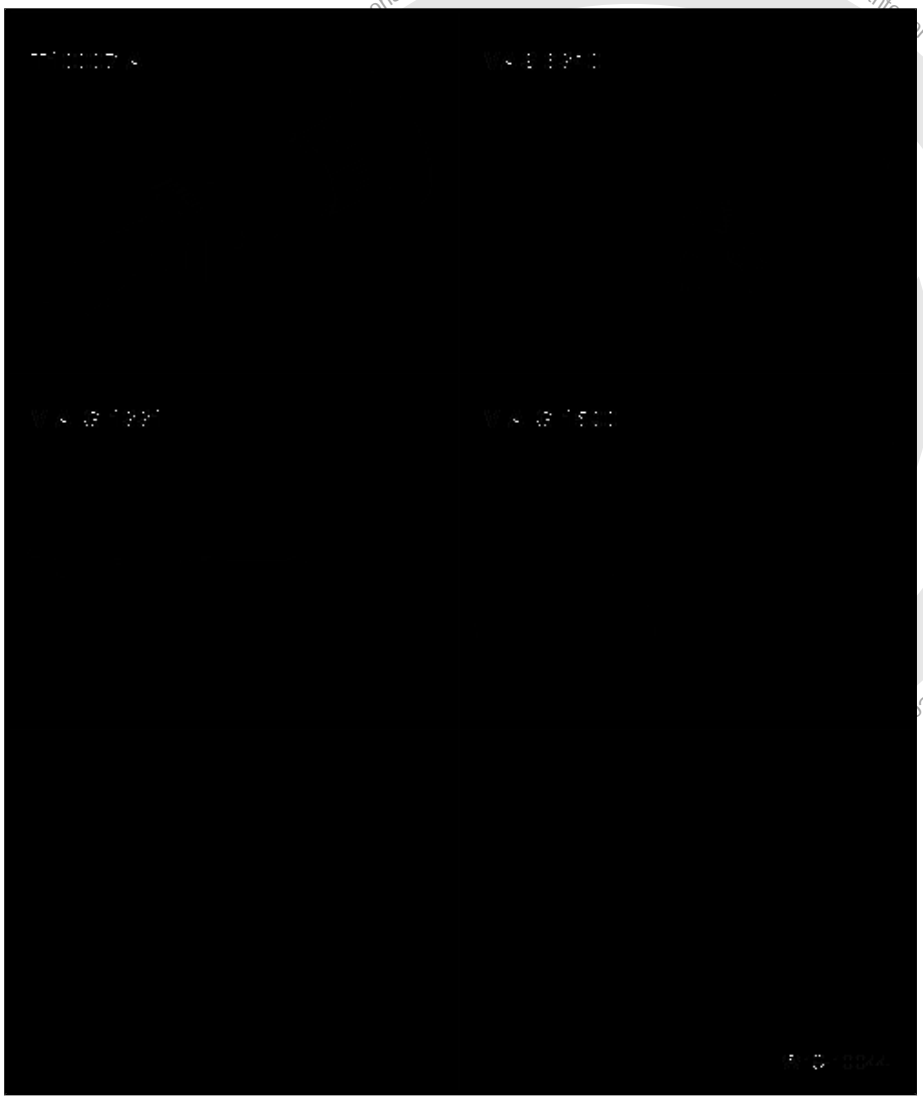
Component	Nm
Radiator to auxiliary radiator for charge air system	5
Cowling to radiator	5
Auxiliary radiator for charge air system to lock carrier	5
Coolant lines to auxiliary radiator for charge air system	5
Condenser to auxiliary radiator for charge air system	5

1.11 Removing and installing coolant pump

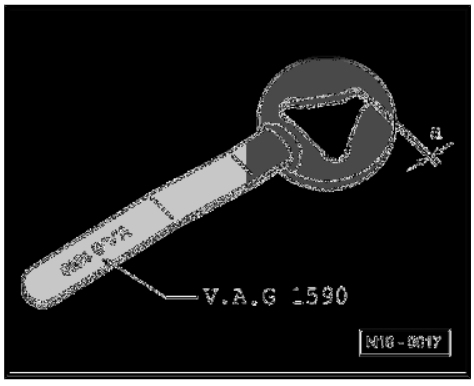
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Special tools and workshop equipment required

- Refractometer - T10007 A-
- Hose clip pliers - VAS 6340-
- Torque wrench (5…50 Nm) - V.A.G 1331-
- Water pump wrench - V.A.G 1590-



– Due to modification to securing bolts for coolant pump pulley, the 3 rounded corners must be filed out to minimum a = 1 mm.



Modifying water pump wrench V.A.G 1590

Note

- *The integrated coolant pump seal must not be separated from the coolant pump.*
- *Damaged or leaking coolant pumps must be replaced complete with seal.*

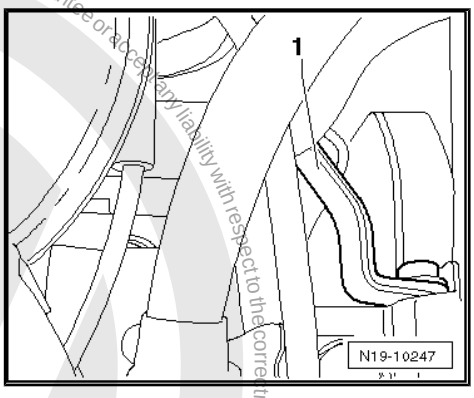
Removing

– Drain coolant ⇒ page 157 .

– Remove poly V-belt ⇒ page 51 .

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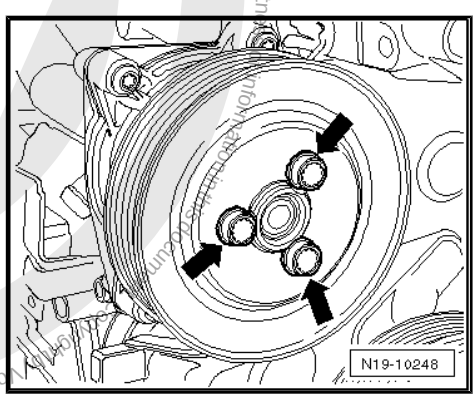
– Remove bracket -1-.



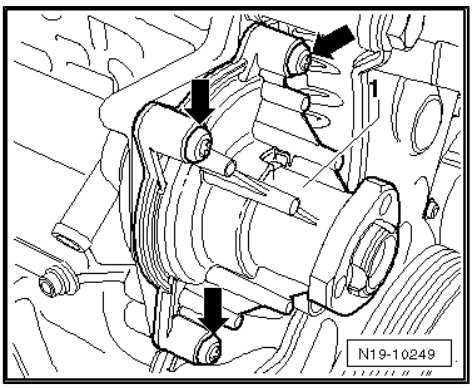
Note

As the bracket is only used during the vehicle production, it need not be reinstalled.

– Hold pulley with water pump wrench - V.A.G 1590- .
– Unscrew securing bolts -arrows- for coolant pump pulley and remove pulley.



– Unscrew securing bolts -arrows- for coolant pump -1- and pull pump off cylinder block.



Installing

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

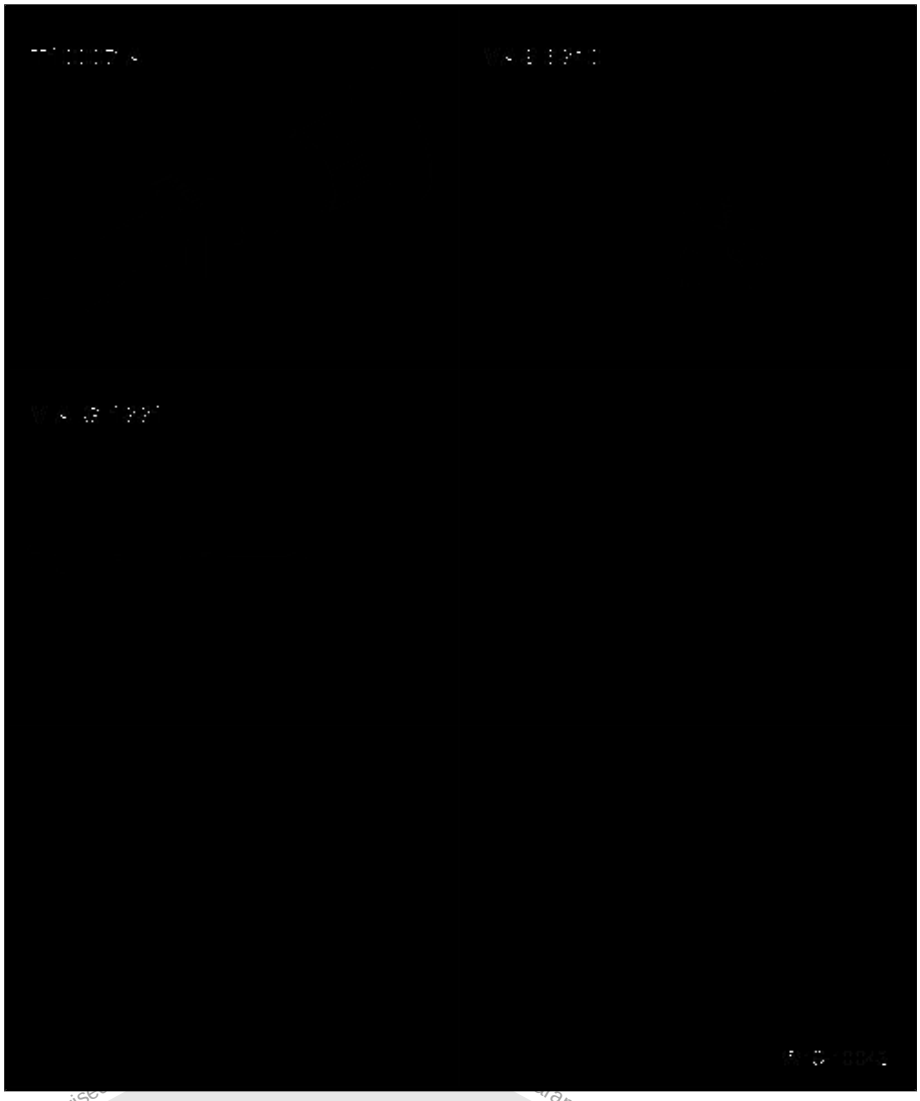
– Install coolant pump in cylinder block.
– Tighten securing bolts to 9 Nm.
– Tighten coolant pump belt pulley to 20 Nm.
– Install poly V-belt ⇒ page 51 .
– Replenish coolant ⇒ page 157 .

1.12 Removing and installing coolant circulation pump - V50-

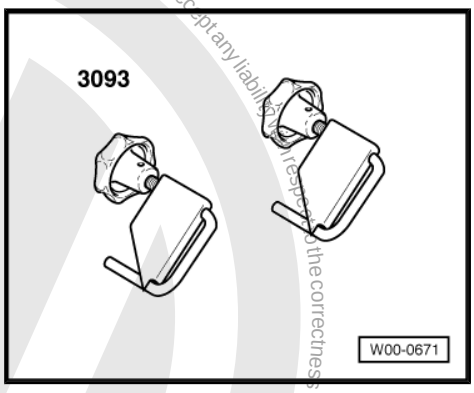
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Special tools and workshop equipment required

- Refractometer - T10007 A-
- Hose clip pliers - VAS 6340-
- Torque wrench (5…50 Nm) - V.A.G 1331-



- Hose clamps up to 40 mm - 3093-



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Removing

WARNING

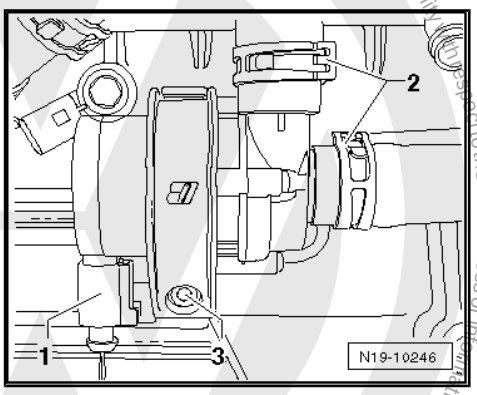
When the engine is warm, the cooling system is under pressure.

Hot steam/hot coolant can escape - risk of scalding.

Cover filler cap on expansion tank with a cloth and open carefully to dissipate pressure.

The fitting location of the coolant circulation pump - V50- is beneath the intake manifold.

– Remove noise insulation or underride guard ⇒ General body repairs, exterior; Rep. gr. 50 ; Removing and installing noise insulation or underride guard .
– Release and pull off connector -1-.
– Seal off water hoses with hose clamps up to 40 mm - 3093- .
– Open clips and pull coolant hoses -2- off.
– Undo bolt -3- and remove pump from bracket.



Installing

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

– Check coolant level and top up if necessary ⇒ page 157 .

Specified torque

Component	Specified torque
Securing bolt	10 Nm

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20 – Fuel supply system

1 Safety precautions

Safety precautions when working on fuel supply system ⇒ page 176 .

Releasing pressure in high-pressure area ⇒ page 177 .

1.1 Safety precautions when working on fuel supply system

Caution

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.*
- *To avoid damage to lines, ensure sufficient clearance from all moving or hot components.*

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

Remove fuel pump fuse. Fuse assignment ⇒ Current flow diagrams, Electrical fault finding and Fitting locations

WARNING

Fuel system is under pressure! Wear eye protection and gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

- 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 gas extraction system is available, a radial fan with a displacement greater than 15 m^3/h can be used providing that motor is not in air flow.
- Prevent skin contact with fuel! Wear fuel-resistant gloves!

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1.2 Releasing pressure in high-pressure area

WARNING

The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).

Prior to opening the high-pressure area, e.g. when removing the high-pressure pump, fuel rail, injectors, a fuel line, or the fuel pressure sender - G247- , the fuel pressure in the high-pressure area must be reduced to a residual pressure of approx. 6 bar. The appropriate procedure is described as follows.

– Connect ⇒ Vehicle diagnostic tester and perform guided function “Releasing fuel high-pressure”.

– Switch off ignition.

WARNING

The fuel lines are pressurized! Wear eye protection and protective clothing to avoid possible injury and skin contact. Before opening the high-pressure section, wrap a cloth around the connection.

– Wrap a clean cloth around the connection and carefully open to release residual pressure of approx. 6 bar. Catch the escaping fuel.

– After completing work, read event memory of engine control unit and clear all event entries that may have been created as a result of pulling off the connector.

Note

If the event memory was cleared, the readiness code must be generated ⇒ Vehicle diagnostic tester “Guided functions”.

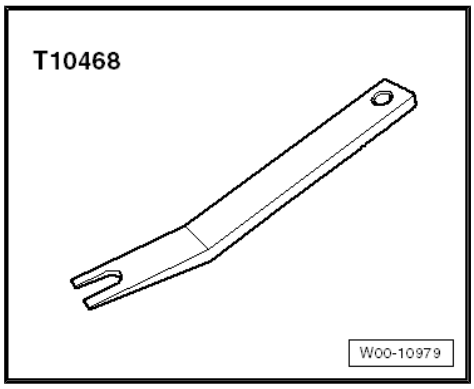
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2 Separating push-on couplings

Special tools and workshop equipment required

- -T10468-



Assignment of push-on couplings

Note

The push-on couplings for fuel, vacuum and breather lines are colour coded. There is either a coloured dot on the connector or the release button is coloured.

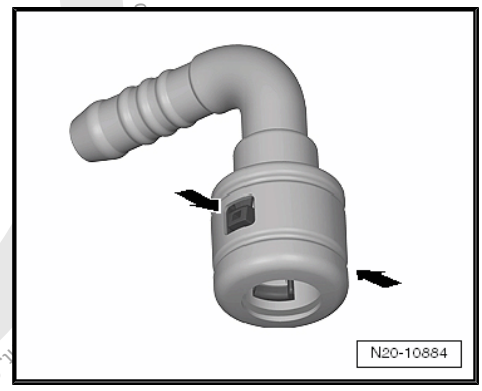
Push-on coupling	Colour code on connector
Fuel supply	Black
Fuel return line	Blue
Breather	White, beige
Vacuum	Green

WARNING

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

Variant 1

Push-on coupling with release buttons -arrows- on right and left

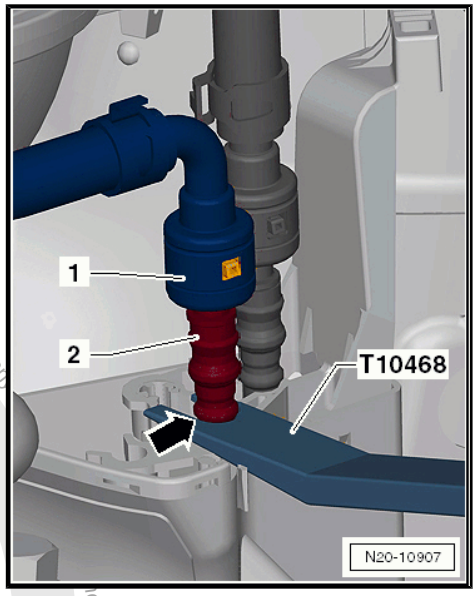


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Opening

It is necessary to counterhold the separating point for fuel -1-.

– Insert -T10468- between heat shield and stop -arrow- of fuel line -2- and counterhold.



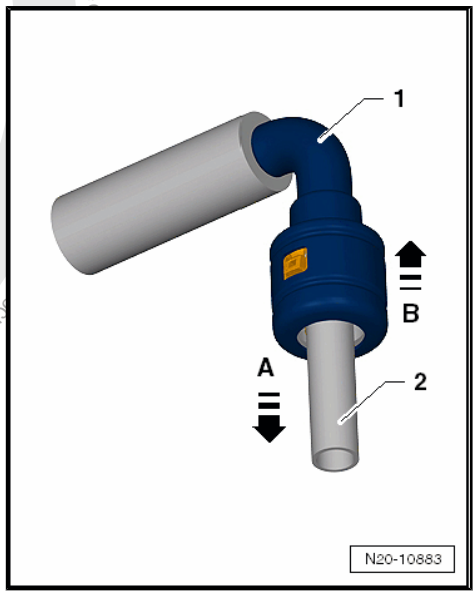
Continuation for all separating points of the fuel system

– Push push-on coupling -1- in -direction of arrow A-.

– Press release buttons and pull push-on coupling -1- off fuel line -2- in -direction of arrow B-.

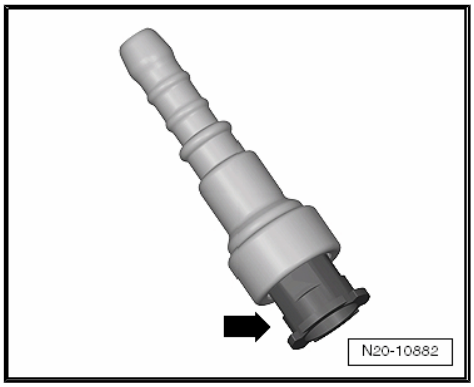
Take note of colour assignment during installation ⇒ page 178

– Ensure push-on coupling is secured properly by pulling.



Variant 2

Push-on coupling with pull-release mechanism -arrow-



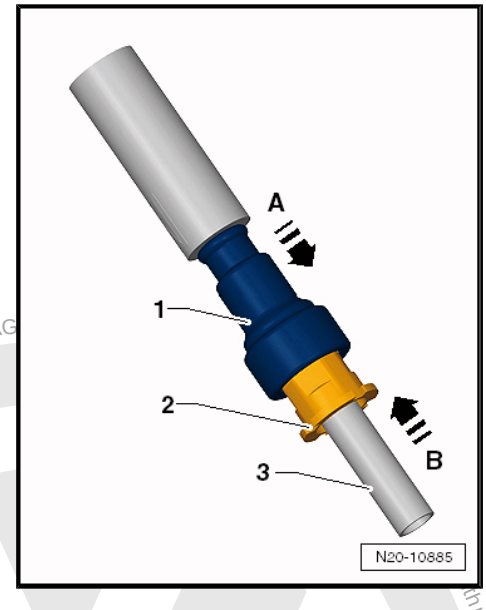
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Opening

– Push push-on coupling -1- in -direction of arrow A-.
– Pull pull-release mechanism -2- in -direction of arrow B-.
– Pull push-on coupling -1- off fuel line -3- in -direction of arrow B-.

Take note of colour assignment during installation ⇒ page 178

– Ensure push-on coupling is secured properly by pulling.



Variant 3

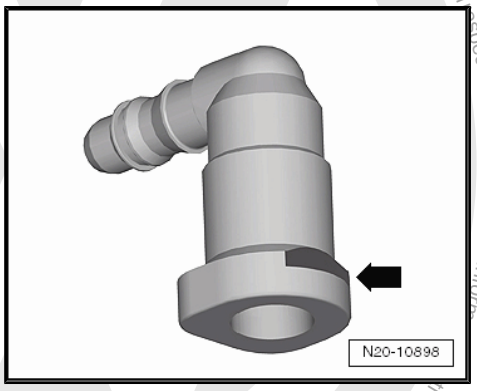
Push-on coupling with front button -arrow-

Opening

– Press release button -arrow- and pull push-on connectors off.

Take note of colour assignment during installation ⇒ page 178

– Ensure push-fit couplings are secured properly by pulling.



Variant 4

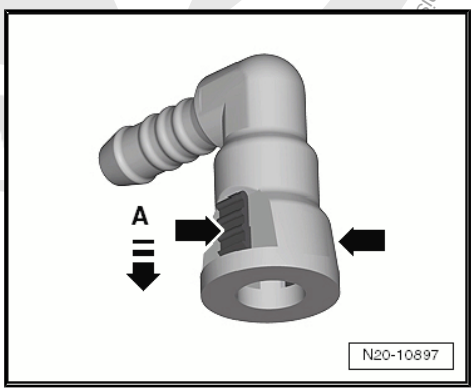
Push-on coupling with release buttons -arrows- on right and left

Opening

– Press push-on coupling in -direction of arrow A-.
– Press release buttons -arrows- and pull push-on coupling off.

Take note of colour assignment during installation ⇒ page 178

– Ensure push-on coupling is secured properly by pulling.



Variant 5

Push-on coupling with release buttons -arrows- on right and left

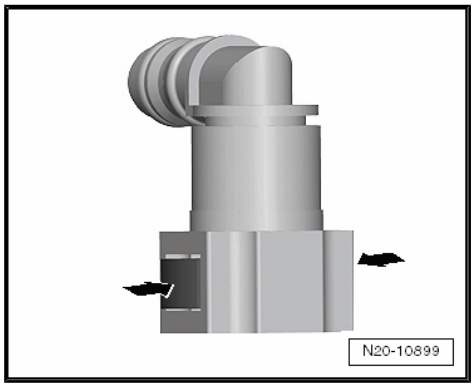
Opening

Take note of colour assignment during installation ⇒ page 178

– Press release buttons -arrows- and pull push-on coupling off.

Take note of colour assignment during installation ⇒ page 178

– Ensure push-on coupling is secured properly by pulling.



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3 Fuel tank (Golf, Golf Plus, Scirocco)

Safety precautions when working on fuel supply system ⇒ page 176 .

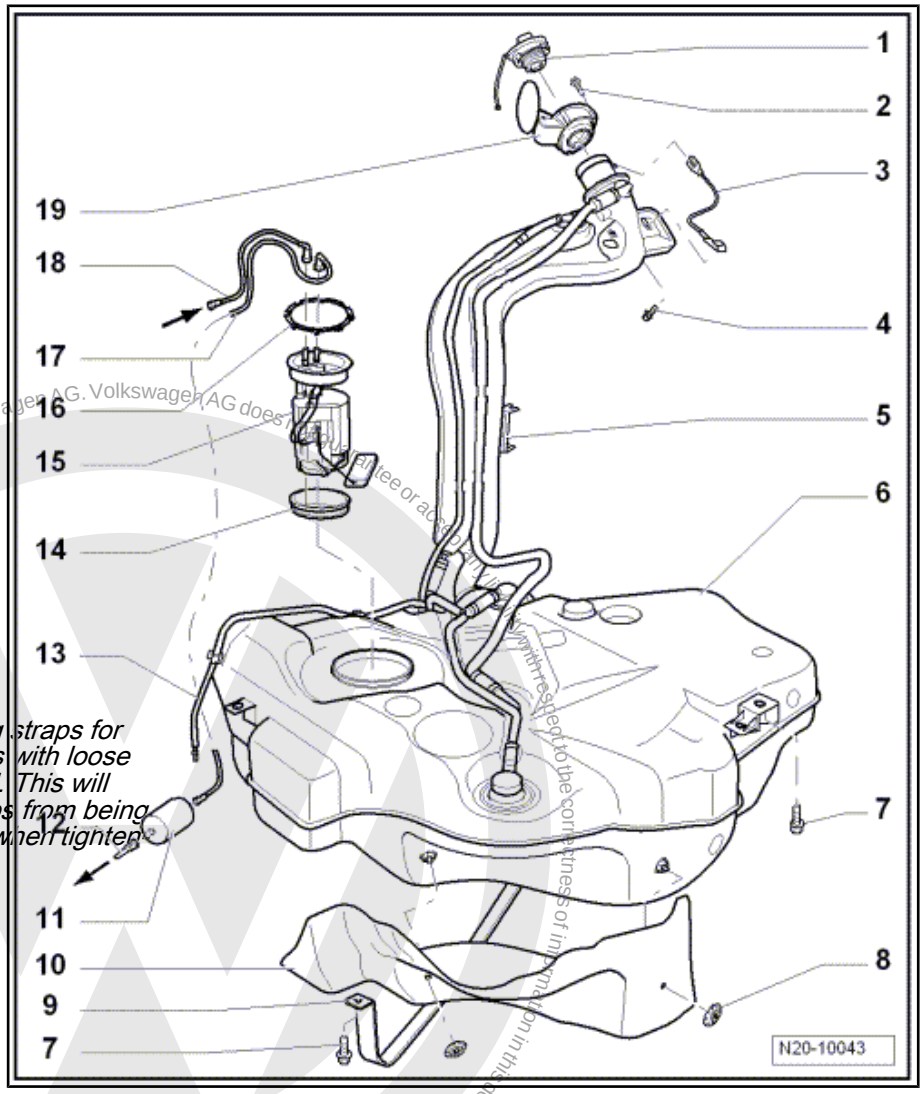
Observe rules for cleanliness ⇒ page 211 .

Assembly overview - fuel tank ⇒ page 181 .

Emptying fuel tank ⇒ page 182 .

Removing and installing fuel tank ⇒ page 185 .

3.1 Assembly overview - fuel tank



1 - Cap

- ❑ Renew if damaged.

2 - Securing bolt

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 185

7 - 25 Nm

- ❑ Renew

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

8 - Clamping washer

9 - Securing strap

- ❑ Note installation position.

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

10 - Heat shield

11 - Fuel filter

- ❑ Installation position: arrow indicates direction of flow.

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12 - Supply line

- ❑ To fuel rail.
- ❑ Check for secure seating.

13 - Breather line

- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

14 - Seal

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

15 - Fuel delivery unit

- ❑ Removing and installing ⇒ page 212
- ❑ Checking fuel pump ⇒ page 215 .
- ❑ Note installation position on fuel tank ⇒ page 182 .
- ❑ With fuel gauge sender - G- .
- ❑ Removing and installing fuel gauge sender - G- ⇒ page 214 .
- ❑ Clean strainer if soiled.

16 - Locking ring, 110 Nm

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

17 - Supply line

- ❑ Black
- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

18 - Return line

- ❑ Blue
- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

19 - Tank flap unit

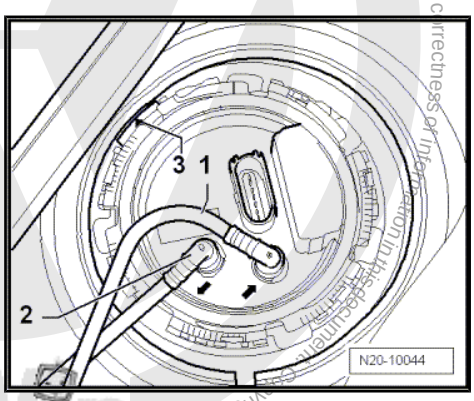
- ❑ With rubber cup.
- ❑ Removing and installing ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

Installation position of fuel delivery unit

Marking -3- on sender points opposite to direction of travel.

Return line (blue or with blue mark) -1-

Black supply line -2-

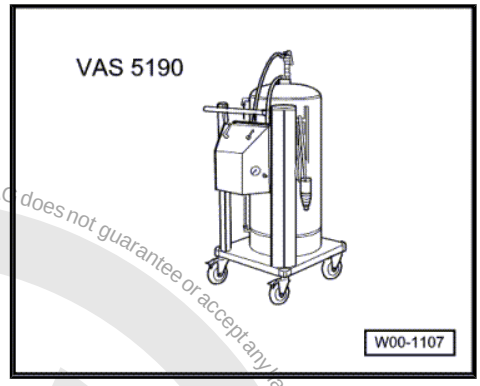


3.2 Emptying fuel tank

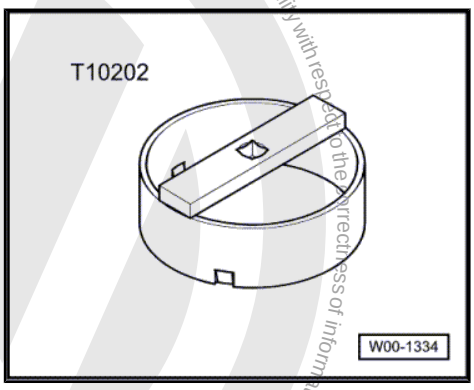
Special tools and workshop equipment required

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♦ Fuel extractor - VAS 5190-



♦ Hexagon key - T10202-



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

– Note safety precautions before beginning work ⇒ page 176 .

Emptying fuel tank if it is more than 3/4 full ⇒ page 183 .

Emptying fuel tank if it is less than 3/4 full ⇒ page 184 .

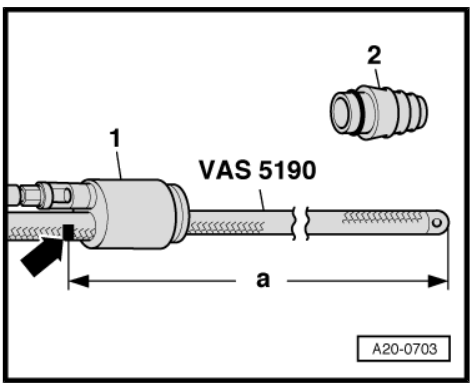
3.2.1 Emptying fuel tank if it is more than 3/4 full

Caution

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

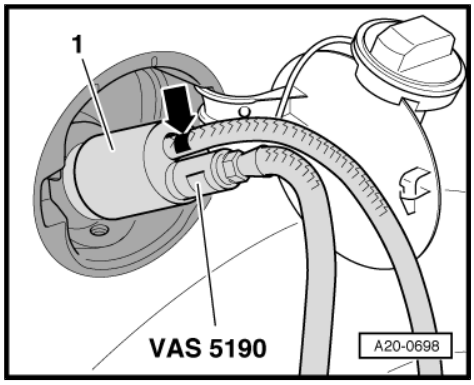
– Remove cotter -2- from shaft -1- of fuel extractor - VAS 5190- .

– At distance -a- = 1180 mm from end, mark extraction hose with insulating tape -arrow-.



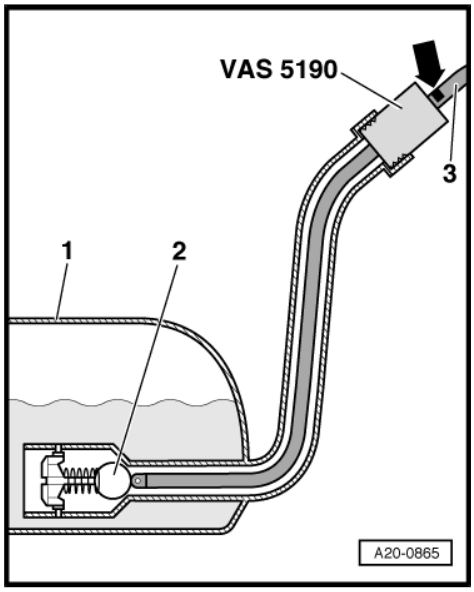
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– Remove filler cap from fuel tank filler neck.
– Screw shaft end -1- of fuel extractor unit - VAS 5190- onto fuel filler neck.
– Push extraction hose into fuel tank until marking on hose -arrow- coincides with shaft end.



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:*

3.2.2 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.

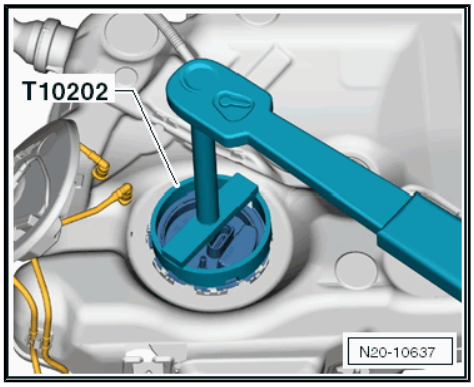
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– Open locking ring using wrench - T10202- .

– Raise fuel delivery unit.

– Insert extraction hose of fuel extractor - VAS 5190- as deeply as possible into fuel tank and extract fuel.

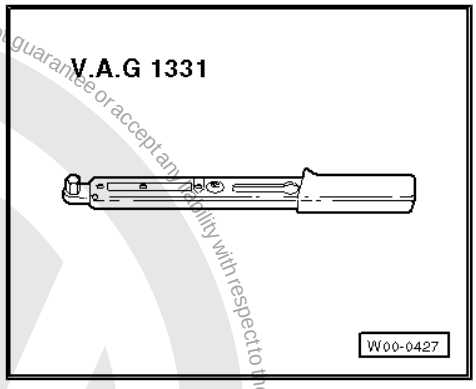
If fuel tank needed only to be emptied, install fuel delivery unit again ⇒ page 212 .



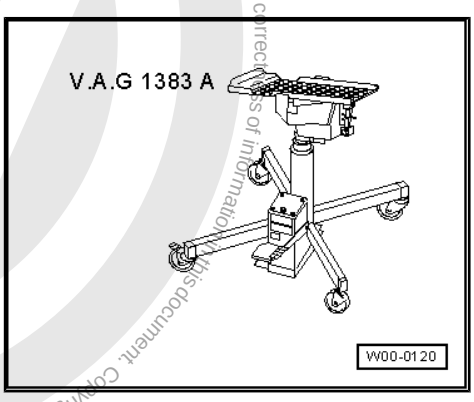
3.3 Removing and installing fuel tank

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 safety precautions before beginning work ⇒ page 176 .

– First check whether a coded radio is fitted. If so, obtain anti-theft coding.

– With the ignition switched off, disconnect battery earth strap.

– Unscrew securing bolts and remove tank flap unit.

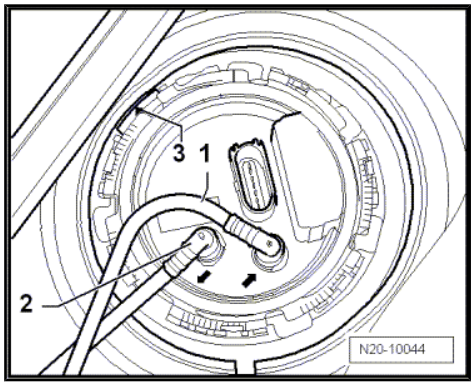
– Drain fuel tank and clean fuel filler neck and surrounding area.

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

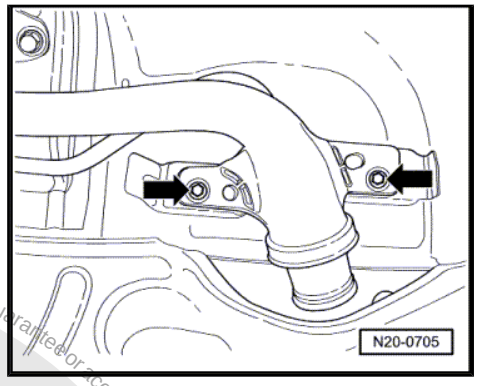
– Remove cover from fuel delivery unit.

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– Pull connector as well as supply and return lines -1 and 2- off flange.
– 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 .



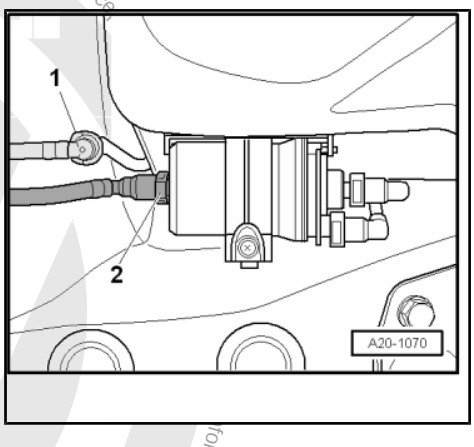
– Unbolt filler pipe from body -arrows-.
– Disconnect all rear exhaust system retainers from body. Then support lowered exhaust system on body with wire.



WARNING

Fuel supply lines are under pressure! Wear eye protection and gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

– Disconnect breather line -1- (white) and fuel line -2- (black) at connecting point.



Note

Press in securing ring to release fuel lines.

– Unscrew securing strap and securing bolts. When doing this, support fuel tank with engine and gearbox jack - V.A.G 1383 A- .
– Lower fuel tank.

Installing

Installation is performed in the reverse sequence. In the process, note the following:

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

- Specified torque for securing bolt for securing strap: 25 Nm.
- Install breather and fuel lines free of kinks.
- Ensure that line connections are tight.
- After installing fuel tank, check that the supply, return and breather lines are still clipped onto the fuel tank.

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4 Fuel tank (Passat)

Safety precautions when working on fuel supply system ⇒ page 176 .

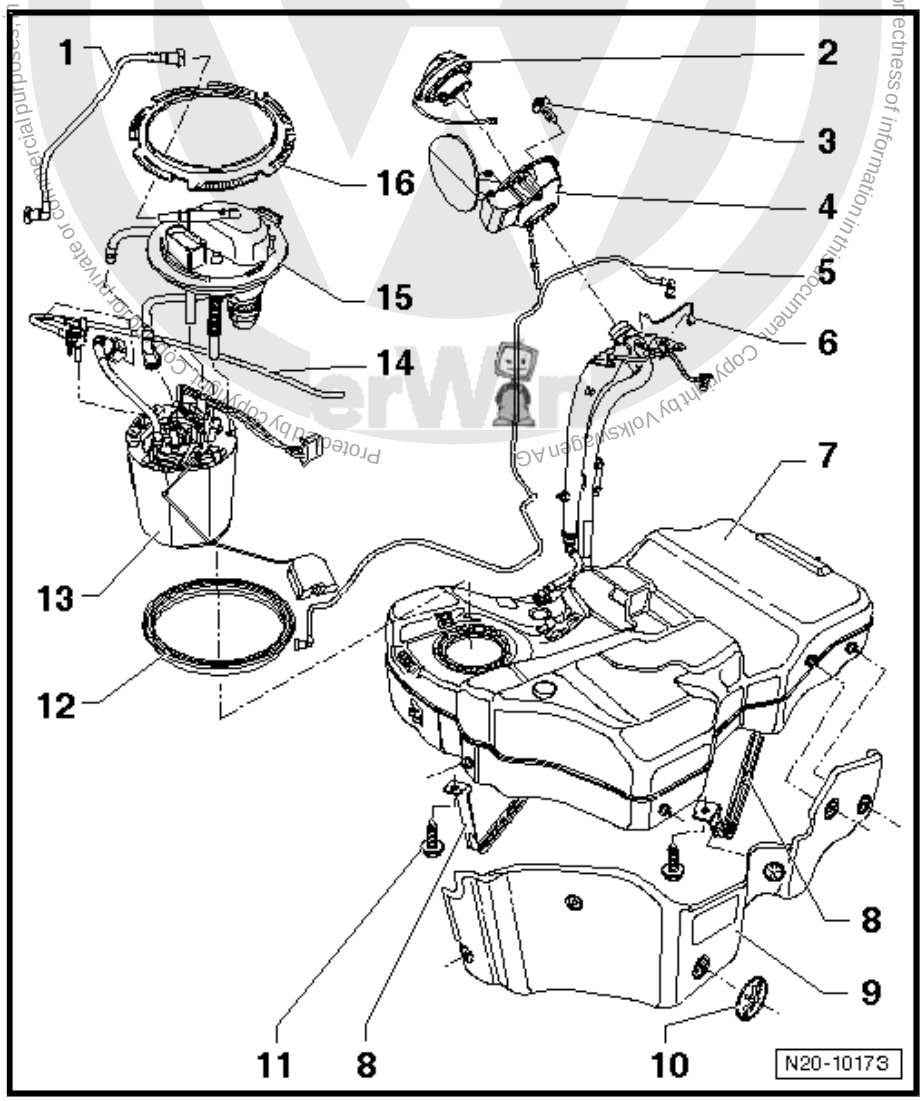
Rules for cleanliness ⇒ page 267 .

Assembly overview - fuel tank ⇒ page 187 .

Emptying fuel tank ⇒ page 188 .

Removing and installing fuel tank ⇒ page 191 .

4.1 Assembly overview - fuel tank



1 - Fuel line

- ❑ Check for secure seating.

2 - Cap

- ❑ Renew if damaged.

3 - Securing bolt

4 - 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 .

5 - Breather line

- ❑ Clipped onto fuel tank.
- ❑ Check for secure seating.

6 - Earth connection

- ❑ Check for secure seating.

7 - Fuel tank

- ❑ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ❑ Removing and installing ⇒ page 191

8 - Securing straps

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

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9 - Heat shield

10 - Clamping washer

11 - Bolt

- ❑ 25 Nm
- ❑ Renew

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

12 - Seal

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

13 - Fuel delivery unit

- ❑ Removing and installing ⇒ page 228
- ❑ Checking fuel pump ⇒ page 233 .
- ❑ With fuel gauge sender - G- .
- ❑ Removing and installing fuel gauge sender - G- ⇒ page 231 .
- ❑ Clean strainer if soiled.

14 - Suction-jet pump

15 - Flange with fuel filter

- ❑ With 6-bar pressure limiting valve.

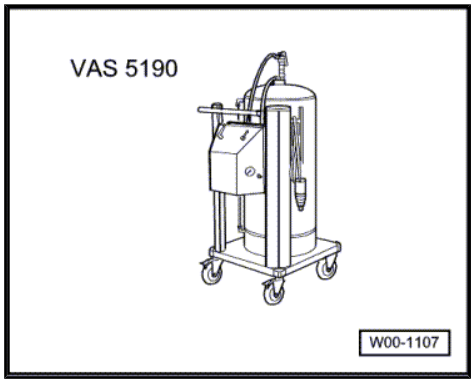
16 - Locking ring

- ❑ 110 Nm
- ❑ Check for secure seating.
- ❑ Remove and install using wrench - T10202- .

4.2 Emptying fuel tank

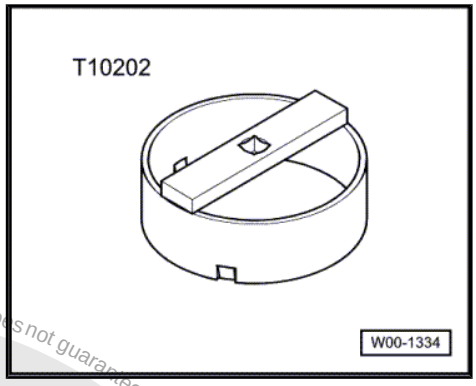
Special tools and workshop equipment required

- ♦ Fuel extractor - VAS 5190-

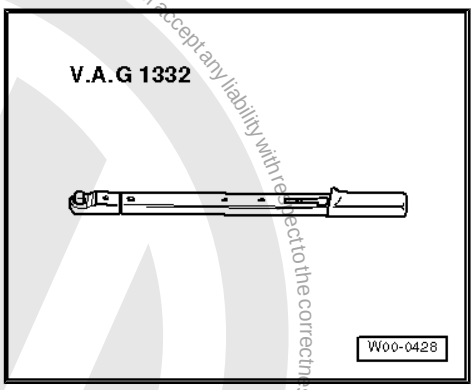


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- Hexagon key - T10202-



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



– Observe safety precautions ⇒ page 176 .

Emptying fuel tank if it is more than 3/4 full ⇒ page 189 .

Emptying fuel tank if it is less than 3/4 full ⇒ page 190 .

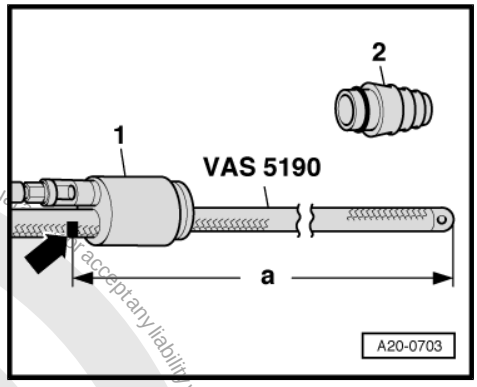
4.2.1 Emptying fuel tank if it is more than 3/4 full

Caution

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

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– Use insulating tape to mark the extraction hose -arrow- at a distance of -a- = 990 mm from the end of the hose.



Note

- *The shaft end -1- and adapter -2- are not used.*
- *There is a flap on the bottom end of the fuel filler neck in the fuel tank, this must not be damaged by the extraction hose. You must therefore push hose into filler neck only as far as marking.*

– Push extraction hose into fuel tank until marking on hose coincides with filler neck.

– Drain fuel tank via filler neck as far as possible.

– Pull extraction hose out carefully.

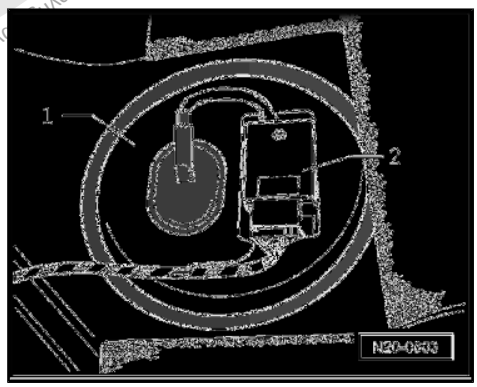
Note

- *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.*
- *Draining fuel tank completely* *⇒ page 190*

4.2.2 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 -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



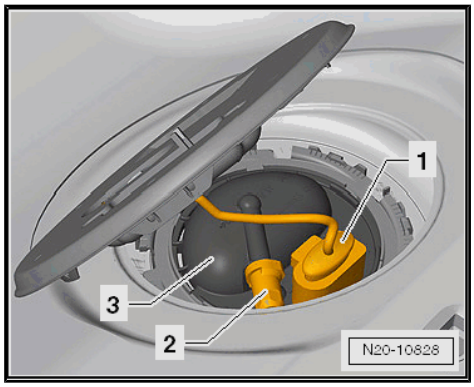
WARNING

The fuel line is under pressure.

Risk of injury to eyes and skin from fuel.

Wear eye protection and protective clothing to avoid eye injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully opening the connection point.

– Release connector -1- and fuel line -2- and pull them off flange -3-.



Note

Press buttons on hose couplings to do this.

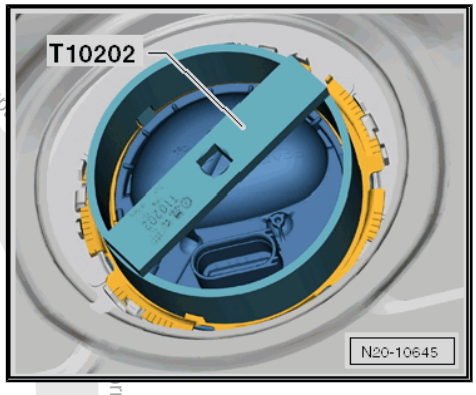
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– Open locking ring using wrench - T10202- .

– Raise flange.

– Insert suction hose of fuel extractor - VAS 5190- as far as possible into fuel tank and extract fuel.

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



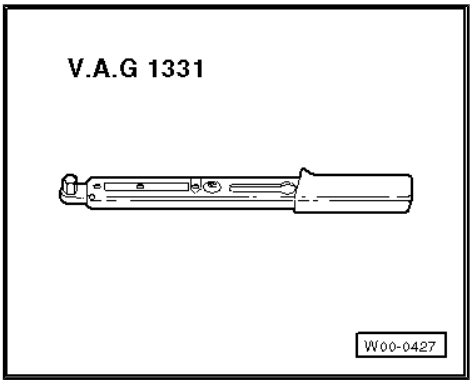
Specified torque

Component	Specified torque
Locking ring	110 Nm

4.3 Removing and installing fuel tank

Special tools and workshop equipment required

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



Remove fuel tank ⇒ page 191 .

Installing fuel tank ⇒ page 193

4.3.1 Removing fuel tank

Note

♦ *The rear axle must be lowered to remove the fuel tank.*

♦ *Open tank flap and, if necessary, take adapter for wheel lock out of luggage compartment before disconnecting battery.*

– Observe safety precautions ⇒ page 176 .

– Check whether a coded radio is fitted. If so, obtain anti-theft code:

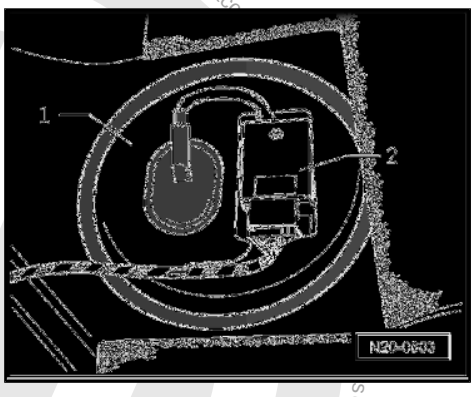
– Disconnect battery earth strap with ignition switched off ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

Drain fuel tank with fuel extractor - VAS 5190- ⇒ page 188 .

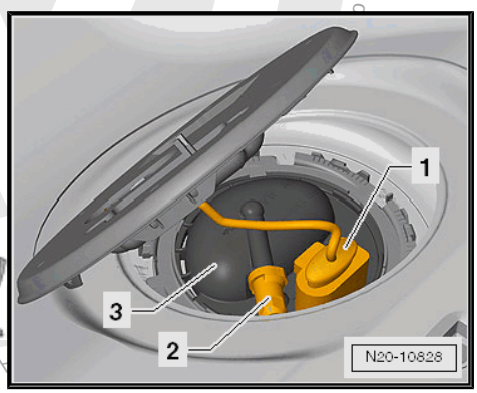
– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

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– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



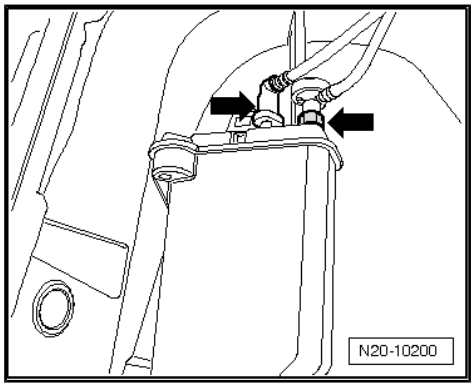
– Release and pull off connector -1-.
– Remove right rear wheel.
– Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .



– Pull breather line and pressure retention valve -arrow- off activated charcoal filter.

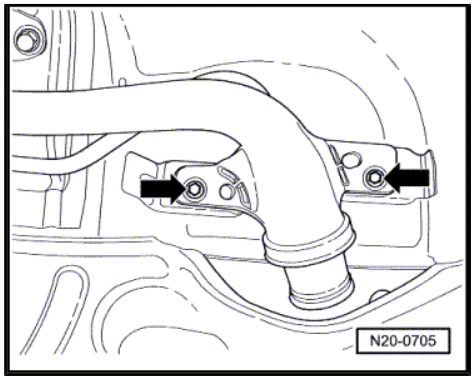
Note

Grasp securing ring (grey) on pressure retention valve and pull valve off upwards.



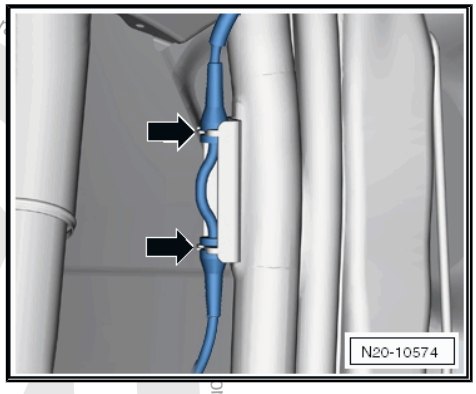
– Unscrew tank flap unit securing bolt and remove tank flap unit ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit .

– Unbolt filler neck from body -arrows-.



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– Unclip wire from filler neck -arrows-.



WARNING

The fuel line is under pressure.

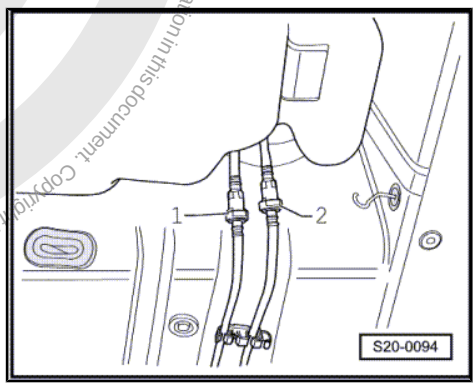
Risk of injury to eyes and skin from fuel.

Wear eye protection and protective clothing to avoid eye injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully opening the connection point.

Note

Press in securing ring to release fuel lines.

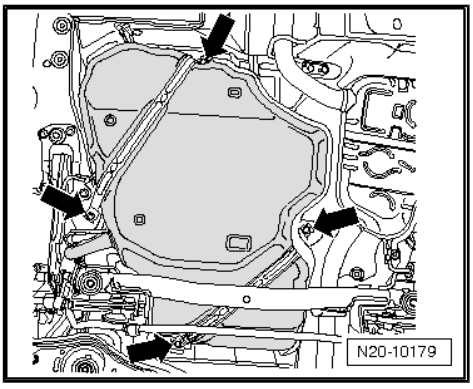
– Separate breather line (white) and fuel line (black) at union.
– Lower rear axle ⇒ Running gear, axles, steering; Rep. gr. 42 ; Assembly overview: Subframe (front-wheel drive); Lowering rear axle .



Note

When lowering axle, make sure that brake lines and electric cables/wire have space to move freely.

– Unscrew bolts of tensioning straps -arrows-.



Note

With the help of a 2nd mechanic, secure fuel tank to prevent it falling.

– Remove tensioning straps.
– With the help of a 2nd mechanic, lower the fuel tank slowly.
– With the aid of a 2nd mechanic, guide the filler neck out between rear axle and body.

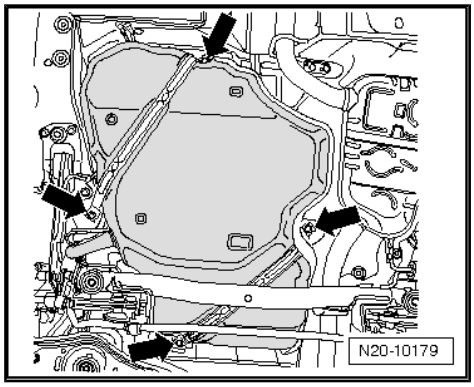
4.3.2 Installing fuel tank

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

– With the aid of a 2nd mechanic, guide the filler neck in between rear axle and body.

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– Slowly raise fuel tank into installation position and secure it.



Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

Tighten securing bolts -arrows-.

– Attach rear axle to body again ⇒ Running gear, axles, steering; Rep. gr. 42 ; Removing and installing rear axle .

- Install breather and fuel lines free of kinks.
- Ensure that line connections are tight.
- Check fuel tank/body earth connection on filler neck.

Specified torque

Component	Specified torque
Tensioning straps to body ♦ To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.	25 Nm
Filler neck to body	8 Nm + 90°
Subframe/rear axle to body ♦ Use new bolts	⇒ Running gear, axles, steering; Rep. gr. 42 ; Removing and installing rear axle .
Mounting the wheels	⇒ Running gear; Rep. gr. 44 ; Specified torque for mounting wheels

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5 Fuel tank (Eos)

Safety precautions when working on fuel supply system ⇒ page 176 .

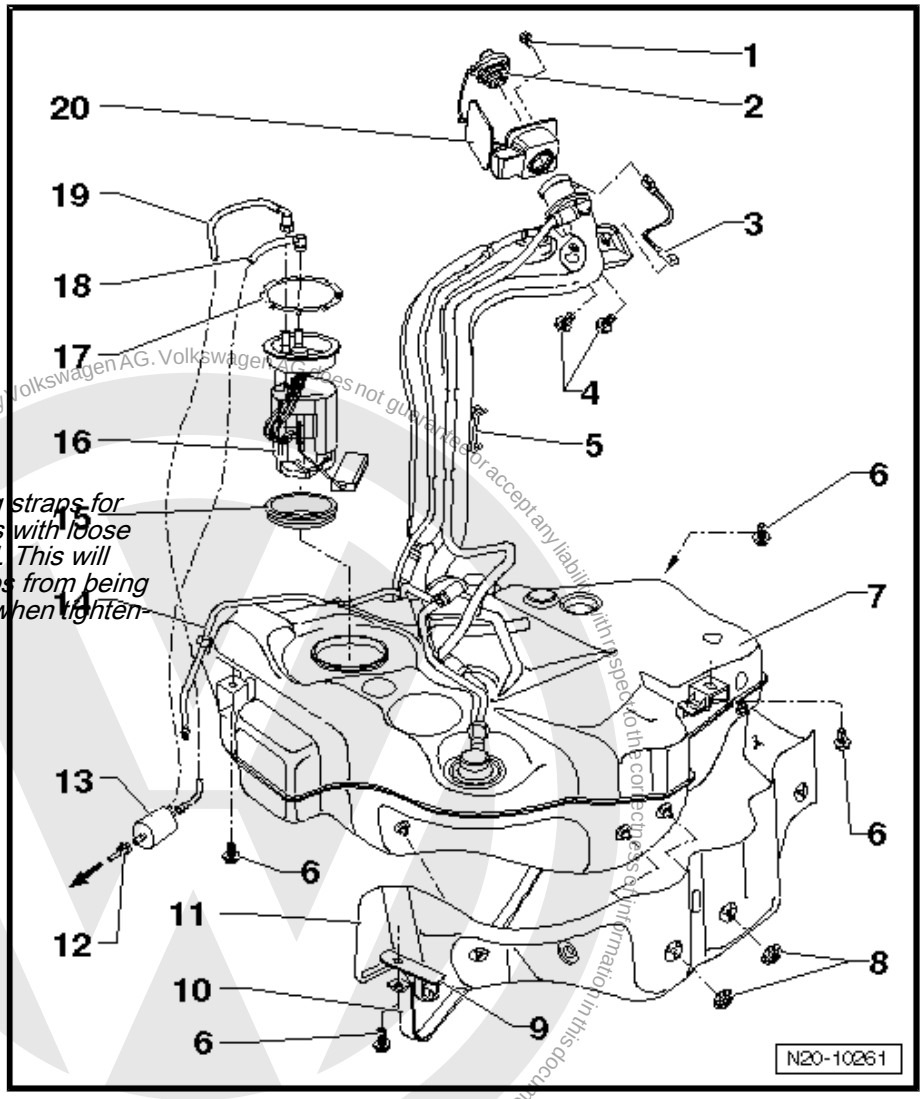
Rules for cleanliness ⇒ page 211 .

Assembly overview - fuel tank ⇒ page 195 .

Emptying fuel tank ⇒ page 197 .

Removing and installing fuel tank ⇒ page 199 .

5.1 Assembly overview - fuel tank



1 - Securing bolt

2 - Cap

- ❑ Renew if damaged.

3 - Earth connection

- ❑ Check for secure seating.

4 - 10 Nm

5 - Cable retainer

6 - 25 Nm

- ❑ Renew

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

7 - Fuel tank

- ❑ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ❑ Removing and installing ⇒ page 199

8 - Clamping washer

9 - Bracket for exhaust system

10 - Securing strap

- ❑ Note installation position.

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

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11 - Heat shield

12 - Supply line

- ❑ To fuel rail.
- ❑ Check for secure seating.

13 - Fuel filter

- ❑ Installation position: arrow indicates direction of flow.

14 - Breather line

- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

15 - Seal

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

16 - Fuel delivery unit

- ❑ Removing and installing ⇒ page 212
- ❑ Checking fuel pump ⇒ page 215 .
- ❑ Note installation position on fuel tank ⇒ page 196 .
- ❑ Removing and installing with fuel gauge sender - G- ⇒ page 214 .
- ❑ Clean strainer if soiled.

17 - Locking ring, 110 Nm

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

18 - Supply line

- ❑ Black
- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

19 - Return line

- ❑ Blue
- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

20 - Tank flap unit

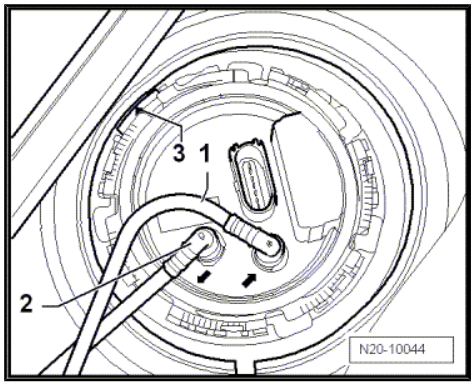
- ❑ With rubber cup.
- ❑ Removing and installing ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

Installation position of fuel delivery unit

Marking -3- on sender points opposite to direction of travel.

Return line (blue or with blue mark) -1-

Black supply line -2-

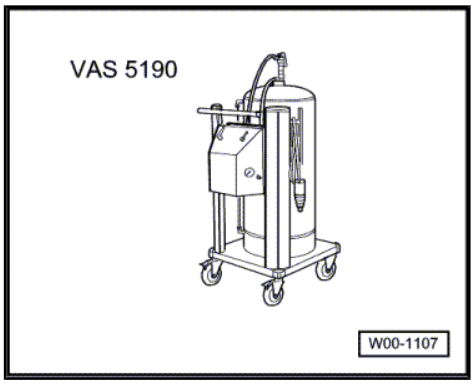


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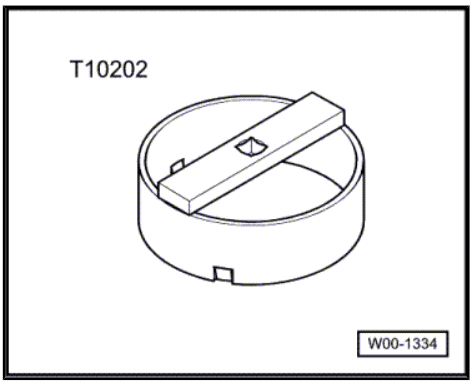
5.2 Emptying fuel tank

Special tools and workshop equipment required

- Fuel extractor - VAS 5190-



- Hexagon key - T10202-



- Torque wrench - V.A.G 1332-

– Note safety precautions before beginning work ⇒ page 176 .

Emptying fuel tank if it is more than 3/4 full ⇒ page 197 .

Emptying fuel tank if it is less than 3/4 full ⇒ page 198 .

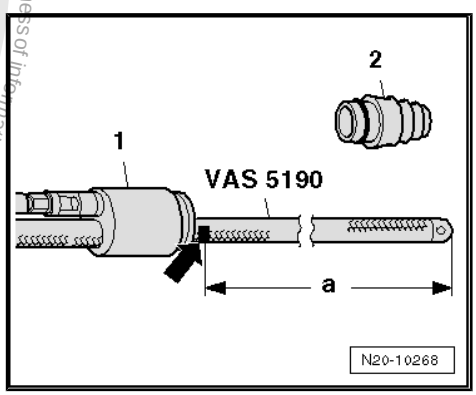
5.2.1 Emptying fuel tank if it is more than 3/4 full

Caution

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

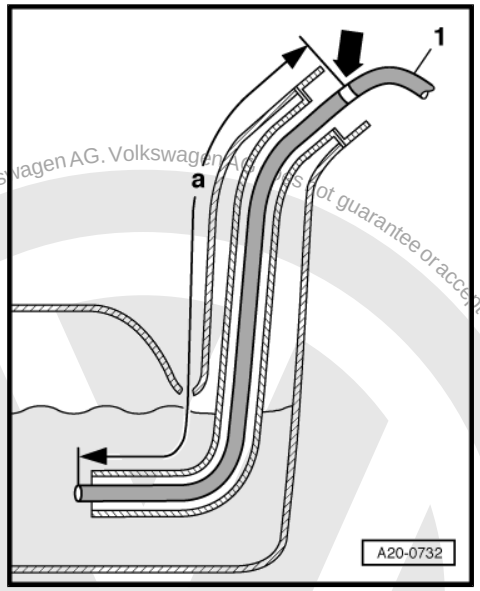
– Remove cotter -2- from shaft -1- of fuel extractor - VAS 5190- .

– Use insulating tape to mark the extraction hose -arrow- at a distance of -a- = 820 mm from the end of the hose.



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– Push extraction hose into fuel tank until marking -arrow- on hose coincides with filler neck.



Note

A ball valve is located at the lower end of filler neck in fuel tank, which must not be damaged by the extraction hose -1-. Therefore push hose into filler neck only as far as marking -arrow-.

– Empty fuel tank as far as possible.

– Carefully pull out extraction hose.

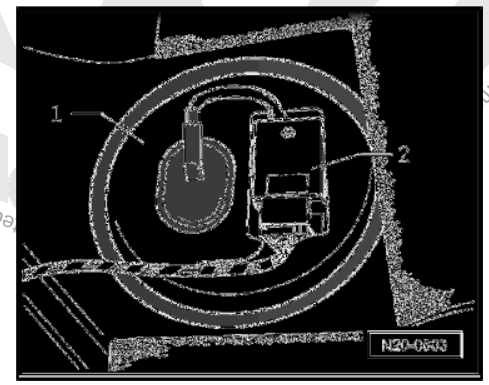
Note

- *When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger.*
- *If the fuel tank has to be drained fully, proceed as follows:* *⇒ page 198* .

5.2.2 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 .

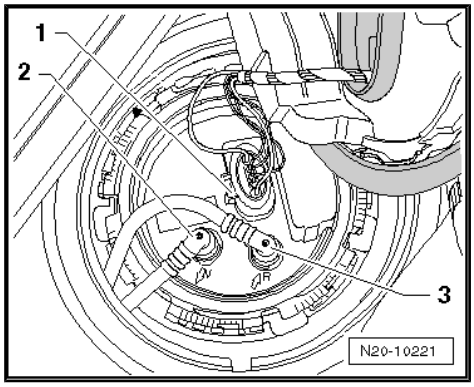
– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



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 -1- and fuel lines -2- and -3- off flange.



Note

- *Press in securing ring to release fuel lines.*
- *On vehicles with auxiliary heater the connector and the fuel line of the metering pump - V54- must also be separated.*

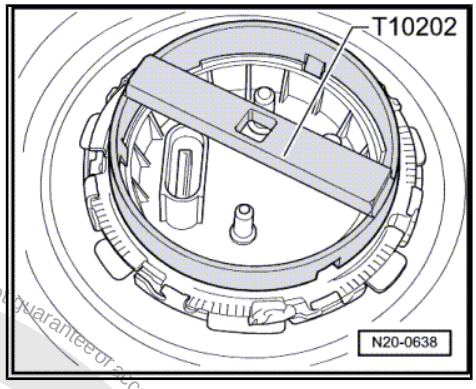
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– Open locking ring using wrench - T10202- .

– Lift sender flange.

– Insert extraction hose of fuel extractor - VAS 5190- as deeply as possible into fuel tank and extract fuel.

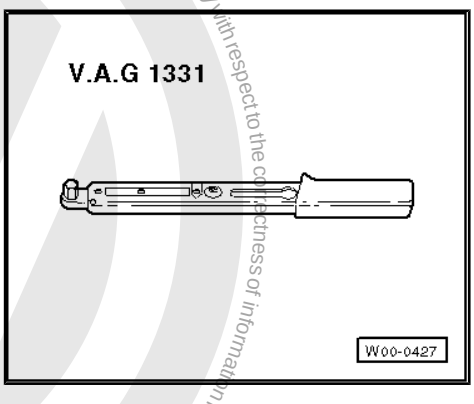
If fuel tank needed only to be emptied, reinstall sender flange ⇒ page 212 .



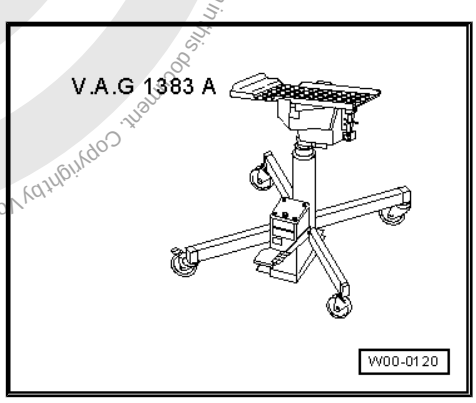
5.3 Removing and installing fuel tank

Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



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



Removing

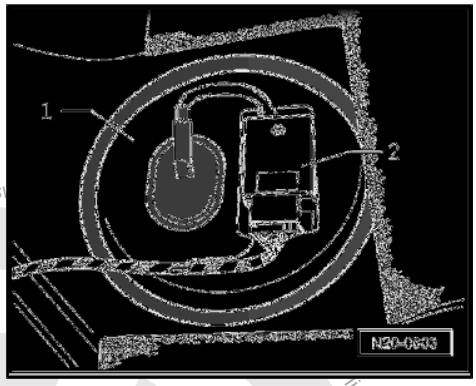
– Note safety precautions before beginning work ⇒ page 176 .

If necessary, empty fuel tank using fuel extractor - VAS 5190- ⇒ page 197 .

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

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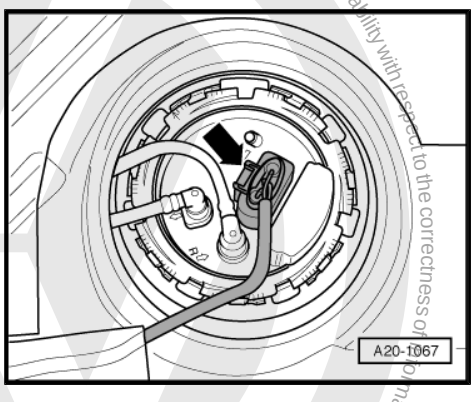
– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



Note

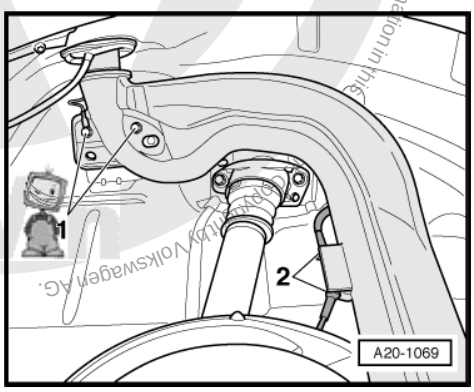
For vehicles with auxiliary heater the metering pump - V54- connector must be separated additionally.

– Pull 5-pin connector -arrow- off flange.

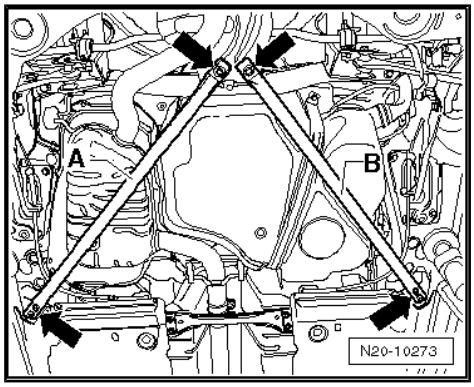


– Remove rear right wheel.
– Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .
– Unscrew tank flap unit securing bolt and remove tank flap unit ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank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

– Unbolt filler neck from body -1-.
– Unclip electrical cable from filler neck -2-.



– Remove supports -A- and -B-.
– Remove centre and rear silencers.
– Remove heat shields from middle and rear silencers.

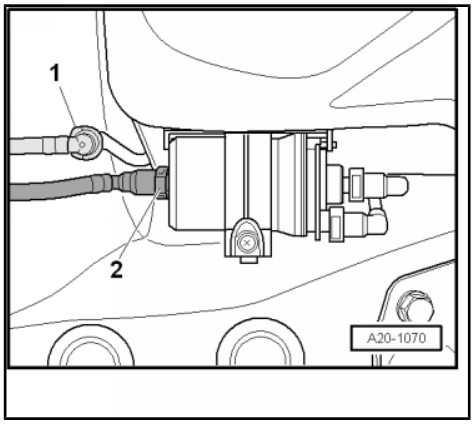


WARNING

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.

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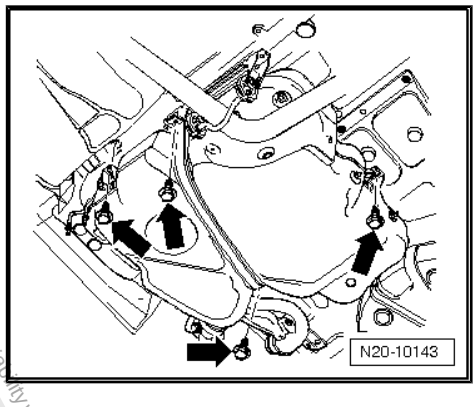
– Disconnect breather line -1- (white) and fuel line -2- (black) at connecting point.



Note

- *Press in securing ring to release fuel lines.*
- *Vehicles with auxiliary heater, the fuel line of the metering pump - V54- must also be separated.*

– Unscrew securing strap and securing bolts. When doing this, support fuel tank with engine and gearbox jack - V.A.G 1383 A- .



– Lower fuel tank.

Installing

Installation is performed in the reverse sequence. In the process, note the following:

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.

- Install breather and fuel lines free of kinks.
- Do not interchange supply and return lines (return line blue or with blue markings, supply line black).
- Ensure that line connections are tight.
- Check earth connection on fuel tank and body to filler neck.
- Install radius rods ⇒ Running gear, axles, steering; Rep. gr. 42 ; Removing and installing radius rods .

Specified torques:

Component	Nm
Fuel tank to body - M6 bolts	10
Fuel tank to body - M8 bolts[1)]	25

1) Renew.

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6 Fuel tank (Tiguan)

Safety precautions when working on fuel supply system ⇒ page 176 .

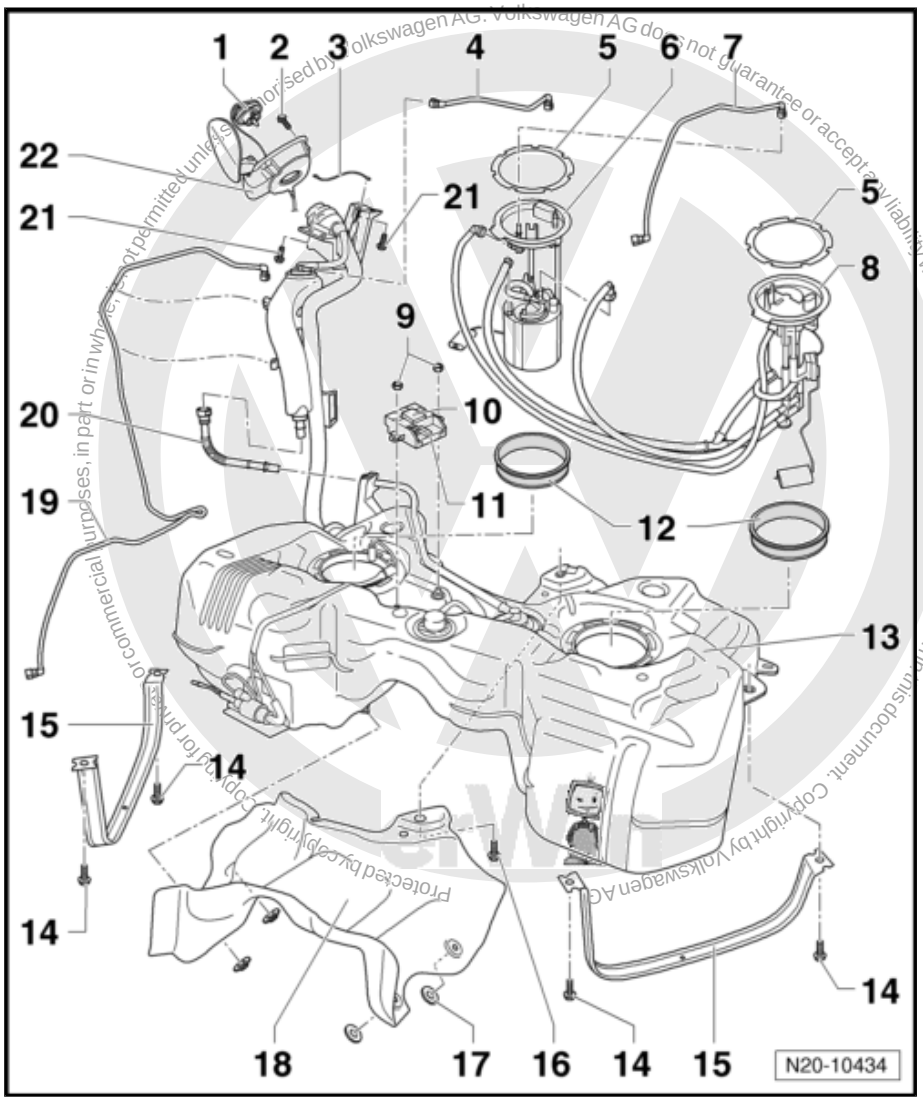
Observe rules for cleanliness ⇒ page 242 .

Assembly overview - fuel tank (Tiguan) ⇒ page 202 .

Draining fuel tank (Tiguan) ⇒ page 204 .

Removing and installing fuel tank (Tiguan) ⇒ page 206 .

6.1 Assembly overview - fuel tank (Tiguan)



1 - Cap

- ❑ Renew if damaged.

2 - Securing bolt

3 - Earth connection

- ❑ Check for secure seating.

4 - Breather line

- ❑ To activated charcoal filter.
- ❑ Check for secure seating.

5 - Locking ring, 110 Nm

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

6 - Fuel delivery unit

- ❑ Removing and installing ⇒ page 243
- ❑ Checking fuel pump ⇒ page 251 .
- ❑ Note installation position on fuel tank ⇒ page 204 .
- ❑ With fuel gauge sender - G- .
- ❑ Removing and installing fuel gauge sender - G- ⇒ page 245 .
- ❑ Clean strainer if soiled.

7 - Supply line

- ❑ Black
- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

8 - Fuel gauge sender 2 - G169-

- ❑ With integrated fuel filter
- ❑ With suction-jet pump.
- ❑ Removing and installing ⇒ page 249

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9 - 3.5 Nm

10 - Bracket for fuel pump control unit - J538-

11 - Fuel pump control unit - J538-

- ❑ Removing and installing ⇒ page 249

12 - Seal

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

13 - Fuel tank

- ❑ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ❑ Removing and installing ⇒ page 206

14 - 25 Nm

- ❑ Renew

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. If different bolts are used, the securing straps might twist during tightening.

15 - Securing strap

- ❑ Note installation position.

Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. If different bolts are used, the securing straps might twist during tightening.

16 - 20 Nm + 1/4 turn (90°) further

- ❑ Renew

17 - Clamping washer

18 - Heat shield

19 - Breather line

- ❑ Clipped onto side of fuel tank.
- ❑ Check for secure seating.

20 - Breather line

- ❑ Check for secure seating.

21 - 8 Nm + 1/4 turn (90°) further

- ❑ Renew

22 - 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 .

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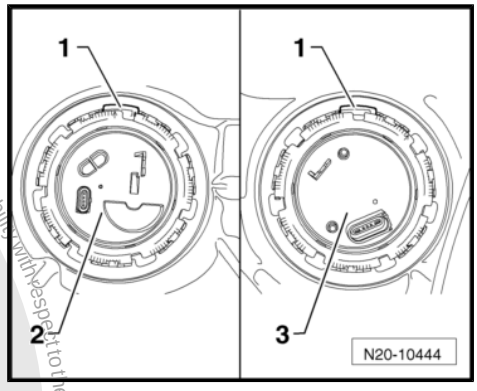
Installation position of flange for fuel delivery unit and fuel gauge sender 2 - G169-

Fuel delivery unit -3-:

The lug -1- points in direction of travel.

Fuel gauge sender 2 - G169- -2-:

The lug -1- points in direction of travel.



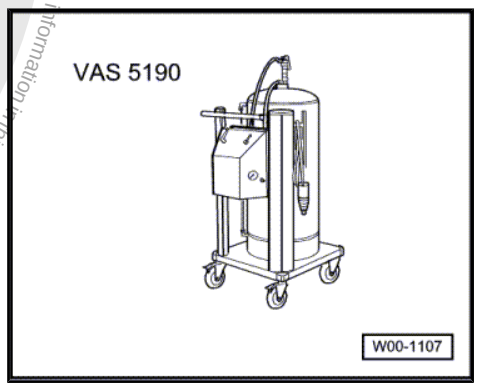
Note

The arrows on the locking rings may be disregarded.

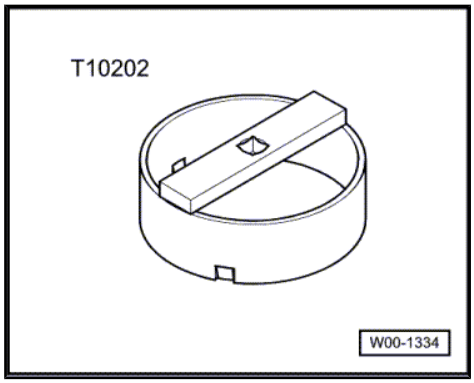
6.2 Draining fuel tank (Tiguan)

Special tools and workshop equipment required

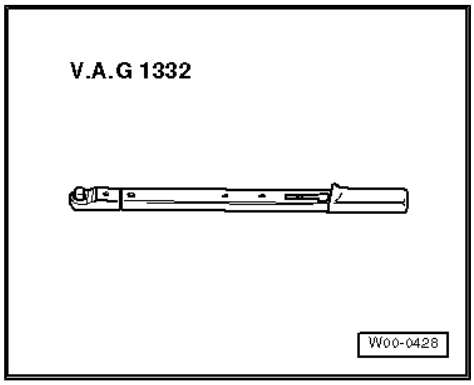
- Fuel extractor - VAS 5190-



- Hexagon key - T10202-



- Torque wrench - V.A.G 1332-



– Observe safety precautions ⇒ page 176 .

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Emptying fuel tank if it is more than 3/4 full ⇒ page 205 .

Emptying fuel tank if it is less than 3/4 full ⇒ page 206 .

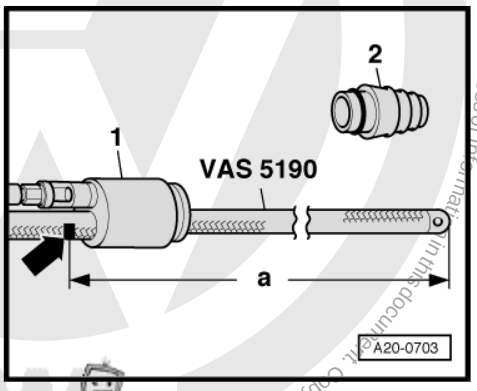
6.2.1 Emptying fuel tank if it is more than 3/4 full

Caution

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

– Remove cone piece -2- from shaft -1- of fuel extractor - VAS 5190- .

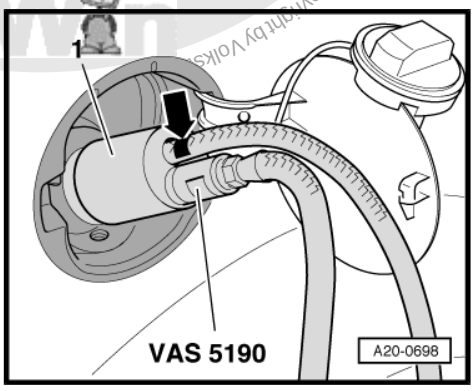
– Make a mark -arrow- on hose with insulating tape at distance -a- = 1200 mm from end of extraction hose.



– Remove fuel filler cap from filler neck.

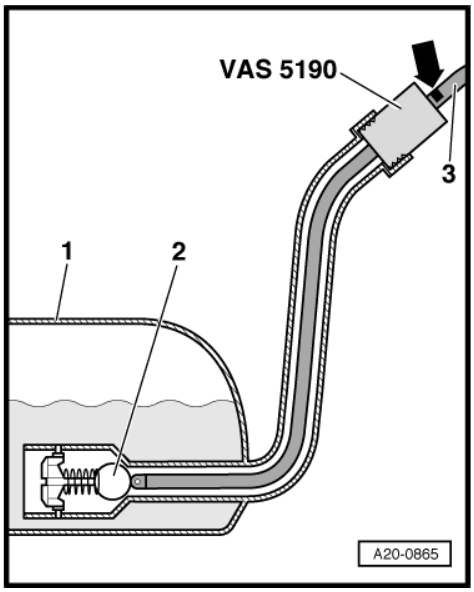
– Screw shaft -1- of fuel extractor - VAS 5190- onto fuel tank filler neck.

– 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 via filler neck as far as possible.

– Pull extraction hose out carefully.

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.*
- *In order to carry out work on fuel pump or fuel tank sender, proceed as follows* ⇒ page 206 *:*

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6.2.2 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 of 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.

– Release connector and fuel lines and pull them off flange.

Note

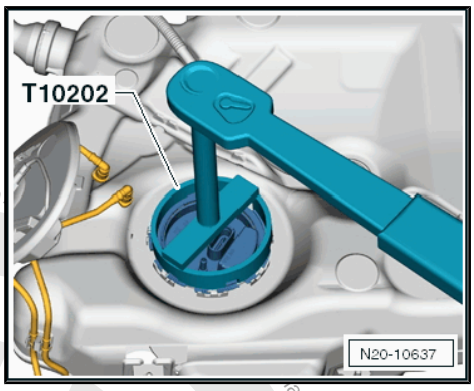
Press buttons on hose couplings to do this.

– Open locking ring using wrench - T10202- .

– Lift fuel delivery unit .

– Insert suction hose of fuel extractor - VAS 5190- as far as possible into fuel tank and extract fuel.

If fuel tank needs only to be emptied, install fuel delivery unit again. ⇒ page 243



– Remove suction-jet pump ⇒ page 246 .

– Insert suction hose of fuel extractor - VAS 5190- as far as possible into fuel tank and extract fuel.

– If fuel tank needs only to be emptied, install suction-jet pump again ⇒ page 246 .

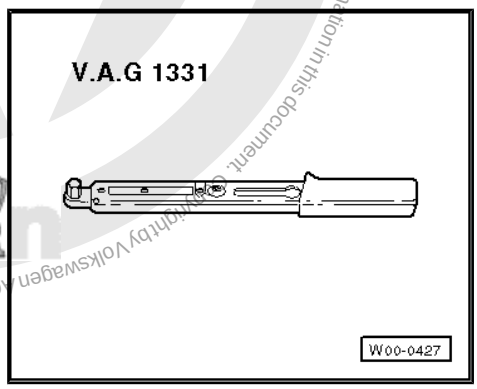
Specified torques

Components	Specified torques
Locking ring	110 Nm

6.3 Removing and installing fuel tank (Tiguan)

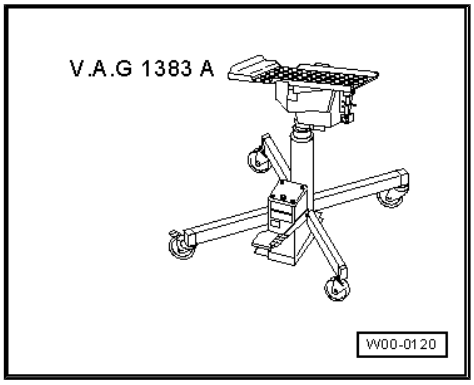
Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-



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



Removing

– Observe safety precautions ⇒ page 176 .

– Check whether a coded radio is fitted. If so, obtain anti-theft coding:

– With ignition switched off, disconnect battery earth strap.

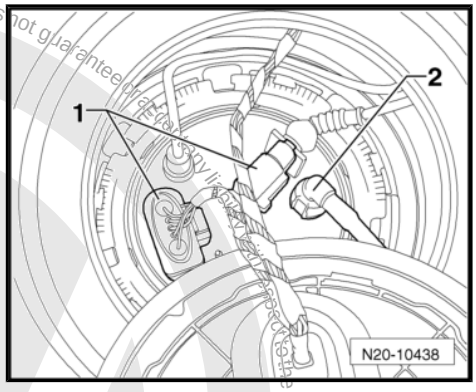
– Unscrew tank flap unit securing bolt and remove tank flap unit ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit .

– Drain fuel tank and clean fuel filler neck and surrounding area.

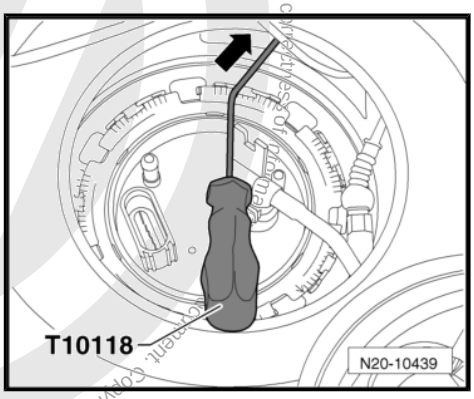
– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

– Remove cover of fuel delivery unit.

– Pull connector -1- and fuel line -2- off right flange (in direction of travel).

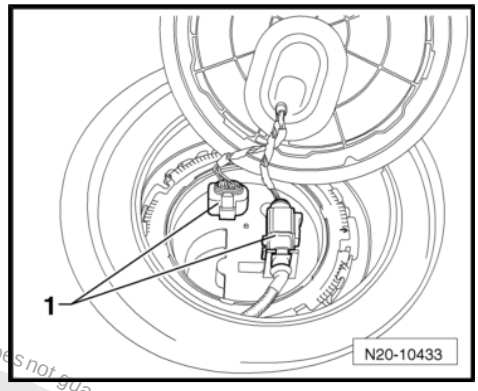


– Release connector -arrow- at fuel pump control unit - J538- and pull off with the assembly tool - T10118- .

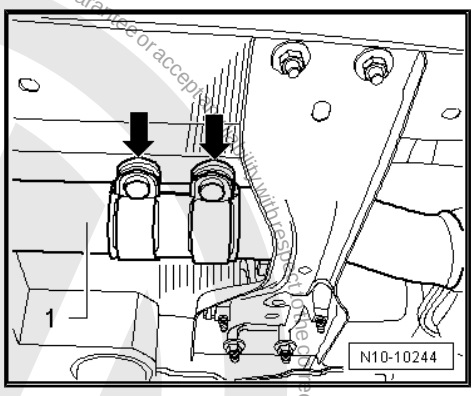


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– Pull connector -1- off left flange (in direction of travel).

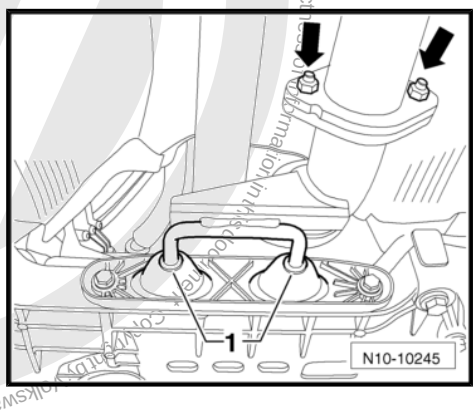


– Loosen nuts -arrows- of clamping sleeve and push it forwards onto exhaust pipe -1-.



– Undo and remove bolts -arrows- and pull exhaust pipe towards the rear.

– Remove rear exhaust system with centre and rear silencers ⇒ page 346 .

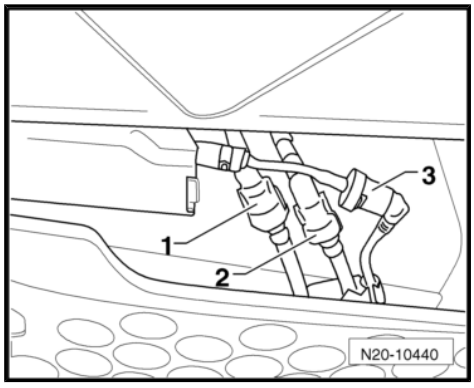


WARNING

Fuel supply lines are under pressure! Wear eye protection and gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

– Disconnect fuel line -1- (black) and breather line -2- (white) at connecting point.

– If an auxiliary heater is fitted, disconnect fuel line -3- as well.



Note

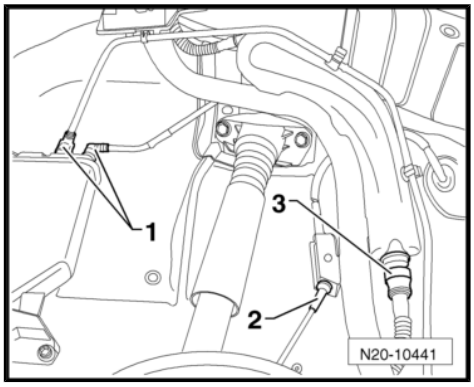
Press in securing ring to release fuel lines.

– Unbolt right rear wheel.

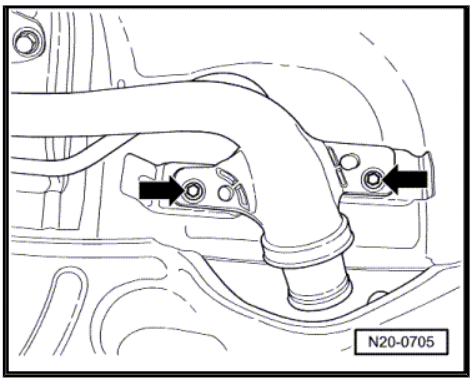
– Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .

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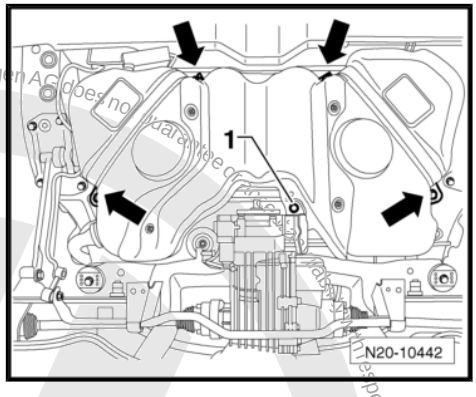
– Disconnect breather lines -1- from activated charcoal filter and fuel tank filler neck -3-.
– Unclip cable -2- from bracket.
– Remove tank flap and cap of fuel tank filler neck.
– Detach earth wire at fuel tank filler neck.



– Unbolt filler neck from body -arrows-.



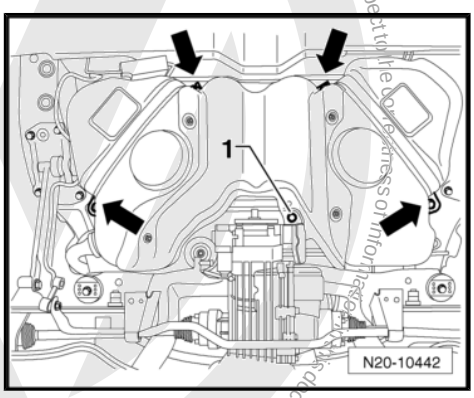
– Unscrew securing bolt -1-.
– Unscrew securing strap and securing bolts -arrows-. When doing this, support fuel tank with engine and gearbox jack - V.A.G 1383 A- .



Installing

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

– With the aid of a 2nd mechanic, guide the filler neck in between rear axle and body.
– Then place fuel tank on engine and gearbox jack - V.A.G 1383 A- .
– Slowly raise fuel tank into installation position and secure it.



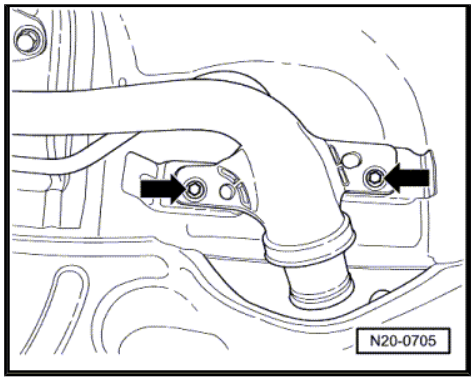
Note

To secure the securing straps for the fuel tank, only bolts with loose washers must be used. If different bolts are used, the securing straps might twist during tightening.

Tighten the new bolts of the tensioning straps -arrows- and new bolt -1-.

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– Tighten securing bolts -arrows- for fuel tank filler neck.



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

- Install breather and fuel lines free of kinks.
- Check fuel tank/body earth connection on filler neck.
- Ensure that line connections are tight.
- After installing fuel tank, check that supply and breather lines are still clipped onto fuel tank.

Specified torque

Component	Specified torque
Tensioning straps to body ♦ To secure the securing straps for the fuel tank, only bolts with loose washers must be used. This will stop the securing straps from being twisted out of position when tightening the bolts.	25 Nm
Filler neck to body	8 Nm + 90°
Exhaust system	⇒ page 346
Mounting the wheels	⇒ Running gear; Rep. gr. 44 ; Specified torque for mounting wheels

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7 Repairing fuel supply system (Golf, Golf Plus, Scirocco, Eos)

Note

- *Hose connections are secured with either spring-type or clamp-type clips.*
- *Renew clamp-type clips with spring-type clips.*
- *Fuel hoses on engine must be secured with spring-type clips only. The use of clamp or screw-type clips is not permissible.*
- *Hose clip pliers - VAS 6340- are recommended to install spring-type clips.*

Safety precautions when working on fuel supply system ⇒ page 176 .

Observe rules for cleanliness ⇒ page 211 .

Observe crash fuel shut-off ⇒ page 211 .

Removing and installing fuel delivery unit ⇒ page 212 .

Removing and installing fuel gauge sender G ⇒ page 214

Checking fuel pump ⇒ page 215 .

7.1 Rules for cleanliness

When working on the fuel supply and injection system, pay careful attention to the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.
- Place removed parts on a clean surface and cover. Use only lint-free cloths.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air. Do not move vehicle.

7.2 Crash fuel shut-off

Function

Crash fuel shut-off system reduces the risk of a vehicle burning in event of a crash in that the fuel pump is switched off. The system also improves the starting characteristics of the engine. When door is opened, the fuel pump is activated for 2 seconds to build up pressure in the fuel system.

When opening fuel system:

Observe safety precautions ⇒ page 176 .

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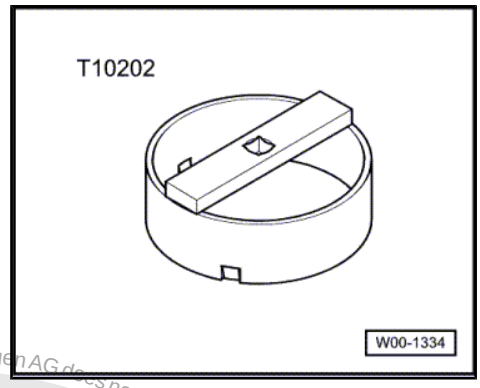
7.3 Removing and installing fuel delivery unit (Golf Plus, Golf, Scirocco, Eos)

Note

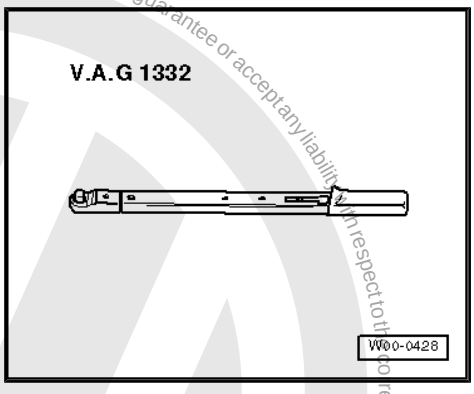
After removing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.

Special tools and workshop equipment required

- Hexagon key - T10202-



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



Removing:

Caution

Prerequisites:

- ***Fuel tank must not be more than 3/4 full. This ensures that the fill level is below the flange of the fuel delivery unit.***

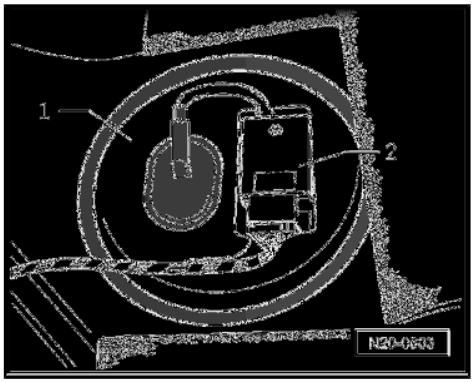
Note

- *If necessary, drain fuel tank using fuel extractor - VAS 5190- .*
- *Note safety precautions before beginning work* *⇒ page 176* *.*
- *Observe rules for cleanliness* *⇒ page 211* *.*
- *Assembly overview - fuel tank* *⇒ page 181* *.*

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Removing and installing bench seat .

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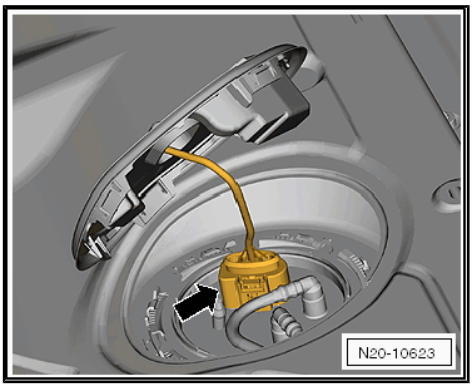
– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



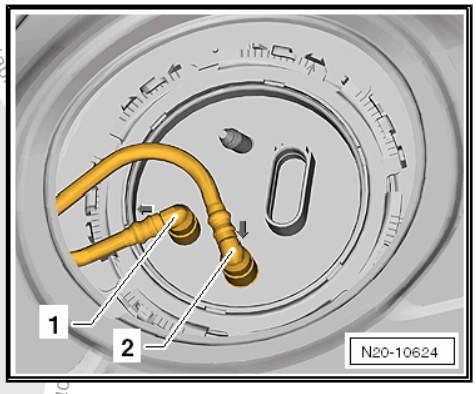
WARNING

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 off connector -arrow-.



– Pull fuel lines -1- and -2- off flange.

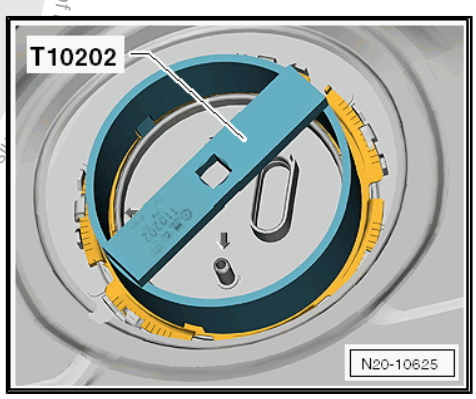


Note

- *Press in securing ring to release fuel lines.*
- *On vehicles with auxiliary heater the connector and the fuel line of the metering pump - V54- must also be separated.*

– Open locking ring using wrench - T10202- and raise flange slightly.

– 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.*
- *Observe waste disposal regulations.*

Installing:

– Renew seal.

– Insert seal for fuel delivery unit dry into opening of fuel tank.

– Coat inner side of seal with fuel.

– When inserting fuel delivery unit, ensure that fuel gauge sender is not bent.

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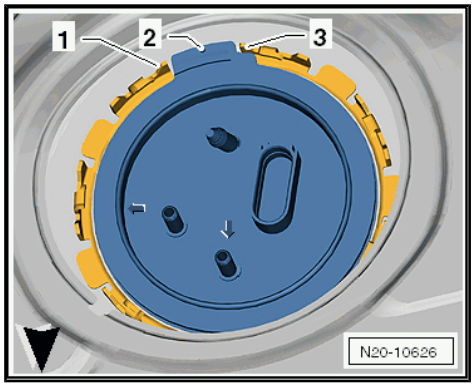
– Press sealing flange down against spring pressure, and move sealing flange to installation position.

• Tab -2- on sealing flange must be between lugs -1- and -3- on fuel tank.

• The -arrow- points forwards.

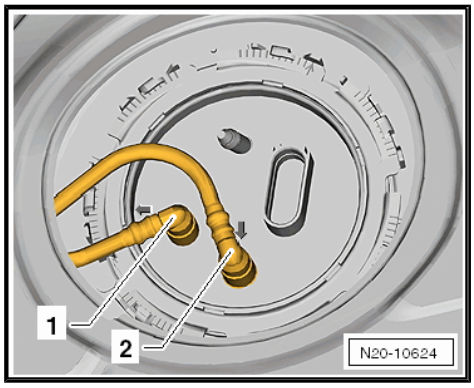
– Tighten sealing flange.

• Specified torque: 110 Nm



– Reconnect supply line-1- (black).

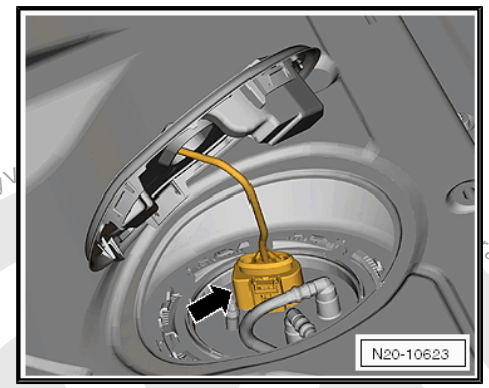
– Reconnect fuel return line -2- (blue or blue marking).



– Reconnect connector -arrow-.

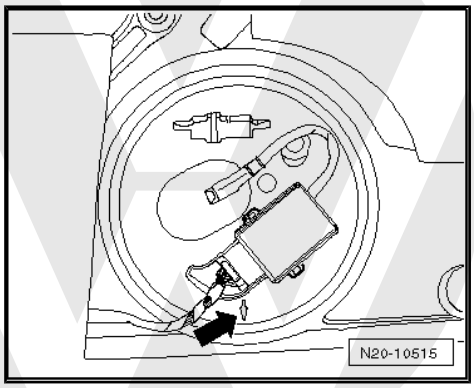
– Ensure push-fit couplings and electrical connectors are secured properly by pulling.

Further installation is performed in the reverse sequence. In the process, note the following:



♦ Observe installation position of fuel feed line to auxiliary heater ⇒ Auxiliary heater; Rep. gr. 82 ; Fuel feed Thermo Top V .

♦ The -arrow- on the cover points forwards.



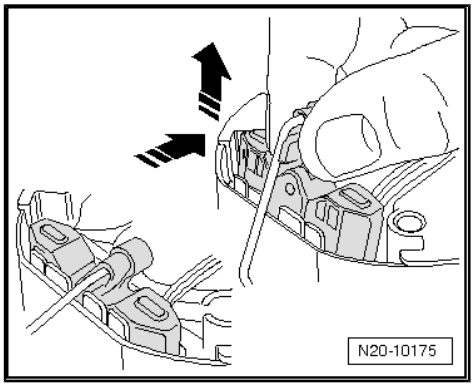
7.4 Removing and installing fuel gauge sender G

Removing:

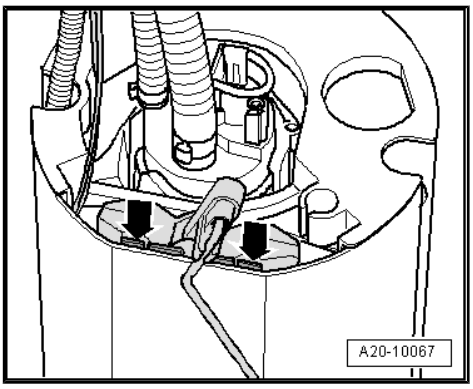
– Remove fuel delivery unit ⇒ page 212 .

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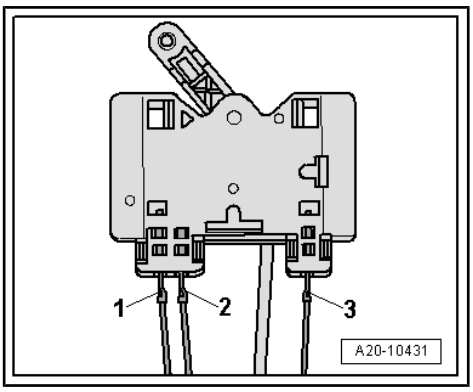
– Pull fuel gauge sender - G- slightly to side and upwards at the same time.



– If the sender cannot be released in this way, the retaining tabs -arrows- must also be pushed to the side slightly.
– Note colour co-ordination of cables for reinstallation.

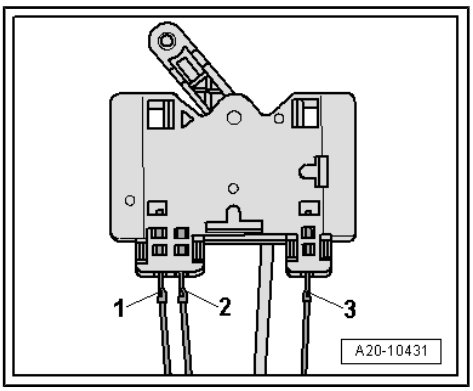


– Release electrical connectors -1…3- and pull them off. Then bend back the locking devices of the connector.



Installing:

– Connect connectors -1…3-. Observe colour co-ordination.
– Check connectors are secured properly by pulling.
– Insert fuel gauge sender - G- into guide on fuel delivery unit and press down until it engages.
– Install fuel delivery unit ⇒ page 212 .



7.5 Checking fuel pump

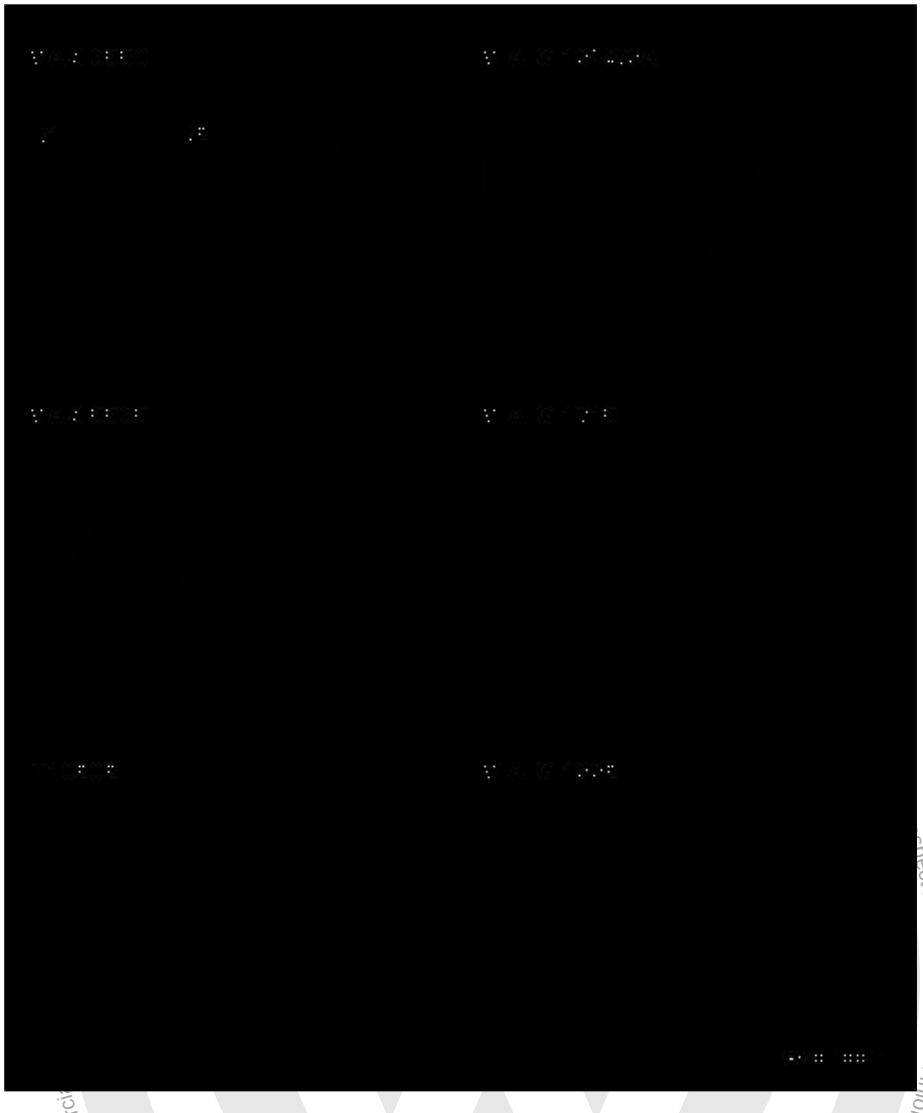
Note

After removing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.

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Special tools and workshop equipment required

- Pressure gauge - VAS 6550-
- Remote control - V.A.G 1348/3A-
- Test instrument adapter/ DSO (5-pin) - VAS 5565-
- Multimeter - V.A.G 1715-
- Insert tool, 22 mm - T10202-
- Torque wrench - V.A.G 1332-
- Measuring container, capacity 2 litres



7.5.1 Checking function and voltage supply

Test prerequisites

- Battery voltage at least 11.5 V
- Fuse for Fuel pump control unit - J538- OK.
- Fuel pump control unit - J538- OK.

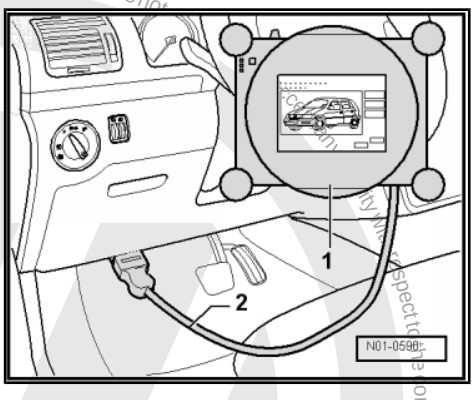
Test sequence:

Note

Function of fuel pump is checked using final control diagnosis.

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– Connect vehicle diagnostic tester as follows:
– Push diagnosis cable connector onto diagnosis connection in driver footwell.
– Switch on ignition.
– Press buttons on display one after the other for `Vehicle self-diagnosis`, `Engine electronics` and `Final control diagnosis`.
– Press right arrow button on display up to final control diagnosis for fuel pump electronics.



The fuel pump must now run slowly up to maximum speed.

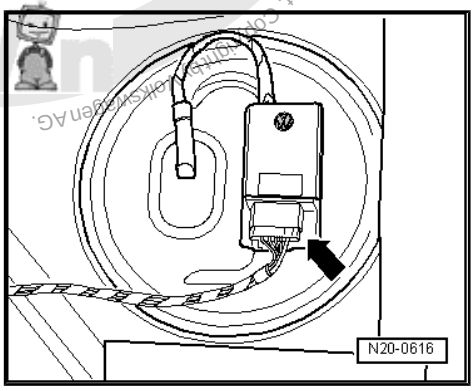
Note

The fuel pump runs very quietly.

– Switch off ignition.

If fuel pump does not run:

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
– Pull connector off fuel pump control unit - J538- .



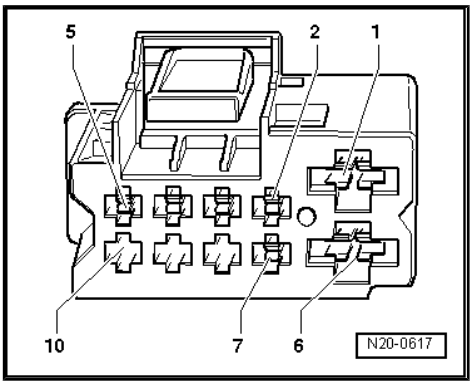
– Check voltage supply between contacts -1- and -6- using multimeter - V.A.G 1715- .

• Specification: approx. battery voltage

Voltage supply not OK:

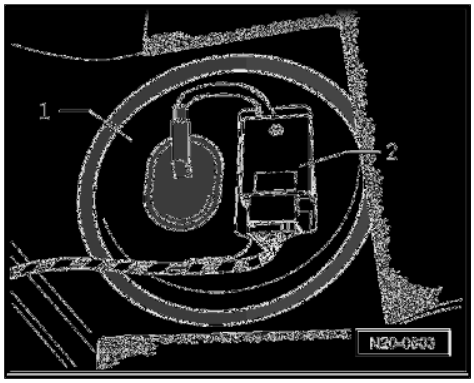
– Locate and eliminate open circuit referring to current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Voltage supply OK:

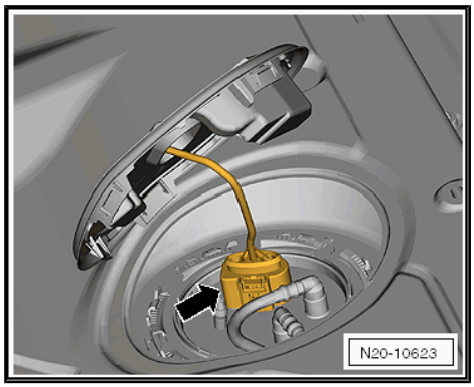


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– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



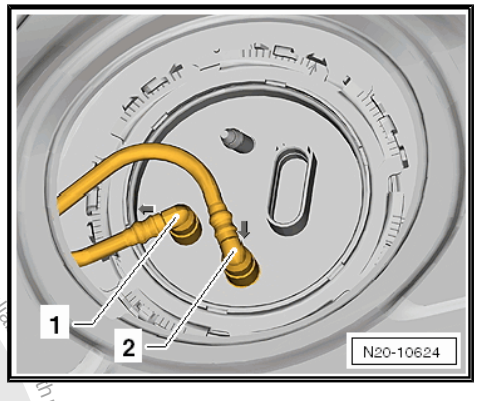
– First check that the connector -arrow- is fitted securely by pulling the connector without pressing the catch. If connector was not inserted correctly, repeat functional check of fuel pump.
– Now pull off connector.
– Check the contacts on the connector and on the fuel delivery unit for damage.



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.

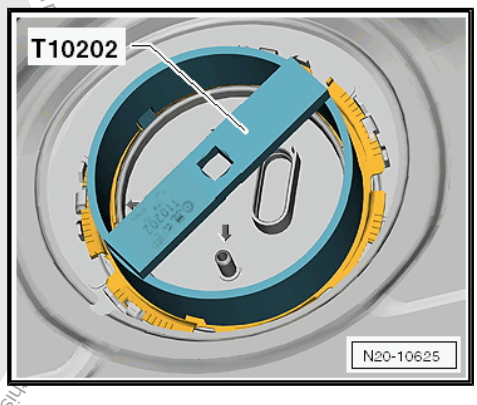
– Pull fuel lines -1- and -2- off flange.



Note

- *Press in securing ring to release fuel lines.*
- *On vehicles with auxiliary heater the connector and the fuel line of the metering pump - V54- must also be separated.*

– Open locking ring using wrench - T10202- .



– Check that electrical wires between flange and fuel pump are connected.

If no open circuit can be found:

– Fuel pump defective, renew fuel delivery unit ⇒ page 212 .

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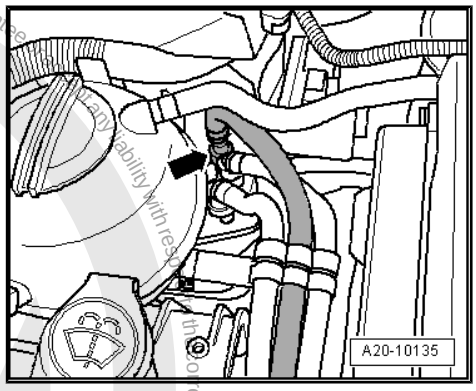
7.5.2 Checking fuel pressure

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 supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.

– Separate push-on couplings ⇒ page 178 .



Note

Press in securing ring to release fuel line.

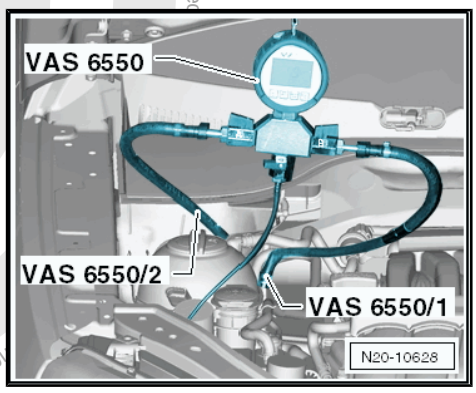
– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/1- and -VAS 6550/2- .

– Make sure that drain tap is closed and cut-off taps are open.

– Actuate fuel pump with final control diagnosis to build up fuel pressure.

– Read fuel pressure on pressure gauge.

• Specification: 4.0…7.0 bar.



If fuel pressure is OK, check holding pressure ⇒ page 220 .

If the specification is exceeded:

– Check return line between fuel filter and fuel pump for kinks and blockages.

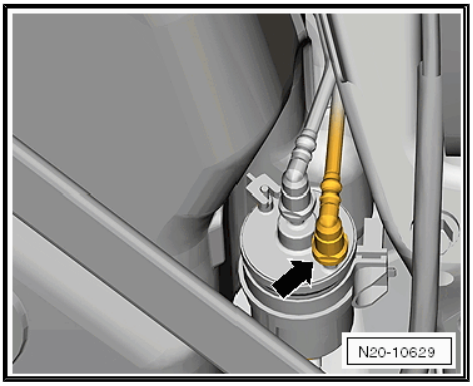
If no fault is found:

– Pressure limit valve in fuel filter is defective. Renew fuel filter.

If the specification is not attained:

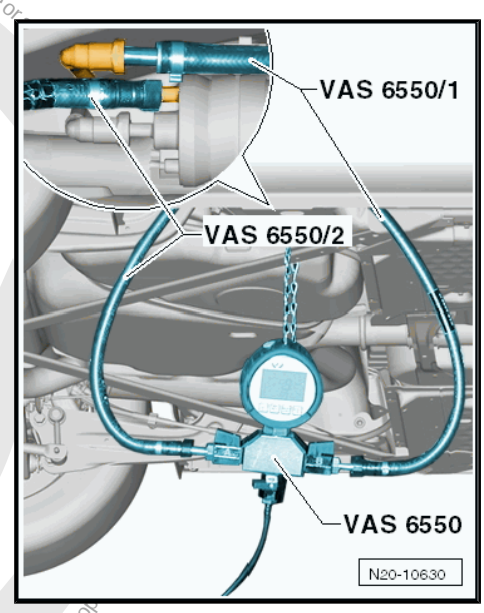
– Check fuel pressure upstream of fuel filter; proceed as follows:

– Pull fuel supply line -arrow- off fuel filter.



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– Connect pressure tester - VAS 6550- between fuel filter and fuel supply line with adapter - VAS 6550/1- and -VAS 6550/2- .
– Make sure that drain tap is closed and cut-off taps are open.
– Start engine and run at idling speed.



– Slowly close cut-off tap -A-. Pressure must rise to min. 7.0 bar. When 7.0 bar is reached, open shut-off tap again immediately.



Note

It may take several minutes until the fuel pressure increases.

If pressure has risen:

– Fuel pump is OK. Pressure limiting valve in fuel filter is defective. Renew fuel filter.

If pressure does not rise:

– Fuel pump defective, renew fuel delivery unit ⇒ page 212 .

7.5.3 Checking holding pressure

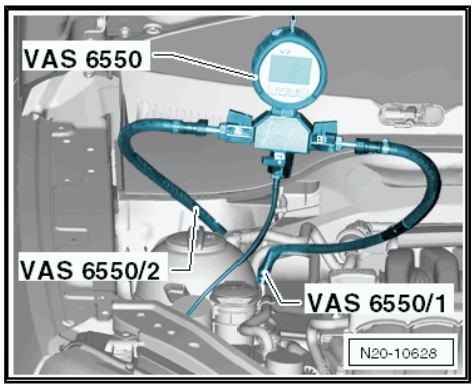
• Fuel pressure OK and pressure tester - VAS 6550- connected. Check fuel pressure ⇒ page 219 .

Test sequence:

– Actuate fuel pump with final control diagnosis to build up fuel pressure.
– Read fuel pressure on pressure gauge.
• Specification: 4.0…7.0 bar
– Watch pressure drop on pressure gauge. After 10 minutes, pressure must not drop below 3.0 bar.

If the pressure drops further:

– Actuate fuel pump with final control diagnosis to build up fuel pressure.



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– After pressure has built up, close cut-off tap -B- of pressure tester immediately. Lever is then at right angle to direction of flow.



If the pressure does not drop now:

Note

Search for leak on engine side. Repeat holding pressure test. This time, close shut-off tap -A- to check whether leak actually is on engine side.

– Check fuel pipe to high-pressure pump for leaks.

If no fault is found:

– Renew high-pressure pump ⇒ page 313 .

If the pressure drops again:

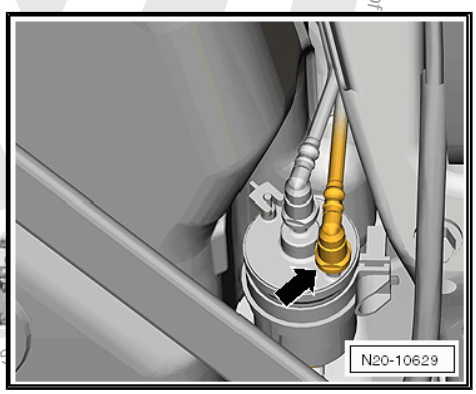
Leak must be sought on fuel tank side; proceed as follows:

– Check fuel supply line to fuel filter for leaks.

If no fault is found on the fuel line:

– Check pressure retention valve in fuel delivery unit. Proceed as follows:

– Pull fuel supply line -arrow- off fuel filter.



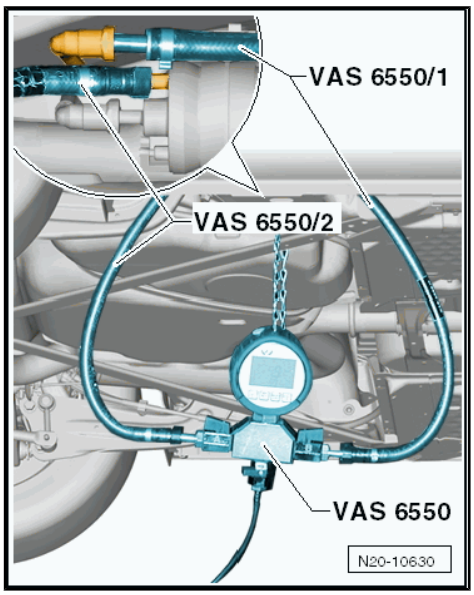
– Connect pressure tester - VAS 6550- between fuel filter and fuel supply line with adapter - VAS 6550/1- and -VAS 6550/2- .

– Make sure that drain tap is closed and cut-off taps are open.

– Actuate fuel pump with final control diagnosis to build up fuel pressure.

– Read fuel pressure on pressure gauge.

• Specification: 4.0…7.0 bar



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– After pressure has built up, close cut-off tap -A-.

– Watch pressure drop on pressure gauge. After 10 minutes, pressure must not drop below 3.0 bar.



If pressure drops:

– Pressure retention valve in fuel pump defective; renew fuel delivery unit ⇒ page 212 .

If the pressure does not drop:

– Pressure retention valve in fuel filter is OK, pressure limiting valve in fuel filter is defective. Renew fuel filter.

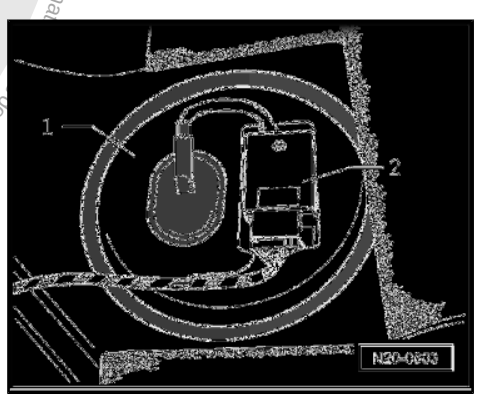
7.5.4 Checking fuel delivery rate

Note

When driving characteristic problems occur when the fuel tank is a approx. 1/4 filled, then check fuel delivery rates with approx. 1/4 filled tank or less.

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

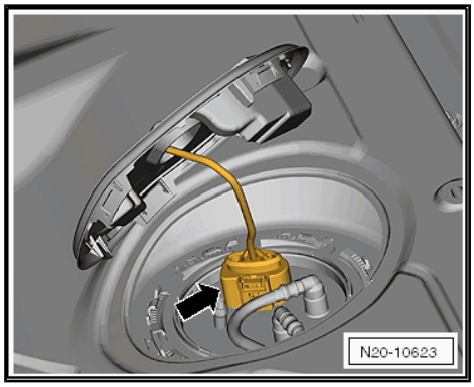
– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



– First check that the connector -arrow- is fitted securely by pulling the connector without pressing the catch. The connector can cause a fault if it has not been fitted correctly.

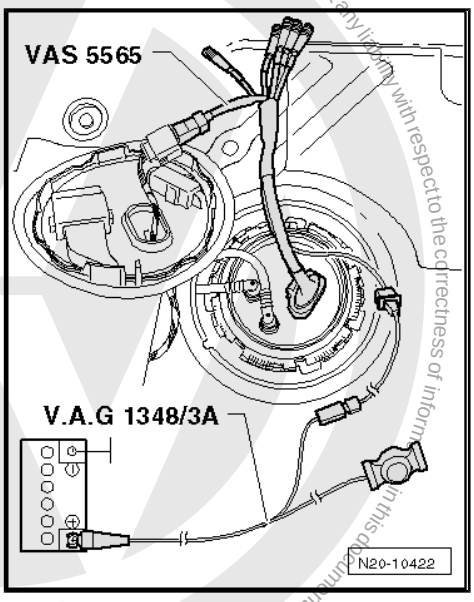
– Now pull off connector.

– Check the contacts on the connector and on the fuel delivery unit for damage.



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– Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
– Connect remote control - V.A.G 1348/3A- to adapter - VAS 5565- and to battery positive terminal clamp in the engine compartment.



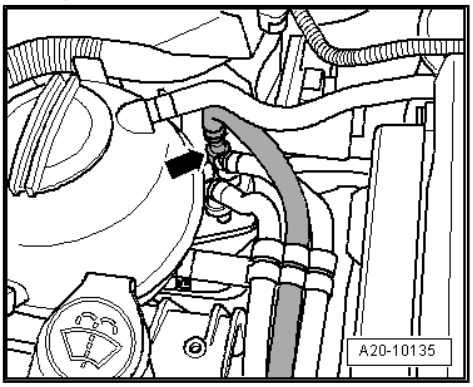
Note

This step serves only to have the fuel pump running when the engine is stopped.

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.

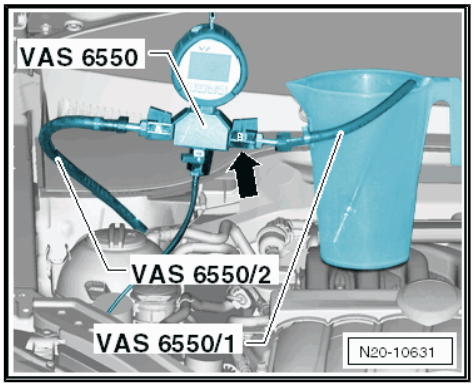
– Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.
– Separate push-on couplings ⇒ page 178 .



Note

Press in securing ring to release fuel lines.

– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- . Hold adapter - VAS 6550/1- in a measuring container.
– Make sure that drain tap is closed and cut-off taps are open.



WARNING

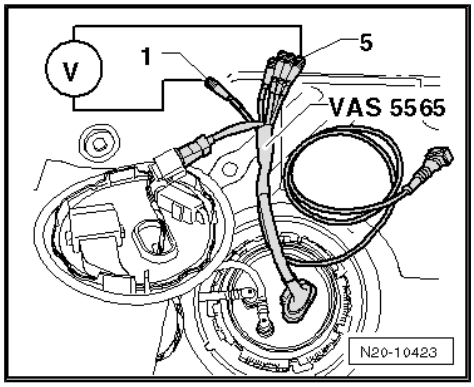
Danger of spraying! Wear eye protection and protective clothing to avoid possible injury and skin contact. Hold container in front of open connection of pressure tester.

– Operate remote control - V.A.G 1348/3A- . Then slowly close shut-off tap -arrow- until a pressure of 4 bar is displayed on pressure gauge. From this point on do not move position of shut-off tap.
– Drain measuring container.

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– The quantity of fuel delivered by the fuel pump is dependant on the battery voltage, therefore, also connect multimeter - V.A.G 1715- to contacts -1 and 5- of 5-pin test instrument/DSO adapter - VAS 5565- .

– Operate remote control for 60 seconds while measuring voltage at fuel pump.



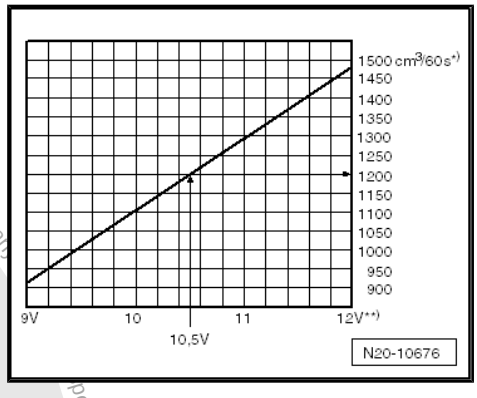
– Compare quantity of fuel delivered with specification.

*) Minimum delivery rate cm^3/60 s

**) Voltage at fuel pump with engine not running and pump running.

Example:

During the test a voltage of 10.5 volts is measured. This equates to a minimum delivery rate of approx. 1200 cm^3/60 s.



If the specification is not attained:

– Check fuel lines for possible restrictions (kinks) or blockages.

If no fault is found:

– Remove cap from fuel filler neck and repeat check. If fuel delivery rate is now reached, check fuel tank breather.

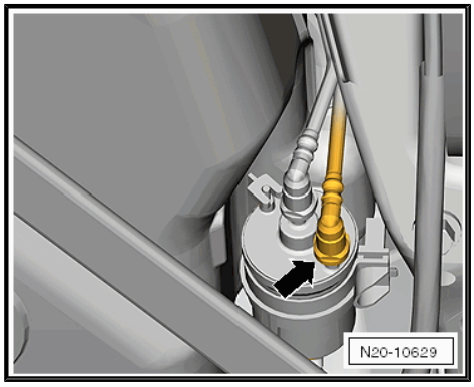
If the specifications are still not attained:

– Check fuel filter (proceed as follows):

WARNING

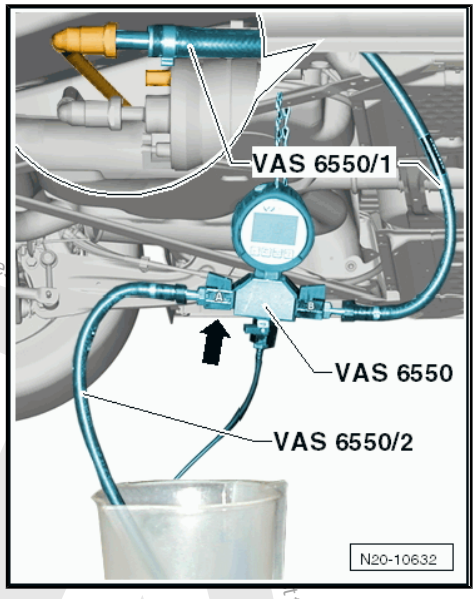
Fuel supply line is pressurised. Wear eye protection and protective clothing to avoid possible injury and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

– Pull fuel supply line -arrow- off fuel filter.



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– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/1- . Hold adapter - VAS 6550/2- in a measuring container.
– Make sure that drain tap is closed and cut-off taps are open.
– Operate remote control - V.A.G 1348/3A- . Then slowly close shut-off tap -arrow- until a pressure of 4 bar is displayed on pressure gauge. From this point on do not move position of shut-off tap.
– Drain measuring container.
– Repeat delivery rate check.



If the minimum delivery rate is now attained:

– Renew fuel filter.

If the minimum delivery rate is again not attained

– Remove fuel delivery unit and check filter strainer for soiling.

Only if still no fault has been detected:

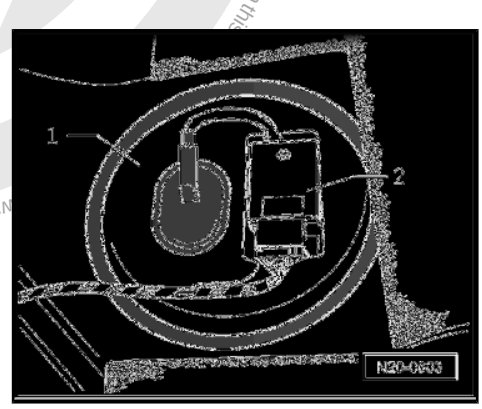
– Renew fuel delivery unit.

If fuel delivery rate has been attained, but nevertheless you suspect a fuel supply system fault (e.g. intermittent failure of fuel supply system):

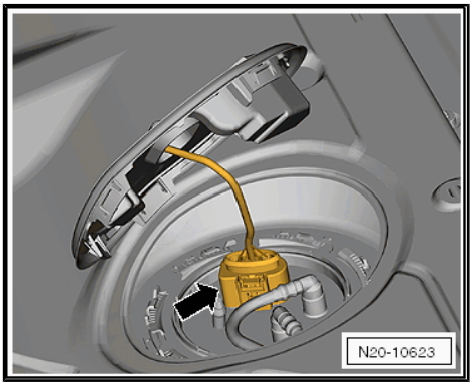
– Measure current draw of fuel pump ⇒ page 225 .

7.5.5 Checking current draw

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.

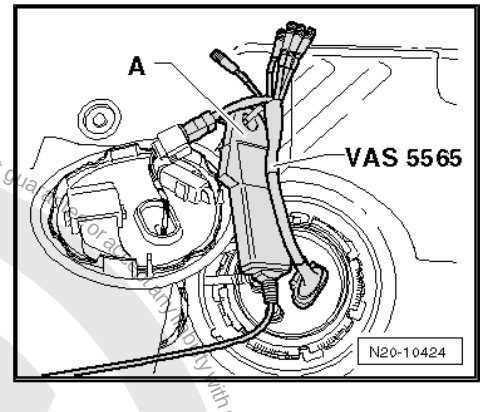


– First check that the connector -arrow- is fitted securely by pulling the connector without pressing the catch. The connector can cause a fault if it has not been fitted correctly.
– Now pull off connector.
– Check the contacts on the connector and on the fuel delivery unit for damage.



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– 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- .
– Start engine and run at idling speed.
– Measure current draw of fuel pump.
• Specification: max. 9 amps (Eos, Golf, Golf Plus,Scirocco).
• Specification: max. 10 amps (Passat).



Note

♦ *The starting current for the fuel pump can lie briefly above specifications when starting the engine.*
♦ *If the fault in the fuel system is not always evident, the check can also be carried out during a road test. A 2nd person is required to do this, however.*

If the current draw is exceeded:

– Fuel pump defective, renew fuel delivery unit ⇒ page 212 .

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8 Repairing fuel supply (Passat)

Note

- *Hose connections are secured with either spring-type or clamp-type clips.*
- *Renew clamp-type clips with spring-type clips.*
- *Fuel hoses on engine must be secured with spring-type clips only. The use of clamp or screw-type clips is not permissible.*
- *Hose clip pliers - VAS 6340- are recommended to install spring-type clips.*

Observe safety precautions when working on fuel supply system ⇒ page 176 .

Observe rules for cleanliness ⇒ page 227 .

Observe crash fuel shut-off ⇒ page 227 .

Removing and installing fuel delivery unit ⇒ page 228 .

Removing and installing fuel gauge sender - G- ⇒ page 231 .

Checking fuel pump ⇒ page 233 .

8.1 Rules for cleanliness

When working on the fuel supply and injection system, pay careful attention to the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.
- Place removed parts on a clean surface and cover. Use only lint-free cloths.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air. Do not move vehicle.

8.2 Crash fuel shut-off

Function

Crash fuel shut-off system reduces the risk of a vehicle burning in event of a crash in that the fuel pump is switched off. The system also improves the starting characteristics of the engine. When door is opened, the fuel pump is activated for 2 seconds to build up pressure in the fuel system.

When opening fuel system:

Observe safety precautions ⇒ page 176 .

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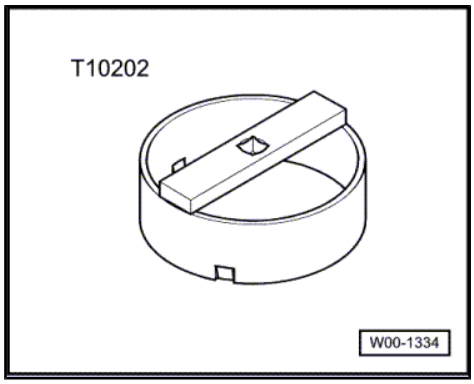
8.3 Removing and installing fuel delivery unit

Note

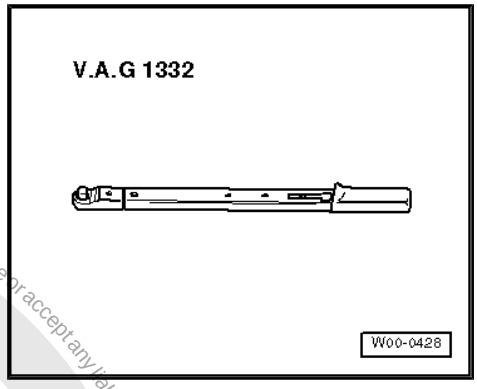
After removing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.

Special tools and workshop equipment required

- Hexagon key - T10202-



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



Removing:

Caution

Prerequisites:

- ***Fuel tank must not be more than 3/4 full. This ensures that the fill level is below the flange of the fuel delivery unit.***

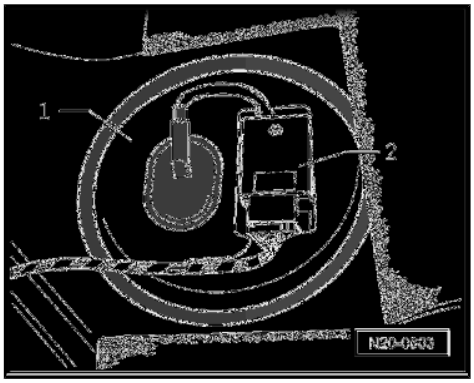
Note

- *Drain fuel tank with fuel extractor - VAS 5190- .*
- *Observe safety precautions ⇒ page 176 .*
- *Observe rules for cleanliness ⇒ page 227 .*

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Removing and installing bench seat .

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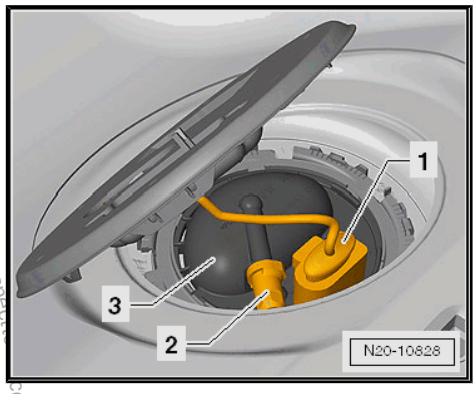
– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



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.

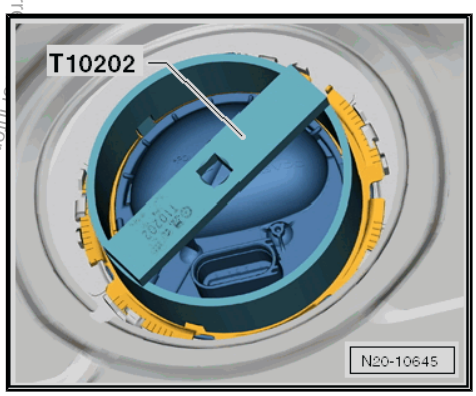
– Release and pull off connector -1-.
– Release fuel line -2- and pull it off fuel delivery unit flange -3-.



Note

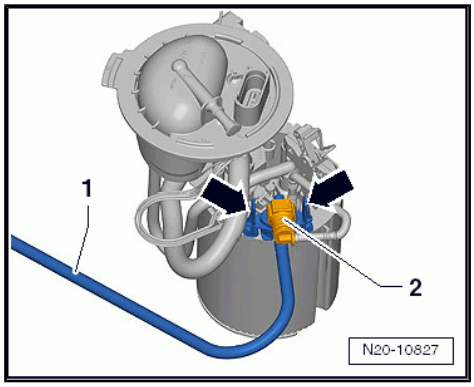
- *Make sure all components are mounted in the correct position.*
- *Press in securing ring to release fuel lines.*
- *On vehicles with auxiliary heater the connector and the fuel line of the metering pump - V54- must also be separated.*

– Open locking ring using wrench - T10202- and raise flange slightly.
– Take fuel delivery unit flange as far as possible out of the opening in the fuel tank.
– Pull seal out of opening.



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– Release and unplug connector -2-.
– Release suction line of suction-jet pump -arrow- and pull it off.
– Take delivery unit out of fuel tank through the opening.



Note

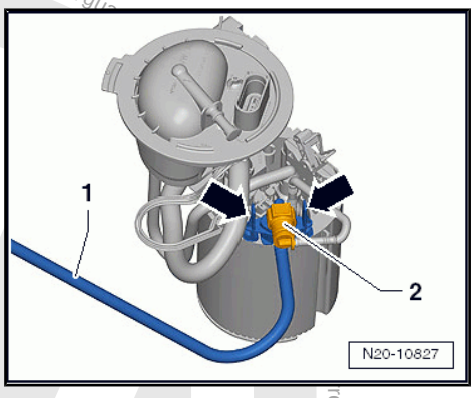
- *If pump unit is to be renewed, old pump unit must be drained before disposal.*
- *Observe disposal regulations*

Installing:

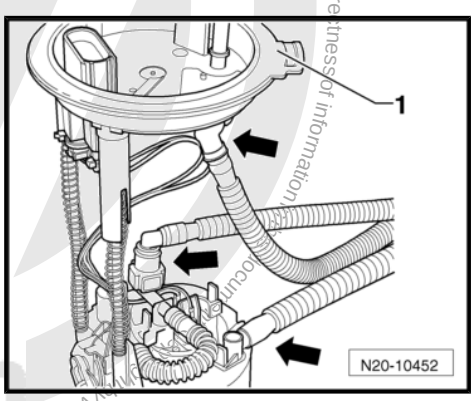
Note

Make sure all components are mounted in the correct position.

– Renew seal.
– Insert seal for fuel delivery unit dry into opening of fuel tank.
– Coat inner side of seal with fuel.
– When inserting fuel delivery unit, ensure that fuel gauge sender is not bent.
– Attach suction line of suction-jet pump -arrows- and click in place.
– Attach connector -2-.



– Check whether flange -1- is correctly seated on fuel delivery unit.



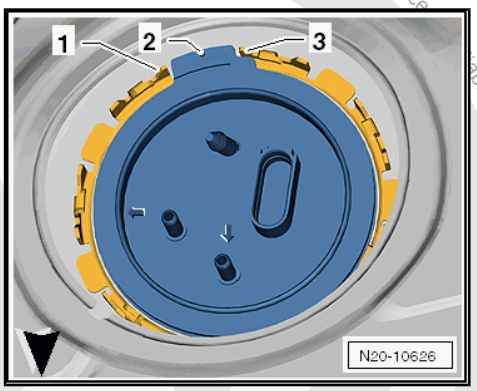
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– Push sealing flange downwards against spring force and move sealing flange into installation position.

• Tab -2- on sealing flange must be between lugs -1- and -3- on fuel tank.

• The -arrow- points forwards.

– Tighten sealing flange.

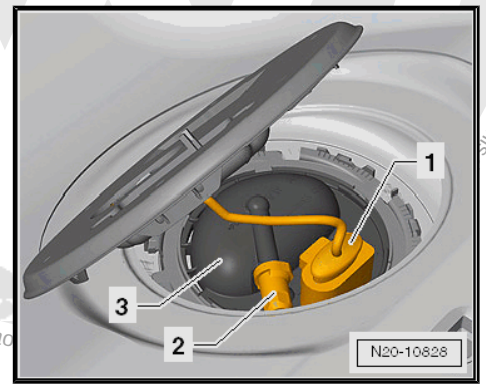


– Attach connector -1-.

– Attach fuel lines -2-.

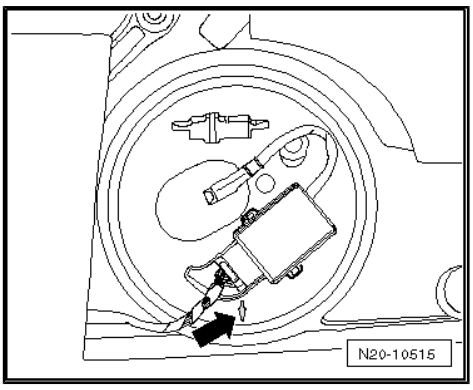
– Ensure push-fit couplings and electrical connectors are secured properly by pulling.

Further installation is performed in the reverse sequence. In the process, note the following:



♦ Observe installation position of fuel feed line to auxiliary heater ⇒ Auxiliary heater; Rep. gr. 82 ; Fuel feed Thermo Top V .

♦ The -arrow- on the cover points forwards.



Specified torque

Component	Specified torque
Locking ring	110 Nm

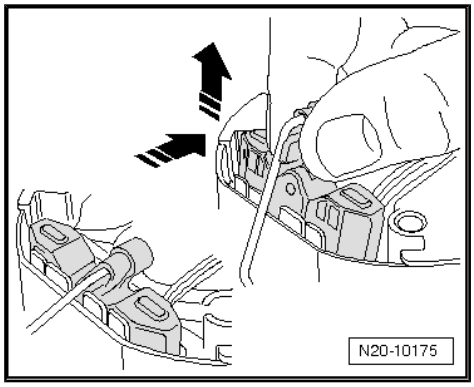
8.4 Removing and installing fuel gauge sender G

Removing:

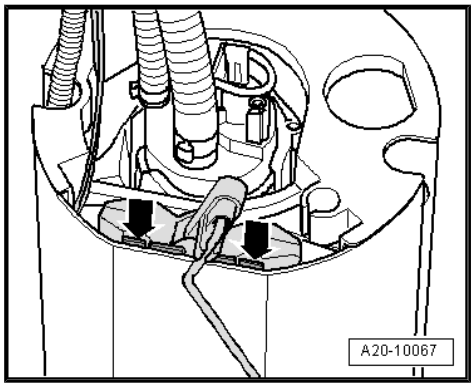
– Remove fuel delivery unit ⇒ page 228 .

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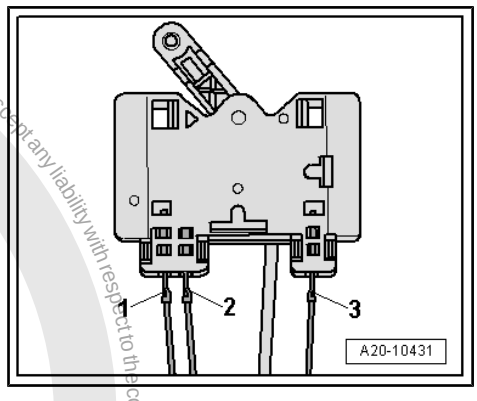
– Pull fuel gauge sender - G- slightly to side and upwards at the same time.



– If the sender cannot be released in this way, push the securing tabs -arrows- to the side slightly.
– Note colour assignment of cables for re-installation.

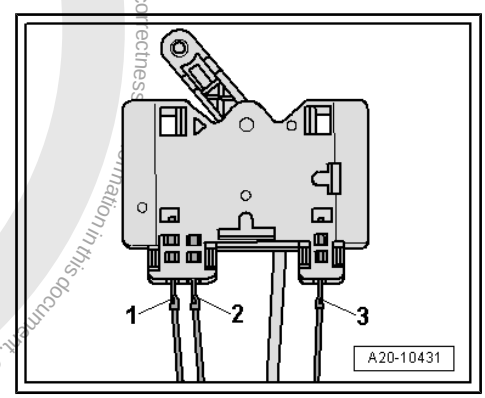


– Release and pull off connectors -1…3- and bend back the locking hooks of connectors.



Installing:

– Connect connectors -1…3-. Note colour assignment.
– Check connectors are secured properly by pulling.
– Insert fuel gauge sender - G- into guide on fuel delivery unit and press down until it engages.
– Install fuel delivery unit ⇒ page 230 .



Specified torque

Component	Specified torque
Locking ring	110 Nm

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8.5 Checking fuel pump

Note

After removing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.

Special tools and workshop equipment required

- Pressure gauge - VAS 6550-
- Remote control - V.A.G 1348/3A-
- Test instrument adapter/ DSO (5-pin) - VAS 5565-
- Multimeter - V.A.G 1715-
- Insert tool, 22 mm - T10202-
- Torque wrench - V.A.G 1332-
- Measuring container, capacity 2 litres



8.5.1 Checking function and voltage supply

Test prerequisites

- Battery voltage at least 11.5 V
- Fuse for Fuel pump control unit - J538- OK.
- Fuel pump control unit - J538- OK.

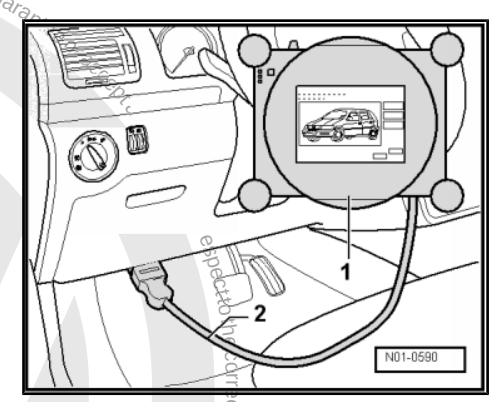
Test sequence:

Note

Function of fuel pump is checked using final control diagnosis.

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– Connect Vehicle diagnosis tester as follows:
– Connect diagnosis cable connector to diagnostic connection in driver footwell.
– Switch ignition on.
– Press one after the other in the display the buttons for `Vehicle self-diagnosis`, `Engine electronics` and `Final control diagnosis`.
– Press right arrow button on display up to final control diagnosis for fuel pump electronics.



The fuel pump must now run slowly up to maximum speed.

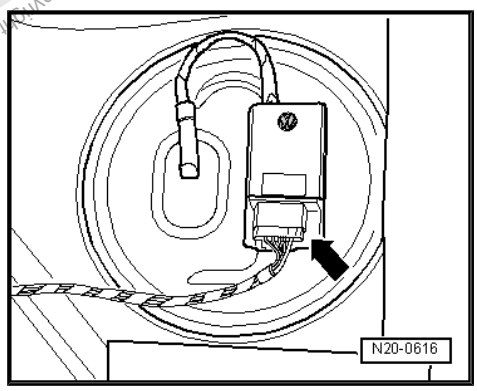
Note

The fuel pump runs very quietly.

– Switch off ignition.

If fuel pump does not run:

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
– Pull connector from fuel pump control unit - J538- .



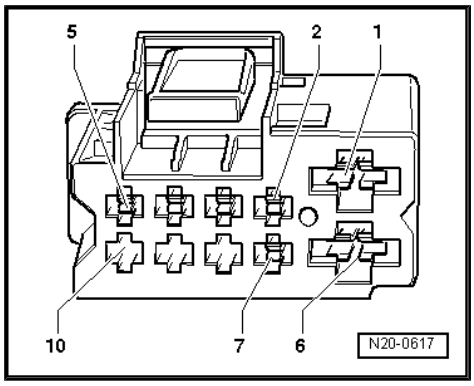
– Check voltage supply between contacts -1- and -6- using multimeter - V.A.G 1715- .

• Specification: approx. battery voltage

Voltage supply not OK:

– Locate and eliminate open circuit referring to current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

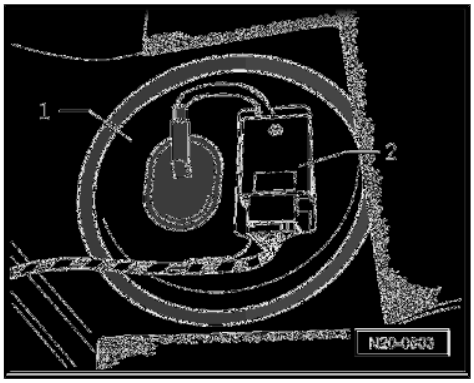
Voltage supply OK:



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– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.

– Check that connector -arrow- is fitted securely by pulling connector without pressing catch. If connector was not inserted correctly, repeat functional check of fuel pump.



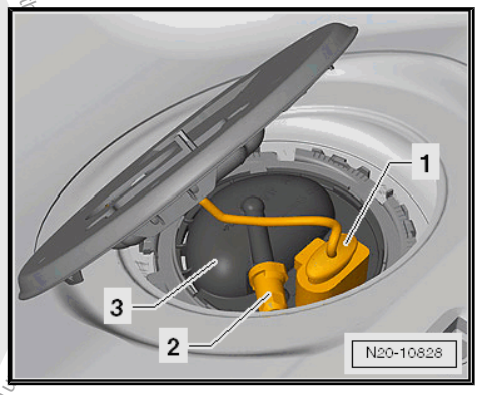
WARNING

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.

– Release and pull off connector -1-.

– Release fuel lines -2- and pull them off fuel delivery unit flange -3-.

– Check contacts on plug and on fuel delivery unit for damage.

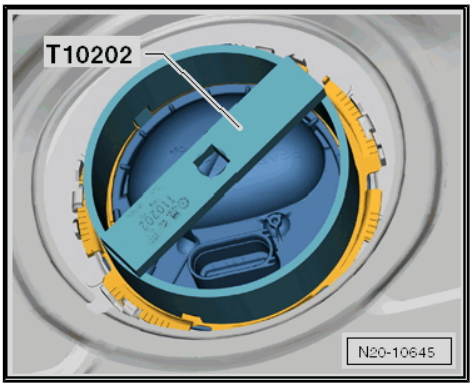


Note

- *Press in securing ring to release fuel lines.*
- *On vehicles with auxiliary heater the connector and the fuel line of the metering pump - V54- must also be separated.*

– Open locking ring using wrench - T10202- .

– Check that electrical wires between flange and fuel pump are connected.



If no open circuit can be found:

– Renew fuel delivery unit ⇒ page 228 .

8.5.2 Checking fuel pressure

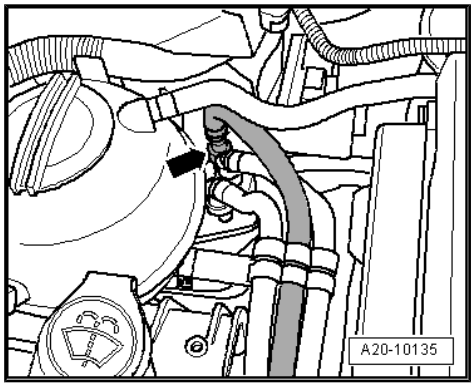
WARNING

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 supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.

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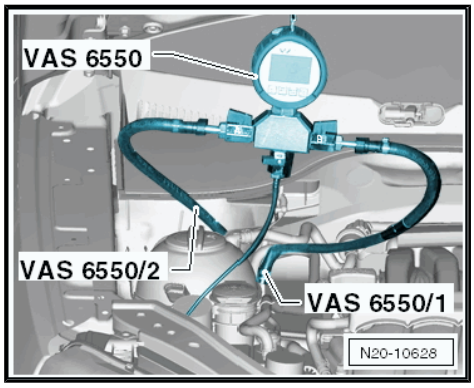
– Separate push-on couplings ⇒ page 178 .



Note

Press in securing ring to release fuel line.

– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/1- and -VAS 6550/2- .



– Make sure that drain tap is closed and cut-off taps are open.
– Actuate fuel pump with final control diagnosis to build up fuel pressure.
– Read off fuel pressure on pressure gauge.
• Specification: 4.0…7.0 bar.

If fuel pressure is OK, check holding pressure ⇒ page 236 .

If the specification is exceeded:

– Pressure limiting valve in fuel delivery unit is defective.

Note

Pressure limiting valve and fuel filter are integrated in fuel delivery unit and cannot be renewed individually.

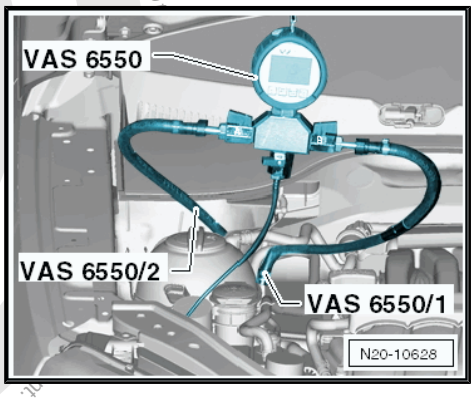
– Renew fuel delivery unit ⇒ page 228 .

If the specification is not attained:

– Fuel pump is defective, renew fuel delivery unit ⇒ page 228 .

8.5.3 Checking holding pressure

• Fuel pressure OK and pressure tester - VAS 6550- connected. Check fuel pressure ⇒ page 235 .



Test sequence:

– Actuate fuel pump with final control diagnosis to build up fuel pressure.
– Read off fuel pressure on pressure gauge.
• Specification: 4.0…7.0 bar
– Observe pressure drop on pressure gauge. After 10 minutes, pressure must not drop below 3.0 bar.

If the pressure drops further:

– Actuate fuel pump with final control diagnosis to build up fuel pressure.

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– After pressure has built up, cut-off tap -B- of pressure tester immediately. Lever is then at right angle to direction of flow.



If the pressure does not drop now:

Note

Search for leak on engine side. Repeat holding pressure test. This time, close shut-off tap -A- to check whether leak actually is on engine side.

– Check fuel pipe to high-pressure pump for leaks.

If no fault is found:

– Renew high-pressure pump ⇒ page 313 .

If the pressure drops again:

Leak must be sought on fuel tank side; proceed as follows:

– Check fuel line leading to fuel tank for leaks.

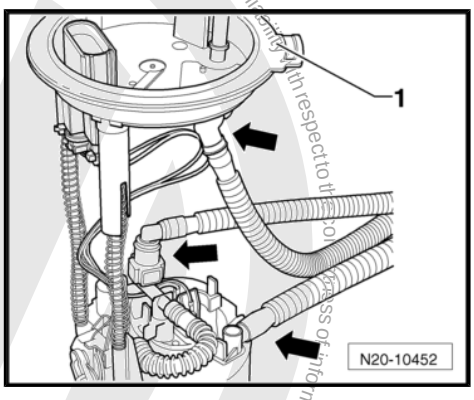
If the fuel line is found to be ok:

– Open fuel delivery unit flange -1- ⇒ page 228 .

– Check that all hose connections are connected.

If no fault is found:

– Renew fuel delivery unit.



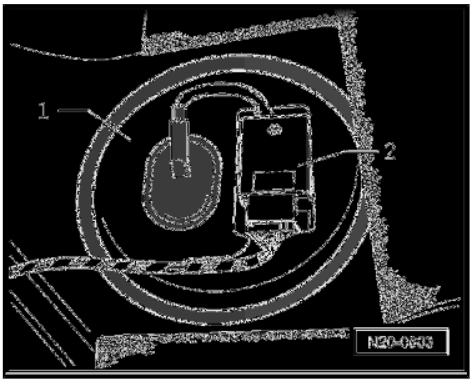
8.5.4 Checking fuel delivery rate

Note

When driving characteristic problems occur when the fuel tank is a approx. 1/4 filled, then check fuel delivery rates with approx. 1/4 filled tank or less.

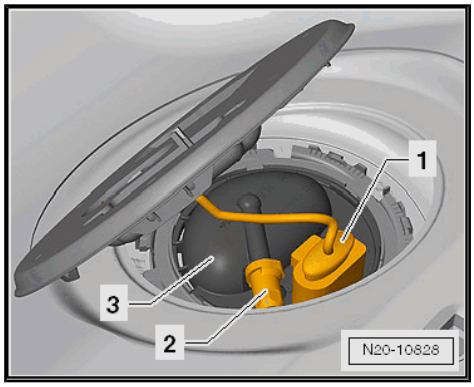
– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.

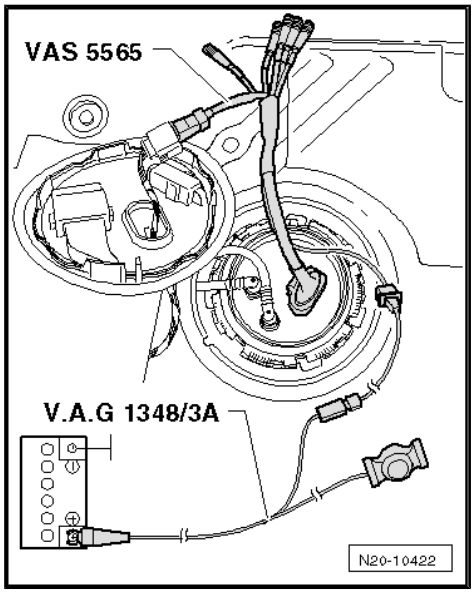


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– Check that connector -1- is fitted securely by pulling connector without pressing catch. The connector can cause a fault if it has not been fitted correctly.
– Now pull off connector.
– Check contacts on plug and on fuel delivery unit for damage.



– Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
– Connect remote control - V.A.G 1348/3A- to adapter - VAS 5565- and to battery positive terminal in engine compartment.



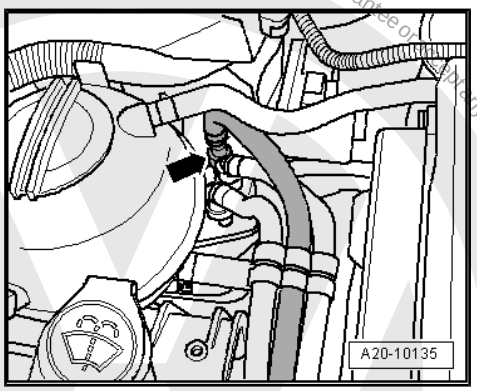
Note

This step serves only to have the fuel pump running when the engine is stopped.

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 supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.
– Separate push-on couplings ⇒ page 178 .



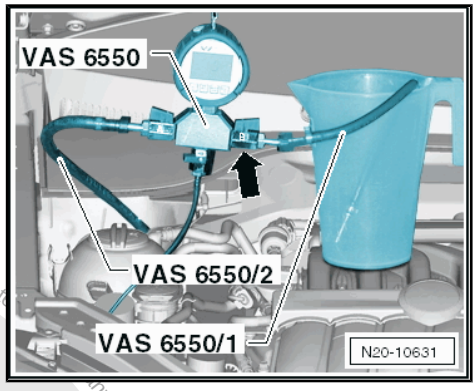
Note

Press in securing ring to release fuel lines.

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– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- . Hold adapter - VAS 6550/1- in a measuring container.

– Make sure that drain tap is closed and cut-off taps are open.



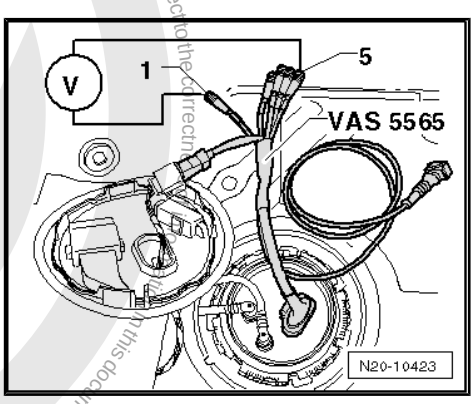
WARNING

Danger of spraying! Wear eye protection and protective clothing to avoid possible injury and skin contact. Hold container in front of open connection of pressure tester.

– Operate remote control - V.A.G 1348/3A- . Then slowly close shut-off tap -arrow- until a pressure of 4 bar is displayed on pressure gauge. From this point on do not move position of shut-off tap.

– Drain measuring container.

– The quantity of fuel delivered by the fuel pump is dependant on the battery voltage. The multimeter - V.A.G 1715- must therefore be connected to contacts -1- and -5- of 5-pin test instrument/DSO adapter - VAS 5565- as well.



Then:

– Operate remote control for 60 seconds, whilst measuring voltage at fuel pump.

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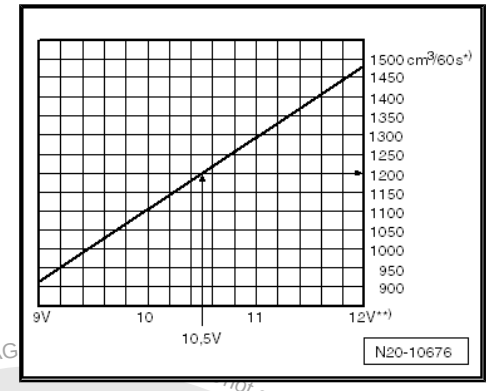
– Compare delivered quantity of fuel with specification.

*) Minimum delivery rate cm^3/60 s

**) Voltage at fuel pump with engine not running and pump running.

Example:

During the test a voltage of 10.5 volts is measured. This equates to a minimum delivery rate of approx. 1200 cm^3/60 s.



If the specification is not attained:

– Check fuel lines for possible restrictions (kinks) or blockages.

If no fault is found:

– Remove cap from fuel filler neck and repeat check. If fuel delivery rate is now reached, check fuel tank breather ⇒ page 266 .

If the specifications are still not attained:

– Remove fuel delivery unit and check filter strainer for dirt.

If no fault is detected:

– Check current consumption of fuel pump ⇒ page 240 .

If no fault is detected:

– Renew fuel delivery unit ⇒ page 228 .

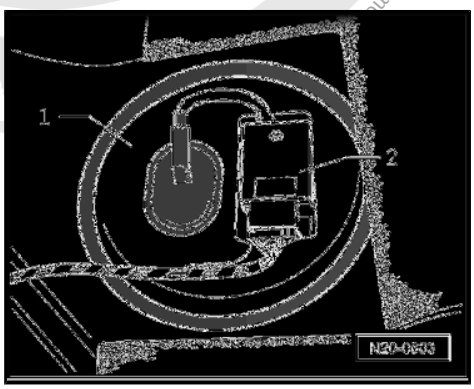
If fuel delivery rate has been attained, but nevertheless you suspect a fuel supply system fault (e.g. intermittent failure of fuel supply system):

– Check current consumption of fuel pump ⇒ page 240 .

8.5.5 Checking current draw

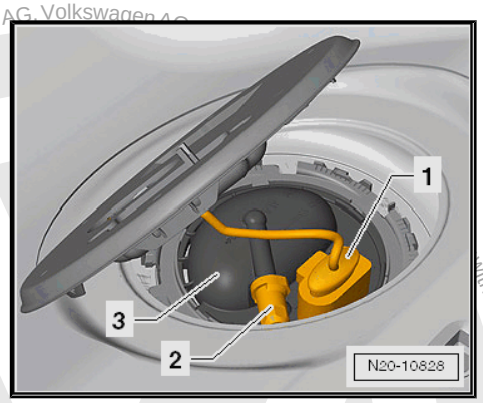
– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

– Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.

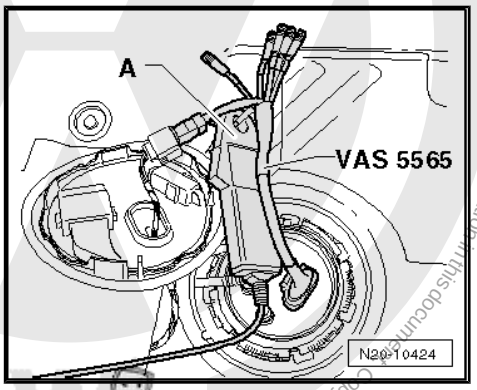


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– Check that connector -1- is fitted securely by pulling connector without pressing catch. The connector can cause a fault if it has not been fitted correctly.
– Release and pull off connector -1-.
– Check contacts on plug and on fuel delivery unit for damage.



– 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- .
– Start engine and run at idling speed.
– Measure current draw of fuel pump.
• Specification: max. 10 amps (Passat).



Note

♦ *The starting current for the fuel pump can lie briefly above specifications when starting the engine.*
♦ *If the fault in the fuel system is not always evident, the check can also be carried out during a road test. A 2nd person is required to do this, however.*

If the current draw is exceeded:

– Renew fuel delivery unit ⇒ page 228 .

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9 Repairing fuel supply (Tiguan)

Note

- *Hose connections are secured with either spring-type or clamp-type clips.*
- *Renew clamp-type clips with spring-type clips.*
- *Fuel hoses on engine must be secured with spring-type clips only. The use of clamp or screw-type clips is not permissible.*
- *Hose clip pliers - VAS 6340- are recommended to install spring-type clips.*

Safety precautions when working on fuel supply system ⇒ page 176 .

Observe rules for cleanliness ⇒ page 242 .

Observe crash fuel shut-off ⇒ page 242 .

Removing and installing fuel delivery unit (Tiguan) ⇒ page 243 .

Removing and installing fuel gauge sender - G- (Tiguan) ⇒ page 245 .

Removing and installing suction-jet pump (Tiguan) ⇒ page 246 .

Removing and installing fuel gauge sender 2 - G169- (Tiguan) ⇒ page 249 .

Checking fuel pump (Tiguan) ⇒ page 251 .

Removing and installing fuel pump control unit - J538- (Tiguan) ⇒ page 249 .

9.1 Rules for cleanliness

When working on the fuel supply and injection system, observe the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.
- Place removed parts on a clean surface and cover. Use only lint-free cloths.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When system is open, avoid working with compressed air and moving vehicle.

9.2 Crash fuel shut-off

Function

Crash fuel shut-off system reduces the risk of a vehicle burning in event of a crash in that the fuel pump is switched off. The system also improves the starting characteristics of the engine. When door is opened, the fuel pump is activated for 2 seconds to build up pressure in the fuel system.

When opening fuel system:

Observe safety precautions ⇒ page 176 .

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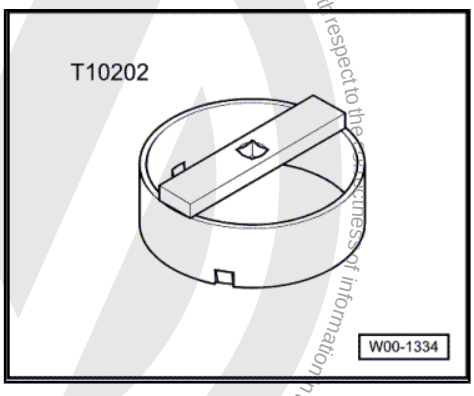
9.3 Removing and installing fuel delivery unit (Tiguan)

Note

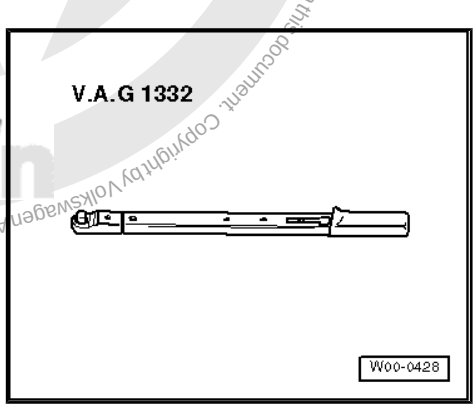
After removing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.

Special tools and workshop equipment required

- Hexagon key - T10202-



- Torque wrench - V.A.G 1332-



9.3.1 Removing

Caution

Prerequisites:

- ***Fuel tank must not be more than 1/2 full. This ensures that the fill level is below the flange of the fuel delivery unit.***

Note

Drain fuel tank with fuel extractor - VAS 5190- .

– Observe safety precautions ⇒ page 176 .

– Observe rules for cleanliness ⇒ page 242 .

– Check whether a coded radio is fitted. If so, obtain anti-theft coding:

– With ignition switched off, disconnect battery earth strap.

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– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

– Remove cover of fuel delivery unit.

WARNING

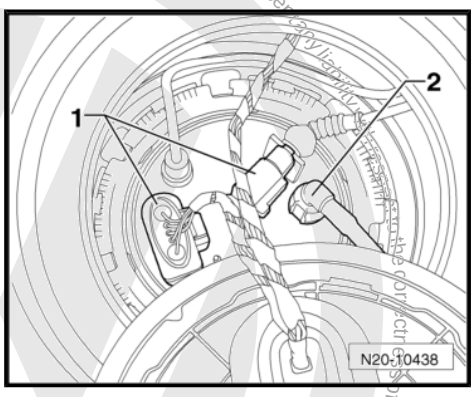
Fuel system is under pressure! Wear eye protection and protective gloves to avoid injuries and skin contact. Before loosening hose connections, wrap a cloth around the connection. Then release pressure by carefully pulling hose off connection.

– Check that the connector is fitted securely by pulling the connector without pressing the catch.

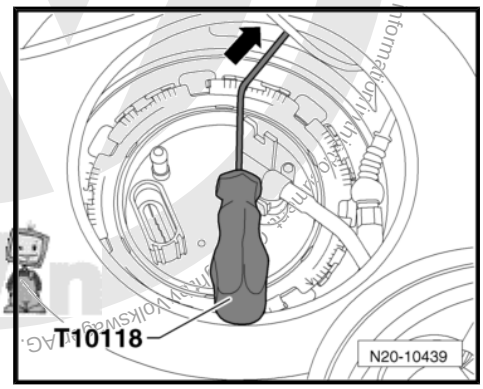
Note

Check contacts of connectors for damage.

– Pull connector -1- and fuel line -2- off right flange (in direction of travel).

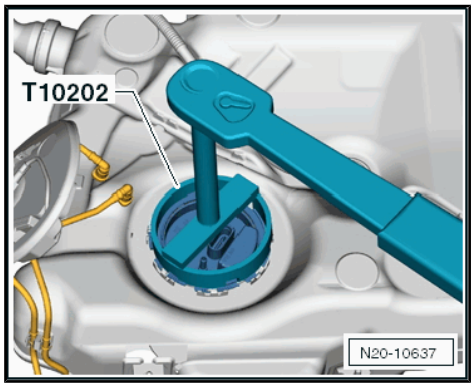


– Release connector -arrow- at fuel pump control unit - J538- and pull off with the assembly tool - T10118- .



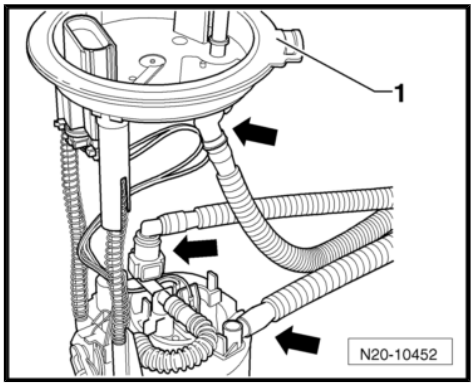
– Open locking ring using wrench - T10202- .

– Lift delivery unit slightly and remove seal out of opening in fuel tank.



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– Release fuel hoses at delivery unit -arrows- and pull delivery unit out of fuel tank.

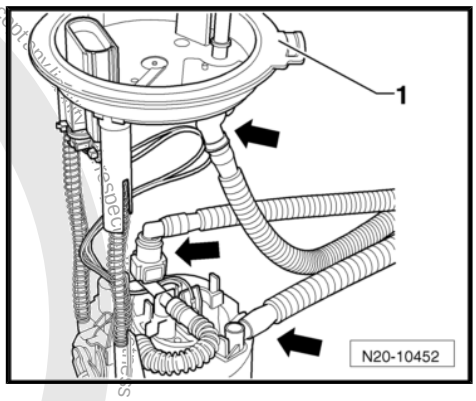


Note

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

9.3.2 Installing

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



Note

- *Fuel hoses are allocated to respective unions.*
- *Ensure push-fit couplings are secured properly by pulling.*
- *When inserting fuel delivery unit, ensure that fuel gauge sender - G- is not bent.*
- *Insert seal for fuel delivery unit dry into opening of fuel tank.*
- *Moisten seal with fuel only when installing fuel delivery unit.*
- *Note installation position of flange for fuel delivery unit: tab -1- must point in direction of travel. The fuel delivery unit flange can be installed only in this position.*
- *Ensure that line connections are tight.*

Specified torque

Component	Specified torque
Locking ring	110 Nm

9.4 Removing and installing fuel gauge sender - G- (Tiguan)

– Remove fuel delivery unit ⇒ page 243 .

Special tools and workshop equipment required

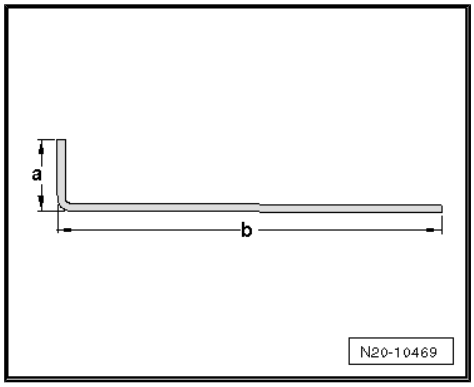
- Welding wire (material thickness = 2 mm)

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– Bend 80 mm long welding wire as shown.

Dimension -a-: 10 mm

Dimension -b-: 70 mm

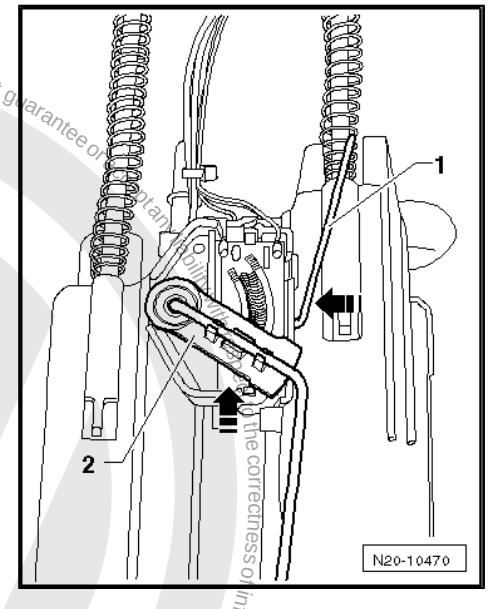


Removing

– Release connector of wiring for fuel gauge sender -2- and disconnect it.

– Press welding wire -1- in direction of -arrow- into recess beneath sender.

– At the same time, push fuel gauge sender -2- from guides in direction of -arrow-.



Installing

– Insert fuel sender into guides on fuel delivery unit and press downwards until it engages.

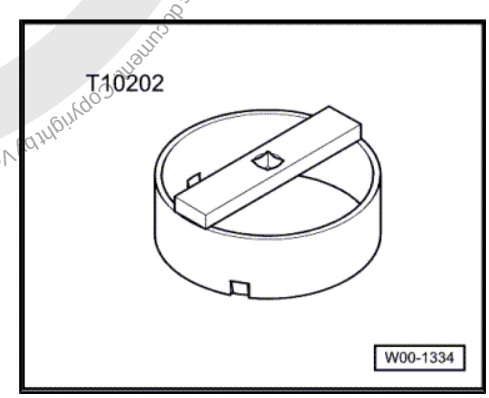
– Attach connector and ensure secure engagement.

– Install fuel delivery unit ⇒ page 243 .

9.5 Removing and installing suction-jet pump (Tiguan)

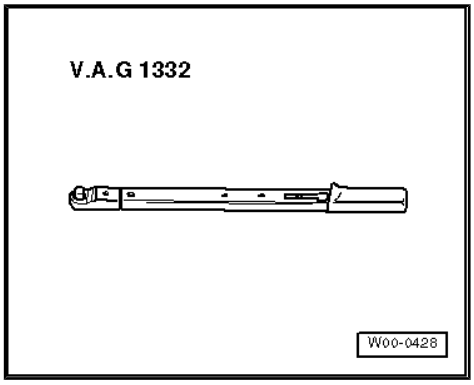
Special tools and workshop equipment required

♦ Hexagon key - T10202-



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- Torque wrench - V.A.G 1332-



Note

- *In the case of the Tiguan, 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.*
- *The fuel delivery unit must first be removed to remove the suction-jet pump.*
- *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.*

9.5.1 Removing

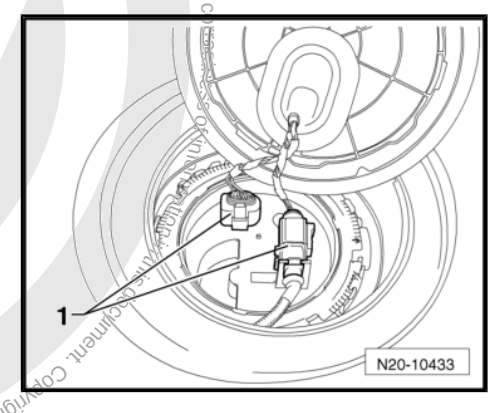
– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

– Remove fuel delivery unit ⇒ page 243 .

– Remove cover on left (as seen looking in direction of travel) of fuel gauge sender 2 - G169- .

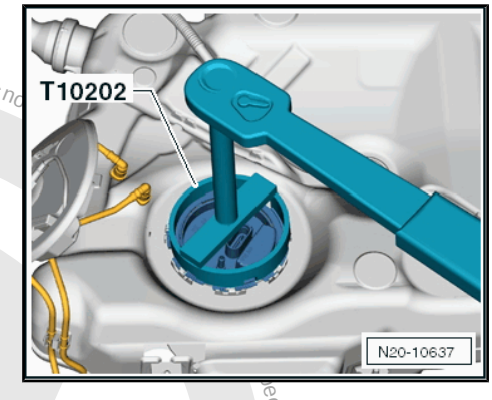
– Check that the connector is fitted securely by pulling the connector without pressing the catch. The connector can cause a fault if it has not been fitted correctly.

– Pull connector -1- off left flange.



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– Open locking ring using wrench - T10202- .
– Lift flange slightly and remove seal out of opening in fuel tank.
– Pull flange together with fuel gauge sender 2 - G169- out of fuel tank.
– Check that the fuel lines on suction-jet pump are fitted securely and are not damaged.
– Additionally check suction-jet pump for any dirt.



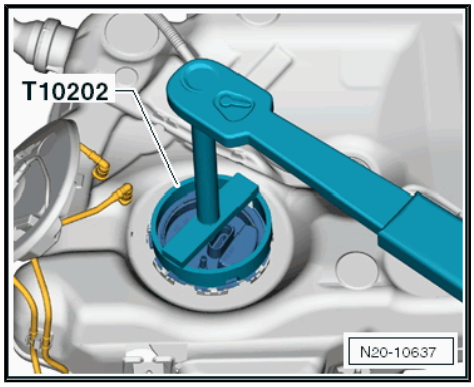
9.5.2 Installing

Caution

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

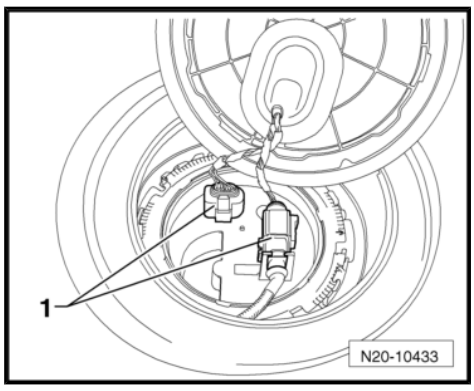
– Insert flange together with fuel gauge sender 2 - G169- into fuel tank. The lug on the flange points in direction of travel.
– Place fuel lines in right chamber of fuel tank ensuring they are not kinked.
– Place a new flange seal dry into aperture in fuel tank and moisten inside (contact to flange) with fuel.
– Make sure fuel gauge sender 2 - G169- ⇒ page 204 is installed in correct position.
– Make sure that oil seal is in correct position.
– Tighten locking ring using wrench - T10202- .

Specified torque: 110 Nm



– Reconnect connector -1- and check it is secured properly by pulling.
– Install fuel delivery unit ⇒ page 243 .

Further assembly is performed in the reverse order of removal.



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9.6 Removing and installing fuel gauge sender 2 - G169- (Tiguan)

– Removing and installing suction-jet pump (Tiguan) ⇒ page 246 .

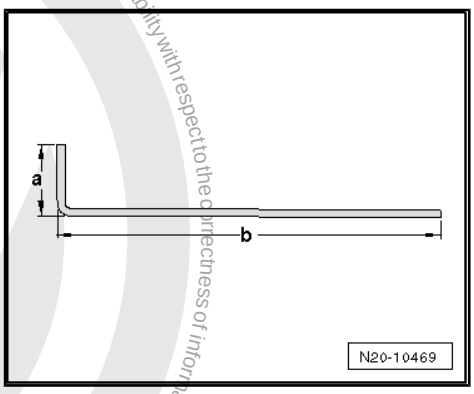
Special tools and workshop equipment required

♦ Welding wire (material thickness = 2 mm)

– Bend 80 mm long welding wire as shown.

Dimension -a-: 10 mm

Dimension -b-: 70 mm

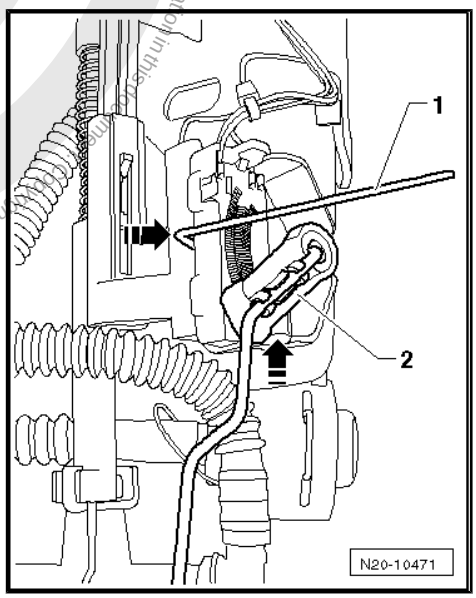


Removing

– Release connectors for lines for fuel gauge sender - G169- -2- and pull off.

– Press welding wire -1- in direction of -arrow- into recess beneath sender.

– At the same time, push fuel gauge sender 2 - G169- -2- from guides in direction of -arrow-.



Installing

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

– Insert fuel gauge sender 2 - G169- into guides and press down until it engages.

– Attach connector and ensure secure engagement.

– Install fuel delivery unit ⇒ page 243 .

9.7 Removing and installing fuel pump control unit - J538- (Tiguan)

Note

The fuel pump control unit - J538- is installed on the fuel tank.

Special tools and workshop equipment required

♦ Commercially available plain slot screwdriver (blade length 120 mm)

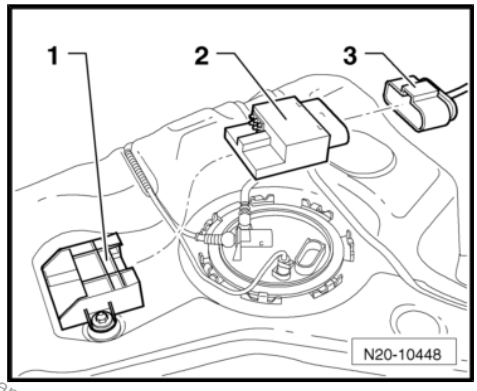
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Fuel pump control unit - J538- fitting location

1 - Bracket for fuel pump control unit - J538-

2 - Fuel pump control unit - J538-

3 - Connector



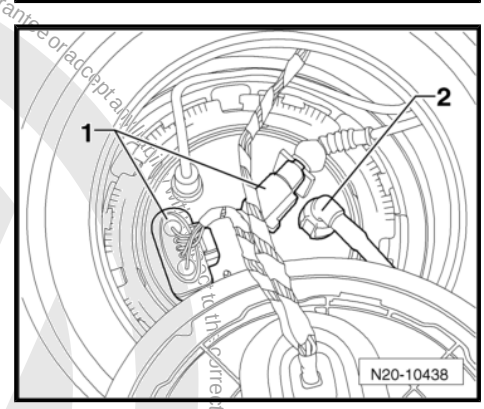
Removing

– Remove cover on right (as seen looking in direction of travel) from fuel delivery unit.

– Check that 5-pin connector -1- is fitted securely by pulling connector without pressing catch. The connector can cause a fault if it has not been fitted correctly.

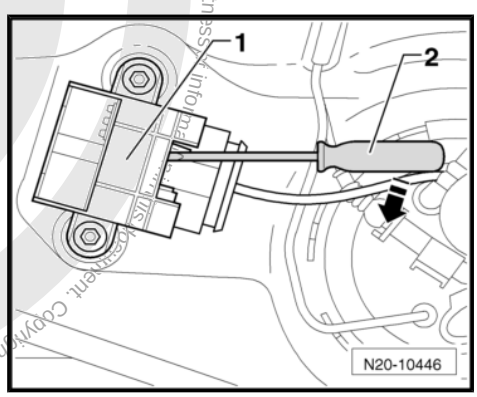
– Pull off connector -1-.

– Check contacts on plug and on fuel delivery unit for damage.



– Slide screwdriver -2- into bracket recess -1- directly above plug.

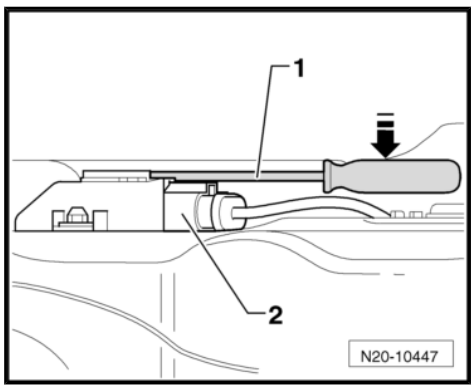
– Swivel screwdriver in -direct of arrow-.



– Press screwdriver downwards in direction of -arrow-, pulling control unit out of bracket by the plug at same time.

– Check that the connector is fitted securely by pulling the connector without pressing the catch. The connector can cause a fault if it has not been fitted correctly.

– Pull connector off control unit.

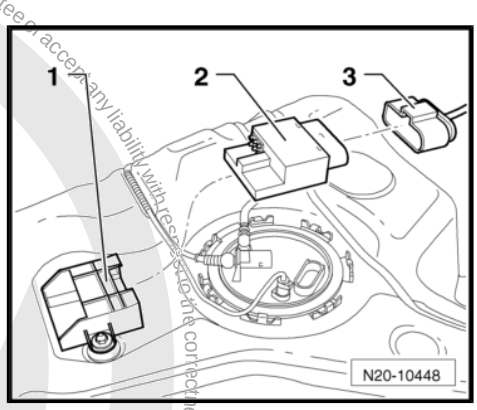


Installing

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– Connect connector -3- to control unit -2- and check secure engagement (by trying to pull it off).
– Slide control unit -2- into bracket -1- until it engages.

Further installation is carried out in the reverse sequence of removal.



9.8 Checking fuel pump (Tiguan)

Note

After removing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.

Special tools and workshop equipment required

- Pressure gauge - VAS 6550-
- Remote control - V.A.G 1348/3A-
- Test instrument adapter/ DSO (5-pin) - VAS 5565-
- Multimeter - V.A.G 1715-
- Hexagon key - T10202-
- Measuring container, capacity 2 litres



Checking function and voltage supply ⇒ page 252

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Check fuel pressure ⇒ page 253 .

Checking holding pressure ⇒ page 254 .

Checking fuel delivery rate ⇒ page 255 .

Checking current draw ⇒ page 258 .

9.8.1 Checking function and voltage supply

- Battery voltage at least 11.5 V
- Fuse for fuel pump on fuse holder OK ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Fuel pump control unit - J538- OK.

Test sequence:

Note

Function of fuel pump is checked using final control diagnosis.

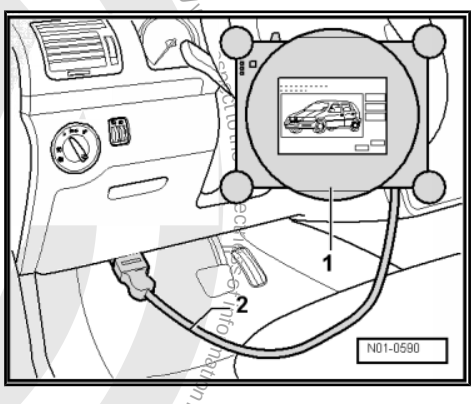
– Connect Vehicle diagnosis tester as follows:

– Connect diagnosis cable connector to diagnostic connection in driver footwell.

– Switch ignition on.

– Press one after the other in the display the buttons for `Vehicle self-diagnosis`, `Engine electronics` and `Final control diagnosis`.

– Press right arrow button on display up to final control diagnosis for fuel pump electronics.



The fuel pump must now run slowly up to maximum speed.

Note

The fuel pump runs very quietly.

– Switch off ignition.

If fuel pump does not run:

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

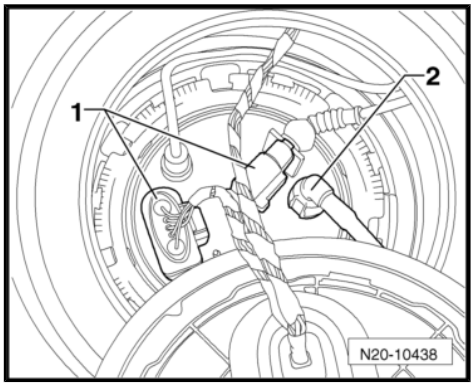
– Remove cover on right (as seen looking in direction of travel) from fuel delivery unit.

Note

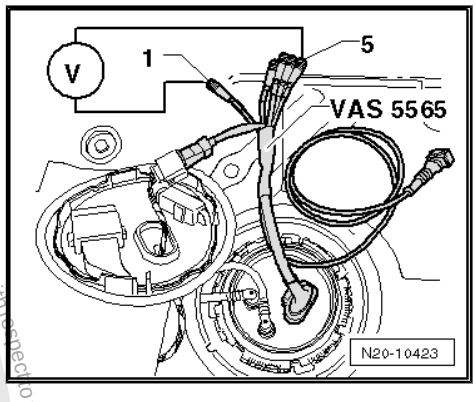
For vehicles with auxiliary heater the metering pump - V54- connector must be separated additionally.

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– Check that 5-pin connector -1- is fitted securely by pulling connector without pressing catch. If connector was not inserted correctly, repeat functional check of fuel pump.
– Now pull off connectors -1-.
– Check contacts on plug and on fuel delivery unit for damage.



– Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
– Connect multimeter - V.A.G 1715- to contacts -1- and -5- of adapters - VAS 5565- .
– Actuate fuel pump with final control diagnosis.
• The voltage must rise up to battery voltage during final control diagnosis.



Voltage supply not OK:

– Locate and eliminate open circuit referring to current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Voltage supply OK:

– Remove fuel delivery unit ⇒ page 243 .
– Check that electrical wires between flange and fuel pump are connected.

If no open circuit can be found:

– Renew fuel delivery unit ⇒ page 243 .

9.8.2 Checking fuel pressure

Test prerequisites

• Function of fuel pump has been checked ⇒ page 252 .

Test procedure

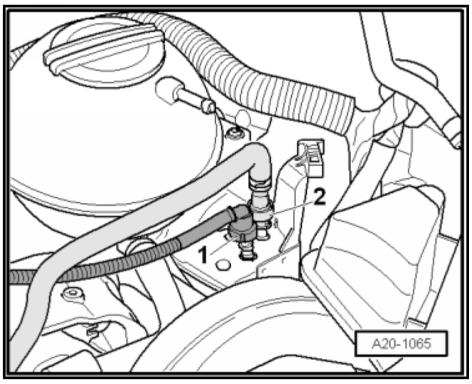
WARNING

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.

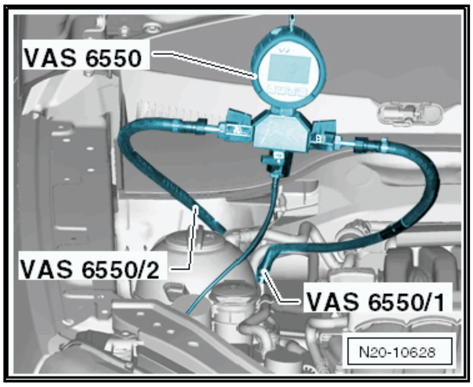
– Pull off supply line (metal coupling) -2- and catch escaping fuel with a cloth.

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– Separate push-on couplings ⇒ page 178 .



– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/1- and -VAS 6550/2- .



– Make sure that drain tap is closed and cut-off taps are open.

– Actuate fuel pump with final control diagnosis to build up fuel pressure.

– Read off fuel pressure on pressure gauge.

• Specification: 4.0…7.0 bar.

If fuel pressure is OK, check holding pressure ⇒ page 254 .

If the specification is not attained:

– Renew left flange with pressure limiting valve, suction jet pump and fuel filter.

Note

Pressure limiting valve and fuel filter are integrated into fuel gauge sender 2 - G169- with suction-jet pump and cannot be renewed individually.

– Repeat check.

If the specifications are still not attained:

– Renew fuel delivery unit ⇒ page 243 .

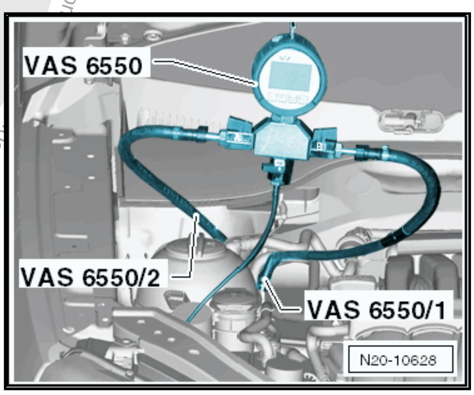
9.8.3 Checking holding pressure

Test prerequisite

• Fuel pressure OK and pressure tester - VAS 6550- connected. Check fuel pressure ⇒ page 253 .

Test sequence:

– Actuate fuel pump with final control diagnosis to build up fuel pressure.



– Read off fuel pressure on pressure gauge.

• Specification: 4.0…7.0 bar

– Observe pressure drop on pressure gauge. After 10 minutes, pressure must not drop below 3.0 bar.

If the pressure drops further:

– Actuate fuel pump with final control diagnosis to build up fuel pressure.

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– After pressure has built up, cut-off tap -B- of pressure tester immediately. Lever is then at right angle to direction of flow.



If the pressure does not drop now:

Note

Search for leak on engine side. Repeat holding pressure check. This time, close shut-off tap -A- to check whether leak actually is on engine side.

– Check fuel pipe to high-pressure pump for leaks.

If no fault is found:

– Renew high-pressure pump ⇒ page 309 .

If the pressure drops again:

Leak must be sought on fuel tank side; proceed as follows:

– Check fuel line leading to flange for leaks.

If no fault is detected on »external« fuel lines, search for leak in fuel tank. Proceed as follows:

– Open flanges on left and right. Ensure all hose connections are fitted correctly and do not leak.

If no fault is found:

– Renew left flange with pressure limiting valve and fuel filter. Repeat pressure retention test. If leak is still present, non-return valve in fuel pump leaks, renew fuel delivery unit ⇒ page 243 .

9.8.4 Checking fuel delivery rate

Note

When driving characteristic problems occur when the fuel tank is a approx. 1/4 filled, then check fuel delivery rates with approx. 1/4 filled tank or less.

Test prerequisites

- Voltage supply OK.

– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

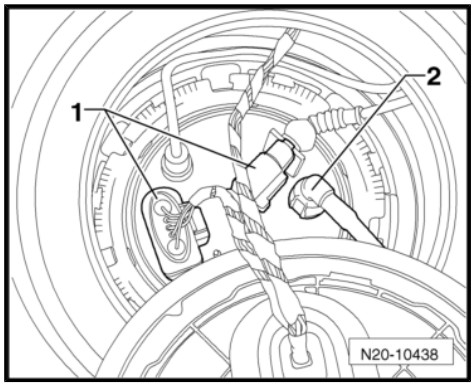
– Remove cover on right (as seen looking in direction of travel) from fuel delivery unit.

Note

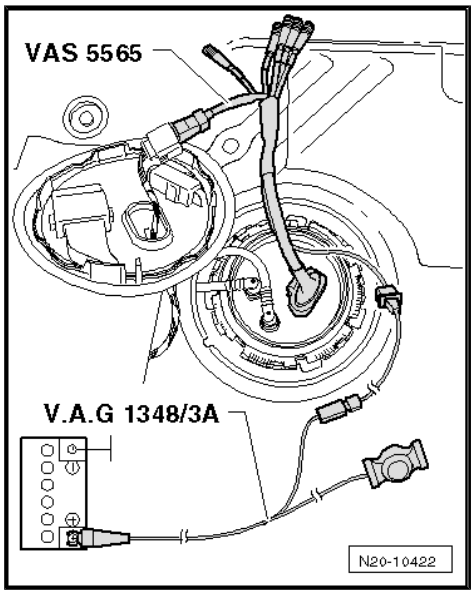
For vehicles with auxiliary heater the metering pump - V54- connector must be separated additionally.

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– Check that 5-pin connector -1- is fitted securely by pulling connector without pressing catch. The connector can cause a fault if it has not been fitted correctly.
– Pull off connector -1-.
– Check contacts on plug and on fuel delivery unit for damage.



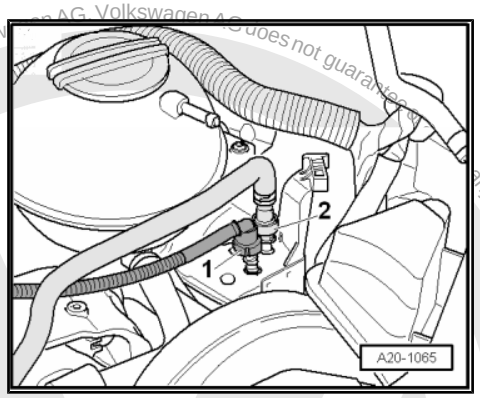
– Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
– Connect remote control - V.A.G 1348/3A- to test instrument adapter/DSO (5-pin) - VAS 5565- and to battery positive (+).



– Pull off supply line (metal coupling) -2- and catch escaping fuel with a cloth.

Note

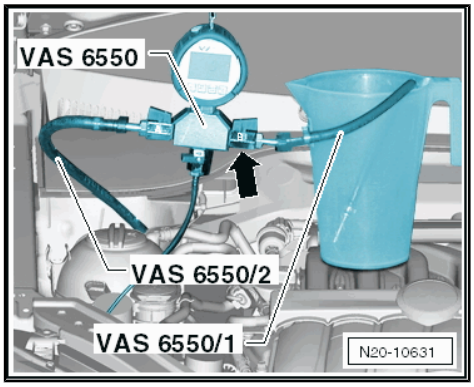
Press in securing ring to release fuel lines.



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– Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- . Hold adapter - VAS 6550/1- in a measuring container.

– Make sure that drain tap is closed and cut-off taps are open.



WARNING

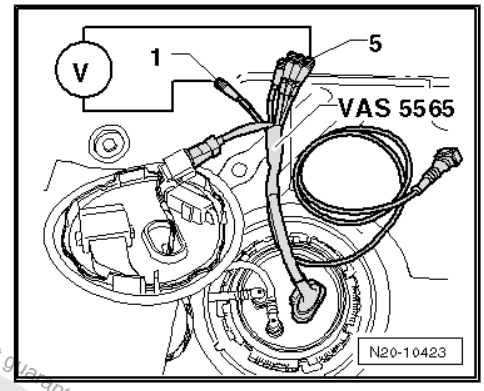
Danger of spray when shut-off tap is opened. Wear eye protection and protective clothing to avoid injuries and skin contact. Hold container in front of open connection of pressure tester.

– Operate remote control - V.A.G 1348/3A- . Then slowly close shut-off tap -arrow- until a pressure of 4 bar is displayed on pressure gauge. From this point on do not move position of shut-off tap.

– Drain measuring container.

– The delivery rate of the fuel pump depends on the battery voltage. Therefore also connect multimeter - V.A.G 1715- to contacts -1- and -5- of adapter - VAS 5565- .

– Operate remote control for 60 seconds, whilst measuring voltage at fuel pump.



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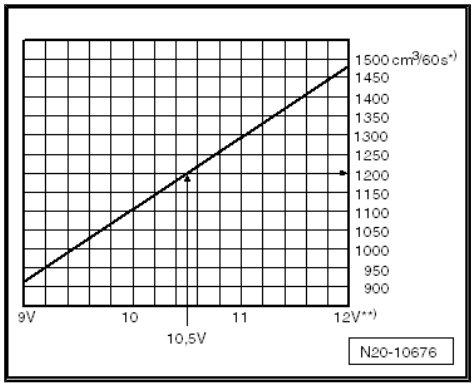
– Compare delivered quantity of fuel with specification.

*) Minimum delivery rate cm^3/60 s

**) Voltage at fuel pump with engine not running and pump running.

Example:

During the test a voltage of 10.5 volts is measured. This equates to a minimum delivery rate of approx. 1200 cm^3/60 s.



If the specification is not attained:

– Check fuel lines for possible restrictions (kinks) or blockages.

If no fault is found:

– Remove cap from fuel filler neck and repeat check. If fuel delivery rate is now reached, check fuel tank breather ⇒ page 269 .

If the specifications are still not attained:

– Open flanges on left and right. Ensure all hose connections are fitted correctly and do not leak. Check sieve in fuel delivery unit and fuel tank for coarse soiling.

If no fault is found:

– Renew left flange with pressure limiting valve and fuel filter. Repeat delivery rate check. If fuel delivery is still insufficient, fuel pump defective, renew fuel delivery unit.

If fuel delivery rate has been attained, but nevertheless you suspect a fuel supply system fault (e.g. intermittent failure of fuel supply system):

– Check current consumption of fuel pump ⇒ page 258 .

9.8.5 Checking current draw

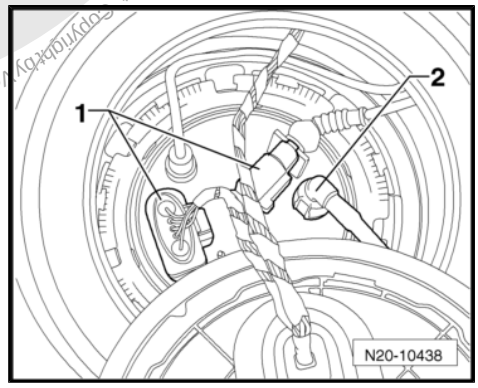
– Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

– Remove cover on right (as seen looking in direction of travel) from fuel delivery unit.

– Check that 5-pin connector -1- is fitted securely by pulling connector without pressing catch. The connector can cause a fault if it has not been fitted correctly.

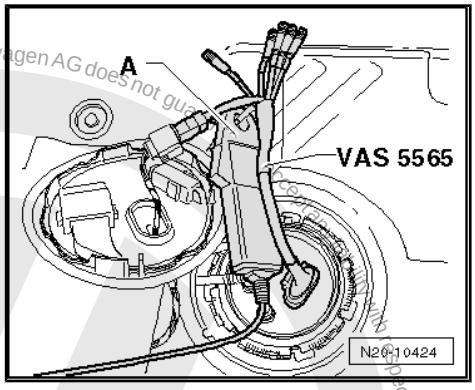
– Pull off connector -1-.

– Check contacts on plug and on fuel delivery unit for damage.



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– 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- .
– Start engine and run at idling speed.
– Measure current draw of fuel pump.
• Specification: max. 16 amps.



Note

♦ *The starting current for the fuel pump can lie briefly above specifications when starting the engine.*
♦ *If the fuel system malfunction is intermittent, the check can be performed during a road test, but a 2nd person is necessary.*

If the current draw is exceeded:

– Renew fuel delivery unit ⇒ page 243 .

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10 Repairing electronic power control (EPC)

Assembly overview ⇒ page 260 .

Removing and installing accelerator module ⇒ page 260

10.1 Assembly overview

1 - Connector

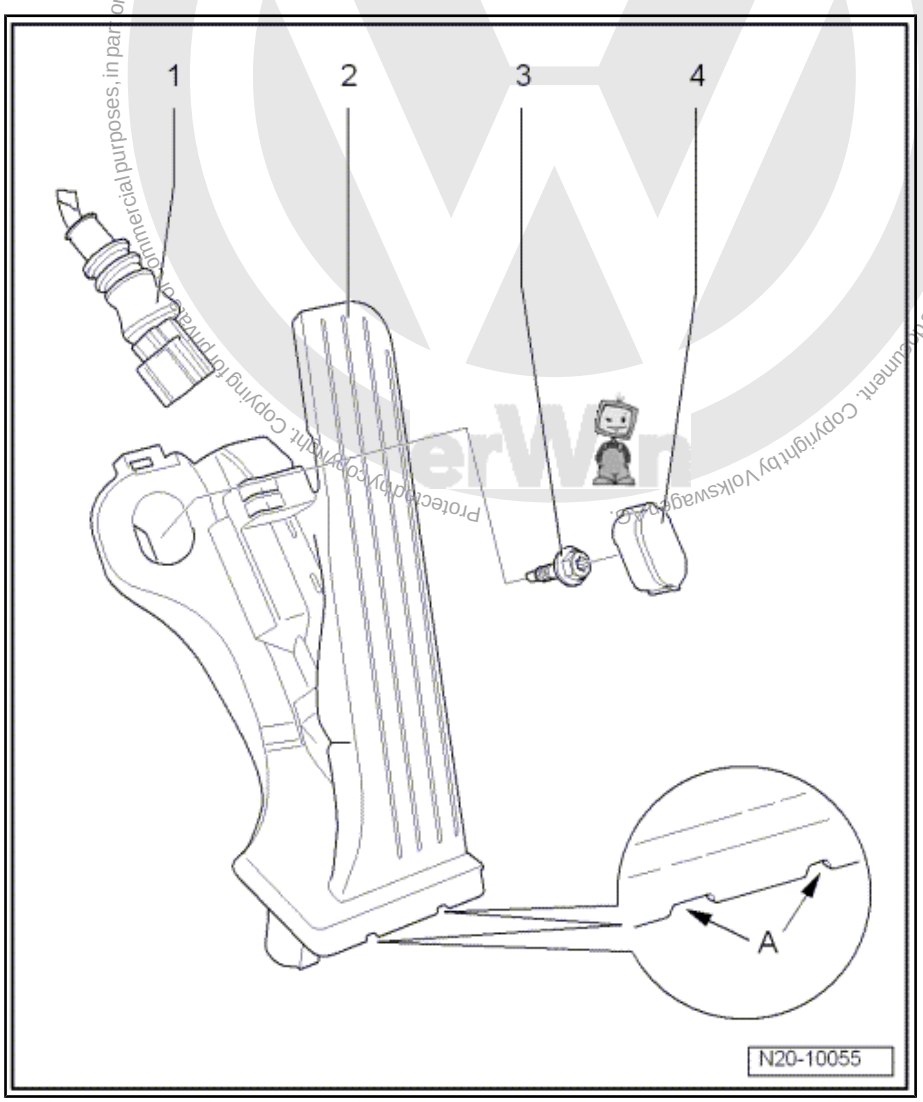
- ❑ Black, 6-pin.

2 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ❑ Openings -A- for release tool.
- ❑ To remove, remove dash panel cover and pedal cluster cover.
- ❑ Removing and installing accelerator module ⇒ page 260

3 - 10 Nm

4 - Protective cap

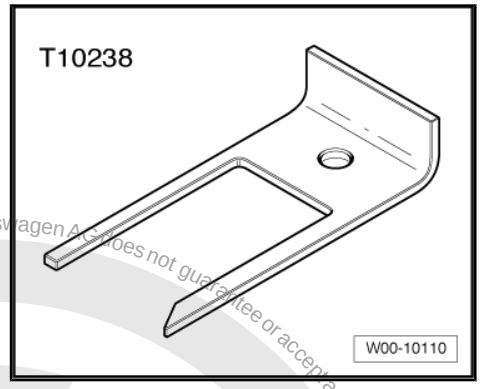


10.2 Removing and installing accelerator module

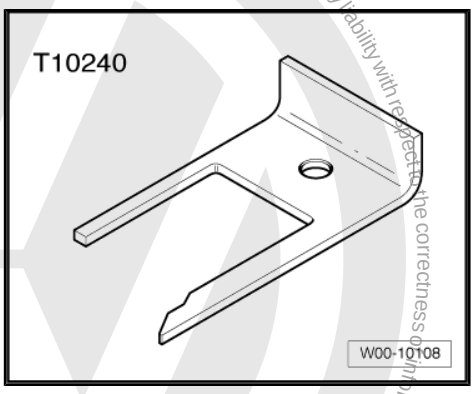
Special tools and workshop equipment required

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- Release tool - T10238-



- Release tool - T10240- (for right-hand drive)



Procedure

– Remove pedal cluster cover.

– Pull connector off accelerator module.

– Pull off protective cap in upper area of accelerator module.

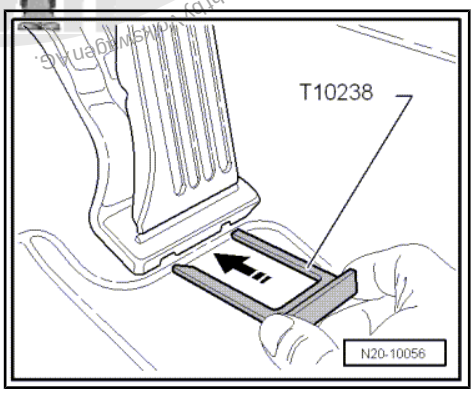
– Remove securing bolt.

– To remove accelerator module, push release tool - T10238- (for right-hand drive models) -T10240- into openings provided to stop.

– Pull out accelerator pedal module vertically.

Install in reverse order.

Specified torque for securing bolt: 10 Nm.



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11 Activated charcoal filter system (Golf, Golf Plus, Eos, Scirocco)

Assembly overview (Golf, Golf Plus, Eos, Scirocco) ⇒ page 262

Checking fuel tank breather (Golf, Golf Plus, Eos, Scirocco) ⇒ page 263

Observe safety precautions ⇒ page 176 .

Observe rules for cleanliness ⇒ page 263 .

Note

- *Hose connections are secured with either spring-type or clamp-type clips.*
- *Renew clamp-type clips with spring-type clips.*
- *Hose clip pliers - VAS 6340- are recommended to install spring-type clips.*

11.1 Assembly overview (Golf, Golf Plus, Eos, Scirocco)

1 - Activated charcoal filter

- ❑ Location: in engine compartment on right.

2 - Pressure retention valve with connecting hose

3 - Connecting hose

- ❑ Check for secure seating.
- ❑ From fuel tank.

4 - 10 Nm

5 - Activated charcoal filter solenoid valve 1 - N80-

- ❑ Fitting location: behind intake manifold
- ❑ Valve closed with ignition switched off.
- ❑ When engine is warm, valve is activated (pulsed) by engine control unit - J623- .

6 - Connecting hose

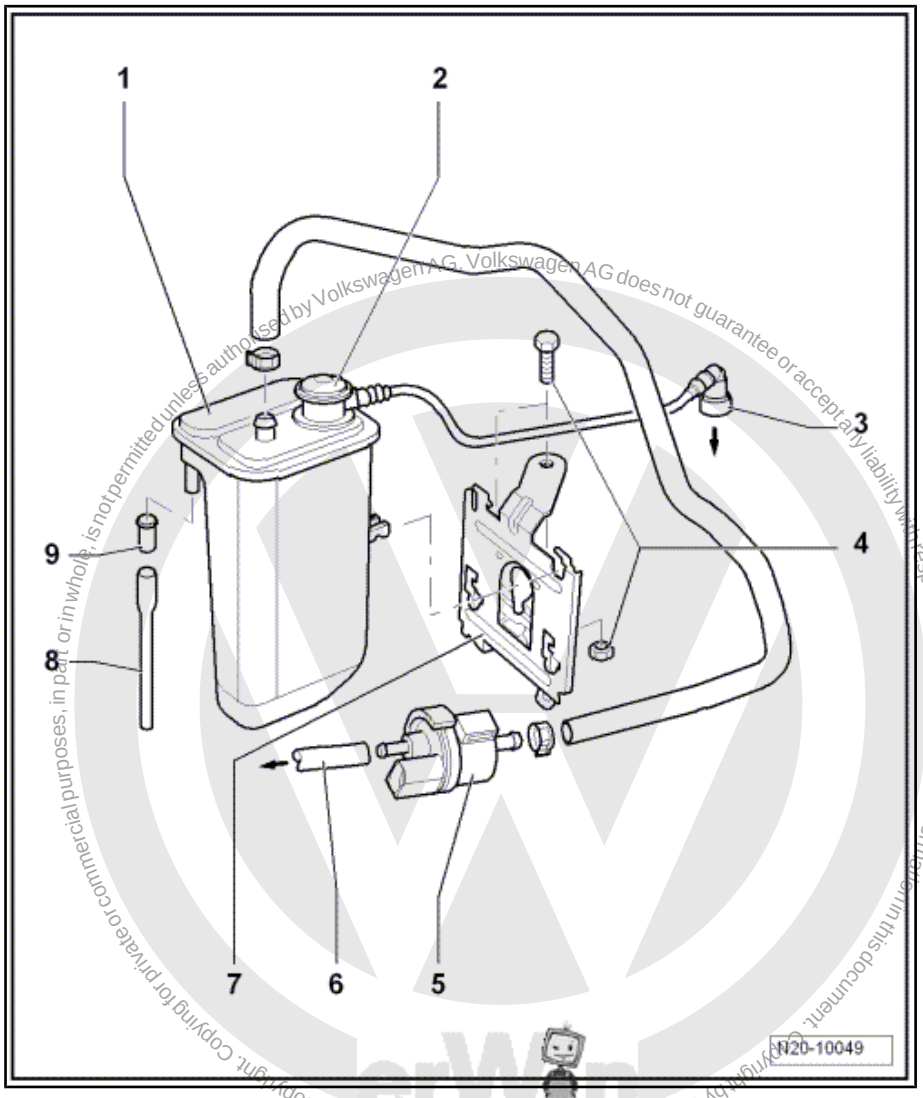
- ❑ To intake manifold.
- ❑ Check for secure seating.

7 - Bracket

- ❑ For activated charcoal filter.

8 - Breather hose

9 - Sealing grommet

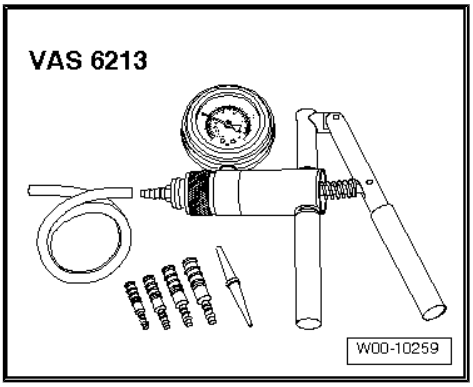


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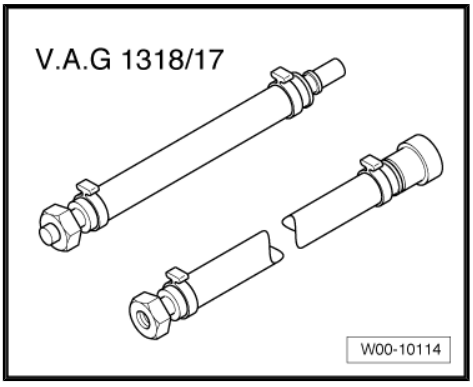
11.2 Checking fuel tank breather (Golf, Golf Plus, Eos, Scirocco)

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-



- Adapter set - V.A.G 1318/17-



Test prerequisite

- Ignition must be switched off.

Test procedure

– Pull off breather line -1-. To do this, press release button.

– Then connect hand vacuum pump - VAS 6213- using adapter set - V.A.G 1318/17- to the activated charcoal filter line.

– Operate hand vacuum pump - VAS 6213- several times. Vacuum must not build up.

If vacuum builds up:

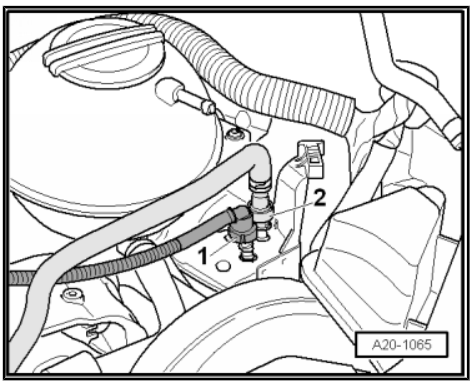
– Check breather hose ⇒ Item 8 (page 262) on activated charcoal filter for soiling and clean if necessary.

If vacuum does not build up:

– Hold breather connection ⇒ Item 8 (page 262) shut and operate vacuum pump again several times. Vacuum must build up.

If vacuum does not build up:

– Renew activated charcoal filter.



11.3 Rules for cleanliness

When working on the fuel supply and injection system, pay careful attention to the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.

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- 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 the system is open: Do not work with compressed air. Do not move vehicle.

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12 Activated charcoal filter system (Passat)

Assembly overview ⇒ page 265 .

Checking fuel tank breather ⇒ page 266 .

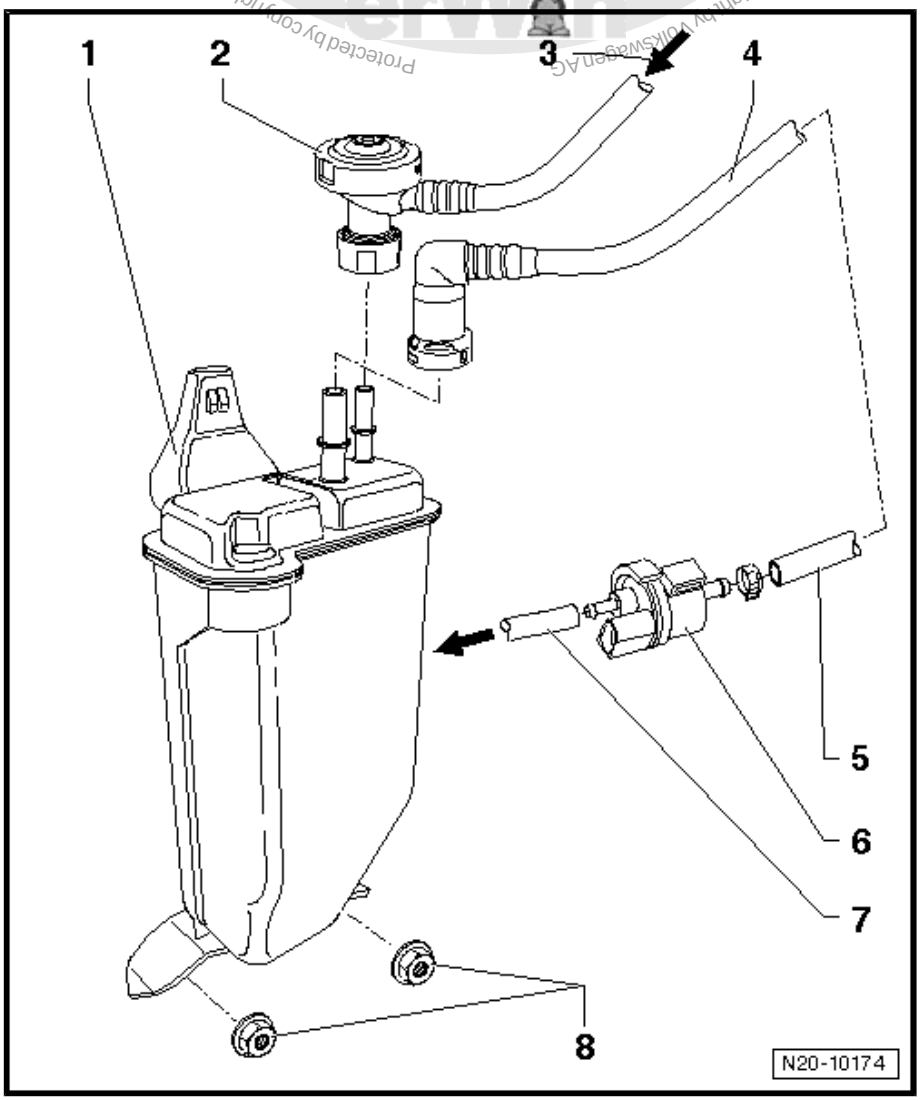
Observe safety precautions ⇒ page 176 .

Observe rules for cleanliness ⇒ page 267 .

Note

- *Hose connections are secured with either spring-type or clamp-type clips.*
- *Renew clamp-type clips with spring-type clips.*
- *Spring-type clip pliers - VAS 5024A- are recommended for installation of spring-type clips.*

12.1 Assembly overview



1 - Activated charcoal filter

- ❑ Location: in rear right wheel housing.

2 - Pressure retention valve with connecting hose

- ❑ To remove, pull off at securing ring.

3 - From fuel tank.

4 - Breather line

- ❑ To activated charcoal filter solenoid valve 1 - N80-
- ❑ Clipped onto fuel tank.

5 - Breather line

- ❑ From activated charcoal filter

6 - Activated charcoal filter solenoid valve 1 - N80-

- ❑ Valve closed with ignition switched off.
- ❑ When engine is warm, valve will be activated (pulsed) by engine control unit.

7 - Connecting hose

- ❑ To intake manifold.
- ❑ Check for secure seating.

8 - Nut

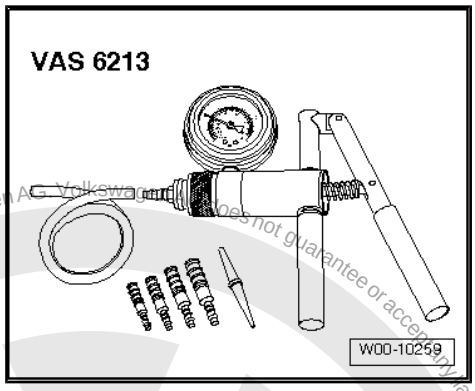
- ❑ 10 Nm

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12.2 Checking fuel tank breather

Special tools and workshop equipment required

♦ Hand vacuum pump - VAS 6213-

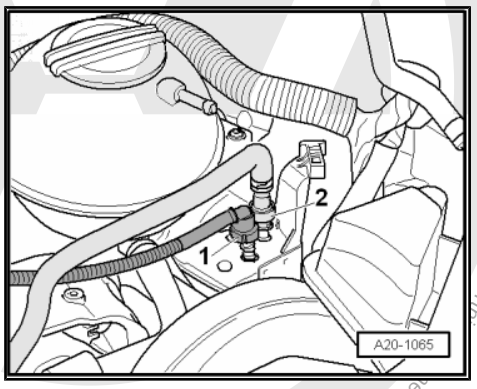


Test prerequisite

• Ignition must be switched off.

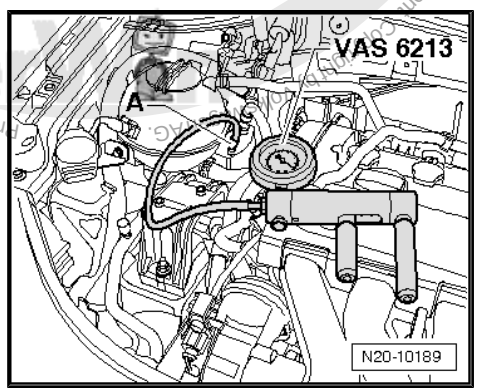
Test procedure

– Pull off breather line -1-; to do this, press in release button.



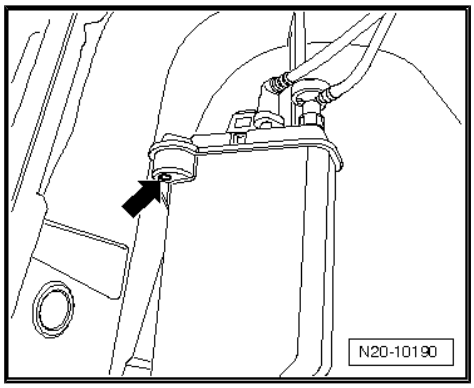
– Connect hand vacuum pump - VAS 6213- to breather line as shown.

– Operate hand vacuum pump - VAS 6213- several times. Vacuum must not build up.



– Seal breather hole in activated charcoal filter -arrow- and operate vacuum pump again several times. Vacuum must build up.

– If vacuum does not build up, renew activated charcoal filter.



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12.3 Rules for cleanliness

When working on the fuel supply and injection system, observe the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.
- Place removed parts on a clean surface and cover. Use only lint-free cloths.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When system is open, avoid working with compressed air and moving vehicle.

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13 Activated charcoal filter system (Tiguan)

Assembly overview (Tiguan) ⇒ page 268 .

Checking fuel tank breather (Tiguan) ⇒ page 269 .

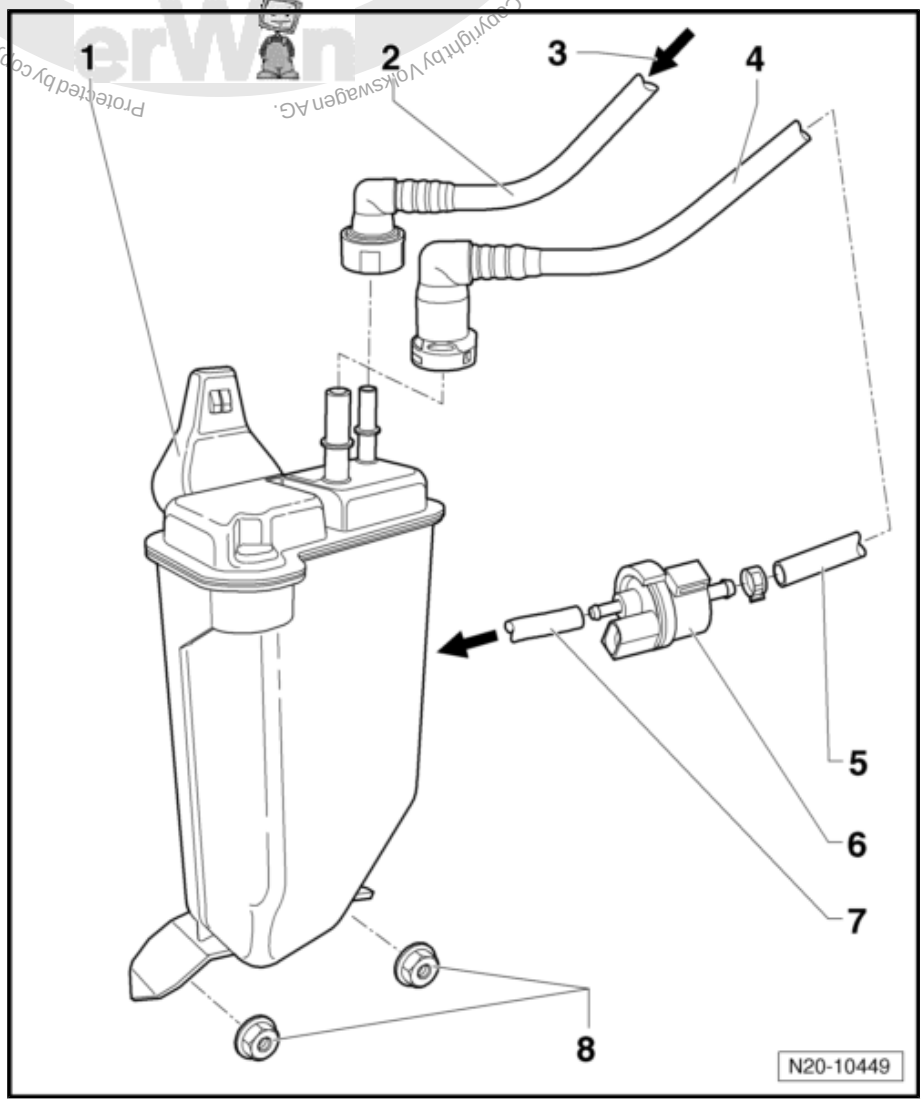
Observe safety precautions ⇒ page 176 .

Observe rules for cleanliness ⇒ page 270 .

Note

- *Hose connections are secured with either spring-type or clamp-type clips.*
- *Renew clamp-type clips with spring-type clips.*
- *Spring-type clip pliers - VAS 5024A- are recommended for installation of spring-type clips.*

13.1 Assembly overview (Tiguan)



1 - Activated charcoal filter

- ❑ Location: in rear right wheel housing.

2 - Connecting hose

- ❑ To remove, pull off at securing ring.

3 - From fuel tank.

4 - Breather line

- ❑ To activated charcoal filter solenoid valve 1 - N80-
- ❑ Clipped onto fuel tank.

5 - Breather line

- ❑ From activated charcoal filter

6 - Activated charcoal filter solenoid valve 1 - N80-

- ❑ Valve closed with ignition switched off.
- ❑ When engine is warm, valve will be activated (pulsed) by engine control unit.

7 - Connecting hose

- ❑ To intake manifold.
- ❑ Check for secure seating.

8 - Nut

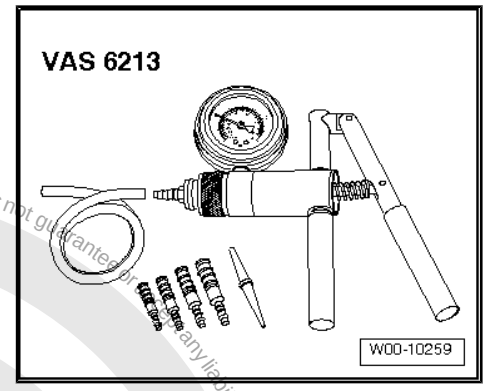
- ❑ 10 Nm

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13.2 Checking fuel tank breather (Tiguan)

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-

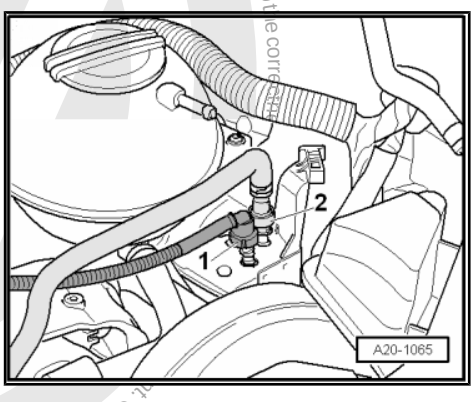


Test prerequisite

- Ignition must be switched off.

Test procedure

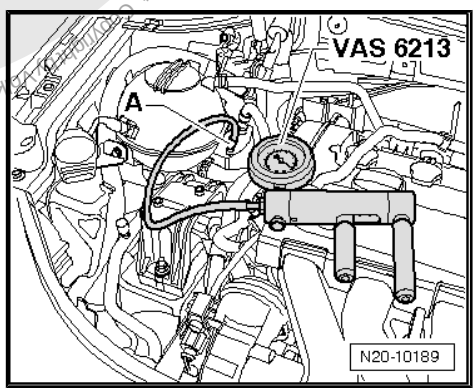
– Pull off bleeder line -1-. To do this, press release button.



– Connect hand vacuum pump - VAS 6213- to breather line as shown.

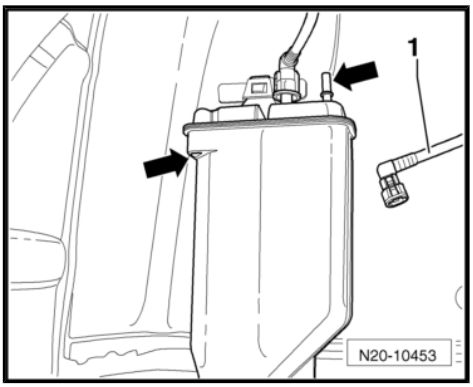
– Operate hand vacuum pump - VAS 6213- several times. Vacuum must not build up.

– Pull off hose -1- at activated charcoal filter.



– Seal breather hole in and connecting pieces at activated charcoal filter -arrows- and operate vacuum pump again several times. Vacuum must build up.

– If vacuum does not build up, renew activated charcoal filter.



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13.3 Rules for cleanliness

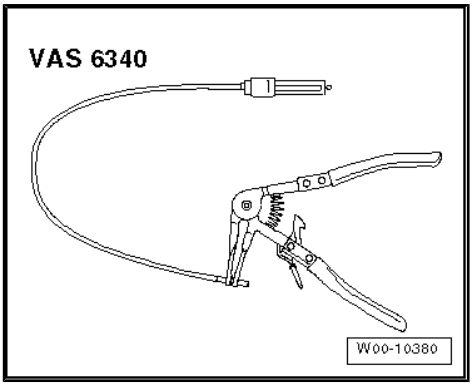
When working on the fuel supply and injection system, observe the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.
- Place removed parts on a clean surface and cover. Use only lint-free cloths.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When system is open, avoid working with compressed air and moving vehicle.

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21 – Turbocharging/supercharging

1 Turbocharger



Note

- *Secure all hose connections with hose clips which conform to production standard.*
- *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- *Charge air system must be free of leaks.*
- *Renew self-locking nuts.*
- *Spring-type clip pliers - VAS 5024A- or hose clip pliers - VAS 6340- are recommended for installation of spring-type clips.*
- *Fill turbocharger with engine oil at oil supply line connection.*
- *After installing turbocharger, run engine for about 1 minute at idle and do not rev up immediately. This ensures that the turbocharger is fully primed with oil.*

Assembly overview - turbocharger ⇒ page 271 .

Removing and installing turbocharger ⇒ page 275 .

Removing and installing compressor housing and turbine housing ⇒ page 280 .

Checking turbocharger vacuum unit ⇒ page 284 .

Removing and installing vacuum unit for turbocharger ⇒ page 286 .

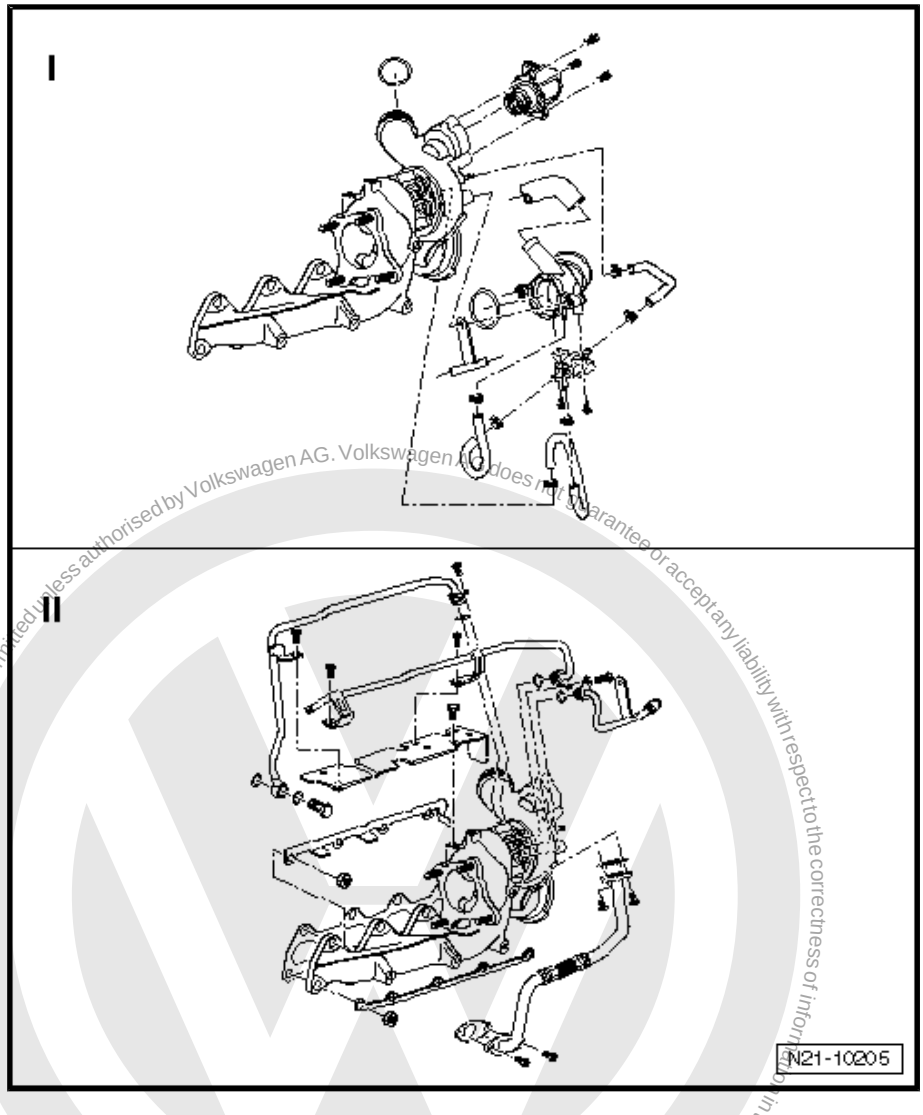
Adjusting vacuum unit for turbocharger ⇒ page 288 .

1.1 Assembly overview - turbocharger

Part I ⇒ page 273

Part II ⇒ page 274

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1.2 Part I

1 - Turbocharger with exhaust manifold

- ❑ Removing and installing ⇒ page 275
- ❑ Removing and installing compressor housing and turbine housing ⇒ page 280 .
- ❑ Checking turbocharger vacuum unit ⇒ page 284 .
- ❑ Removing and installing vacuum unit for turbocharger ⇒ page 286 .
- ❑ Adjusting vacuum unit for turbocharger ⇒ page 288 .

Specified torques:

- ❑ Securing bolts for vacuum unit to turbocharger: 20 Nm.
- ❑ Lock nut to vacuum unit rod: 10 Nm.

2 - O-ring

- ❑ Renew

3 - Turbocharger air recirculation valve - N249-

4 - 11 Nm

5 - Connecting hose

6 - Intake connecting pipe

7 - 10 Nm

8 - Connecting hose

9 - Spring-type clip

10 - Charge pressure control solenoid valve - N75-

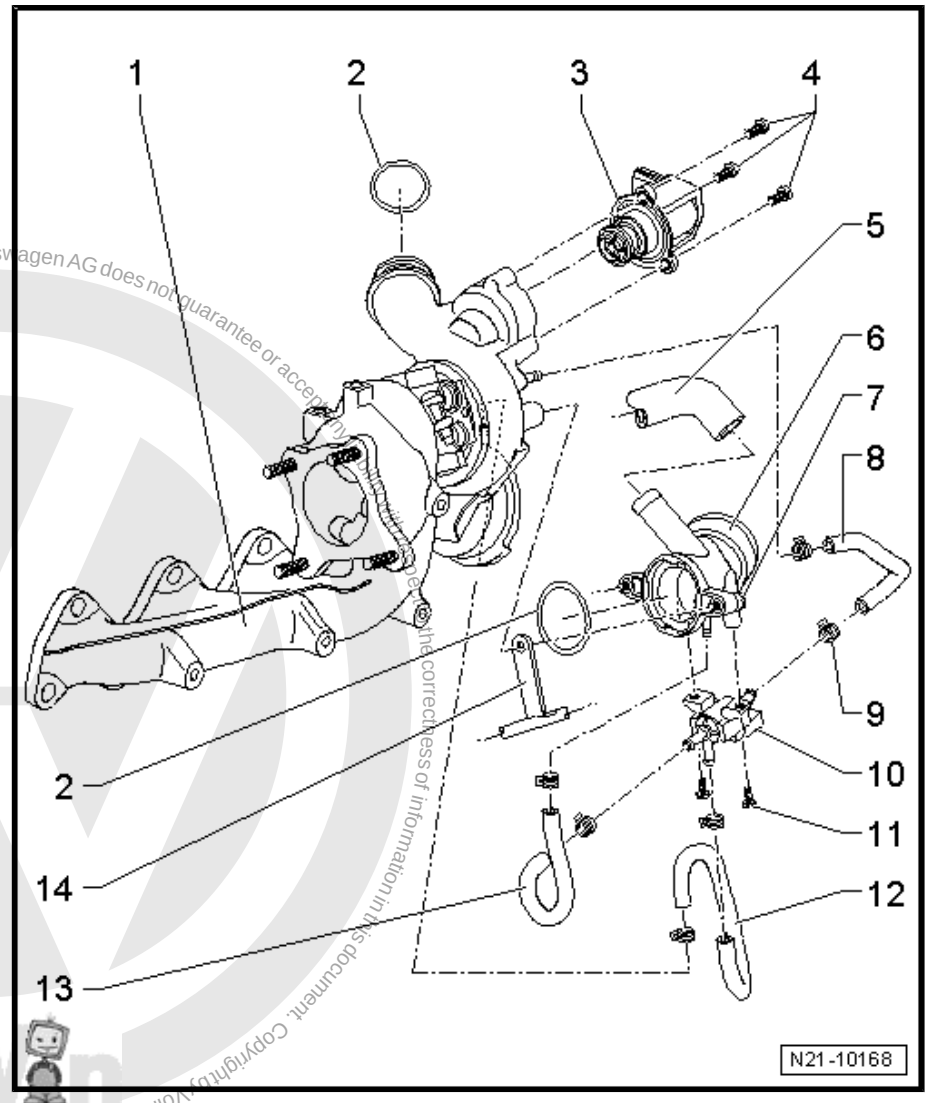
11 - 10 Nm

12 - Connecting hose

13 - Connecting hose

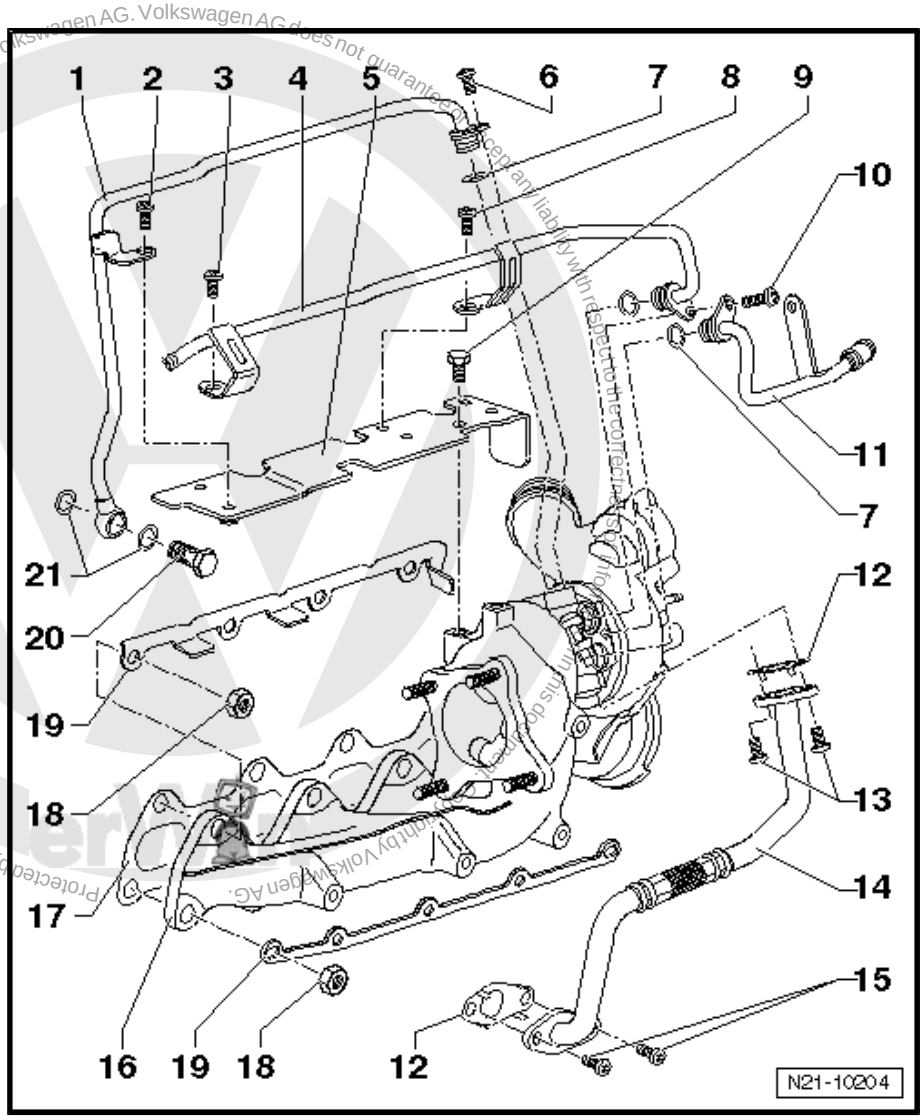
14 - Bracket

- ❑ At coolant line.



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1.3 Part II



1 - Oil supply pipe

- ❑ Beginning with model year 2009 ➢ revised oil supply pipe installed.
- ❑ Note specified torques ⇒ Item 20 (page 275) .

2 - 8 Nm

3 - 8 Nm

4 - Coolant pipe

5 - Bracket

6 - 8 Nm

7 - O-ring

- ❑ Renew

8 - 8 Nm

9 - 20 Nm

10 - 8 Nm

11 - Coolant pipe

12 - Gasket

- ❑ Renew

13 - 8 Nm

14 - Oil return pipe

15 - 8 Nm

16 - Turbocharger with exhaust manifold

- ❑ Removing and installing ⇒ page 275
- ❑ Removing and installing compressor housing and turbine housing ⇒ page 280 .

Note

- ♦ *The studs need to be renewed as well as the securing nuts.*
- ♦ *Screw studs into cylinder head until they project only by 25 mm.*

17 - Gasket

- ❑ Renew

18 - 25 Nm

- ❑ Renew
- ❑ Coat studs of exhaust manifold with high-temperature paste.

Note

- ♦ *The studs need to be renewed as well as the securing nuts.*
- ♦ *Screw studs into cylinder head until they project only by 25 mm.*

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19 - Bracket

20 - Banjo bolt

- ❑ Renew

Note

Beginning with model year 2009 ► revised oil supply pipe installed. Note differing specified torques.

Specified torques:

- ❑ Banjo bolt on cylinder block 30 Nm
- ❑ Banjo bolt on timing housing 20 Nm.

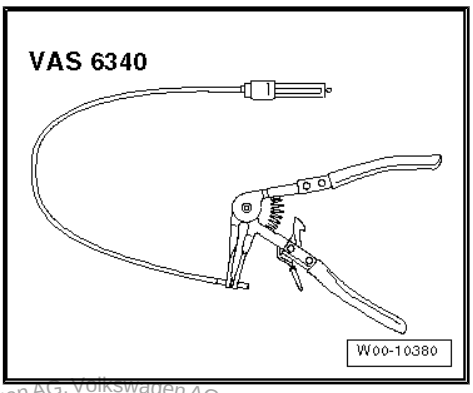
21 - Seal

- ❑ Renew

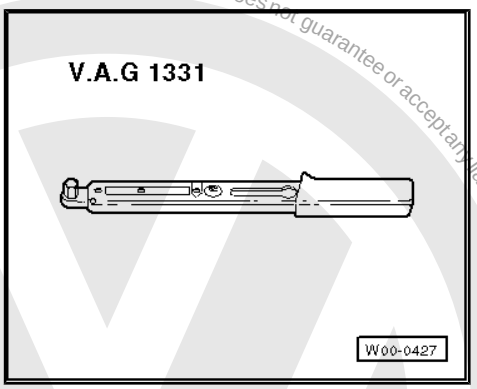
1.4 Removing and installing turbocharger

Special tools and workshop equipment required

- ♦ Hose clip pliers - VAS 6340-

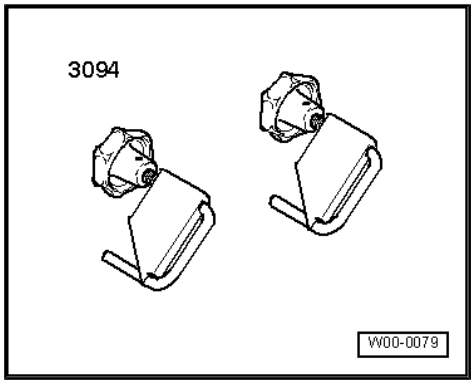


- ♦ Torque wrench (5…50 Nm) - V.A.G 1331-



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- Hose clamps up to 25 mm - 3094-



Caution

When a mechanical fault is found on the turbocharger, e.g. a destroyed compressor impeller, it is not only sufficient to renew the turbocharger. To prevent this from causing further damage, perform the following repairs:

- ***Check air filter housing, air filter element and intake hoses for soiling.***
- ***Check complete charged air routing and charge air cooler for foreign objects.***

If foreign objects are found in the charge air system, the charged air routing must be cleaned and the charge air cooler must be renewed, if necessary.

Removing

Note

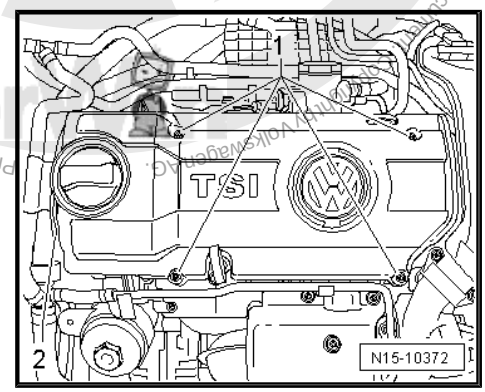
Before carrying out further work, disconnect battery earth strap. Check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

– Clamp off coolant hoses to turbocharger using hose clamps from -3094- .

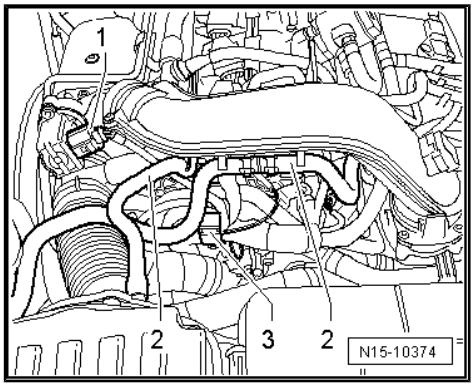
– Remove securing bolts -1- from engine cover panel.

– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.

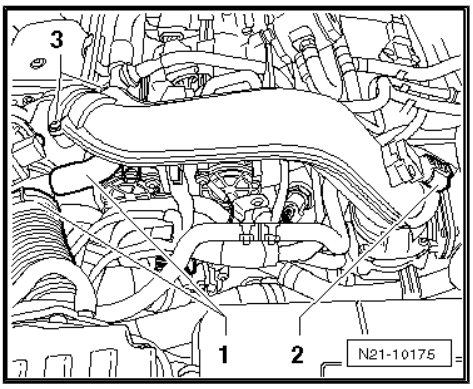


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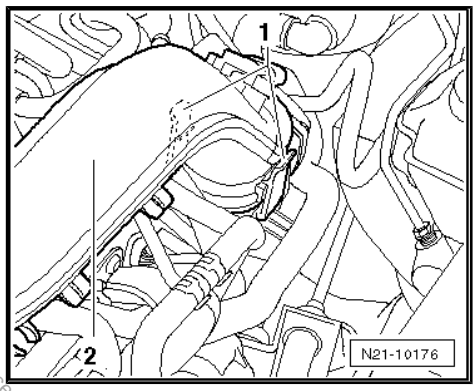
– Pull connector -1- off turbocharger air recirculation valve - N249- .
– Detach hoses -2- at pressure pipe and open wiring guide -3-.



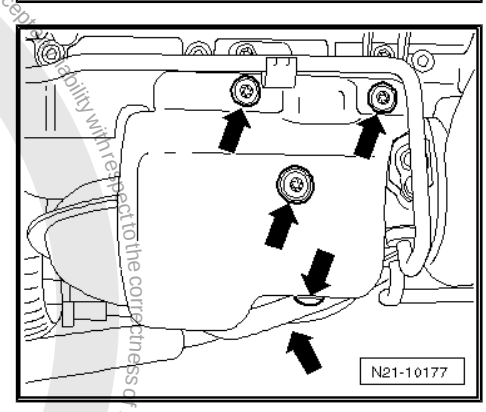
– Pull hoses -1- off intake connecting pipe for turbocharger.
– Pull connector -2- off charge air pressure sender - G31- with intake air temperature sender 2 - G299- and remove securing bolts -3-.



– Press retaining clips -1- outwards and pull pressure pipe -2- upwards.
– Then pull pressure pipe -2- off turbocharger.

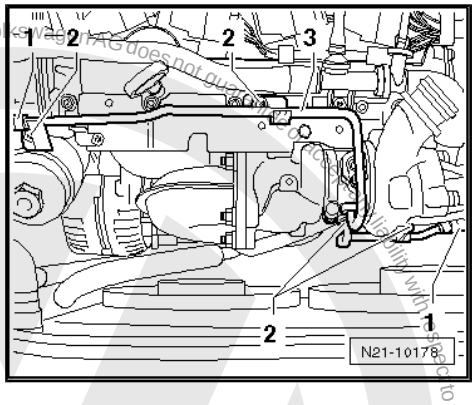


– Unscrew securing bolts -arrows- and remove heat shield from turbocharger.



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– Detach coolant hoses -1- from coolant pipes.
– Unscrew securing bolts -2- and remove coolant pipe -3-.
– Remove poly V-belt ⇒ page 51 .
– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87

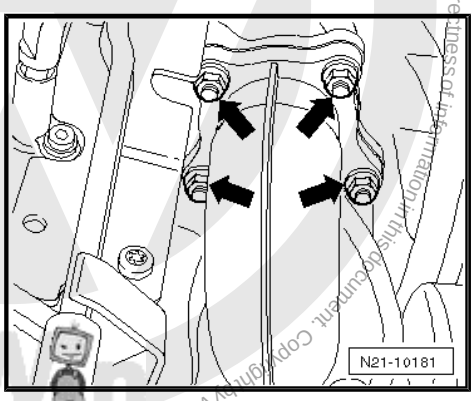


Note

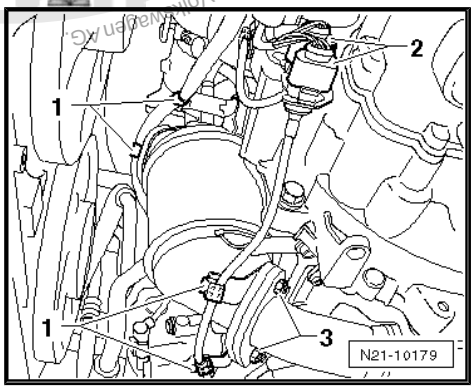
The air conditioning system lines must not be opened.

– Secure air conditioner compressor to lock carrier.
– Ensure that lines are not kinked.

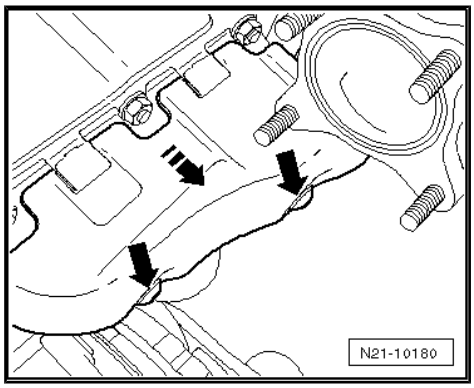
– Unbolt securing nuts at turbocharger -arrows-.
– Unclip wiring -1- from catalytic converter.



– Disconnect connectors -2-.
– Unscrew securing nuts -3- and remove seal.
– Remove catalytic converter downwards.

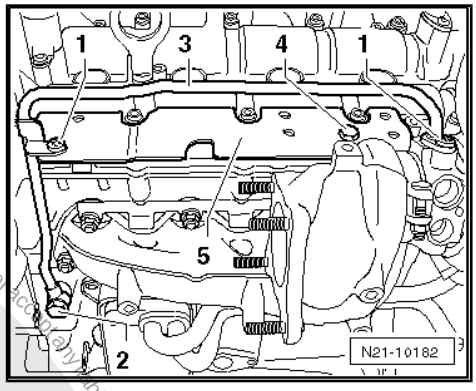


– Remove securing bolts -arrows- from heat shield and pull shield off exhaust manifold in direction of -arrow-.
– Remove securing bolts -1- for oil supply pipe -3-.



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– Unscrew banjo bolt -2- from cylinder block and remove oil supply pipe.

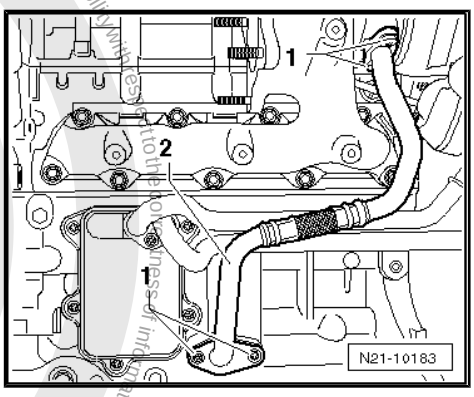


Note

Beginning with model year 2009 ➢ banjo bolt -2- is secured on timing housing.

– Unscrew securing bolt -4- and remove bracket -5-.

– Unscrew securing bolts -1- for oil return pipe -2- and remove pipe.



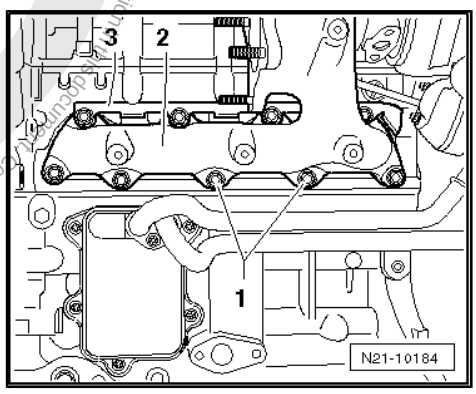
Note

The alternator must only be loosened if the securing nuts have inner drive splines.

– Loosen alternator ⇒ Electrical system; Rep. gr. 27 ; Removing and installing alternator .

– Remove all securing nuts -1- from exhaust manifold and pull bracket -3- off studs.

– Remove exhaust manifold together with turbocharger -2- from cylinder head.



Installing

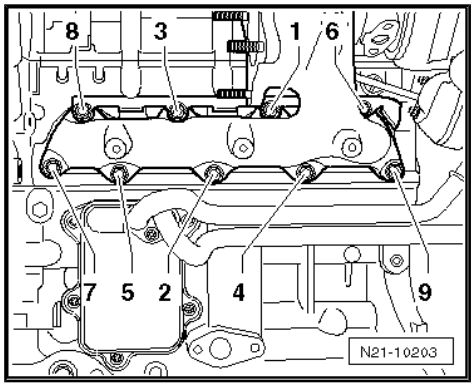
Note

- *The studs need to be renewed as well as the securing nuts.*
- *Screw studs into cylinder head until they project only by 25 mm.*

– Fit turbocharger together with exhaust manifold and new gasket to cylinder head.

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– Tighten securing nuts to 25 Nm in sequence as specified.



Perform further installation in reverse order, paying attention to the following:

- Renew seals, gaskets and self-locking nuts.
- Fill turbocharger with engine oil at oil supply line connection.
- After installing turbocharger, run engine for about 1 minute at idling speed to ensure that oil is supplied to turbocharger.
- Secure all hose connections with hose clips which conform to production standard.

Specified torques:

Assembly overview - part I, turbocharger ⇒ page 273 .

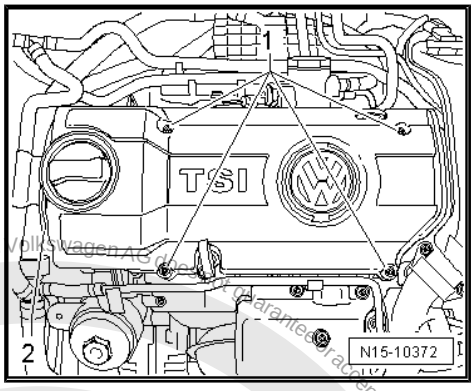
Assembly overview - part II, turbocharger ⇒ page 274 .

Assembly overview - catalytic converter and add-on parts ⇒ page 346

– Top up coolant if necessary ⇒ page 157 .

– Attach coolant hoses -2- to engine cover panel and press engine cover panel downwards.

– Tighten securing bolts -1- for engine cover panel to 8 Nm.



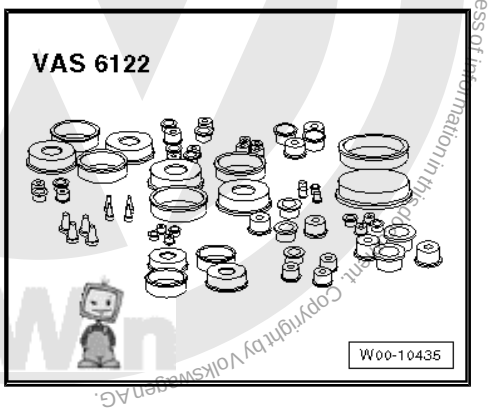
1.5 Removing and installing compressor housing and turbine housing

Note

Please use a suitable repair kit for the following work sequence ⇒ Electronic Parts Catalogue (ETKA) .

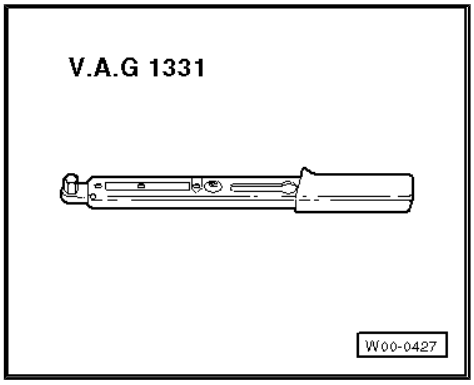
Special tools and workshop equipment required

- Engine bung set - VAS 6122-

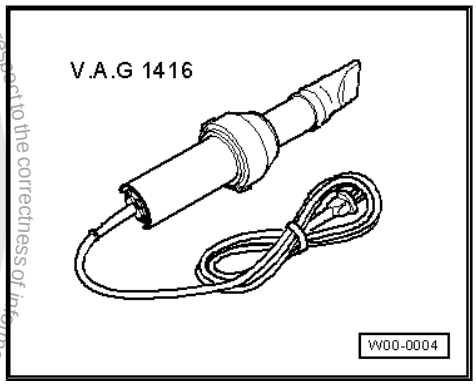


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♦ Torque wrench - V.A.G 1331-



♦ Hot air blower - V.A.G 1416-

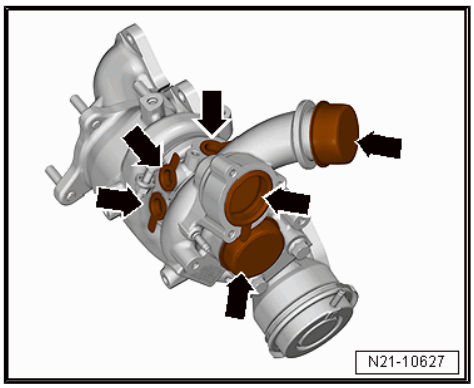


Removing

– Remove turbocharger ⇒ page 275 .

– Checking turbocharger vacuum unit ⇒ page 284 .

– Seal all openings in turbocharger -arrows- with suitable plugs from engine bung set - VAS 6122- .

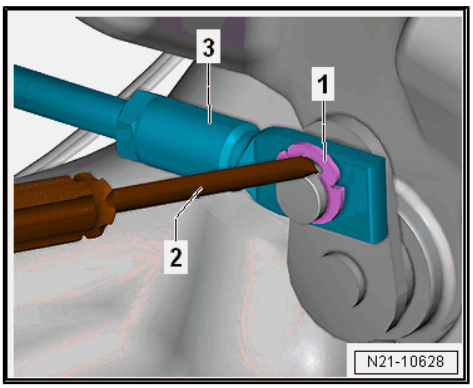


– Remove circlip -1- using screwdriver -2-.

– Pull threaded rod -3- off stud.

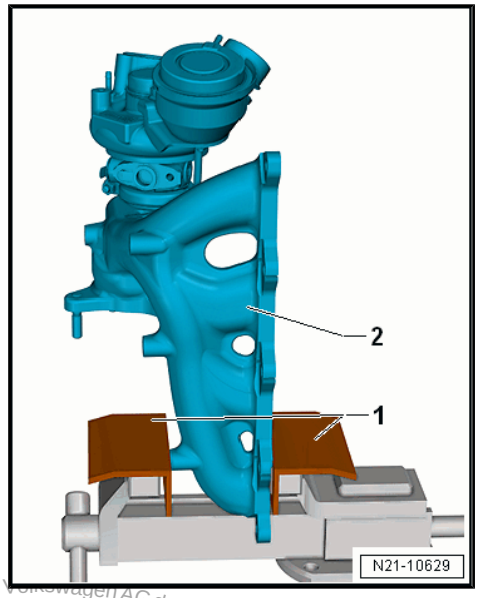
Caution

In order to prevent the exhaust manifold from becoming damaged, always use aluminium protective jaws -1- for the vice!

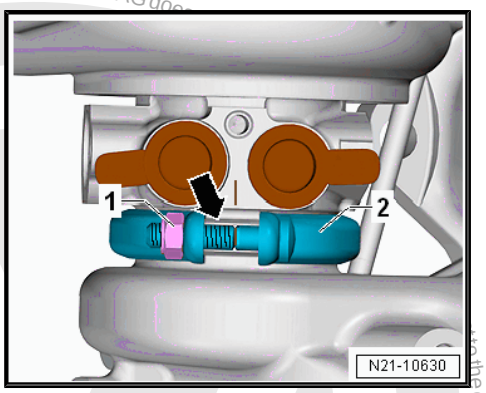


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– Clamp exhaust manifold -2- in vice as shown in illustration.



– Use a waterproof pen to mark position of bolt -arrow- relative to compressor housing.
– Unscrew securing nut -1- of clamp -2-, and remove clamp.



Caution

If the turbine housing is still tightly secured to the compressor housing after the clamp -2- has been removed:

- *Do not use leverage tools!*
- *Always use the hot air blower - V.A.G 1416- to loosen the connection in order to prevent the centring pin on the turbine housing from becoming damaged.*

If the compressor housing is still tightly secured to the turbine housing due to deposits:

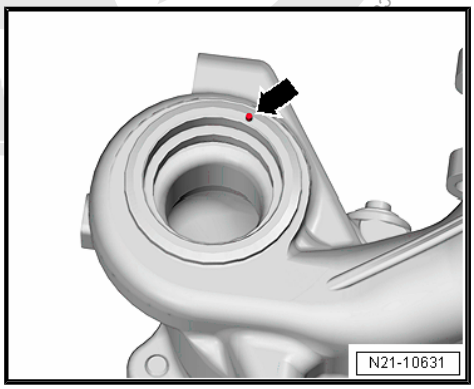
– Using hot air blower - V.A.G 1416- , apply heat evenly all around the connection point between the compressor housing and the turbine housing for about 2 minutes.
– Carefully remove compressor housing upwards.

If the centring pin -arrow- is shared off or damaged, the turbocharger needs to be renewed together with the exhaust manifold.

Caution

Place compressor housing on workbench as shown in illustration in order to prevent any damage to the turbine wheel!

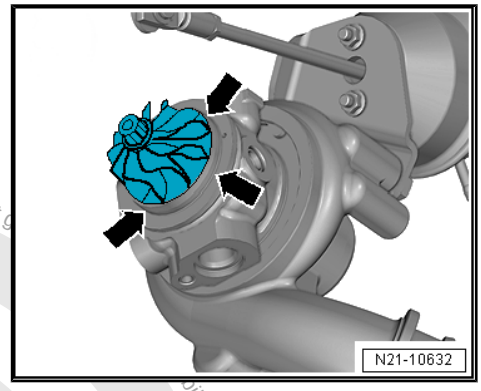
Do not use compressed air to clean the compressor housing!



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– Clean compressor housing all around -arrows- using, for example, brake cleaner and sandpaper (220 to 1000 grade).

– Remove exhaust manifold from vice.



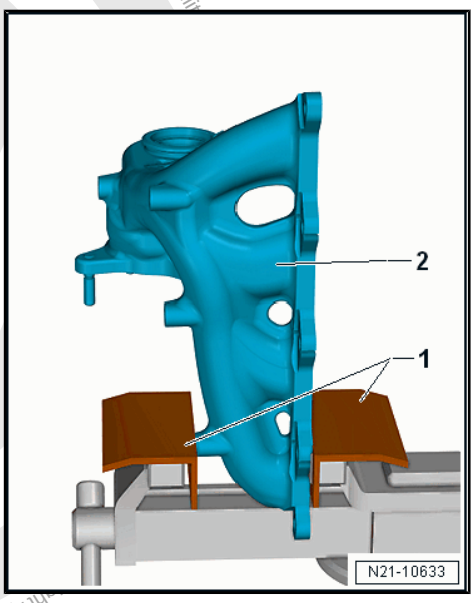
Installing

Caution

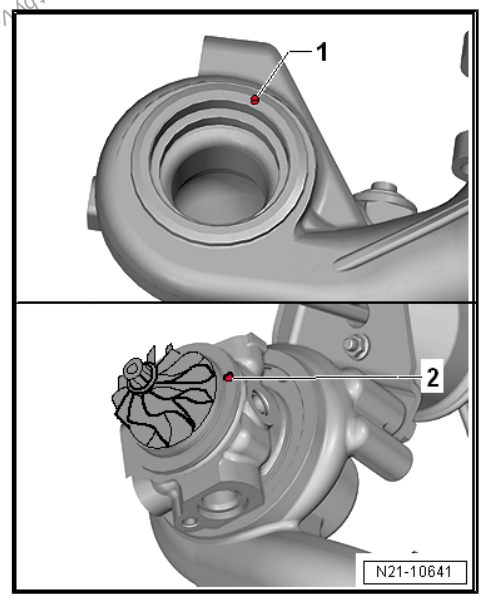
In order to prevent the exhaust manifold from becoming damaged, always use aluminium protective jaws -1- for the vice!

– Clamp new exhaust manifold -2- in vice as shown in illustration.

– Fit compressor housing onto turbine housing.

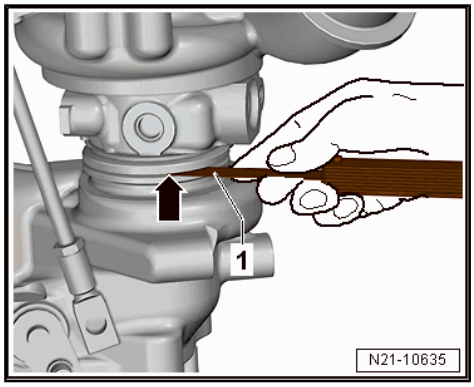


Make sure that centring pin -1- of turbine housing engages in hole -2- of compressor housing.



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– Using a feeler gauge -1-, measure gap -arrow- between compressor housing and turbine housing.



The gap must be even all around and must measure ≤ 1.2 mm.

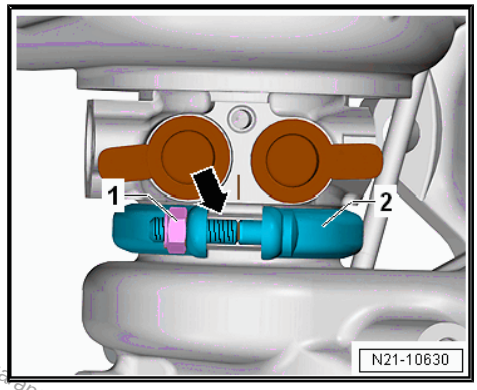
– Fit new clamp around both flanges.

Note

- *The stud may bend slightly when the securing nut is tightened to 9 Nm. This is normal and not critical.*
- *Therefore, a new clamp with a new stud must always be used when assembling.*

– Align clamp so that centre of stud is flush with marking -arrow- on compressor housing.

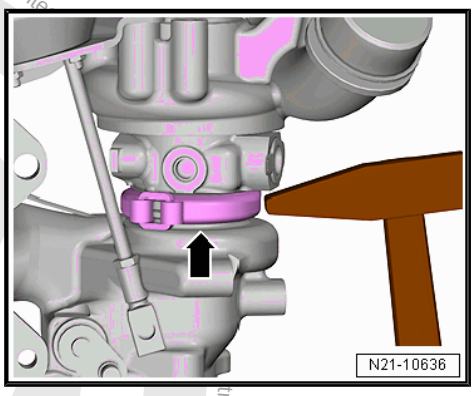
– Tighten new securing nut -1- of clamp -2- to 9 Nm.



– Apply light hammer blows alternately all around the clamp -arrow-

in order to ensure proper seating of the clamp.

– Then, tighten securing nut again to 9 Nm.

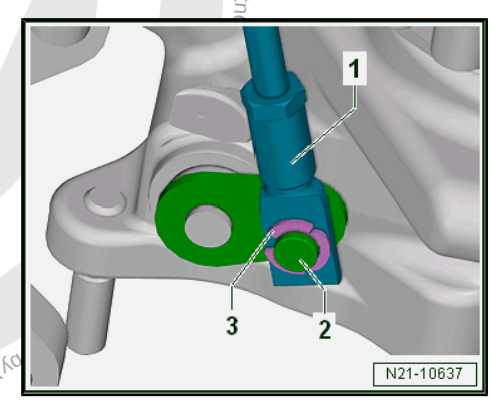


– Push threaded rod -1- of vacuum unit onto stud -2-.

– Push new circlip -3- into groove in stud.

– Adjusting vacuum unit for turbocharger ⇒ page 288 .

– Installing turbocharger ⇒ page 275 .



1.6 Checking vacuum unit for turbocharger

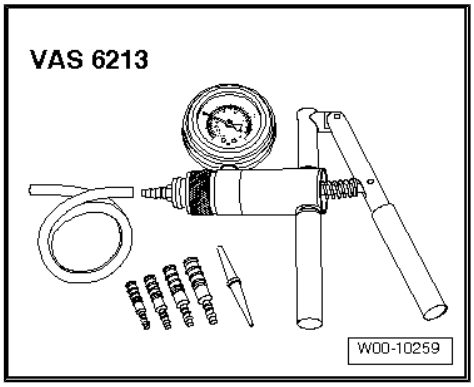
Removing and installing vacuum unit for turbocharger ⇒ page 286 .

Adjusting vacuum unit for turbocharger ⇒ page 288 .

Special tools and workshop equipment required

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♦ Hand vacuum pump - VAS 6213-



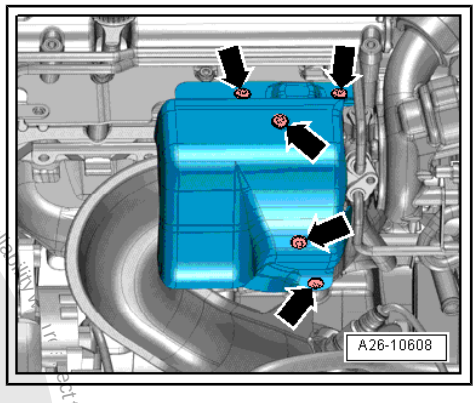
Test prerequisites

♦ The hose from the turbocharger via the charge pressure control solenoid valve - N75- to the vacuum unit must have through-flow and be free of leaks.

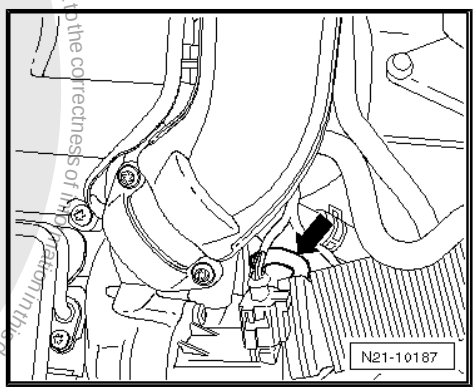
♦ Charge pressure control solenoid valve - N75- OK.

Procedure

– Unscrew bolts -arrows- and remove heat shield for turbocharger.

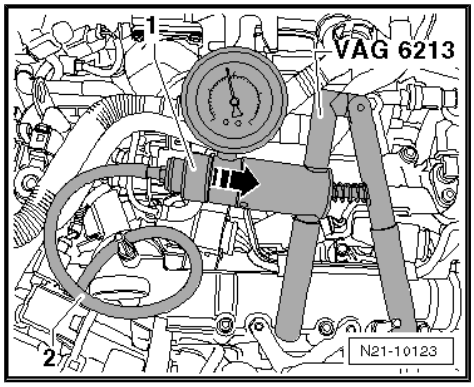


– Pull hose -arrow- off vacuum unit.



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– Place hose -2- of hand-operated vacuum pump - VAS 6213- onto vacuum unit connection.
– Push sliding ring -1- on hand vacuum pump - VAS 6213- to stop in direction of -arrow-.
– Operate hand vacuum pump - VAS 6213- repeatedly.



Caution

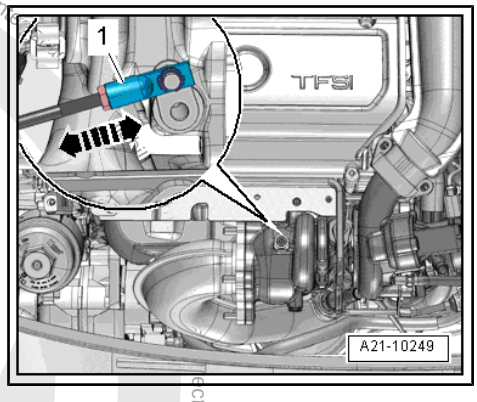
Excessive pressure may damage the vacuum unit.

The pressure must not exceed 800 mbar!

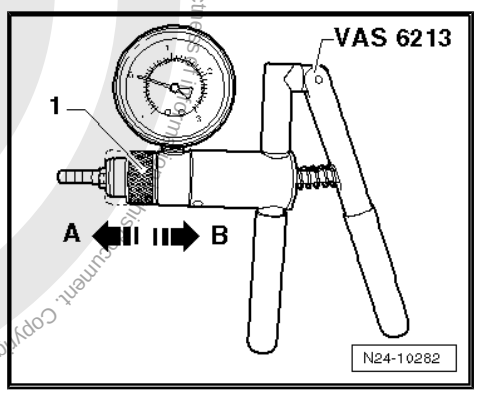
Note

The illustration shows the installation position with the turbocharger removed.

– Observe operating rod -1- of turbocharger vacuum unit.
♦ The operating rod must move from approx. 300 mbar.
♦ At approx. 800 mbar, the operating rod must reach the end of the adjustment travel.



– Vent hand-operated vacuum pump - VAS 6213- -arrow A-.
♦ The operating rod must move in the opposite direction.



Note

Check the movement sequence of the operating rod in the entire adjustment range. It must move continuously and smoothly.

Assembly is performed in the reverse order of removal.

Specified torque of heat shield for turbocharger: 8 Nm

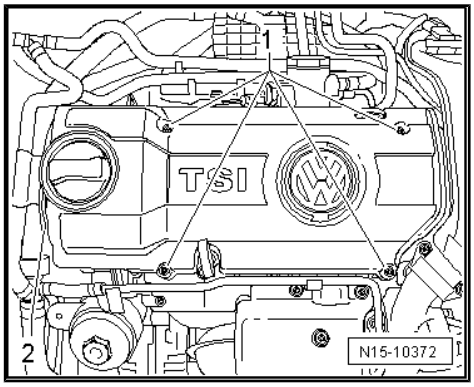
1.7 Removing and installing vacuum unit for turbocharger

Removing

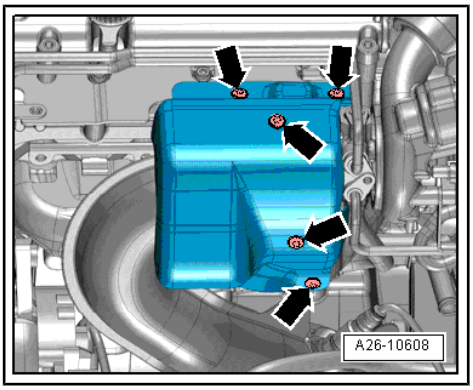
– Detach coolant hose -2- from engine cover panel.

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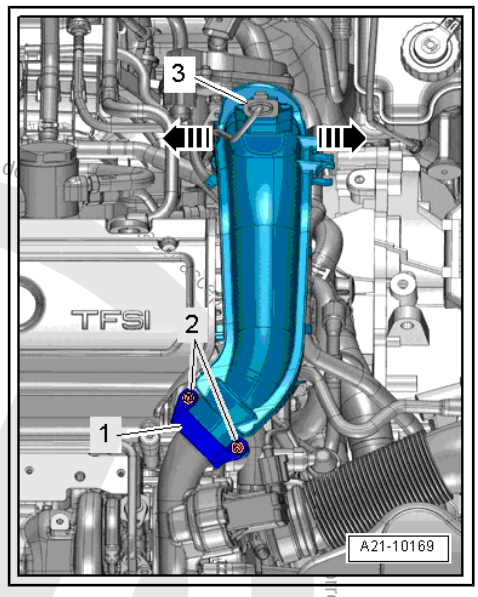
– Pull oil dipstick out.
– Unscrew bolts -arrows- and remove engine cover panel.
– Remove air filter housing ⇒ page 303 .



– Unscrew bolts -arrows- and remove heat shield for turbocharger.
– Unscrew bolts -2- and remove retaining clip -1-.



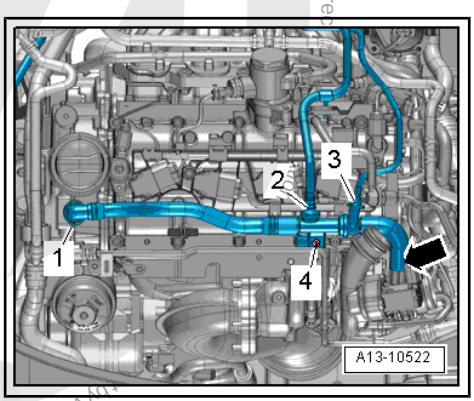
– Pull connector -3- off charge air pressure sender - G31- .
– Release catches -arrows- and pull air pipe first off throttle valve module - J338- and then off turbocharger.
– Lay hoses at air pipe to side.



– Unscrew bolt -4- and remove crankcase breather hose from turbocharger -arrow- and lay it to side.

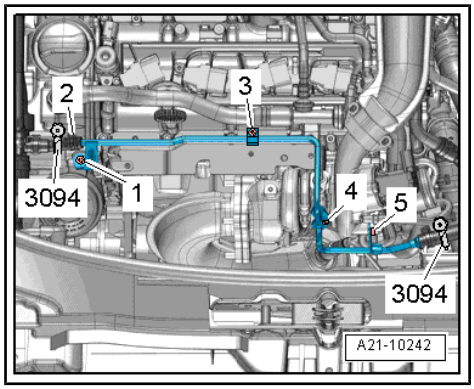
Note

The positions labelled -1, 2, 3- should be disregarded.



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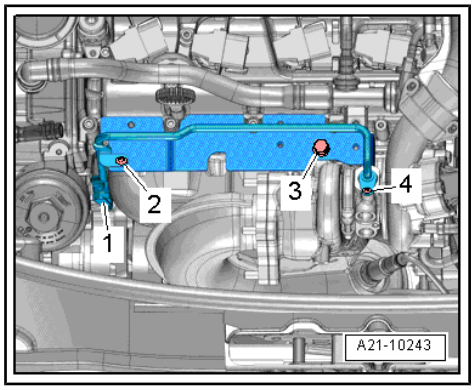
– Clamp off coolant hoses using hose clips - 3094- as illustrated.
– Remove bolts -1, 3, 4, 5-.
– Pull coolant lines off turbocharger and lay to side.



Note

The position labelled -2- should be disregarded.

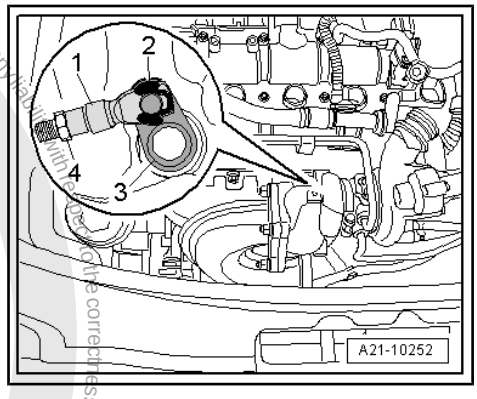
– Unscrew bolts -2- and -3-, then remove retaining plate.



Note

The positions labelled -1- and -4- should be disregarded.

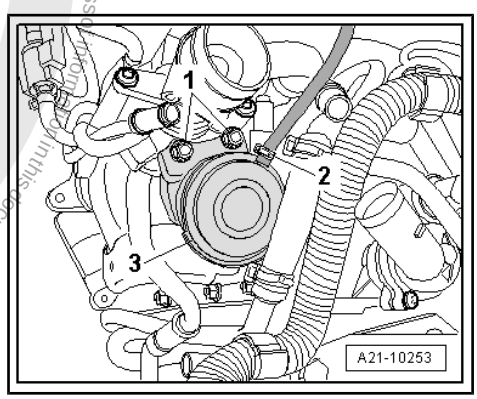
– Lever off securing clip -2- and pull threaded piece -1- of operating rod off operating lever pin -3-.



Note

The position labelled -4- should be disregarded.

– Remove hose -2- from turbocharger vacuum unit.
– Unscrew bolts -1- and remove turbocharger vacuum unit -3-.



Installing

Specified torques ⇒ page 273 .

Specified torque of heat shield for turbocharger: 8 Nm

Installation is performed in the reverse order of removal.

– Install new securing clip for operating rod.

Note

Ensure securing clip seats correctly in the pin groove.

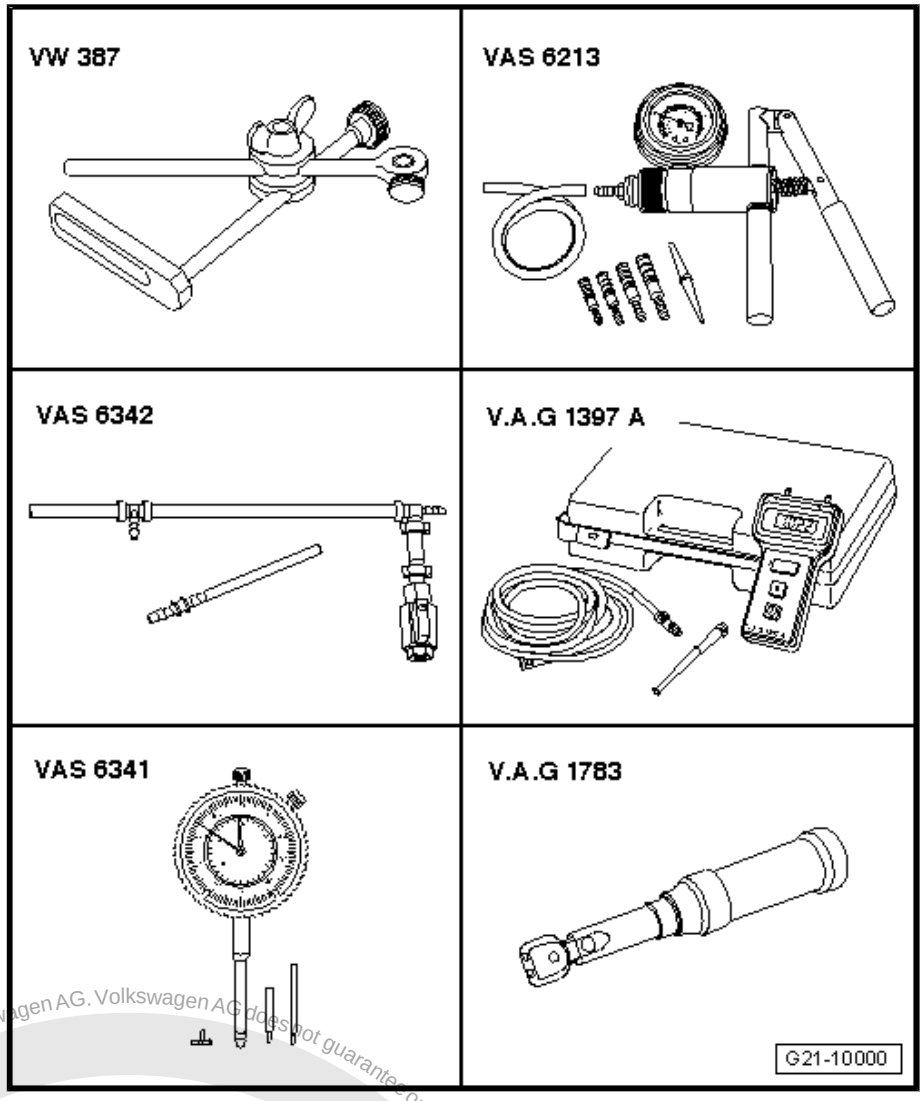
– Adjusting vacuum unit for turbocharger ⇒ page 288 .

1.8 Adjusting vacuum unit for turbocharger

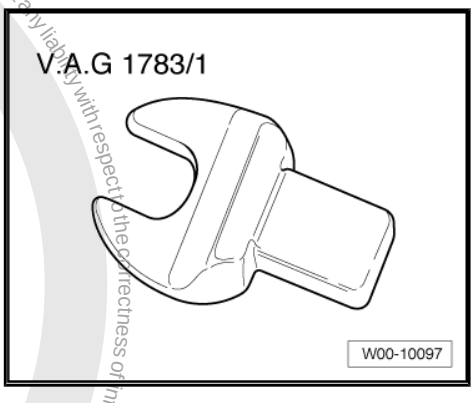
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Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-
- Hand vacuum pump - VAS 6213-
- Pressure regulating valve - VAS 6342-
- Turbocharger tester - V.A.G 1397A-
- Dial gauge set, 4-part - VAS 6341-
- Torque wrench - V.A.G 1783-



- Open end spanner insert (10 mm) - V.A.G 1783/1-

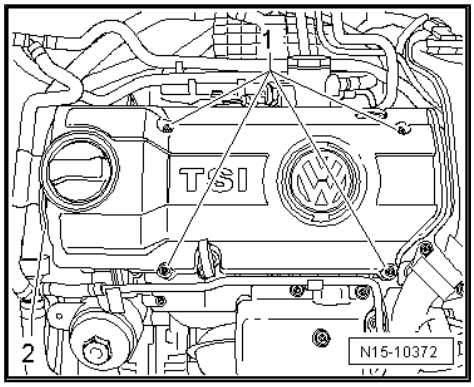


Procedure

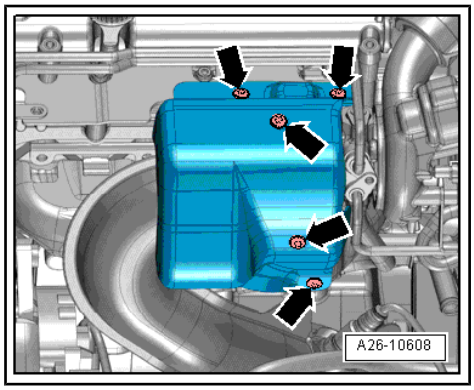
– Detach coolant hose -2- from engine cover panel.

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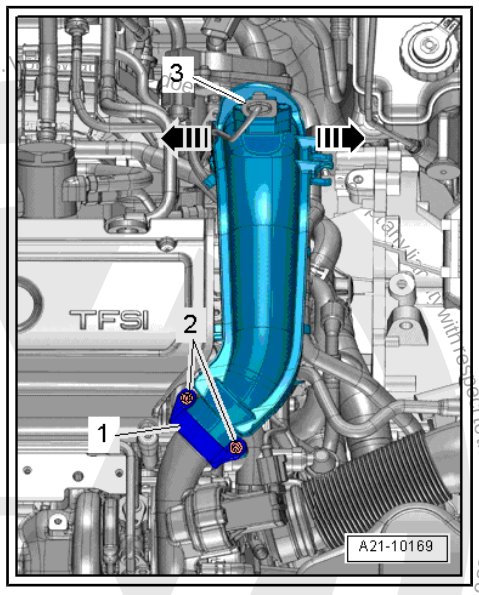
– Pull oil dipstick out.
– Unscrew bolts -arrows- and remove engine cover panel.
– Remove air filter housing ⇒ page 303 .



– Unscrew bolts -arrows- and remove heat shield for turbocharger.
– Unscrew bolts -2- and remove retaining clip -1-.



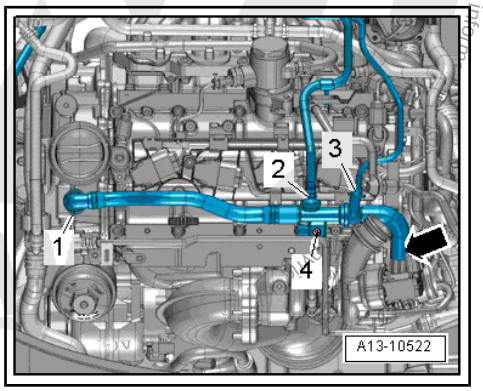
– Pull connector -3- off charge air pressure sender - G31- .
– Release catches -arrows- and pull air pipe first off throttle valve module - J338- and then off turbocharger.
– Lay hoses at air pipe to side.



– Unscrew bolt -4- and remove crankcase breather hose from turbocharger -arrow- and lay it to side.

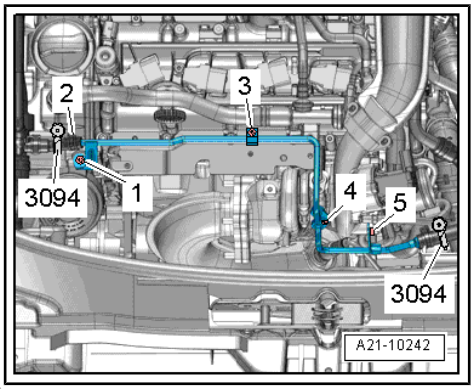
Note

The positions labelled -1, 2, 3- should be disregarded.



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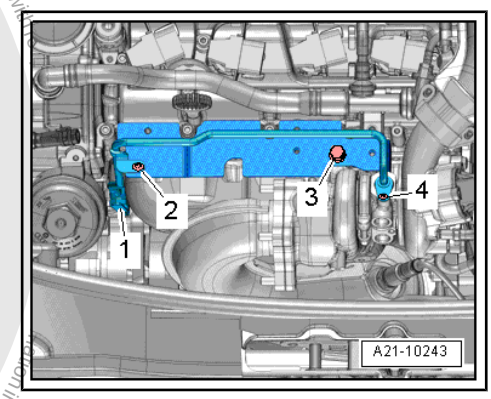
– Clamp off coolant hoses using hose clips - 3094- as illustrated.
– Remove bolts -1, 3, 4, 5-.
– Pull coolant lines off turbocharger and lay to side.



Note

The position labelled -2- should be disregarded.

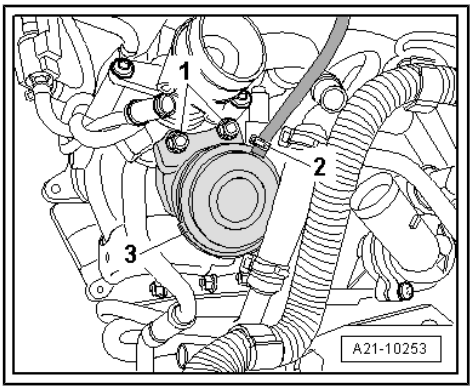
– Unscrew bolts -2- and -3-, then remove retaining plate.



Note

The positions labelled -1- and -4- should be disregarded.

– Remove hose -2- from turbocharger vacuum unit.

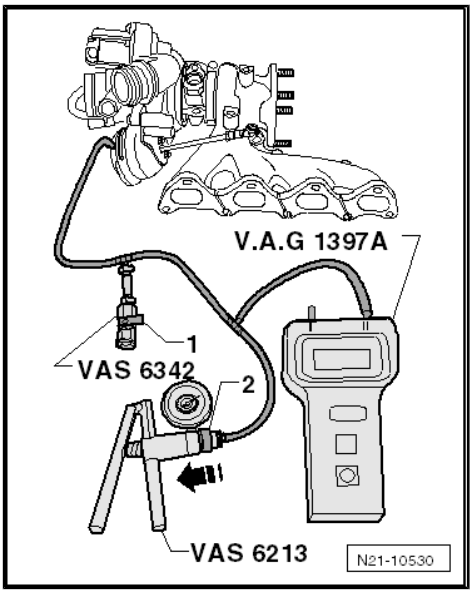


Note

The position labelled -1- should be disregarded.

– Connect test and measuring instruments together as illustrated and connect to connection “II” of turbocharger tester - V.A.G 1397A- and to turbocharger vacuum unit.

– Close lever -1- on pressure regulating valve - VAS 6342- .
– Move slide ring -2- of hand-operated vacuum pump - VAS 6213- in direction of -arrow-.
– Switch on turbocharger tester - V.A.G 1397A- and set sliding switch to position “II”.
– Operate hand vacuum pump - VAS 6213- several times until a pressure of approx. 800 mbar is attained.



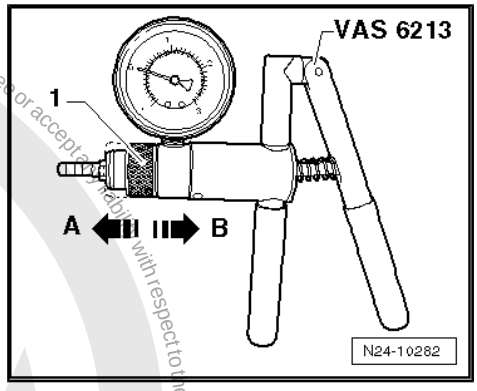
Caution

Excessive pressure may damage the vacuum unit.

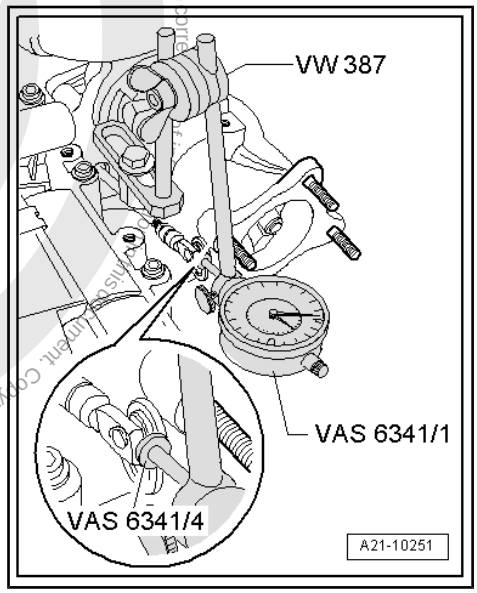
The pressure must not exceed 800 mbar!

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– Vent hand-operated vacuum pump - VAS 6213- -arrow A- so that rod of charge pressure control vacuum unit in turbocharger can move freely.
– Repeat process 5 times.
– Secure universal dial gauge bracket - VW 387- to turbocharger as illustrated.

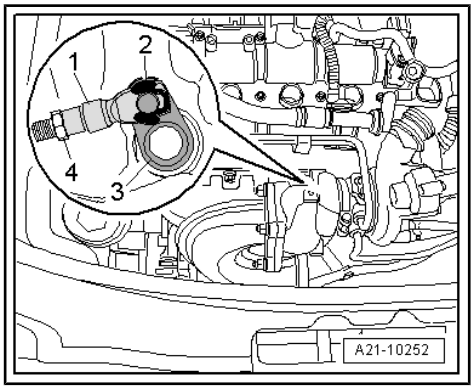


– Secure dial gauge - VAS 6341/1- with flat pickup - VAS 6341/4- to universal dial gauge bracket - VW 387- .
– Set dial gauge - VAS 6341/1- to 1 mm pretension at 0 bar.
– Turn graduated scale of dial gauge - VAS 6341/1- to “0”.
– Operate hand vacuum pump - VAS 6213- several times until pressure of 385 mbar is attained on turbocharger tester - V.A.G 1397A- .



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Specification on dial gauge - VAS 6341/1- : 1 mm stroke.



Note

- *If specification is not attained, loosen lock nut -4-.*
- *Lever up securing clip -2- and pull threaded piece -1- off operating lever pin -3-.*
- *Turn threaded piece on operating rod until specification is attained. Position threaded piece onto operating lever pin to perform check.*
- *If the bore of the threaded piece does not fit onto the pin in this position, the threaded piece may be rotated one-half turn in either direction.*
- *Secure threaded piece with securing clip -2- to operating lever pin and tighten lock nut -4-.*

Checking adjustment of vacuum unit

– Set dial gauge - VAS 6341/1- to 1 mm pretension at 0 bar.

Measurement 1:

– Operate hand vacuum pump - VAS 6213- several times until a pressure of 750…800 mbar is attained on turbocharger tester - V.A.G 1397A- .

– Reduce pressure to 375 mbar on pressure regulating valve - VAS 6342- .

– Read stroke on dial gauge - VAS 6341/1- and make a note.

– Reduce pressure to 0 mbar on pressure regulating valve - VAS 6342- .

– Operate hand vacuum pump - VAS 6213- several times until pressure of 375 mbar is attained on turbocharger tester - V.A.G 1397A- .

– Read stroke on dial gauge - VAS 6341/1- and make a note.

– Calculate average by adding values “1” and “2” and dividing sum by 2.

Specification: 1 mm

Measurement 2:

– Operate hand vacuum pump - VAS 6213- several times until a pressure of 750…800 mbar is attained on turbocharger tester - V.A.G 1397A- .

– Reduce pressure to 475 mbar on pressure regulating valve - VAS 6342- .

– Read stroke on dial gauge - VAS 6341/1- and make a note.

– Reduce pressure to 0 mbar on pressure regulating valve - VAS 6342- .

– Turn graduated scale of dial gauge - VAS 6341/1- to “0”.

– Operate hand vacuum pump - VAS 6213- several times until pressure of 475 mbar is attained on turbocharger tester - V.A.G 1397A- .

– Read stroke on dial gauge - VAS 6341/1- and make a note.

– Calculate average by adding values “1” and “2” and dividing sum by 2.

Specification: 5 mm

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– If specifications are not attained, repeat adjustment procedure.

Specified torques ⇒ page 273 .

Specified torque of heat shield for turbocharger: 8 Nm

Assembly is performed in the reverse order of removal.

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2 Charge air system

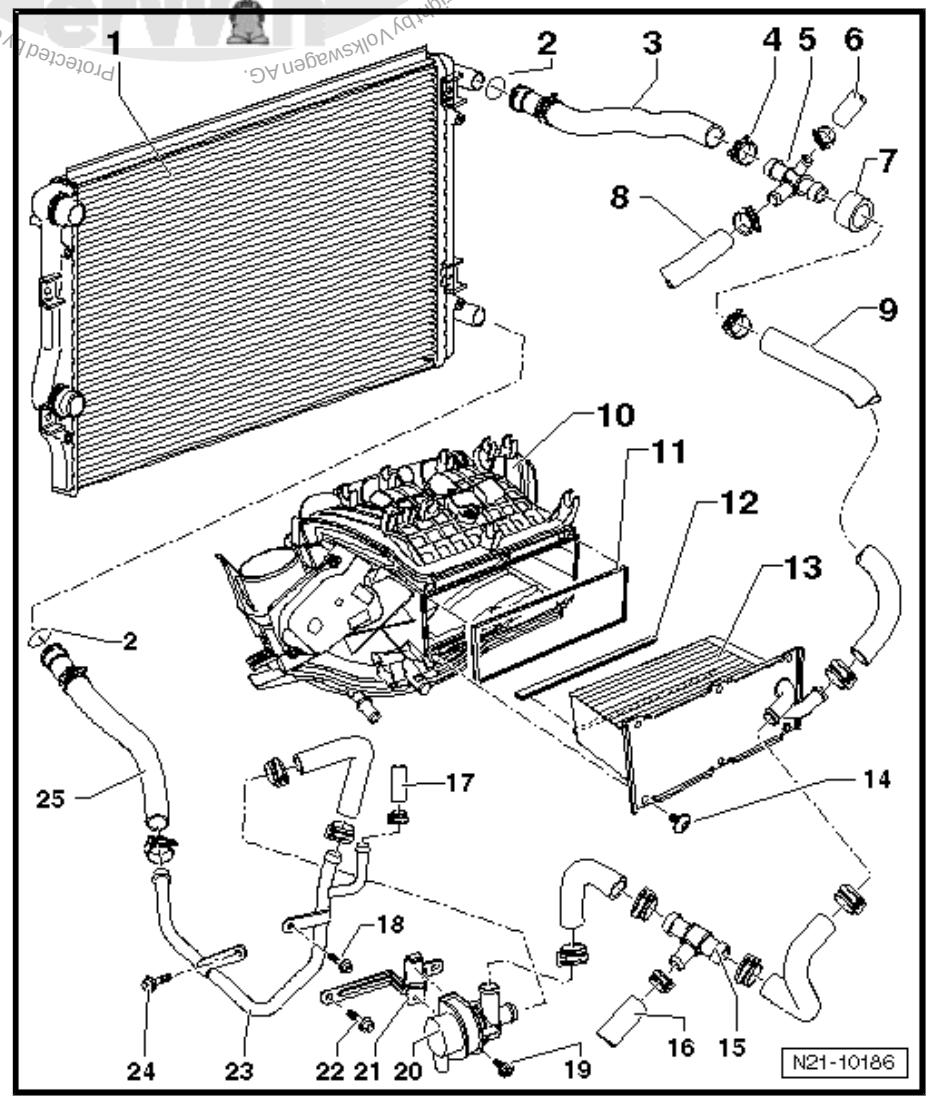
Note

- *Spring-type clip pliers - VAS 5024A- or hose clip pliers - VAS 6340- are recommended for installation of spring-type clips.*
- *Secure all hose connections with hose clips which conform to production standard.*
- *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- *Charge air system must be free of leaks.*

Assembly overview - charge air system ⇒ page 295 .

Removing and installing intake manifold charge air cooler ⇒ page 296

2.1 Assembly overview - charge air system



1 - Auxiliary radiator for charge air system

- ❑ Remove cooler to remove ⇒ page 163 .
- ❑ Removing and installing in the Tiguan and Passat ⇒ page 167 .

2 - O-ring

- ❑ Renew if damaged.

3 - Upper coolant hose

- ❑ Coolant hose schematic diagram ⇒ page 156 .

4 - Spring-type clip

- ❑ Removing and installing with hose clip pliers - VAS 6340- .

5 - Connecting pipe

6 - Coolant hose

- ❑ To expansion tank.

7 - Protective grommet

8 - Coolant hose

- ❑ To turbocharger.

9 - Coolant hose

10 - Intake manifold

- ❑ Removing and installing ⇒ page 308

11 - Gasket

- ❑ Renew if damaged.

12 - Sealing strip

- ❑ Make sure it is properly seated when installing the charge air cooler.

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13 - Charge air cooler

- ❑ Removing and installing ⇒ page 296
- ❑ To remove, remove intake manifold ⇒ page 308 .

14 - 7 Nm

- ❑ When installing, first evenly tighten by hand and then tighten to specified torque.

15 - Connecting pipe

16 - Coolant hose

- ❑ Coolant hose schematic diagram ⇒ page 156 .

17 - Coolant hose

- ❑ Coolant hose schematic diagram ⇒ page 156 .

18 - 10 Nm

19 - 10 Nm

20 - Coolant circulation pump - V50-

- ❑ Removing and installing ⇒ page 173

21 - Bracket

22 - 20 Nm

23 - Coolant pipe

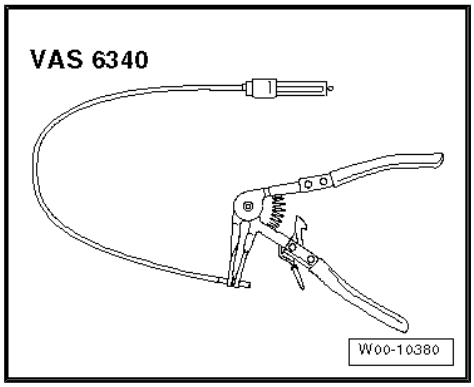
24 - 10 Nm

25 - Lower coolant hose

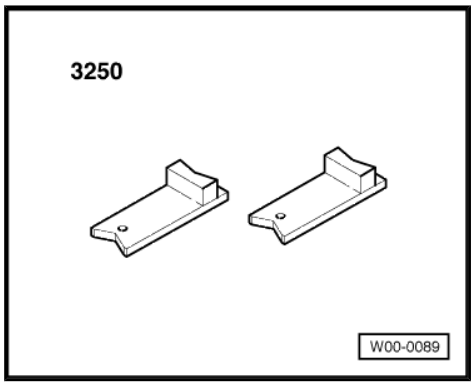
2.2 Removing and installing intake manifold charge air cooler

Special tools and workshop equipment required

- ♦ Hose clip pliers - VAS 6340-



- ♦ Support - 3250-



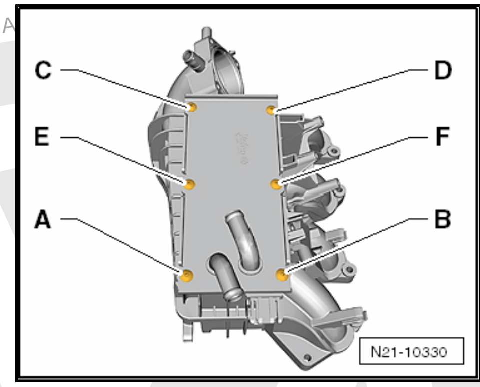
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Removing

– Remove intake manifold ⇒ page 308 .

– Unscrew securing bolts for charge air cooler in specified sequence -A- to -F-.

– Pull charge air cooler out of intake manifold.



Installing

Note

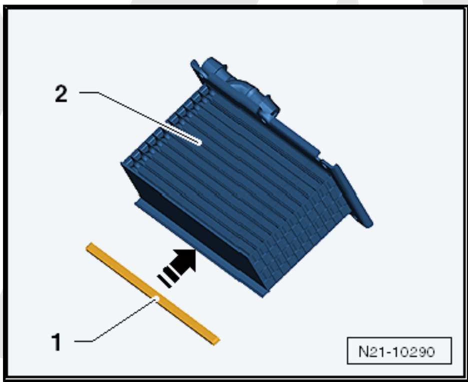
Charge air cooler is installed into intake manifold using a workshop press.

– Push sealing strip -1- in -direction of arrow- onto edge of charge air cooler.

– Check new gasket is seated correctly on intake manifold.

– Push charge air cooler into intake manifold to stop.

Do not tilt charge air cooler when installing it.

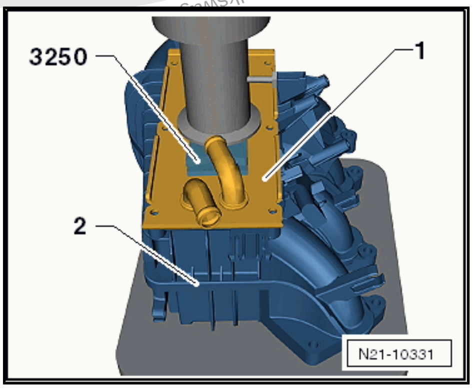


Note

- ♦ *Align intake manifold on table of workshop press.*
- ♦ *The housing of the charge air cooler -1- must be horizontal.*
- ♦ *Use, for example, a wooden block as a base.*

– Position support - 3250- centrally on charge air cooler.

– Carefully lower ram of workshop press until housing of charge air cooler -1- lies on intake manifold -2-.

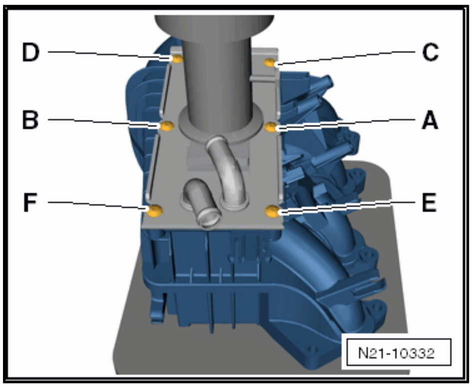


– Screw securing bolts in evenly until bolt heads make contact.

– Tighten securing bolts to 7 Nm in sequence specified -A- to -F-.

– Install intake manifold ⇒ page 308 .

Further installation is performed in the reverse order of removal.



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24 – Mixture preparation - injection

1 Injection system

Assembly overview - parts I and II, intake manifold ⇒ page 298 .

Assembly overview - part I, intake manifold ⇒ page 300 .

Assembly overview - part II, intake manifold ⇒ page 301 .

Assembly overview - fuel rail with injectors ⇒ page 302 .

Assembly overview - air filter ⇒ page 302 .

Removing and installing air filter ⇒ page 303 .

Removing and installing throttle valve module - J338- ⇒ page 304 .

Cleaning throttle valve module - J338- ⇒ page 307 .

Removing and installing intake manifold ⇒ page 308 .

Assembly overview - high-pressure pump ⇒ page 309 .

Checking fuel pressure sender - G247- ⇒ page 310 .

Removing and installing high-pressure pump ⇒ page 313 .

Removing and installing injectors ⇒ page 317 .

Renewing Teflon seal and support washer on injector ⇒ page 320 .

Safety precautions ⇒ page 323 .

Rules for cleanliness ⇒ page 211 .

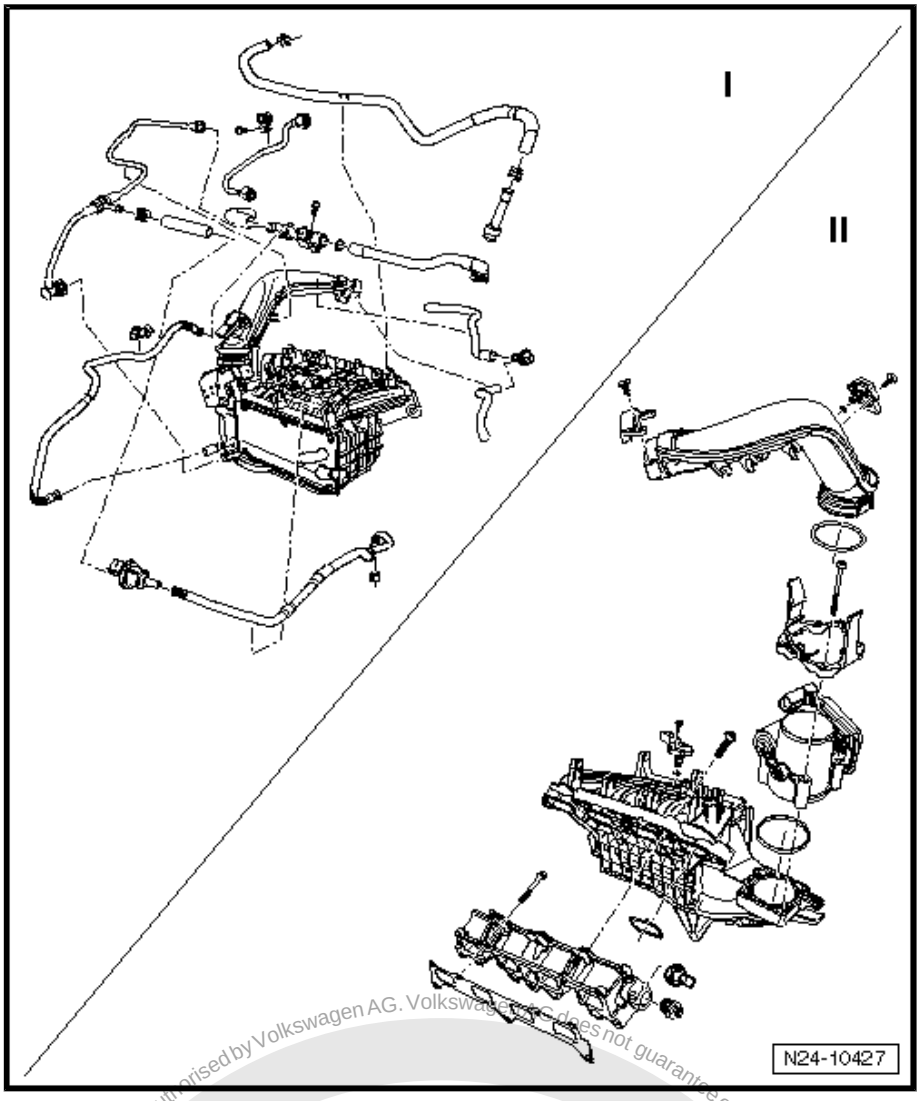
Technical data ⇒ page 325 .

General notes on injection

- The engine control unit - J623- is equipped with self-diagnosis. Before carrying out repairs and for fault finding, first read event memory. Also the vacuum hoses and connections must be checked (unmetered air).
- Fuel hoses in engine compartment must be secured only with spring-type clips. The use of clamp or screw-type clips is not permissible.
- For trouble-free operation of electrical components, a voltage of at least 11.5 V is necessary.
- Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and damage the Lambda probe.
- Vehicles are fitted with a crash fuel shut-off circuit. It reduces the danger of a fire in a crash as the fuel pump is switched off via the fuel pump relay. The system also improves the starting characteristics of the engine. When door is opened, the fuel pump is activated for 2 seconds to build up pressure in the fuel system.

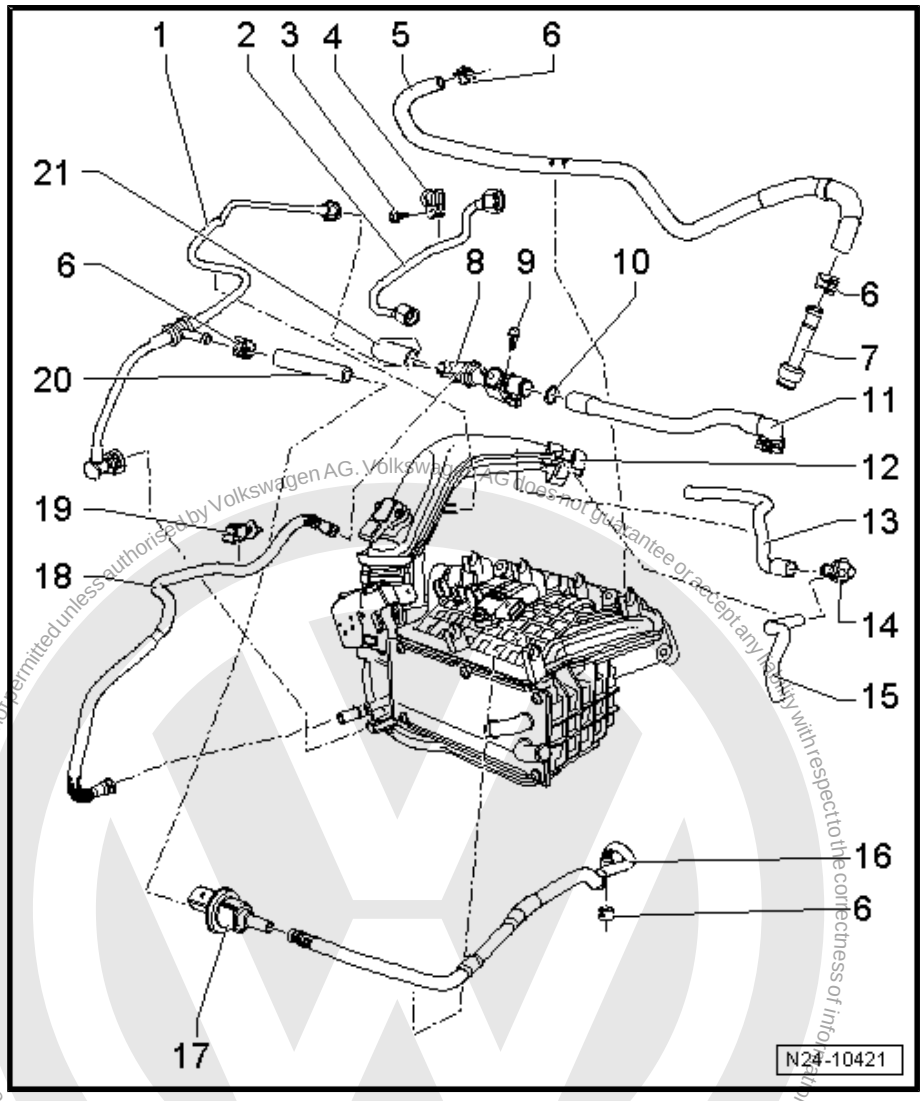
1.1 Assembly overview - parts I and II, intake manifold

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1.2 Assembly overview - part I, intake manifold



1 - Connecting hose

2 - Fuel pipe

- ❑ High-pressure.

Specified torques for union nuts.

To high-pressure pump: 18 Nm.

To lower part of intake manifold: 20 Nm

3 - 8 Nm

4 - Retaining clamp

5 - Fuel hose

- ❑ Low-pressure.
- ❑ To high-pressure pump.

6 - Spring-type clip

- ❑ Removing and installing with hose clip pliers - VAS 6340- .

7 - Connection

- ❑ For fuel supply.

8 - Non-return valve

- ❑ For crankcase ventilation.

9 - 8 Nm

10 - O-ring

- ❑ Not available as separate replacement part
- ❑ In event of damage, renew complete component

11 - Connection

- ❑ On valve timing housing.

12 - Pressure pipe

- ❑ From turbocharger

13 - Connecting hose

- ❑ On camshaft housing.

14 - Non-return valve

15 - Connecting hose

- ❑ On air filter housing.

16 - Connecting hose

- ❑ On activated charcoal filter.

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17 - Activated charcoal filter solenoid valve 1 - N80-

18 - Connecting hose

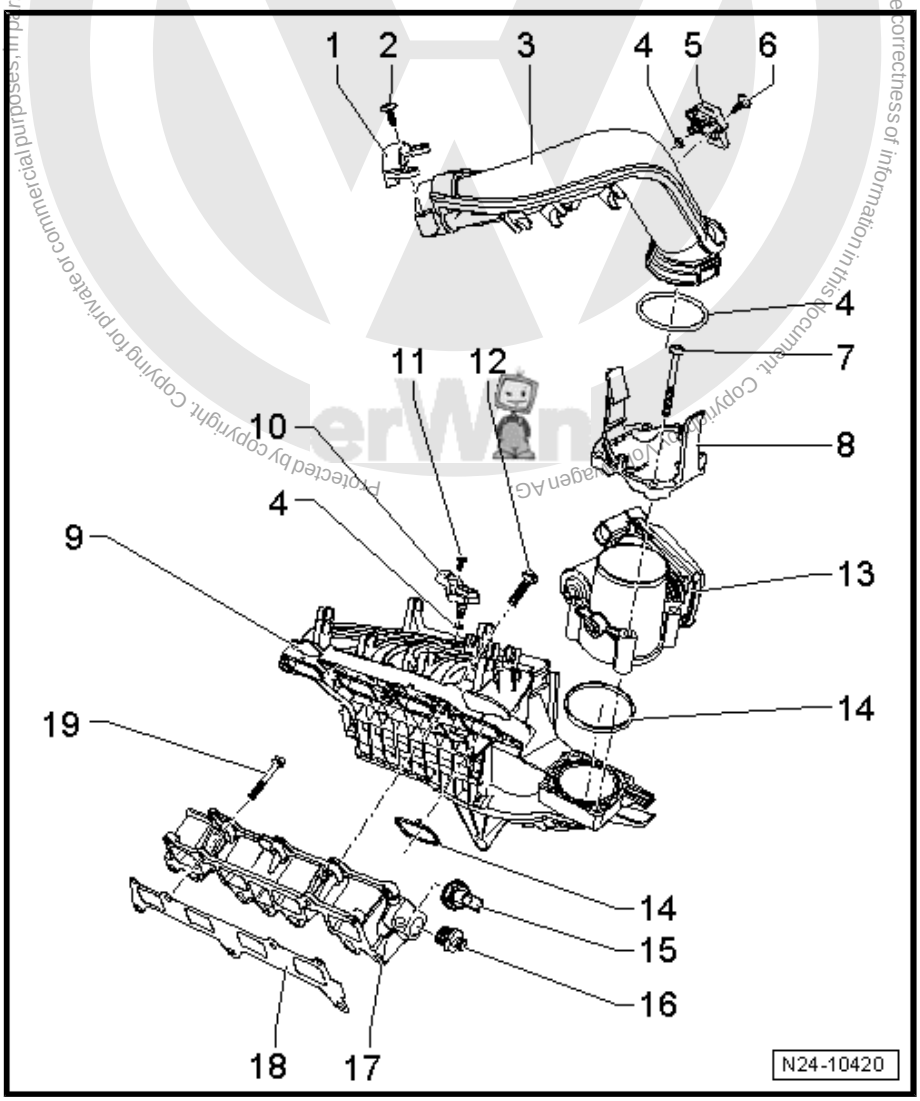
19 - Retaining clamp

20 - Connecting hose

21 - Connecting hose

- ❑ On turbocharger.

1.3 Assembly overview - part II, intake manifold



1 - Retaining clip

2 - 7 Nm

3 - Pressure pipe

4 - O-ring

- ❑ Renew

5 - Charge air pressure sender - G31- with intake air temperature sender 2 - G299-

6 - 5 Nm

7 - 7 Nm

8 - Adapter

9 - Intake manifold

- ❑ Removing and installing ⇒ page 308

10 - Intake manifold pressure sender - G71-

11 - 5 Nm

12 - 20 Nm

13 - Throttle valve module - J338-

- ❑ Removing and installing ⇒ page 304
- ❑ Clean ⇒ page 307 .
- ❑ If renewed, erase learnt values and adapt engine control unit - J623- ⇒ Vehicle diagnostic tester “Guided functions”.

14 - Seal

- ❑ Renew

15 - Fuel pressure sender - G247- , 22 Nm

- ❑ Checking fuel pressure sender - G247- ⇒ page 310 .

16 - 80 Nm

17 - Intake manifold lower part

To remove:

- ❑ Remove throttle valve module - J338- ⇒ page 304 .
- ❑ Removing and installing intake manifold ⇒ page 308 .

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18 - Gasket

- ❑ Renew

19 - 20 Nm

1.4 Assembly overview - fuel rail with injectors

1 - O-ring

- ❑ Renew
- ❑ Before installing, moisten lightly with clean engine oil.

2 - Spring element

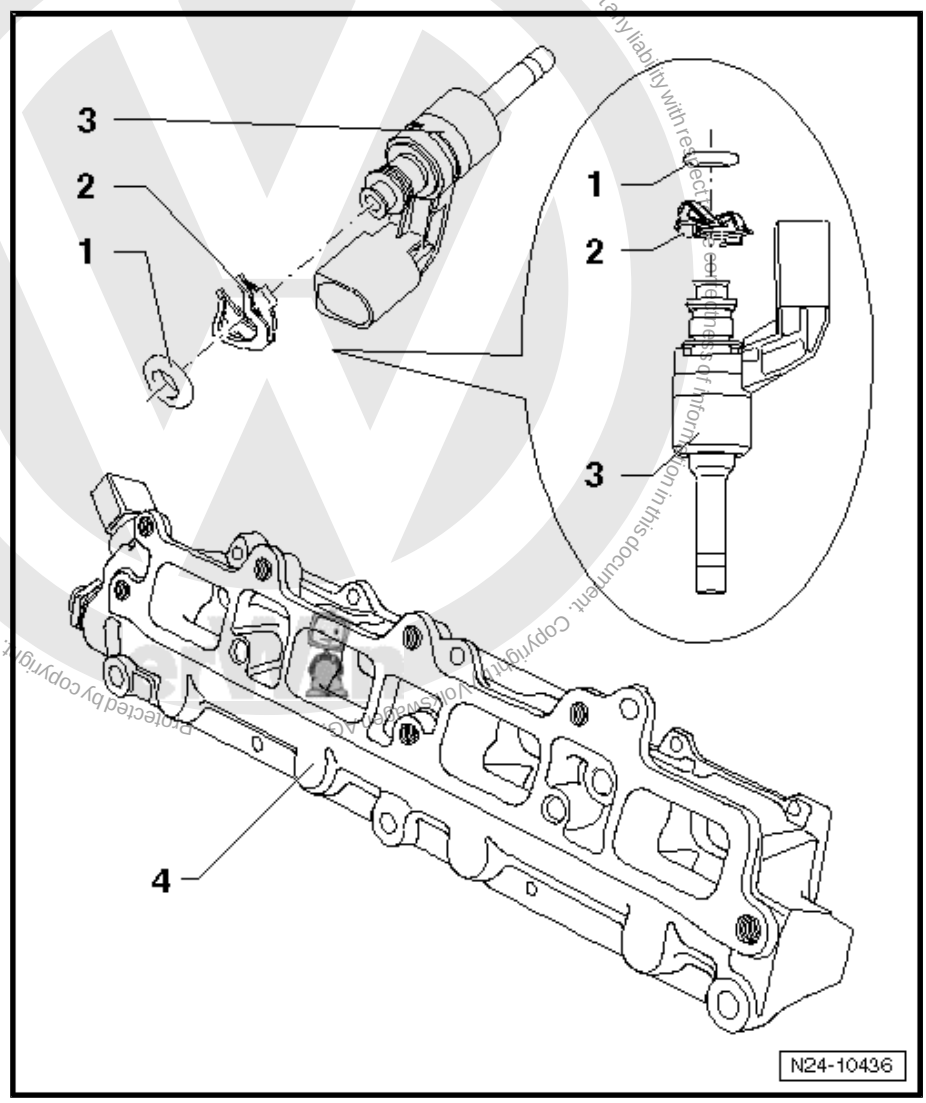
- ❑ Renew each time after removing lower part of intake manifold.
- ❑ Ensure proper seating on injector.

3 - Injector, cylinder 4 - N33-

- ❑ Injector, cylinder 1 - N30-
- ❑ Injector, cylinder 2 - N31-
- ❑ Injector, cylinder 3 - N32-
- ❑ With Teflon seal and support washer.
- ❑ After removing injector, Teflon seal and support washer must be renewed ⇒ page 320 .
- ❑ Removing and installing injectors ⇒ page 317 .

4 - Intake manifold lower part

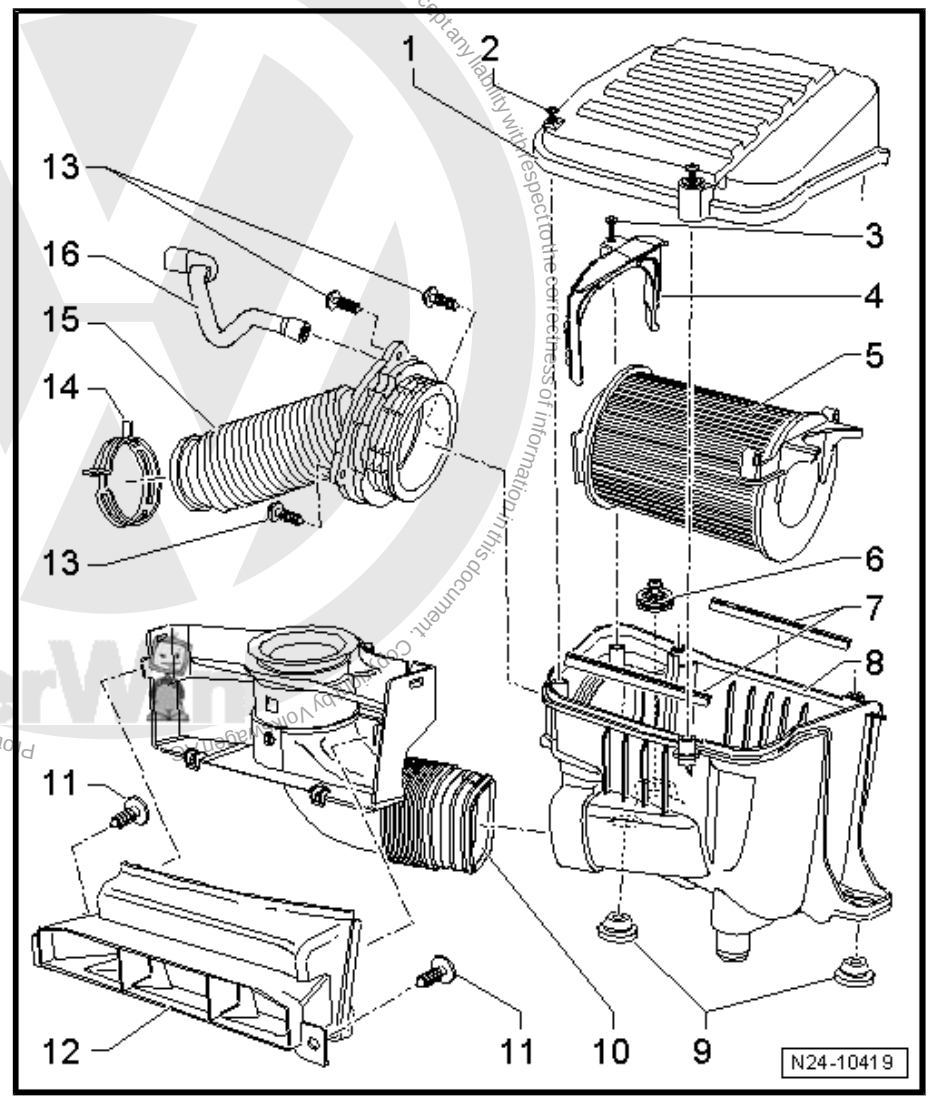
- ❑ To remove, remove and install throttle valve module - J338- and intake manifold ⇒ page 304 .



1.5 Assembly overview - air filter

Removing and installing air filter ⇒ page 303 .

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1 - Air filter upper part

2 - 1.6 Nm

- ❑ Tighten with torque screwdriver - VAS 6494- .

3 - 1.6 Nm

- ❑ Tighten with torque screwdriver - VAS 6494- .

4 - Bracket

5 - Filter element

6 - Bonded rubber bush, 8 Nm

- ❑ With captive bolt.

7 - Sealing strips

- ❑ Renew if damaged.

8 - Air filter lower part

- ❑ Removing and installing ⇒ page 303

9 - Rubber bush

10 - Intake connecting pipe

- ❑ With cover.

11 - 3 Nm

12 - Intake air duct

13 - 1.6 Nm

- ❑ Tighten with torque screwdriver - VAS 6494- .

14 - Spring-type clip

- ❑ Remove and install with hose clip pliers - VAS 6340- .

15 - Intake hose

16 - Vacuum hose

- ❑ Renew if damaged.
- ❑ From camshaft housing.

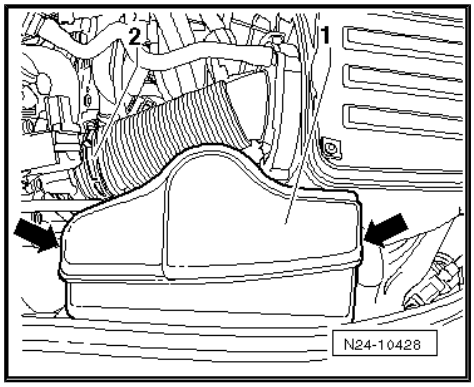
1.6 Removing and installing air filter

Removing

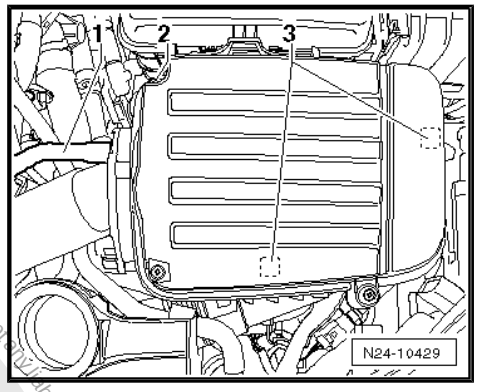
– Press catches -arrows- and remove cover -1- from intake manifold.

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– Pull intake connecting pipe out of intake air duct.
– Pull spring-type clip -2- together with intake hose off turbocharger.



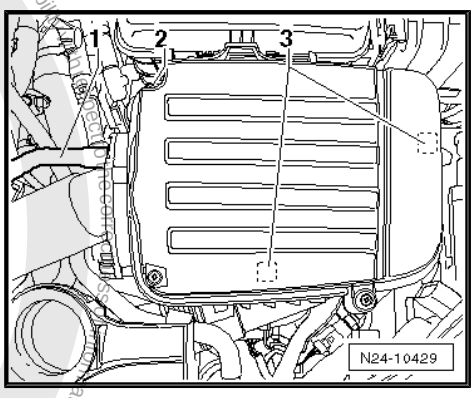
– Pull vacuum hose -1- from air filter housing.
– Remove securing bolt -2- and pull air filter housing upwards off locating pins -3-.



Installing

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

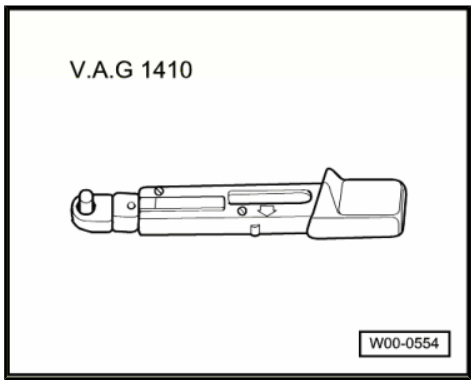
– Push air filter housing onto locating pins -3- from above.
– Tighten securing bolt -2- to 8 Nm.
– Fit vacuum hose -1- onto air filter connection.



1.7 Removing and installing throttle valve module - J338-

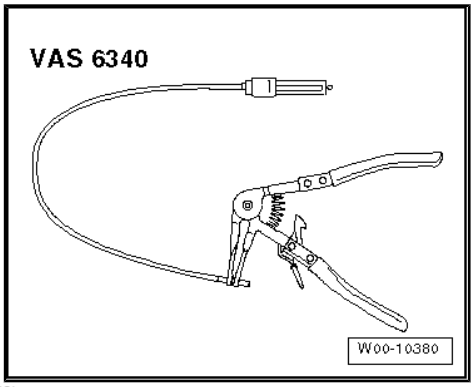
Special tools and workshop equipment required

♦ Torque wrench (4…20 Nm) - V.A.G 1410-



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♦ Hose clip pliers - VAS 6340-

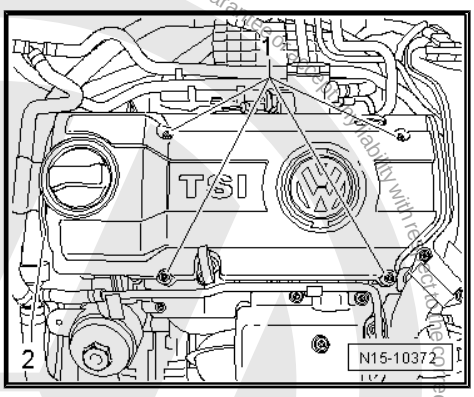


Removing

– Remove securing bolts -1- from engine cover panel.

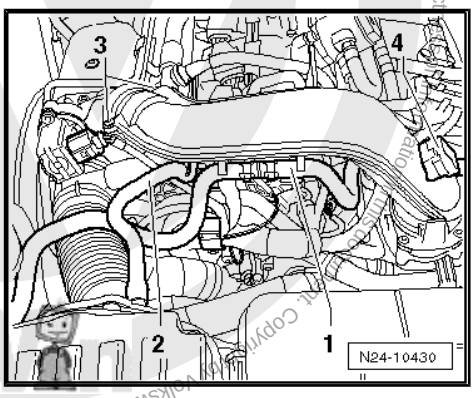
– Pull oil dipstick out

– Detach coolant hoses -2- at engine cover panel and pull engine cover panel upwards.



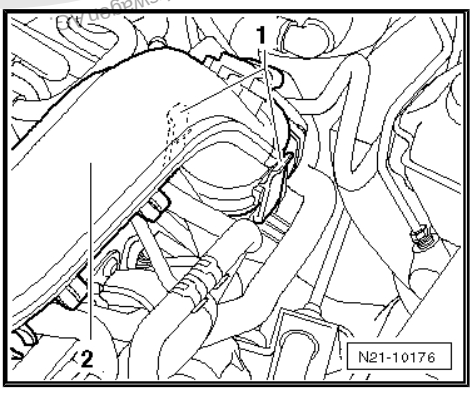
– Detach hoses -1- and -2- from pressure pipe.

– Pull connector off charge air pressure sender - G31- with intake air temperature sender 2 - G299- -4- and remove securing bolts -3-.



– Press retaining clips -1- outwards and slightly pull pressure pipe -2- upwards.

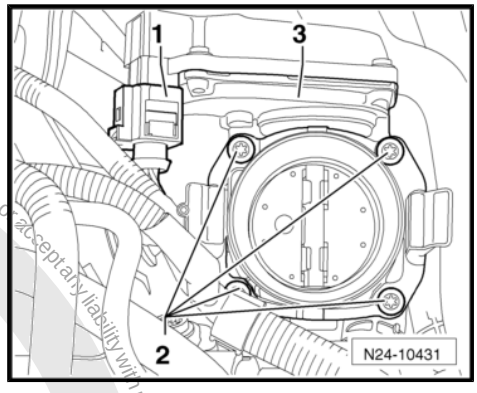
– Then pull pressure pipe -2- off turbocharger.



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– Pull connector -1- off throttle valve module - J338- .

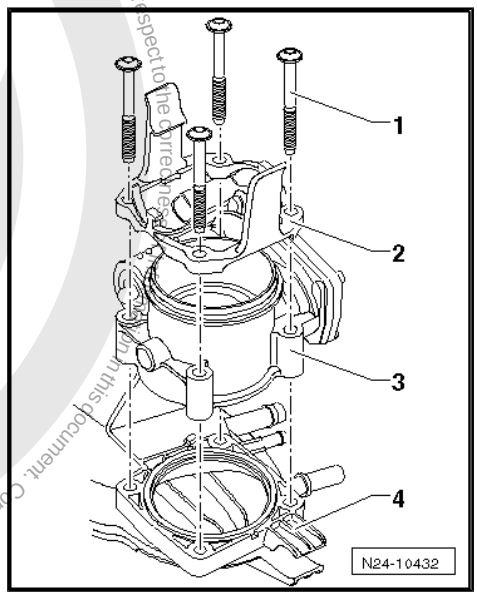
– Unscrew securing bolts -2- and remove throttle valve module -3- from intake manifold.



Installing

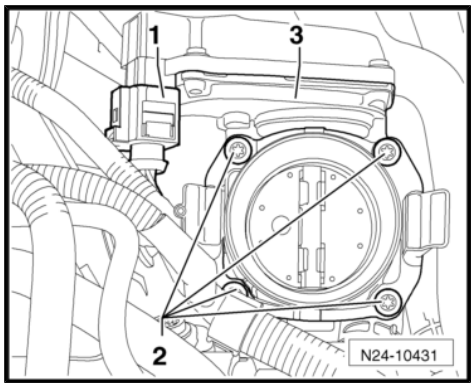
– Place new sealing ring into groove in intake manifold.

– Position throttle valve module -3- together with adapter -2- and securing bolts -1- on intake manifold -4-.



– Tighten securing bolts -2- to 7 Nm.

– Fit connector -1- onto throttle valve module -3-.



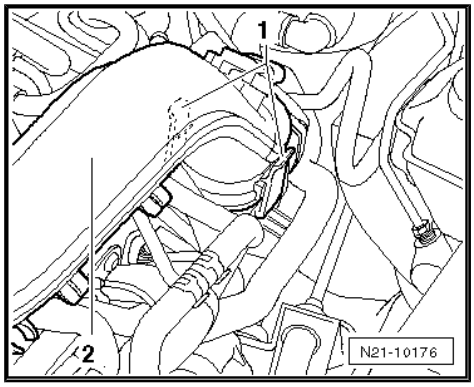
Note

Before installing, lightly coat O-rings on turbocharger and in pressure pipe with engine oil.

– Fit pressure pipe -2- onto turbocharger.

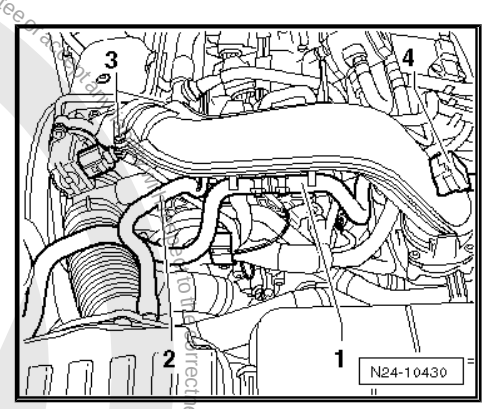
– Press pressure pipe -2- onto throttle valve module.

The retaining clips -1- must engage audibly.



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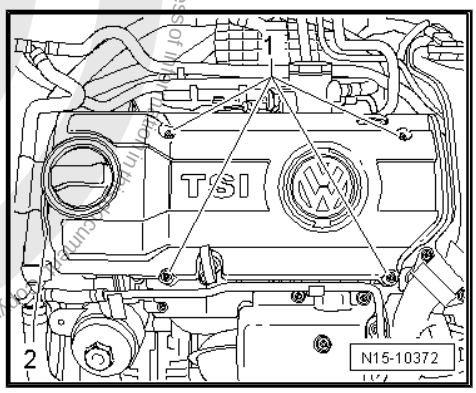
– Tighten bolts -3- of retaining clips to 7 Nm.
– Fit connector onto charge air pressure sender - G31- with intake air temperature sensor 2 - G299- .
– Press hoses -1- and -2- into retainers on pressure pipe.



– Attach coolant hoses -2- to engine cover panel and place engine cover panel on camshaft housing.
– Tighten securing bolts -1- to 8 Nm.

If a new throttle valve module was installed:

– Erase learnt values and adapt engine control unit - J623- to throttle valve module ⇒ Vehicle diagnostic tester “Guided functions”.



1.8 Cleaning throttle valve module - J338-

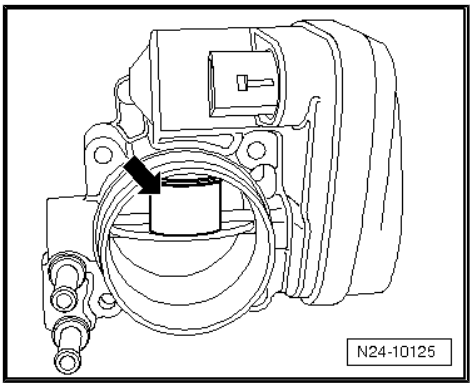
Note

- *If a new engine control unit - J623- is installed the throttle valve module must be adjusted. Adaptation must be performed only with a new or cleaned throttle valve module, because soiling or coking at the end stop of the throttle valve can lead to incorrect adaptation values.*
- *When cleaning the throttle valve housing it must not be scratched.*

– Remove throttle valve module ⇒ page 304 .
– Open throttle valve by hand and lock in open position using a suitable object (e.g. wood or plastic wedge) -arrow-.

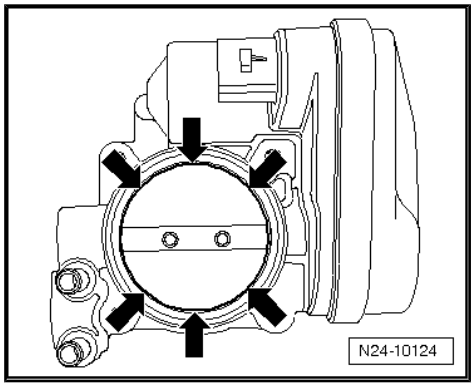
WARNING

Acetone is highly inflammable. Please observe the accidental regulations and safety notes when handling with highly inflammable fluids. Do not use compressed air when cleaning the throttle valve. Wear eye protection and protective clothing to avoid possible injury and skin contact.



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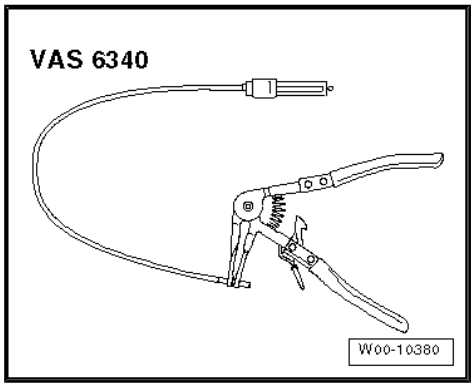
– Thoroughly clean throttle valve housing, especially around the closed throttle valve -arrows- using commercially available acetone according to DIN 53247 and a brush.
– Wipe off throttle valve housing using a lint-free cloth.
– Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
– Erase learnt values and adapt engine control unit - J623- to throttle valve module ⇒ Vehicle diagnostic tester “Guided functions”.



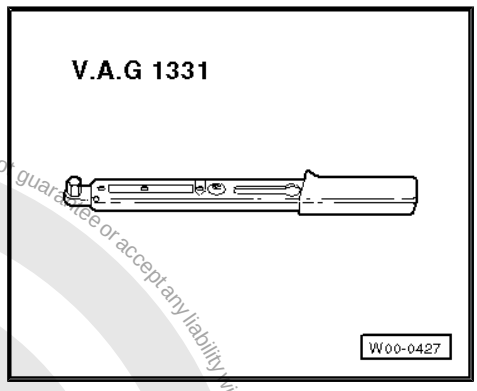
1.9 Removing and installing intake manifold

Special tools and workshop equipment required

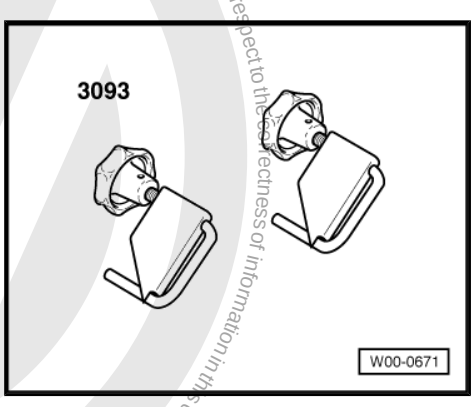
♦ Hose clip pliers - VAS 6340-



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



♦ Hose clamps up to 40 mm - 3093-

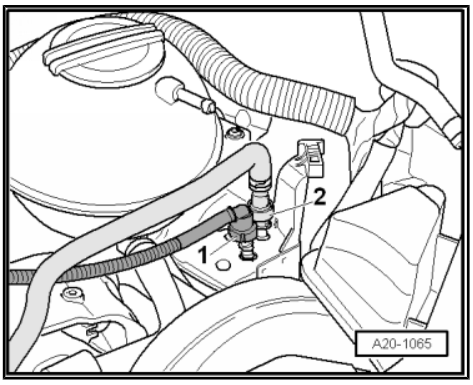


Removing

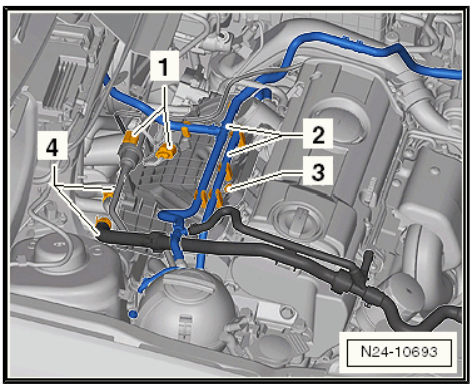
– Drain coolant ⇒ page 157

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– Remove throttle valve module ⇒ page 304 .
– Press release button -2- and pull fuel supply line off.
– Separate push-on couplings ⇒ page 178 .



– Release and pull off connector -1-.
– Clamp off coolant hoses -4- with hose clips up to 40 mm - 3093- .
– Pull off coolant hoses -4- after first opening the retaining clips.
– Unclip lines -2- from bracket.
– Unscrew securing bolts -3- of intake manifold.
– Unclip the other lines.
– Remove intake manifold.



Installing

Installation is performed in the reverse order of removal.

Specified torque of securing bolts for intake manifold: 20 Nm.

Specified torques and installation sequence for charge air cooler ⇒ page 295

1.10 Assembly overview - high-pressure pump

WARNING

The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).

Prior to opening the high-pressure area, e.g. when removing the high-pressure pump, fuel rail, injectors, a fuel line, or the fuel pressure sender - G247- , the fuel pressure in the high-pressure area must be reduced to a residual pressure of approx. 6 bar. The appropriate procedure is described in the chapter on releasing pressure in the high-pressure section ⇒ page 177 .

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1 - 20 Nm

2 - Connection

- ❑ Low-pressure.

3 - Spring-type clip

- ❑ Remove and install with hose clip pliers - VAS 6340- .

4 - Fuel hose

- ❑ Low-pressure.
- ❑ With spring-type clip.

5 - Union nut, 18 Nm

- ❑ Observe safety precautions ⇒ page 176 .
- ❑ Counterhold when loosening connection to high-pressure pump.

6 - Connection

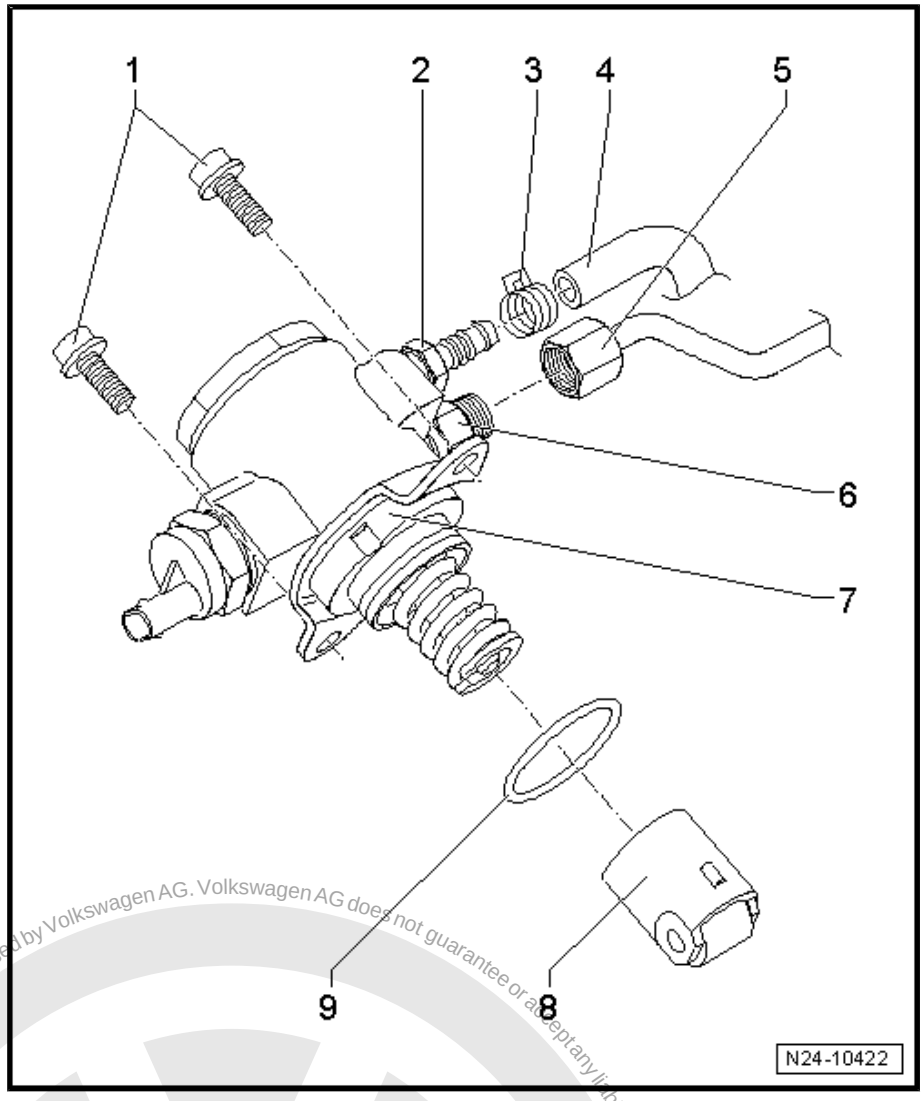
7 - High-pressure pump with fuel pressure regulating valve - N276-

8 - Roller tappet

- ❑ Lightly coat with engine oil when installing.

9 - O-ring

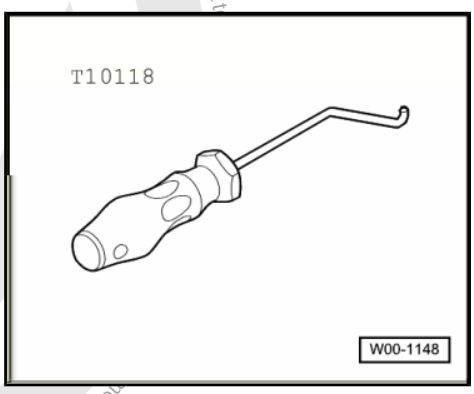
- ❑ Renew
- ❑ Lightly coat with engine oil when installing.



1.11 Checking fuel pressure sender - G247-

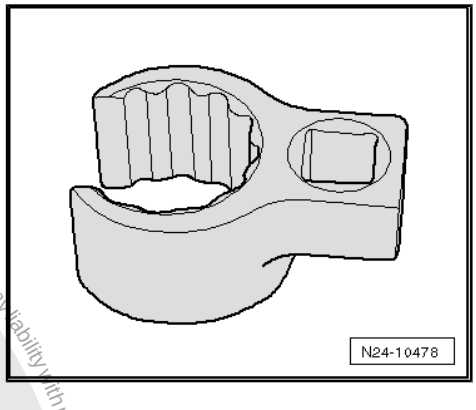
Special tools and workshop equipment required

♦ Assembly tool - T10118-



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- Open ring spanner with 3/8" drive, width across flats 27 mm (flared spanner)



- Pressure sensor tester - VAS 6394/1-
- Adapter - VAS 6394/2-
- Test adapter - VAS 5570-

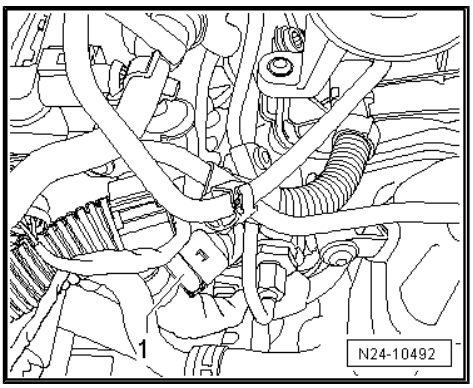
Procedure

WARNING

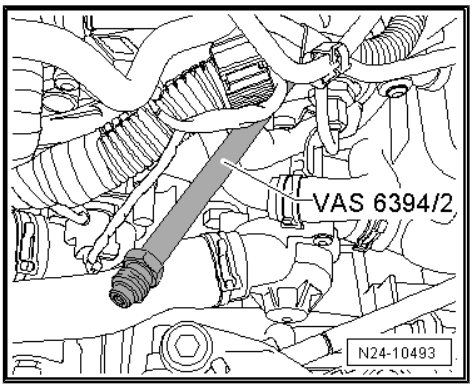
The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).

Prior to opening the high-pressure area, e.g. when removing the high-pressure pump, fuel rail, injectors, a fuel line, or the fuel pressure sender - G247- , the fuel pressure in the high-pressure area must be reduced to a residual pressure of approx. 6 bar. The appropriate procedure is described in the chapter on releasing pressure in the high-pressure section ***⇒ page 177*** ***.***

– Remove fuel pressure sender - G247- -1- using an open ring spanner.

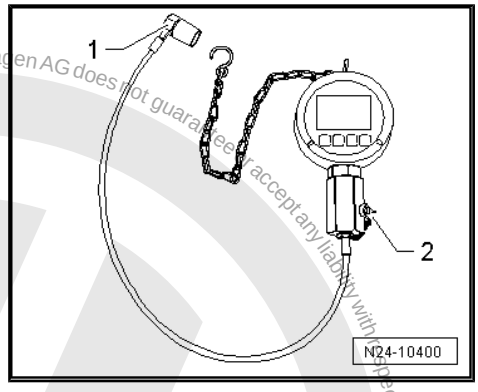


– Moisten tapered seal of adapter - VAS 6294/2- with clean engine oil and screw into fuel rail. Specified torque: 22 Nm.

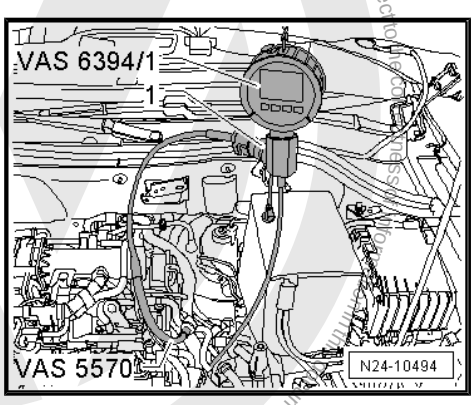


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– Unscrew plug -2- and screw fuel pressure sender - G247- into tester - VAS 6394/1- . Specified torque 22 Nm.
– Connect pressure line of tester - VAS 6394/1- to adapter - VAS 6394/2- .

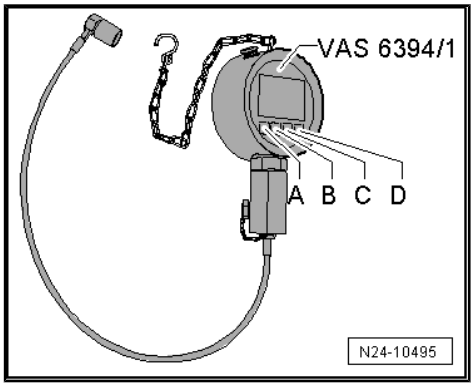


– Connect fuel pressure sender -1- and electrical connector of fuel pressure sender using test instrument adapter - VAS 5570- .



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– Switch on tester - VAS 6394/1- to do this, press button -A- once briefly.



Note

- *When button -A- is pressed for 2 seconds, the illumination will be switched on for 20 seconds.*
- *If the pressure tester - VAS 6394/1- reading is not 0 bar, carry out a zero point procedure ⇒ operating instructions .*

– Connect vehicle diagnostic tester to diagnostic connection.

– Switch on ignition.

– Press following buttons on display of diagnostic tester one after the other:

`Vehicle self-diagnosis`

`Self-diagnosis` ▶

`01 - Engine electronics` ▶

`011 - Measured values` ▶

– Select measured value block 2 4 7 and confirm with Q.

The actual fuel pressure value is shown in display zone 2, measured by the fuel pressure sender - G247- .

– Start engine.

– Compare the displayed pressure of pressure tester - VAS 6394/1- with the displayed actual value on vehicle diagnostic tester .

• A maximum pressure deviation of 5 bar is permissible.

– If the deviation is greater than 5 bar, renew fuel pressure sender - G247- .

WARNING

The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).

Prior to opening the high-pressure area, e.g. when removing the high-pressure pump, fuel rail, injectors, a fuel line, or the fuel pressure sender - G247- , the fuel pressure in the high-pressure area must be reduced to a residual pressure of approx. 6 bar. The appropriate procedure is described in the chapter on releasing pressure in the high-pressure section ***⇒ page 177*** ***.***

– Repeat the test with the new fuel pressure sender - G247- and compare both measured values.

If measured values again fail to correspond:

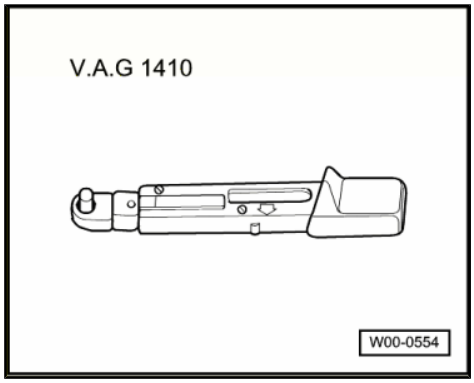
– Check wiring ⇒ Vehicle diagnostic tester.

1.12 Removing and installing high-pressure pump

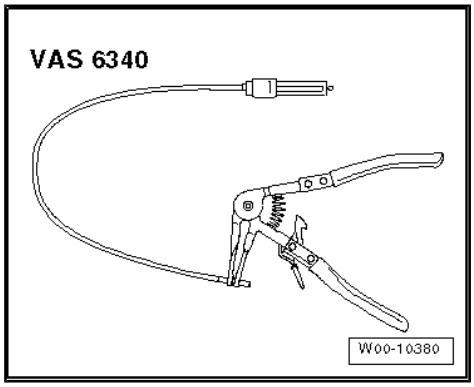
Special tools and workshop equipment required

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♦ Torque wrench (4…20 Nm) - V.A.G 1410-



♦ Hose clip pliers - VAS 6340-



Removing

Observe safety precautions ⇒ page 176 .

Observe rules for cleanliness ⇒ page 211 .

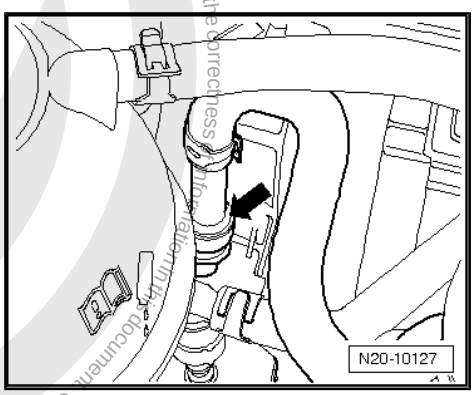
WARNING

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Prior to opening the high-pressure area, e.g. when removing the high-pressure pump, fuel rail, injectors, a fuel line, or the fuel pressure sender - G247- , the fuel pressure in the high-pressure area must be reduced to a residual pressure of approx. 6 bar. The appropriate procedure is described in the chapter on releasing pressure in the high-pressure section ⇒ page 177 .

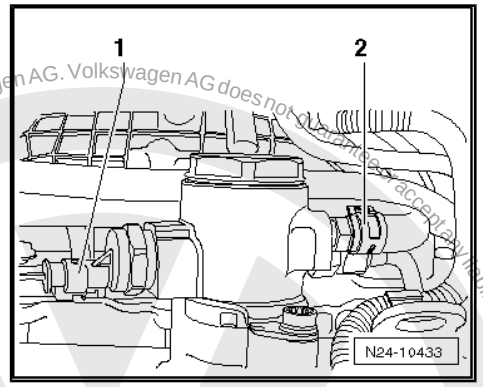
– Separate fuel supply line -arrow-.

– Separate push-on couplings ⇒ page 178 .



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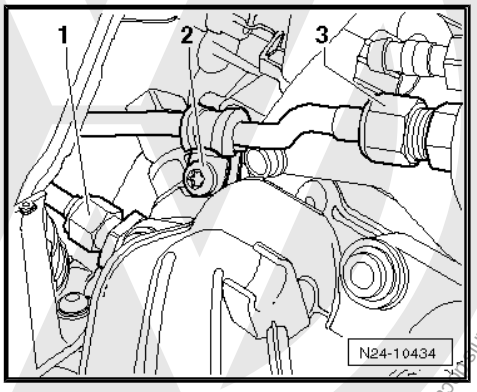
– Pull connector -1- and fuel supply line -2- off high-pressure pump.



Note

Catch escaping fuel in a cloth.

– Remove cable guide -2-.

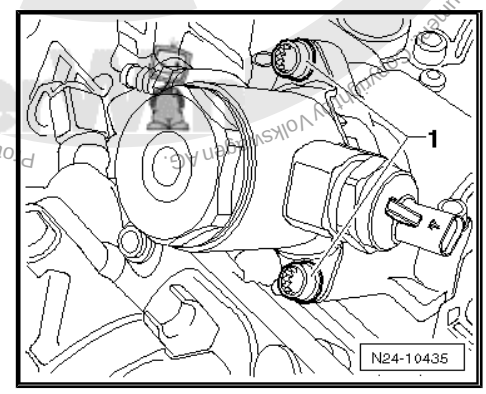


Note

Use a spanner to counterhold threaded connections on high pressure pump and on lower part of intake manifold when loosening union nuts.

– Loosen union nuts -1- and -3- of high-pressure line.

– Unscrew securing bolts -1- evenly.



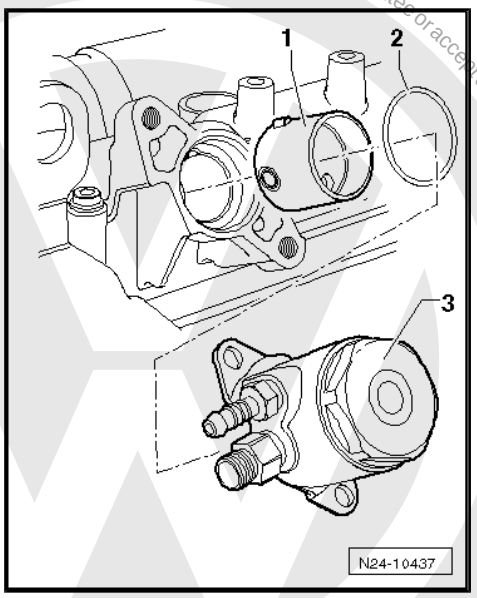
Caution

Only grasp high-pressure pump on housing when removing and installing!

When the high-pressure piston spring package loosens the high-pressure pump will leak and must be replaced.

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– Pull high-pressure pump -3- and roller tappet -1- out of camshaft housing.



Installing

Caution

Only grasp high-pressure pump on housing when removing and installing!

When the high-pressure piston spring package loosens the high-pressure pump will leak and must be replaced.

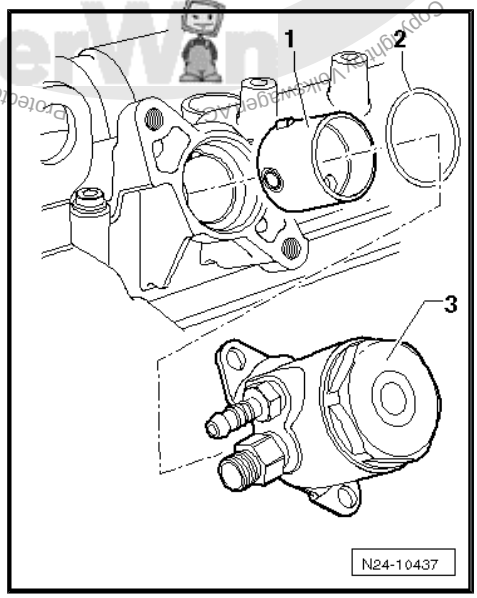
Note

- *Moisten high-pressure pump roller tappet with clean engine oil.*
- *The high-pressure pump O-ring must be renewed.*

– Slide roller tappet -1- into camshaft housing.

– Insert new, lubricated O-ring -2- in groove of high-pressure pump -3-.

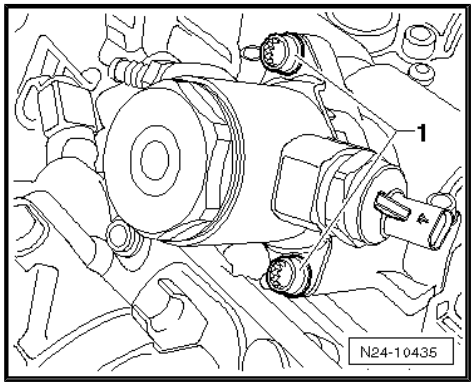
– Place high-pressure pump -3- onto camshaft housing.



– Screw in securing bolts -1- by hand until bolt heads are seated on flange.

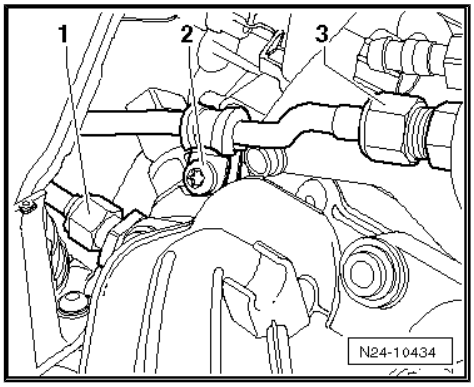
– Tighten securing bolts -1- evenly until flange is seated on camshaft housing.

Specified torque: 20 Nm



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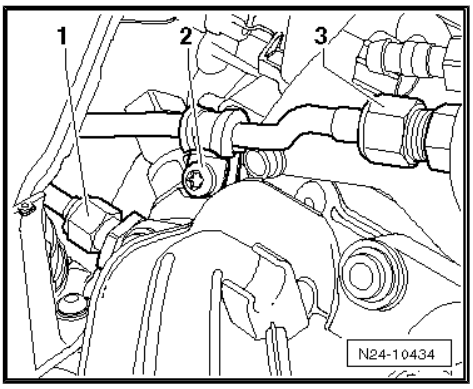
– Tighten union nuts of high-pressure line -1- and -3- hand-tight.
– Install cable guide and tighten securing bolt -2- to 8 Nm.



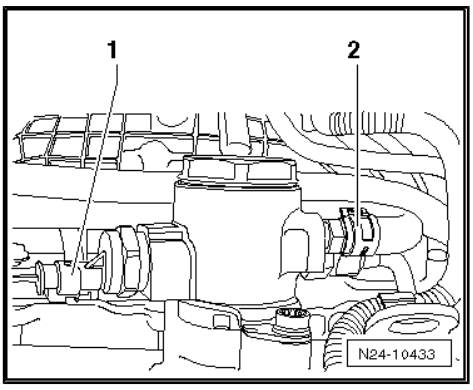
Note

Use a spanner to counterhold threaded connections on high-pressure pump and on lower part of intake manifold when tightening union nuts.

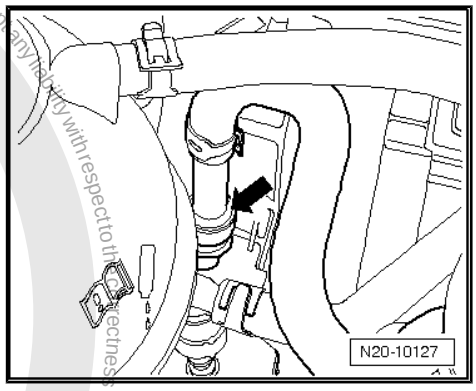
– Tighten union nuts -1- and -3- of high-pressure line to 18 Nm.



– Secure fuel supply line -2- and connector -1- to high-pressure pump.



– Reconnect fuel supply line -arrow-.



1.13 Removing and installing injectors

Note safety precautions before beginning work ⇒ page 323 .

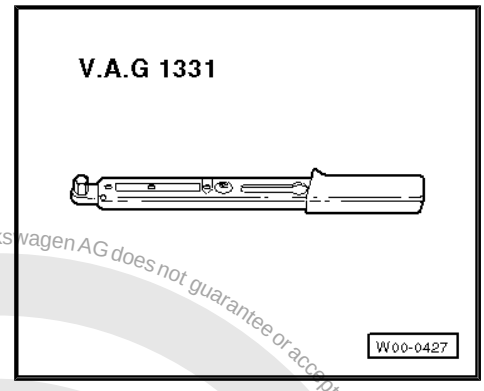
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Note

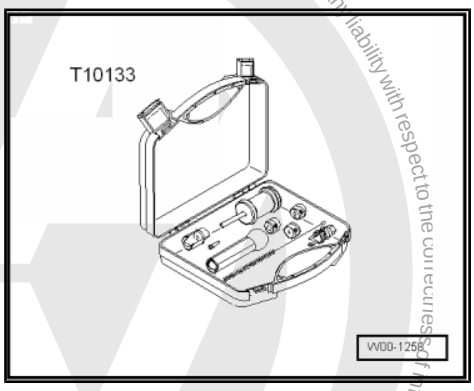
Teflon seal on injector must be renewed each time after removing injector ⇒ page 320 .

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-



- Tool set - T10133-



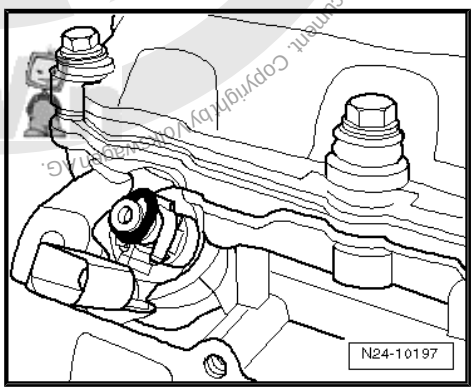
Removing

– Remove intake manifold ⇒ page 308 .

– Remove lower part of intake manifold ⇒ page 301 .

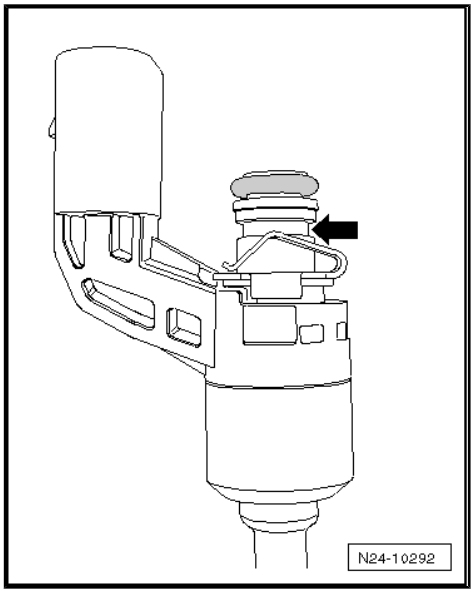
– Press O-ring upwards by hand as shown, and remove it from injector.

– Screw slide hammer - T10133/3- to puller - T10133/15- .



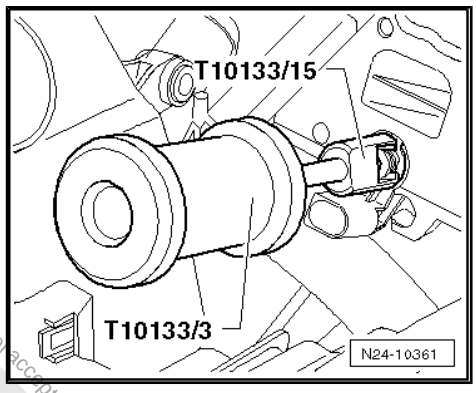
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– Then insert puller - T10133/15- into groove -arrow- on injector.



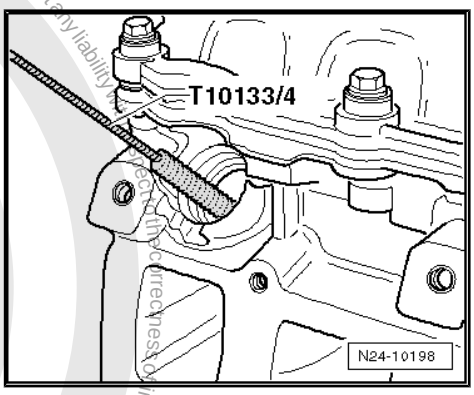
– Pull injector out by tapping carefully.

Installing



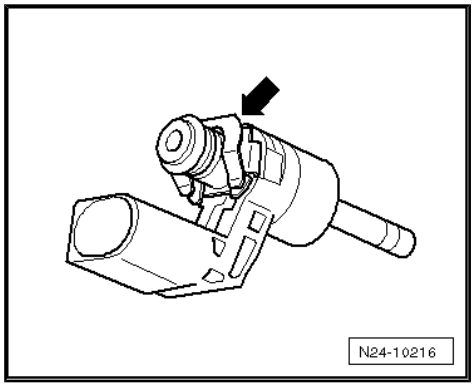
– Thoroughly clean injector holes in cylinder head using nylon brush - T10133/4- .

– Check plastic support washer for damage, renew if necessary ⇒ page 320 .



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– Renew spring element -arrow- and Teflon seal each time the injectors are removed ⇒ page 320 .
– Renew O-rings between injector and lower part of intake manifold and moisten slightly with clean engine oil.



Note

The Teflon seal on the injector must not be oiled or greased.

– Push injector into cylinder head bore to stop by hand.

Note

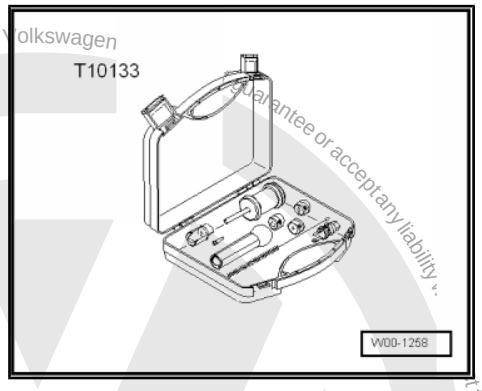
The injector must insert easily. If necessary wait until the seal has contracted sufficiently.

– Ensure correct position of injectors in cylinder head.
– Place lower part of intake manifold carefully on injectors and tighten securing bolts to 20 Nm ⇒ page 300 .
– Install intake manifold ⇒ page 308 .

1.14 Renewing Teflon seal and support washer on injector

Special tools and workshop equipment required

♦ Tool set - T10133-



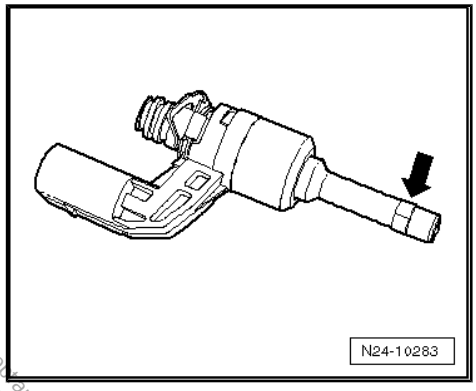
Procedure

Renewing Teflon seal

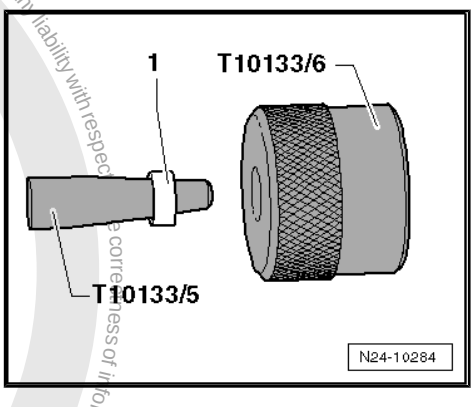
– Remove intake manifold ⇒ page 308 .
– Remove lower part of intake manifold ⇒ page 301 .
– Remove injectors ⇒ page 317 .
– Clean injector carefully.
– Carefully cut open seal with a knife as shown -arrow-. Avoid contact between knife blade and valve body under all circumstances.

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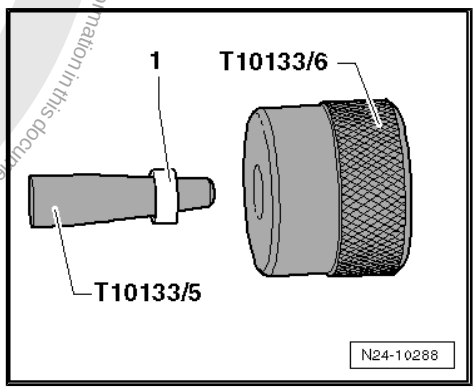
– Remove old seal and clean seal groove in area of seal -arrow-. Remove coking deposits using a brass wire brush.



– Fit new oil seal -1- onto assembly cone - T10133/5- . Using assembly sleeve - T10133/6- (knurling points to seal -1-), gently slide seal onto assembly cone - T10133/5- as far as possible.

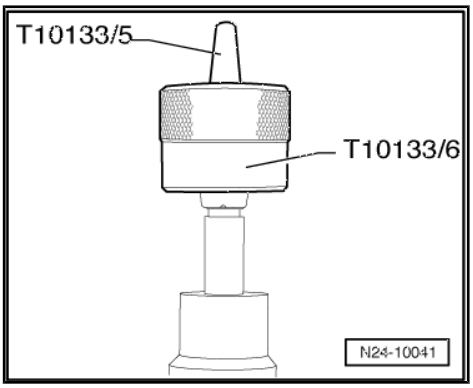


– Turn assembly sleeve - T10133/6- around (knurling no longer points to seal) and push seal -1- to end of assembly cone - T10133/5- .
– Now place assembly cone - T10133/5- with seal onto injector from front. Slide seal further onto injector using assembly sleeve - T10133/6- .



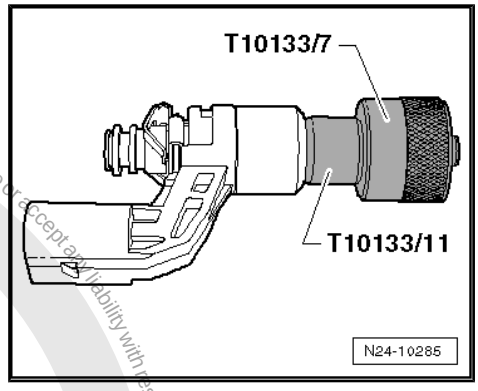
The seal is not yet seated in its groove.

– Remove assembly sleeve - T10133/6- and assembly cone - T10133/5- .
– Slide seal into annular groove by hand.
– Position spacer sleeve - T10133/11- onto valve body.
– Now push calibration sleeve - T10133/7- over seal to stop onto spacer sleeve - T10133/11- .



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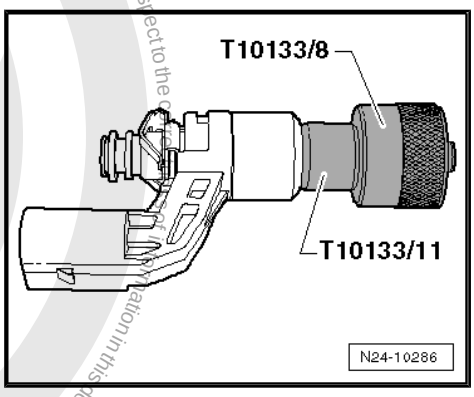
– Pull off calibration sleeve - T10133/7- again.
– Now push calibration sleeve - T10133/8- over seal to stop onto spacer sleeve - T10133/11- .
– Pull off calibration sleeve - T10133/8- again.



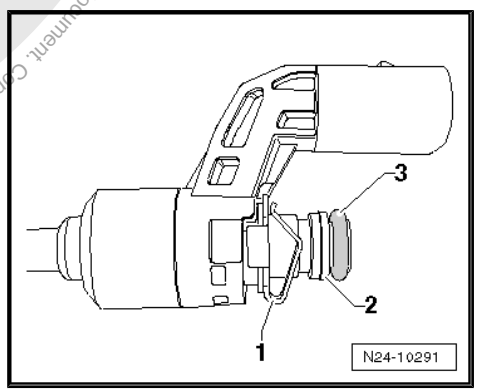
Now the Teflon seal has correct installation dimensions.

Renewing support washer

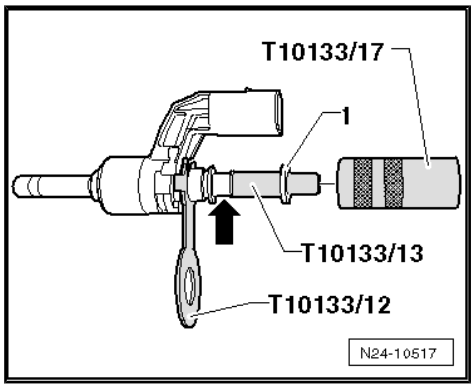
– Remove O-ring -3-.
– Cut support washer -2- open with a small pair of side cutters and remove it.



– Pull spring element -1- off injector and replace with retaining plate - T10133/12- .



– Place new support washer -1- onto assembly cone - T10133/13- and position onto injector as shown.
– Slide support washer -1- into first groove -arrow- on injector using calibration sleeve - T10133/17- (knurled side points to injector).

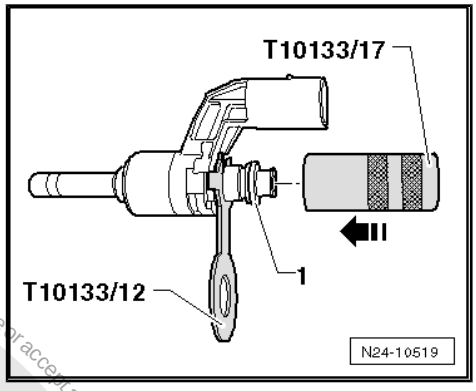


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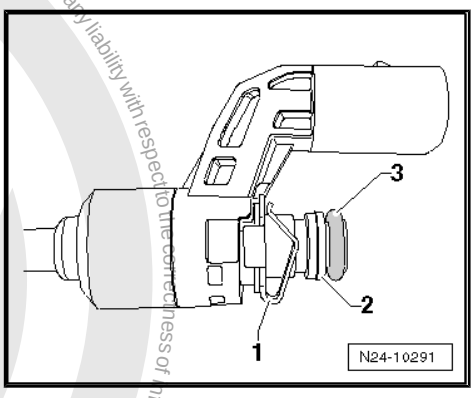
– Now turn calibration sleeve - T10133/17- around (knurled side no longer points to injector). Slide calibration sleeve over support washer -1- in direction of -arrow- to stop on retaining plate - T10133/12- .

– Pull calibration sleeve - T10133/17- down again.

The support washer now has correct installation dimensions.

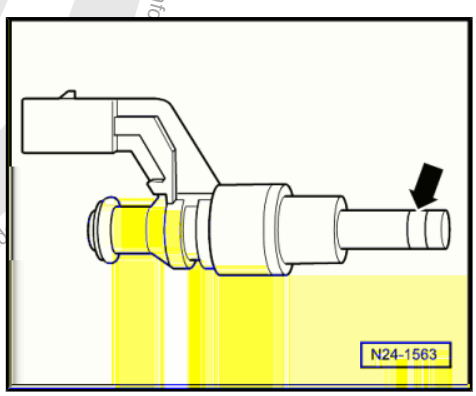


– Now remove retaining plate - T10133/12- and fit a new spring element -1- instead. Fit a new O-ring -3- in front of support washer -2-.



Note

The Teflon seal -arrow- must not be oiled to install injector.



– Install injectors ⇒ page 317 .

– Place lower part of intake manifold carefully on injectors and tighten securing bolts to 20 Nm ⇒ page 300 .

– Install intake manifold ⇒ page 308 .

Further installation is carried out in the reverse sequence of removal.

1.15 Safety precautions

WARNING

Fuel system is under pressure! 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.

To prevent injuries to persons and/or damage to the injection and ignition system, the following must be observed:

- For safety reasons, fuse No. 27 must be removed from fuse holder on left under dash panel before opening fuel system. Otherwise fuel pump will be activated by driver door contact switch.
- Do not touch or disconnect ignition cables when the engine is running or being turned at starter speed.

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- Switch off ignition before connecting or disconnecting injection and ignition system wiring as well as test instrument cables.

Caution

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.***
- ***To avoid damage to lines, ensure sufficient clearance from all moving or hot components.***

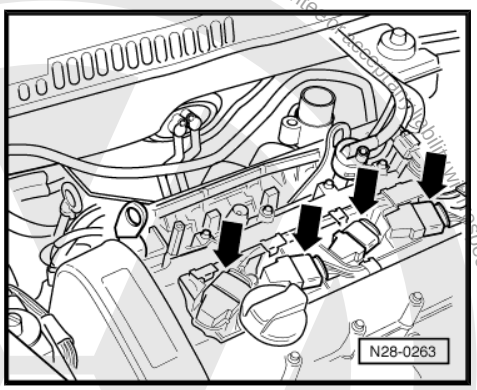
Note the following if testers and measuring instruments have to be used during a road test:

- Test and measuring instruments must always be secured to rear seat and operated by a second person from this location.

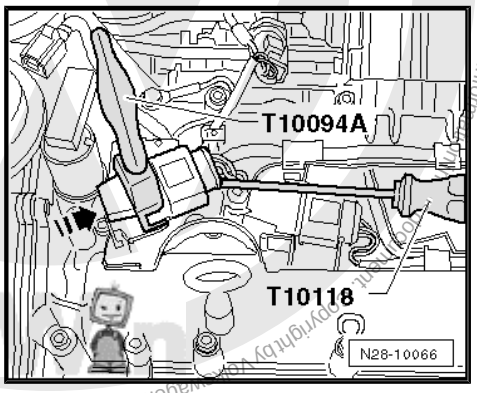
If test and measuring instruments are operated from front passenger seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

- If the engine is to be turned at starter speed without starting:

– Pull all 4-pin connectors -arrows- off ignition coils.

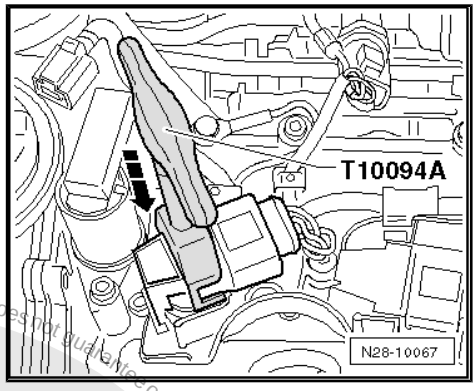


– To do this, fit puller - T10094 A- on ignition coil with final output stage -arrow- ⇒ page 361 .
– Pull ignition coil with final output stage out slightly.
– Fit assembly tool - T10118- as shown.
– Carefully release connector locking mechanism and pull off connector.
– When installing ignition coil for final output stage, slide connector on until it audibly engages.



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– Fit puller - T10094 A- as shown ⇒ page 361 .
– Press ignition coil with final output stage into cylinder head in direction of -arrow-.



1.16 Rules for cleanliness

When working on the fuel supply and injection system, pay careful attention to the following “5 rules” for cleanliness:

- Thoroughly clean all unions and surrounding areas before disconnecting.
- Place removed parts on a clean surface and cover. Use only lint-free cloths.
- Carefully cover opened components or seal if repairs cannot be carried out immediately.
- Install clean components only. Do not remove replacement parts from packing until immediately before installing. Do not use parts that have not been stored in their packing (e.g. in tool boxes etc.).
- When the system is open: Do not work with compressed air. Do not move vehicle.

1.17 Technical data

Engine code		CAXA, CMSB
Idling check		
Idling speed[7)]	rpm	600 … 800
Engine control unit - J623-		
System		Motronic MED 17
Governed speed	rpm	From approx. 5,600-6,000

7) Not adjustable.

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2 Engine control unit - J623-

Removing and installing engine control unit - J623- (Golf ► 2008, Eos) ⇒ page 326

Removing and installing anti-theft engine control unit - J623- (Golf ► 2008, Eos ► 10.2008) ⇒ page 327

Removing and installing engine control unit - J623- (Golf 2009 ►) ⇒ page 330

Removing and installing anti-theft engine control unit - J623- (Golf 2009►, Eos 11.2008►, Scirocco 10.2008►, Passat 2011►) ⇒ page 331

Removing and installing engine control unit - J623- (Golf Plus) ⇒ page 333

Removing and installing anti-theft engine control unit (Golf Plus, Touran) - J623- ⇒ page 335 .

Removing and installing engine control unit - J623- (Passat ► 2006) ⇒ page 337

Removing and installing anti-theft-secured engine control unit - J623- (Passat 2006 ►) ⇒ page 338

Removing and installing engine control unit - J623- (Scirocco) ⇒ page 339

Removing and installing anti-theft engine control unit - J623- (Scirocco 09.2008 ►) ⇒ page 341

Removing and installing engine control unit - J623- (Tiguan) ⇒ page 342

Removing and installing anti-theft engine control unit - J623- (Tiguan) ⇒ page 343

2.1 Removing and installing engine control unit - J623- (Golf ► 2008, Eos)

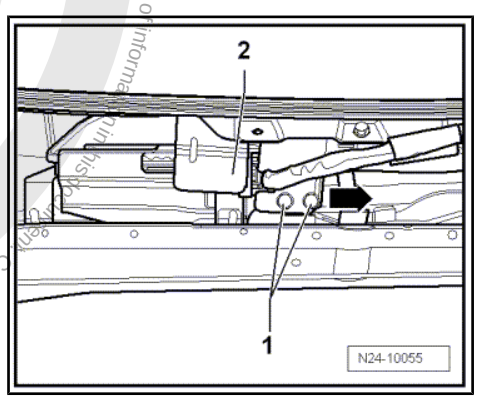
If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

Removing

– Switch off ignition.

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

– Remove securing bolts -1- and remove cover plate -2-.



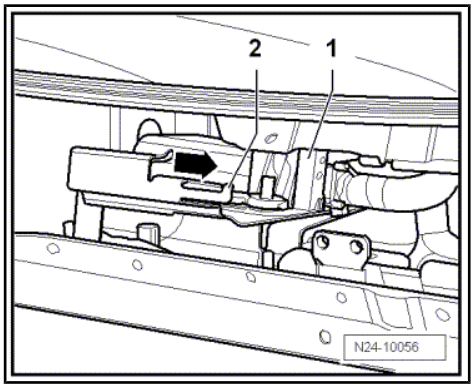
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– Release front connector -1- from engine control unit and pull it off.

– Lever up catch -2- slightly.

– Then press engine control unit out of retainer -in direction of arrow-.

– Then release rear connector on engine control unit and pull it off.



Installing

– Fit rear connector to engine control unit and lock in position.

– Push engine control unit onto bracket.

– Fit front connector to engine control unit and lock it in position.

– Install cover plate for connectors.

– Tighten securing bolts -1- to 10 Nm.

– If engine control unit - J623- is renewed, erase learnt values and adapt engine control unit using ⇒ vehicle diagnostic tester in “Guided functions”.

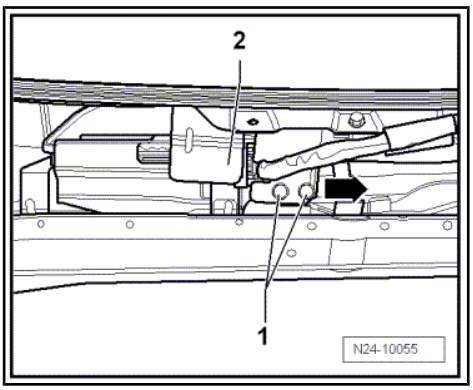
– Read event memory, rectify any faults and then clear ⇒ Vehicle diagnosis tester event memory,“Guided Fault Finding”.

– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

– The readiness code must be generated if the event memory has been cleared.

– Carry out a road test.

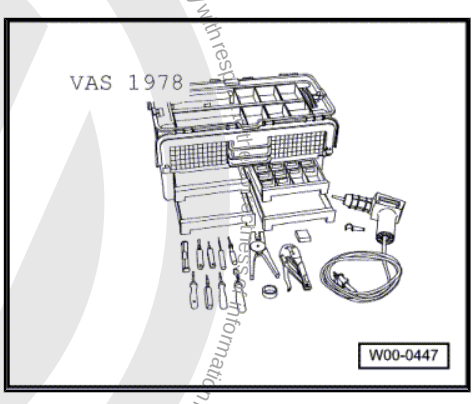
– Read control unit event memory again.



2.2 Removing and installing anti-theft engine control unit - J623- (Golf ► 2008, Eos ► 10.2008)

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 you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

Removing

– Switch off ignition.

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– Remove wiper arms and plenum chamber cover: ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .
– Remove plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

Note

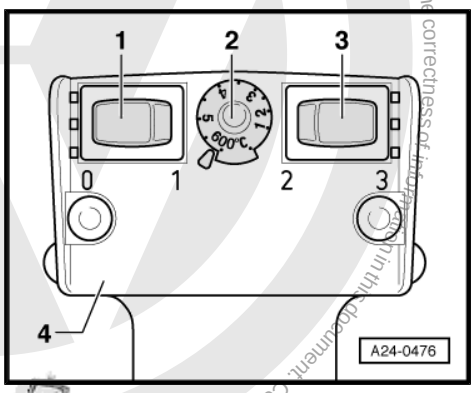
The shear-head bolt threads are coated with locking compound. Heating the shear-head bolt with a hot air blower releases the locking effect of the locking compound.

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 setting potentiometer -2- to maximum heat output (600°C).
– Set two-stage switch for volume of air -3- to position 3.



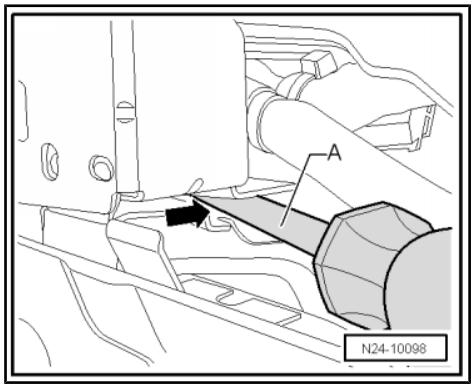
WARNING

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 using mole grips on bolt head.

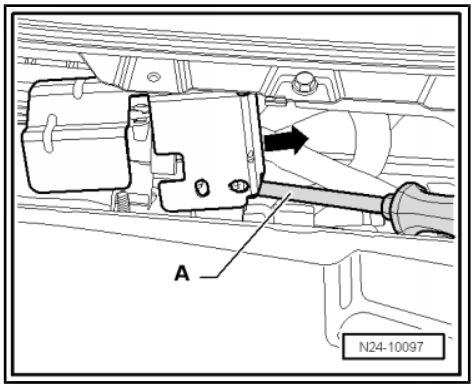
The procedure for the second shear-head bolt is identical.

– Insert a screwdriver between protective housing -A- and bracket -arrow-.

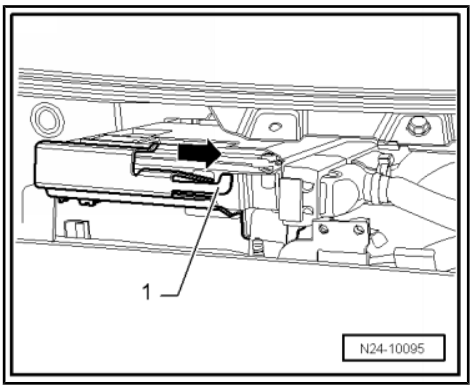


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– Lever up protective housing using screwdriver -A- and in sideward motion pull off bracket -arrow-.

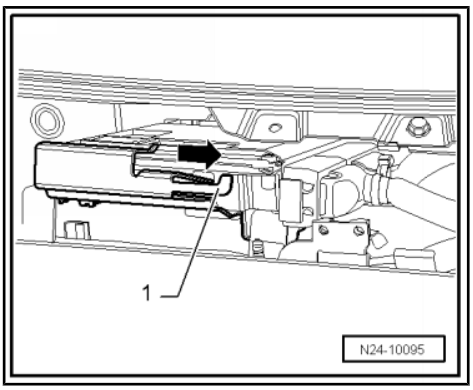


– Bend catch open slightly -1-.
– Then push engine control unit out of retainer -arrow-.
– Now release connector on engine control unit and pull off connector.



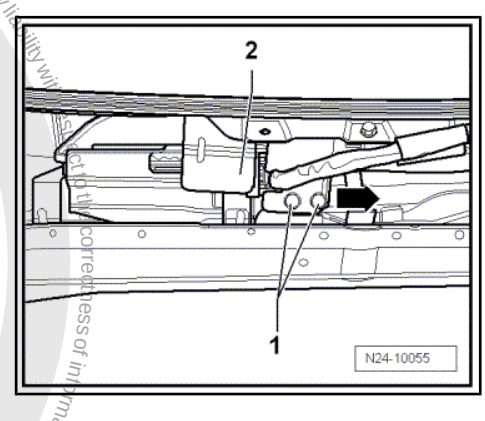
Installing

– Fit connector to engine control unit and lock connector in position.
– Push engine control unit onto bracket.
– Press catch -1- against engine control unit.
– Select “guided functions” in the vehicle diagnosis, testing and information system - VAS 5051B- .
– Perform vehicle identification and select engine code.
– Perform function “Renew control unit”.
– Push protective housing onto bracket.



– Tighten new shear-head bolts -1- evenly until heads shear-head off.
– If engine control unit - J623- is renewed, erase learnt values and adapt engine control unit using ⇒ vehicle diagnostic tester in “Guided functions”.

  Read event memory, rectify any faults and then clear ⇒ Vehicle diagnosis tester event memory,“Guided Fault Finding”.
– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
– The readiness code must be generated if the event memory has been cleared.
– Carry out a road test.
– Read control unit event memory again.



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2.3 Removing and installing engine control unit - J623- (Golf 2009 ►)

If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

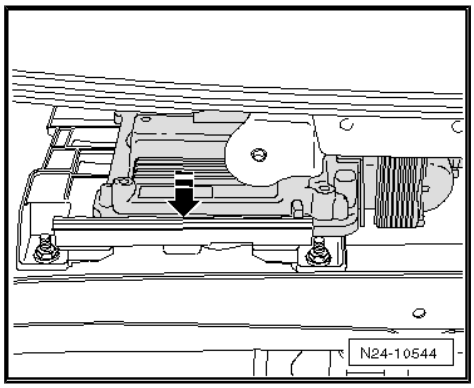
Removing

– Switch off ignition.

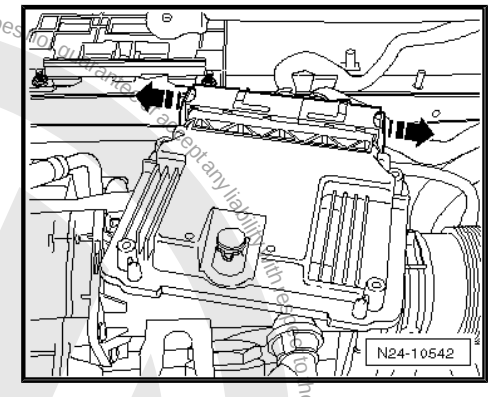
– Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .

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

– Press retaining frame down in -direction of arrow- and remove engine control unit.

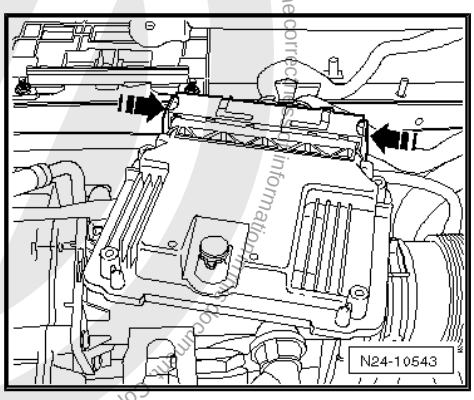


– Push connector locking devices in direction of -arrow-, and pull connectors off.



Installing

– Fit connectors to engine control unit and slide locking devices onto stop in direction of -arrow-.

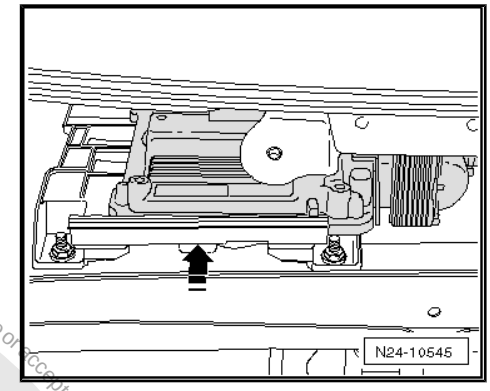


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– Insert engine control unit into retaining frame and press retaining frame upwards in -direction of arrow-

– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

– Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .



2.4 Removing and installing anti-theft engine control unit - J623- (Golf 2009 ►, Eos 11.2008 ►, Scirocco 10.2008►, Passat 2011►)

If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

Removing

– Switch off ignition.

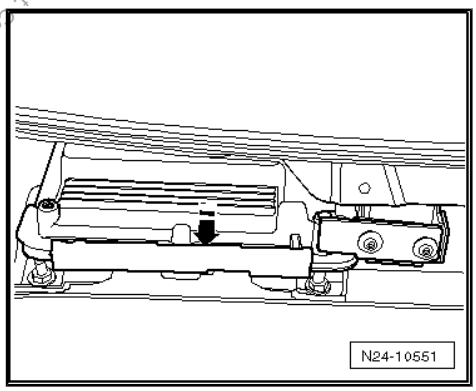
– Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .

Golf 2009, Eos 11.2008, Scirocco 10.2008

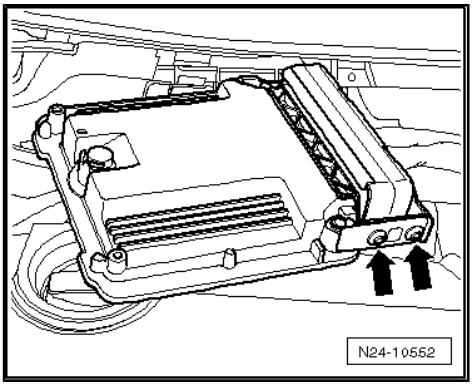
– Remove plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

Continuation for all vehicles

– Press retaining frame down in -direction of arrow- and remove engine control unit.



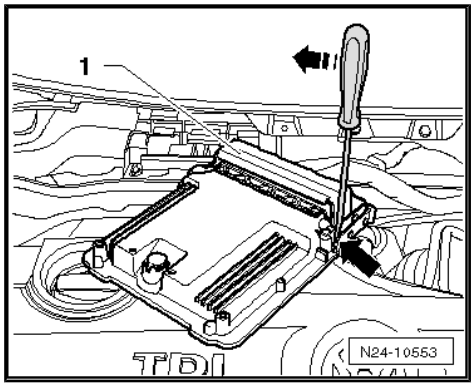
– Unscrew shear-head bolts -arrows- using pliers.



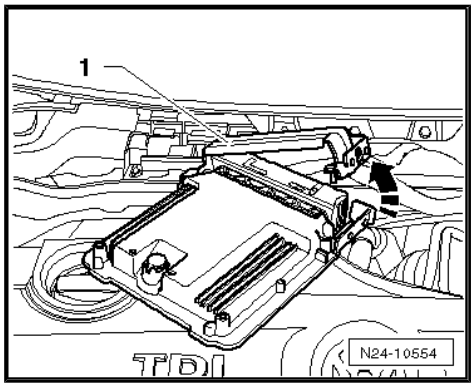
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– Insert screwdriver between both locking plates -arrow-.

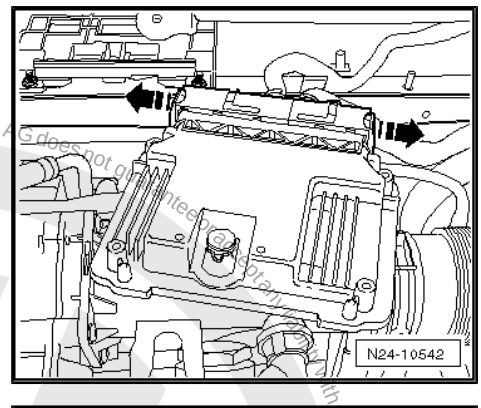
– Carefully press screwdriver in direction of -arrow- and bend retaining bow -1- upwards at the same time.



– Bend retaining bow -1- in direction of -arrow- until it can be pulled off connectors.

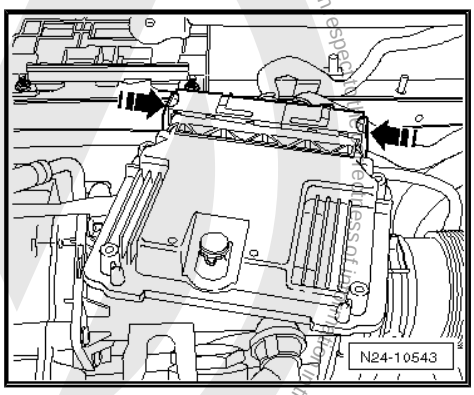


– Push connector locking devices in direction of -arrow-, and pull connectors off.



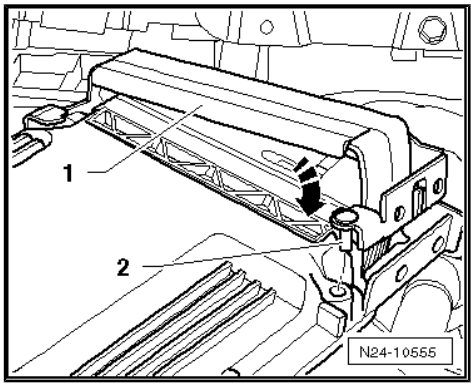
Installing

– Fit connectors to engine control unit and slide locking devices onto stop in direction of -arrow-.

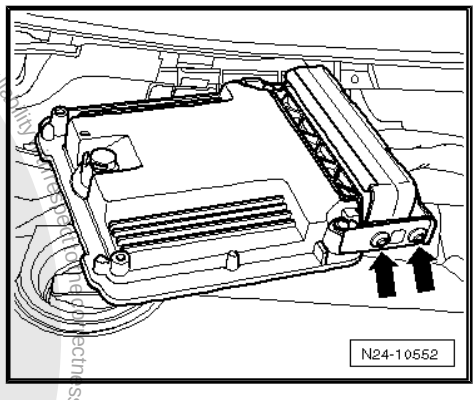


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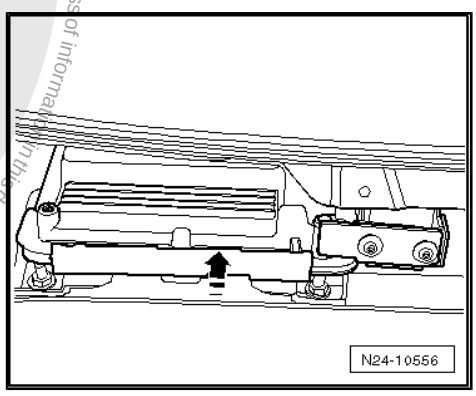
– Fit retaining bow -1- onto connectors and press it in direction of -arrow-.
– Guide pin -2- to stop into hole on valve timing housing.



– Secure retaining bow with shear-head bolts to engine control unit -arrows-.
– Tighten shear-head bolts evenly until heads shear-head off -arrows-.



– Insert engine control unit into retaining frame and press retaining frame upwards in -direction of arrow-



Golf 2009, Eos 11.2008, Scirocco 10.2008

– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

Continuation for all vehicles

– Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms.

2.5 Removing and installing engine control unit - J623- (Golf Plus)

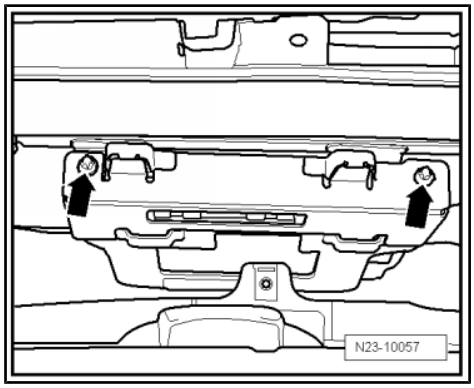
If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

Removing

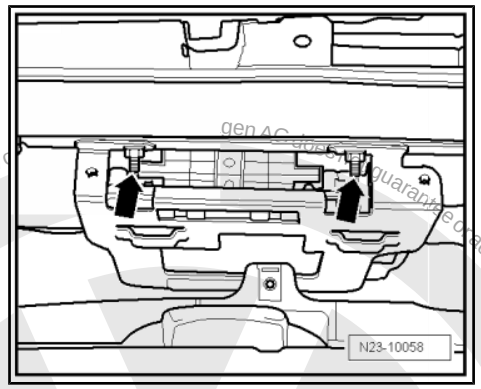
– Switch off ignition.
– Remove plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

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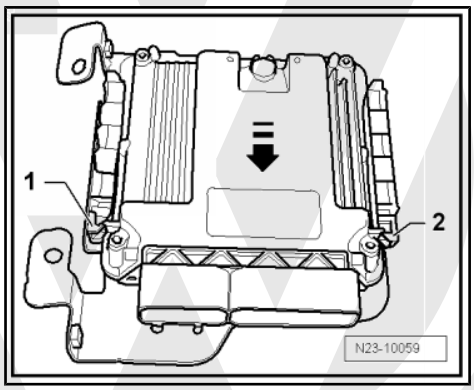
– Loosen securing bolts -arrows- of control unit cover.
– Then remove securing nuts for control unit bracket -arrows-.



– Release connectors on engine control unit and pull off connector.



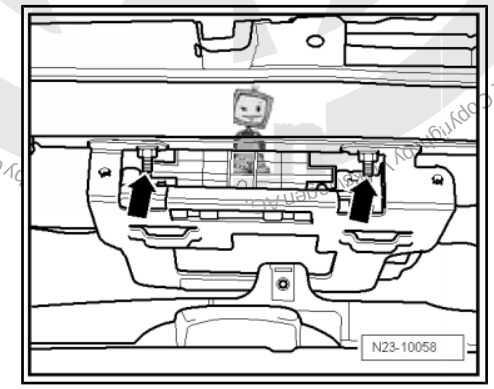
– Press catches -1- and -2- outwards. Then pull engine control unit off control unit bracket in -direction of arrow-.



Installing

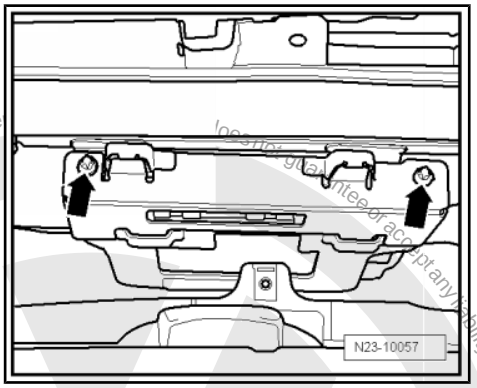
– Push engine control unit onto control unit bracket until it engages in catches.
– Fit connectors to engine control unit and lock in position.

– Tighten securing bolts -arrows- to 10 Nm.



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– Tighten securing bolts -arrows- to 5 Nm.

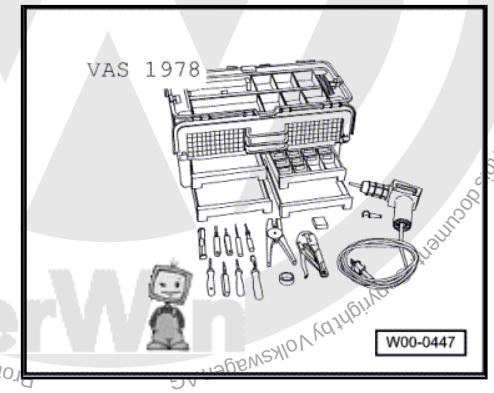


– If engine control unit - J623- is renewed, erase learnt values and adapt engine control unit using ⇒ vehicle diagnostic tester in “Guided functions”.
– Read event memory, rectify any faults and then clear ⇒ Vehicle diagnosis tester event memory,“Guided Fault Finding”.
– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
– The readiness code must be generated if the event memory has been cleared.
– Carry out a road test.
– Read control unit event memory again.

2.6 Removing and installing anti-theft engine control unit - J623- (Golf Plus)

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 you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

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.

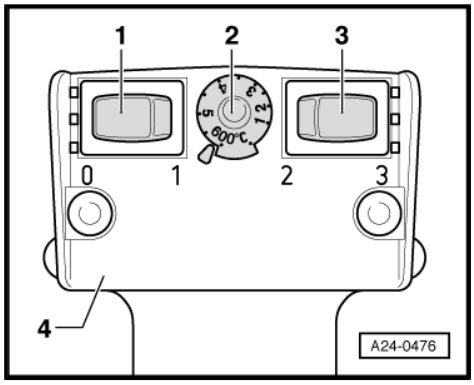
Caution

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:

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– Turn temperature setting potentiometer -2- to maximum heat output (600°C).
– Set two-stage switch for volume of air -3- to position 3.



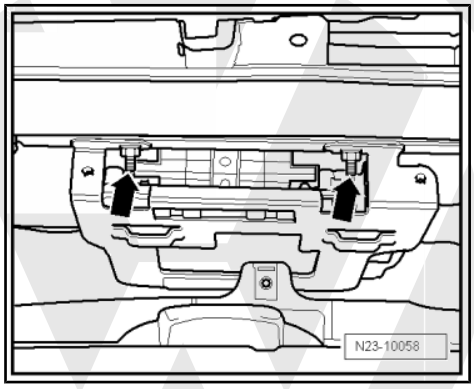
WARNING

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 using mole grips on bolt head.

The procedure for the second shear-head bolt is identical.

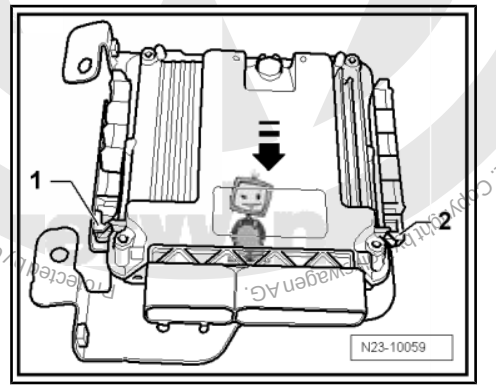
– Then remove securing nuts for control unit bracket -arrows-.
– Release connectors on engine control unit and pull off connector.



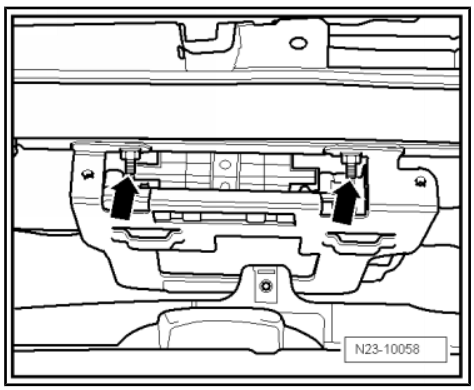
– Press catches -1- and -2- outwards. Then pull engine control unit off control unit bracket in -direction of arrow-.

Installing

– Push engine control unit onto control unit bracket until it engages in catches.
– Fit connectors to engine control unit and lock in position.

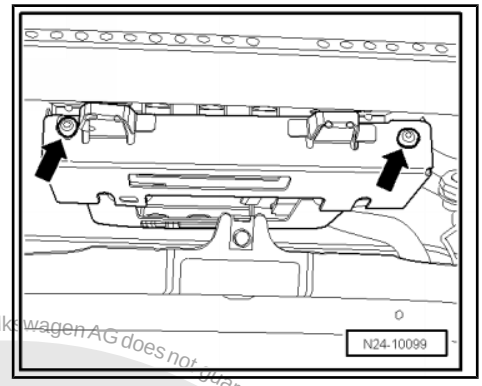


– Tighten securing bolts -arrows- to 10 Nm.
– Install cover of protective housing.



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– Tighten new shear-head bolts -arrows- evenly until heads shear off.



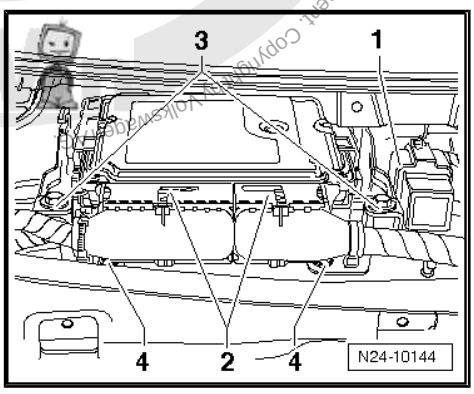
– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
– If engine control unit - J623- is renewed, erase learnt values and adapt engine control unit using ⇒ vehicle diagnostic tester in “Guided functions”.
– Read event memory, rectify any faults and then clear ⇒ Vehicle diagnosis tester event memory,“Guided Fault Finding”.
– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .
– The readiness code must be generated if the event memory has been cleared.
– Carry out a road test.
– Read control unit event memory again.

2.7 Removing and installing engine control unit - J623- (Passat 2006 ►)

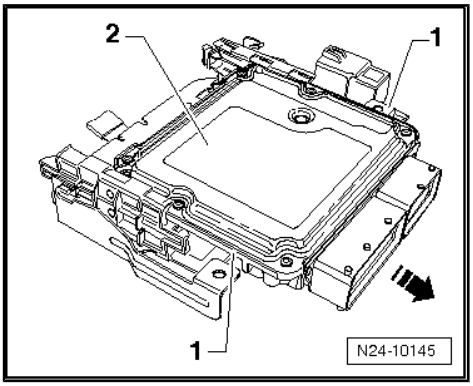
If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

Removing

– Switch off ignition.
– 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
– 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-.

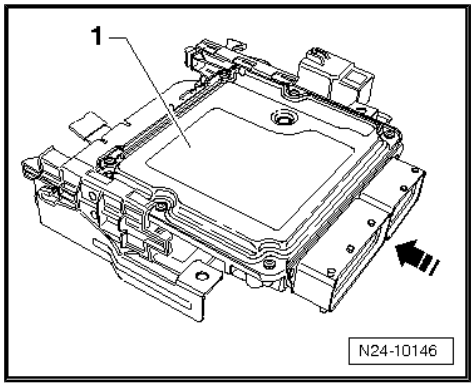


Installing

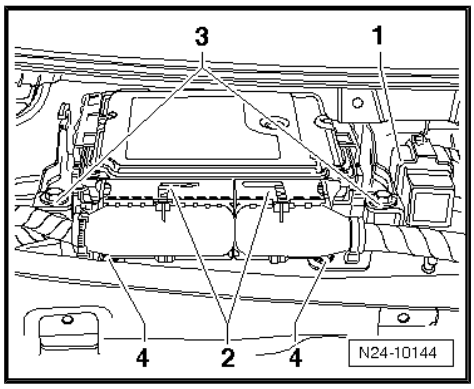
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– Slide engine control unit -1- into retaining frame in -direction of arrow-.
– Fit retainer frame with engine control unit onto retainer -4-.

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 ⇒ General body repairs, exterior; Rep. gr. 64 ; Removing and installing plenum chamber cover .
– Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .



2.8 Removing and installing anti-theft-secured engine control unit - J623- (Passat 2006 ►)

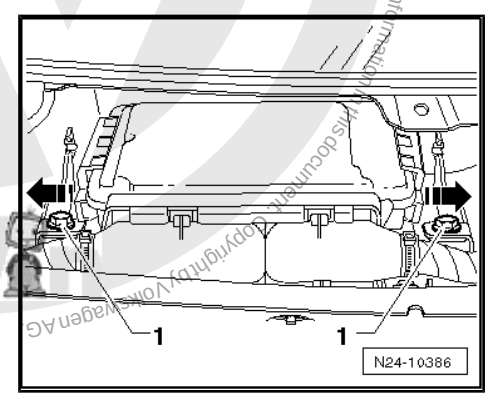
If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

Special tools and workshop equipment required

♦ Grip pliers

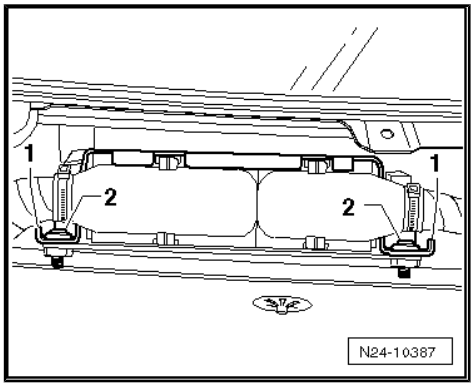
Removing

– Switch off ignition.
– 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
– Remove bolts -1-.
– Cover the plenum chamber with a clean cloth so that it is not scratched.
– Raise engine control unit with retaining frame slightly.
– Release engine control unit in direction of -arrow- and pull out slightly.



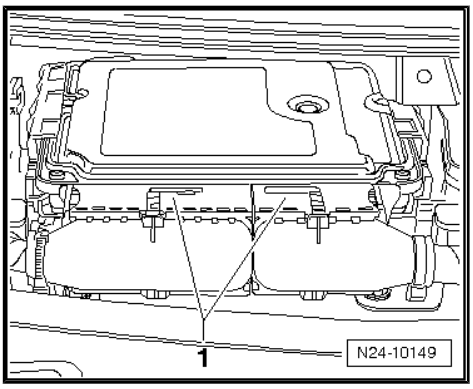
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– Bend the upper ends -1- of locking clip outwards.
– Remove shear-head bolts -2- using grip pliers and remove locking clip.



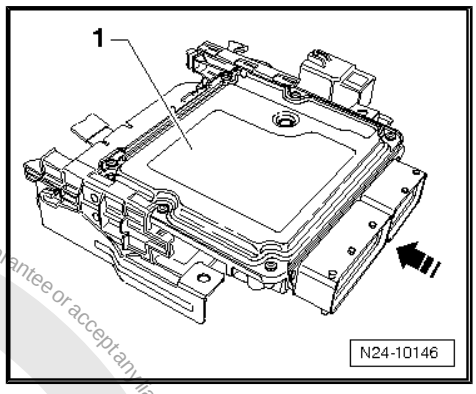
– Slide connector locking devices -1- on engine control unit outwards and pull off both connectors.
– Remove engine control unit.

Installing:

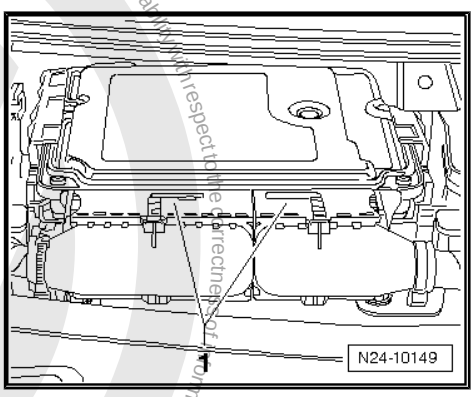


– Slide engine control unit -1- in direction of -arrow- in retaining frame until it engages.
– Tighten the retaining frame.

  Specified torque: 6 Nm



– Fit connectors to engine control unit and slide locking devices -1- inwards.
– Take a new locking clip and tighten new shear-head bolts evenly until heads shear off.



2.9 Removing and installing engine control unit - J623- (Scirocco)

If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

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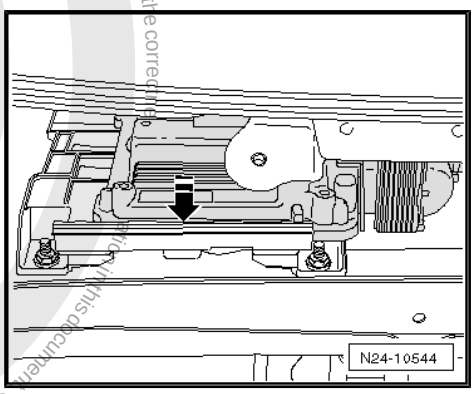
Removing

– Switch off ignition.

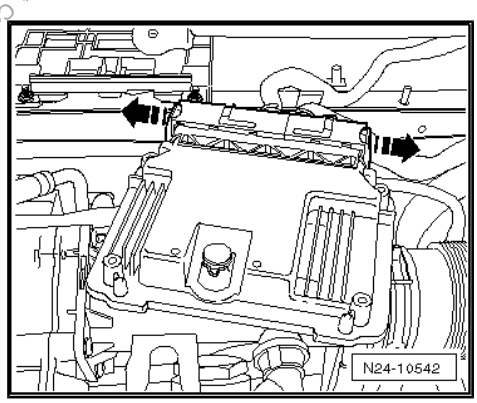
– Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .

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

– Press retaining frame down in -direction of arrow- and remove engine control unit.

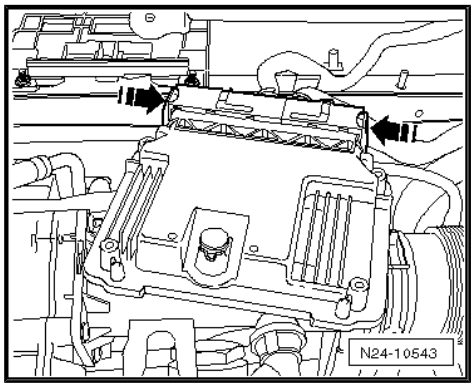


– Push connector locking devices in direction of -arrow-, and pull connectors off.



Installing

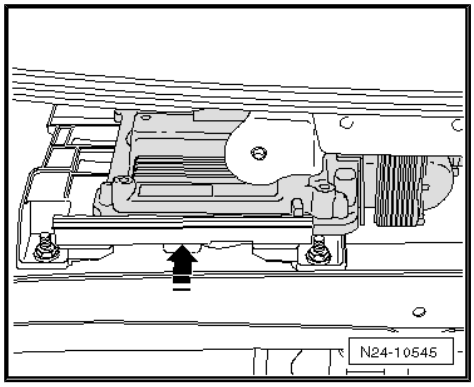
– Fit connectors to engine control unit and slide locking devices onto stop in direction of -arrow-.



– Insert engine control unit into retaining frame and press retaining frame upwards in -direction of arrow-

– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

– Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .



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2.10 Removing and installing anti-theft engine control unit - J623- (Scirocco ► 09.2008)

If you wish to renew the engine control unit, connect the ⇒ vehicle diagnostic tester and perform the guided function “Renewing control unit”.

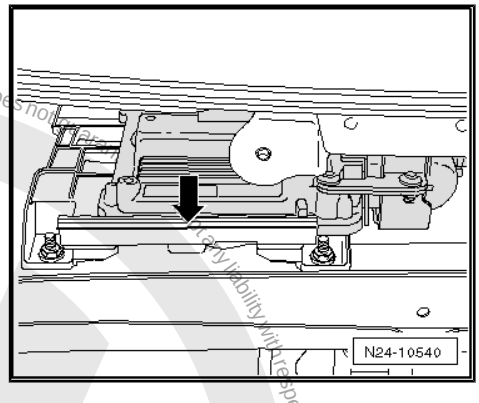
Removing

– Switch off ignition.

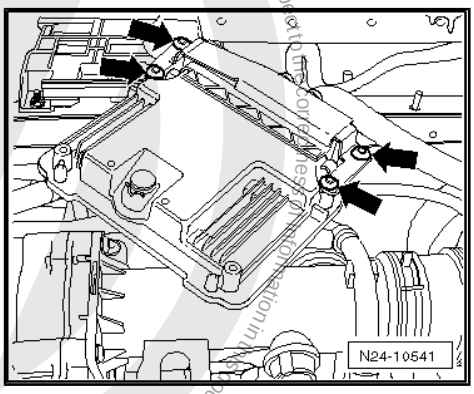
– Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .

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

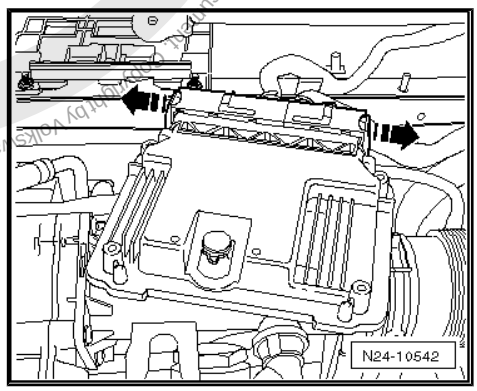
– Press retaining frame down in -direction of arrow- and remove engine control unit.



– Remove shear-head bolts -arrows- using pliers and remove locking clips.



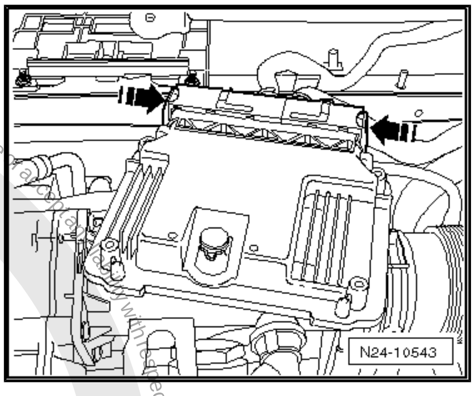
– Push connector locking devices in direction of -arrow-, and pull connectors off.



Installing

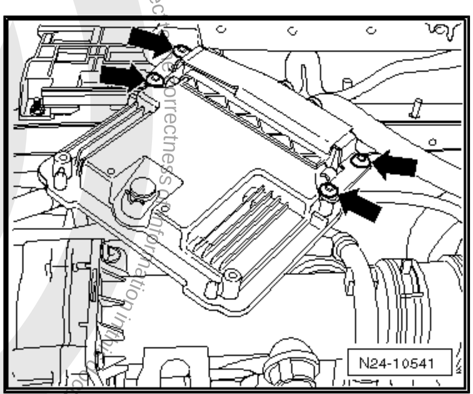
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– Fit connectors to engine control unit and slide locking devices onto stop in direction of -arrow-.



– Fit the two locking clips over the connector and secure with new shear-head bolts -arrows-.

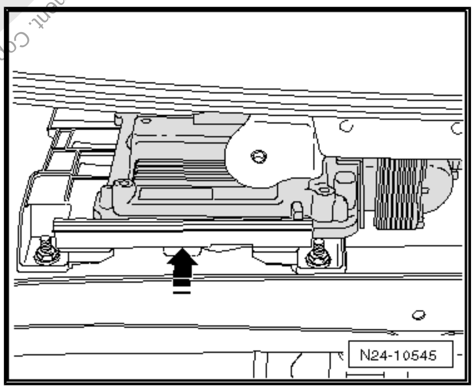
– Tighten shear-head bolts evenly until heads shear-head off -arrows-.



– Insert engine control unit into retaining frame and press retaining frame upwards in -direction of arrow-

– Install plenum chamber bulkhead ⇒ General body repairs; Rep. gr. 50 ; Body - front; Plenum chamber bulkhead .

– Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms.



2.11 Removing and installing engine control unit - J623- (Tiguan)

If you wish to replace the engine control unit, connect the vehicle diagnosis, testing and information system - VAS 5051 B- and carry out the guided function “Renew control unit”.

Removing

– Switch off ignition.

– Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .

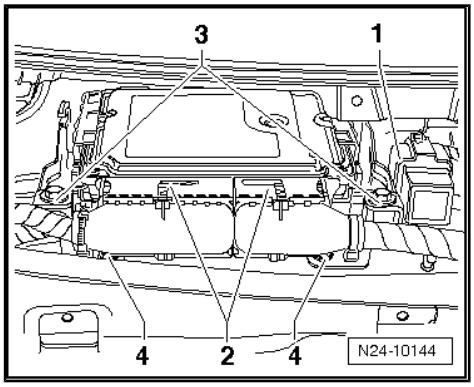
– Remove plenum chamber cover: ⇒ General body repairs, exterior; Rep. gr. 64 ; Removing and installing plenum chamber cover

– Pull connector (if there is one) -1- off heated windscreen control unit - J505- .

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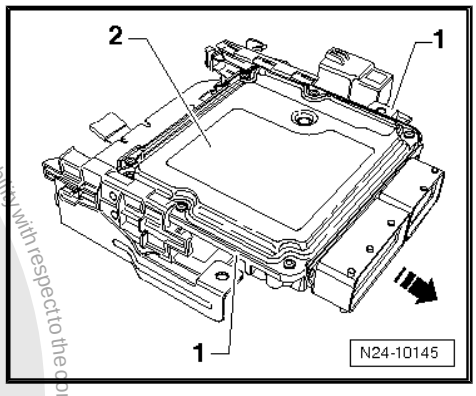
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– Slide connector locking devices -2- on engine control unit outwards and pull off both connectors.
– Remove securing bolts -3-.
– Remove retainer frame with engine control unit from plenum chamber.



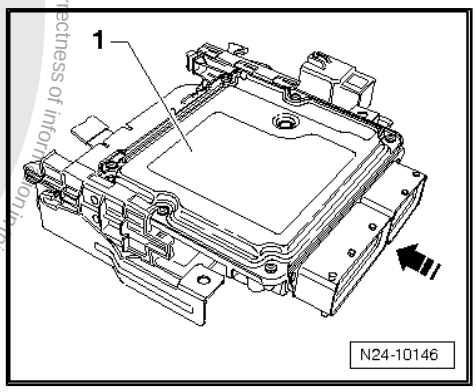
– Press locking device -1- outwards and slide engine control unit -2- in -direction of arrow-.

Installing

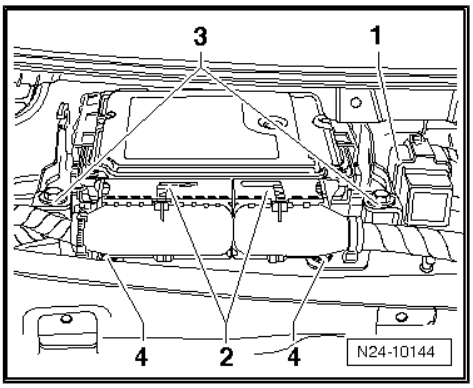


– Slide engine control unit -1- into retaining frame in -direction of arrow-.
– Fit retainer frame with engine control unit onto retainer -4-.

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.
– Attach connector (if there is one) -1- to heated windscreen control unit - J505- .
– Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 64 ; Removing and installing plenum chamber cover .
– Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .



2.12 Removing and installing anti-theft engine control unit - J623- (Tiguan)

If you wish to replace the engine control unit, connect the vehicle diagnosis, testing and information system - VAS 5051B- and carry out the guided function “Renew control unit”.

Special tools and workshop equipment required

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♦ Grip pliers

Removing

– Switch off ignition.

– Remove wiper arms, ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms.

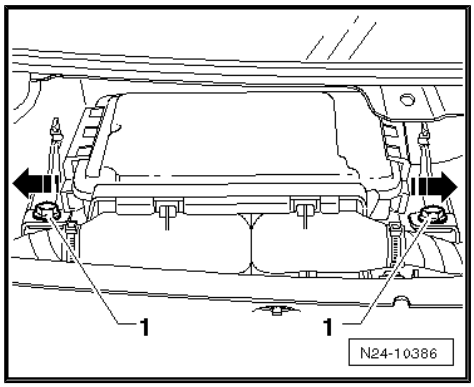
– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 64 ; Removing and installing plenum chamber cover.

– Remove bolts -1-.

– Cover the plenum chamber with a clean cloth so that it is not scratched.

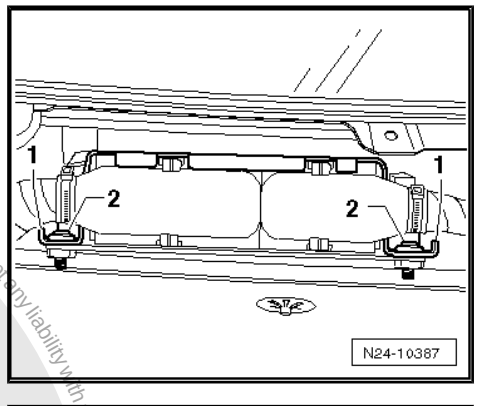
– Raise engine control unit with retaining frame slightly.

– Release engine control unit in direction of -arrow- and pull out slightly.



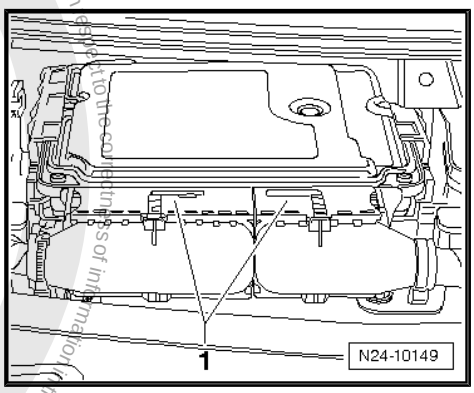
– Bend the upper ends -1- of locking clip outwards.

– Remove shear-head bolts -2- using grip pliers and remove locking clip.



– Slide connector locking devices -1- on engine control unit outwards and pull off both connectors.

– Remove engine control unit.

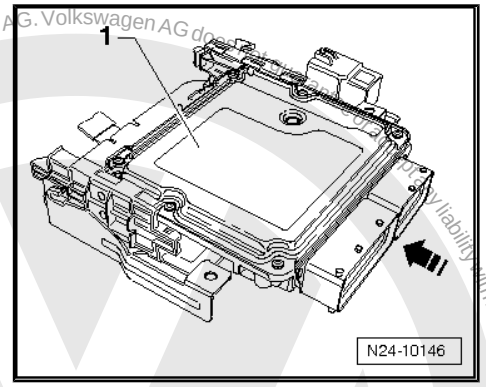


Installing:

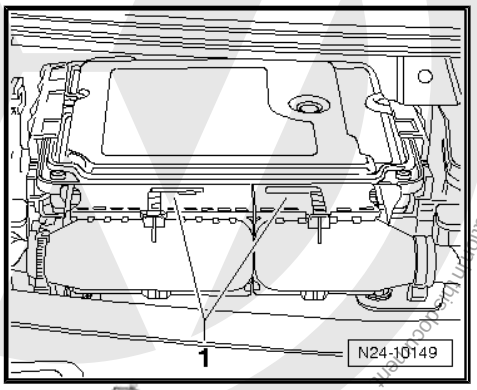
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– Slide engine control unit -1- in direction of -arrow- in retaining frame until it engages.
– Tighten the retaining frame.

  Specified torque: 6 Nm



– Fit connectors to engine control unit and slide locking devices -1- inwards.
– Take a new locking clip and tighten new shear-head bolts evenly until heads shear off.



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26 – Exhaust system

1 Removing and installing parts of exhaust system

Note

- *After working on the exhaust system, ensure that the system is not under stress and that there is sufficient clearance to the bodywork. If necessary, loosen double clamp and align silencer and exhaust pipe so that sufficient clearance is maintained to the bodywork and the support rings are evenly loaded.*
- *Renew self-locking nuts.*

Assembly overview - catalytic converter and add-on parts ⇒ page 346

Assembly overview - silencer with mountings (Golf, Golf Plus, Scirocco) ⇒ page 349

Assembly overview - silencer with mountings (Passat 2006 ►) ⇒ page 350

Assembly overview - silencer with mountings (Passat 2011 ►) ⇒ page 351

Assembly overview - silencer with mountings (Eos) ⇒ page 352

Assembly overview - silencer with mountings (Tiguan) ⇒ page 353 .

Removing and installing centre and rear silencers (Golf, Golf Plus, Scirocco, Eos) ⇒ page 353 .

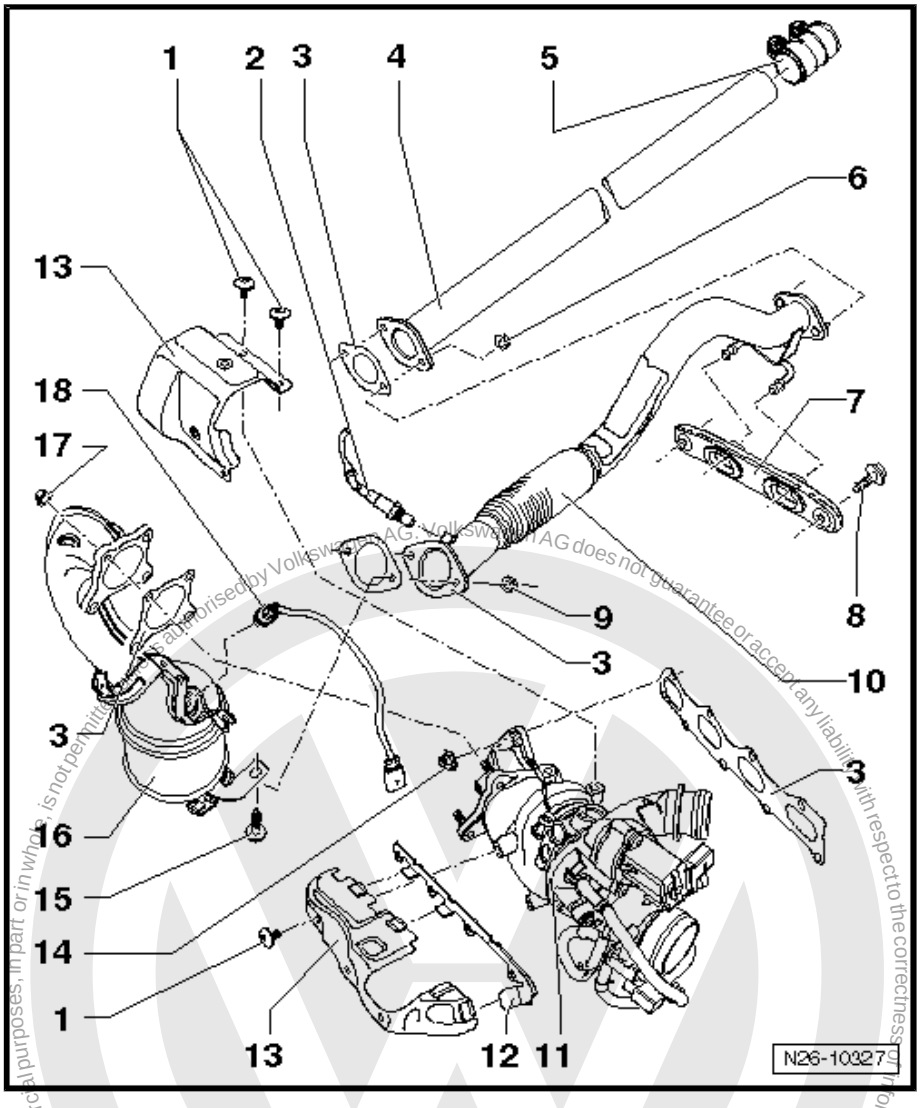
Detaching centre and rear silencers (Passat) ⇒ page 355 .

Separating centre and rear silencers (Tiguan) ⇒ page 357 .

Mounting position and specified torque of the clamping sleeve ⇒ page 358

1.1 Assembly overview - catalytic converter and attachments

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1 - 10 Nm

- ❑ First tighten all securing bolts by hand when installing.

2 - Lambda probe after catalytic converter - G130-

- ❑ Specified torque: 50 Nm
- ❑ Grease only the threads with “G 052 112 A3”; “G 052 112 A3” must not get into the slots on the probe body.
- ❑ If seal is leaking, nip open and renew.

3 - Gasket

- ❑ Renew

4 - Exhaust pipe

5 - Double clamp, 25 Nm

- ❑ Mounting position and specified torque ⇒ page 358
- ❑ For separate replacement of centre and rear silencers
- ❑ Tighten bolted connections evenly.

6 - 25 Nm

- ❑ Renew

7 - Mounting

8 - 25 Nm

9 - 25 Nm

- ❑ Renew

10 - Exhaust pipe

- ❑ With decoupling element.
- ❑ Do not bend decoupling element more than 10° - otherwise it can be damaged.

11 - Turbocharger

- ❑ Removing and installing compressor housing and turbine housing ⇒ page 280 .

Note

- ♦ *The studs need to be renewed as well as the securing nuts.*
- ♦ *Screw studs into cylinder head until they project only by 25 mm.*

12 - Bracket

13 - Heat shield

14 - 25 Nm

- ❑ Renew

Note

- ♦ *The studs need to be renewed as well as the securing nuts.*

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♦ *Screw studs into cylinder head until they project only by 25 mm.*

❑ Coat studs of exhaust manifold with high-temperature paste.

15 - 25 Nm

❑ Renew

Note

Use clips when installing ⇒ *page 348* .

16 - Catalytic converter with exhaust pipe

Note

Use clips when installing.

❑ Install catalytic converter ⇒ page 348 .

17 - 23 Nm

❑ Renew

18 - Lambda probe - G39- , 50 Nm

❑ Grease only the threads with “G 052 112 A3”; “G 052 112 A3” must not get into the slots on the probe body.

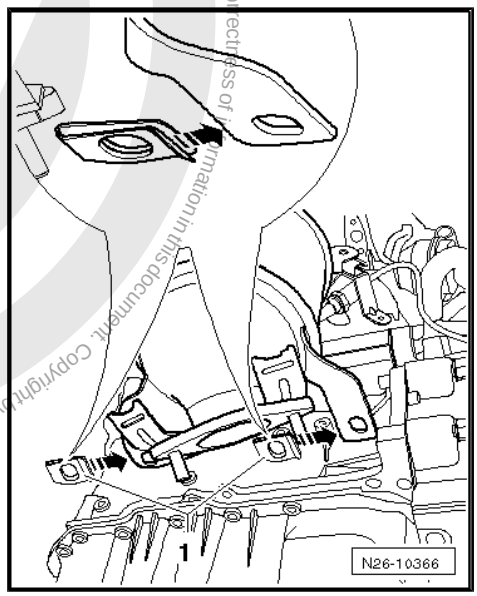
❑ Remove and install with Lambda probe open ring spanner set - 3337- .

Install catalytic converter.

– Slide clips onto bracket in -direction of arrow-.

The lips of the clips face downwards.

– Tighten new securing bolts to 25 Nm.



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1.2 Assembly overview - silencer with mountings (Golf, Golf Plus, Scirocco)

1 - Mounting

2 - 25 Nm

3 - Bracket

- ❑ Note installation position.

4 - Centre silencer

- ❑ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes.
- ❑ Aligning exhaust system free of stress
- ❑ Separating centre and rear silencers ⇒ page 353

5 - 25 Nm

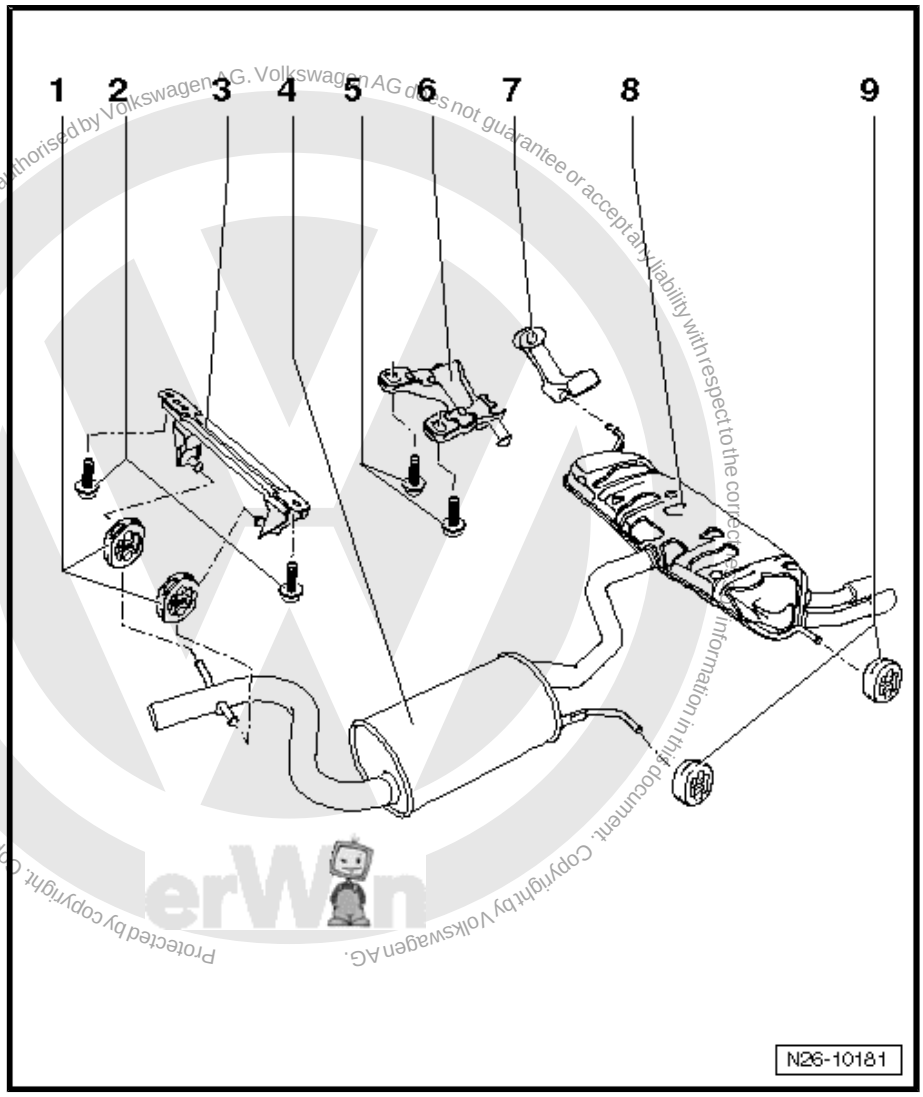
6 - Bracket

- ❑ Note installation position.

7 - Mounting

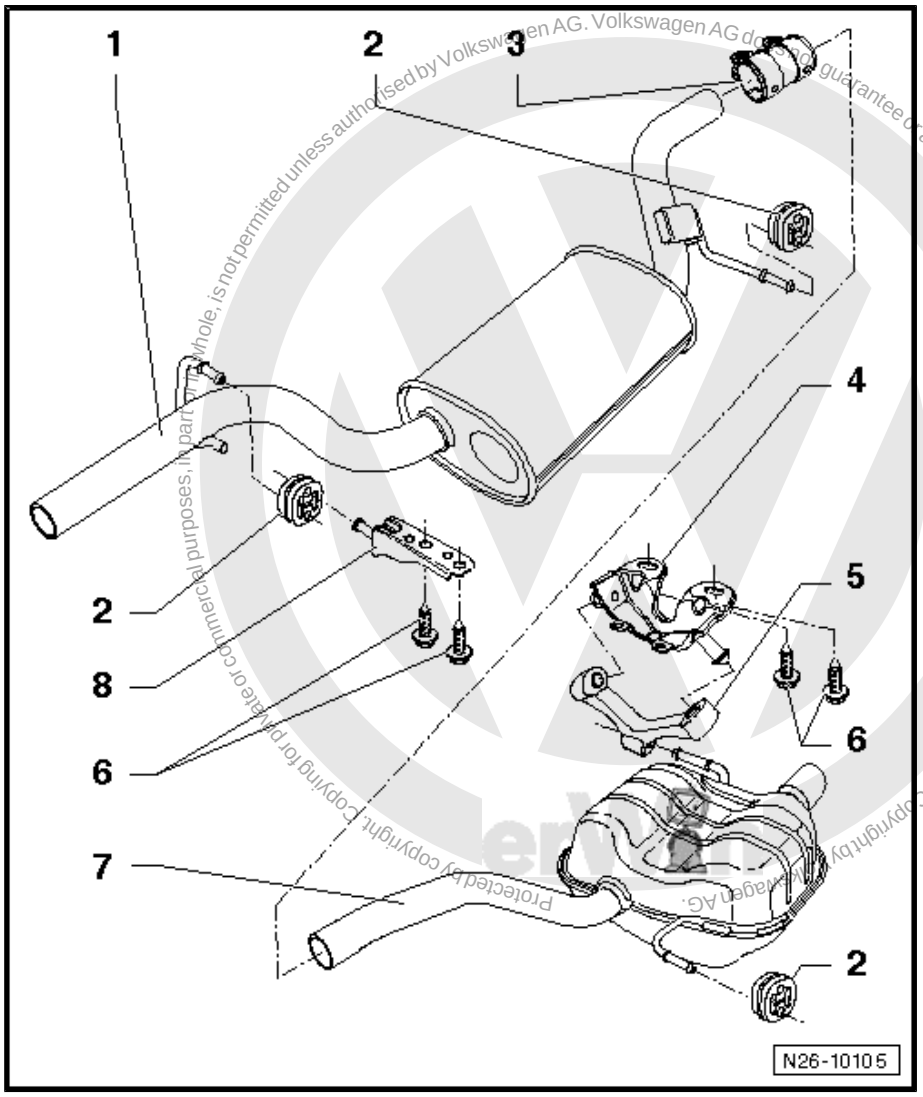
8 - Rear silencer

9 - Mounting



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1.3 Assembly overview - silencer with mountings (Passat 2006 ►)



1 - Exhaust pipe with front silencer

2 - Mounting

3 - Double clamp

- ❑ For repair cases
- ❑ Mounting position and specified torque ⇒ page 358
- ❑ Note installation position ⇒ page 350 .
- ❑ During production, front and rear silencers are installed as a single component. In case of repair, the front and rear silencers are supplied individually and with a double clamp for connecting.
- ❑ Cut through exhaust pipe with e.g. pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- at right angles at the separating point ⇒ page 350 .

4 - Bracket

- ❑ Note installation position.

5 - Mounting

6 - Bolt

- ❑ 25 Nm

7 - Exhaust pipe with rear silencer

- ❑ Align after mounting ⇒ page 355 .

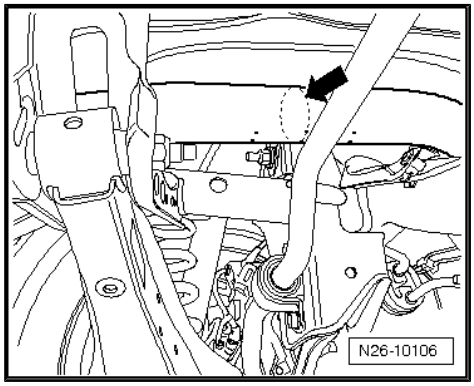
8 - Bracket

- ❑ Note installation position.

Separating point on exhaust pipe

WARNING

To avoid injury from metal shavings, wear eye protection and protective clothing.



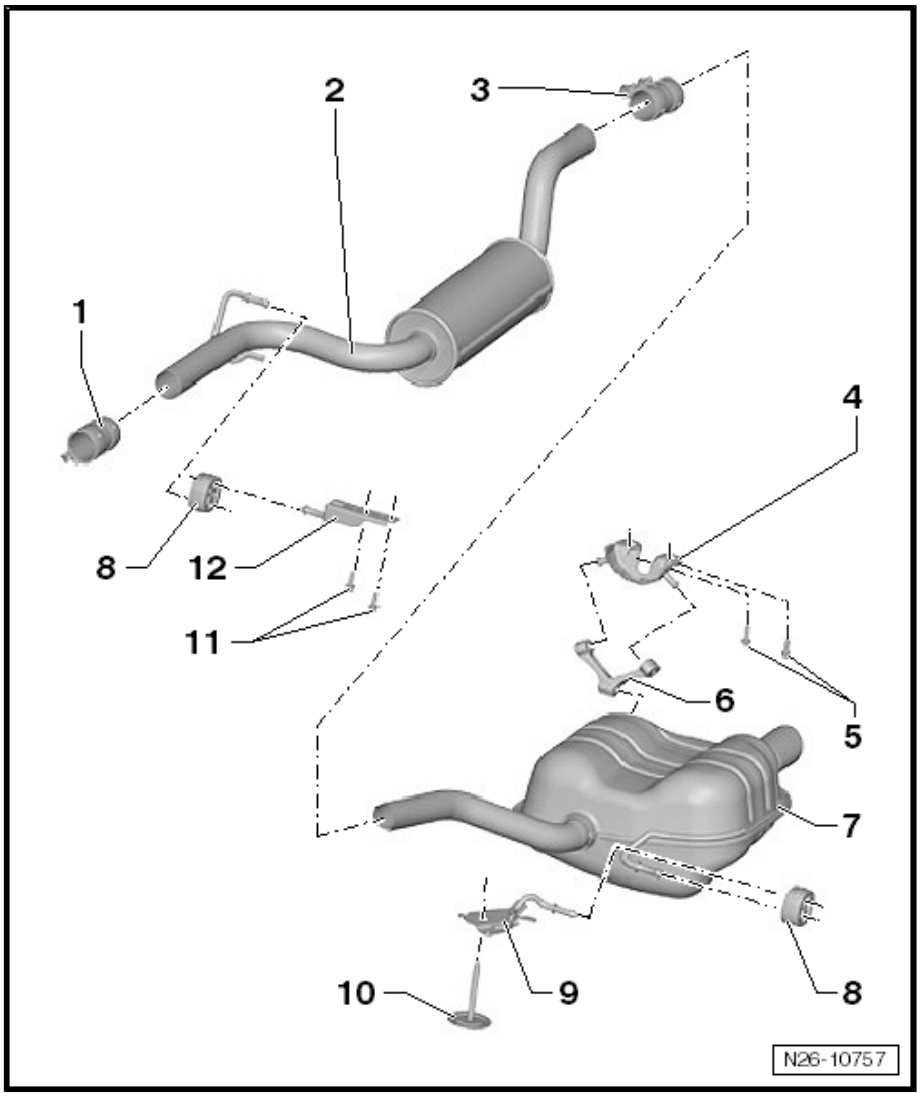
– Cut through exhaust pipe at separating point -arrow- at right angles e.g. with pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- .

– Position repair double clamp at markings.

– Align rear silencer -1- so that dimensions -a- are identical.

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1.4 Assembly overview - silencer with mountings (Passat 2011 ►)



1 - Clamp

- ❑ For repair cases
- ❑ Mounting position and specified torque ⇒ page 358
- ❑ Note installation position ⇒ page 355 .
- ❑ During production, front and rear silencers are installed as a single component. In case of repair, the front and rear silencers are supplied individually and with a double clamp for connecting.
- ❑ Cut through exhaust pipe with e.g. pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- at right angles at the separating point ⇒ page 355 .
- ❑ Allocation ⇒ electronic parts catalogue (ETKA) .

2 - Exhaust pipe with front silencer

3 - Clamp

- ❑ For repair cases
- ❑ Mounting position and specified torque ⇒ page 358
- ❑ Comply with instructions for alignment of rear silencer ⇒ page 355
- ❑ During production, front and rear silencers are installed as a single component. In case of repair, the front and rear silencers are supplied individually and with a double clamp for connecting.
- ❑ Cut through exhaust pipe with e.g. pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- at right angles at the separating point ⇒ page 355 .
- ❑ Allocation ⇒ electronic parts catalogue (ETKA) .

4 - Bracket

- ❑ Note installation position.

5 - Bolt

- ❑ 25 Nm

6 - Mounting

- ❑ Allocation ⇒ electronic parts catalogue (ETKA) .

7 - Exhaust pipe with rear silencer

- ❑ Align after mounting ⇒ page 355 .
- ❑ Allocation ⇒ electronic parts catalogue (ETKA) .

8 - Mounting

- ❑ Allocation ⇒ electronic parts catalogue (ETKA) .

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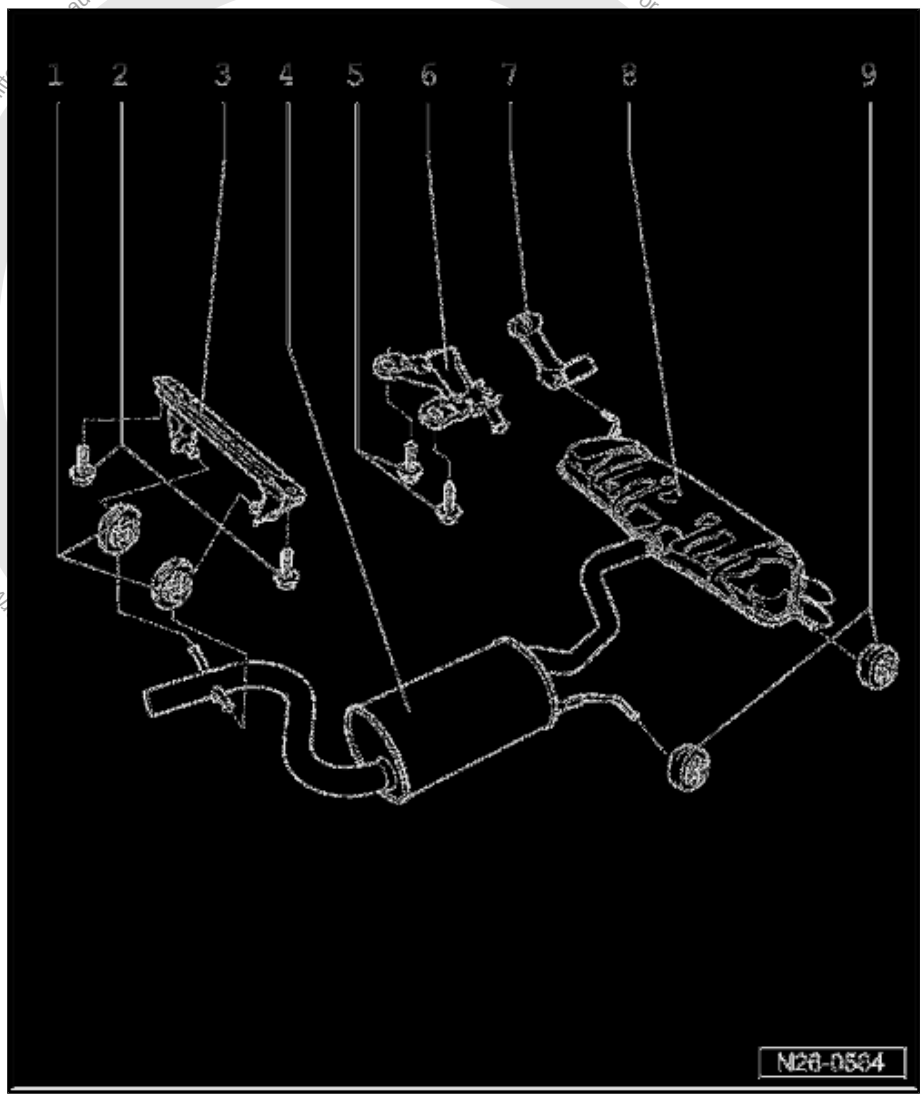
9 - Bracket

- ❑ Note installation position.

10 - Bolt

- ❑ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 42 ; Wheel suspension, rear .
- ❑ 90 Nm + 90°
- ❑ Always renew after removing.
- ❑ M12 x 1.5 x 110
- ❑ Allocation ⇒ electronic parts catalogue (ETKA) .

1.5 Assembly overview - silencer with mountings (Eos)



1 - Mounting

2 - 25 Nm

3 - Bracket

- ❑ Note installation position.

4 - Centre silencer

- ❑ Centre and rear silencers are installed as a single component during production. In case of repair, the centre and rear silencers are supplied separately, including a repair double clamp for purposes of connection.
- ❑ Cut through exhaust pipe with e.g. pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- at right angles at the separating point ⇒ page 353 .

5 - 25 Nm

6 - Bracket

- ❑ Note installation position.

7 - Mounting

8 - Rear silencer

- ❑ Centre and rear silencers are installed as a single component during production. In case of repair, the centre and rear silencers are supplied separately, including a repair double clamp for purposes of connection.
- ❑ Cut through exhaust pipe with e.g. pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- at right angles at the separating point ⇒ page 353 .

9 - Mounting

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1.6 Assembly overview - silencer with mountings (Tiguan)

1 - Exhaust pipe with centre and rear silencers

- ❑ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes.
- ❑ Aligning exhaust system free of stress

2 - Bolt

- ❑ 20 Nm

3 - Bracket

4 -

- ❑ 25 Nm
- ❑ Qty. 2

5 - Bracket

6 - Mounting

7 - Bolt

- ❑ 25 Nm
- ❑ Qty. 2

8 - Bracket

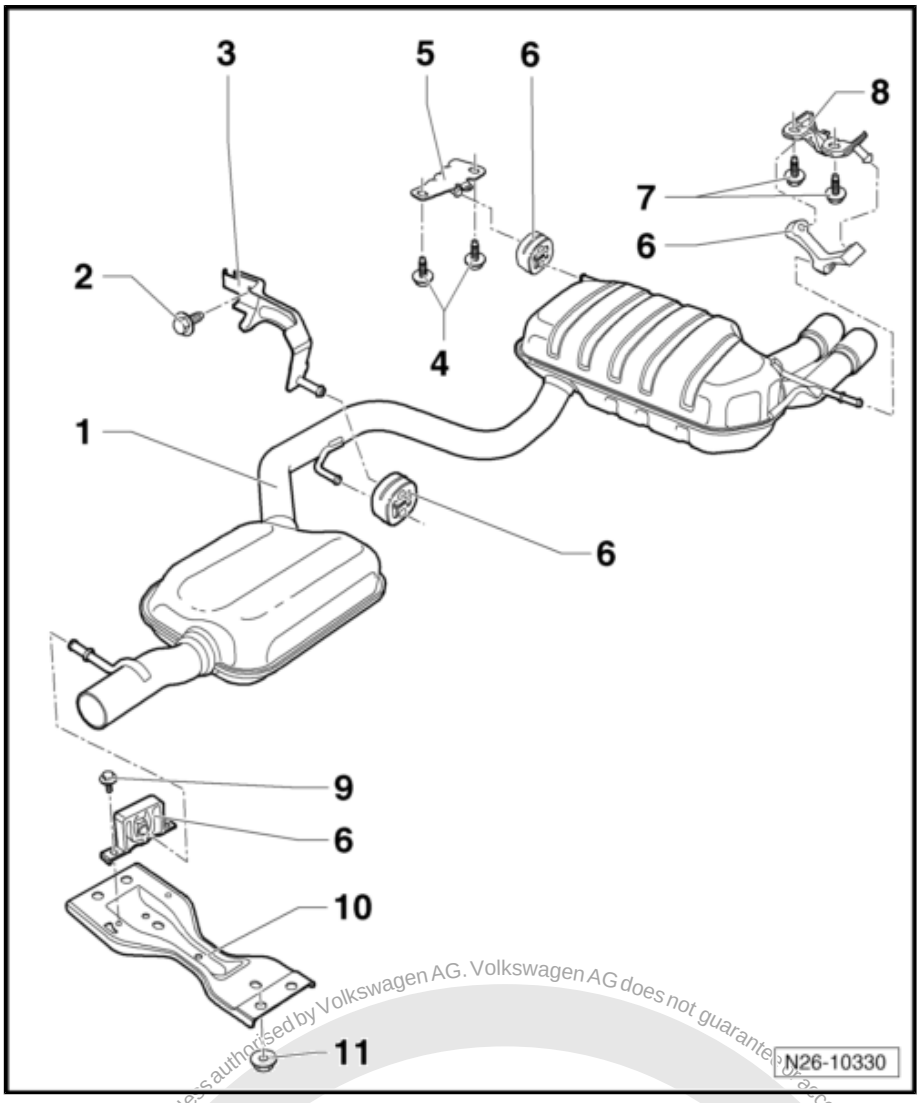
9 - Bolt

- ❑ 25 Nm
- ❑ 2 on right and 2 on left

10 - Tunnel bridge

11 - Nut

- ❑ 25 Nm
- ❑ Qty. 4



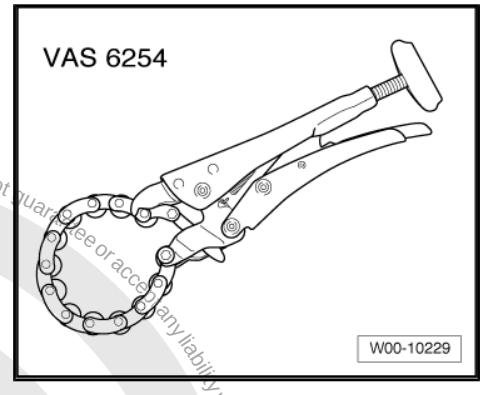
1.7 Removing and installing centre and rear silencers (Golf, Golf Plus, Scirocco, Eos)

- ♦ The connecting pipe can be cut through at the point marked in order to renew the centre and rear silencers separately.
- ♦ Cutting location is marked by an indentation on circumference of exhaust pipe.

Special tools and workshop equipment required

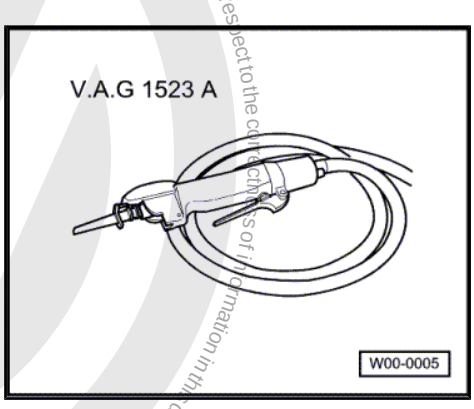
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♦ Chain-type pipe cutter - VAS 6254-



or

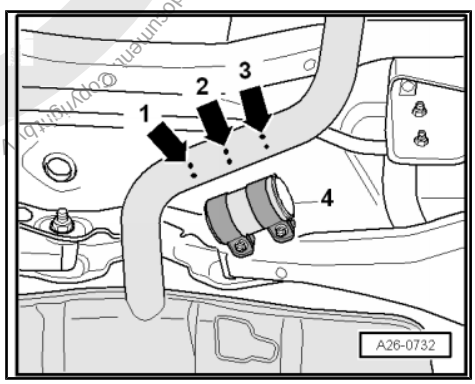
♦ Pneumatic sabre saw - V.A.G 1523A-



Procedure

– Cut through exhaust pipe at cutting point -arrow 2- using chain-type pipe cutter - VAS 6254- or pneumatic sabre saw - V.A.G 1523A- .

– Position double clamp -4- centrally at side marks when installing -1- and -3-.

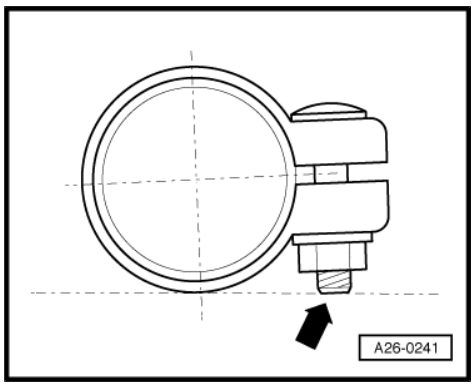


– Install double clamp so that bolt ends do not protrude beyond lower edge of double clamp -arrow-.

• Threaded connection faces to rear.

– Ensure correct mounting position and tightening torque ⇒ page 358 .

– Align rear silencer free of stress ⇒ page 355 .



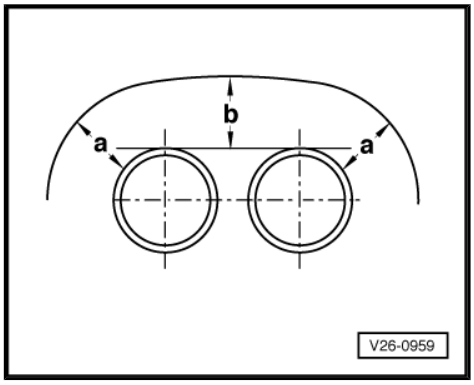
Specified torques

Component	Nm
Double clamp	25

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Aligning rear silencer (Golf, Golf Plus)

– Align rear silencer so that dimensions -a- are identical.

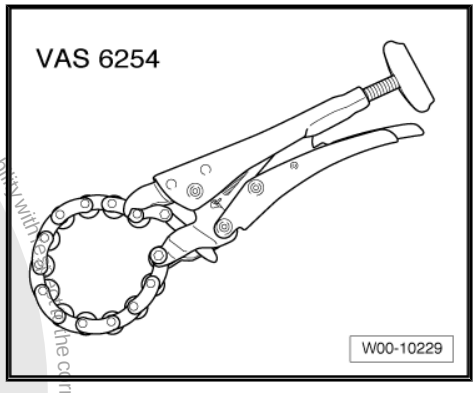


1.8 Detaching centre and rear silencers (Passat)

- The connecting pipe can be cut through at the point marked in order to renew the centre and rear silencers separately.
- Cutting location is marked by an indentation on circumference of exhaust pipe.

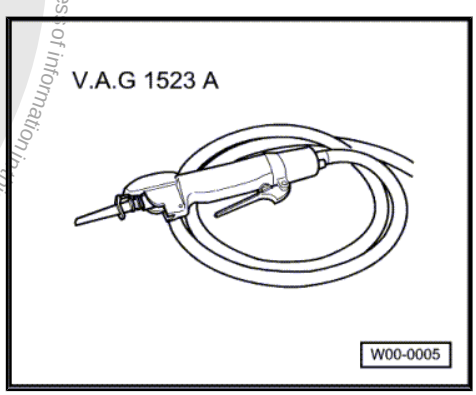
Special tools and workshop equipment required

- Chain-type pipe cutter - VAS 6254-



Or

- Pneumatic sabre saw - V.A.G 1523A-

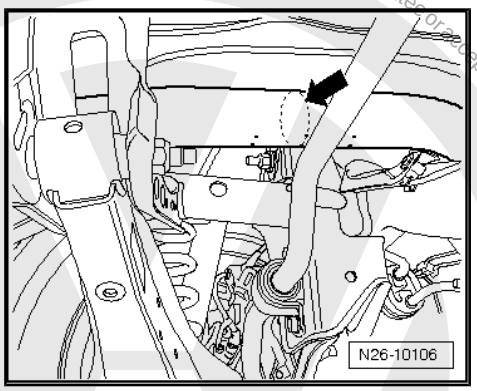


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Separating point on exhaust pipe

WARNING

To avoid injury from metal shavings, wear eye protection and protective clothing.



BlueMotion vehicles up to 10.2010

– Remove panelling of rear axle ⇒ Wheel suspension, rear; Rep. gr. 42 ; Assembly overview: Attachments for subframe of BlueMotion vehicles .

– Remove additional underbody panels on left and right ⇒ Body, front; Rep. gr. 50 ; Additional underbody panels (BlueMotion) - Assembly overview for vehicles up to 10.2010 .

BlueMotion vehicles from 11.2010

– Remove panelling of rear axle ⇒ Wheel suspension, rear; Rep. gr. 42 ; Assembly overview: Attachments for subframe of BlueMotion vehicles .

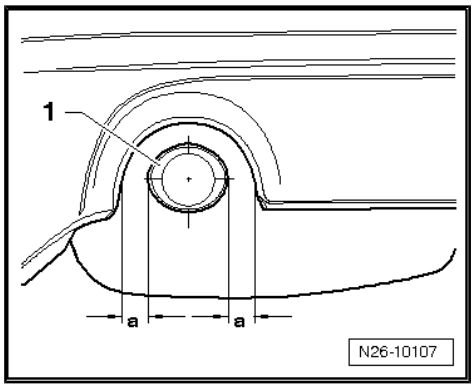
– Remove additional underbody panels on left and right ⇒ Body, front; Rep. gr. 50 ; Additional underbody panels (BlueMotion) - Assembly overview for vehicles from 11.2010 .

– Cut through exhaust pipe at separating point -arrow- at right angles e.g. with pneumatic sabre saw - V.A.G 1523A- or chain pipe cutter - VAS 6254- .

– Position double clamp for repair in middle of markings.

Aligning rear silencer

– Align rear silencer -1- so that dimensions -a- are identical.

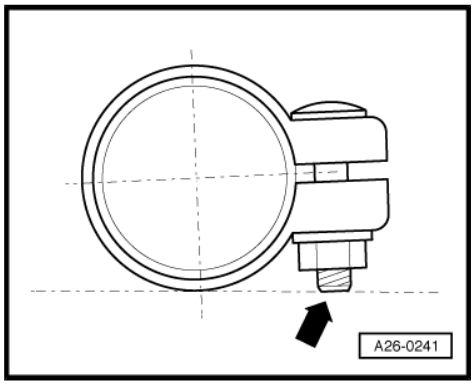


– Install clamping sleeve so that bolt end does not protrude beyond lower edge of clamping sleeve -arrow-.

• Nuts are below

– Ensure correct mounting position and tightening torque ⇒ page 358 .

– Aligning rear silencer free of stress ⇒ page 356



Specified torque

Component	Specified torque
Double clamp	⇒ page 358

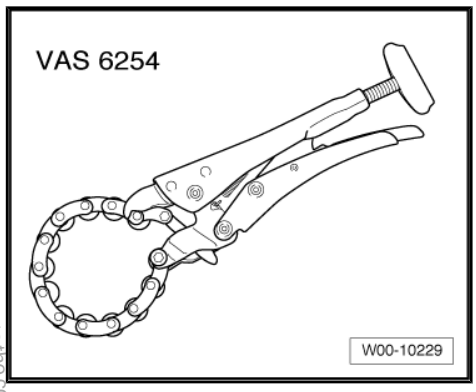
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1.9 Separating centre and rear silencers (Tiguan)

- The connecting pipe can be cut through at the point marked in order to renew the centre and rear silencers separately.
- Cutting location is marked by an indentation on circumference of exhaust pipe.

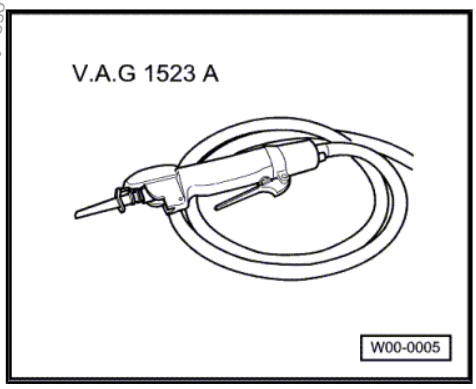
Special tools and workshop equipment required

- Chain-type pipe cutter - VAS 6254-



Or

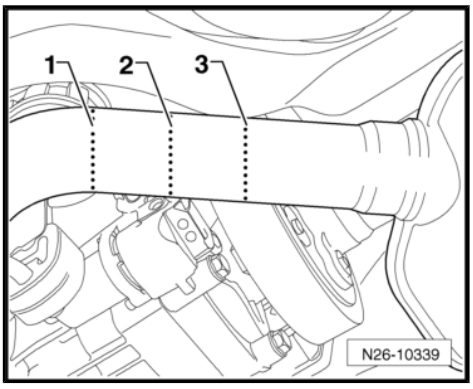
- Pneumatic sabre saw - V.A.G 1523A-



Procedure

– Cut through exhaust pipe at separating point -2- using chain-type pipe cutter - VAS 6254- or pneumatic sabre saw - V.A.G 1523A- .

– Position clamping sleeve centrally at side marks -1- and -3- when installing.



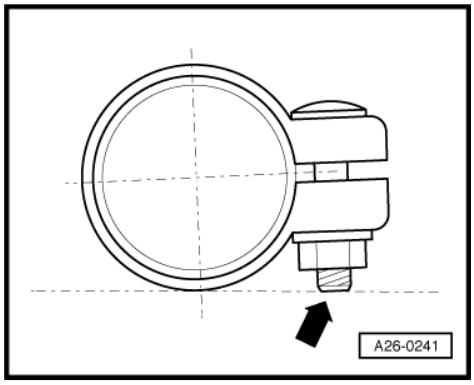
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– Install clamping sleeve so that bolt end does not protrude beyond lower edge of clamping sleeve -arrow-.

• Threaded connection faces to rear.

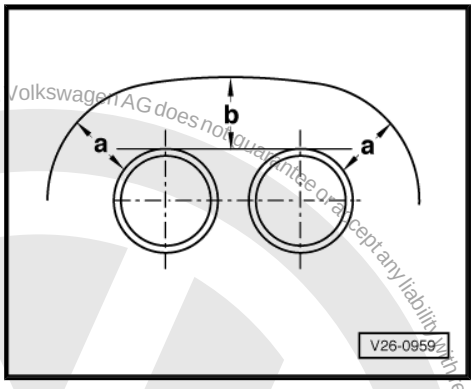
– Ensure correct mounting position and tightening torque ⇒ page 358 .

– Aligning rear silencer free of stress ⇒ page 358



Aligning rear silencer

– Align rear silencer so that dimensions -a- are identical.



Specified torque

Component	Specified torque
Double clamp	⇒ page 358

1.10 Installation position and specified torque of clamp

Note

Gradual introduction of clamp with continuous clip.

Specified torque and mounting dimensions of clamping sleeve.

Clamp -A- with 2 individual clips.

Specified torque 25 Nm.

Length: 95 mm

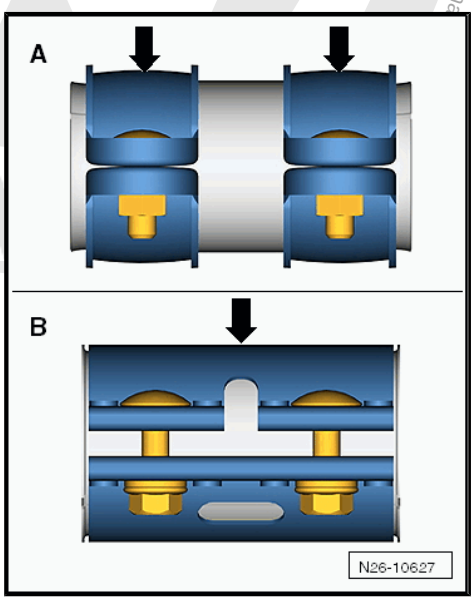
Installation dimensions -a- 5 mm (only for front clamp)

Clamp -B- with continuous clip.

Specified torque: 35 Nm.

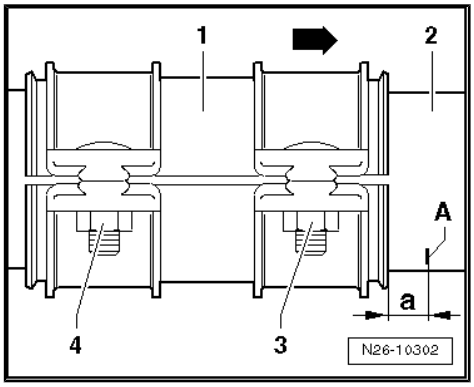
Length: 88 mm

Installation dimensions -a- 8.5 mm (only for front clamp)



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Installation dimension -a- for vehicles with marking -A- on front exhaust pipe



1 - Clamp

2 - Front exhaust pipe

3 - Securing nut

4 - Securing nut

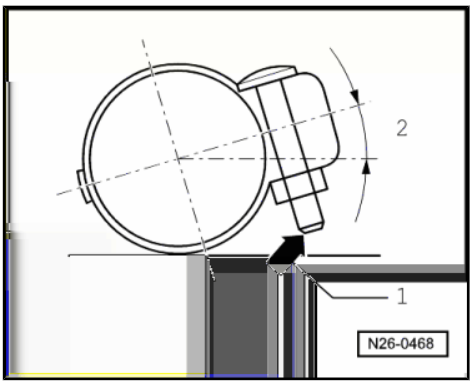
a - Installation dimension

A - Marking

Installation position of front clamp

– Install clamp so that end of bolt -arrow- does not extend beyond lower edge of clamp.

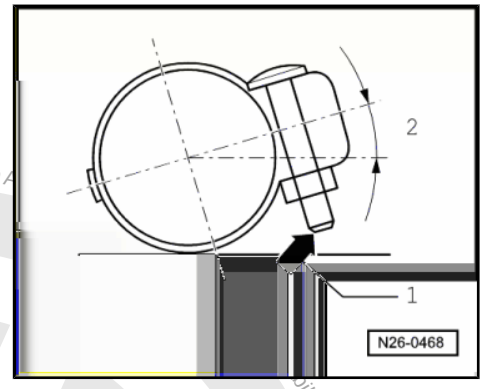
• Threaded connection faces right.



Installation position of rear clamp

– Install clamp so that end of bolt -arrow- does not extend beyond lower edge of clamp.

• Threaded connection faces to rear.



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28 – Ignition system

1 Repairing ignition system

General notes on ignition system

- The engine control unit - J623- is equipped with self-diagnosis.
- For trouble-free operation of electrical components, a voltage of at least 11.5 V is necessary.
- Certain tests may lead to a fault being detected and stored by the engine control unit - J623- . Therefore, after completing all the checks and repairs, read the event memory and clear it if necessary.

Assembly overview - ignition system ⇒ page 360 .

Removing and installing ignition coils with output stage ⇒ page 361 .

Safety precautions ⇒ page 362 .

Spark plug test data ⇒ page 363 .

1.1 Assembly overview - ignition system

1 - Connector

- ❑ Black, 4-pin.
- ❑ Release using assembly tool - T10118- .

2 - Ignition coil 3 with output stage - N291-

- ❑ Ignition coil 1 with output stage - N70-
- ❑ Ignition coil 2 with output stage - N127-
- ❑ Ignition coil 4 with output stage - N292-
- ❑ Removing and installing ⇒ page 361

3 - Connector

- ❑ Black, 2-pin.
- ❑ For knock sensor 1 - G61- .
- ❑ Connector contacts are gold-plated.

4 - Knock sensor 1 - G61-

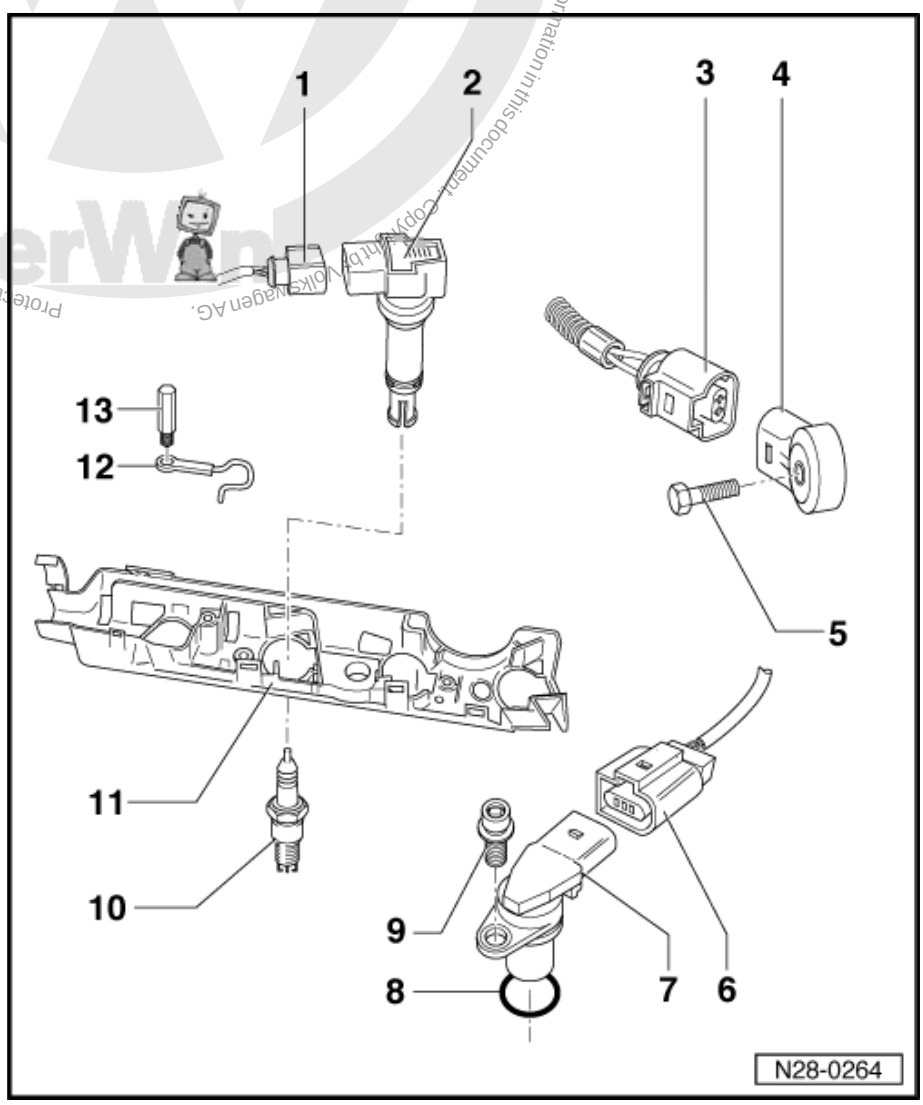
- ❑ Connector contacts are gold-plated.

5 - 20 Nm

- ❑ The specified torque influences the function of the knock sensor.

6 - Connector

- ❑ Black, 3-pin.
- ❑ For Hall sender - G40- .



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7 - Hall sender - G40-

8 - O-ring

- ❑ Renew if damaged.

9 - 10 Nm

10 - Spark plug, 25 Nm

- ❑ Remove and install with spark plug socket and extension - 3122 B- .
- ❑ Type and electrode gap ⇒ page 363 .

11 - Cable guide

- ❑ Bolt to camshaft housing with 5 Nm torque.

12 - Earth wire

- ❑ Loosen or tighten only with ignition switched off.

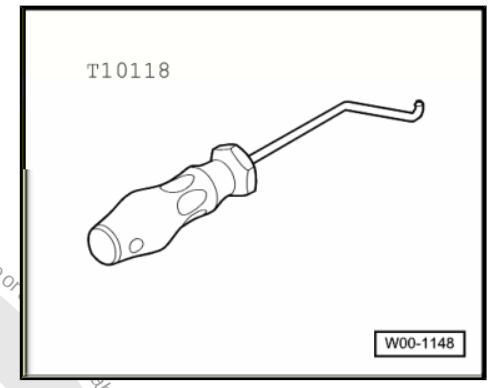
13 - 10 Nm

- ❑ Loosen or tighten only with ignition switched off.

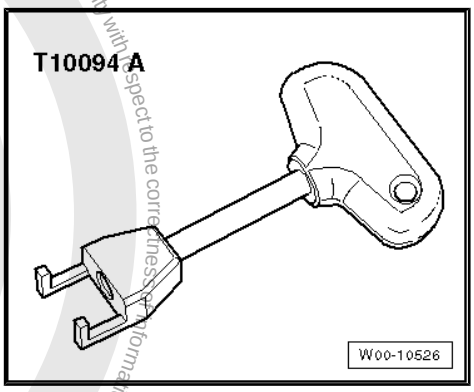
1.2 Removing and installing ignition coils with output stage

Special tools and workshop equipment required

- ♦ Assembly tool - T10118-



- ♦ Puller - T10094 A-

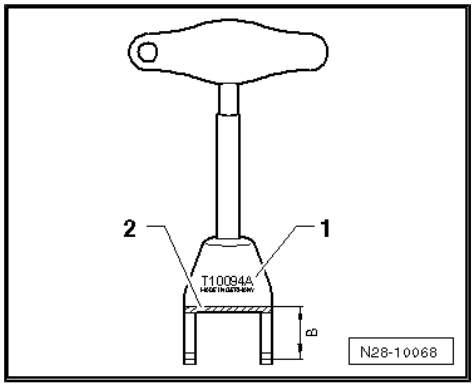


Note

The housings for ignition coils with output stages have been modified. As a result, these ignition coils can only be installed or removed using puller - T10094 A- . The previous puller - T10094- can continue to be used if modified as described below.

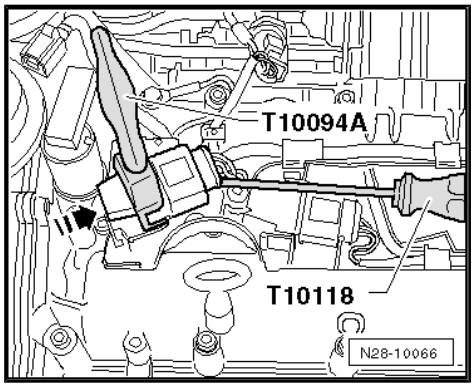
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– Remove marked area -2- using suitable workshop equipment to attain the new nominal dimension -B- of 18 mm.
– Additionally identify the tool designation with the letter A -1-.



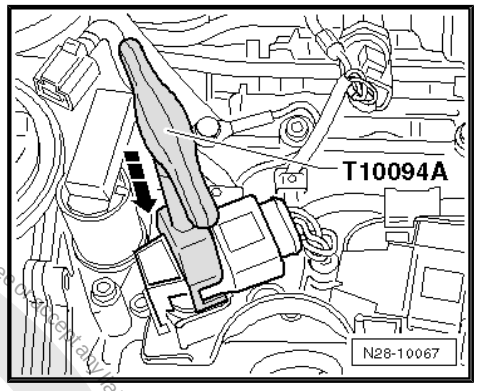
Removing

– Fit puller - T10094 A- on ignition coil with final output stage -arrow-.
– Pull ignition coil with final output stage out slightly.
– Fit assembly tool - T10118- as shown.
– Carefully release connector locking mechanism and pull off connector.



Installing

– Fit puller - T10094 A- on ignition coil with final output stage.
– Push connector onto ignition coil with final output stage until it audibly engages.
– Press ignition coil with final output stage into cylinder head in direction of -arrow-.



1.3 Safety precautions

To prevent injuries to persons and/or damage to the injection and ignition system, the following must be observed:

- Do not touch or disconnect ignition cables when the engine is running or being turned at starter speed.
- Switch off ignition before connecting or disconnecting injection and ignition system wiring as well as test instrument cables.

Note the following if testers and measuring instruments have to be used during a road test:

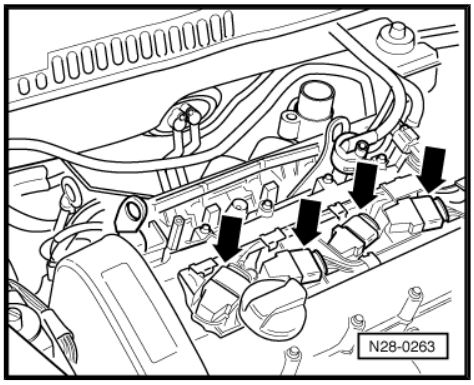
- Test and measuring instruments must always be secured to rear seat and operated by a second person from this location.

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.

- If the engine is to be turned at starter speed without starting:

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– Pull all 4-pin connectors -arrows- off ignition coils with final output stage ⇒ page 361 .
– Remove fuse for fuel pump control unit - J538- from fuse holder. Fuse assignment ⇒ Current flow diagrams, Electrical fault finding and Fitting locations



1.4 Test data, spark plugs

Engine codes	CAXA, CMSB
Firing order	1-3-4-2
Spark plugs	
VW part number 8)	101 905 626 B
Electrode gap	0.8…0.9 mm
Specified torque	25 Nm
Change interval	⇒ Maintenance ; Booklet ; Time or distance dependent additional work

8) Current spark plugs ⇒ Electronic parts catalogue (ETKA)

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