



## Workshop Manual

Eos 2006 ➤

Golf 2004 ➤

Passat 2006 ➤

**4-cylinder injection engine (2.0 l engine, turbocharger)**

Engine ID	AXX	BPY	BWA						
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Edition 03.2017



## List of Workshop Manual Repair Groups

### Repair Group

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



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## 00 – Technical data

### 1 Engine number

(VRL010190; Edition 03.2017)

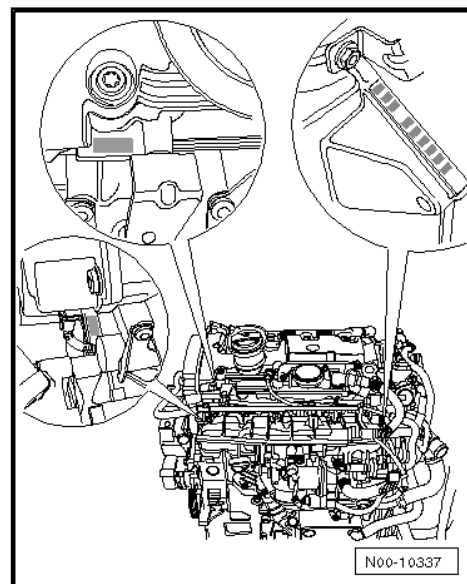
The engine number ("code letters" and "serial number") can be found on the left on the joint between the engine and the gearbox.

The engine code is also stamped on the right side of the cylinder head and on the cylinder block.

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.

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

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





## 2 Engine data

Code	AXX	BPY	BWA
Manufactured	10.04 ►	03.05 ►	06.05 ►
Exhaust emissions fulfil	EU 4 standard, EU 2 ddk	ULEV 2	EU 4 standard, EU 2 ddk
Displacement cm <sup>3</sup>	1984	1984	1984
Power KW at rpm	147/5700	147/5700	147/5700
Torque Nm at rpm	280/2000	280/2000	280/2000
Bore Ø mm	82.5	82.5	82.5
Stroke mm	92.8	92.8	92.8
Compression ratio	10.5	10.5	10.3
Valves per cylinder	4	4	4
RON	98 unleaded <sup>1</sup>	95 unleaded <sup>2)</sup>	98 unleaded <sup>1</sup>
Injection, ignition	Motronic MED 9.1	Motronic MED 9.1	Motronic MED 9.1
Type of mixture formation	Homogeneous	Homogeneous	Homogeneous
Knock control	2 sensors	2 sensors	2 sensors
Lambda control	2 probes	2 probes	2 probes
Three-way catalytic converter	yes	yes	yes
Camshaft timing adjustment	yes	yes	yes
Electronic power control	yes	yes	yes

<sup>1)</sup> Also 95 RON with reduced power

<sup>2)</sup> Also 91 RON with reduced power

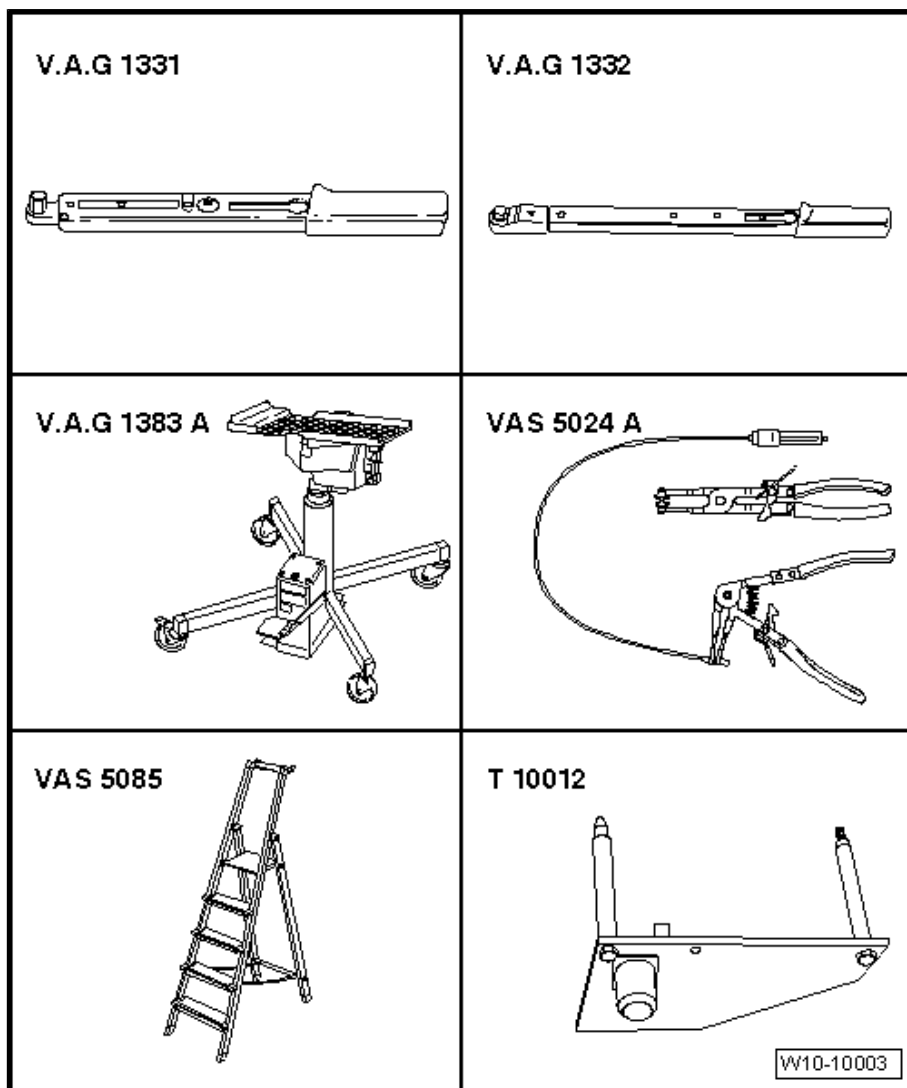




## 10 – Removing and installing engine

### 1 Removing and installing engine

Special tools and workshop equipment required



- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Pliers for spring-type clips - VAS 5024A-
- ◆ Stepladder - VAS 5085-
- ◆ Engine support - T10012-
- ◆ Cable tie

Removing engine ➔ [page 4](#) .

Securing engine to assembly stand ➔ [page 9](#) .

Installing engine ➔ [page 11](#) .

Assembly mountings ➔ [page 13](#)



## 1.1 Removing engine

Securing engine to assembly stand ➔ [page 9](#) .



### Note

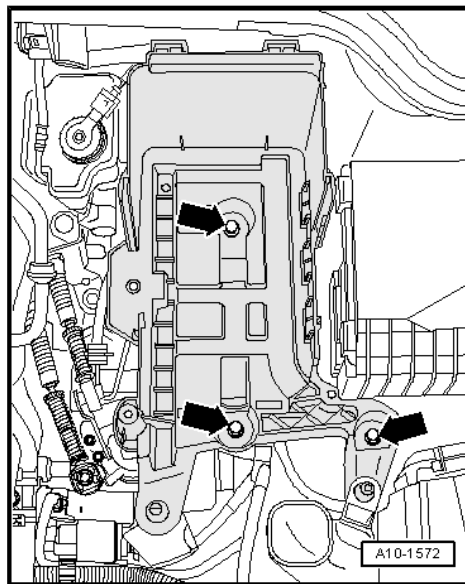
- ♦ *The battery earth must be disconnected for the remaining procedure. Therefore, first check whether a coded radio is fitted. Then obtain anti-theft coding first if necessary.*
- ♦ *The engine is removed downwards together with the gearbox.*
- ♦ *All cable ties which are opened or cut through when engine is removed must be replaced in the same position when engine is installed.*



### Caution

**Observe the following points during all installation work, in particular in the engine compartment, due to the space limitations:**

- ♦ **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 to all moving or hot components.**
- Disconnect earth strap at battery with ignition switched off ➔ Electrical system; Rep. gr. 27 ; Disconnecting and connecting battery.
  - Remove engine cover panel/air filter ➔ [page 273](#) .
  - Remove battery and battery tray.
- Golf, Eos:**
- Remove wiper arms, plenum chamber cover and plenum chamber bulkhead ➔ Electrical system; Rep. gr. 92 ; Wind-screen wiper system .
  - Pull engine wiring harness connector off engine control unit.

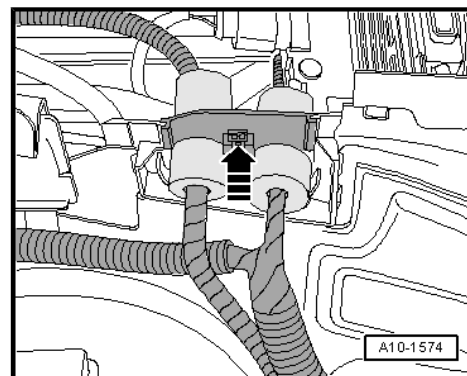




- Release feed-through for engine wiring harness -arrow- and pull off upwards.

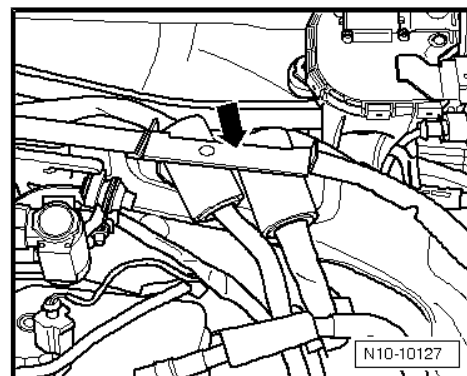
**Passat:**

- Remove wiper arms and plenum chamber cover ⇒ Rep. gr. 92 .
- Pull engine wiring harness connector off engine control unit.

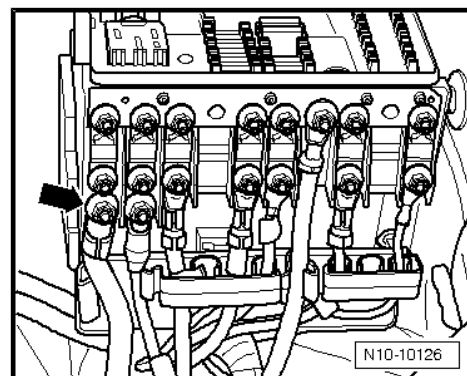


- Release feed-through for engine wiring harness -arrow- and pull off upwards.

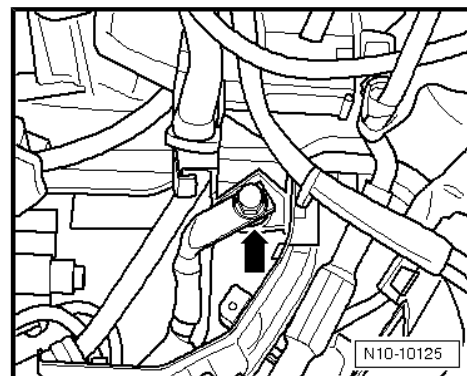
**All vehicles:**



- Unscrew cable from alternator at fuse holder -arrow-.



- Unscrew earth cable from longitudinal member -arrow-.





- Open wiring guide catches on longitudinal member -arrows-.
- Separate all connectors between engine wiring harness and body and lay engine wiring harness on engine.

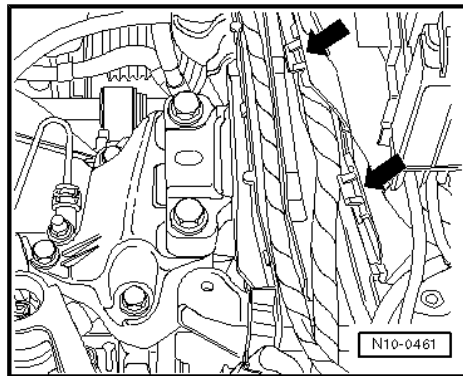
Engine code BPY:



#### WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



- Disconnect lines -1, 2 and 3-. Do this by operating release buttons.

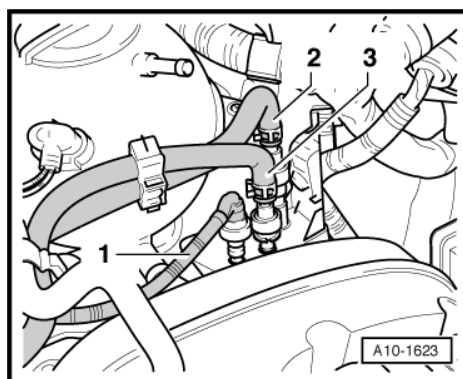
Engine codes AXX, BWA:



#### WARNING

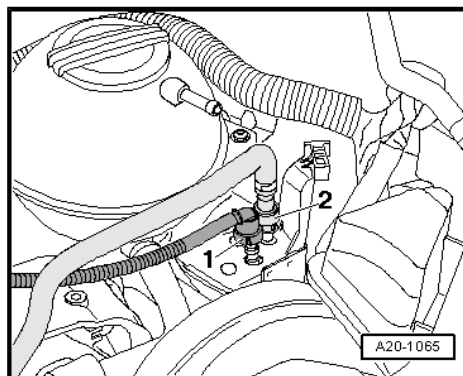
*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



- Disconnect breather line -1- and fuel supply line -2-.

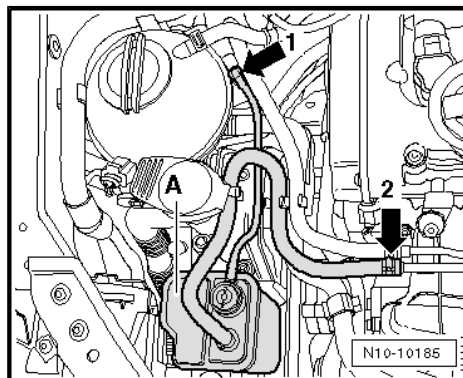
Golf, Eos:



- Disconnect breather line -2-. Pull activated charcoal filter with hoses upwards out of bracket.

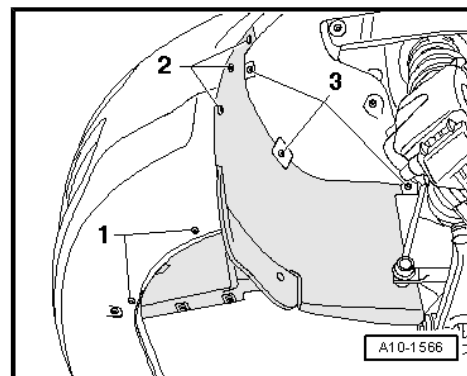
Continued for all vehicles:

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

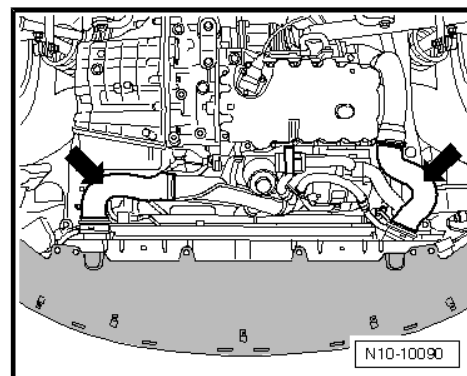




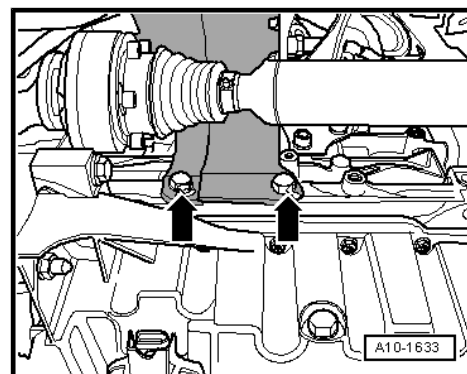
- Remove left and right wheel housing liner front part.



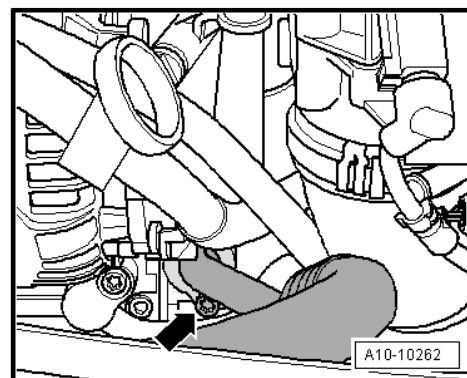
- Remove charge air hoses -arrows-.



- Unbolt heat shield for right-hand drive shaft -arrows-.
- Remove left and right drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Removing and installing drive shafts .
- Remove front exhaust pipe with catalytic converter  
⇒ [page 318](#) .
- Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier .
- Drain coolant ⇒ [page 126](#) .
- Empty air conditioning ⇒ Rep. gr. 87 .

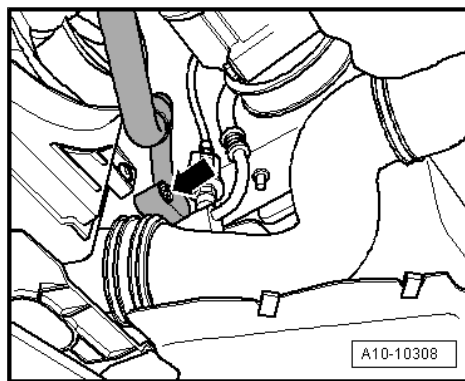


- Disconnect refrigerant line -arrow- from air conditioner compressor.





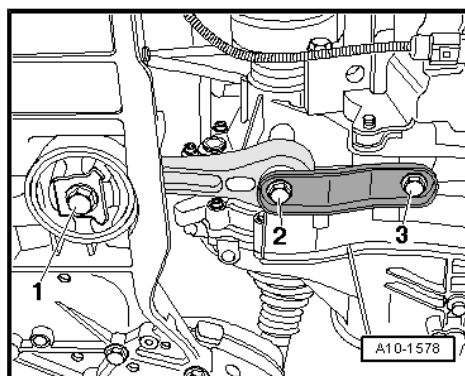
- Remove refrigerant line from condenser -arrow-.



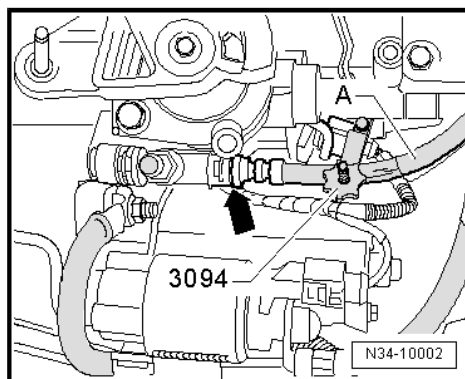
- Unscrew bolts -1...3- and remove pendulum support.
- Pull off or disconnect all other electrical connections from the engine and gearbox as necessary and lay open.
- Separate all connecting, coolant, vacuum and intake hoses from engine.

#### Vehicles with manual gearbox:

- Remove selector mechanism from gearbox ⇒ Rep. gr. 34 .



- Clamp-off hose for pipe/hose line -A- to slave cylinder using hose clips - 3094- .
- Pull out clip -arrow- for pipe/hose line to stop.
- Pull pipe/hose line out of slave cylinder breather.



#### Caution

*Do not operate clutch pedal any more.*

#### Vehicles with automatic gearbox:

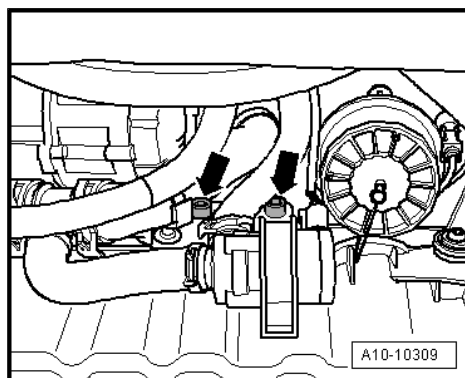
- Disconnect selector lever cable from gearbox ⇒ Automatic gearbox 09G; Rep. gr. 37 ; Repairing selector mechanism .

#### Vehicles with DSG®:

- Remove selector lever cable from gearbox: ⇒ Power transmission; Rep. gr. 34 ; Selector mechanism .

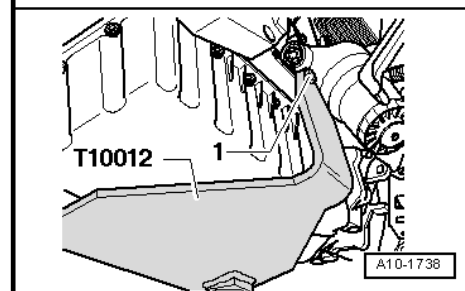
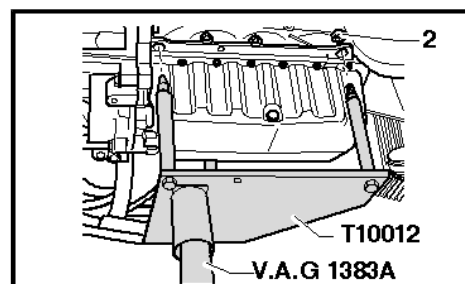
#### Continued for all vehicles:

- Unscrew coolant circulation pump - V50- -arrows-.
- Insert engine bracket - T10012- in engine and gearbox jack - V.A.G 1383 A- .

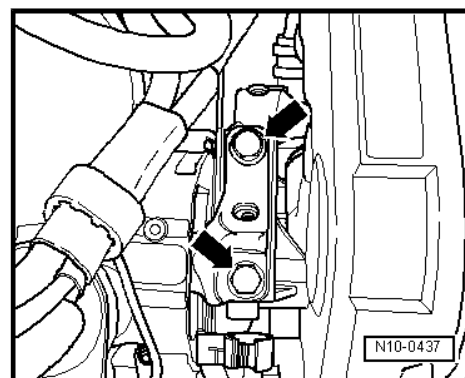




- Place engine bracket - T10012- on engine as shown and tighten bolt -1- and nut -2- to approx. 20 Nm.
- Lift engine and gearbox slightly using engine and gearbox jack - V.A.G 1383 A- .



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

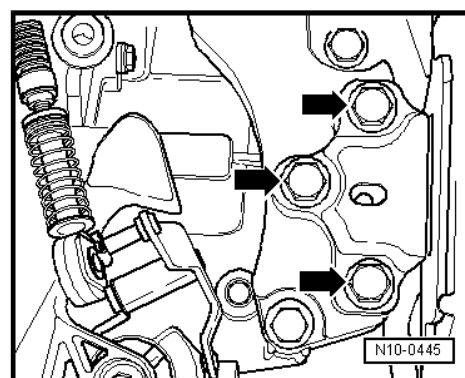


- Unscrew assembly mounting on gearbox side from gearbox support -arrows-.



#### Note

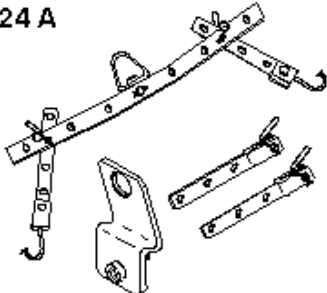

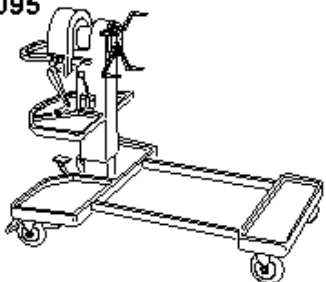
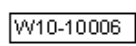
- ◆ To remove securing bolts use a stepladder - VAS 5085- .
- ◆ Engine and gearbox must be guided carefully when lowering to prevent damage to the bodywork.
- Carefully lower engine with gearbox.



## 1.2 Securing engine to assembly stand



**Special tools and workshop  
equipment required**

<b>2024 A</b> 	<b>VAS 6100</b> 
<b>VAS 6095</b> 	
	

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

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

- Disconnect gearbox.





- Attach lifting tackle - 2024 A- as follows and lift from engine and gearbox jack - VAS 6100- using workshop crane - V.A.G 1383 A- .

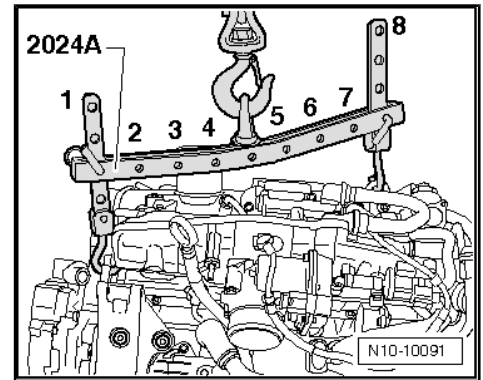
Pulley end: 2nd hole in hook rail at position 1.

Flywheel end: 1st hole in hook rail at position 7.



#### Caution

*Use securing pins on the hooks and locking pins to avoid damaging the engine and vehicle.*



- ◆ The positions marked 1...4 on the bar must face towards the V-belt pulley end.
- ◆ The holes in the hook rails are counted up from the hook.
- Secure engine to engine and gearbox support - VAS 6095- .

## 1.3 Installing engine

Assembly mountings ⇒ [page 13](#) .

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



#### Caution

*Observe the following points during all installation work, in particular in the engine compartment, due to the space limitations:*

- ◆ *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 to all moving or hot components.*

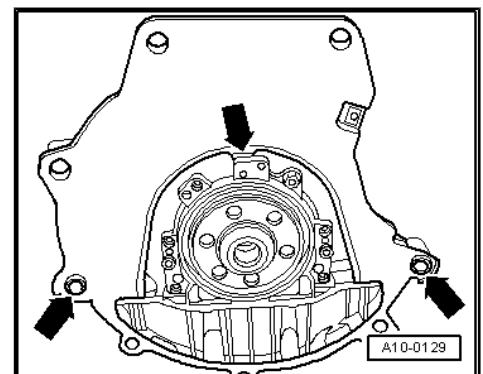
- Insert new dowel sleeves in the cylinder block for centring the engine and gearbox.
- Hook intermediate plate onto sealing flange and slide onto dowel sleeves -arrows-.

#### Vehicles with manual gearbox:

- Lightly grease input shaft splines with grease - G 000 100- .
- Check clutch and clutch actuation mechanism and install ⇒ Manual gearbox; Rep. gr. 30 ; Repairing clutch actuation mechanism .

#### Continued for all vehicles:

- When installing engine and gearbox assembly, ensure sufficient clearance to subframe and radiator.
- 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 pendulum support.



#### Note

- ◆ Specified torques for assembly mountings ⇒ [page 13](#) .
- ◆ Electrical connections and routing ⇒ *Electrical system*; Rep. gr. 97 .
- Install front exhaust pipe.
- Install right and left drive shaft ⇒ *Running gear, axles, steering*; Rep. gr. 40 ; *Removing and installing drive shaft* .

#### Vehicles with manual gearbox:

- Install selector mechanism and adjust if necessary ⇒ Rep. gr. 34 .
- Reconnect pipe/hose line to slave cylinder breather ⇒ *Manual gearbox*; Rep. gr. 30 ; *Repairing clutch control* .

#### Vehicles with automatic gearbox:

- Install selector lever cable and adjust if necessary ⇒ *Automatic gearbox 09G*; Rep. gr. 37 ; *Repairing selector mechanism* .

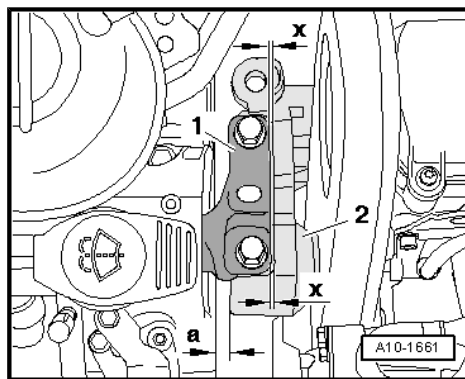
#### Continued for all vehicles:

- Install noise insulation ⇒ *General body repairs, exterior*; Rep. gr. 50 ; *Assembly overview - Body - front* .
- Install plenum chamber bulkhead (Golf and Eos only), plenum chamber cover and wiper arms ⇒ *Electrical system*; Rep. gr. 92 ; *Window wiper system*; *Removing and installing window wiper system* .
- Connect battery and observe required procedures after connecting battery ⇒ *Electrical system*; Rep. gr. 27 ; *Disconnecting and reconnecting battery* .
- Fill coolant system with coolant ⇒ [page 126](#) .
- Connect vehicle diagnostic, testing and information system - VAS 5051B- .
- Read all fault memories and clear all fault entries that have been created during assembly.
- Perform road test.
- Then carry out the vehicle system test again and correct any faults that have been created.



#### Note

*If the fault memory was cleared, the readiness code must be generated ⇒ Vehicle diagnostic tester. "Guided functions".*





## Specified torques:

Bolted connection		Specified torque
Nuts and bolts	M6	10 Nm
	M7	15 Nm
	M8	25 Nm
	M10	40 Nm
	M12	60 Nm

## 1.4 Assembly mountings

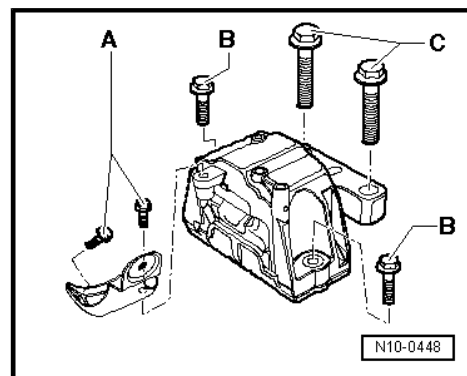
### Engine mounting

A = 20 Nm + 90° (1/4 turn) further <sup>1)</sup>

B = 40 Nm + 90° (1/4 turn) further <sup>1)</sup>

C = 60 Nm + 90° (1/4 turn) further <sup>1)</sup>

<sup>1)</sup> Renew

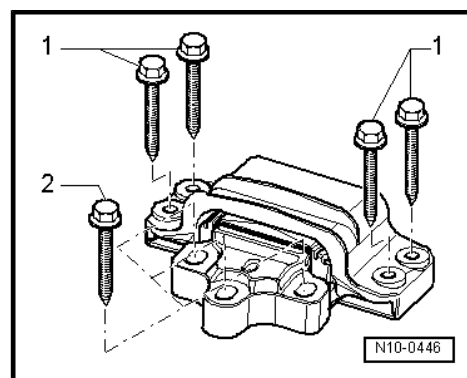


### Gearbox mounting

1 = 40 Nm + 90° (1/4 turn) further <sup>1)</sup>

2 = 60 Nm + 90° (1/4 turn) further <sup>1)</sup>

<sup>1)</sup> Renew



### Pendulum support



#### Note

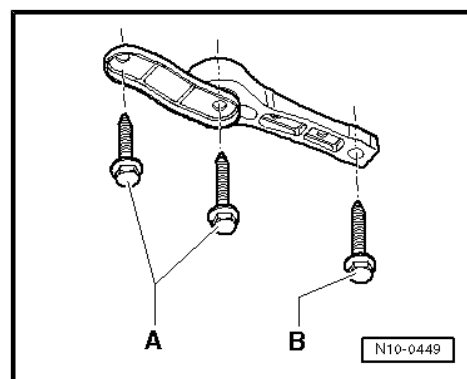
*First bolt pendulum support to gearbox and then to subframe.*

A Property class 8.8 = 40 Nm + 90° (1/4 turn) further <sup>1)</sup>

A Property class 10.9 = 50 Nm + 90° (1/4 turn) further <sup>1) 2)</sup>

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

<sup>1)</sup> Renew



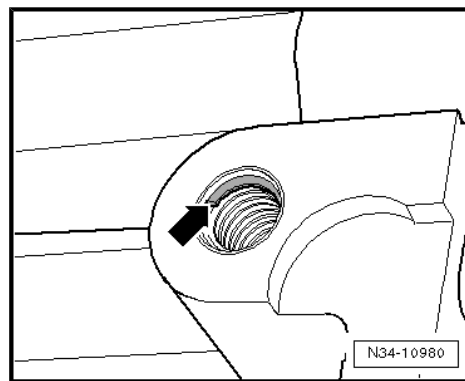


Eos 2006 ➤ , Golf 2004 ➤ , Passat 2006 ➤

4-cylinder injection engine (2.0 l engine, turbocharger) - Edition 03.2017

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2) On manual gearboxes, class 10.9 bolts may only be used if threaded inserts (e.g. HeliCoil) are installed. Identification: shoulder along beginning of thread -arrow-.





## 13 – Crankshaft group

### 1 Dismantling and assembling engine



#### Caution

*The cylinder bore may not be worked on (reboring, honing, grinding) may not be carried out using workshop tools! This will damage the surface of the cylinder bore.*



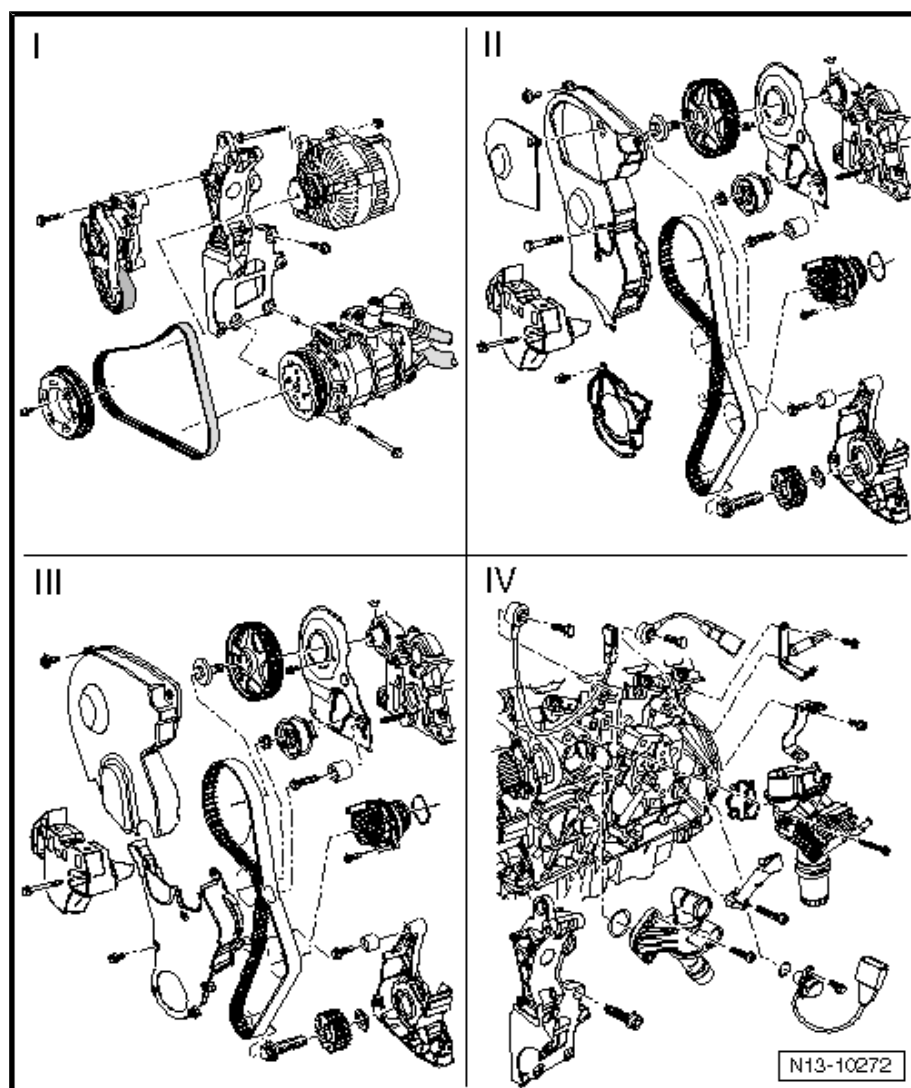
#### Note

- ◆ *Finding metal shavings or a large quantity of small metal particles during engine repair could indicate that the crankshaft bearings or conrod bearings are damaged. To prevent this from causing further damage, perform the following repairs:*
- ◆ *Thoroughly clean oil channels.*
- ◆ *Renew oil spray jets.*
- ◆ *Renew engine oil cooler.*
- ◆ *Renew oil filter element.*

Assembly overview ➔ [page 15](#) .

Removing and installing poly V-belt ➔ [page 22](#)

#### 1.1 Assembly overview



Part I ➤ [page 17](#)

Part II ➤ [page 18](#)

Part III ➤ [page 20](#)

Part IV ➤ [page 22](#)



## 1.1.1 Part I

### 1 - Ancillary bracket

- ☐ Note tightening sequence ⇒ [page 18](#)

2 - 23 Nm

3 - 23 Nm

### 4 - Alternator

- ☐ Removing and installing ⇒ Electrical system; Rep. gr. 27 ; Removing and installing alternator
- ☐ To facilitate attachment of alternator, knock back threaded bushes for alternator securing bolts slightly.

5 - 40 Nm

- ☐ Note tightening sequence ⇒ [page 18](#)

### 6 - Bush

- ☐ Qty. 2

7 - 25 Nm

### 8 - Air conditioner compressor

- ☐ Removing and installing ⇒ Air conditioning system; Rep. gr. 87 .

### 9 - Poly V-belt

- ☐ Mark direction of rotation with chalk or felt pen before removing.
- ☐ Check for wear
- ☐ Do not kink
- ☐ Removing and installing ⇒ [page 22](#)

### 10 - Pulley

- ☐ For poly V-belt.

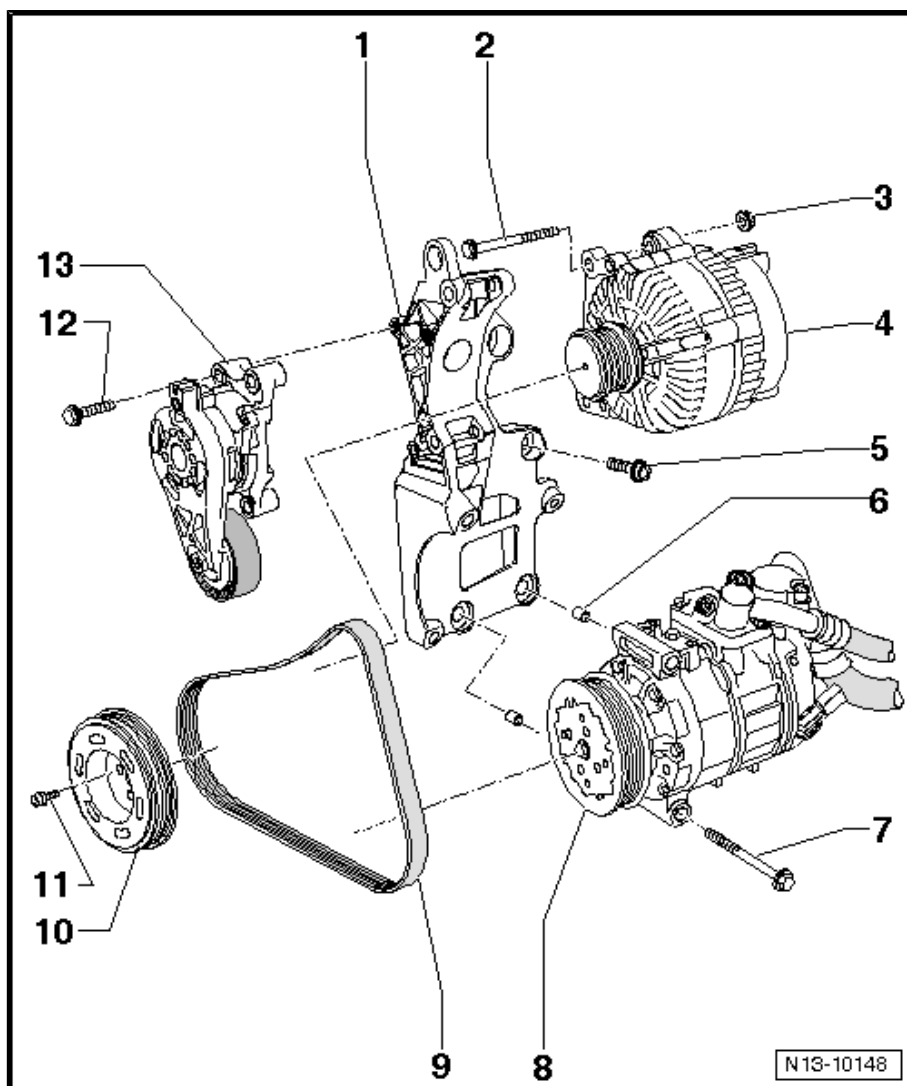
11 - 20 Nm + 90° (1/4 turn) further

- ☐ Renew

12 - 23 Nm

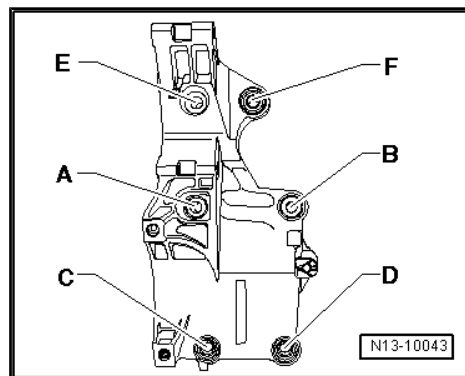
### 13 - Tensioning device for poly V-belt

- ☐ Swing with open-end spanner to slacken poly V-belt.





### Bolt-tightening sequence for ancillary bracket



### 1.1.2 Part II, vehicles without split toothed belt guard



#### Note

*Vehicles as of 01/2006 have a new toothed belt guard. Identification: the upper part of the toothed belt guard has no cover ⇒ [Item 25 \(page 20\)](#) and the toothed belt guard is split in the area of the engine bracket. Assembly overview - vehicles with split toothed belt guard ⇒ [page 20](#) .*





1 - 10 Nm

2 - Upper toothed belt guard

3 - 50 Nm + 180° (1/2 turn) further

- ☐ Renew
- ☐ Use counterhold - 3036- to loosen and tighten.

4 - Camshaft sprocket

- ☐ Locked in installation position by Woodruff key.

5 - 10 Nm

- ☐ Install with locking fluid

6 - Rear toothed belt guard

7 - Woodruff key

- ☐ Check for firm seating

8 - 25 Nm

- ☐ Specified torque for stud in cylinder head  
⇒ [Item 27 \(page 48\)](#)

9 - Semi-automatic belt tensioner

10 - Coolant pump

- ☐ Removing and installing  
⇒ [page 129](#)

11 - O-ring

- ☐ Renew

12 - 25 Nm

13 - Damper wheel

14 - 15 Nm

15 - 35 Nm

16 - Damper wheel

17 - Sealing flange

18 - Diamond-coated washer

- ☐ Renew

19 - Crankshaft pulley

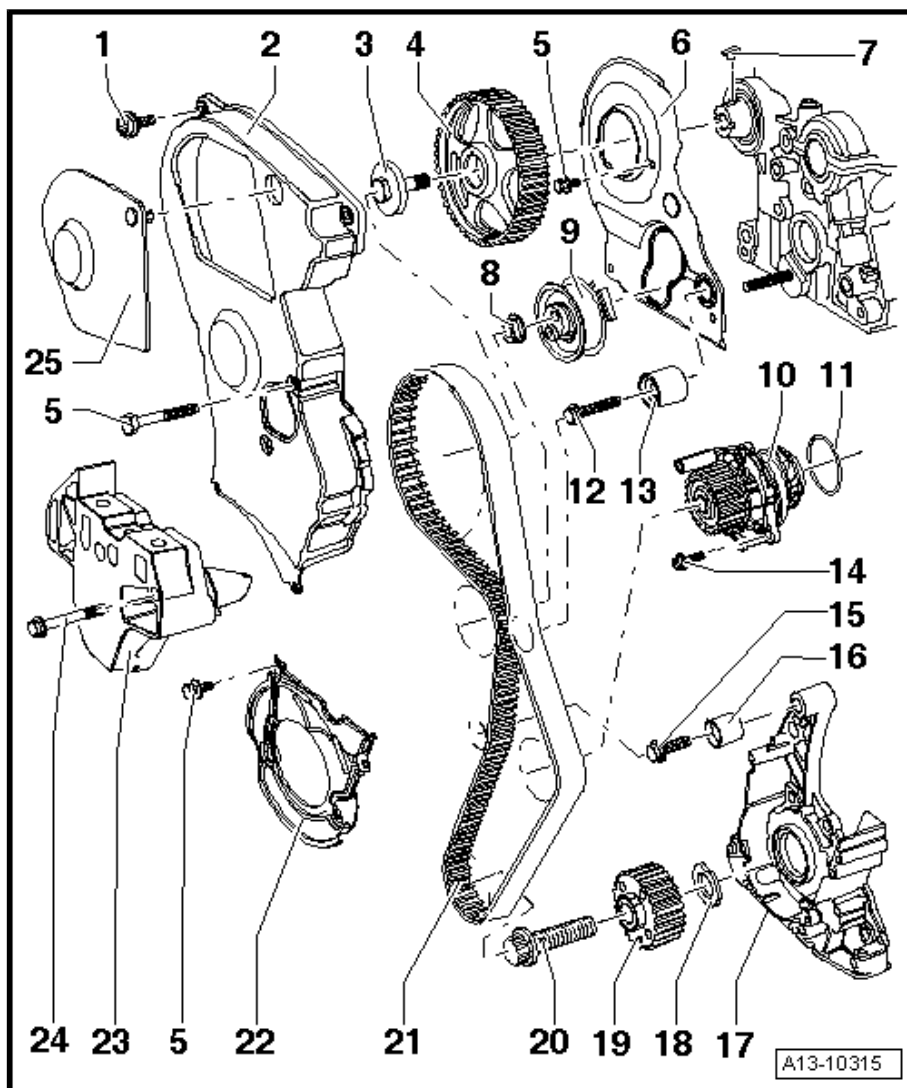
- ☐ Contact surface between toothed belt pulley, diamond-coated washer and crankshaft must be free of oil
- ☐ Can only be fitted in one position

20 - 90 Nm + 90° (1/4 turn) further

- ☐ Renew
- ☐ Do not oil
- ☐ Use counterhold - 3415- to loosen and tighten.

21 - Toothed belt

- ☐ Mark direction of rotation with chalk or felt pen before removing.
- ☐ Check for wear





- 22 - Lower toothed belt guard
- 23 - Engine support
- 24 - 45 Nm
- 25 - Cap for toothed belt guard

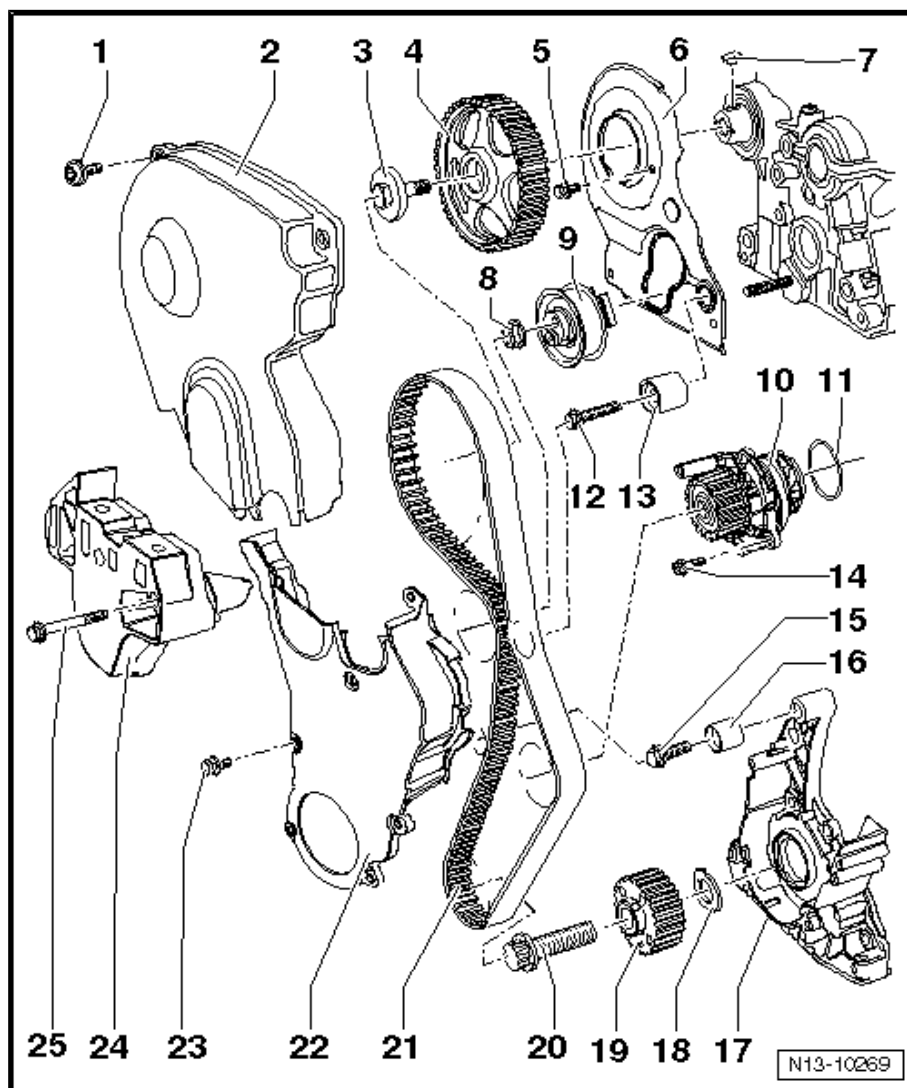
### 1.1.3 Part III, vehicles with split toothed belt guard



#### Note

Vehicles as of 01/2006 have a new toothed belt guard. Identification: the upper part of the toothed belt guard has no cover  
⇒ [Item 25 \(page 20\)](#) and the toothed belt guard is split in the area of the engine bracket. Assembly overview - vehicles without split toothed belt guard ⇒ [page 18](#).

- 1 - 10 Nm
- 2 - Upper toothed belt guard
- 3 - 50 Nm + 180° (1/2 turn) further
- ☐ Renew
- ☐ Use counterhold - 3036- to loosen and tighten.
- 4 - Camshaft sprocket
- ☐ Locked in installation position by Woodruff key.
- 5 - 10 Nm
- ☐ Install with locking fluid
- 6 - Rear toothed belt guard
- 7 - Woodruff key
- ☐ Check for firm seating
- 8 - 25 Nm
- ☐ Specified torque for stud in cylinder head  
⇒ [Item 27 \(page 48\)](#)
- 9 - Semi-automatic belt tensioner
- 10 - Coolant pump
- ☐ Removing and installing  
⇒ [page 129](#)
- 11 - O-ring
- ☐ Renew





**12 - 25 Nm**

**13 - Damper wheel**

**14 - 15 Nm**

**15 - 35 Nm**

**16 - Damper wheel**

**17 - Sealing flange**

**18 - Diamond-coated washer**

- ☐ Renew

**19 - Crankshaft pulley**

- ☐ Contact surface between toothed belt pulley, diamond-coated washer and crankshaft must be free of oil
- ☐ Can only be fitted in one position

**20 - 90 Nm + 90° (1/4 turn) further**

- ☐ Renew
- ☐ Do not oil
- ☐ Use counterhold - 3415- to loosen and tighten.

**21 - Toothed belt**

- ☐ Mark direction of rotation with chalk or felt pen before removing.
- ☐ Check for wear

**22 - Lower toothed belt guard**

**23 - Securing bolts**

- ☐ For lower toothed belt guard
- ☐ Qty. 7
- ☐ 8 Nm

**24 - Engine support**

**25 - 45 Nm**



## 1.1.4 Part IV

### 1 - Knock sensor 1 - G61-

- ☐ To remove, the coolant thermostat housing must be removed  
⇒ [page 133](#)
- ☐ Gold-plated contacts

### 2 - 20 Nm

- ☐ The specified torque influences the function of the knock sensor.

### 3 - Knock sensor 2 - G66-

- ☐ To remove, the oil filter bracket must be removed ⇒ [page 111](#)
- ☐ Gold-plated contacts

### 4 - Cable bracket

### 5 - Bolt

### 6 - Cable bracket

### 7 - Bolt

### 8 - Seal

- ☐ Renew

### 9 - Oil filter bracket with attachments

- ☐ Dismantling and assembling ⇒ [page 102](#)

### 10 - 15 Nm + 1/4 turn further (90°)

- ☐ Renew

### 11 - Intake manifold support

### 12 - Bolt

### 13 - 10 Nm

### 14 - Engine speed sender - G28-

### 15 - Sealing ring

- ☐ Renew

### 16 - 15 Nm

### 17 - Coolant thermostat housing with thermostat

- ☐ Removing and installing ⇒ [page 133](#)

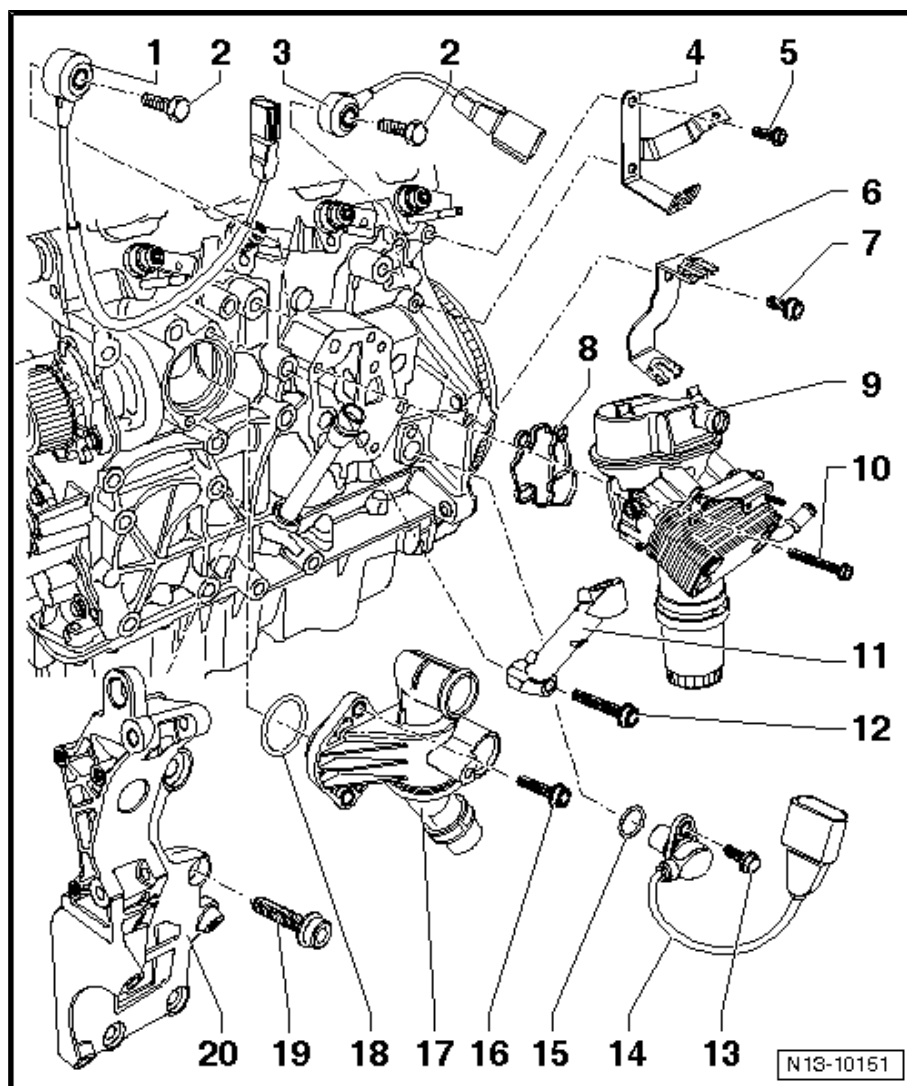
### 18 - O-ring

- ☐ Renew

### 19 - 40 Nm

### 20 - Ancillary bracket

- ☐ Tightening sequence ⇒ [page 18](#)

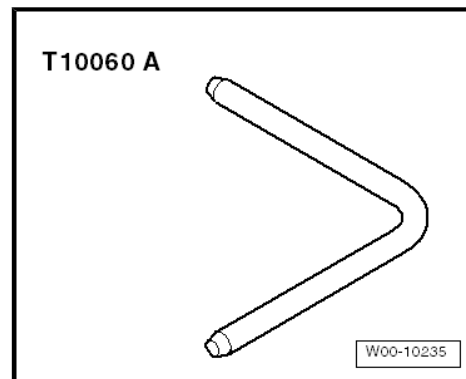


## 1.2 Removing and installing poly-V belt

Special tools and workshop equipment required



◆ Locking pin - T10060A-



**Removing poly V-belt:**

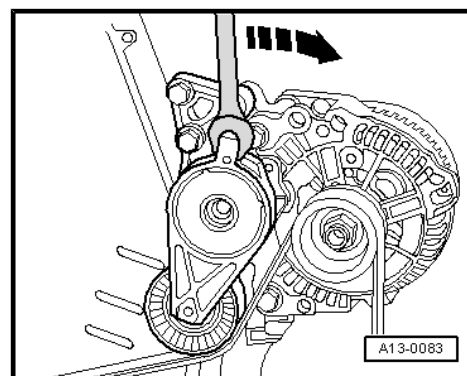
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .
- Mark poly V-belt direction of rotation.

**Vehicles with activated charcoal filter in engine compartment:**

- Unhook activated charcoal filter and swing to side.

**All vehicles:**

- Turn tensioning device in direction of arrow to relieve tension on poly V-belt.



- Lock tensioning element using locking pin - T10060A- .
- Remove poly V-belt.

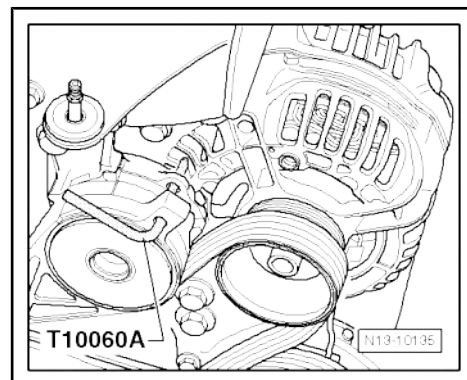
**Installing poly V-belt:**

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



**Note**

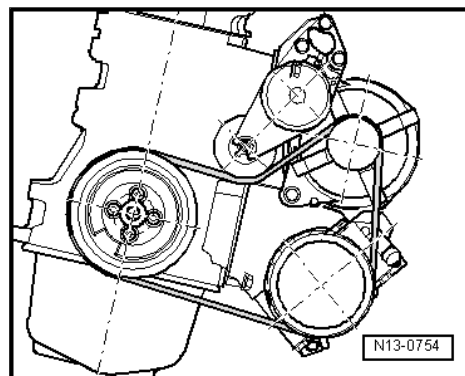
- ◆ *When fitting poly V-belt, check the direction of belt rotation and make sure the belt is seated properly in the belt pulleys.*
- ◆ *Fit poly V-belt for air conditioner compressor last*



After completing repairs always:



- Start engine and check belt running





## 2 Sealing flange and flywheel or drive plate



### Note

Repairing clutch ➔ Manual gearbox ; Rep. gr. 30 ; Repairing clutch .

➔ [“2.1 Assembly overview - sealing flange”, page 25](#)

➔ [“2.2 Renewing crankshaft oil seal \(belt pulley end\)”, page 26](#)

➔ [“2.3 Removing and installing sealing flange \(belt pulley end\)”, page 28](#)

➔ [“2.4 Removing and installing crankshaft sealing flange \(fly-wheel end\)”, page 31](#)

➔ [“2.5 Removing and installing flywheel”, page 32](#)

➔ [“2.6 Removing and installing drive plate”, page 33](#)

### 2.1 Assembly overview - sealing flange

1 - 90 Nm + 1/4 turn further (90°)

2 - Crankshaft pulley

3 - 15 Nm

4 - Sealing ring

- ☐ Do not additionally oil or grease the oil seal sealing lip.
- ☐ Replacing ➔ [page 26](#)

5 - Sealing flange (belt pulley end)

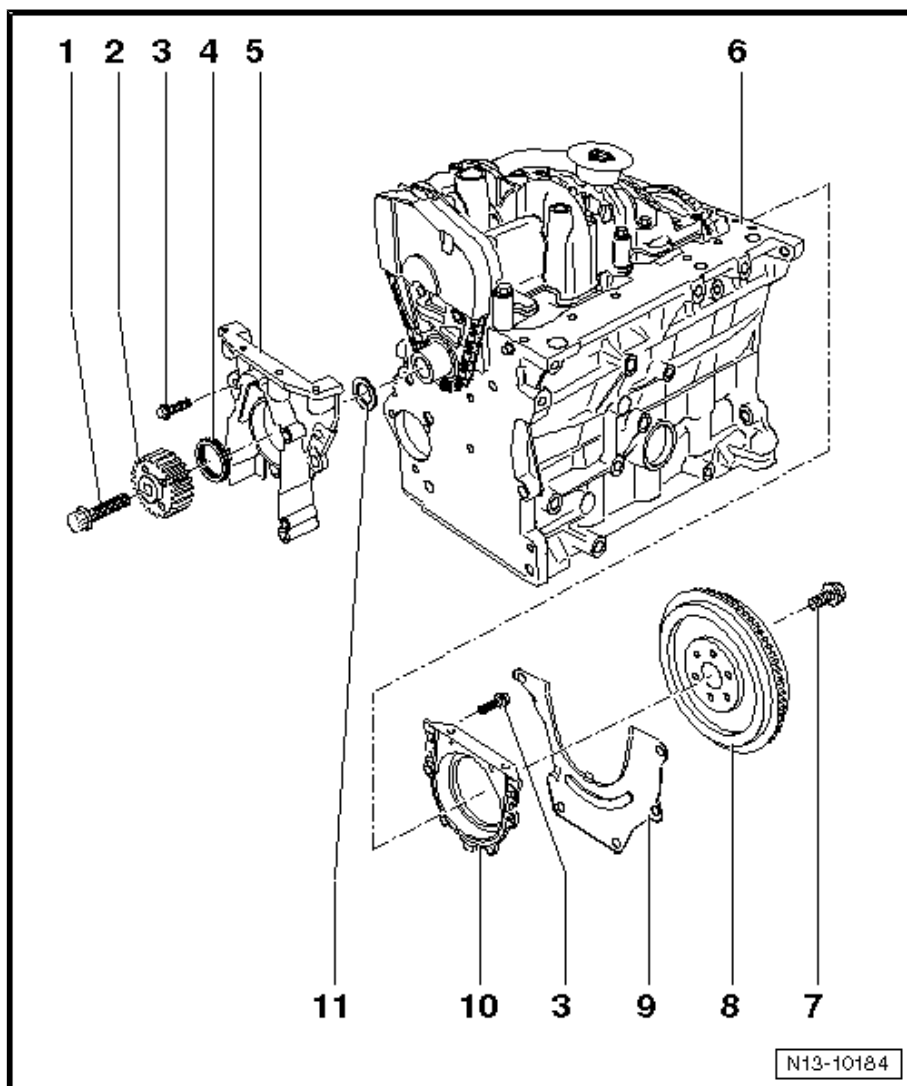
- ☐ Must seat on dowel pins.
- ☐ Removing and installing ➔ [page 28](#)
- ☐ Remove sump in order to remove and install.

6 - Cylinder block

- ☐ Removing and installing oil pump with balance shaft gear assembly ➔ [page 107](#) .
- ☐ Removing and installing crankshaft ➔ [page 35](#) .
- ☐ Dismantling and assembling pistons and con-rods ➔ [page 40](#)

7 - 60 Nm + 1/4 turn further (90°)

- ☐ Renew





## 8 - Flywheel/drive plate

- ☐ Removing and installing flywheel ➔ [page 32](#)
- ☐ Removing and installing drive plate ➔ [page 33](#)

## 9 - Adapter

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

## 10 - Sealing flange with oil seal

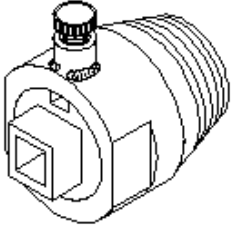
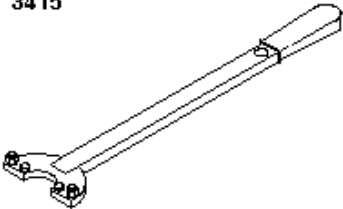

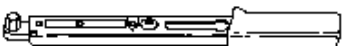

- ☐ Renew only as complete unit
- ☐ Removing and installing ➔ [page 31](#)

## 11 - Diamond-coated washer

- ☐ Renew

## 2.2 Renewing crankshaft oil seal (belt pulley end)

Special tools and workshop equipment required

<b>3203</b> 	<b>3415</b> 
<b>T10053</b> 	<b>V.A.G 1331</b> 
<b>V.A.G 1332</b> 	<div>W13-0104</div>

- ◆ Seal puller - 3203-
- ◆ Counterhold - 3415-
- ◆ Assembly tool - T10053-



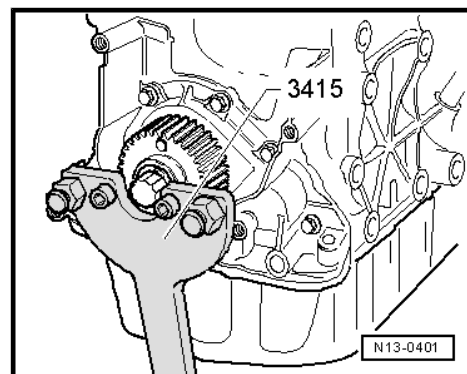


◆ Torque wrench - V.A.G 1331-

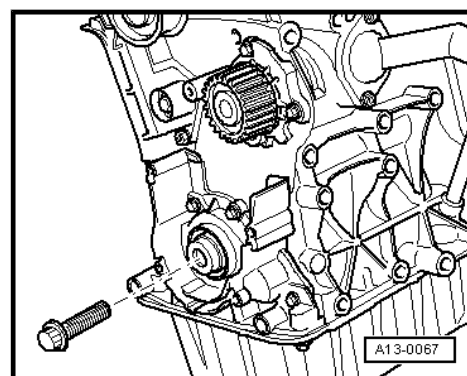
◆ Torque wrench - V.A.G 1332-

#### Remove seal:

- Remove poly V-belt ⇒ [page 22](#) .
- Remove toothed belt:  
Vehicles with split toothed belt guard ⇒ [page 66](#) .  
Vehicles without split toothed belt guard ⇒ [page 55](#) .
- Remove crankshaft pulley. by locking the toothed-belt pulley using counterhold - 3415- .



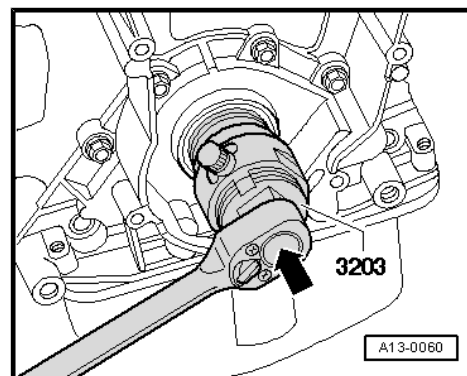
- To guide seal extractor, screw centre bolt into crankshaft up to the stop by hand.
- Unscrew inner part of oil seal extractor - 3203- nine turns (approx. 20 mm) out of outer part and lock with knurled screw.



- Lubricate threaded head of oil seal extractor - 3203- , place it in position and, exerting firm pressure, screw it into the oil seal as far as possible.
- Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.

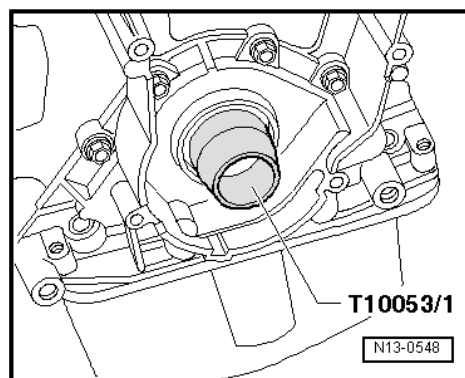
#### Install seal:

- Remove oil residue from crankshaft journal using clean cloth.





- Fit guide sleeve - T10053/1- onto crankshaft journal.
- Slide dry oil seal over guide sleeve onto crankshaft journal.

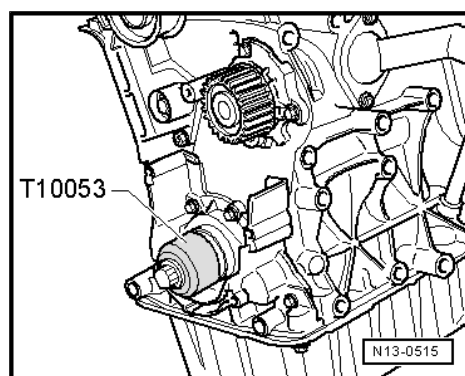


- Press in oil seal using assembly tool - T10053- and bolt - T10053/2- (M16 x 1.5 x 60) onto stop.

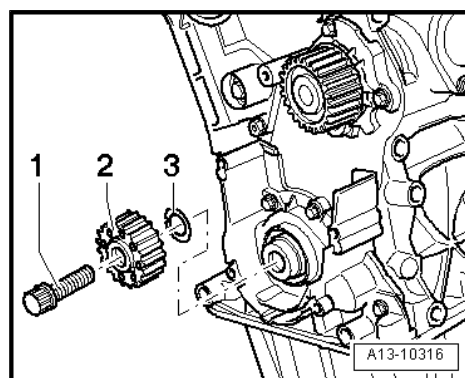


#### Note

- ◆ *Contact surface between pulley, diamond-coated washer and crankshaft must be free of oil.*
- ◆ *The centre bolt must be renewed.*
- ◆ *Thread and shoulder must be free of oil and grease.*



- Fit toothed belt pulley -2- with diamond-coated washer -3- and tighten bolt -1- hand-tight.



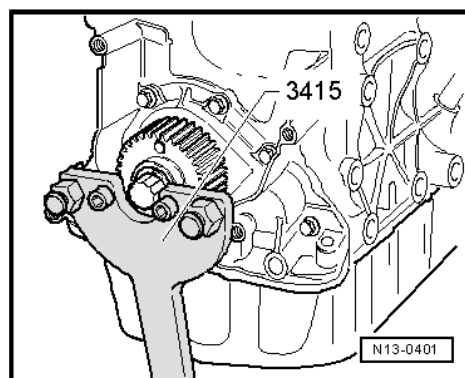
- Lock toothed belt pulley using counterhold - 3415- .
- Tighten new centre bolt to 90 Nm and turn 90° (1/4 turn) further (turning further can be done in several stages).

Further assembly is basically the reverse of the removal procedure.

Installing toothed belt and adjusting valve timing.

Vehicles with split toothed belt guard ➔ [page 66](#) .

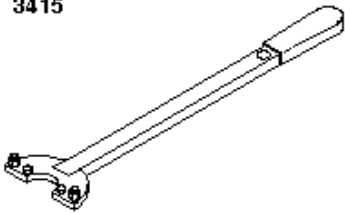
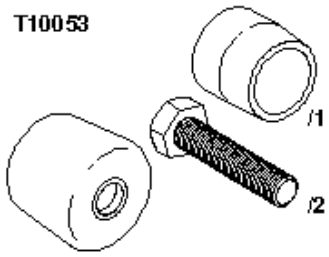
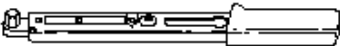

Vehicles without split toothed belt guard ➔ [page 55](#) .



## 2.3 Removing and installing sealing flange (belt pulley end)



# Special tools and workshop equipment required

<p><b>3415</b></p> 	<p><b>T10053</b></p> 
<p><b>V.A.G 1331</b></p> 	<p><b>V.A.G 1332</b></p> 
	<p>W13-0105</p>

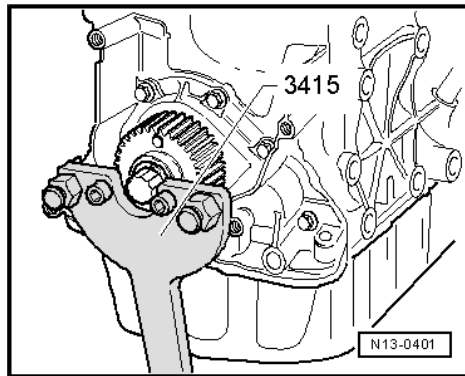
- ◆ Counterhold - 3415-
- ◆ Assembly tool - T10053-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Hand drill with plastic brush
- ◆ Silicone sealant - D 176 404 A2-
- ◆ Scraper

## Removing sealing flange:

- Remove poly V-belt ➔ [page 22](#) .
- Remove toothed belt:
  - Vehicles with split toothed belt guard ➔ [page 66](#) .
  - Vehicles without split toothed belt guard ➔ [page 55](#) .
- Turn crankshaft back slightly.



- Remove crankshaft pulley. by locking the toothed-belt pulley using counterhold - 3415- .
- Drain engine oil.
- Remove sump ➔ [page 104](#) .
- Unscrew sealing flange (belt pulley end).
- Remove sealing flange; if necessary, loosen using light blows with a rubber headed hammer.
- Remove sealant residue from cylinder block with a flat scraper.
- Cover seal with a clean cloth.

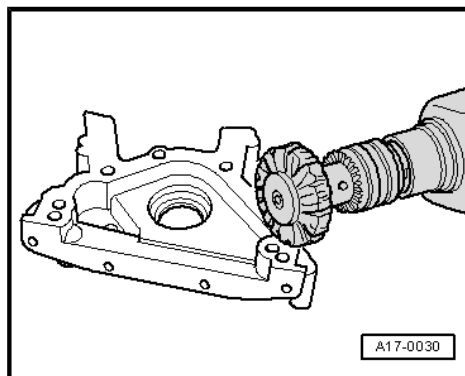


#### Note

*If seal is to be renewed, drive out seal.*

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

#### Installing sealing flange:

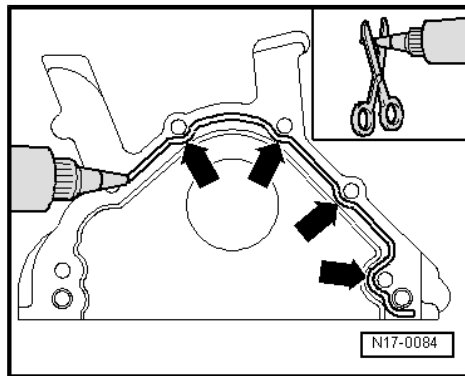


- Cut off tube nozzle at forward marking (approx. 3 mm Ø of nozzle).
- Apply sealant bead of about 2...3 mm as shown -arrows- to clean sealing surface of sealing flange.



#### Note

- ◆ *Before applying sealant bead, cover sealing ring with a clean cloth.*
- ◆ *The sealing compound bead must not be thicker than 2...3 mm. Otherwise excessive sealing compound will enter the sump and may block the oil suction pipe strainer.*
- ◆ *Check the expiry date of the sealant.*
- ◆ *The sealing flange must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *When fitting sealing flange with oil seal installed use guide sleeve - T10053/1- .*
- ◆ *Leave the sealant to dry for approx. 30 minutes after assembly. Only then fill with engine oil.*



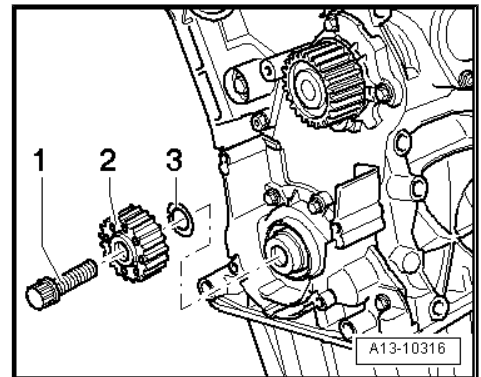
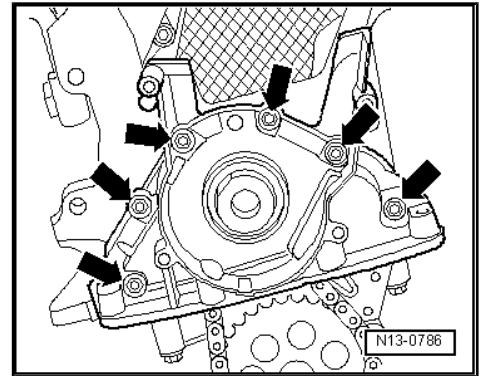


- Fit sealing flange immediately and lightly tighten all bolts -arrows-.
- Tighten sealing flange securing bolts diagonally and alternately. Specified torque: 15 Nm
- Remove excess sealant.
- Install sump ➔ [page 104](#) .
- If necessary, install seal ➔ [page 26](#) .



#### Note

- ◆ *Contact surface between pulley, diamond-coated washer and crankshaft must be free of oil.*
  - ◆ *The centre bolt must be renewed.*
  - ◆ *Thread and shoulder must be free of oil and grease.*
- Fit toothed belt pulley -2- with diamond-coated washer -3- and tighten bolt -1- hand-tight.



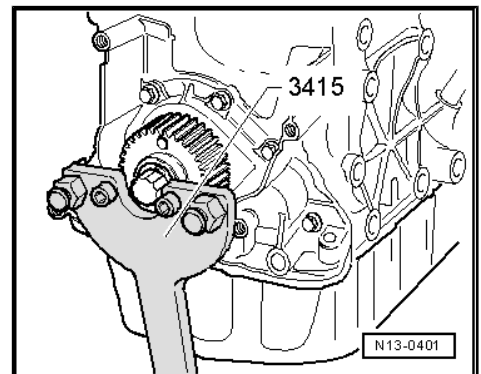
- Lock toothed belt pulley using counterhold - 3415- .
- Tighten new centre bolt to 90 Nm and turn 90° (1/4 turn) further (turning further can be done in several stages).

Further assembly is basically the reverse of the removal procedure.

Installing toothed belt and adjusting valve timing.

Vehicles with split toothed belt guard ➔ [page 66](#) .

Vehicles without split toothed belt guard ➔ [page 55](#) .



## 2.4 Removing and installing crankshaft sealing flange (flywheel end)

### Removing sealing flange:

- Remove gearbox.
- Remove flywheel.
- Remove sump ➔ [page 104](#) .



- Unbolt sealing flange -arrows-.

Installing sealing flange:

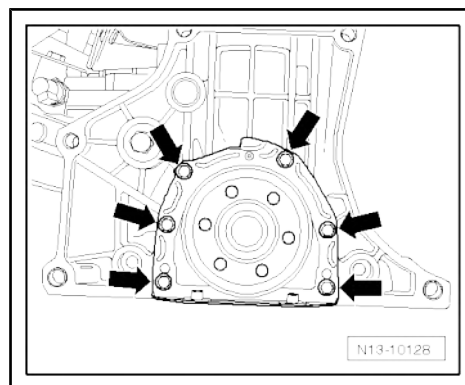
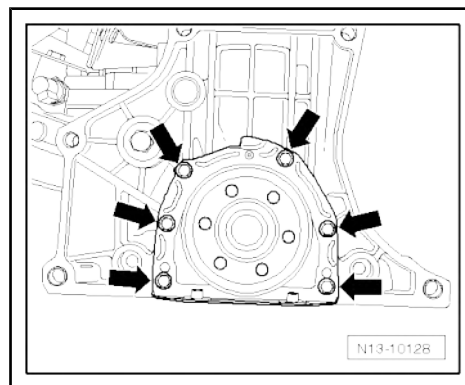


**Note**

*Do not additionally oil or grease the oil seal sealing lip.*

- Clean sealing surfaces. They must be free of oil and grease.
- Remove oil residue from crankshaft journal using clean cloth.
- Use protective sleeve supplied when installing. Remove protective sleeve first after sealing flange has been slid onto crankshaft journal. The sealing flange locates on dowel pins.
- Tighten securing bolts to 15 Nm -arrows-.
- Install sump ⇒ [page 104](#) .

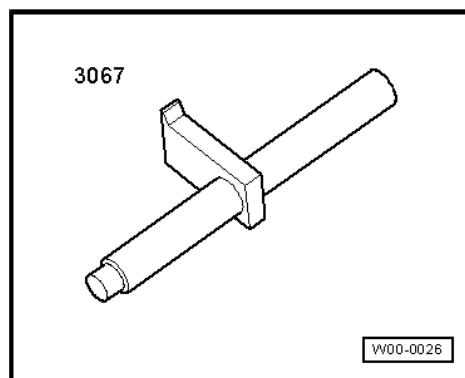
Further assembly is basically the reverse of the removal procedure.



## 2.5 Removing and installing flywheel

Special tools and workshop equipment required

- ◆ Counterhold 3067



Removing:

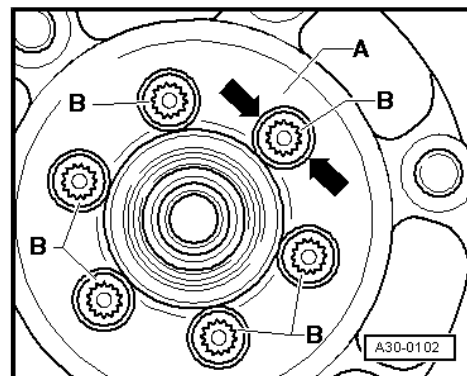


**Note**

*To avoid damaging the dual-mass flywheel during removal, the bolts -B- must not be removed using a pneumatic or impact driver. It is only permissible to remove the bolts -B- by hand.*



- Turn flywheel -A- so that bolts -B- are centred over holes -arrows-.
- When removing bolts -B-, make sure that screw heads do not jam on flywheel.



- Insert counterhold - 3067- in hole on cylinder block.
- Mark position of flywheel in relation to engine.
- Unbolt flywheel.

#### Installing:

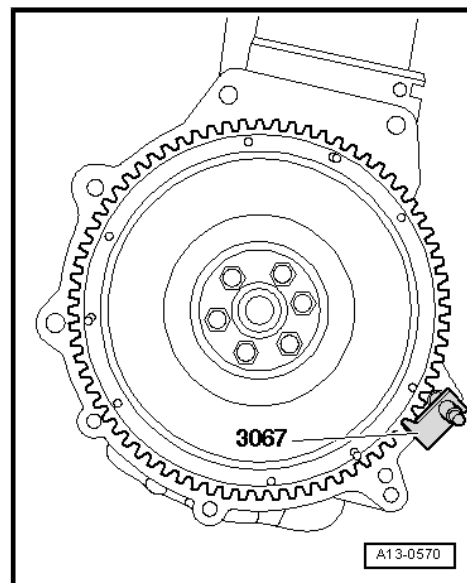
Installation is carried out in the reverse order. When installing, note the following:

- Renew bolts.

#### Specified torque

Component	Nm
Dual-mass flywheel to crankshaft	60 + 90° <sup>1)</sup>

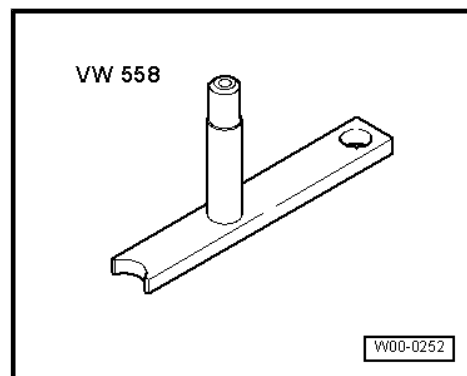
<sup>1)</sup> 90° equals a quarter of a turn



## 2.6 Removing and installing drive plate

#### Special tools and workshop equipment required

- ◆ Counterhold - VW 558-



- ◆ Depth gauge
- ◆ Hexagon bolt M8x45 and two M10 hexagon nuts

#### Loosening and tightening drive plate:

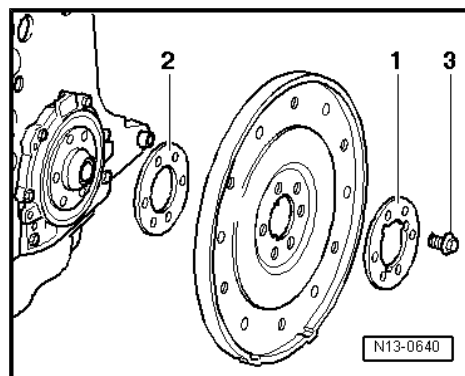
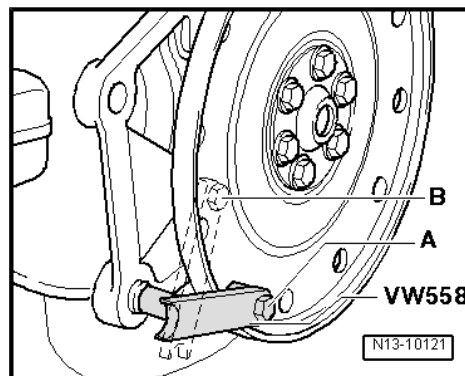
- Secure counterhold - VW 558- to drive plate with hexagon bolt M8x45. Insert two M10 hexagon nuts between counterhold and drive plate.



Installation position of counter hold: -A- to loosen, -B- to tighten.

**Installing drive plate:**

- Fit drive plate using ring with recesses -1-.
- Fit new bolts -3- and tighten to 30 Nm.
- Check dimension -a- at three points and calculate average.



Specification: 19.5...21.1 mm

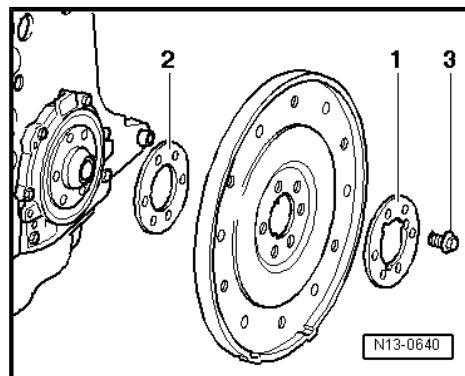
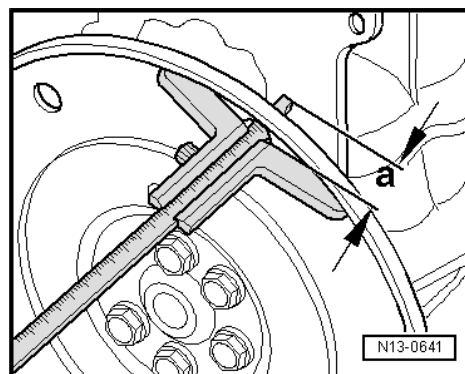


**Note**

*Measure through hole in drive plate to milled surface of cylinder block.*

If specification is not attained:

- Remove drive plate again and fit shim -2-. Tighten bolts -3- again to 30 Nm.
- Tighten bolts to 60 Nm and turn 90° (1/4 turn) further (turning further can be done in several stages).







## 3 Crankshaft



### Note

- ◆ *Before removing crankshaft, make provision for a suitable surface for storing crankshaft to ensure that sender wheel  
⇒ [Item 4 \(page 36\)](#) is not damaged or lies against any other item.*
- ◆ *Secure the engine to engine and gearbox support - VAS 6095- in order to carry out the repairs.*

⇒ [“3.1 Assembly overview - crankshaft”, page 35](#)

⇒ [“3.1.1 Removing and installing sender wheel”, page 37](#)

⇒ [“3.2 Pulling needle bearing out of and driving into crankshaft”, page 37](#)

⇒ [“3.3 Crankshaft dimensions”, page 39](#)

⇒ [“3.4 Identification of crankshaft upper bearing”, page 39](#)

### 3.1 Assembly overview - crankshaft



### Note

*For vehicles with DSG® a needle bearing must be installed in rear end of crankshaft.*



**1 - 65 Nm + 90° (1/4 turn) further**

- ☐ Renew
- ☐ Threaded along complete length.
- ☐ Only tighten to 65 Nm when measuring crankshaft radial clearance. Do not turn further.

**2 - Bearing cap**

- ☐ Bearing cap 1: belt pulley end.
- ☐ Bearing shell retaining lugs in cylinder block and bearing caps must align.

**3 - 10 Nm + 90° (1/4 turn) further**

- ☐ Renew

**4 - Sender wheel**

- ☐ For engine speed sender - G28-
- ☐ Always renew sender wheel if securing bolts have been unscrewed
- ☐ Can only be installed in one position (holes are offset).
- ☐ Removing and installing ⇒ [page 37](#)

**5 - Crankshaft**

- ☐ Axial clearance, new: 0.07...0.23 mm; wear limit: 0.30 mm
- ☐ Check radial clearance with Plastigage, new: 0.017...0.037 mm, wear limit: 0.07 mm
- ☐ Do not rotate crankshaft when checking radial clearance
- ☐ Crankshaft dimensions ⇒ [page 39](#) .
- ☐ Removing and installing needle bearing ⇒ [page 37](#)

**6 - Thrust washers**

- ☐ For bearing 3

**7 - Bearing shell for cylinder block**

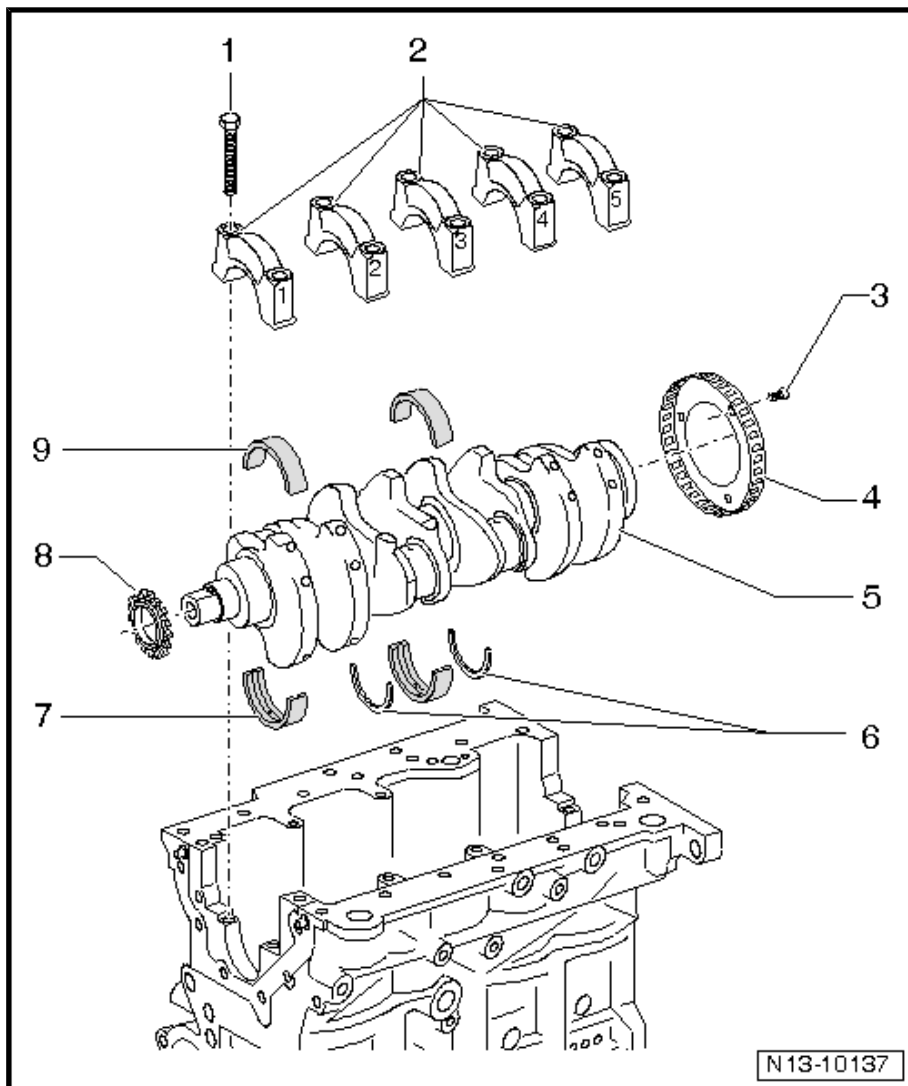
- ☐ With oil groove.
- ☐ Classification for ordering spare parts ⇒ [page 39](#) .
- ☐ Do not interchange used bearing shells (mark).

**8 - Sprocket**

- ☐ For oil pump drive.

**9 - Bearing shell for bearing cap**

- ☐ Without oil groove.
- ☐ Do not interchange used bearing shells (mark).





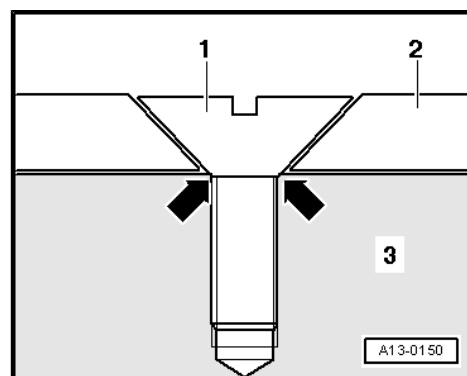
### 3.1.1 Removing and installing sender wheel

- Renew sender wheel -2- each time bolts -1- are loosened.



#### Note

- ◆ *The second time the countersunk head bolts are tightened, the contact points in the sender wheel for the countersunk heads are deformed so far that the bolt head -arrows- seats on the crankshaft -3-, and the sender wheel is loose under the bolt.*
- ◆ *The sender wheel can only be installed in one position, the holes are offset.*



### 3.2 Pulling needle bearing out of and driving into crankshaft

Only vehicles with a dual clutch gearbox

Special tools and workshop equipment required

- ◆ Counter support, e.g. KUKKO 22-1 - VAS 251 621-



- ◆ Internal puller - VAS 251 635-



- ◆ Drift - VW 207 C-



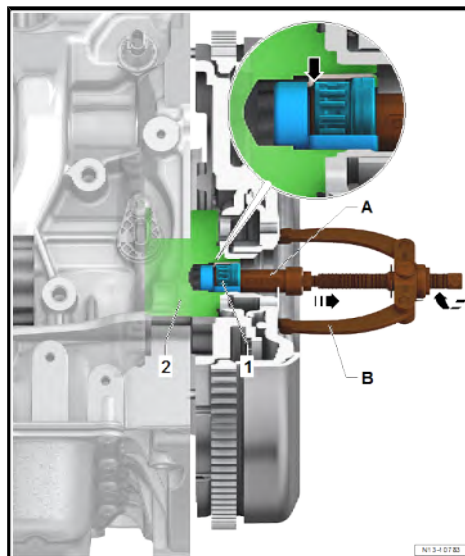


#### Condition:

- The front edges of the inner puller must not be chipped.
- Gearbox has been removed.

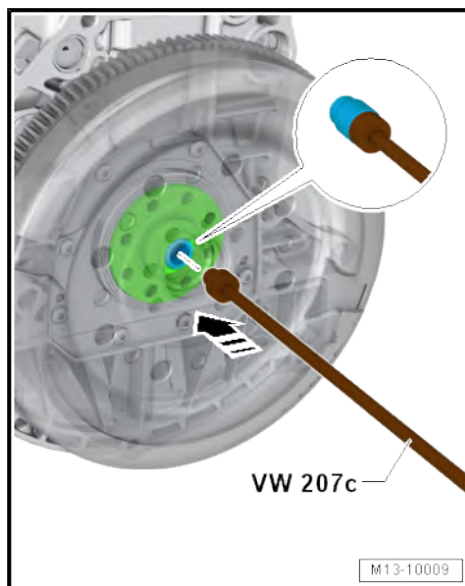
#### Pulling out needle roller bearing

- Pull out needle bearing -1- with internal puller - VAS 251 635-A- and counter support, e.g. KUKKO 22-1 - VAS 251 621-B- from crankshaft -2-.
- The internal puller must be positioned behind the needle-and-cage assembly -arrow-.



#### Installing

- Clean bearing seat in crankshaft and apply as thin coating of grease.
- Drive needle bearing into crankshaft to installation depth using drift - VW 207 C- .



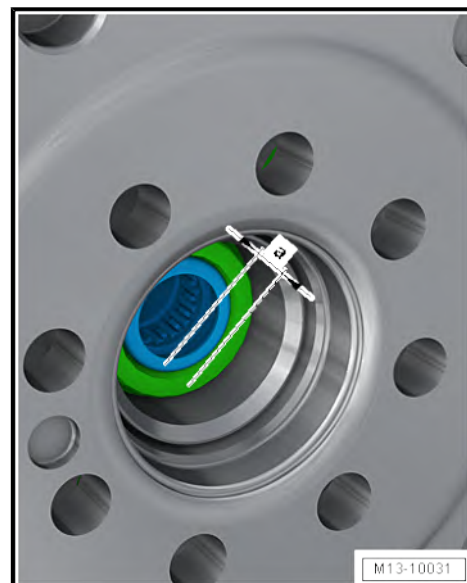


Installation depth: dimension -a- = 2.0 mm



#### Note

*If the needle bearing is inadvertently driven in too far, it must be renewed because it will be damaged when it is pulled out again.*



### 3.3 Crankshaft dimensions

(Dimensions in mm)

Honing dimension	Crankshaft main journal Ø		Conrod journal Ø	
Basic dimension	54.00	-0.017 -0.037	47.80	-0.022 -0.042
Stage I	53.75	-0.017 -0.037	47.55	-0.022 -0.042
Stage II	53.50	-0.017 -0.037	47.30	-0.022 -0.042
Stage III	53.25	-0.017 -0.037	47.05	-0.022 -0.042

### 3.4 Identification of crankshaft upper bearing

Upper bearing shells of the proper thickness are allocated to the cylinder block in the factory. Coloured dots are used to identify the thickness of the bearing shells.

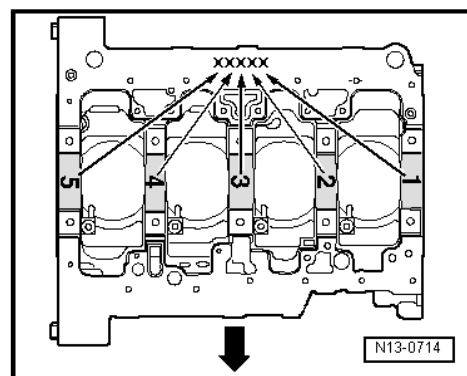
Letters on the lower sealing surface of the cylinder block indicate which bearing thickness is to be used at each position.

S	=	black
R	=	red
G	=	yellow
B	=	blue
W	=	white



#### Note

- ◆ Arrow points in direction of travel.
- ◆ If the coloured marks are no longer readable, use blue bearing shells.
- ◆ Lower bearing shells with colour mark "yellow" are always supplied as spare parts.





## 4 Pistons and conrods

⇒ "4.1 Assembly overview - pistons and conrods", page 40

⇒ "4.1.1 Bearing shells - installation position", page 41

⇒ "4.2 Separating new conrod", page 41

⇒ "4.3 Removing and installing pistons", page 42

⇒ "4.4 Checking pistons and cylinder bores", page 43

### 4.1 Assembly overview - pistons and conrods

#### 1 - Conrod bolt

- ☐ 45 Nm + 90° (1/4 turn) further
- ☐ Renew
- ☐ Oil threads and contact surface
- ☐ To measure radial clearance, tighten to 30 Nm but not further.

#### 2 - Securing bolt with pressure relief valve

- ☐ 27 Nm
- ☐ Opening pressure: 1.3 to 1.6 bar

#### 3 - Oil spray jet

- ☐ For piston cooling

#### 4 - Conrod bearing cap

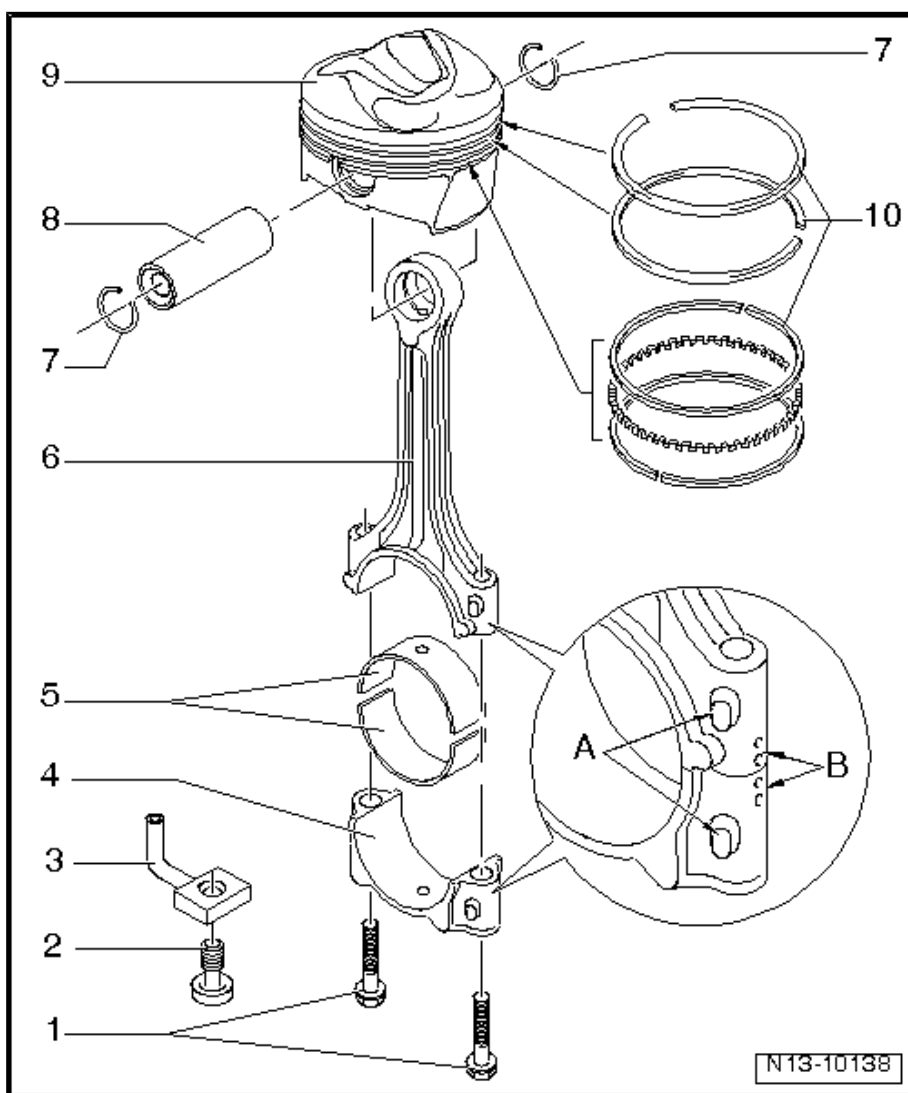
- ☐ Observe installation position
- ☐ Due to the cracking method used to separate the bearing cap from the conrod in manufacture, the caps only fit in one position and only on the appropriate conrod.
- ☐ Mark cylinder number -B-
- ☐ Installation position: markings -A- face towards belt pulley end.

#### 5 - Bearing shell

- ☐ Note installation position ⇒ [page 41](#)
- ☐ Do not interchange used bearing shells.
- ☐ Axial clearance, new: 0.10 to 0.35 mm, wear limit: 0.4 mm
- ☐ Check radial clearance with Plastigage: new: 0.02...0.06 mm, wear limit: 0.09 mm. Do not rotate crankshaft when checking radial clearance.

#### 6 - Connecting rod

- ☐ With industrially cracked conrod cap.
- ☐ Renew as set only.
- ☐ Mark cylinder number -B-
- ☐ Installation position: markings -A- face towards belt pulley end.





- ☐ Separating new conrod ➤ [page 41](#) .

## 7 - Locking ring

## 8 - Piston pin

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

## 9 - Piston

- ☐ Checking ➤ [page 44](#)
- ☐ Mark installation position and cylinder number.
- ☐ Arrow on piston crown points to belt pulley end.
- ☐ Install using piston ring clamp.
- ☐ Checking cylinder bores ➤ [page 44](#) .
- ☐ Piston and cylinder dimensions ➤ [page 43](#) .
- ☐ Removing and installing ➤ [page 42](#)

## 10 - Piston rings

- ☐ Offset gaps by 120°
- ☐ Use piston ring pliers to remove and install.
- ☐ Marking faces to piston crown
- ☐ Checking ring gap ➤ [page 43](#) .
- ☐ Checking ring-to-groove clearance ➤ [page 43](#) .

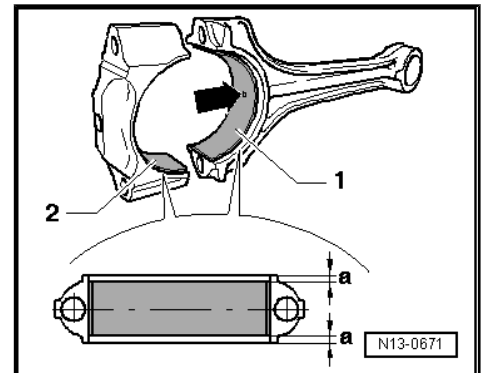
### 4.1.1 Bearing shells - installation position

Bearing shell -1- with oil hole -arrow- for conrod.

Bearing shell -2- without oil hole for conrod bearing cap.

- Position bearing shells in centre of conrod and conrod bearing cap when fitting.

Distance -a- must be identical on both sides.



### 4.2 Separating new conrod

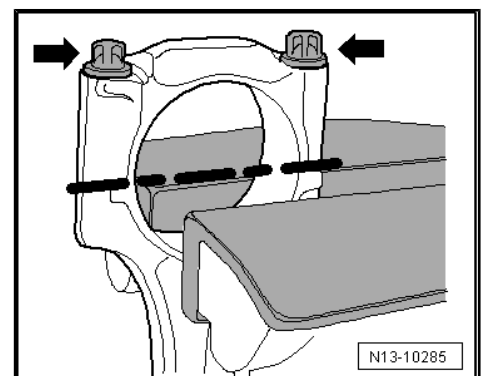
On a new conrod, it is possible that the breaking point has not fully separated. Proceed as follows if the conrod bearing cap cannot be removed by hand:

- Mark which cylinder the conrod belongs to ➤ [page 40](#) .
- Lightly clamp the conrod in a vice using aluminium vice clamps, as shown in the illustration.



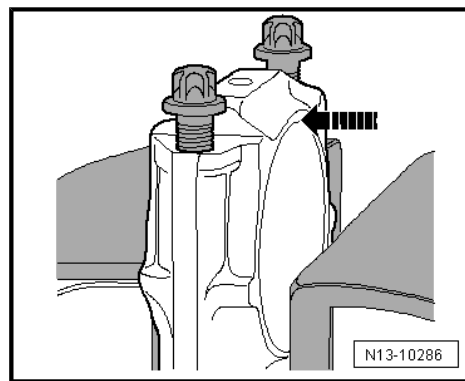
#### Note

- ◆ Only clamp conrod lightly so as not to damage it.
- ◆ Conrod is clamped below the dashed line.
- Unscrew both bolts -arrows- about 5 turns.





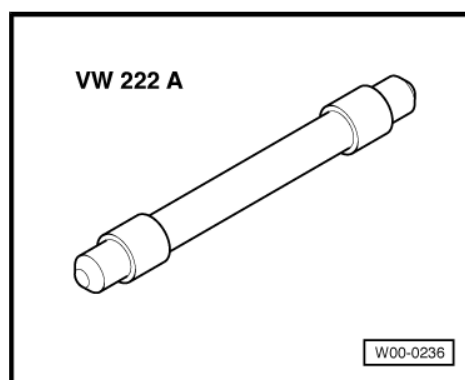
- Using a plastic hammer, carefully knock against conrod bearing cap in -direction of arrow- until it is loose.



## 4.3 Removing and installing pistons

### Special tools and workshop equipment required

- ◆ Drift - VW 222 A-



- ◆ Piston ring clamp, commercially available

### Removing

- Remove cylinder head ⇒ [page 50](#) .
- Remove sump ⇒ [page 104](#) .
- Remove oil pump with balance shaft gear assembly ⇒ [page 107](#) .
- Mark piston installation position and corresponding cylinder number.
- Mark conrod installation position and corresponding cylinder number ⇒ [Item 6 \(page 40\)](#) .
- 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 retaining ring from piston pin eye.
- Drive out piston pin using drift - VW 222 A- .

### Installing

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

- Specified torque ⇒ [page 40](#) .



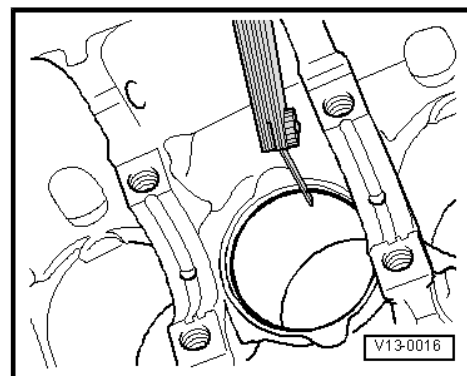


#### Note

- ◆ *If a further tightening angle is specified for certain bolts, these must be renewed.*
- ◆ *Arrow on piston crown points to belt pulley end.*
- ◆ *Offset piston ring gaps by 120°.*
- Oil running surfaces of bearing shells.
- Install piston with commercially available piston ring clamp, noting installation position ⇒ [Item 9 \(page 41\)](#) .
- Install conrod bearing cap, noting installation position ⇒ [Item 6 \(page 40\)](#) .
- Install cylinder head ⇒ [page 50](#) .
- Install oil pump with balance shaft gear assembly ⇒ [page 109](#) .

## 4.4 Checking pistons and cylinder bores

### Checking piston ring gap

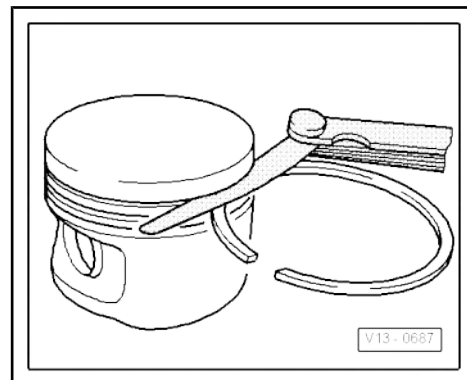


#### Special tools and workshop equipment required

- ◆ Feeler gauge
- Push ring squarely from above down into cylinder bore to approx. 15 mm from bottom end of cylinder.

Piston ring		Ring gap	
		New	Wear limit
Compression rings	mm	0.20 to 0.40	0.8
Oil scraper ring	mm	0.25 to 0.50	0.8

### Checking ring-to-groove clearance



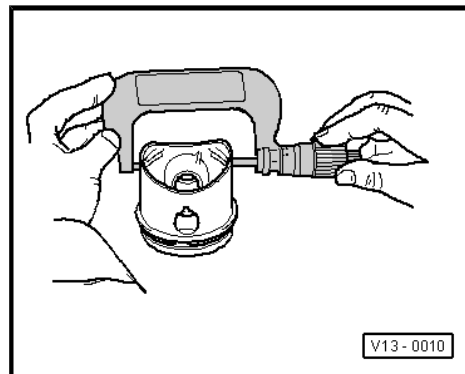
#### Special tools and workshop equipment required

- ◆ Feeler gauge
- Clean annular groove before check.



Piston ring		Clearance	
		New	Wear limit
Compression rings	mm	0.06 to 0.09	0.20
Oil scraper ring	mm	0.03 to 0.06	0.15

#### Checking piston

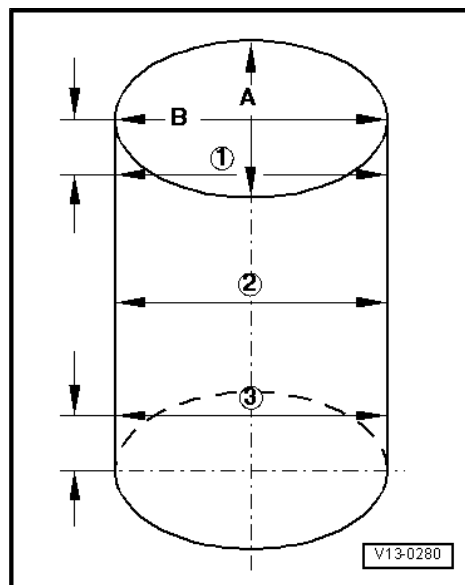


#### Special tools and workshop equipment required

- ♦ Micrometre 75 - 100 mm - VAS 6071-
- Measure pistons approx 10 mm from the lower edge of skirt, at 90° to the piston pin axis.

Deviation from nominal dimension: max. 0.04 mm

#### Checking cylinder bores



#### Special tools and workshop equipment required

- ♦ Cylinder gauge - VAS 6078-
- Take measurements at 3 positions in both lateral direction -A- and longitudinal direction -B-.
- Deviation from nominal dimension: max. 0.08 mm



#### Note

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



## Piston and cylinder dimensions



### Caution

*The cylinder bore may not be worked on (reboring, honing, grinding) may not be carried out using workshop tools! This will damage the surface of the cylinder bore.*

		Piston Ø	Cylinder bore Ø
Basic dimension	mm	82.465 <sup>1)</sup>	82.51

<sup>1)</sup> Dimensions without graphite coating (thickness 0.02 mm). The graphite coating wears away.



## 15 – Cylinder head, valve gear

### 1 Cylinder head



#### Note

- ◆ *If an exchange cylinder head is installed, all the contact surfaces between the supporting elements, roller rocker fingers and the running surfaces of the camshaft must be oiled before the cylinder head cover is fitted.*
- ◆ *The plastic protectors fitted to protect the open valves must be removed only immediately before the cylinder head is fitted.*
- ◆ *Renew cylinder head bolts.*
- ◆ *If the cylinder head is renewed, all the coolant in the system must also be renewed.*

Assembly overview - cylinder head ⇒ [page 46](#) .

Removing and installing cylinder head ⇒ [page 50](#) .

Removing and installing toothed belt ⇒ [page 55](#)

Checking compression ⇒ [page 76](#) .

#### 1.1 Assembly overview - cylinder head



1 - 10 Nm

2 - Cylinder head cover

- ☐ Removing and installing  
⇒ [page 48](#)

3 - Seal

- ☐ Renew if damaged or leaking

4 - Crankcase breather valve

5 - Sealing cover

6 - Seal

- ☐ Renew if damaged or leaking

7 - 4 Nm

8 - Gasket for cylinder head cover

- ☐ Renew if damaged or leaking

9 - Vacuum pump

10 - 4 Nm

11 - Inlet camshaft control valve 1 - N205-

- ☐ Removing and installing  
⇒ [page 92](#)

12 - Sealing ring

- ☐ Renew

13 - 10 Nm

14 - Cable bracket

15 - Sealing ring

- ☐ Renew if damaged or leaking

16 - 10 Nm

17 - Housing

18 - Seal

- ☐ Renew

19 - Transportation shackle

20 - 25 Nm

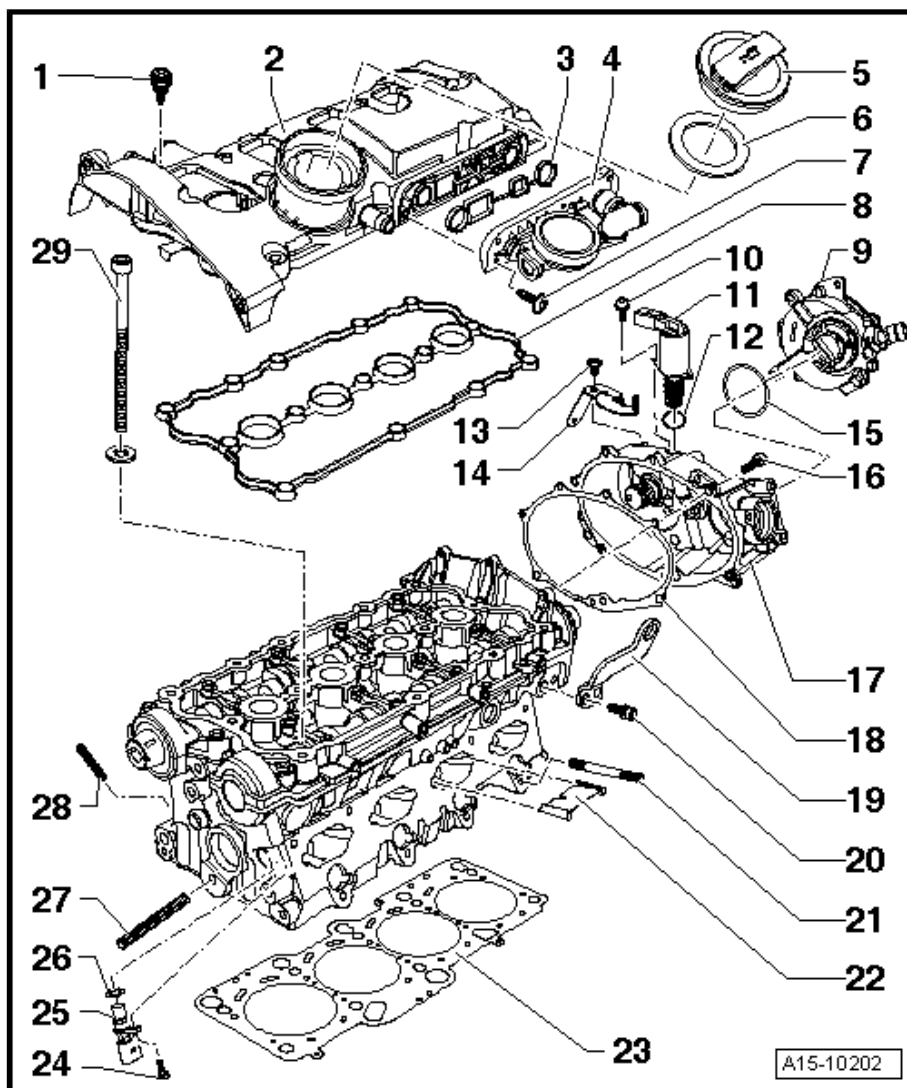
21 - 10 Nm

- ☐ Threaded stud for intake manifold

22 - Partition

23 - Cylinder head gasket

- ☐ Renew
- ☐ Observe installation position: Part number to cylinder head





24 - 10 Nm

25 - Hall sender - G40-

26 - Sealing ring

27 - 10 Nm

- ☐ Stud for tensioning roller.

28 - 20 Nm

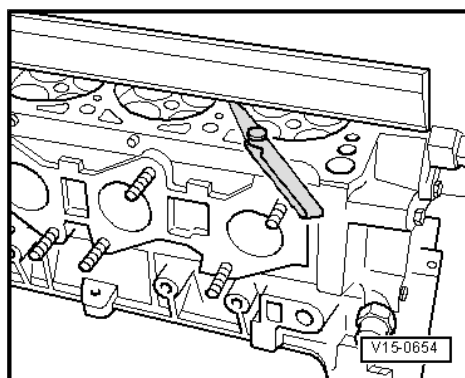
- ☐ Stud for exhaust manifold.

29 - Cylinder head bolt

- ☐ Renew
- ☐ Observe sequence for loosening and tightening ➔ [page 50](#)
- ☐ Specified torque: 40 Nm + 1/2 turn (180°) further.

#### Checking cylinder head for distortion:

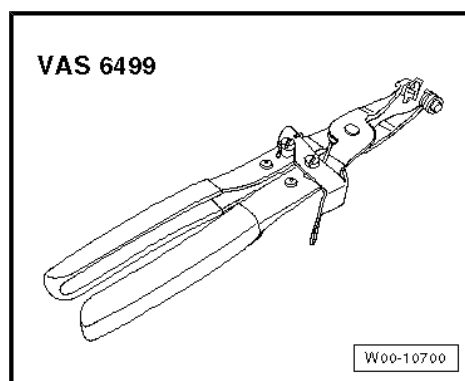
- Use straightedge 500 mm - VAS 6075- and feeler gauge to check for distortion at several points.
- ◆ Max. permissible distortion: 0.1 mm.
- Renew cylinder head if max. distortion is exceeded.



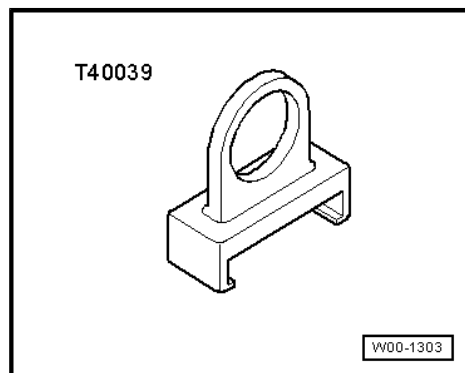
## 1.2 Removing and installing cylinder head cover

#### Special tools and workshop equipment required

- ◆ Spring-type clip pliers - VAS 6499-



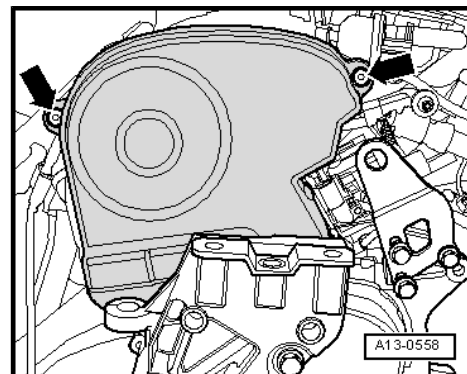
- ◆ Puller - T40039-





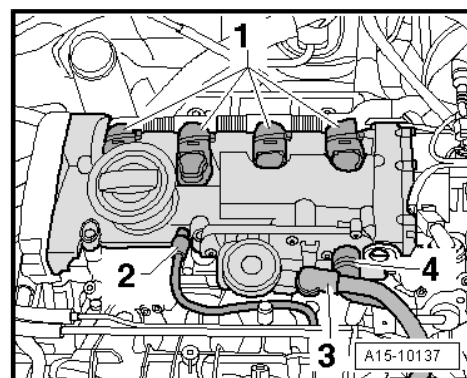
### Removing:

- Remove engine cover panel/air filter ➔ [page 273](#) .
- Unscrew bolts -arrows-.
- Remove ignition coils with output stages ➔ [page 323](#) .



### Engine codes AXX, BWA:

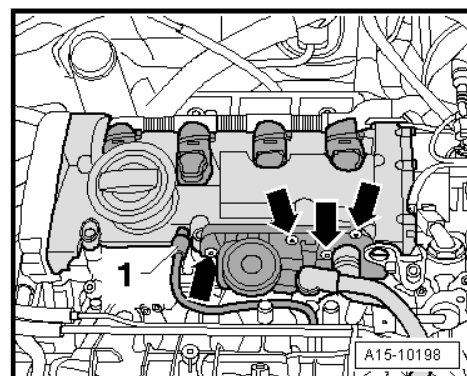
- Separate wires -2, 3 and 4- from cylinder head cover.



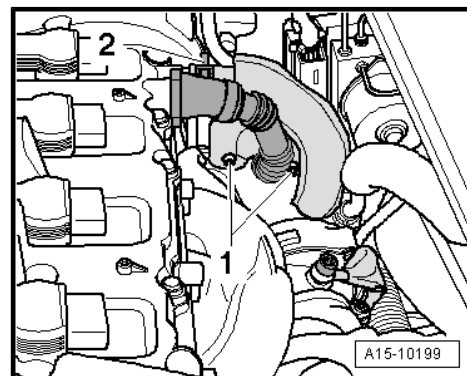
### Engine code BPY:

- Remove activated charcoal filter line from cylinder head cover -1-.
- Remove crankcase breather valve from cylinder head cover -arrows-.

### Continued for all vehicles:



- Unbolt crankcase breather line with heat shield from turbocharger -1-.
- Remove activated charcoal filter line to turbocharger from cylinder head cover -2-.
- Loosen cylinder head cover working from outside inwards.
- Remove cylinder head cover.



### Installing:

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



#### Note

*Renew cylinder head cover gaskets if damaged.*

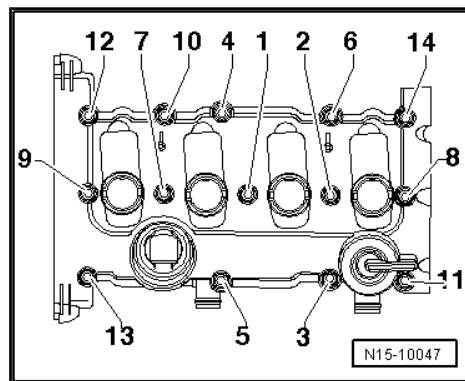


- Tighten cylinder head cover in several stages in tightening sequence as shown.
- Ensure the upper toothed belt guard is correctly fitted.

**Specified torques ➔ page 46**

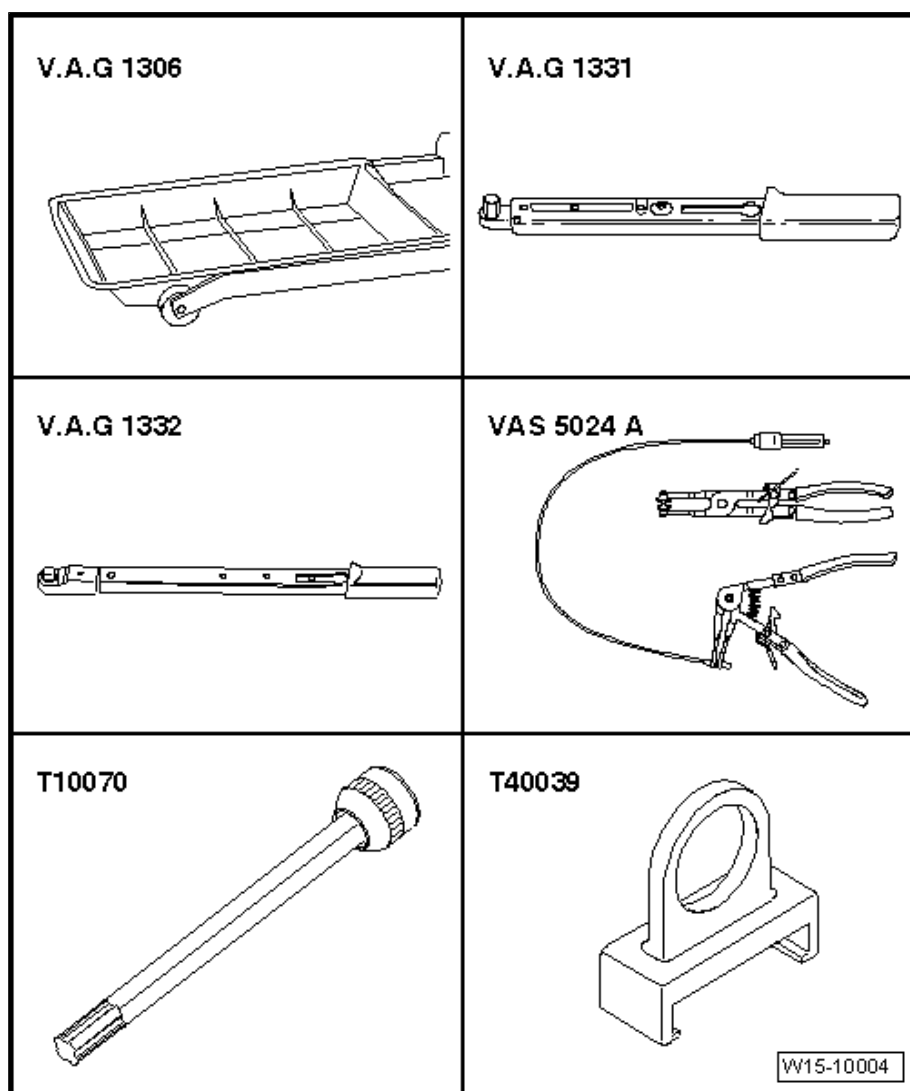
Component	Nm
Cylinder head cover to cylinder head	10
Toothed belt guard to cylinder block	10 <sup>1)</sup>

<sup>1)</sup> Install with locking fluid



## 1.3 Removing and installing cylinder head

**Special tools and workshop equipment required**



- ◆ Drip tray - V.A.G 1306-
- ◆ Puller - T40039-
- ◆ Pliers for spring-type clips - VAS 5024A-
- ◆ Bit - T10070-
- ◆ Torque wrench - V.A.G 1332-





- ◆ Torque wrench - V.A.G 1331-



#### Caution

*Observe the following points during all installation work, in particular in the engine compartment, due to the space limitations:*

- ◆ *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 to all moving or hot components.*

Removing cylinder head ➔ [page 51](#)

Installing cylinder head ➔ [page 54](#)

### 1.3.1 Removing cylinder head

- The engine must be no more than warm to touch.



#### Note

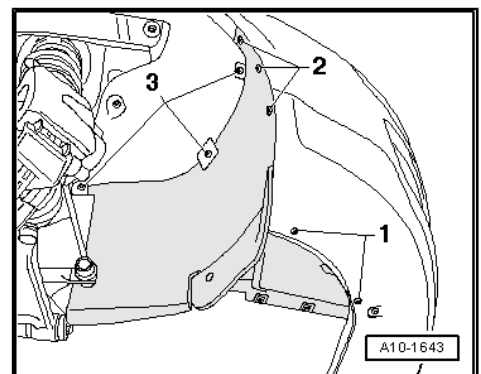
- ◆ *All cable ties which were opened or cut during removal must be renewed at the same points.*
- ◆ *If engine oil is dirty, change oil ➔ Maintenance ; Booklet 18.1 .*
- First check whether a coded radio is fitted. If so, obtain anti-theft code.
- Disconnect earth strap at battery with ignition switched off ➔ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery .

#### Golf, Eos:

- Remove plenum chamber bulkhead ➔ Rep. gr. 50 .

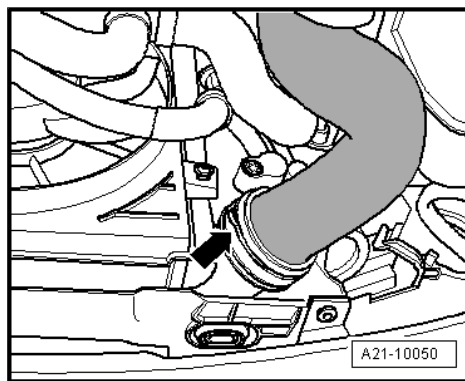
#### All:

- Remove intake manifold ➔ [page 277](#) .
- Drain coolant ➔ [page 126](#) .
- Remove right wheel housing liner front part.
- Remove catalytic converter together with front exhaust pipe ➔ [page 318](#) .

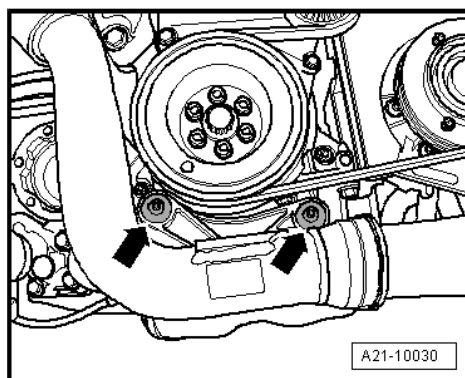




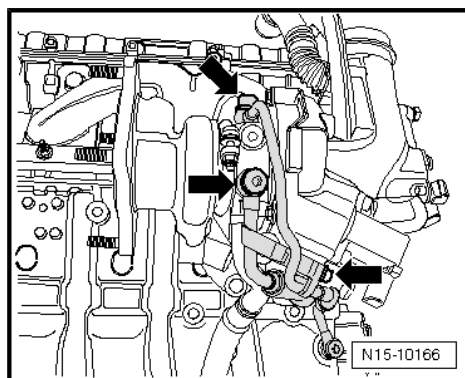
- Pull charge air hose -arrow- off charge air cooler.



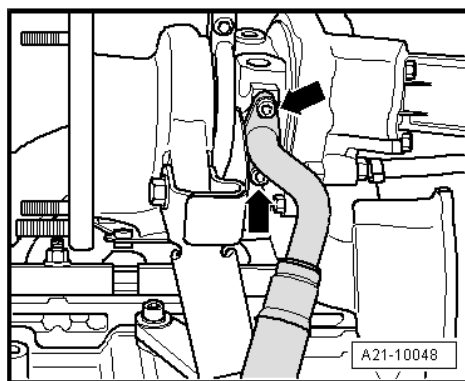
- Unscrew bolts -arrows- and remove charge air pipe.
- Pull off or disconnect all other electrical connections from turbocharger and lay to side.



- Unbolt oil supply line and coolant supply line from turbocharger -arrows-.

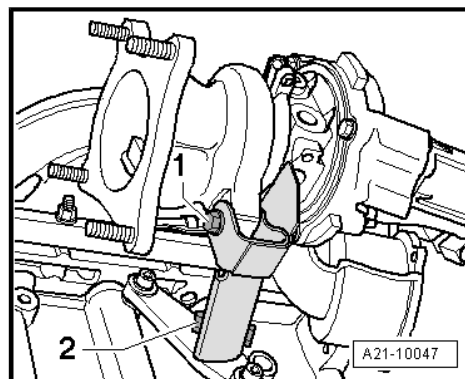


- Remove oil return line -arrows- at turbocharger.

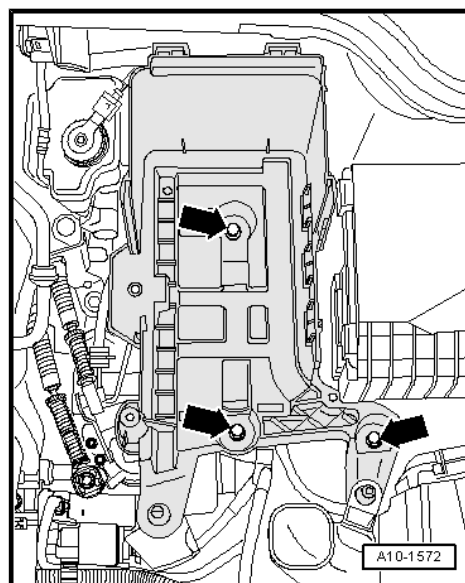




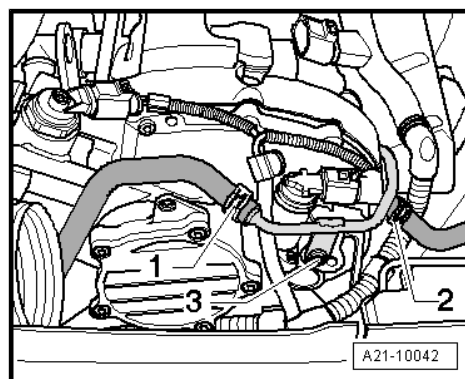
- Remove bolts -1- and -2- and remove support for turbocharger.



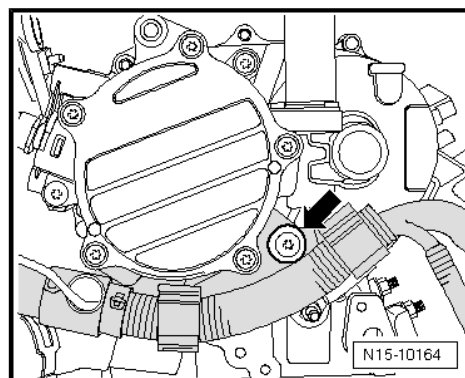
- Remove battery and battery tray.



- Pull off coolant hoses -1- and -2-.
- Pull off or disconnect all the other electrical connections as necessary from the cylinder head and lay open.

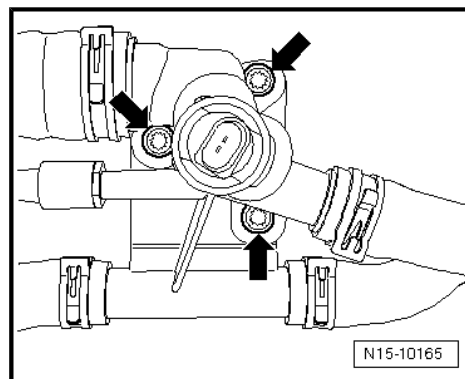


- Unscrew cable retainer and place wiring harness to side.





- Unscrew coolant flange -arrows-.
- Remove poly V-belt ➔ [page 22](#) .
- Remove locking pin - T10060A- from tensioner for poly V-belt.
- Remove toothed belt.
- Vehicles with split toothed belt guard ➔ [page 66](#) .
- Vehicles without split toothed belt guard ➔ [page 55](#) .
- Remove cylinder head cover ➔ [page 48](#) .



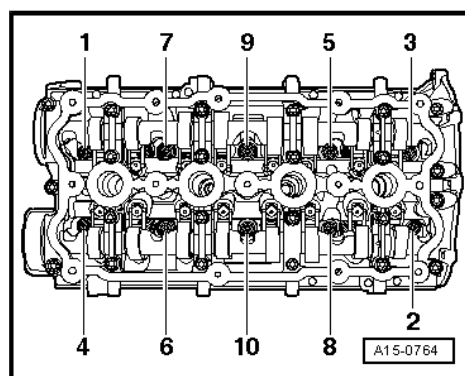
- Observe correct sequence when loosening cylinder head bolts.



#### Note

*Check that all hoses and other connections to engine, gearbox and body have been detached.*

- Remove cylinder head.



### 1.3.2 Installing cylinder head

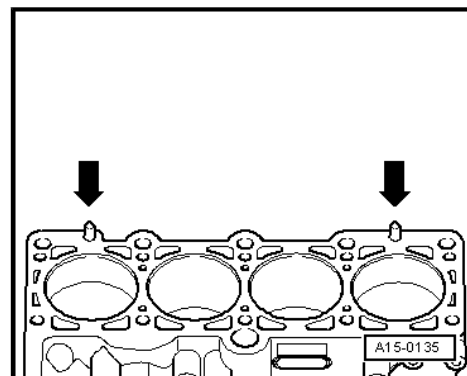


#### Note

- ◆ *There must be no oil or coolant in the cylinder head bolt pockets in the cylinder head.*
- ◆ *Do not remove new cylinder head gasket from its packing until immediately before installing.*
- ◆ *Handle new gasket with extreme care. Damage will cause leakage.*
- ◆ *Renew cylinder head bolts.*
- Place clean cloths in cylinders so that no dirt or emery cloth particles can get in between cylinder wall and piston.
- Also prevent dirt and emery cloth particles from getting into coolant.
- Now carefully clean sealing surfaces of cylinder head and cylinder block. When doing this, ensure that surfaces are not scored or scratched (if sand paper is used, grade must not be less than 100).
- Carefully remove metal particles, emery residue and cloths.
- If crankshaft has since been turned, position cylinder number 1 piston to TDC and then turn crankshaft back slightly.
- Fit new cylinder head gasket. Inscription (Part No.) must be readable.

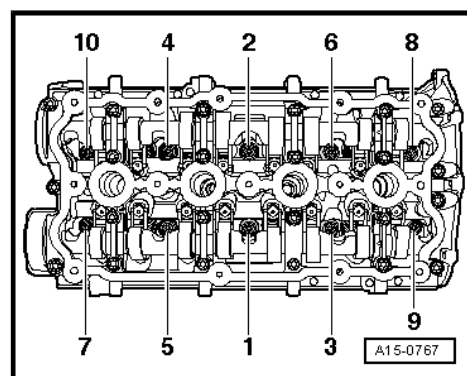


- Observe centring pins in cylinder block -arrows-.
- Fit cylinder head.
- Insert cylinder head bolts and tighten hand-tight.



- Then tighten cylinder head bolts in indicated sequence as follows:

Stage	Tighten
1	– Tighten to 40 Nm using torque wrench.
2	– Turn 90° further (1/4 turn) using a rigid wrench.
3	– Turn 90° further (1/4 turn) using a rigid wrench.



- Install cylinder head cover ➔ [page 48](#) .

- Install toothed belt.

Vehicles with split toothed belt guard ➔ [page 66](#) .

Vehicles without split toothed belt guard ➔ [page 55](#) .

Further assembly is basically the reverse of the removal procedure.

Filling with new coolant ➔ [page 126](#) .

## 1.4 Removing and installing toothed belt, vehicles without split toothed belt guard

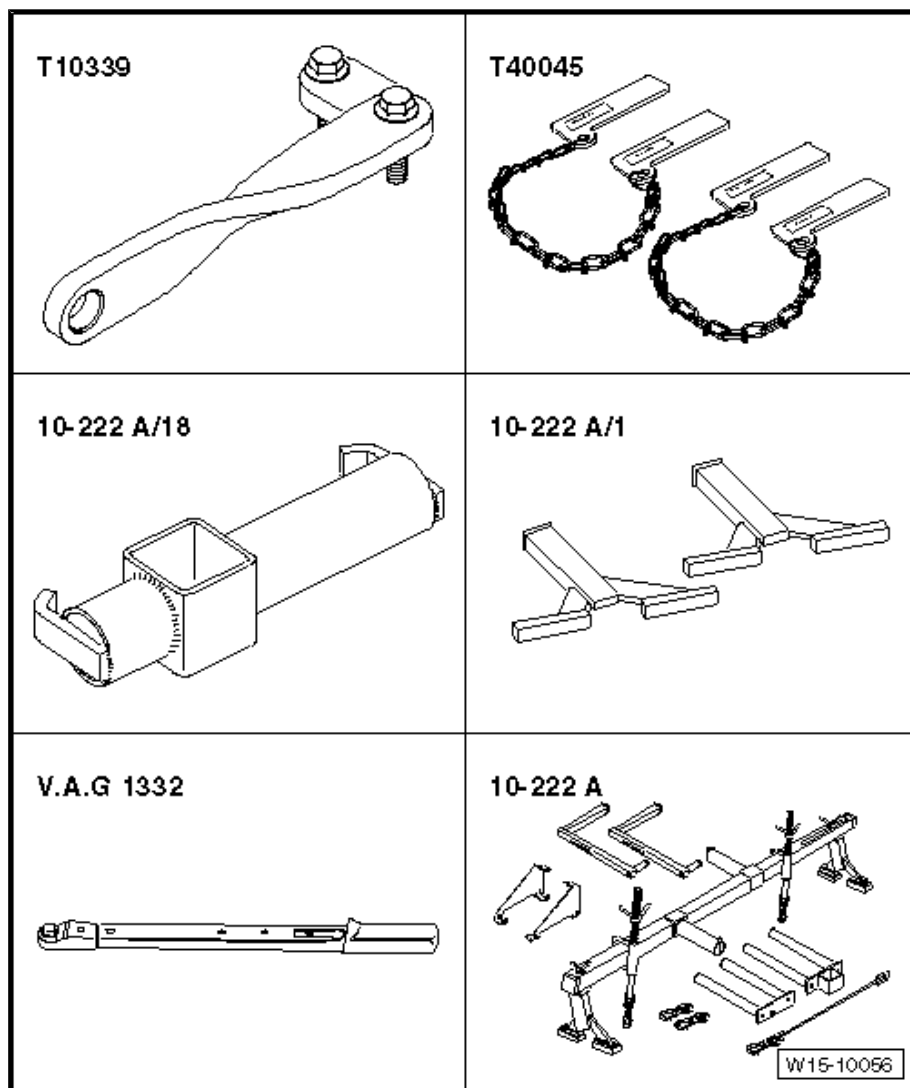


### Note

*Vehicles as of 01/2006 have a new toothed belt guard. Identification: the upper part of the toothed belt guard has no cover ➔ [Item 25 \(page 20\)](#) and the toothed belt guard is split in the area of the engine bracket. Removing and installing toothed belt, vehicles with split toothed belt guard ➔ [page 66](#) .*



**Special tools and workshop equipment required**



- ◆ Bracket - T10339-
- ◆ Wing compensation plate - T40045- only Golf
- ◆ Adapter - 10 - 222 A /18- only Golf and Eos
- ◆ Rack - 10 - 222 A /1-
- ◆ Support - 10 - 222 A-
- ◆ Torque wrench - V.A.G 1332-



**Note**

*To remove engine bracket, lift engine a considerable amount with support bracket - 10-222A-. Disconnect drive shafts from gearbox to prevent damage through extreme bending angles.*

Removing toothed belt ➔ [page 67](#)

Installing toothed belt ➔ [page 63](#)

### 1.4.1 Removing toothed belt

- Remove engine cover panel/air filter ➔ [page 273](#) .



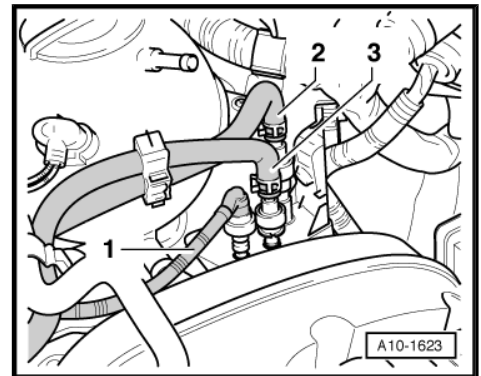
## WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*
- ◆ *For safety reasons, the fuse for the fuel pump must be removed before opening the fuel system ➔ **page 140**. Otherwise, the fuel pump could be activated by the driver door contact switch.*

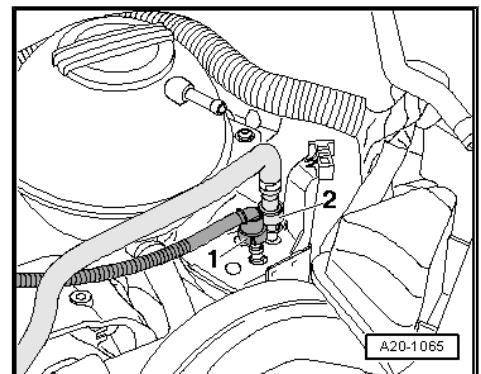
### Engine code BPY:

- Disconnect lines -1, 2 and 3-. Do this by operating release buttons.



### Engine codes AXX, BWA:

- Disconnect breather line -1- and fuel supply line -2-.



### Golf, Eos:

- Disconnect breather line -2-. Pull activated charcoal filter -A- with hoses upwards out of bracket.

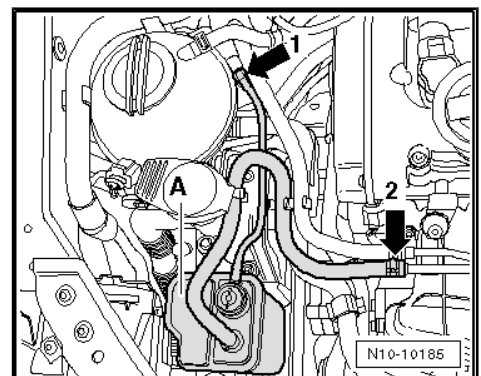
### Continued for all vehicles:



## WARNING

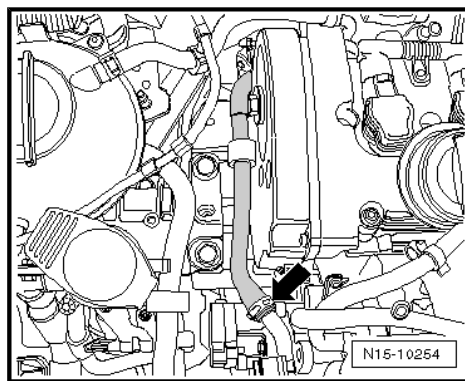
*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*

- Open coolant expansion tank to release pressure and close again.

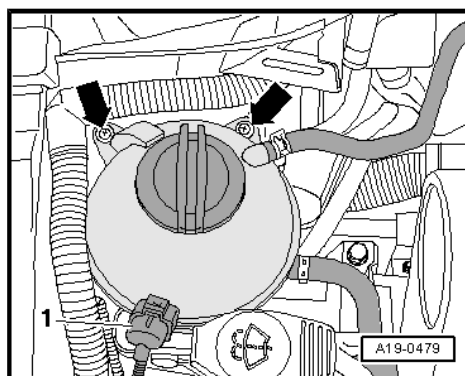




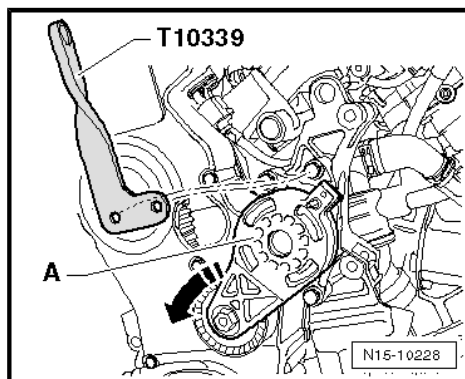
- Release clamp -arrow- and detach coolant hose. Collect escaping coolant with a cloth.



- Pull off connector -1-. Loosen expansion tank and lay it to side.
- Remove poly V-belt ➔ [page 22](#) .

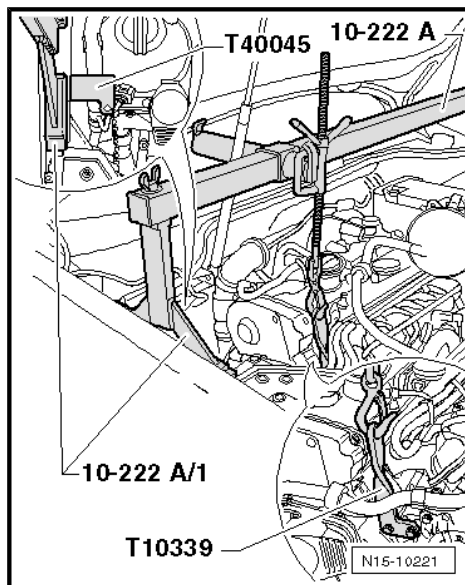


- Remove poly V-belt tensioner -A- and secure bracket - T10339- to both upper threaded holes.



#### Golf:

- Fit support bracket - 10-222A- with rack - 10-222A/1- and adapter - 10 - 222 A /18- on wing edges.
- Place the wing compensation plate - T40045- below the right and left wing edge as shown. Take up weight of engine in its installation position.

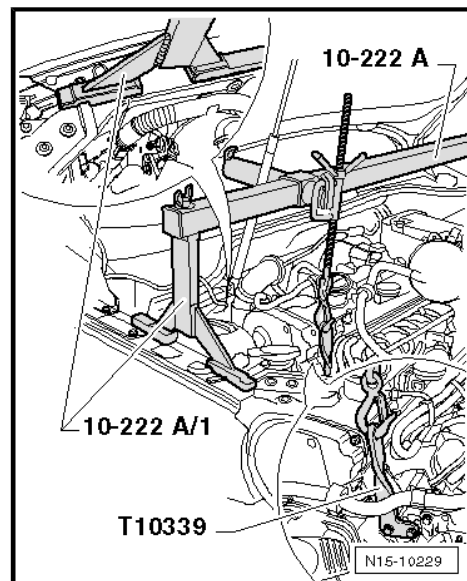






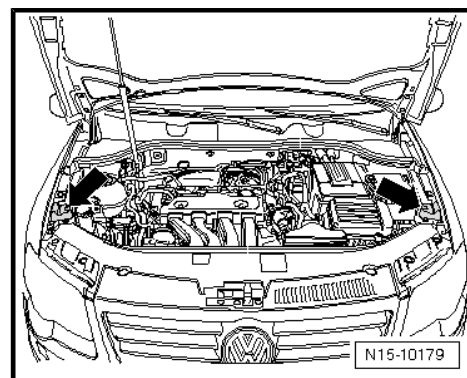
#### Eos:

- Fit support bracket - 10-222A- with rack - 10-222A/1- and adapter - 10 - 222 A /18- on wing edges. Take up weight of engine in its installation position.



#### Passat:

- Remove stop buffers for bonnet -arrows-.



- Fit support bracket - 10-222A- with rack - 10-222A/1- on wing edges as shown. Take up weight of engine in its installation position.

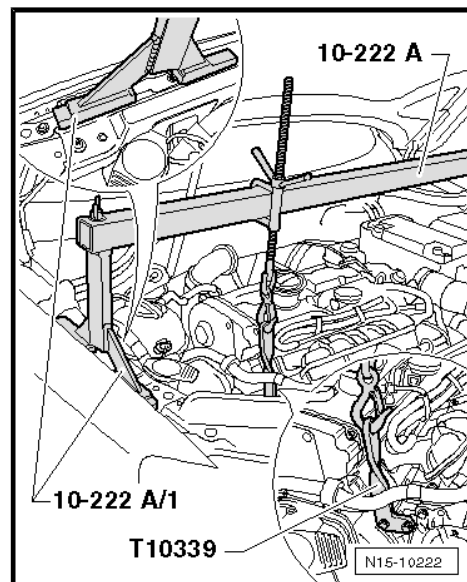
#### Continued for all vehicles:



Caution

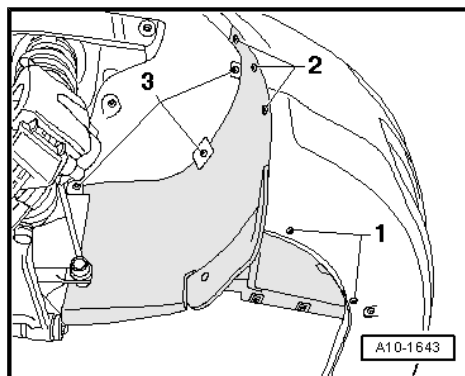
*Ensure that the edges of the wings are not damaged.*

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

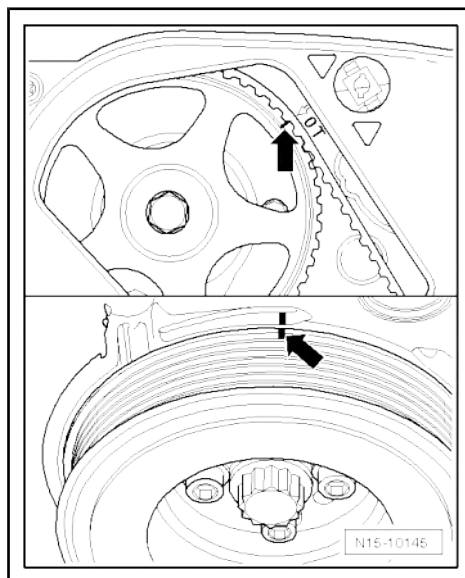




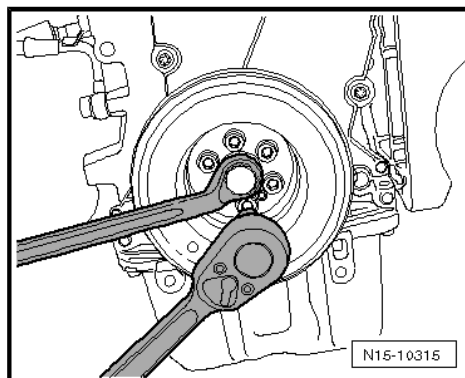
- Remove right wheel housing liner front part.



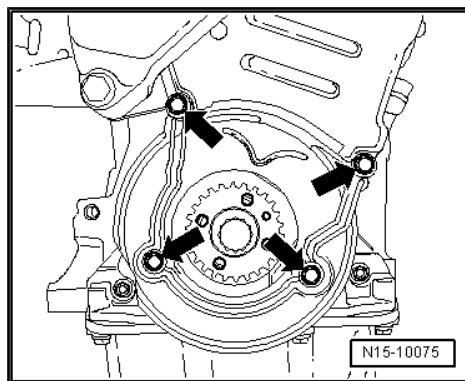
- Set camshaft pulley to “TDC” marking by turning crankshaft. The mark on the camshaft toothed-belt pulley must align with the arrow on the toothed-belt guard.



- Remove belt pulley with vibration damper.



- Unscrew bolts from toothed belt guard lower part -arrows-.

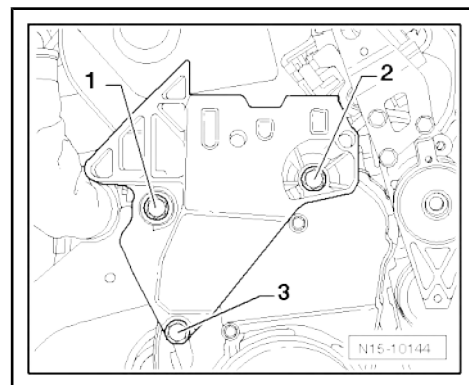




- Remove lower bolt -3-.

**Golf, Eos with engine codes BPY and Passat:**

- Loosen bolts of right wheel housing liner and push to side.



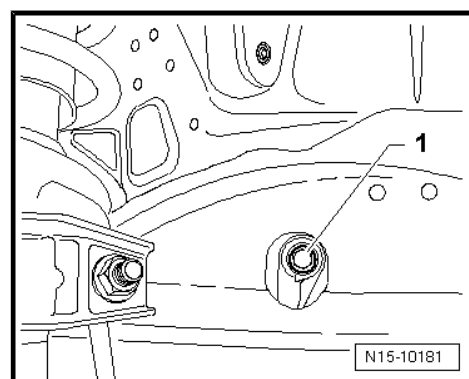
- Remove bolt -1- through hole in wheel housing.

**Continued for all vehicles:**

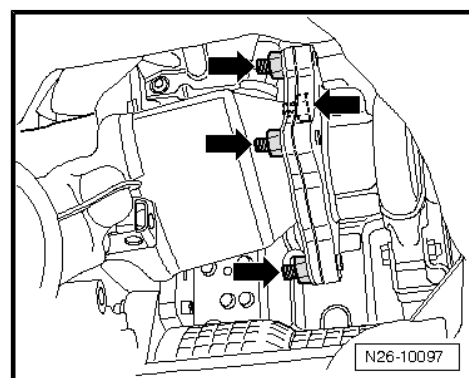


**Note**

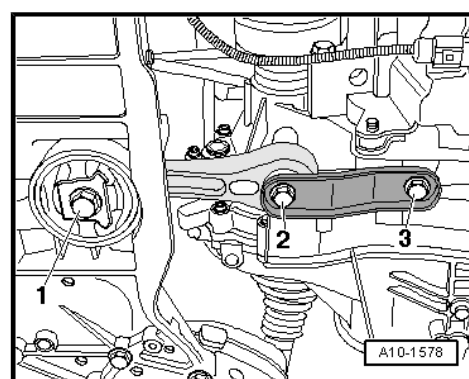
*Following work steps are necessary to raise the engine high enough.*



- Loosen front exhaust pipe with catalytic converter from turbocharger -arrows-.
- Pull catalytic converter from turbocharger.



- Unscrew bolts -2- and -3- at pendulum support.
- Disconnect drive shafts from gearbox ⇒ Running gear, axles, steering; Rep. gr. 40 ; Repairing drive shafts.





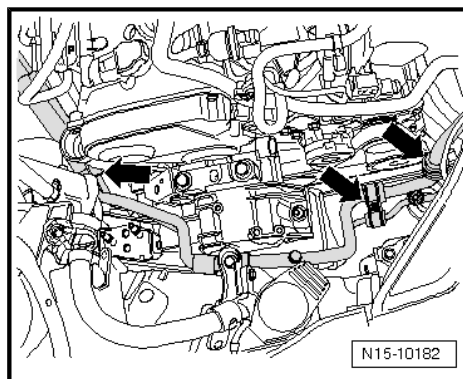
- Loosen pipes of air conditioning system from body -arrows-.



#### Note

*Do not open air conditioning system!*

- If fitted, unscrew auxiliary heater coolant pipes from engine.

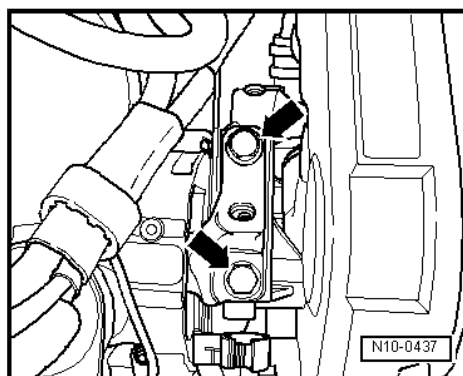


- Remove securing bolts from assembly mounting/engine bracket -arrows- and remove complete assembly mounting.

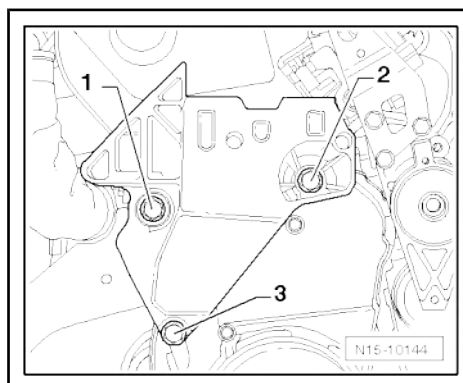


#### Caution

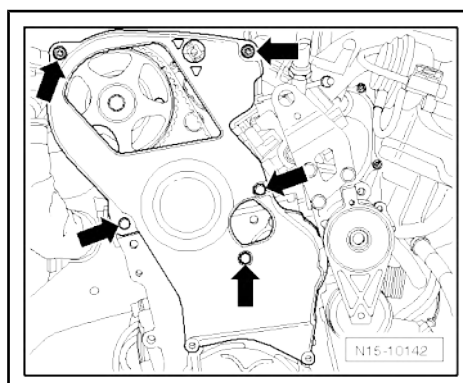
*When raising engine using support bracket - 10-222A-, ensure that no components or hoses are damaged, strained or torn off.*



- Raise engine with support bracket - 10-222A- until the upper bolts -1- (only engine code AXX, BWA) and -2- of engine bracket can be loosened and removed.
- Lift engine further, until the engine bracket can be removed upwards.



- Unscrew remaining bolts from toothed belt guard -arrows- and remove toothed belt guard from engine.
- Mark direction of rotation of toothed belt.
- Loosen tensioning roller and remove toothed belt.
- Turn crankshaft back slightly.



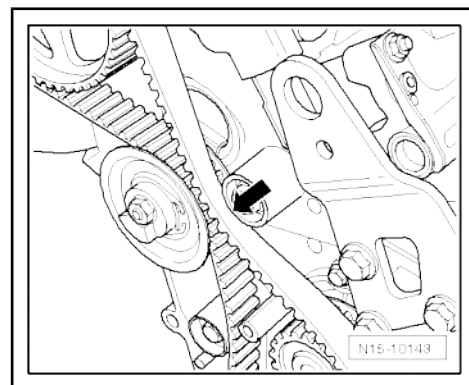
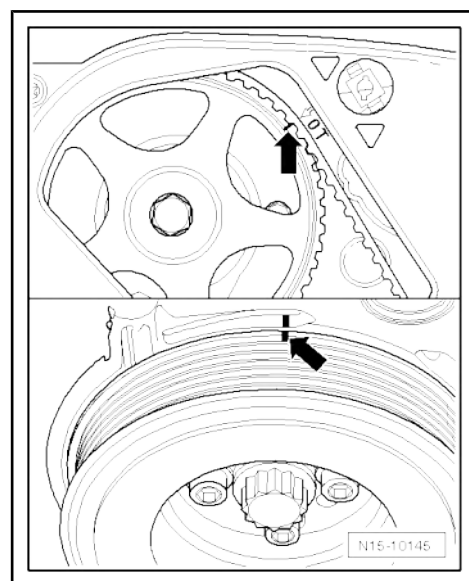


## 1.4.2 Installing toothed belt



### Note

- ◆ *When camshaft is turned, crankshaft must not be at TDC.  
Danger of damage to valves and piston crowns.*
  - ◆ *The engine must be no more than warm to touch.*
  - ◆ *Specified torques ➔ [page 18](#).*
  - Fit toothed belt on crankshaft pulley (note direction of rotation).
  - Secure toothed belt guard lower part with the two lower bolts.
  - Install belt pulley/vibration damper using new bolts. Specified torque: 20 Nm + turn 90° further.
  - Turn crankshaft and camshaft to TDC No. 1 cylinder -arrows-.
- 
- Fit toothed belt in the sequence: tensioning roller, camshaft pulley, coolant pump and last onto idler roller -arrow-.





### Note

*Check that tensioning roller is seated correctly in the cylinder head.*

- Tension toothed belt. To do so, turn hexagon key at the eccentric adjuster clockwise (direction of arrow) until the notch is above the indicator (toothed belt over-tensioned).
- Then release tension on toothed belt.
- Now tension toothed belt until the notch and the indicator are aligned.
- Tighten securing nut to 25 Nm.
- Turn crankshaft two turns in engine direction of rotation until engine is again at TDC. It is important that the last 45° rotation (1/8 turn) is performed without interruption.
- Check toothed belt tension again. Specification: indicator and notch must align.

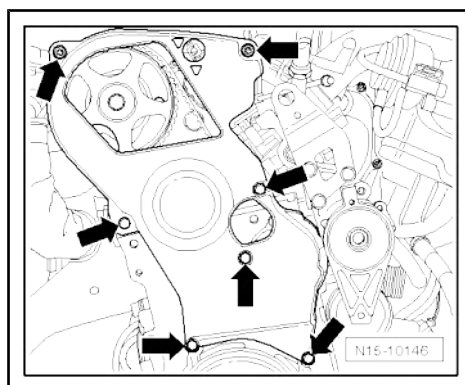
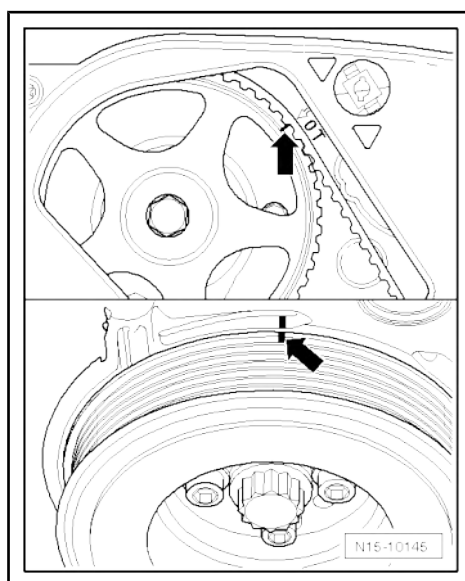
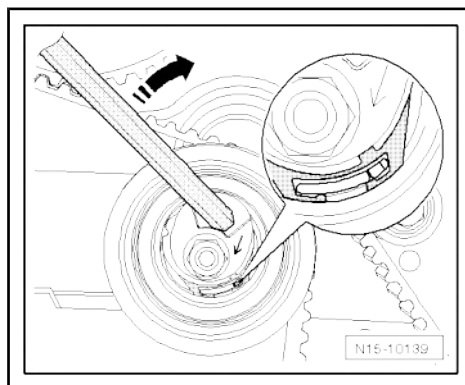
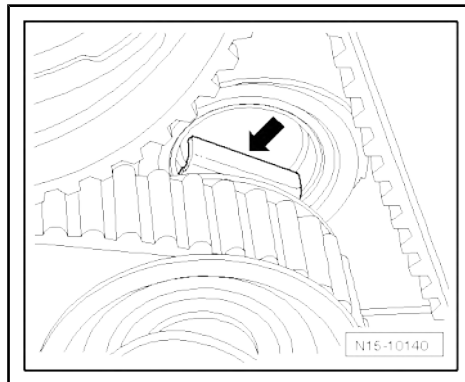
- Check valve timing again.

If the markings do not align:

- Repeat valve timing adjustment.

If the markings align:

- Install toothed belt guard -arrows-.
- Install engine support on cylinder block from above and tighten bolts hand-tight.





## Note

◆ *Note the different bolt lengths. Bolt -3- is about 25 mm shorter than bolts -1 and 2-.*

◆ *Golf, Eos with engine code BPY and Passat: The bolt -1- can be installed through the hole in wheel housing and tightened.*

– Lower engine with support bracket - 10-222A- until lower bolt -3- can be tightened.

– Tighten all bolts to 45 Nm.

– Install engine assembly mounting. Specified torques  
⇒ [page 13](#) .

– Tighten bolts for engine assembly mounting and engine bracket hand-tight -arrows-; to do so, bring surfaces into contact using support bracket - 10 - 222 A- .

– 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-.

– Tighten bolts for engine assembly mounting and engine bracket. Specified torque: ⇒ [page 13](#) .

– Remove support bracket - 10 - 222 A- .

– Remove bracket - T10339- and install poly V-belt tensioner.

– Install poly V-belt ⇒ [page 22](#) .

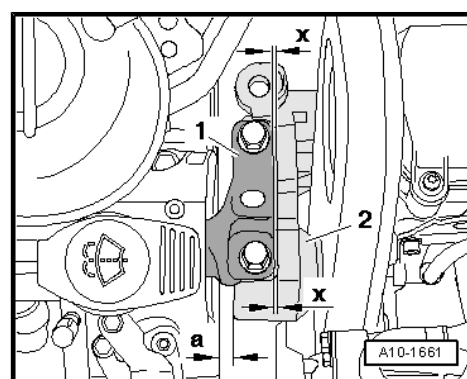
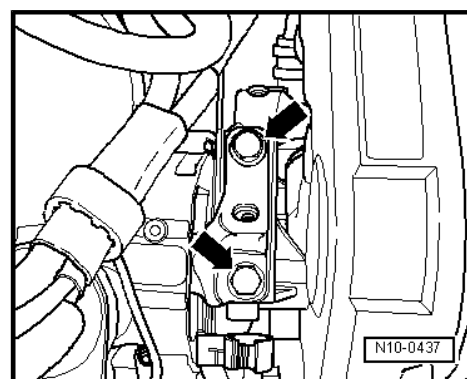
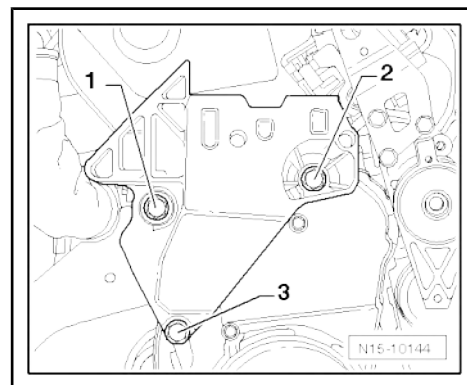
– Reconnect fuel and breather lines. Ensure that plug-in connectors are properly secured.

– Install coolant expansion tank and check coolant level.

– Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .

– Reconnect current supply.

– Install engine cover panel/air filter.





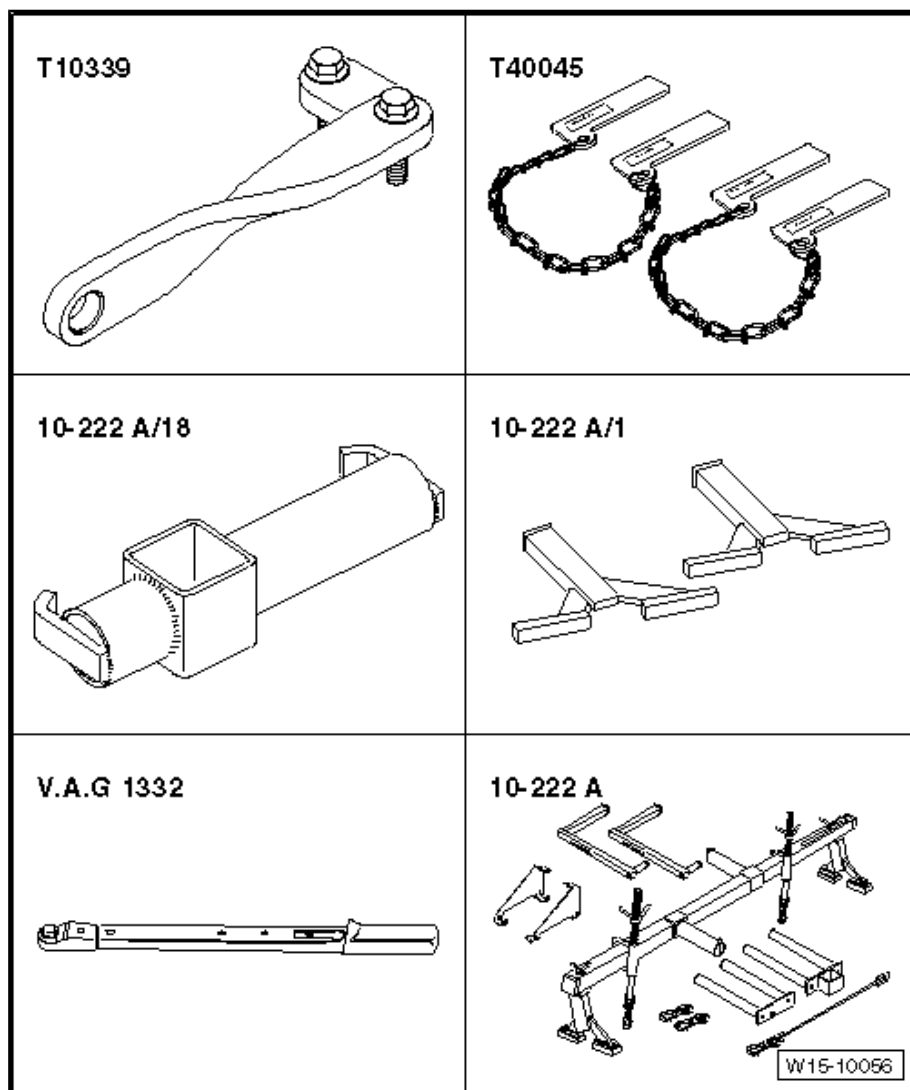
## 1.5 Removing and installing toothed belt, vehicles with split toothed belt guard



### Note

Vehicles as of 01/2006 have a new toothed belt guard. Identification: the upper part of the toothed belt guard has no cover ➔ [Item 25 \(page 20\)](#) and the toothed belt guard is split in the area of the engine bracket. Removing and installing toothed belt, vehicles without split toothed belt guard ➔ [page 55](#).

### Special tools and workshop equipment required



- ◆ Bracket - T10339-
- ◆ Wing compensation plate - T40045- (only Golf)
- ◆ Adapter - 10 - 222 A /18- (only Golf and Eos)
- ◆ Rack - 10 - 222 A /1-
- ◆ Support - 10 - 222 A-
- ◆ Torque wrench - V.A.G 1332-

Removing toothed belt ➔ [page 67](#)





Installing toothed belt ➔ [page 63](#)

### 1.5.1 Removing toothed belt

- Remove engine cover panel/air filter ➔ [page 273](#) .



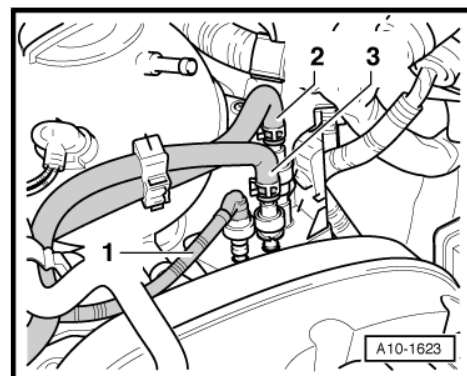
#### WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*
- ◆ *For safety reasons, the fuse for the fuel pump must be removed before opening the fuel system ➔ [page 140](#) . Otherwise, the fuel pump could be activated by the driver door contact switch.*

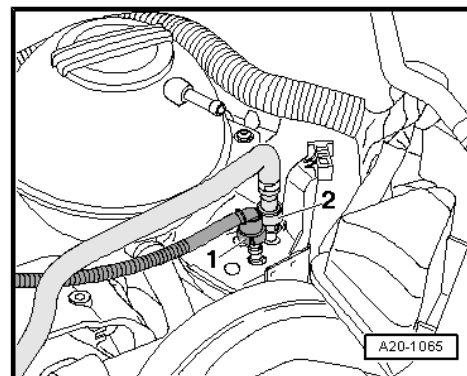
#### Engine code BPY:

- Disconnect lines -1, 2 and 3-. Do this by operating release buttons.



#### Engine codes AXX, BWA:

- Disconnect breather line -1- and fuel supply line -2-.





#### Golf, Eos:

- Separate breather line -2- and pull activated charcoal filter -A- with hoses upwards out of bracket.

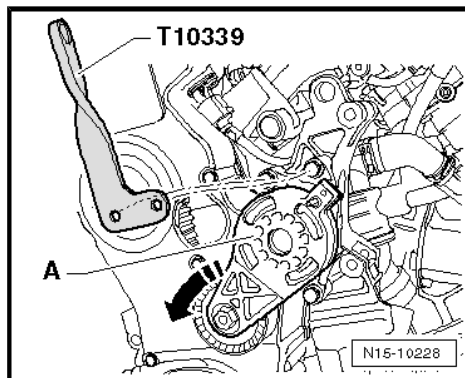
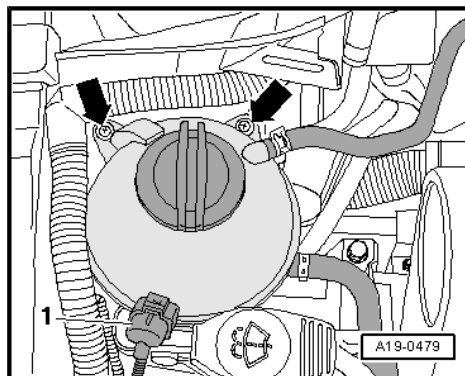
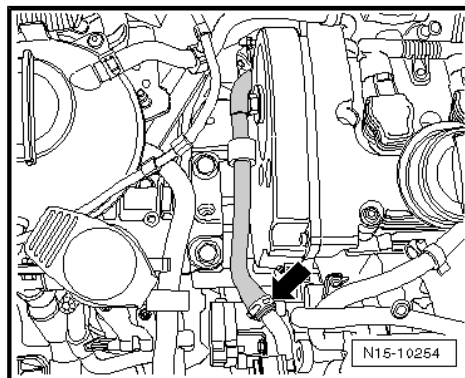
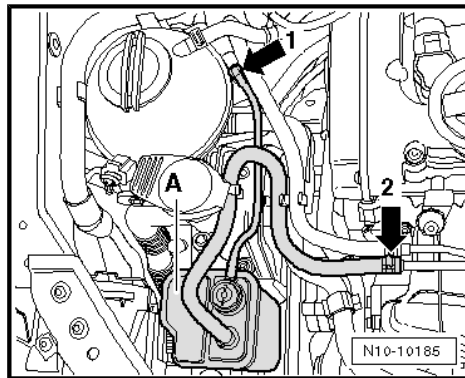
#### Continued for all vehicles:



#### WARNING

*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*

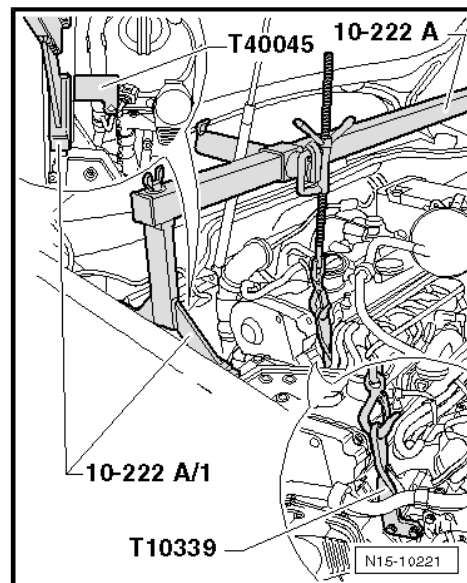
- Open coolant expansion tank to release pressure and close again.
- Release clamp -arrow- and detach coolant hose. Collect escaping coolant with a cloth.
- Pull off connector -1-. Loosen expansion tank and lay it to side.
- Remove poly V-belt ➔ [page 22](#) .
- Remove poly V-belt tensioner -A- and secure bracket - T10339- to both upper threaded holes.





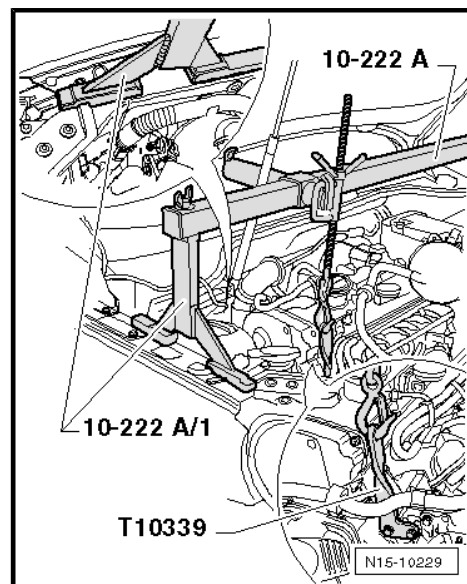
#### Golf:

- Fit support bracket - 10 - 222 A- with rack - 10 - 222 A /1- and adapter - 10 - 222 A /18- on wing edges.
- Place the wing compensation plate - T40045- below the right and left wing edge as shown. Take up weight of engine in its installation position.



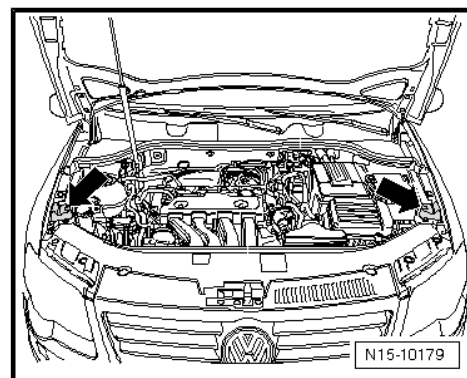
#### Eos:

- Fit support bracket - 10-222A- with rack - 10-222A/1- and adapter - 10 - 222 A /18- on wing edges. Take up weight of engine in its installation position.



#### Passat:

- Remove stop buffers for bonnet -arrows-.





- Fit support bracket - 10-222A- with rack - 10-222A/1- on wing edges as shown. Take up weight of engine in its installation position.

Continued for all vehicles:



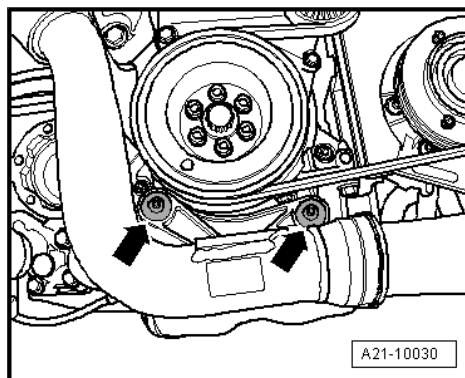
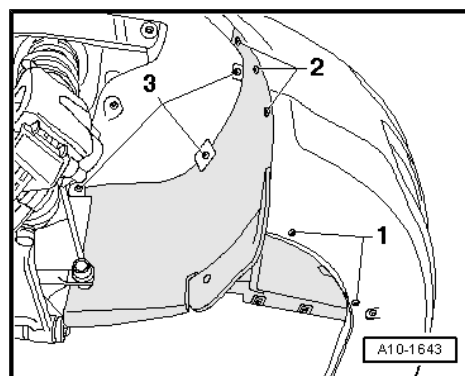
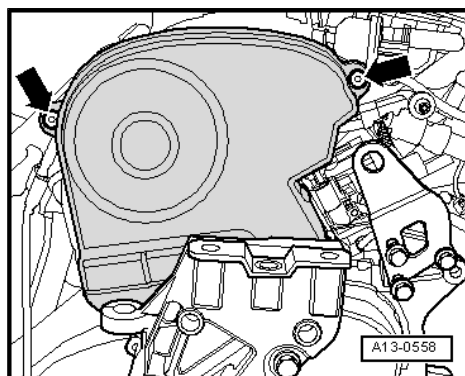
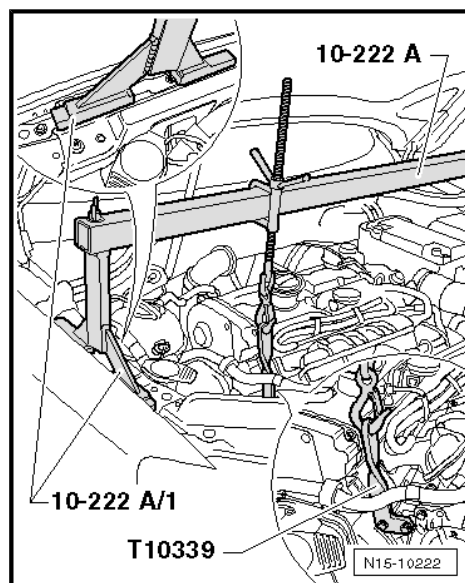
Caution

*Ensure that the edges of the wings are not damaged.*

- Remove bolts -arrows- and remove toothed belt guard upwards.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .

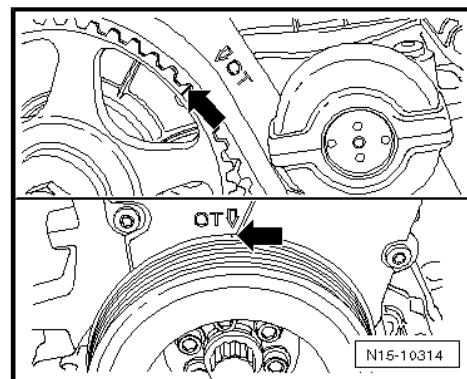
- Remove right wheel housing liner front part.

- Unscrew bolts -arrows- and remove charge air pipe.





- Set camshaft pulley to TDC marking by turning crankshaft. The mark on the camshaft toothed-belt pulley must align with the arrow on the toothed-belt guard.

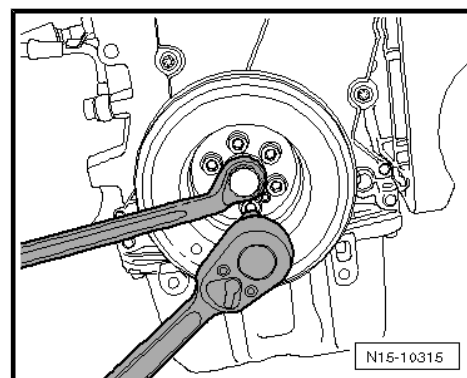


- Remove belt pulley with vibration damper.

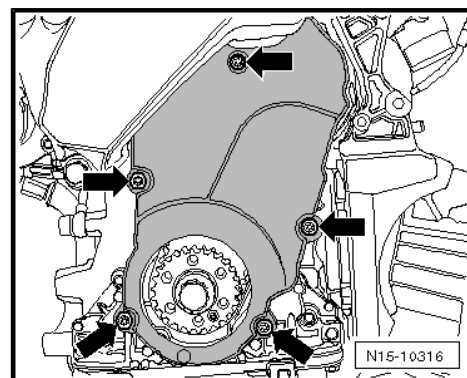


#### Note

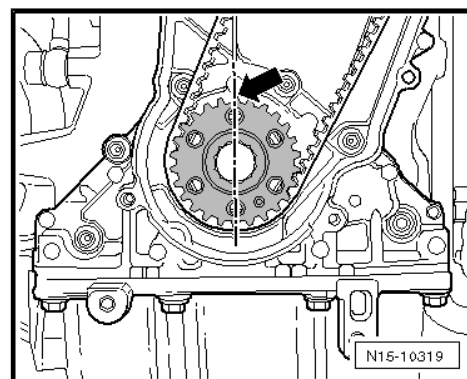
- ◆ The TDC markings must align before removing the vibration damper.
- ◆ The crankshaft must not be turned until the TDC position is additionally marked.



- Remove lower bolts from toothed belt guard lower part -arrows-.



- Mark TDC position -arrow-.

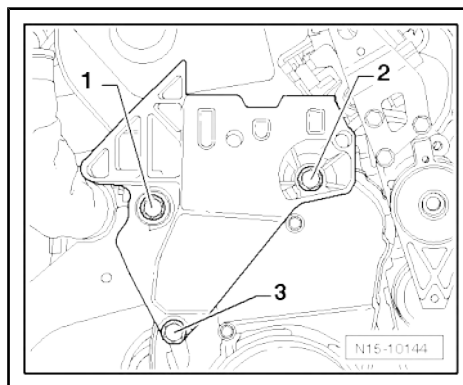




- Remove lower bolt -3-.

**Golf, Eos with engine codes BPY and Passat:**

- Loosen bolts of right wheel housing liner and push to side.



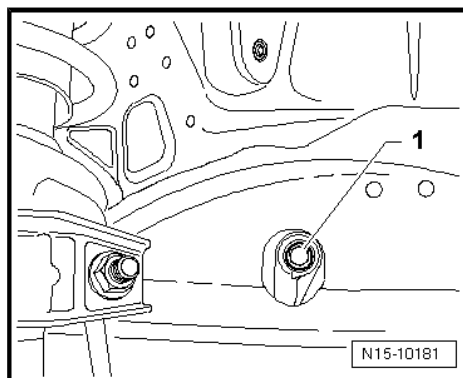
- Remove bolt -1- through hole in wheel housing.

**Continued for all vehicles:**

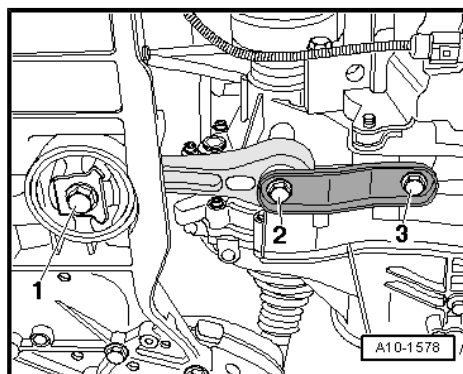


**Note**

*The following work step is necessary to raise the engine high enough.*



- Unscrew bolts -2- and -3- at pendulum support.

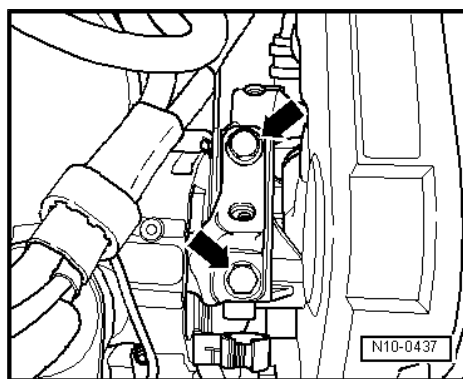


- Remove securing bolts from assembly mounting/engine bracket -arrows- and remove complete assembly mounting.



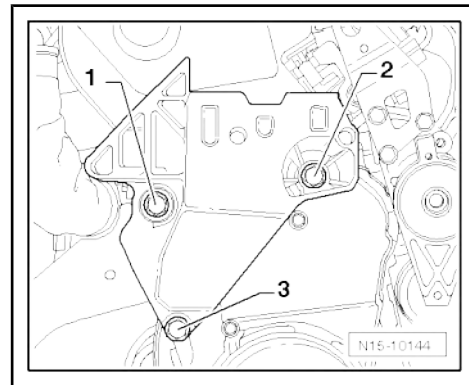
**Caution**

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

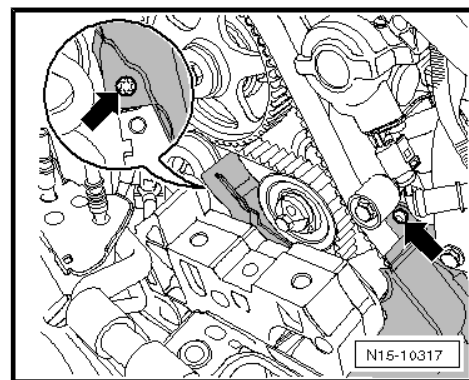




- Raise engine with support bracket - 10-222A- until the upper bolts -1- (only Golf, Eos with engine codes AXX, BWA) and -2- of engine bracket can be loosened and removed.



- Unscrew the two upper bolts from toothed belt guard -arrows- and remove toothed belt guard from engine downwards.
- Now remove engine bracket from engine upwards.
- Mark direction of rotation of toothed belt.
- Loosen tensioning roller and remove toothed belt.
- Turn crankshaft back slightly.

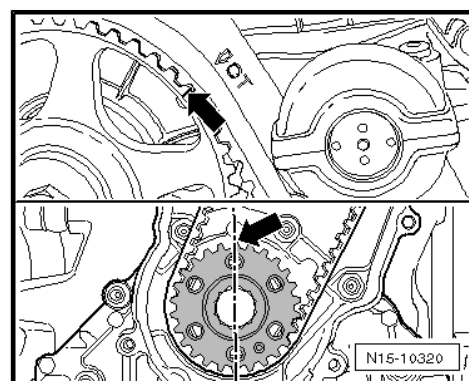


## 1.5.2 Installing toothed belt



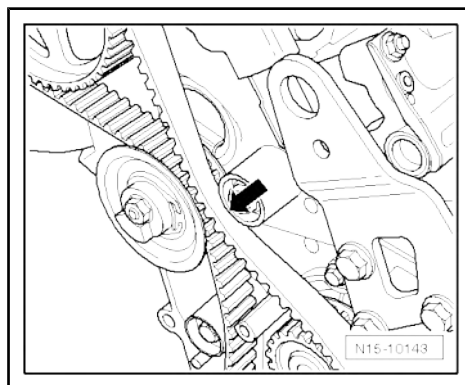
### Note

- ◆ *When camshaft is turned, crankshaft must not be at TDC. Danger of damage to valves and piston crowns.*
- ◆ *The engine must be no more than warm to touch.*
- ◆ *Specified torques ➔ [page 20](#).*
- Set camshaft and crankshaft to TDC markings.
- Fit toothed belt on crankshaft pulley (note direction of rotation).



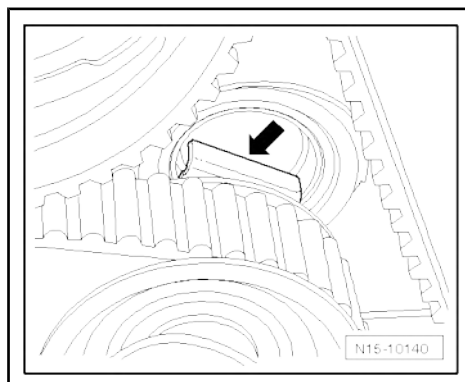


- Fit toothed belt in the sequence: tensioning roller, camshaft pulley, coolant pump and last onto idler roller -arrow-.

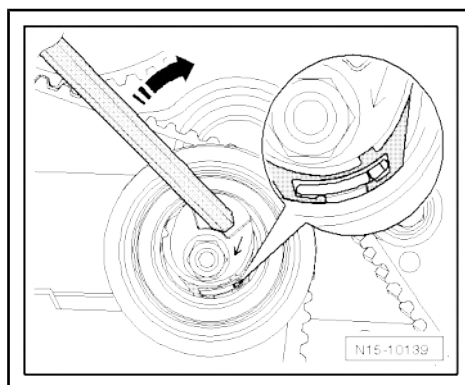


#### Note

*Check that tensioning roller is seated correctly in the cylinder head.*



- Tension toothed belt. To do so, turn hexagon key at the eccentric adjuster clockwise (direction of arrow) until the notch is above the indicator (toothed belt over-tensioned).
- Then release tension on toothed belt.
- Now tension toothed belt until the notch and the indicator are aligned.
- Tighten securing nut to 25 Nm.
- Turn crankshaft two turns in engine direction of rotation until engine is again at TDC. It is important that the last 45° rotation (1/8 turn) is performed without interruption.
- Check toothed belt tension. Specification: indicator and notch must align.



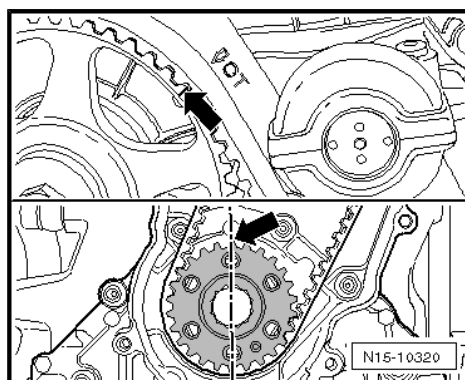
- Check valve timing. The markings must align -arrows-.

If the markings do not align:

- Repeat valve timing adjustment.

If the markings align:

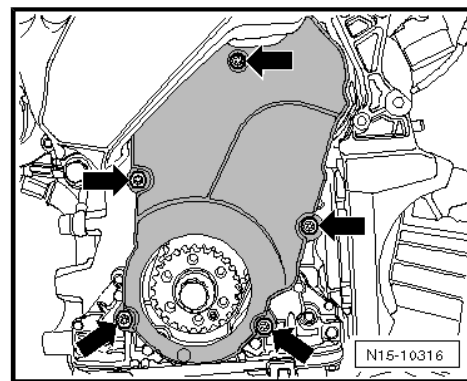
- Bring engine bracket to installation position.



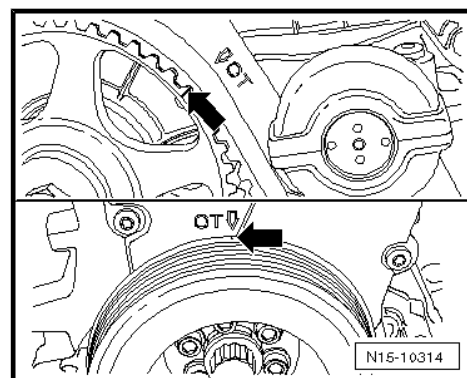




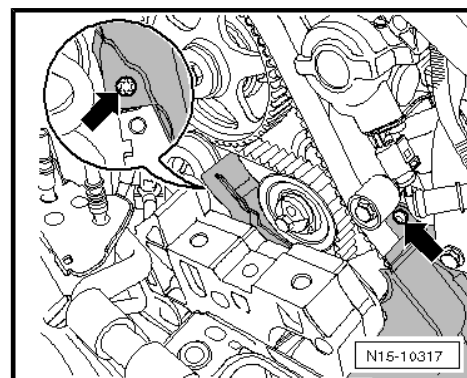
- Install toothed belt guard from below -arrows-.
- Install belt pulley/vibration damper using new bolts. Specified torque: 20 Nm + turn 90° further.



- Check valve timing again: The markings must align -arrows-.

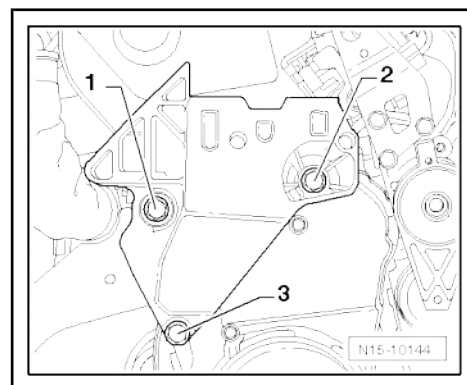


- Tighten the two upper bolts of toothed belt guard -arrows-.
- Fit engine bracket on cylinder block and tighten bolts hand-tight.



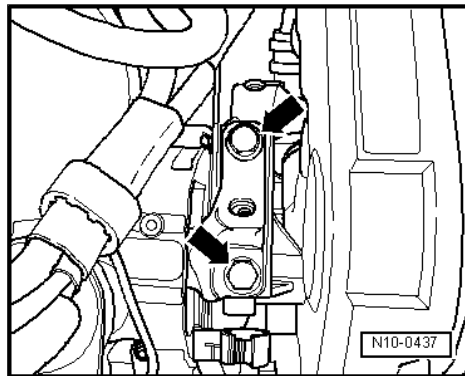
#### Note

- ♦ Note the different bolt lengths. Bolt -3- is about 25 mm shorter than bolts -1 and 2-.
- ♦ Engine code BPY: The bolt -1- can be installed through the hole in wheel housing and tightened.
- Lower engine with support bracket - 10-222A- until lower bolt -3- can be tightened.
- Tighten all bolts to 45 Nm.
- Install engine assembly mounting. Specified torques  
⇒ [page 13](#) .

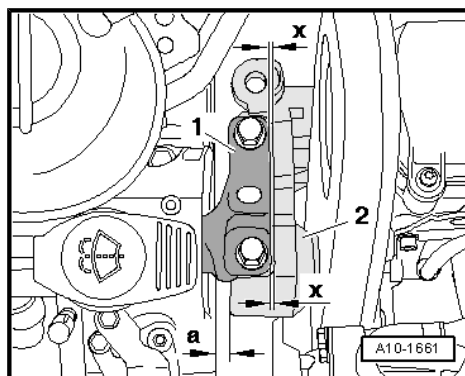




- Tighten bolts for engine assembly mounting and engine bracket hand-tight -arrows-; to do so, bring surfaces into contact using support bracket - 10 - 222 A- .
- Align engine mountings as follows:



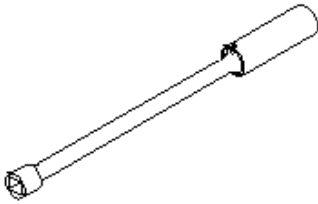
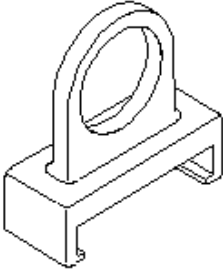


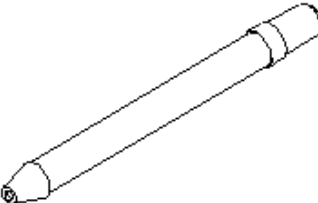
- ◆ There must be a distance -a- of at least 10 mm between engine support and longitudinal member (right side).
- ◆ The side surface of the engine support -2- should be located parallel to the support arm -1-.
- Tighten bolts for engine assembly mounting and engine bracket. Specified torque: ➔ [page 13](#) .
- Remove support bracket - 10 - 222 A- .
- Remove bracket - T10339- and install poly V-belt tensioner.
- Install poly V-belt ➔ [page 22](#) .
- Reconnect fuel and breather lines. Ensure that plug-in connectors are properly secured.
- Install coolant expansion tank.
- Install noise insulation ➔ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .
- Reconnect current supply.
- Install engine cover panel/air filter.



## 1.6 Checking compression



**Special tools and workshop equipment required**

<p><b>3122 B</b></p> 	<p><b>T40039</b></p> 
<p><b>V.A.G 1331</b></p> 	<p><b>V.A.G 1763</b></p> 
<p><b>V.A.G 1381/5A</b></p> 	<p>W15-10051</p>

- ◆ Spark plug socket - 3122 B-
- ◆ Puller - T40039-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Compression tester - V.A.G 1763-
- ◆ Adapter - V.A.G 1381/5A-

**Test specification:**

- The engine oil temperature must be at least 30 °C.
- Voltage supply OK.
- Remove engine cover panel/air filter ➔ [page 273](#) .
- Remove ignition coils with output stages ➔ [page 323](#) .
- Unscrew spark plugs using spark plug socket and extension - 3122 B- .



- 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 .*

- Have a second mechanic operate the starter.
- Operate starter until tester shows no further pressure increase.

**Compression pressures:**

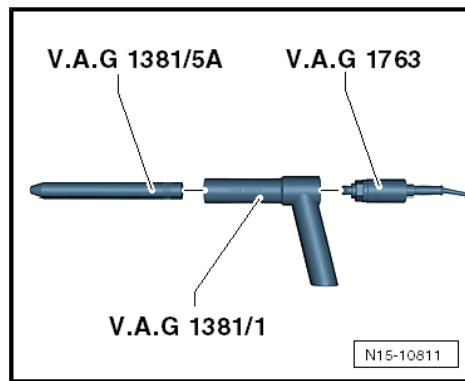
Engine code	New bar pressure	Wear limit bar pressure	Difference between cylinders bar pressure
AXX, BWA, BPY	11.0...14.0	7.0	max. 3.0

- After completing work, read fault memory of engine control unit, clear all fault entries that have been stored during checks and repairs.



**Note**

*If the fault memory was cleared, the readiness code must be generated ⇒ Vehicle diagnostic tester. "Guided functions".*





## 2 Valve gear



### Note

- ◆ *Cylinder heads which have cracks between the valve seats or between a valve seat insert and the spark plug thread can be used further without reducing service life, provided the cracks do not exceed a maximum of 0.3 mm in width, or when no more than the first 4 turns of the spark plug thread are cracked.*
- ◆ *Cylinder head and retaining frame must only be renewed together.*
- ◆ *After installing camshafts wait for approx. 30 minutes before starting engine. The hydraulic compensation elements must settle (otherwise valves will strike pistons).*
- ◆ *After working on the valve gear, turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*
- ◆ *Always renew gaskets and seals.*

Assembly overview - valve gear ⇒ [page 79](#)

Valve dimensions ⇒ [page 81](#)

Checking valve guides ⇒ [page 81](#)

Renewing valve stem seals ⇒ [page 82](#)

Renewing exhaust camshaft seal ⇒ [page 86](#)

Removing and installing camshaft adjuster ⇒ [page 89](#)

Removing and installing inlet camshaft control valve 1 - N205-  
⇒ [page 92](#)

Removing and installing camshafts ⇒ [page 94](#)

### 2.1 Assembly overview - valve gear



**1 - 50 Nm + 180° (1/2 turn) further**

- ☐ Renew
- ☐ Use counterhold - 3036- to loosen and tighten.

**2 - Camshaft sprocket**

- ☐ Use counterhold - 3036- to loosen and tighten.

**3 - Sealing ring**

- ☐ Renewing ⇒ [page 86](#)

**4 - Cylinder head**

**5 - Valve guide**

- ☐ Checking ⇒ [page 81](#)

**6 - Valve stem seal**

- ☐ Renewing ⇒ [page 82](#)

**7 - Valve springs**

**8 - Upper valve spring plate**

**9 - Valve cotter**

**10 - Hydraulic compensation element**

- ☐ Do not interchange
- ☐ Oil contact surface

**11 - Woodruff key**

- ☐ Check for firm seating

**12 - Exhaust camshaft**

- ☐ Check radial clearance with Plastigage (roller rocker fingers not installed). Wear limit: 0.1 mm.
- ☐ Runout: max. 0.035 mm

**13 - Ladder frame**

- ☐ With integrated camshaft bearings.
- ☐ Clean sealing surface; reworking not permitted.
- ☐ Remove sealant residue.

**14 - 8 Nm + 1/4 turn further (90°)**

- ☐ Renew

**15 - Camshaft adjuster**

- ☐ Removing and installing ⇒ [page 89](#)

**16 - 20 Nm and 1/8 turn (45°) further**

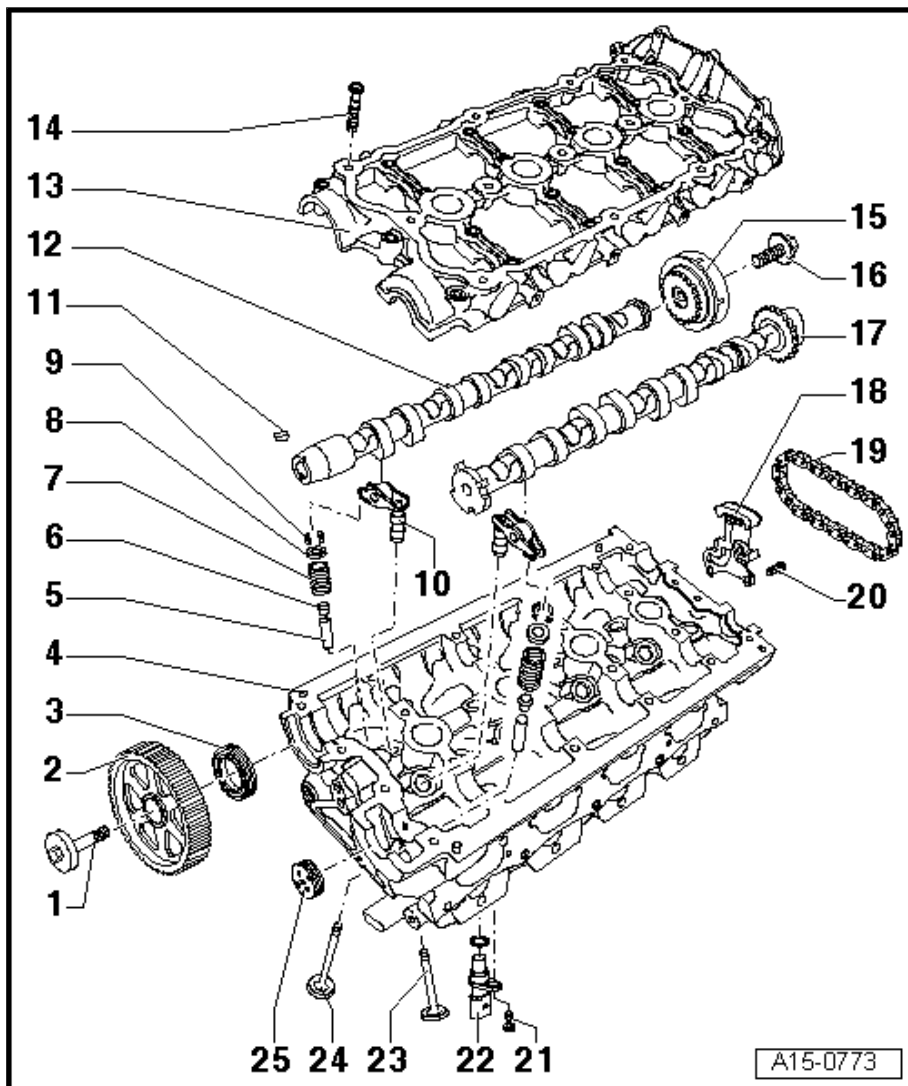
- ☐ Use camshaft clamp - T10252- to loosen and tighten.
- ☐ Renew

**17 - Inlet camshaft**

- ☐ Check radial clearance with Plastigage; wear limit: 0.1 mm
- ☐ Runout: max. 0.035 mm

**18 - Chain tensioner**

- ☐ Secure with locking pin - T10115- before removing.





## 19 - Drive chain

- ☐ Removing and installing ➔ [page 89](#)
- ☐ Check for wear

## 20 - 10 Nm

## 21 - 10 Nm

## 22 - Hall sender - G40-

## 23 - Outlet valve

- ☐ Do not rework. Only lapping in is permitted.
- ☐ Valve dimensions ➔ [page 81](#)
- ☐ Checking valve guides ➔ [page 81](#)

## 24 - Inlet valve

- ☐ Do not rework. Only lapping in is permitted.
- ☐ Valve dimensions ➔ [page 81](#)
- ☐ Checking valve guides ➔ [page 81](#)

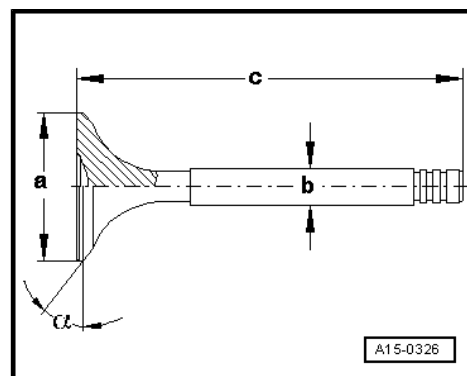
## 25 - Sealing cover

- ☐ Renew
- ☐ Removing: pierce centre of cap using screwdriver and lever out.
- ☐ Installing: Do not use sealant, press in 1...2 mm using thrust piece - 3334- .

## 2.2 Valve dimensions

Inlet and exhaust valves must not be reworked. Only lapping-in is permitted.

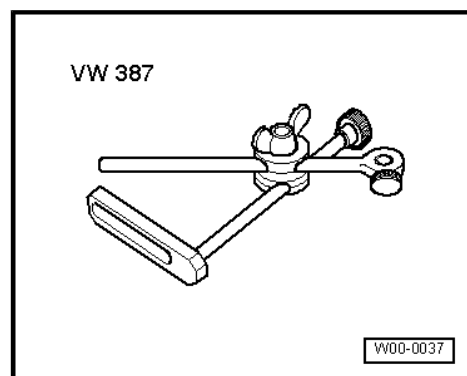
Dimension		Inlet valve	Outlet valve
Ø a	mm	33.75...33.95	27.90...28.10
Ø b	mm	5.98	5.95
c	mm	103.97	101.87
α	°	45	45



## 2.3 Checking valve guides

### Special tools and workshop equipment required

- ◆ Universal dial gauge holder - VW 387-



- ◆ Dial gauge

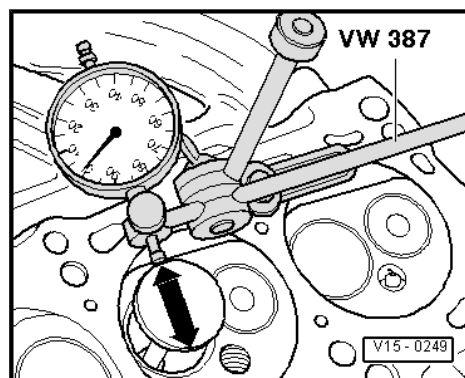


- Insert new valve in guide. End of valve stem must be at same height as guide. On account of differing stem diameters, only use inlet valve in inlet guide and exhaust valve in exhaust guide.

- Determine rock. Wear limit: 0.8 mm

If the amount of sideways play is exceeded:


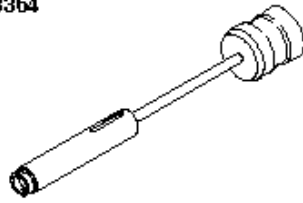
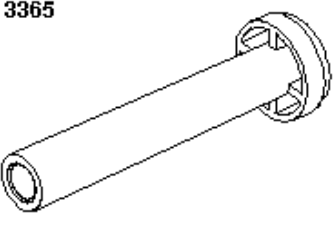
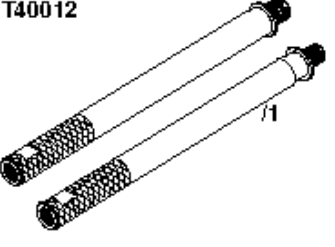


- Renew cylinder head.



## 2.4 Renewing valve stem seals

(With cylinder head installed)

Special tools and workshop equipment required

<b>3122 B</b> 	<b>3364</b> 
<b>3365</b> 	<b>T40012</b> 
<b>V.A.G 1331</b> 	<b>VAS 5161</b> 

- ◆ Spark plug socket - 3122 B-
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Adapter - T40012-





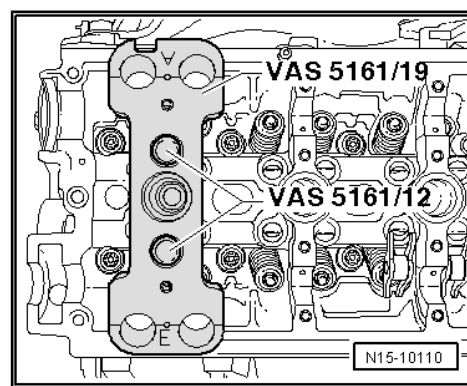
- ◆ Torque wrench - V.A.G 1331-
- ◆ Dismantling and assembling device for valve cotters - VAS 5161 A-
- ◆ Guide plate - VAS 5161/19-

Removing valve stem oil seals ⇒ [page 83](#) .

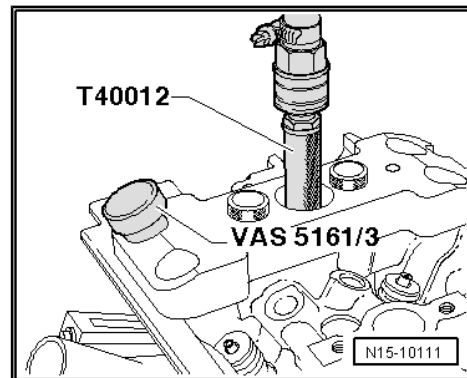
Installing valve stem oil seals ⇒ [page 85](#) .

## 2.4.1 Removing valve stem oil seals

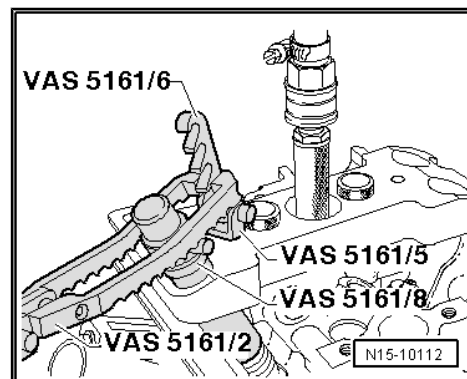
- Remove camshafts ⇒ [page 94](#) .
- Remove roller rocker fingers and place onto a clean surface. When doing this, ensure that roller rocker fingers are not interchanged.
- Remove spark plug with spark plug socket and extension - 3122 B- .
- Secure guide plate - VAS 5161/19- with knurled screws - VAS 5161/12- to cylinder head as shown.
- Set piston of the respective cylinder to "bottom dead centre".
- Screw adapter - T40012- into spark plug hole and connect to compressed air supply of at least 6 bar.



- Knock loose sticking valve cotters using punch - VAS 5161/3- and a plastic-headed hammer.



- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate - VAS 5161/19- .
- Insert assembly cartridge - VAS 5161/8- into guide plate - VAS 5161/19- .
- Attach pressure fork - VAS 5161/2- to snap-in device - VAS 5161/6- .

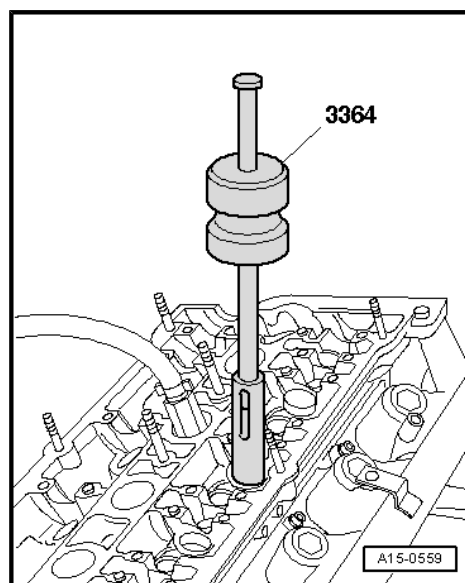
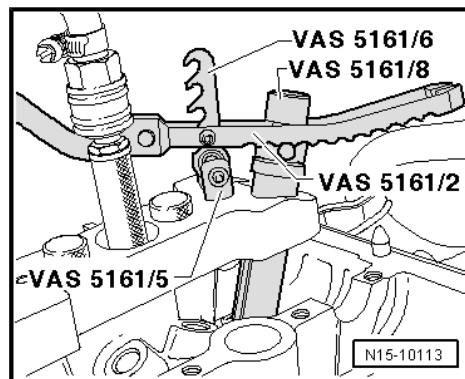




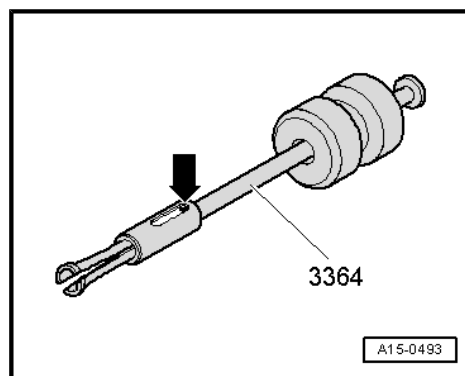
### Note

*On the exhaust side, the pressure fork - VAS 5161/2- must be hooked in as shown.*

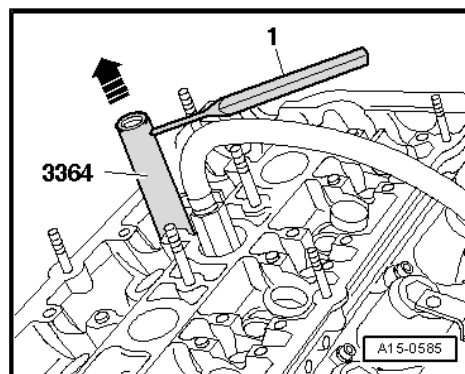
- Press down assembly cartridge - VAS 5161/8- . At the same time, turn knurled screw of assembly cartridge - VAS 5161/8- clockwise until ends engage in valve cotters.
- Move knurled screw back and forth lightly to press apart valve cotters and capture them in the assembly piece.
- Release pressure fork - VAS 5161/2- .
- Remove assembly cartridge - VAS 5161/8- .
- Pull off valve stem oil seals with puller 3364.



- If puller 3364 cannot be used due to cramped conditions, drive out roll pin -arrow- using drift and remove slide hammer.



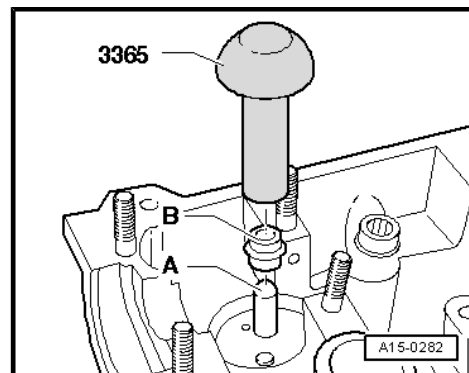
- Place lower part of puller device 3364 on valve stem seal.
- Insert a punch -1- through hole in lower section of puller.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.



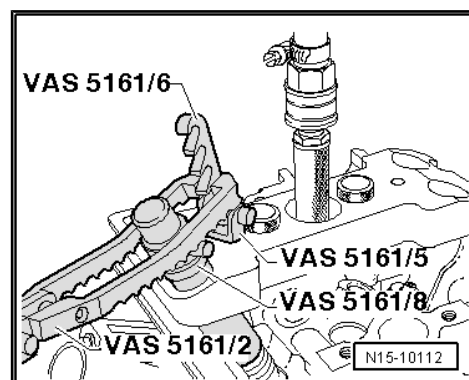


## 2.4.2 Installing valve stem seals

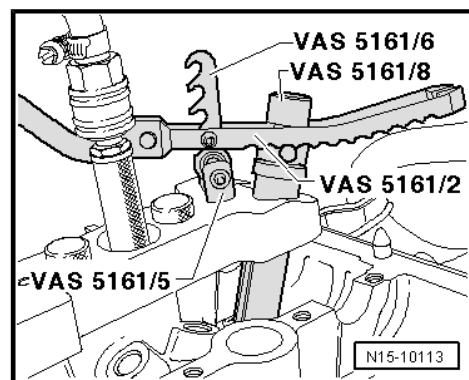
- To prevent damage to new valve stem seals -B-, attach plastic sleeve -A- to valve stem.
- Lubricate sealing lip of valve stem oil seal -B-, place it in the valve stem oil seal fitting tool - 3365- and push carefully onto valve guide.
- Remove plastic sleeve -A-.
- Insert valve spring and valve spring plate.
- Set up disassembly and assembly tool - VAS 5161- as shown.



### Inlet side



### Exhaust side



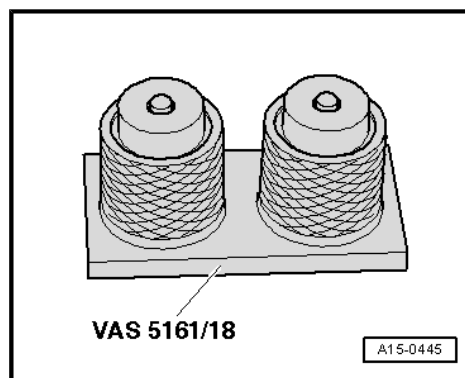


## Note

- ◆ If the valve cotters have been removed from the installation cartridge, they must first be inserted into the insertion device - VAS 5161/18-.
- ◆ Press assembly cartridge - VAS 5161/8- onto inserting device from above and capture valve cotters.
- Press assembly cartridge - VAS 5161/8- down using pressure fork - VAS 5161/2- and turn knurled screw of assembly cartridge back and forth while pulling upwards.
- Release the pressure fork - VAS 5161/2- with knurled screw still in pulled-out position.
- Remove removal and installing device for valve cotters - VAS 5161 A-.

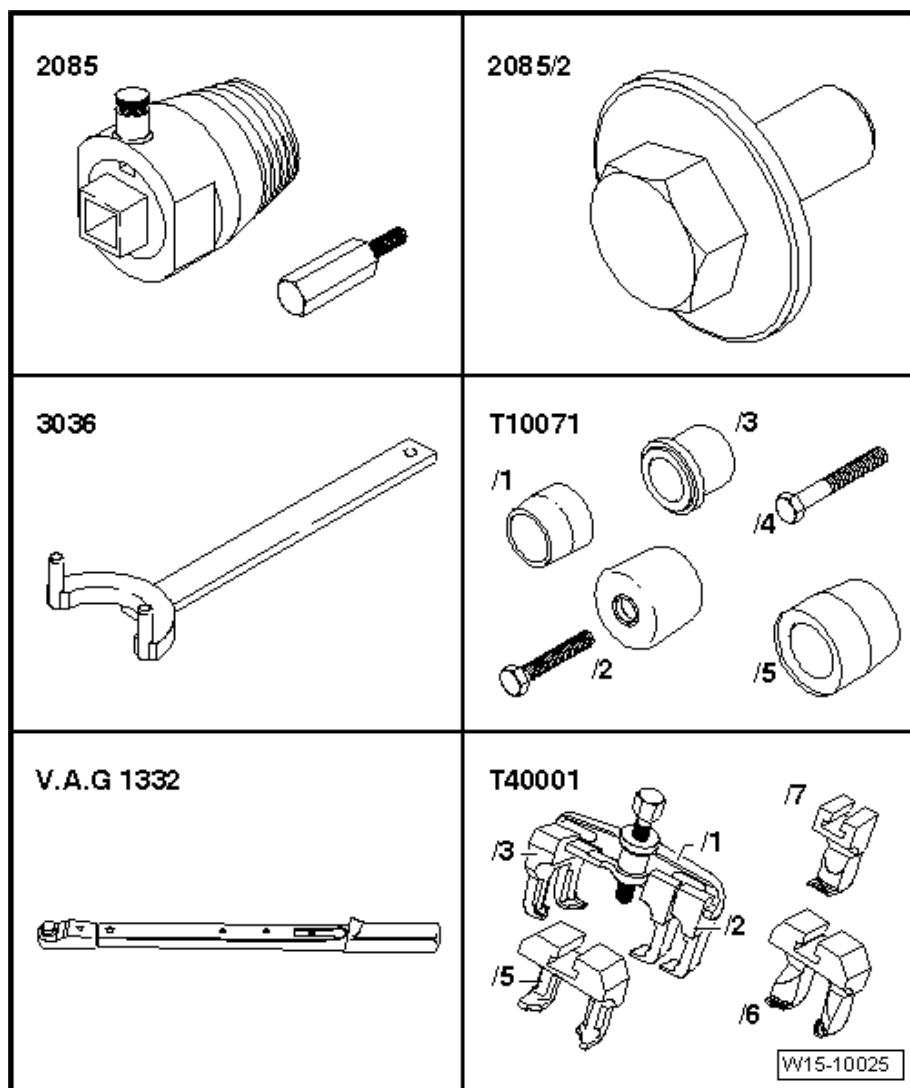
Further assembly is basically the reverse of the removal procedure.

- Installing camshafts ➔ [page 94](#).



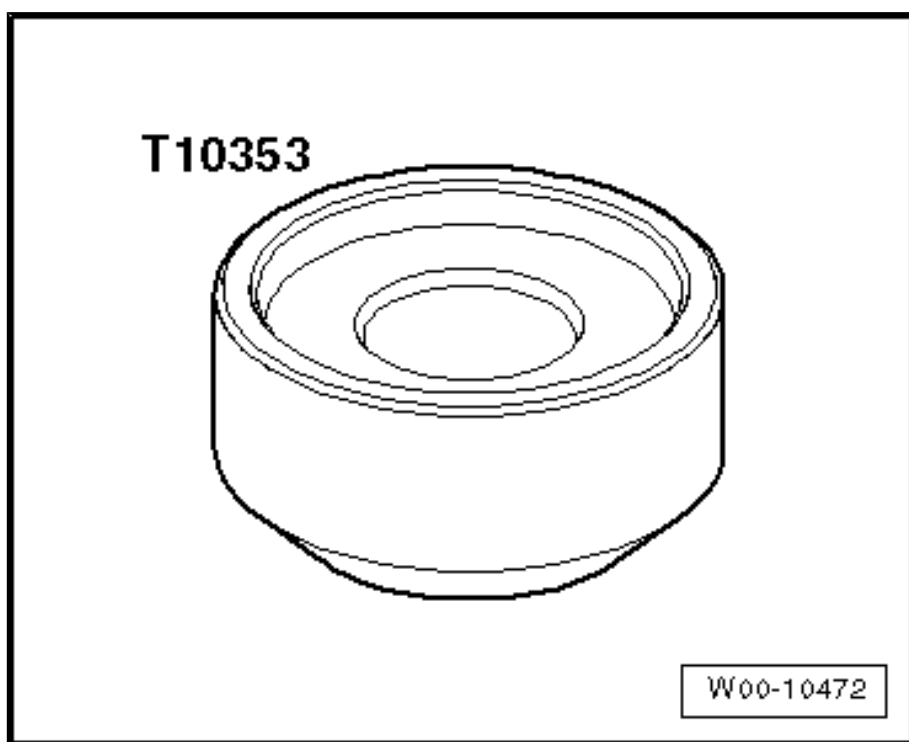
## 2.5 Renewing exhaust camshaft seal

Special tools and workshop equipment required





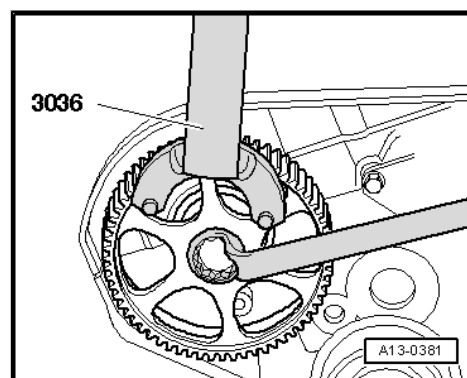
- ◆ Seal puller - 2085-
- ◆ Adapter - 2085/2-
- ◆ Counterhold - 3036-
- ◆ Assembly tool - T10071-
- ◆ Two-arm puller - T40001- with claw - T40001/6- and claw - T40001/7-
- ◆ Torque wrench - V.A.G 1332-



- ◆ Thrust piece - T10353-

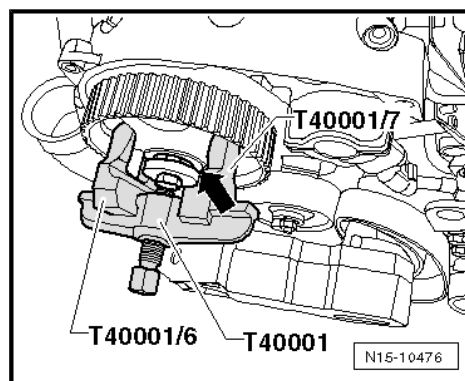
**Remove seal:**

- Remove toothed belt:  
Vehicles with split toothed belt guard ➤ [page 66](#) .  
Vehicles without split toothed belt guard ➤ [page 55](#) .
- Loosen securing bolt for camshaft pulley and unscrew approx. 10 mm (use counterhold - 3036- ).

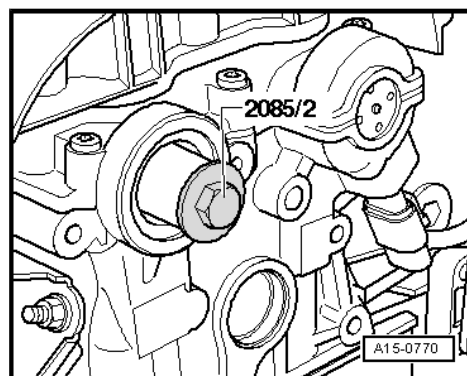




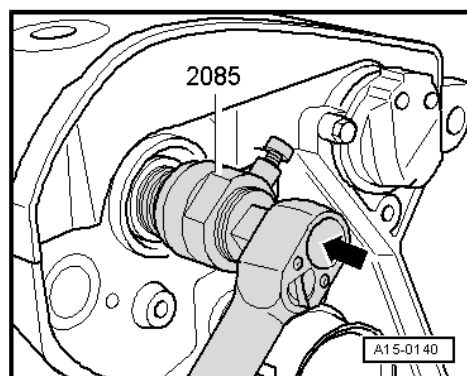
- Pull off camshaft toothed belt pulley using puller - T40001- , hook - T40001/6- and hook - T40001/7- . The puller - T40001- is supported by the securing bolt -arrow-.
- Remove securing bolt and camshaft pulley.



- To guide seal extractor, screw adapter - 2085/2- into camshaft to stop by hand.
- Screw inner part of oil seal extractor - 2085- two turns (approx. 3 mm) out of outer part and lock using knurled screw.



- Lubricate threaded head of oil seal extractor - 2085- , place it in position and, exerting firm pressure, screw it into the oil seal as far as possible.
- Loosen knurled screw and turn inner part against camshaft until oil seal is pulled out.



#### Install seal:

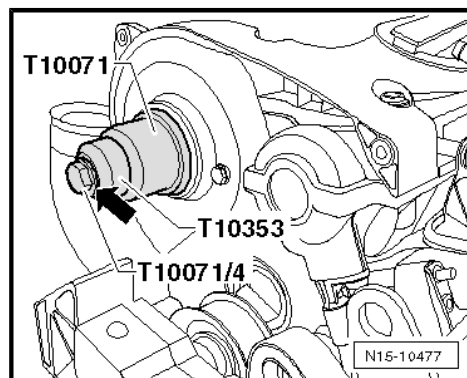
- Remove oil residue from camshaft journal using a clean cloth.
  - Tape over groove in taper of camshaft (e.g. with Sellotape).
  - Carefully push dry seal onto camshaft journal.
- 
- Press in oil seal to stop using fitting sleeve - T10071- , thrust piece - T10353- and a washer -arrow-. To do this, use screw - T10071/4- .



#### Note

*The thrust piece - T10353- is required for the length compensation of the bolt - T10071/4- . Washers can also be used for this purpose.*

- Insert parallel key into camshaft.





- Install camshaft sprocket. To tighten bolt, hold camshaft toothed belt pulley in position using counterhold - 3036- . Specified torque: ⇒ [page 79](#) .



#### Note

- ◆ *When turning the camshaft, the pistons must not be at TDC. This could otherwise result in damage to valves and pistons.*
- ◆ *Ensure the parallel key is correctly seated.*

- Install toothed belt.

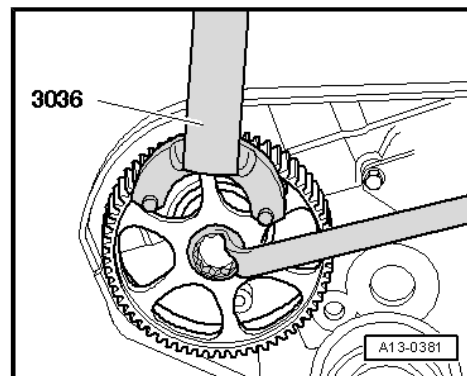
Vehicles with split toothed belt guard ⇒ [page 66](#) .

Vehicles without split toothed belt guard ⇒ [page 55](#) .

- Install poly V-belt ⇒ [page 22](#) .

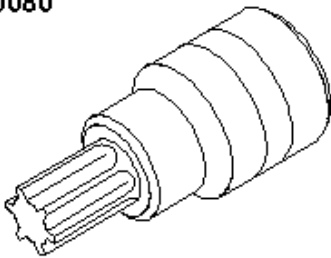
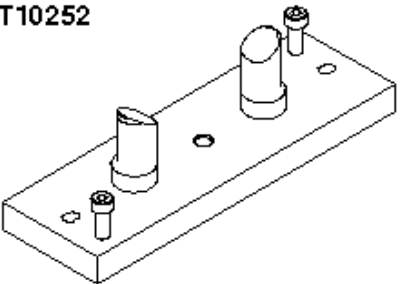
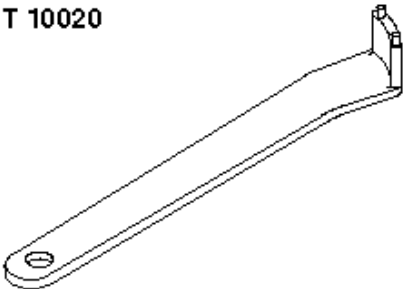
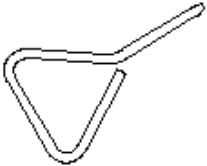
Further assembly is basically the reverse of the removal procedure.

Filling with new coolant ⇒ [page 126](#) .



## 2.6 Removing and installing camshaft adjuster

Special tools and workshop equipment required

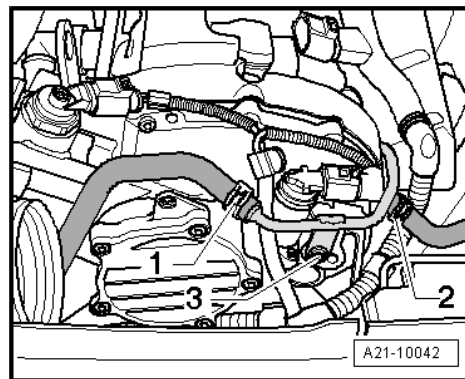
<p><b>T40080</b></p> 	<p><b>T10252</b></p> 
<p><b>T 10020</b></p> 	<p><b>T10115</b></p> 
	<p><b>G15-10004</b></p>



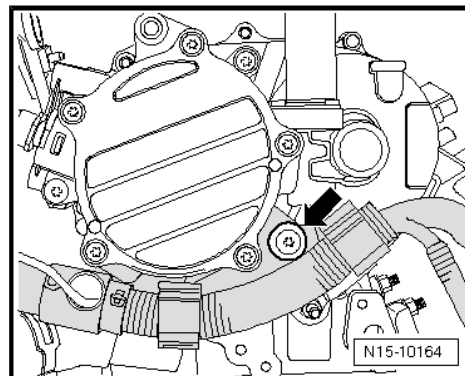
- ◆ Bit - T40080-
- ◆ Camshaft clamp - T10252-
- ◆ Locking pin - T10115-
- ◆ Pin wrench - T10020-
- ◆ Torque wrench - V.A.G 1332-

### Removing camshaft adjuster

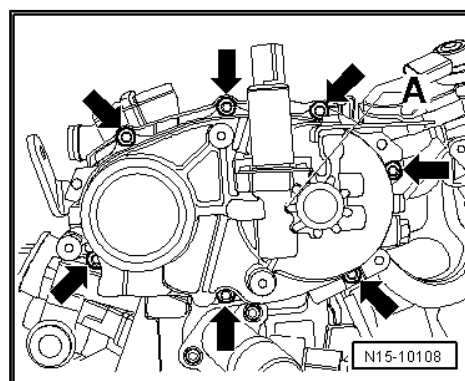
- Remove high-pressure pump ➔ [page 289](#) .
- Remove cylinder head cover ➔ [page 48](#) .
- Pull off coolant hoses -1 and 2-, unscrew bolt -3- and loosen coolant pipe from heat shield.



- Unscrew cable retainer -arrow-.



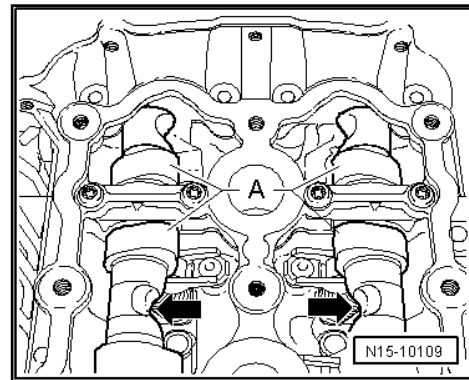
- Remove cover from camshaft adjuster -arrows-.







- Align mark on camshaft toothed belt pulley with mark on toothed belt guard. The indentations -arrows- now point vertically to each other.

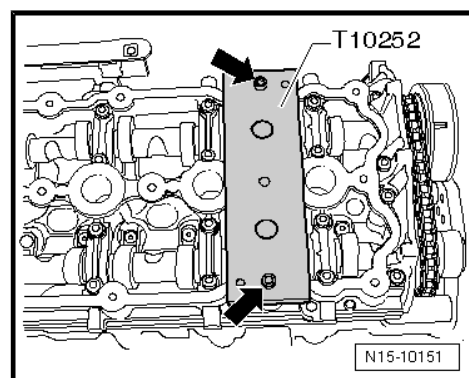


- Fit camshaft clamp - T10252- as shown and secure -arrows-.
- Loosen securing bolt for camshaft adjuster using special wrench, long reach - T40080- .



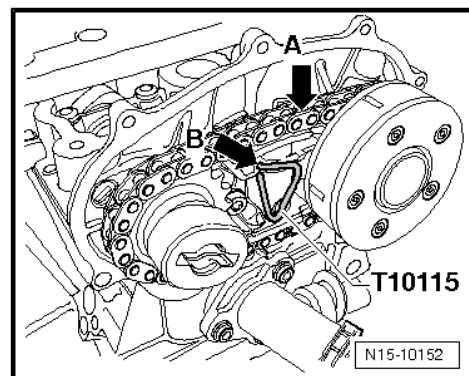
#### Note

*Do not cant special wrench, long reach - T40080- ! It could otherwise »twist«.*

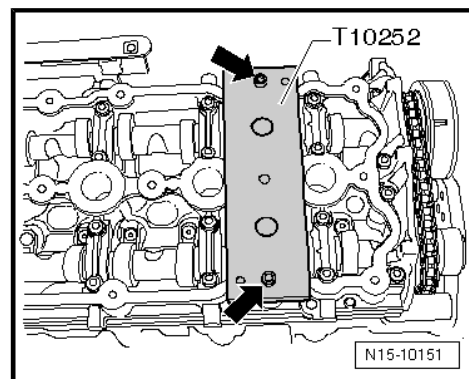


- Press chain tensioner together -arrow A- and secure it with locking pin - T10115- -arrow B-.
- Remove securing bolt from camshaft adjuster and remove camshaft adjuster together with chain.

#### Installing camshaft adjuster

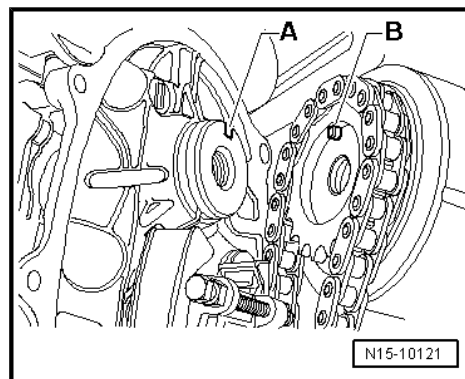


- The camshafts are located with the camshaft clamp - T10252- .
- Fit chain onto camshaft adjuster.

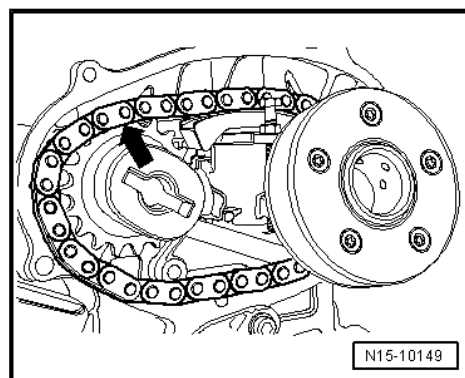




- Hold camshaft adjuster in front of exhaust camshaft so that notch -A- and pin -B- align.



- Lay chain over inlet camshaft chain sprocket starting at top -arrow- without changing its position.



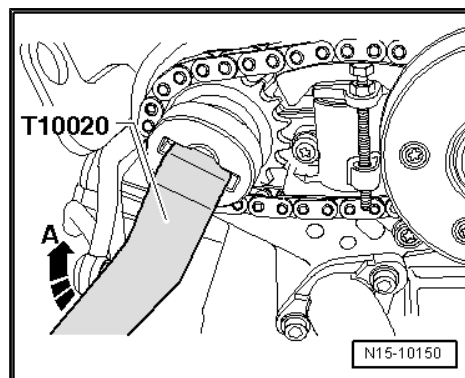
- Slowly turn inlet camshaft using 2-hole pin wrench - T10020- in direction of arrow -A- until the camshaft adjuster fits on the camshaft.



#### Note

*If pin does not fit into notch, remove chain and fit it again.*

- Tighten camshaft adjuster securing bolt to 20 Nm + 1/8 turn (45°) further. Use special wrench, long reach - T40080- for this purpose.



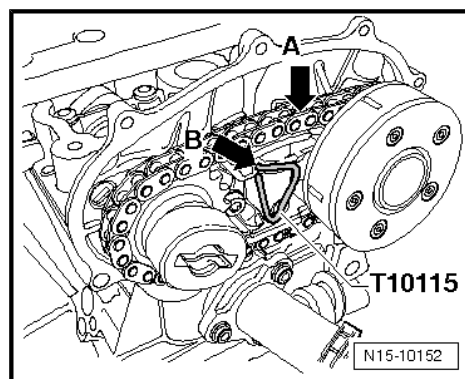
#### Note

*Do not cant special wrench, long reach - T40080- ! It could otherwise »twist«.*

- Remove locking pin - T10115- -arrow B-.

Further assembly is basically the reverse of the removal procedure.

- Installing high-pressure pump ⇒ [page 289](#) .



## 2.7 Removing and installing camshaft control valve 1 - N205-



### Special tools and workshop equipment required



- ◆ Torque wrench - V.A.G 1783-
- ◆ TORX bit set - V.A.G 1766-
- ◆ Ratchet insert 1/4" - VAS 6234-
- ◆ Pliers for spring-type clips - VAS 5024 A-

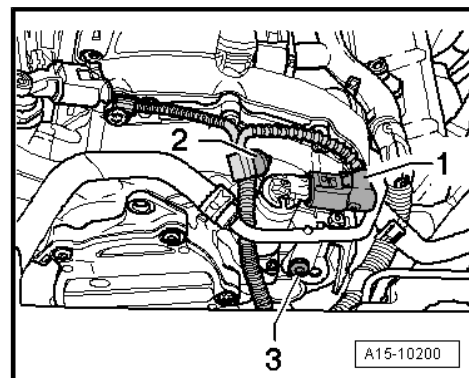
### Removing

- Pull off connector -1-.
- Loosen wiring harness -2- from retainer.
- Unscrew bolt -3-.



### Note

*Do not pull inlet camshaft control valve 1 - N205- out of connector.*





- Unscrew bolts -arrows- and pull inlet camshaft control valve 1 - N205- out of housing.

#### Installing



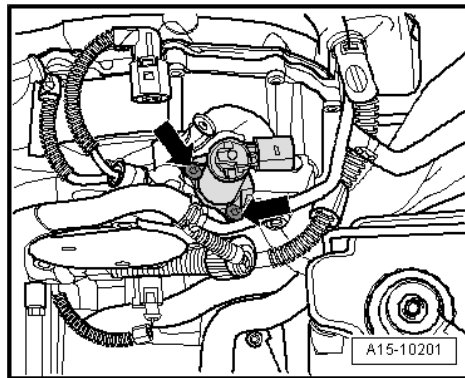
#### Note

- ◆ *The inlet camshaft control valve 1 - N205- and housing must be free of dirt and soiling.*
- ◆ *Unpack the new inlet camshaft control valve 1 - N205- immediately prior to installation.*



#### Caution

- ◆ *Ensure the inlet camshaft control valve 1 - N205- is protected from knocks and impacts.*



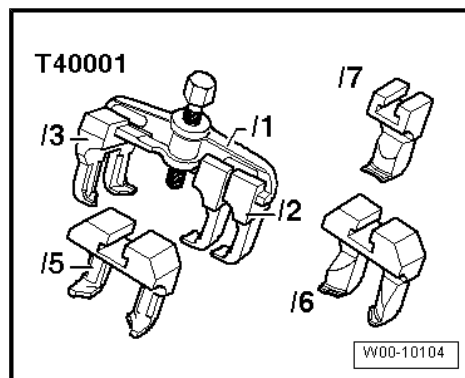
- Moisten O-ring with engine oil.
- Carefully insert inlet camshaft control valve 1 - N205- into housing and press vertically to valve axis to stop by hand.
- Tighten bolts to 4 Nm.

Further assembly is basically the reverse of the removal procedure.

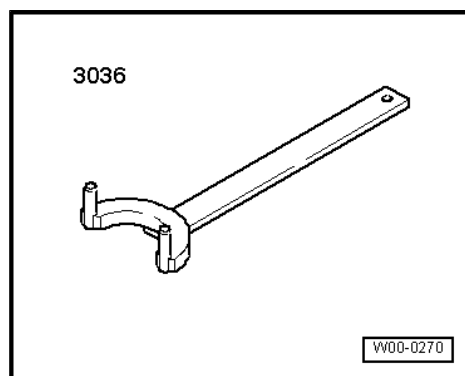
## 2.8 Removing and installing camshafts

### Special tools and workshop equipment required

- ◆ Two-arm puller - T40001-



- ◆ Counterhold - 3036-



- ◆ Sealant - D 154 103 A1-



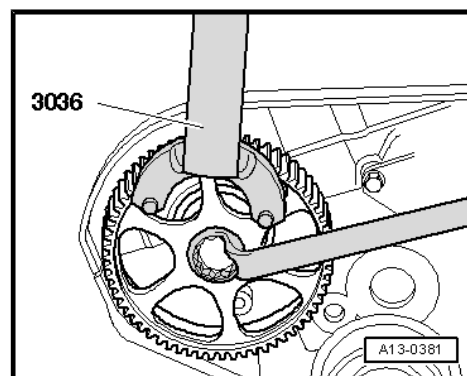
## Removing camshafts



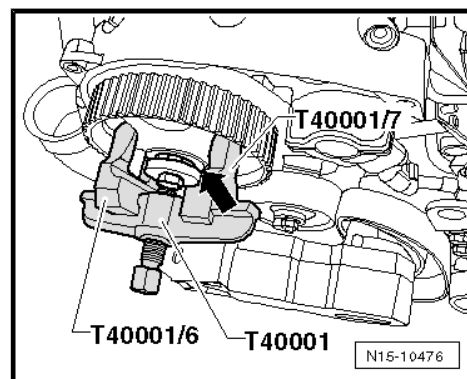
### Note

- ◆ *The sealing surfaces on the bottom of the retaining frame and top of the cylinder head must not be reworked.*
- ◆ *The camshaft bearings are integrated into the cylinder head and the retaining frame. The toothed belt must be relieved of tension before the retaining frame is removed.*
- ◆ *Renew camshaft oil seal and sealing cap if retaining frame has been unfastened.*

- Remove camshaft adjuster ➔ [page 89](#) .
- Remove toothed belt:  
Vehicles with split toothed belt guard ➔ [page 66](#) .  
Vehicles without split toothed belt guard ➔ [page 55](#) .
- Loosen securing bolt for camshaft pulley and unscrew approx. 10 mm (use counterhold - 3036- ).



- Pull off camshaft toothed belt pulley using puller - T40001- , hook - T40001/6- and hook - T40001/7- . The puller - T40001- is supported by the securing bolt -arrow-.
- Remove securing bolt and camshaft pulley.
- Remove rear toothed belt guard from cylinder head.
- Loosen retaining frame bolts evenly working from outside inwards and remove retaining frame.
- Carefully lift out the camshafts and place them down on a clean surface.





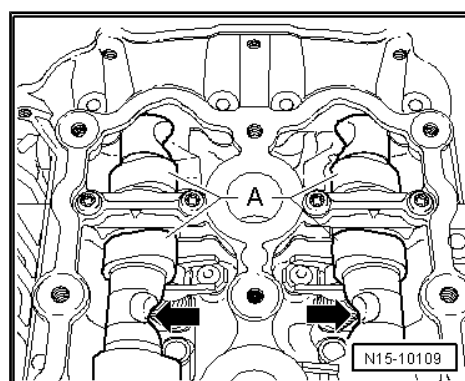
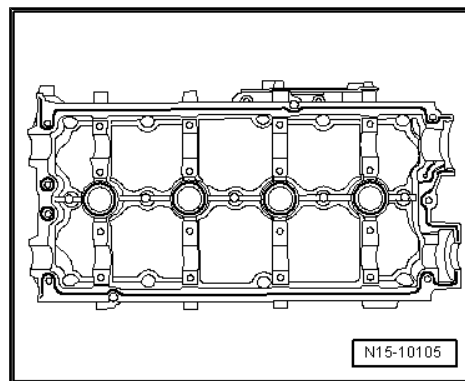
- Remove old sealant from groove in retaining frame as well as from sealing surfaces.
- Prevent dirt and residual sealant from entering cylinder head.

### Installing camshafts



#### Note

- ◆ *Sealing surfaces must be free of oil and grease.*
  - ◆ *The pistons cannot be positioned at TDC.*
  - ◆ *Ensure that all roller rocker fingers are properly seated on valve stem ends.*
- Oil running surfaces of camshafts.
  - Insert camshafts carefully in the camshaft bearings of cylinder head. Cams -A- of cylinder 4 must face each other.

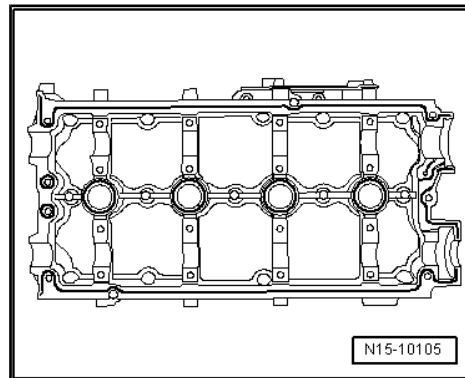


- Apply even, slightly projecting sealant bead (D 154 103 A1) into clean groove of retaining frame.

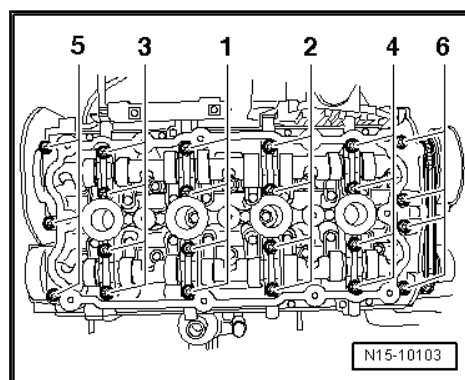


#### Note

- ◆ *Sealant must not be applied too thickly. If necessary wipe away excess sealant with a lint-free cloth.*
- ◆ *The retaining frame must be positioned and bolted on without interruption because the sealant begins to harden immediately when the sealing surfaces come into contact with each other.*
- ◆ *Check the expiry date of the sealant.*



- Place retaining frame on cylinder head.
- Tighten bolts lightly in several stages, working from inside outwards.
- Then tighten bolts in the sequence shown to 8 Nm <sup>1</sup>/<sub>4</sub> (90°) turn further.
- Drive in sealing cap ⇒ [Item 25 \(page 81\)](#) about 1...2 mm using thrust piece - 3334- .
- Install camshaft oil seal ⇒ [page 86](#) .
- Install rear toothed belt guard.
- Insert parallel key into camshaft.





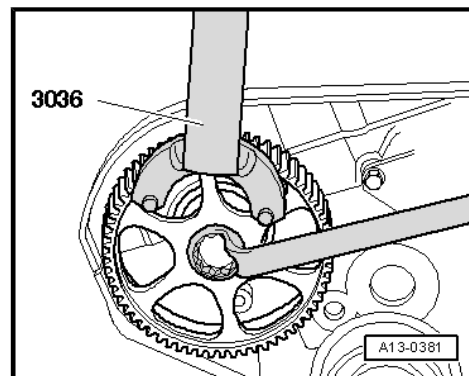
- Install camshaft sprocket. To tighten bolt, hold camshaft toothed belt pulley in position using counterhold - 3036- . Specified torque: ➔ [page 79](#) .



#### Note

- ◆ *When turning the camshaft, the pistons must not be at TDC. This could otherwise result in damage to valves and pistons.*
- ◆ *Ensure the parallel key is correctly seated.*
- Install toothed belt.  
Vehicles with split toothed belt guard ➔ [page 66](#) .  
Vehicles without split toothed belt guard ➔ [page 55](#) .
- Install camshaft adjuster ➔ [page 89](#) .
- Install cylinder head cover ➔ [page 48](#) .

Further assembly is basically the reverse of the removal procedure.





## 17 – Lubrication

### 1 Parts of lubrication system



#### Note

- ♦ *Finding metal shavings or a large quantity of small metal particles during engine repair could indicate that the crankshaft bearings or conrod bearings are damaged. To prevent this from causing further damage, perform the following repairs:*
- ♦ *Thoroughly clean oil channels.*
- ♦ *Renew oil spray jets.*
- ♦ *Renew engine oil cooler.*
- ♦ *Renewing oil filter.*
- ♦ *The oil level must remain below the max. mark - danger of damage to catalytic converter!*

Engine oil ⇒ [page 98](#) .

Assembly overview - parts of lubrication system ⇒ [page 98](#)

Draining oil filter housing ⇒ [page 103](#) .

Removing and installing sump ⇒ [page 104](#) .

Removing and installing oil pump with balance shaft gear assembly ⇒ [page 107](#) .

Removing and installing oil pressure switch - F1- ⇒ [page 112](#) .

Checking oil pressure and oil pressure switch (single pin oil pressure switch) ⇒ [page 113](#) .

Checking oil pressure and oil pressure switch (2-pin oil pressure switch) ⇒ [page 115](#) .

#### 1.1 Engine oil:

##### Oil capacities:

With oil filter 4.6 l

without oil filter 4.1 l.

Engine oil specifications ⇒ Maintenance ; Booklet ; Service tables .

Change engine oil ⇒ Maintenance ; Booklet ; Engine oil: Drain or extract; renew oil filter and replenish engine oil .

##### Markings on oil dipstick:

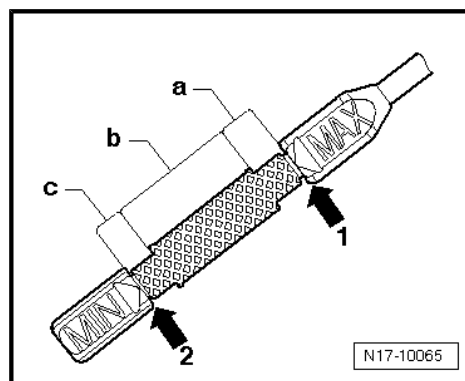
1 - Max. mark

2 - Min. mark

a - Oil level in max. mark area: do not replenish engine oil.

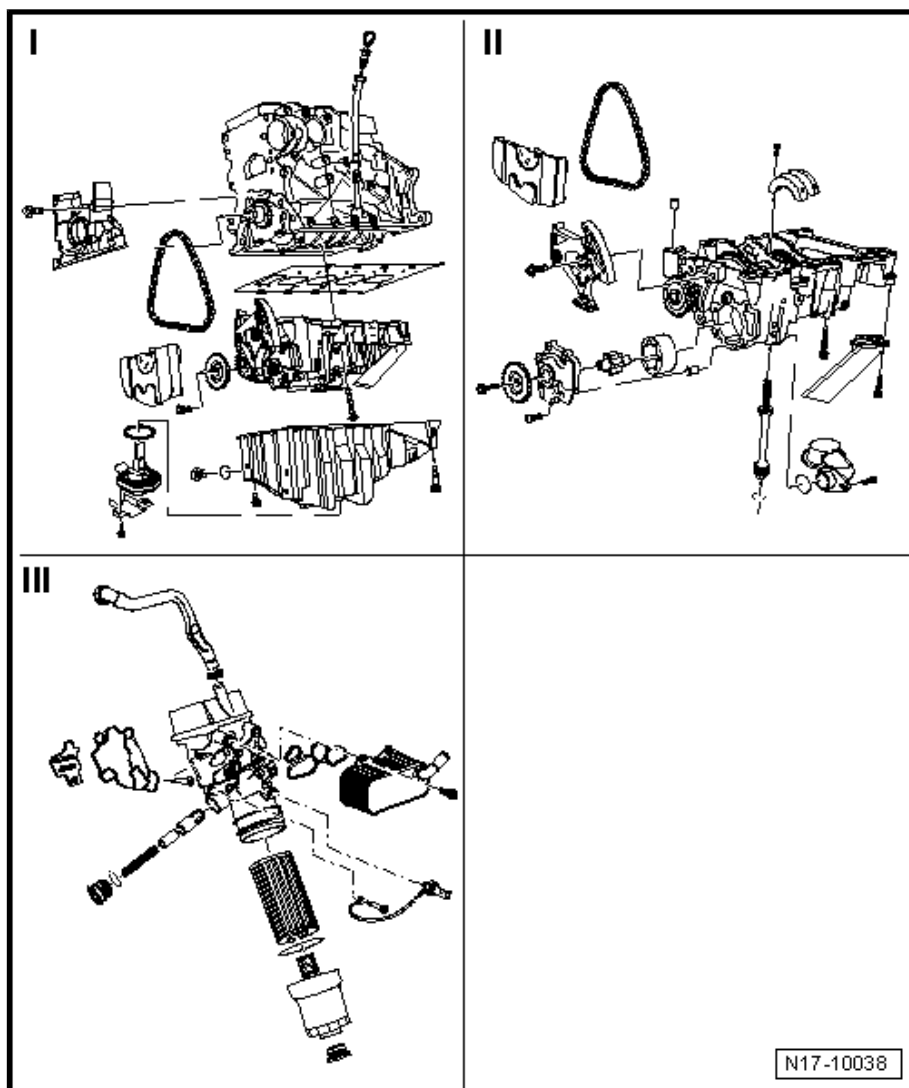
b - Oil level in middle range: can be topped up with engine oil.

c - Oil level in min. mark area: Replenish with approx. 0.5 l engine oil!



#### 1.2 Assembly overview - parts of lubrication system

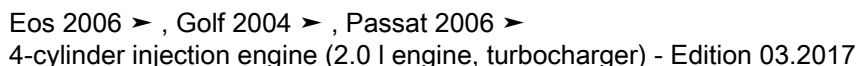




Part I ⇒ [page 100](#)

Part II ⇒ [page 101](#)

Part III ⇒ [page 102](#)



1 - 15 Nm

## 2 - Oil dipstick

- ❑ Markings  $\Rightarrow$  page 98.
- ❑ The oil level must not be above the max. mark!

### 3 - Dipstick guide

#### 4 - Guide tube

## 5 - Adapter

**6 - Oil pump with balance shaft gear assembly**

- ❑ With 12 bar pressure relief valve
- ❑ Removing and installing  
⇒ page 107

**7 - 15 Nm +  $\frac{1}{4}$  turn further (90°)**

- ❑ Renew
- ❑ Note different bolt lengths ⇒ **page 110**.

**8 - 15 Nm**

9 - 8 Nm

- ❑ To secure charge air pipe.

## 10 - Oil pan

- ❑ Clean sealing surface before fitting.
- ❑ Removing and installing  
⇒ page 104

**11 - 15 Nm**

**12 - Oil drain plug**

- ☐ 30 Nm
- ☐ With captive seal
- ☐ Renew

### 13 - Sprocket

14 - 10 Nm

- ☐ Not for engine code BPY

### 15 - Protective cap

- ☐ Not for engine code BPY

### 16 - Oil level and oil temperature sender - G266-

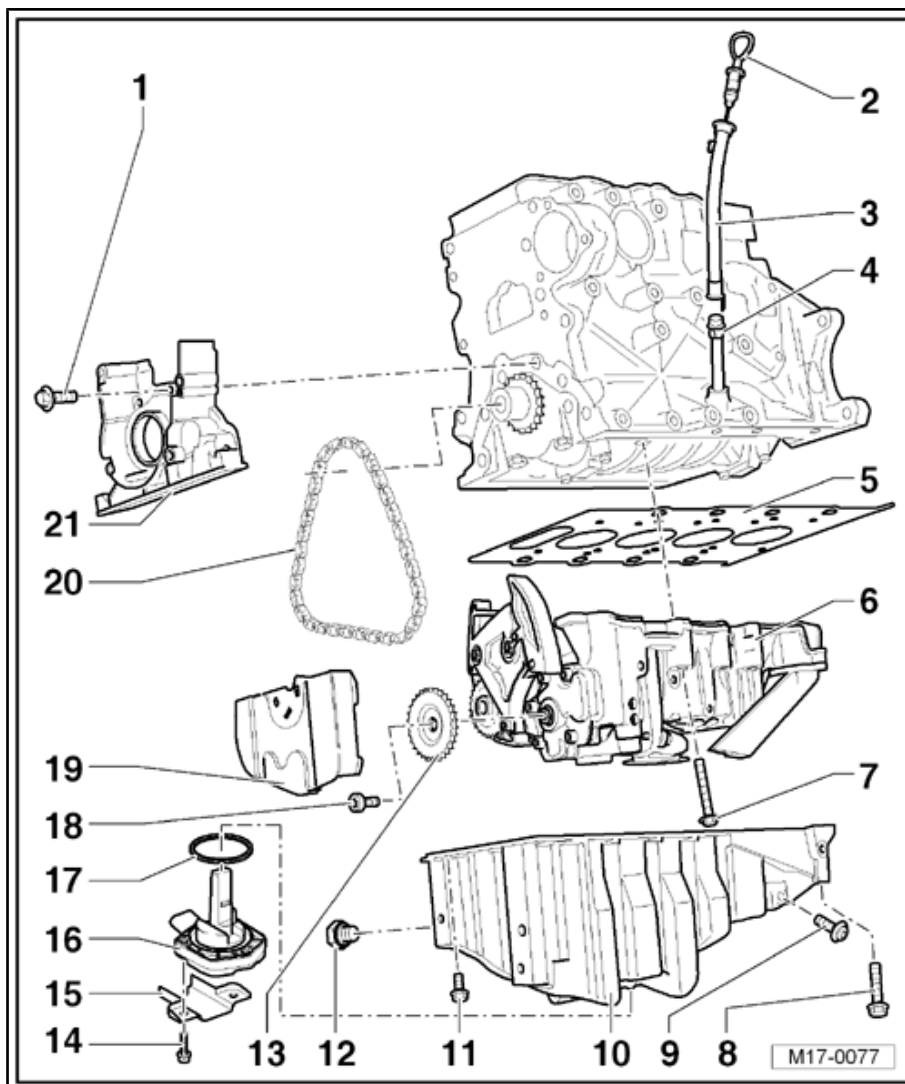
- ❑ Not for engine code BPY

**17 - Sealing ring**

- ☐ Not for engine code BPY
- ☐ Renew
- ☐ Lubricate before installing.

**18 - 20 Nm +  $\frac{1}{4}$  turn further (90°)**

- ☐
- Renew





## 19 - Chain guard

## 20 - Chain

## 21 - Sealing flange

- ☐ Must seat on dowel sleeves.
- ☐ Removing and installing ⇒ [page 28](#)
- ☐ Remove sump in order to remove and install ⇒ [page 104](#) .
- ☐ Renewing crankshaft oil seal - belt pulley end ⇒ [page 26](#) .

## 1.2.2 Part 2

### 1 - Chain guard

### 2 - Chain

- ☐ Before removing, mark running direction (installation position) with paint.

### 3 - Dowel sleeves

### 4 - Adapter

### 5 - Oil pump with balance shaft gear assembly

- ☐ Before installing, ensure that both dowel sleeves for centring are installed.

### 6 - 9 Nm

### 7 - Cover

- ☐ Prevents engine oil from foaming

### 8 - 40 Nm

### 9 - 8 Nm

### 10 - Oil intake tube

- ☐ Clean strainer if soiled

### 11 - O-ring

- ☐ Renew

### 12 - 15 Nm + 1/4 turn further (90°)

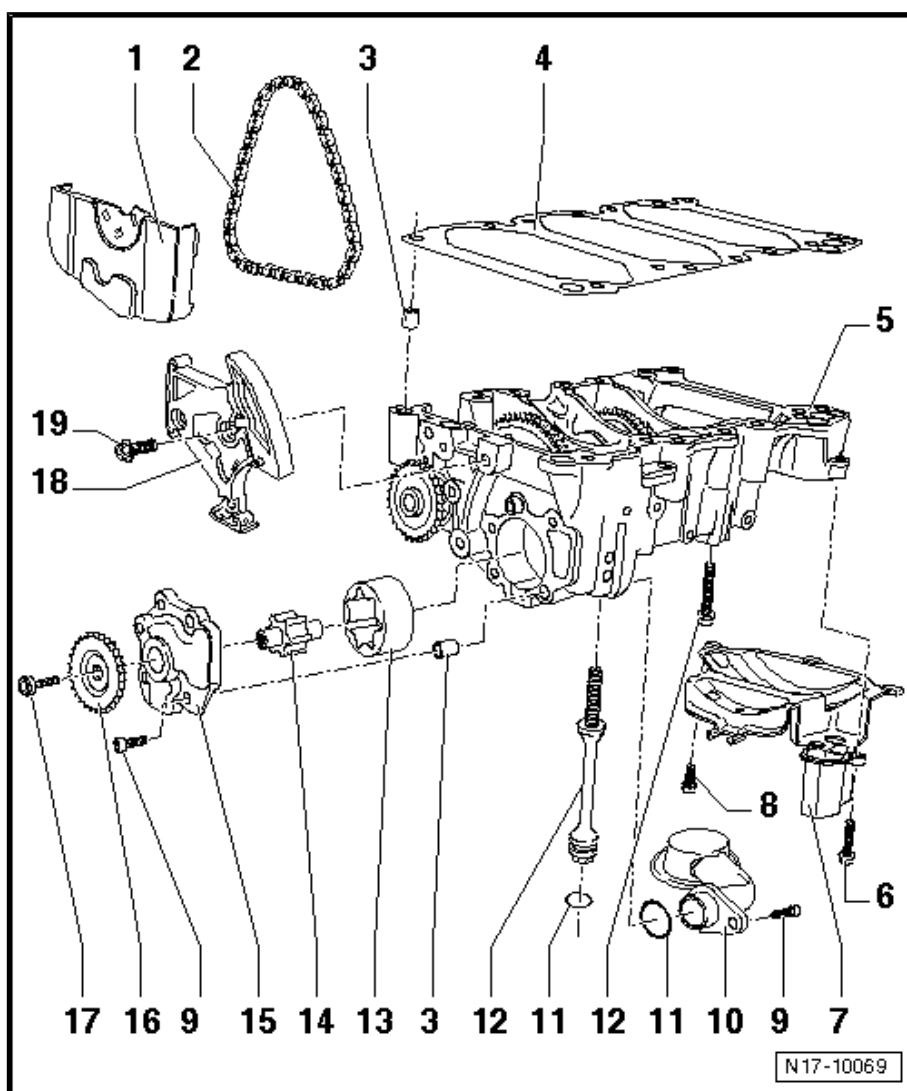
- ☐ Renew
- ☐ Note different bolt lengths ⇒ [page 110](#) .

### 13 - Outer rotor

- ☐ Check running surfaces for scoring.
- ☐ Marking must be visible.

### 14 - Inner rotor

- ☐ Check running surfaces for scoring.





15 - Oil pump cover

16 - Sprocket

17 - 20 Nm +  $\frac{1}{4}$  turn further (90°)

☐ Renew

18 - Chain tensioner with tensioning rail

☐ Preload when installing ⇒ [page 111](#) .

19 - 15 Nm

### 1.2.3 Part 3 Oil filter bracket

1 - Tube

☐ For crankcase ventilation.

2 - Oil pressure switch - F1-

☐ 1.4 bar, black.

☐ Checking ⇒ [page 113](#)

☐ Removing and installing  
⇒ [page 112](#)

☐ Specified torque: 20 Nm

☐ With earth wire for oil  
pressure switch (only  
with single pin oil pres-  
sure switch).

3 - 15 Nm + turn 90° further

☐ Renew

☐ With earth wire for oil  
pressure switch (only  
with single pin oil pres-  
sure switch).

4 - Bracket

5 - 25 Nm

6 - Engine oil cooler

☐ Observe notes

⇒ [page 98](#)

☐ Ensure clearance to ad-  
jacent components

7 - Seal

☐ Renew

8 - 15 Nm + turn 90° further

☐ Renew

9 - Sealing ring

☐ Renew

☐ Coat with oil before inserting

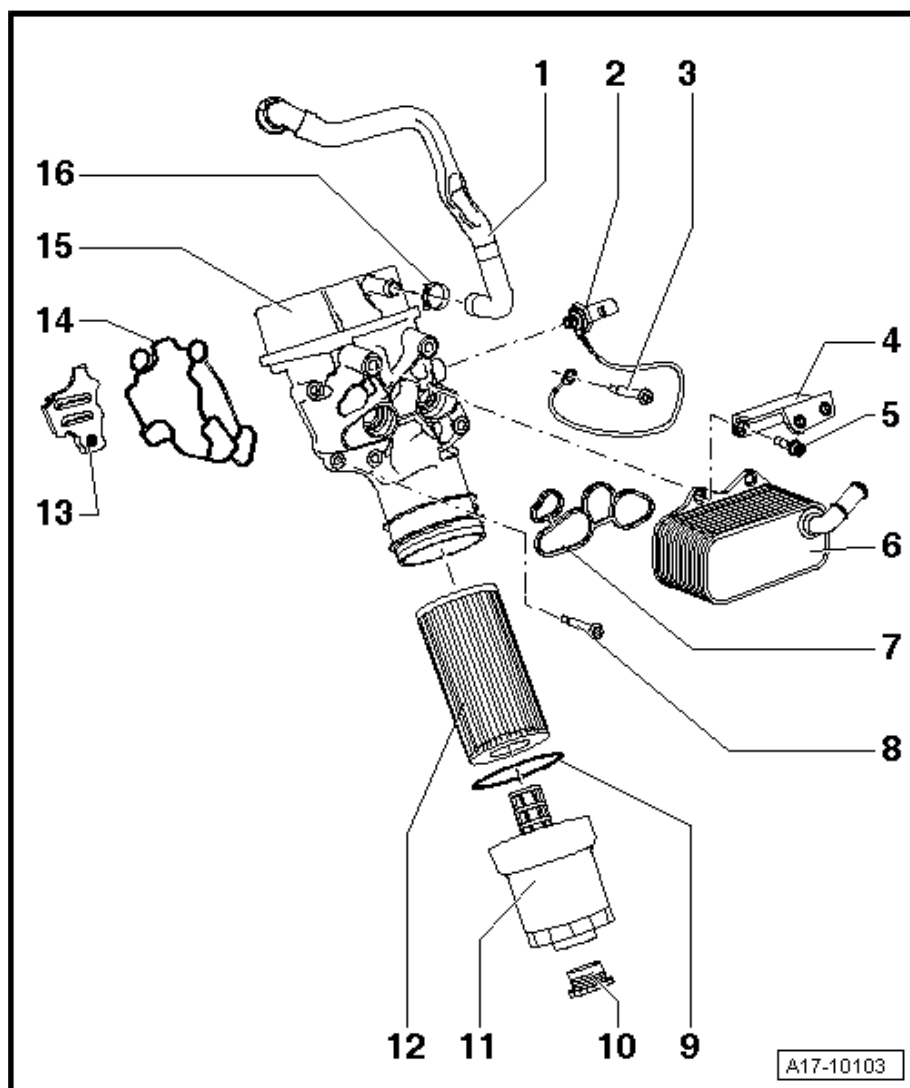
☐ Service tag at top

10 - Dust cap

11 - Oil filter housing

☐ 25 Nm

☐ Remove and install with oil filter tool - 3417-





- ☐ Emptying ⇒ [page 103](#)

## 12 - Oil filter element

- ☐ Empty oil filter housing before removing ⇒ [page 103](#) .
- ☐ Renew ⇒ Maintenance ; Booklet ; Engine oil: draining or extracting; renewing oil filter and replenishing engine oil

## 13 - Baffle plate

## 14 - Seal

- ☐ Renew

## 15 - Oil filter bracket

- ☐ With pressure relief valve, approx. 4 bar.
- ☐ Removing and installing ⇒ [page 111](#)

## 16 - Spring-type clip

# 1.3 Drain oiling filter housing

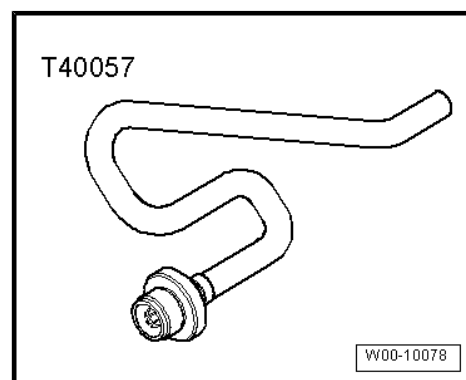


### Note

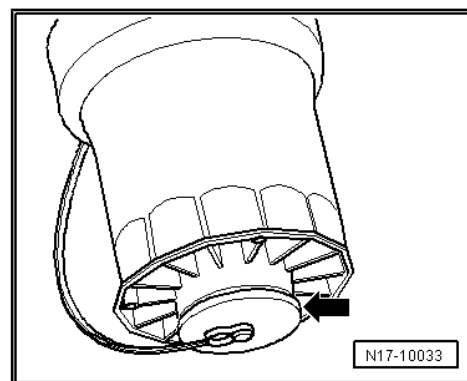
*A valve is opened in the oil filter housing when oil drain adapter - T40057- is screwed in. When oil drain adapter - T40057- is removed, the valve closes again.*

### Special tools and workshop equipment required

- ◆ Oil drain adapter - T40057-

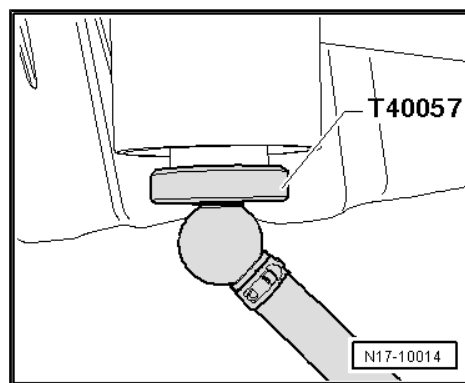


- Unscrew dust cap from oil filter housing -arrow-.



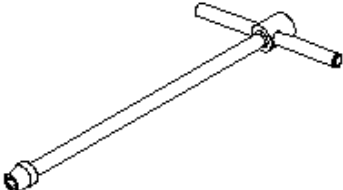
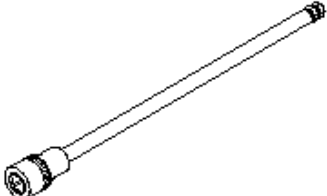
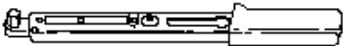


- Hold hose of oil drain adapter - T40057- in a catch pan and screw oil drain adapter - T40057- into oil filter housing.
- Allow engine oil to drain off.



## 1.4 Removing and installing sump

Special tools and workshop equipment required

<b>3185</b> 	<b>T10058</b> 
<b>V.A.G 1331</b> 	
	<b>W17-0030</b>

- ◆ U/J extension and socket, 10 mm - 3185-
- ◆ Bit - T10058-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Scraper
- ◆ Silicone sealant - D 176 404 A2-



### Removing sump:

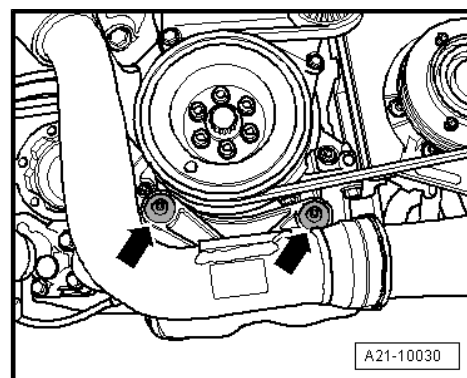
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .
- Drain engine oil.



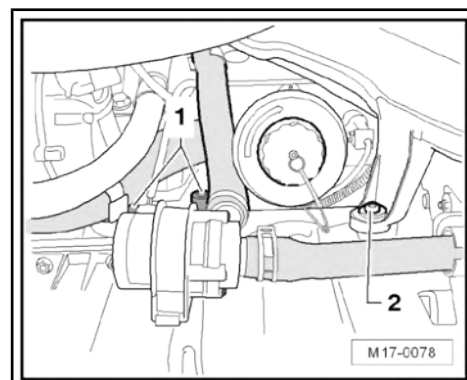
#### Note

*Please observe disposal instructions!*

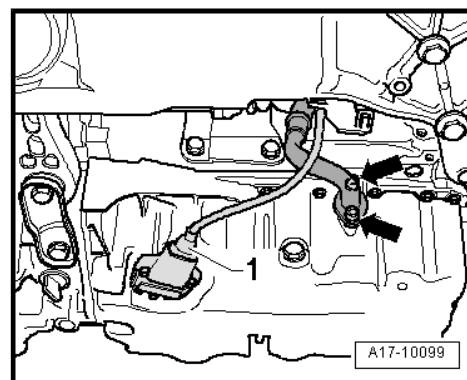
- Unscrew bolts -arrows-.



- Unscrew securing bolts -1- and -2-.

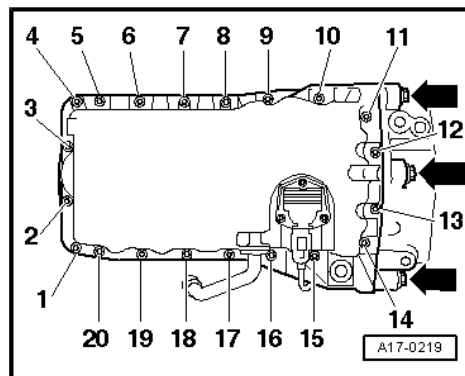


- Unbolt oil return line -arrows-.
- Pull off connector -1- on vehicles with oil level and oil temperature sender - G266- .





- Remove securing bolts for sump to gearbox -arrows-.
- Loosen sump bolts on flywheel end using T-bar and socket, 10 mm - 3185- and remove with special wrench, long reach - T10058- .
- Unscrew remaining bolts and remove sump. Loosen sump with light blows of a rubber headed hammer if necessary.
- Remove sealant residue from cylinder block with a flat scraper.



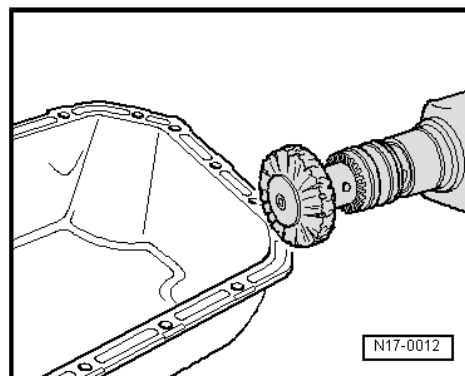
- Remove remaining sealant from sump e.g. with rotating plastic brush or similar.

#### Installing sump:

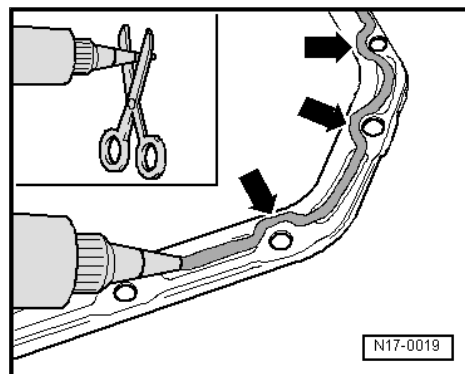


#### Note

- ♦ Check the expiry date of the sealant.
- ♦ The sump must be installed immediately and tightened after applying silicone sealing compound.



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



#### Note

- ♦ The sealant bead must not be thicker, otherwise excessive sealant enters the sump and may block the oil suction pipe strainer.
- ♦ If gearbox is removed, sump must align smoothly with cylinder block.
- ♦ If gearbox is installed, sump must rest against gearbox.
- ♦ Let sealing compound dry for approx. 30 minutes after installing oil sump. Only then fill with engine oil.

- Put sump in position immediately and tighten bolts as follows:
  - 1 - Tighten all sump/cylinder block bolts only very lightly and diagonally.
  - 2 - Tighten sump/gearbox bolts lightly.
  - 3 - Further tighten all sump/cylinder block bolts lightly using diagonal sequence.
  - 4 - Tighten sump/gearbox bolts to 40 Nm.
  - 5 - Tighten all sump/cylinder block bolts diagonally to 15 Nm.

Further assembly is basically the reverse of the removal procedure.

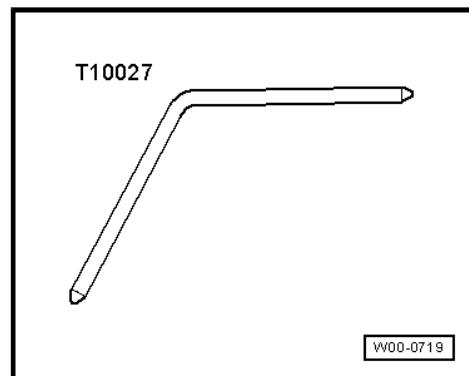




## 1.5 Removing and installing oil pump with balance shaft gear assembly

Special tools and workshop equipment required

- ◆ Locking pin - T10027-



- ◆ Silicone sealant - D 176 404 A2-

Removing oil pump with balance shaft gear assembly

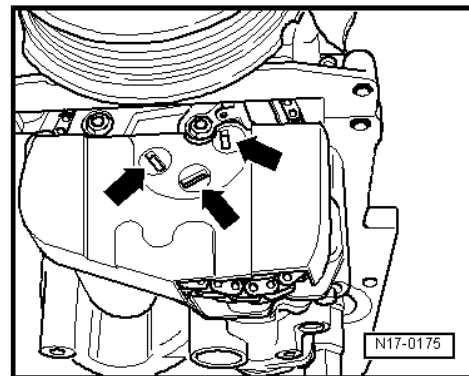
⇒ [page 107](#)

Installing and adjusting oil pump with balance shaft gear assembly ⇒ [page 109](#)

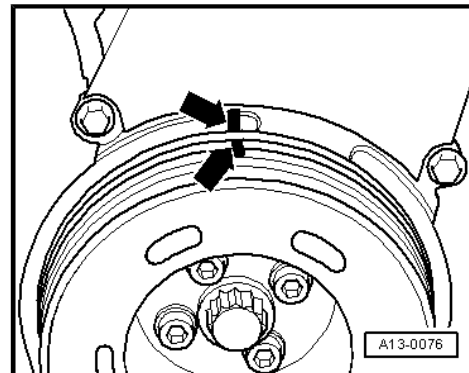
Preloading chain tensioner ⇒ [page 111](#)

### 1.5.1 Removing oil pump with balance shaft gear assembly

- Remove sump ⇒ [page 104](#) .
- Pull off chain guard. Release retaining tabs if necessary through openings -arrows- using a small screwdriver.



- Turn crankshaft to TDC No. 1 cylinder.





### Note

*Check that there is a marking on balance shaft sprocket which aligns with locking hole -arrow-. If there is no mark, mark position using a waterproof pen. The mark is required for reinstalling.*

- Loosen bolt on oil pump sprocket. Counterhold on centre bolt of vibration damper.

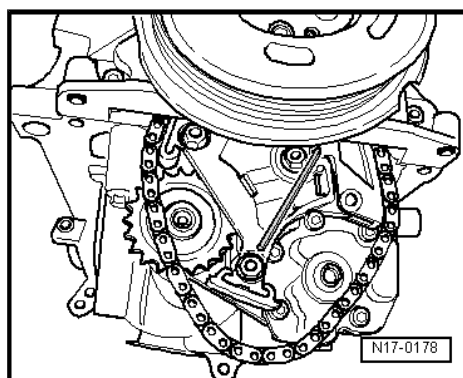
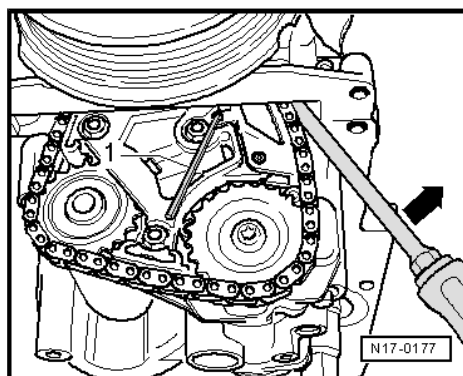
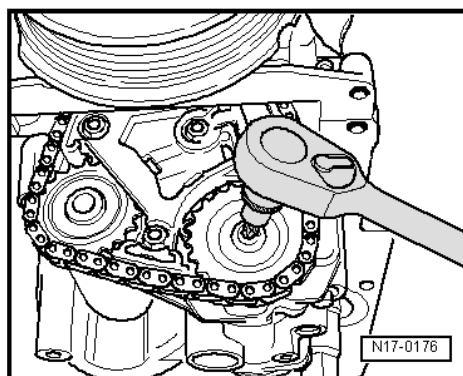
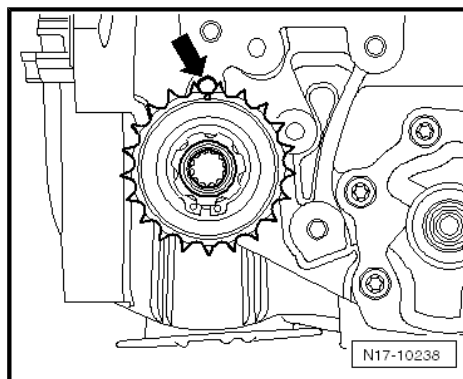


### Caution

***The balance shaft drive sprocket must not be loosened!***

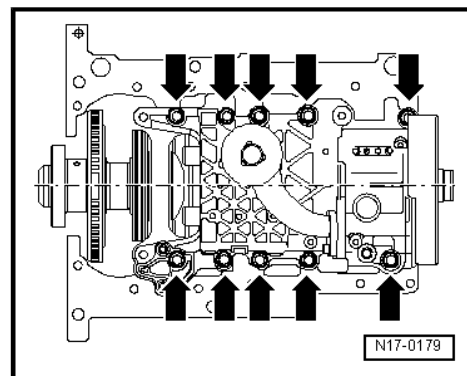
- Relieve tension on chain guide using a screwdriver -arrow- and lock using a 3 mm hexagon socket head key -1-.

- Remove oil pump sprocket and disengage chain at balance shaft drive.



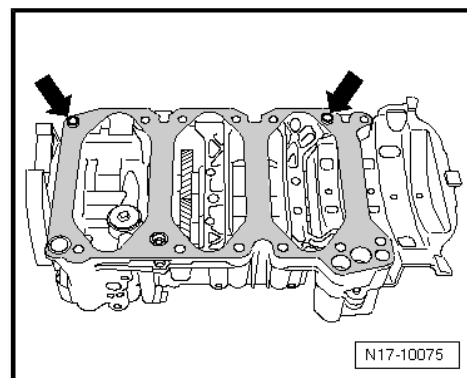


- Loosen balance shaft gear assembly bolts from inside outwards and remove it. Assembly overview - oil pump with balance shaft gear assembly ➤ [page 101](#) .



### 1.5.2 Removing and installing oil pump with balance shaft gear assembly

- Chain tensioner preloaded ➤ [page 111](#)
- Place intermediate plate over dowel sleeves of balance shaft gear assembly as shown -arrows-.

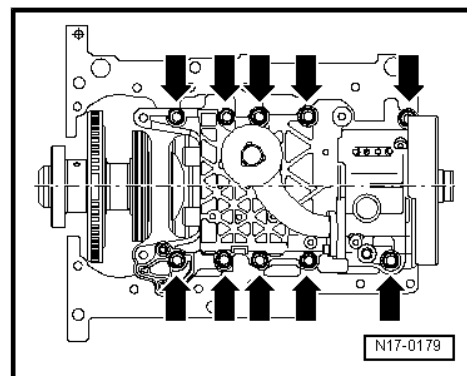


- Install oil pump with balance shaft gear assembly and intermediate plate. Tighten securing bolts from inside outwards to 15 Nm + 1/4 turn (90°) further.

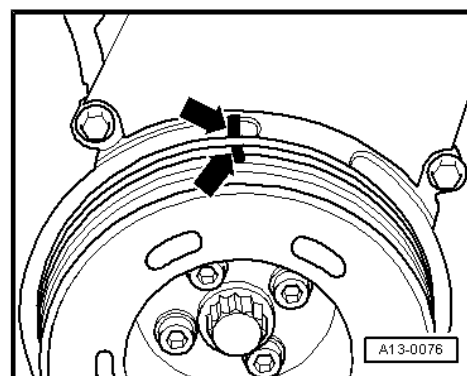


#### Note

Note different bolt lengths ➤ [page 110](#) .

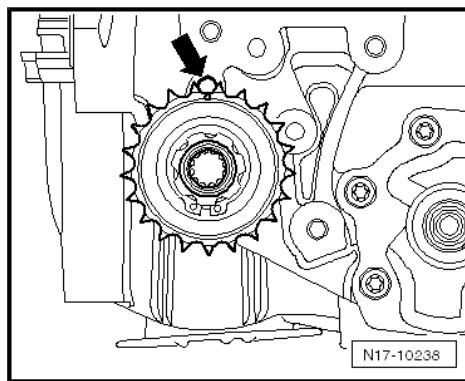


- Turn crankshaft to TDC No. 1 cylinder.





- Align marking on balance shaft chain sprocket -arrow- with locking hole.

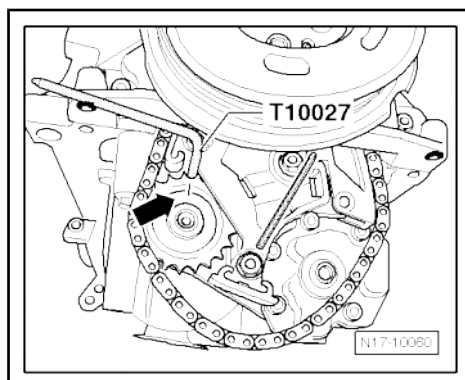


- Lock sprocket in this position using locking pin - T10027- . Lay chain over balance shaft sprocket.
- Install oil pump sprocket and hand-tighten the bolt.



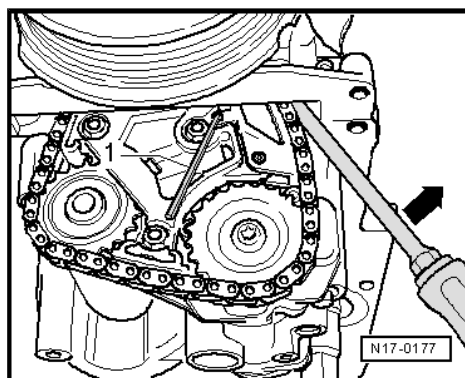
#### Note

*The oil pump sprocket can only be installed correctly in one position. For installation, only the oil pump may be turned.*



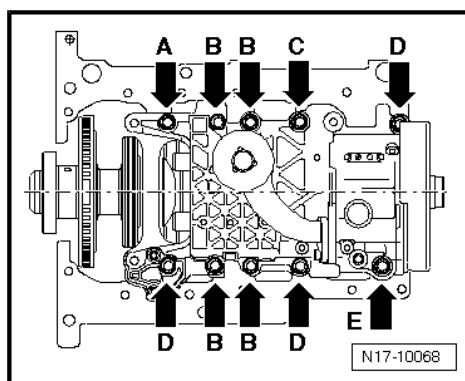
- Remove locking pin - T10027- and hexagon socket head key -1-. Secure oil pump sprocket. Specified torque 20 Nm + 1/4 turn (90°) further. Counterhold on centre bolt of vibration damper.
- Install sump ➔ [page 104](#) .

Further assembly is basically the reverse of the removal procedure.



#### Bolt allocation for balance shaft gear assembly

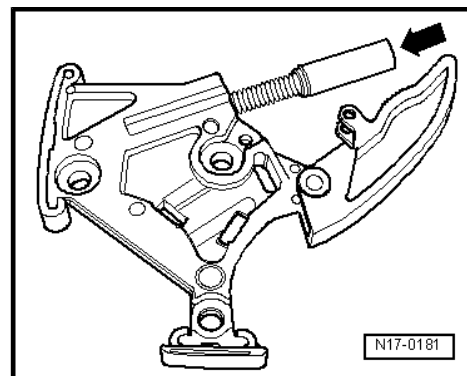
- A - Hexagon head collar bolt M7x40
- B - Hexagon collared bolt M7x70
- C - Hexagon head collar bolt M7x90
- D - Hexagon head collar bolt M7x55
- E - Plug with O-ring



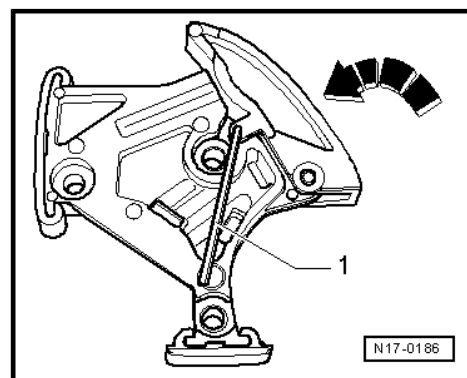


### 1.5.3 Preloading chain tensioner

- Pre-tension piston by hand -arrow-.



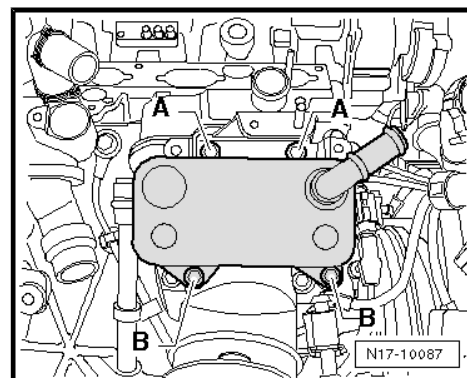
- Press chain guide in direction of arrow and lock in place using 3 mm hexagon socket head key -1-.



### 1.6 Removing and installing oil filter bracket

Removing:

- Remove intake manifold ➔ [page 277](#) .
- Remove coolant pipes ➔ [page 131](#) .
- Remove engine oil cooler by unscrewing bolts -A- and -B-.



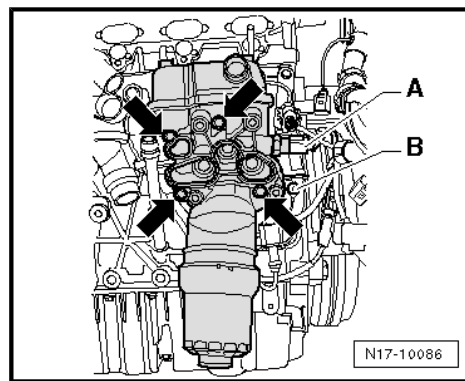


- Pull connector -A- off oil pressure switch and unscrew bolt -B- for earth wire.
- Unscrew securing bolts -arrows- and remove oil filter bracket.

**Installing:**

- Renew gaskets ⇒ [Item 7 \(page 102\)](#) and ⇒ [Item 14 \(page 103\)](#) .
- Install baffle plate ⇒ [Item 13 \(page 103\)](#) .
- Install oil filter bracket and tighten bolts evenly to 15 Nm + 90°.
- Install engine oil cooler with bracket for coolant pipes.

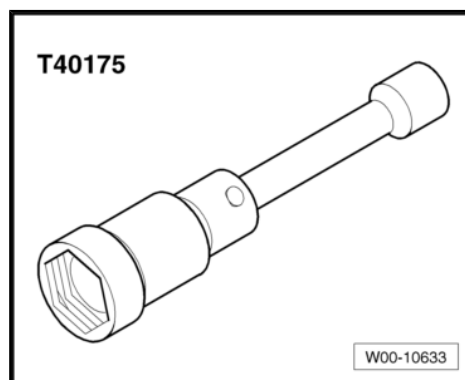
Further assembly is basically the reverse of the removal procedure.



## 1.7 Removing and installing oil pressure switch - F1-

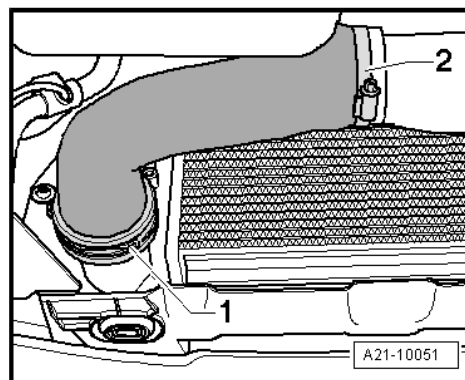
**Special tools and workshop equipment required**

- ◆ Jointed wrench 24 mm - T40175-



**Removing:**

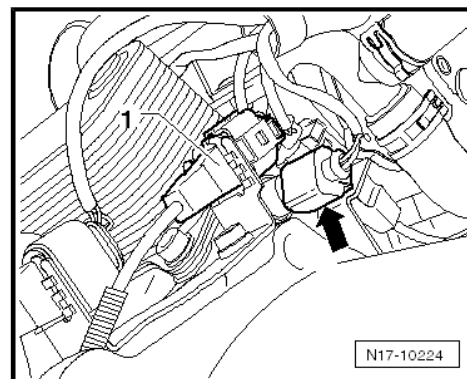
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Noise insulation .
- Remove left charge air pipe -item 1 and 2-





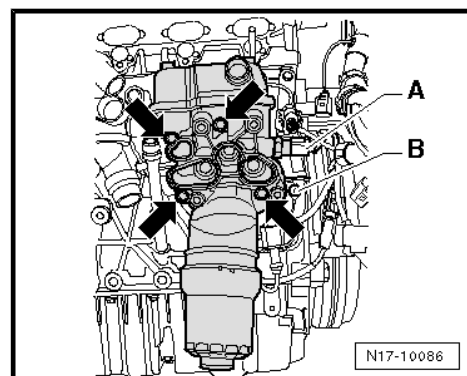
- Remove electrical connector -1- from retainer and pull connector -arrow- off oil pressure switch.

**Vehicles with a 1-pin oil pressure switch:**



- Unscrew bolt -B- for earth line (ignore arrows).

**All vehicles:**



- Unscrew oil pressure switch with 24 mm articulated wrench - T40175-

**Installing:**

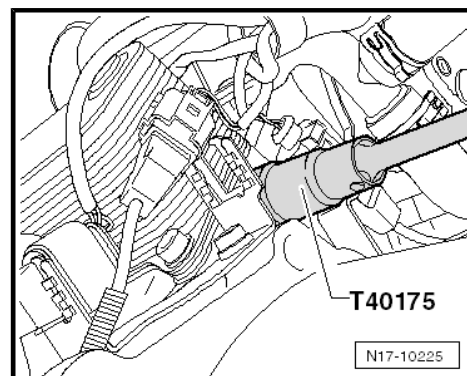
- Insert oil pressure switch by hand and tighten to 20 Nm.



**Note**

*For single pin oil pressure switch, check earth wire is connected.*

Further assembly is basically the reverse of the removal procedure.



## 1.8 Checking oil pressure and oil pressure switch (single pin oil pressure switch)

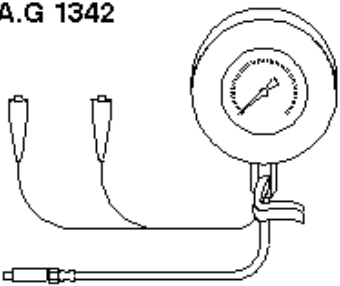
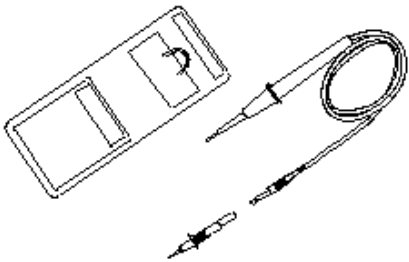



**Note**

*Single pin and 2-pin oil pressure switches have been installed. Check which type of oil pressure switch has been installed. Checking oil pressure and oil pressure switch (2-pin oil pressure switch) ⇒ [page 115](#).*



**Special tools and workshop  
equipment required**

<b>V.A.G 1342</b> 	<b>V.A.G 1527 B</b> 
<b>V.A.G 1594 C</b> 	

W17-10002

- ◆ Oil pressure tester - V.A.G 1342-
- ◆ Voltage tester - V.A.G 1527 B-
- ◆ Adapter set - V.A.G 1594C-
- Engine oil level OK.
- Engine oil temperature at least 80 °C (radiator fan must have run once)



**Note**

*Functional check and repair of the optical and acoustic oil pressure display: Current flow diagrams ⇒ Vehicle diagnostic tester "Functions and component selection".*





- Remove oil pressure switch - F1- ➔ [page 112](#) and screw it into tester.
- Screw tester into oil filter bracket in place of oil pressure switch.
- Connect brown wire of tester to earth (-).
- Connect voltage tester - V.A.G 1527 B- to battery positive (+) and oil pressure switch using cable from auxiliary measuring set - V.A.G 1594C- . LED must not light up.
- If the LED lights up, renew 1.4 bar oil pressure switch - F1- .

If LED does not light up:

- Start engine and increase engine revolutions. At 1.2...1.6 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 between 2.7...4.5 bar.

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

If specification is not attained:

- Check strainer in oil suction pipe for contamination/soiling ➔ [Item 10 \(page 101\)](#) .



#### Note

*Mechanical damage, e.g. to bearings, could also be the cause for oil pressure being too low.*

If no fault is found:

- Renew oil pump and balance shaft gear assembly ➔ [page 107](#) .

If the specification is exceeded:

- Check oil channels.
- If necessary, replace oil filter bracket with pressure relief valve.

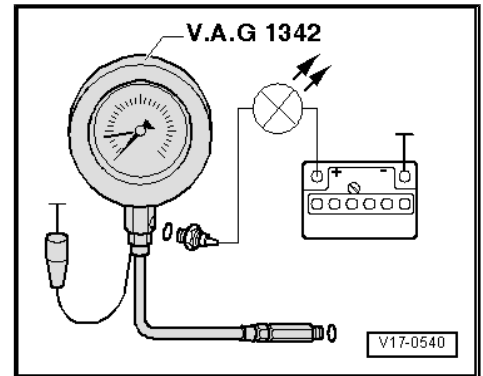
## 1.9 Checking oil pressure and oil pressure switch (2-pin oil pressure switch)



#### Note

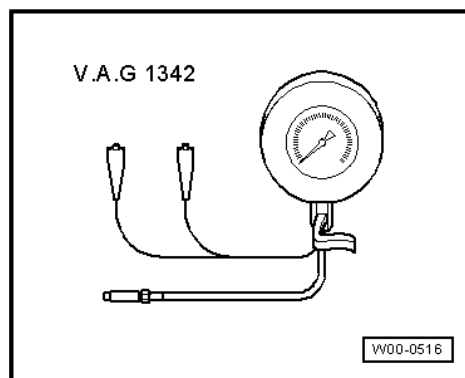
*Single pin and 2-pin oil pressure switches have been installed. Check which type of oil pressure switch has been installed. Checking oil pressure and oil pressure switch (single pin oil pressure switch) ➔ [page 113](#) .*

**Special tools and workshop equipment required**

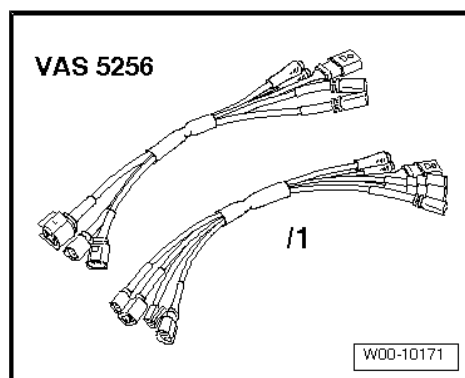




◆ Oil pressure tester - V.A.G 1342-



◆ Test instrument adapter/DSO (2-pin) - VAS 5256-



◆ Hand multimeter - V.A.G 1526D-



- Engine oil level OK.
- Engine oil temperature at least 80 °C (radiator fan must have run once)



**Note**

*Functional check and repair of the optical and acoustic oil pressure display: Current flow diagrams ⇒ Vehicle diagnostic tester "Functions and component selection".*



- Remove oil pressure switch - F1- ➔ [page 112](#) and screw it into tester.
- Screw tester into oil filter bracket in place of oil pressure switch.
- Connect test instrument/DSO adapter (2-pin) - VAS 5256- to oil pressure switch
- Connect Multimeter - V.A.G 1526D- to test instrument/DSO adapter (2-pin) - VAS 5256- and check for continuity.
- Oil pressure switch must be open below 1.2 bar.
- Start engine and increase engine speed. At 1.2...1.6.bar, the oil pressure switch must close, 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 between 2.7...4.5 bar.

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

If specification is not attained:

- Check strainer in oil suction pipe for contamination/soiling  
➔ [Item 10 \(page 101\)](#) .



#### Note

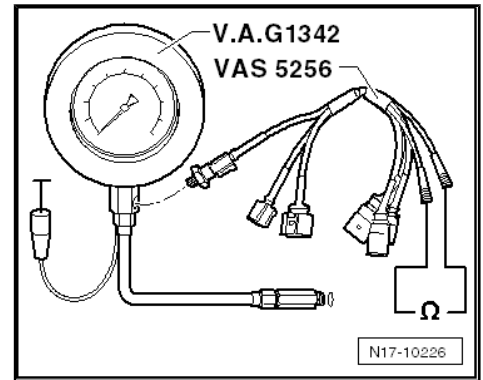
*Mechanical damage, e.g. to bearings, could also be the cause for oil pressure being too low.*

If no fault is found:

- Renew oil pump and balance shaft gear assembly  
➔ [page 107](#) .

If the specification is exceeded:

- Check oil channels.
- If necessary, replace oil filter bracket with pressure relief valve.





## 19 – Cooling

### 1 Parts of cooling system



#### WARNING

*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*



#### Note

- ◆ *Cooling system is pressurized when engine is warm. If necessary, release pressure before carrying out repairs.*
- ◆ *Secure all hose connections with hose clips which conform to production standard.*
- ◆ *Hose clip pliers - VAS 6362- and -VAS 6499- are recommended for installing spring-type clips.*
- ◆ *Renew gaskets and seals.*
- ◆ *The arrows on the coolant pipes and on the ends of the hoses must be aligned with each other.*

Assembly overview - parts of cooling system, engine side  
⇒ [page 118](#) .

Assembly overview - parts of cooling system, body side  
⇒ [page 122](#) .

Connection diagram for coolant hoses ⇒ [page 123](#)

Draining and filling with coolant ⇒ [page 126](#) .

Removing and installing coolant pump ⇒ [page 129](#) .

Removing and installing coolant pipes ⇒ [page 131](#)

Removing and installing thermostat housing with thermostat  
⇒ [page 133](#)

Removing and installing radiator fan - V7- and radiator fan 2 - V177- ⇒ [page 134](#)

Removing and installing radiator ⇒ [page 134](#)

Checking cooling system for leaks ⇒ [page 137](#) .

#### 1.1 Assembly overview - parts of cooling system, engine side



**1 - Securing bolt**

- ☐ 40 Nm

**2 - Securing bolt**

- ☐ 30 Nm

**3 - Coolant pipe**

**4 - Connection hose**

**5 - O-ring**

- ☐ Renew

**6 - Union**

**7 - 10 Nm**

**8 - Retaining clip**

**9 - O-ring**

- ☐ Renew

**10 - Radiator outlet coolant - G62-**

**11 - Connection hose**

**12 - Connector**

**13 - Connection hose**

**14 - Connection hose**

**15 - Connection hose**

**16 - Coolant pipe**

**17 - 5 Nm**

**18 - Connection hose**

**19 - Coolant pipe**

**20 - 5 Nm**

**21 - Thermostat housing**

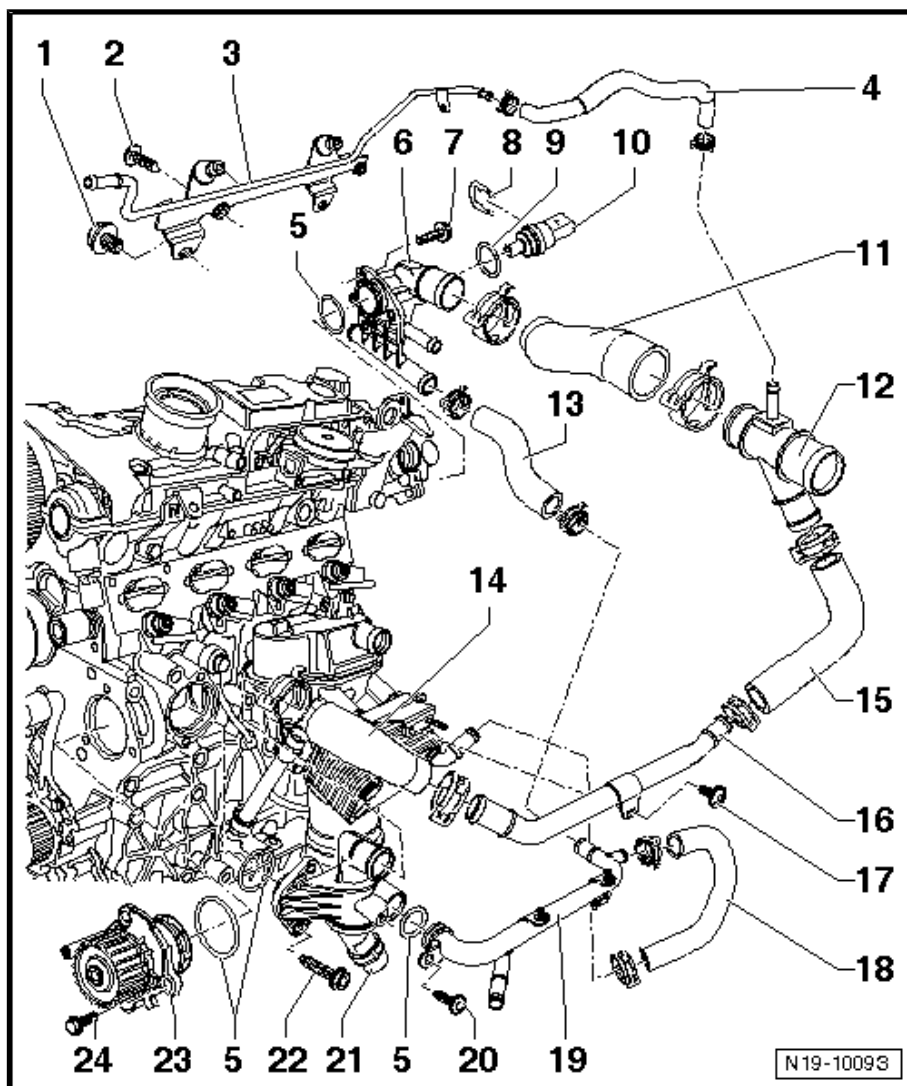
- ☐ With thermostat
- ☐ Checking thermostat ⇒ Vehicle diagnostic tester "Function and component selection".
- ☐ Starts to open at 87 °C

**22 - 15 Nm**

**23 - Coolant pump**

- ☐ Removing and installing ⇒ [page 129](#)

**24 - 15 Nm**



N 19-10093



## 1.2 Assembly overview - coolant circulation pump - V50- (vehicles with bypass thermostat)

1 - 3 Nm

2 - Coolant pipe

3 - Spring-type clip

4 - Coolant line

❑ To turbocharger

5 - Spring-type clip

6 - Coolant hose

❑ With bypass thermostat

❑ Checking bypass thermostat ➔ [page 125](#)

7 - 5 Nm

8 - Radiator outlet coolant temperature sender - G83-

9 - Retaining clip

10 - O-ring

❑ Renew

11 - Lower coolant hose

12 - T-piece

13 - Coolant hose

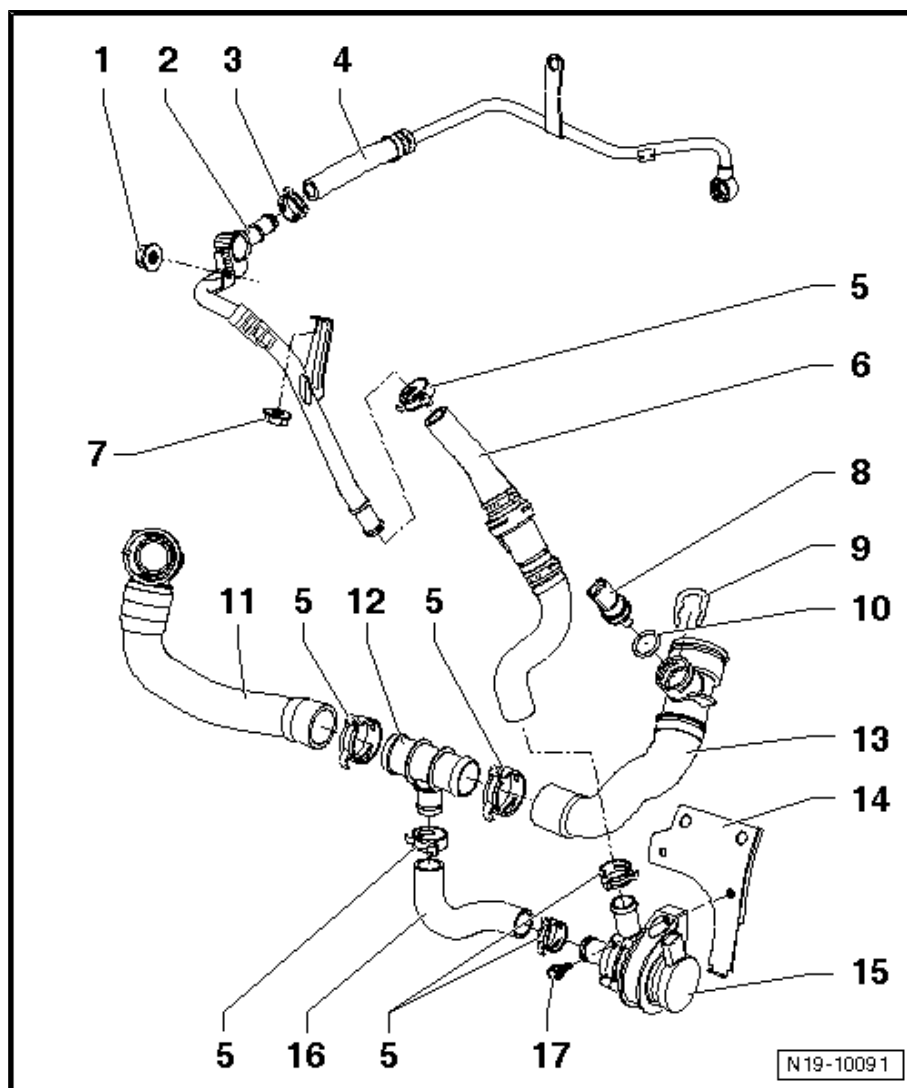
14 - Bracket

15 - Coolant circulation pump - V50-

❑ The function can be checked using final control diagnosis ➔ Vehicle diagnostic tester.

16 - Coolant hose

17 - 8 Nm





### 1.3 Assembly overview - coolant circulation pump - V50- (vehicles with no by-pass thermostat)

1 - 3 Nm

2 - Coolant pipe

3 - Spring-type clip

4 - Coolant line

☐ To turbocharger

5 - Coolant hose

6 - Bracket

7 - Coolant hose

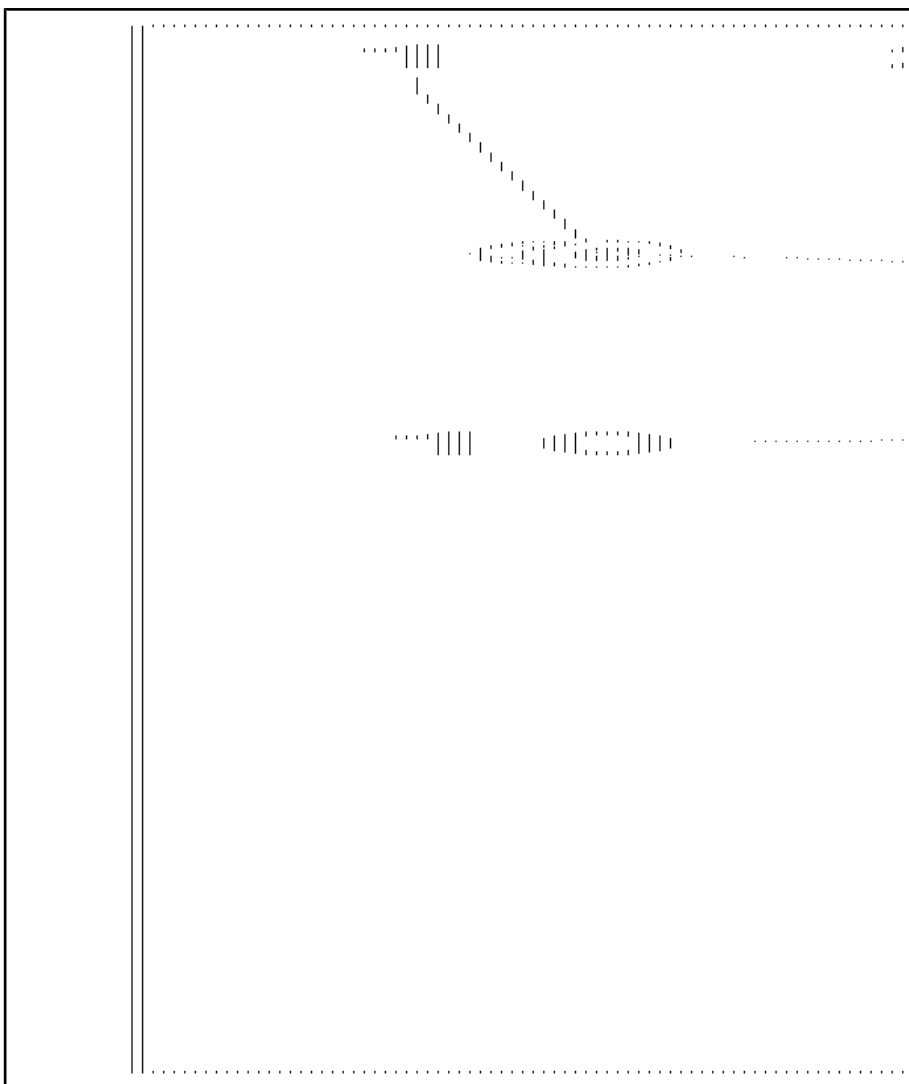
☐ To cooler opening

8 - Coolant circulation pump - V50-


☐ The function can be checked using final control diagnosis ⇒ Vehicle diagnostic tester.

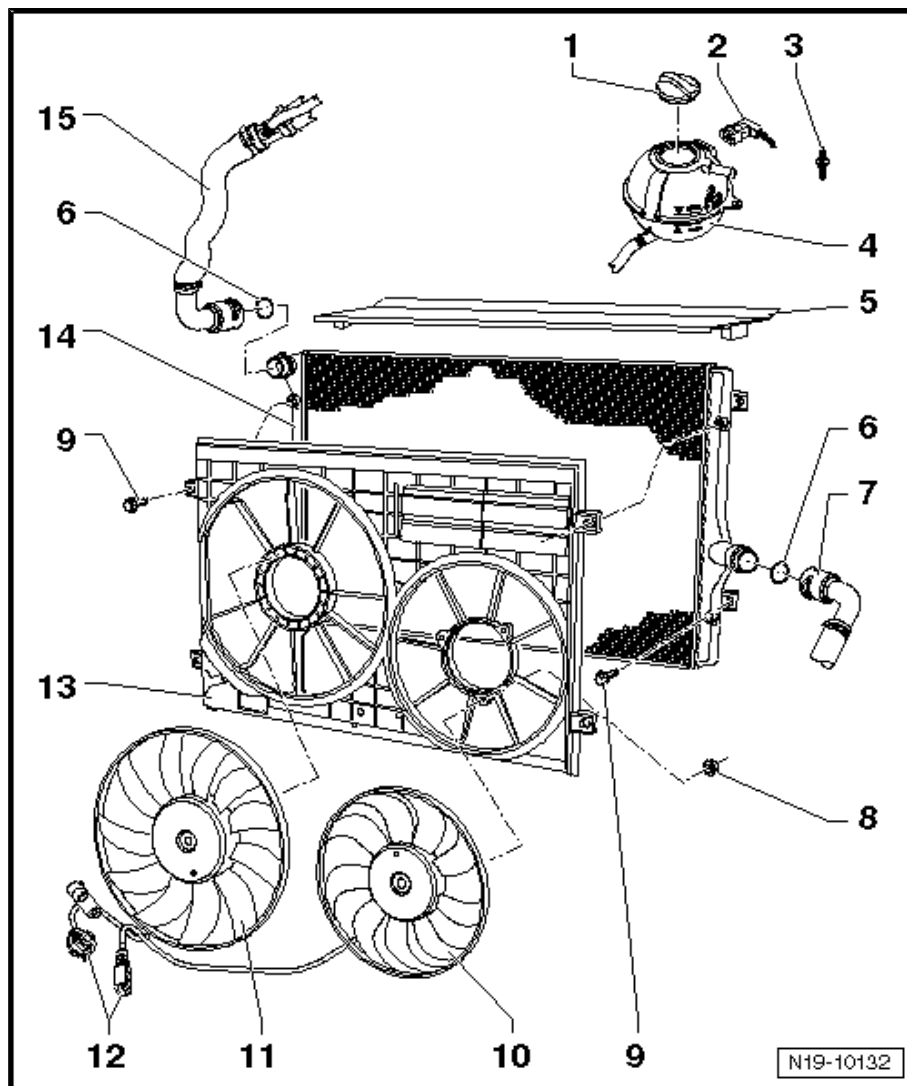
9 - 8 Nm

10 - 5 Nm



## 1.4 Assembly overview - parts of cooling system, body side

- 1 - Sealing cover**  
☐ Checking pressure relief valve in filler cap  
⇒ [page 139](#) .
- 2 - Connector**
- 3 - 5 Nm**
- 4 - Expansion tank**  
☐ Checking cooling system for leaks  
⇒ [page 137](#) .
- 5 - Sealing strip**  
☐ Passat only
- 6 - O-ring**  
☐ Renew if damaged
- 7 - Lower coolant hose**  
☐ To connection for thermostat.
- 8 - 5 Nm**
- 9 - 5 Nm**
- 10 - Radiator fan 2 - V177-**  
☐ Removing and installing  
⇒ [page 134](#)
- 11 - Radiator fan - V7-**  
☐ Removing and installing  
⇒ [page 134](#)  
☐ With radiator fan control unit - J293- .
- 12 - Connector**
- 13 - Cowling**
- 14 - Radiator/cooler**  
☐ Removing and installing ⇒ [page 134](#)  
☐ After renewing, renew entire coolant.
- 15 - Upper coolant hose**  
☐ To connection on cylinder head.
- 
- A technical line drawing of a car's engine compartment, specifically focusing on the cooling system. Various components are labeled with numbers 1 through 15. 1 points to a sealing cover on the filler cap. 2 points to a connector. 3 points to a nut. 4 points to the expansion tank. 5 points to a sealing strip. 6 points to an O-ring. 7 points to the lower coolant hose. 8 points to a nut. 9 points to a nut. 10 points to the radiator fan 2. 11 points to the radiator fan. 12 points to a connector. 13 points to the cowling. 14 points to the radiator/cooler. 15 points to the upper coolant hose.







## 1.5 Coolant hose schematic diagram (vehicles to 06.2005)

### 1 - Radiator/cooler

- ☐ Removing and installing  
⇒ [page 134](#)
- ☐ If renewed, refill system with fresh coolant.

### 2 - Coolant circulation pump - V50-

- ☐ The function of the pump can be checked using final control diagnosis ⇒ Vehicle diagnostic tester.
- ☐ The flow of the coolant in the run-on phase is opposite to the flow shown.

### 3 - Bypass thermostat

- ☐ Checking ⇒ [page 125](#)

### 4 - Thermostat housing

- ☐ With thermostat
- ☐ Checking thermostat  
⇒ Vehicle diagnostic tester "Function and component selection".

### 5 - Coolant pump

- ☐ Removing and installing

### 6 - Cylinder head/cylinder block

- ☐ If renewed, refill system with fresh coolant.

### 7 - Turbocharger

- ☐ Removing and installing  
⇒ [page 248](#)

### 8 - Expansion tank

- ☐ With cap
- ☐ Checking pressure relief valve in filler cap ⇒ [page 139](#) .

### 9 - Heat exchanger for heater

- ☐ If renewed, refill system with fresh coolant.

### 10 - Hose

- ☐ Only for automatic gearbox.

### 11 - Gear oil cooler

- ☐ Only for automatic gearbox.

### 12 - Bypass thermostat

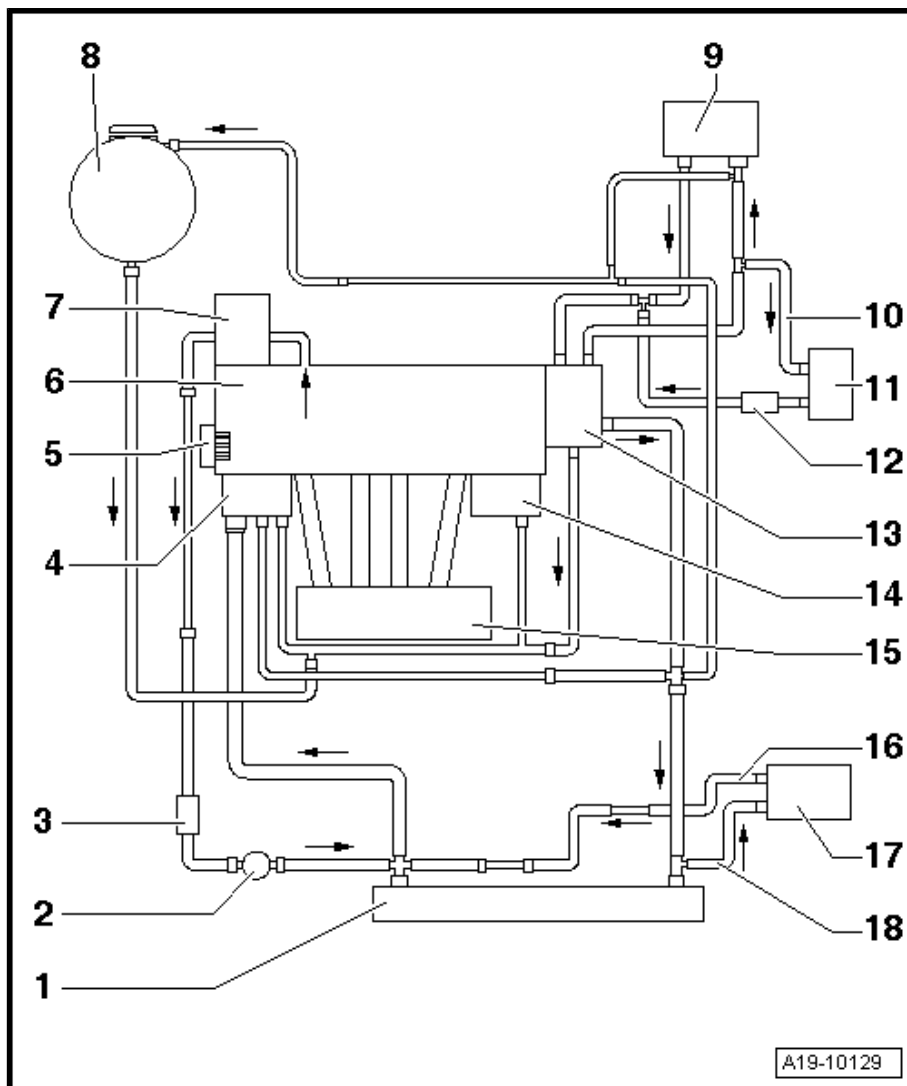
- ☐ Only for automatic gearbox.
- ☐ Checking ⇒ [page 125](#)

### 13 - Coolant connection

### 14 - Engine oil cooler

### 15 - Intake manifold

- ☐ Removing and installing ⇒ [page 277](#)





#### 16 - Hose

- ☐ Only for auxiliary radiator

#### 17 - Auxiliary radiator

- ☐ Optional equipment

#### 18 - Hose

- ☐ Only for auxiliary radiator

### 1.6 Coolant hose schematic diagram (vehicles from 06.2005)

#### 1 - Expansion tank

- ☐ With cap
- ☐ Checking pressure relief valve in filler cap  
⇒ [page 139](#) .

#### 2 - Turbocharger

- ☐ Removing and installing  
⇒ [page 248](#)

#### 3 - Cylinder head/cylinder block

- ☐ If renewed, refill system with fresh coolant.

#### 4 - Coolant connection

#### 5 - Heat exchanger for heater

- ☐ If renewed, refill system with fresh coolant.

#### 6 - Bypass thermostat

- ☐ Only for automatic gear-box.
- ☐ Checking ⇒ [page 125](#)

#### 7 - Gear oil cooler

- ☐ Only for automatic gear-box.

#### 8 - Engine oil cooler

#### 9 - Intake manifold

- ☐ Removing and installing  
⇒ [page 277](#)

#### 10 - Radiator/cooler

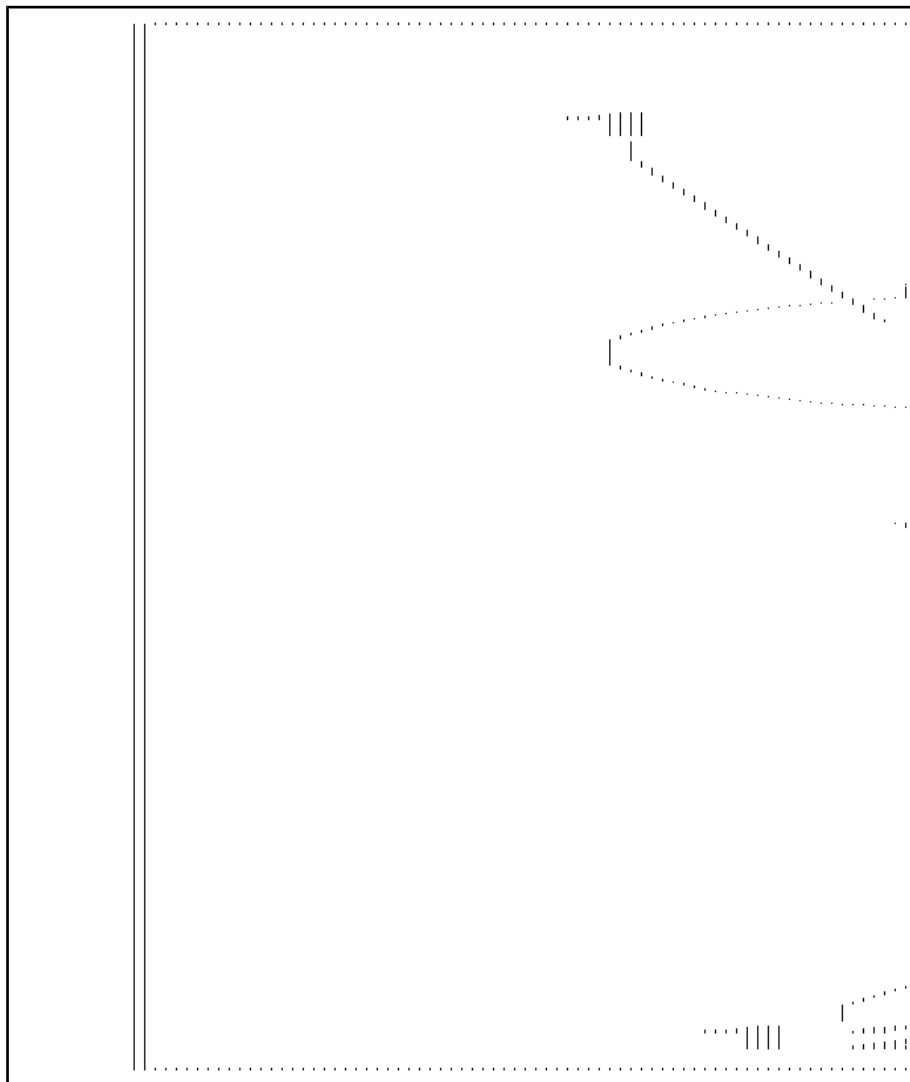
- ☐ Removing and installing  
⇒ [page 134](#)
- ☐ If renewed, refill system with fresh coolant.

#### 11 - Coolant circulation pump - V50-

- ☐ The flow of the coolant in the run-on phase is opposite to the flow shown.
- ☐ The function can be checked using final control diagnosis ⇒ Vehicle diagnostic tester.

#### 12 - Thermostat housing

- ☐ With thermostat
- ☐ Checking thermostat ⇒ Vehicle diagnostic tester "Function and component selection".

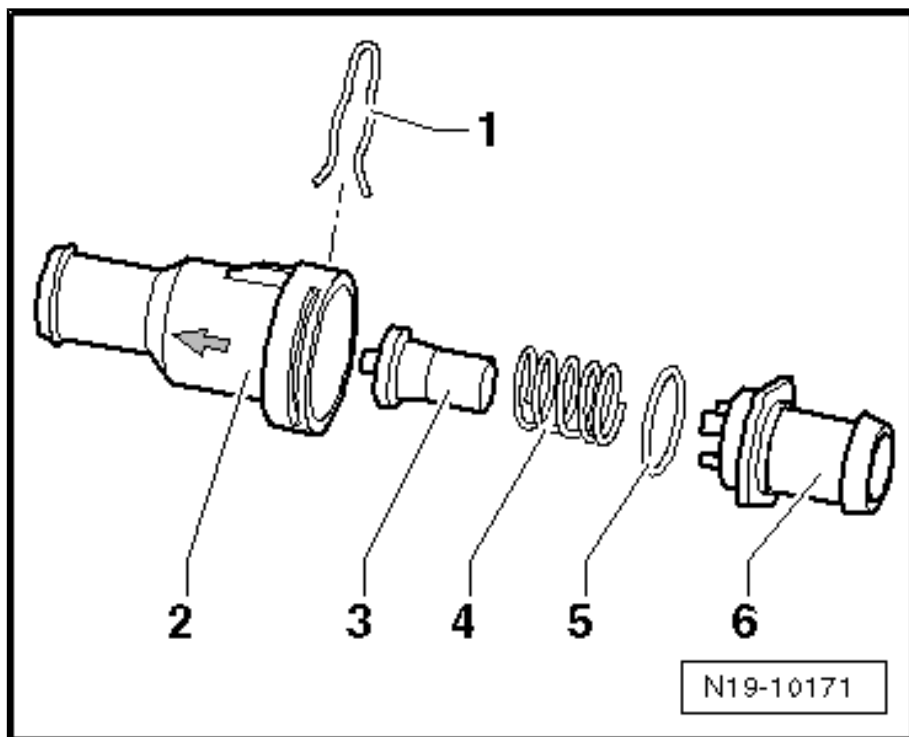




## 1.7 Bypass thermostat

### Assembly overview - bypass thermostat

- 1 - Retaining clip
- 2 - Bottom part of housing
- 3 - Working element
- 4 - Spring
- 5 - O-ring
- 6 - Housing, upper part



### Checking bypass thermostat

- Remove working element ➔ [Item 3 \(page 125\)](#) .
- Heat working element in coolant bath.

Opening begins at approx. 75 °C

Fully open at approx. 85 °C

Opening lift approx. 5 mm

### Installation position of bypass thermostat

Bypass thermostat for gearbox oil coolant circuit:

The arrow on lower part of housing points towards heat exchanger for heater.

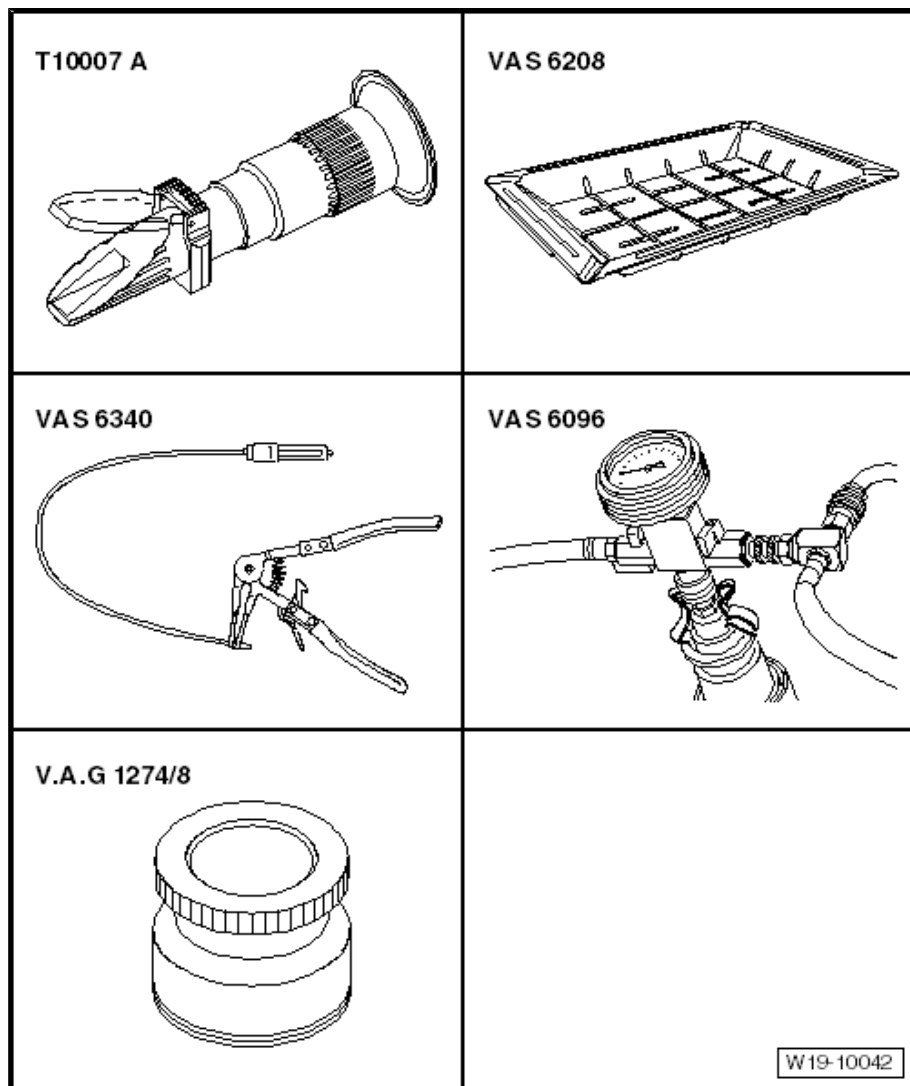
Bypass thermostat for turbocharger coolant circuit:

Arrow on lower part of housing points towards coolant circulation pump - V50- .



## 1.8 Draining and adding coolant

Special tools and workshop equipment required



- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Spring-type clip pliers - VAS 6362-
- ◆ Coolant system charge unit - VAS 6096-
- ◆ Refractometer - T10007 A-

Drain coolant ⇒ [page 126](#) .

Fill with coolant ⇒ [page 127](#)

### 1.8.1 Draining coolant



Note

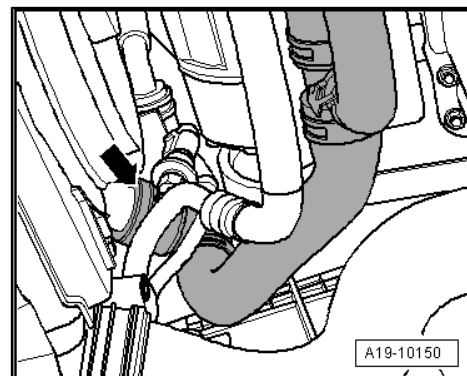
*Observe disposal regulations!*



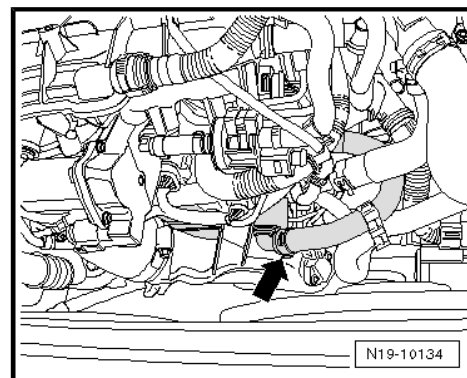
#### WARNING

*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*

- Open cap for coolant expansion tank.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .
- Release plug-in connector -arrow- and remove coolant hose from radiator.



- Also remove hose from engine oil cooler -arrow-.



### 1.8.2 Filling with coolant

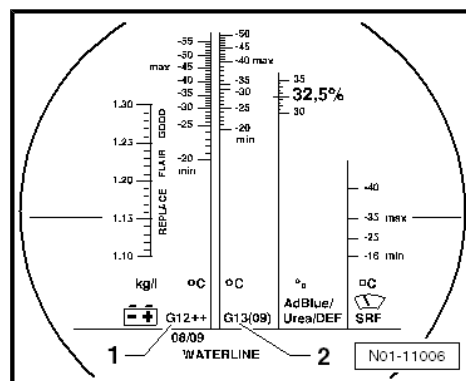


#### Caution

*Only clean water may be used for mixing. Soiled water does not have the required quality to ensure the coolant's function.*

**Note**

- ◆ *The water used for mixing has a major influence on the effectiveness of the coolant. Because the water quality differs from country to country and even from region to region, the quality of the water to be used in the cooling system has been specified by Volkswagen. Distilled water fulfils all requirements. Therefore, always use only distilled water when mixing coolant for topping up or renewing coolant.*
- ◆ *Use only coolant additives which conform 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 motor.*
- ◆ *Mixed in the proper proportions, coolant inhibits frost and corrosion damage as well as scaling. Such additives also raise the boiling point of the coolant. For this reason, the cooling system must be filled all-year-round with coolant additives.*
- ◆ *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- ◆ *Use ONLY refractometer - T10007A- for determining current anti-freeze value.*
- ◆ *The normal frost protection must be to -25 °C, in countries with arctic conditions to -36°C. Only when the climatic conditions demand it, may the frost protection be increased, but never to more than -48 °C. It may, however, be increased only to a maximum of -48°C. Otherwise, the cooling effect will be impaired.*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be guaranteed down to at least -25°C.*
- ◆ *Read off anti-freeze figures for respective replenished coolant additives.*
- ◆ *The temperature read off the refractometer - T10007A- corresponds the »ice flocculation point«. Flakes of ice may start forming in the coolant at this temperature.*
- ◆ *Never reuse old coolant.*
- ◆ *Use only a water/coolant additive mixture as a slip agent for coolant hoses.*

**Recommended mixture ratios:**

Frost protection to	Anti-freeze proportion	Coolant additive	Water <sup>1</sup>
-25°C	40 %	3.2 l	4.8 l
-36°C	50 %	4.0 l	4.0 l

<sup>1)</sup> The quantity of coolant can vary depending upon the vehicle equipment.

- Reconnect hose and plug-in connector
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .

**With cooling system charge unit - VAS 6096- :**

- Screw adapter for cooling system tester - V.A.G 1274/8- onto expansion tank.



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

**Without cooling system charge unit - VAS 6096- :**

- Slowly fill coolant to upper marking of shaded field on expansion tank.
- Fit expansion tank cap.

**Vehicles with no auxiliary heater**

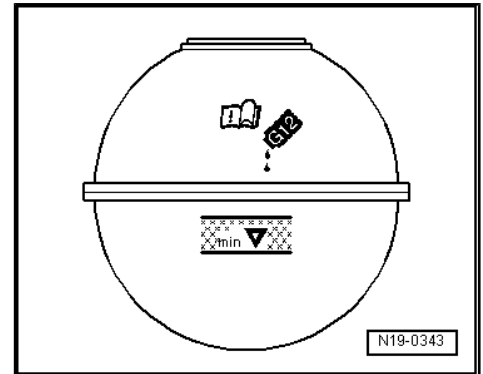
- Start engine and maintain an engine speed of about 2,000 rpm for about 3 minutes.
- Run engine until radiator fan - V7- cuts-in.

**From heater coolant shut-off valve - N279-**

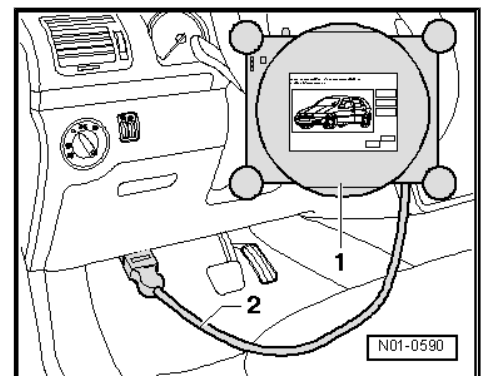


**Caution**

*The auxiliary heater must only be switched on when the coolant circuit is filled, described as follows:*



- Connect vehicle diagnostic, testing and information system - VAS 5051 A- as follows:
- Push diagnosis cable connector onto diagnosis connection in driver footwell.
- Start engine and maintain an engine speed of about 2,000 rpm for about 3 minutes.
- Press buttons on display for "Vehicle self-diagnosis", "18 - Auxiliary heater" and "Final control diagnosis" one after the other.
- Press right arrow button on display up to final control diagnosis for heater coolant shut-off valve - N279- .
- Initiate final control diagnosis for heater coolant shut-off valve - N279- . Continue to maintain engine speed at approx. 2,000 rpm for about 1 minute.
- Run engine until radiator fan - V7- cuts-in.



**Continued for all vehicles**



**WARNING**

*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*

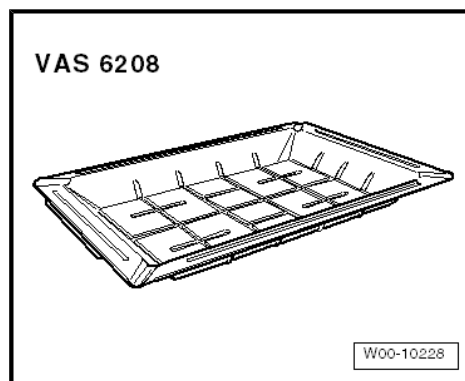
- Check coolant level and top up as needed. When engine is at normal operating temperature, the coolant level must be at the upper mark; when engine is cold, in the middle of the shaded field.

## 1.9 Removing and installing coolant pump

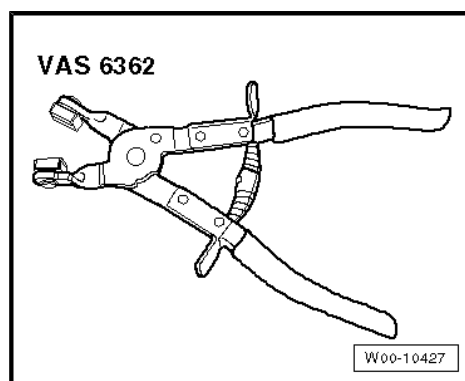
Special tools and workshop equipment required



- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Spring-type clip pliers - VAS 6362-



#### Removing coolant pump:



#### WARNING

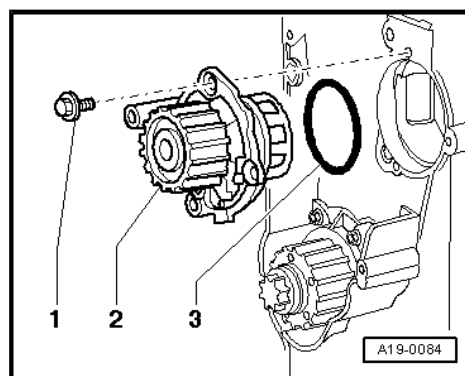
*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*

- Drain coolant ➔ [page 126](#) .
- Remove toothed belt.  
Vehicles with split toothed belt guard ➔ [page 66](#) .  
Vehicles without split toothed belt guard ➔ [page 55](#) .
- Unscrew coolant pump securing bolts -1- and remove coolant pump -2-.
- Remove O-ring -3-.

#### Installing coolant pump:

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

- Renew O-ring.
- Clean or smooth sealing surface for O-ring.







- Moisten new O-ring -3- with coolant.
- Fit coolant pump -2-.
- Installation position: plug in the housing faces downwards.
- Tighten bolts -1- for coolant pump.
- Install toothed belt.
- Vehicles with split toothed belt guard ➔ [page 66](#) .
- Vehicles without split toothed belt guard ➔ [page 55](#) .
- Fill with coolant ➔ [page 126](#) .

**Specified torques:**

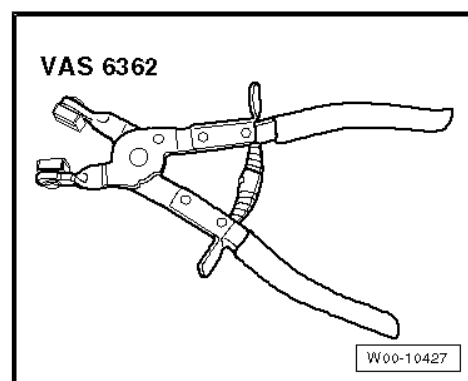
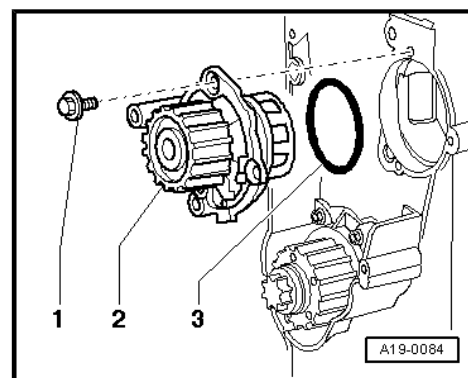
Component	Nm
Coolant pump to cylinder block	15
Toothed belt guard to cylinder block	10 <sup>1)</sup>

<sup>1)</sup> Install with locking fluid

## 1.10 Removing and installing coolant pipes

**Special tools and workshop equipment required**

- ◆ Spring-type clip pliers - VAS 6362-



**Removing:**

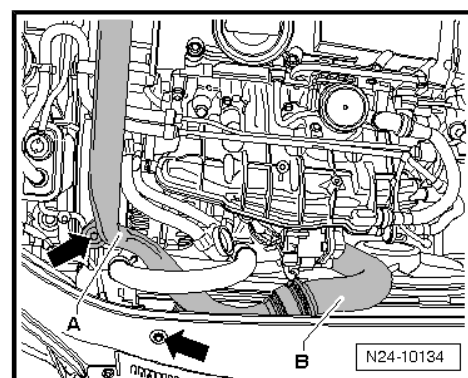
- Remove engine cover panel/air filter ➔ [page 273](#) .

**Golf:**

- Remove pipe -A- and hose -B- -arrows-.

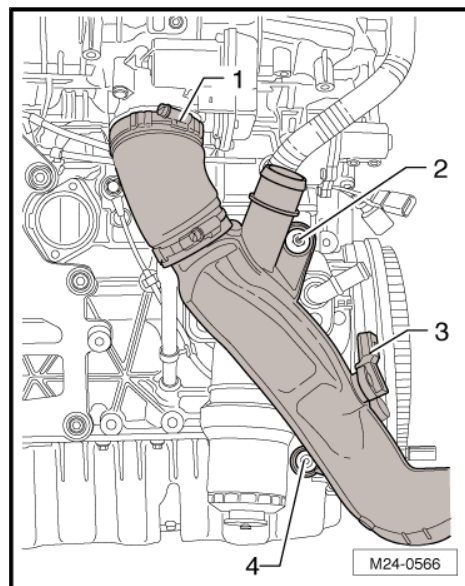
**All vehicles:**

- Remove noise insulation ➔ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .

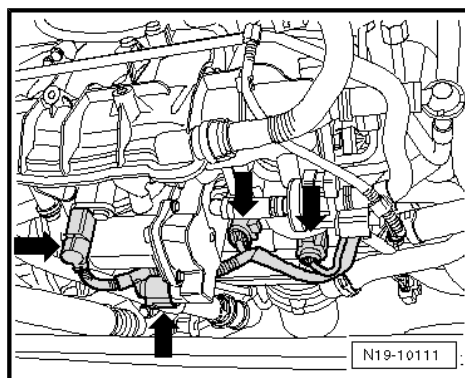




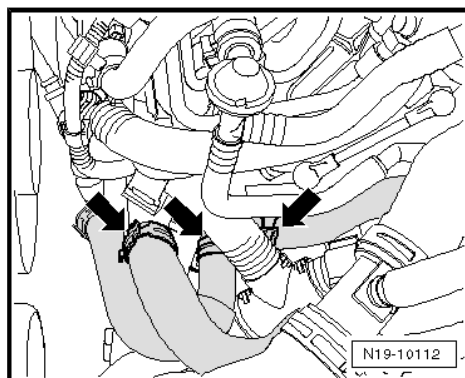
- Pull connector -3- off charge air pressure sender - G31- .
- Unscrew bolts -2- and -4-.
- Loosen clamp -1-, disconnect plug-in connector on charge air cooler and remove charge air pipe and hose downwards.
- Drain coolant ⇒ [page 126](#) .



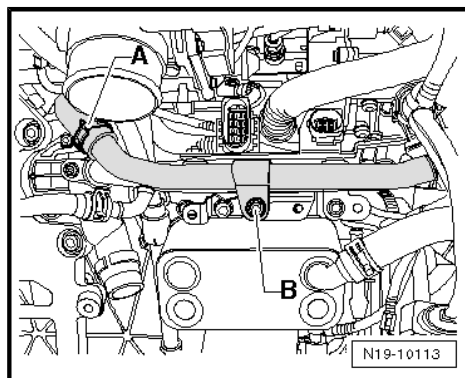
- Disconnect electrical connectors -arrows-.



- Detach coolant hoses from coolant pipes -arrows-.



- Pull off hose -A- and unscrew bolt -B-. Remove front coolant pipe.

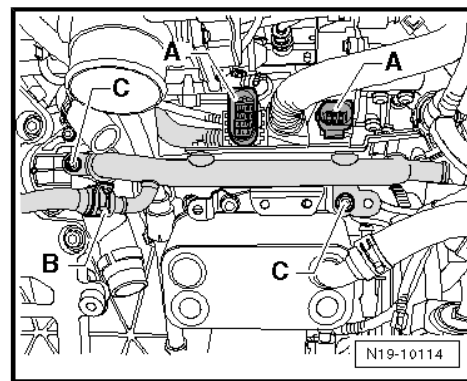




- Loosen connector -A- from retainer, pull off hose -B- and unscrew bolts -C-. Remove rear coolant pipe.

#### Installing:

Install in reverse order of removal.



## 1.11 Removing and installing coolant thermostat housing with thermostat

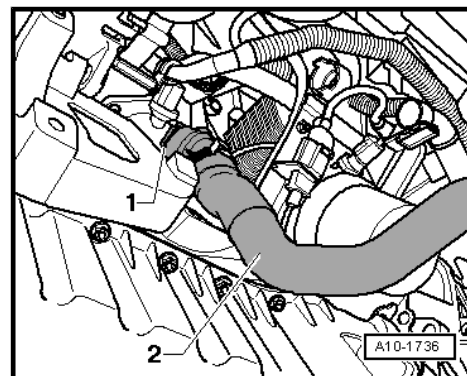


#### Note

*Checking thermostat ⇒ Vehicle diagnostic tester "Function and component selection".*

#### Removing:

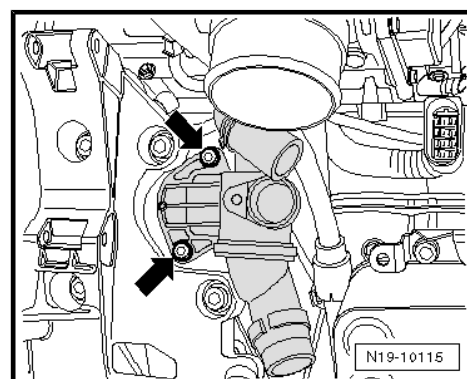
- Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator
- Remove coolant pipes ⇒ [page 131](#) .
- Pull coolant hose -2- off coolant distribution housing, to do this, pull out retaining clip -1-.



- Unscrew bolts -arrows- and remove thermostat housing with thermostat from engine.

#### Installing:

- Clean sealing surface for O-ring.
- Renew O-ring and moisten it with coolant.
- Fit thermostat housing on cylinder block and tighten bolts evenly to 15 Nm.
- Further assembly is basically the reverse of the removal procedure.

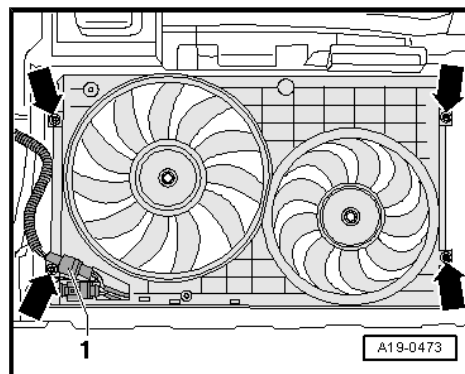




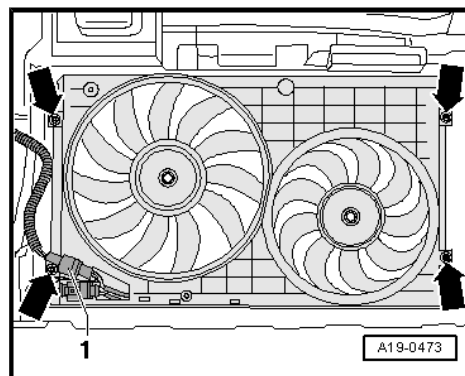
## 1.12 Removing and installing radiator fan - V7- and radiator fan 2 - V177-

### Removing radiator fan

- Remove upper securing bolts of cowling -arrows-. Loosen coolant pipes if necessary, and push to side.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Body - front; Noise insulation .



- Separate connector -1- and unscrew lower cowling securing bolts -arrows-.
- Remove cowling downwards.

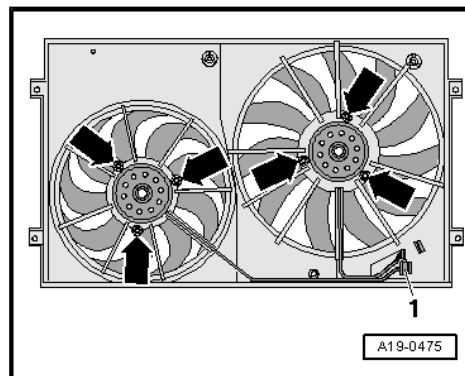


- Separate electrical connector -1- and free wiring.
- Unscrew nuts -arrows- and remove fan.

### Installing radiator fan:

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

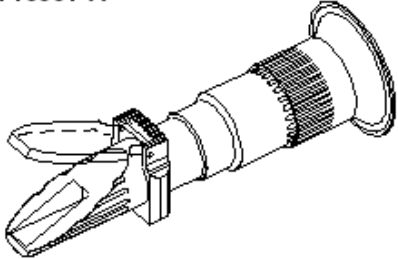
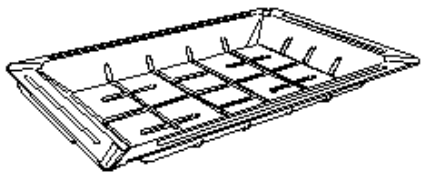
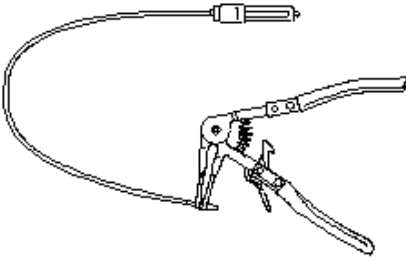
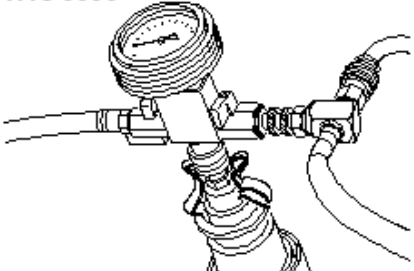
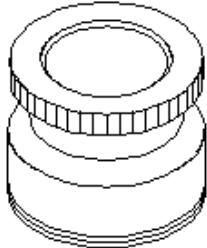
Specified torques ⇒ [page 122](#) .



## 1.13 Removing and installing radiator, Golf and Eos



# Special tools and workshop equipment required

<p><b>T10007 A</b></p> 	<p><b>VAS 6208</b></p> 
<p><b>VAS 6340</b></p> 	<p><b>VAS 6096</b></p> 
<p><b>V.A.G 1274/8</b></p> 	<p>W19-10042</p>

- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Spring-type clip pliers - VAS 6362-
- ◆ Coolant system charge unit - VAS 6096-
- ◆ Refractometer - T10007 A-

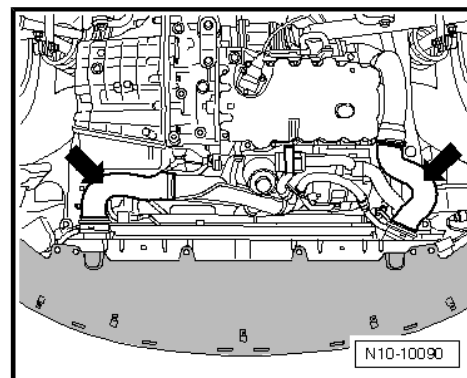
## Removing radiator

- Drain coolant ➔ [page 126](#) .
- Remove charge air hoses -arrows-.
- Bring lock carrier into service position ➔ General body repairs; Rep. gr. 50 ; Body - front; Lock carrier service position .
- Pull coolant hoses off radiator.
- Remove cowl together with radiator fan ➔ [page 134](#) .



### Note

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





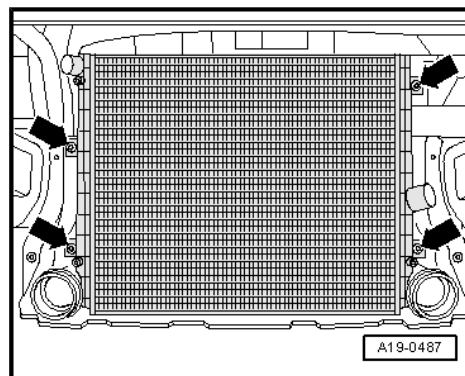
- Remove bolts -arrows- from radiator.
- Remove radiator downwards.

#### Installing radiator

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

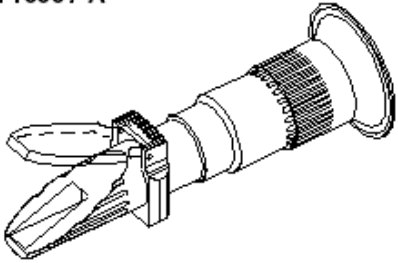
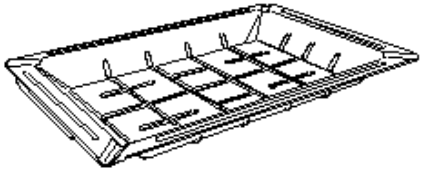
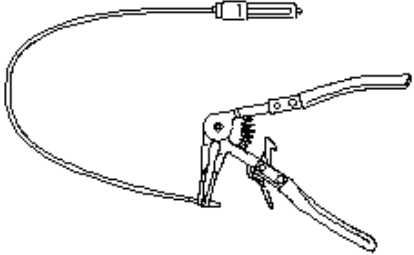
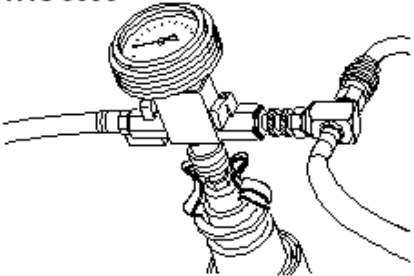
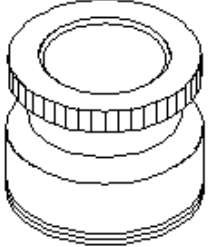

- Never reuse old coolant.
- Fill with coolant ➔ [page 126](#) .

Specified torques ➔ [page 122](#) .



## 1.14 Removing and installing radiator, Passat

Special tools and workshop equipment required

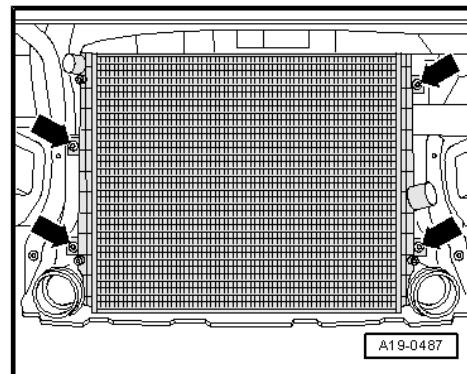
<b>T10007 A</b> 	<b>VAS 6208</b> 
<b>VAS 6340</b> 	<b>VAS 6096</b> 
<b>V.A.G 1274/8</b> 	 <b>W19-10042</b>

- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Spring-type clip pliers - VAS 6362-
- ◆ Coolant system charge unit - VAS 6096-
- ◆ Refractometer - T10007 A-



### Removing radiator

- Drain coolant ➔ [page 126](#) .
- Pull coolant hoses off radiator.
- Remove cowl together with radiator fan ➔ [page 134](#) .
- Remove bolts -arrows- from radiator.



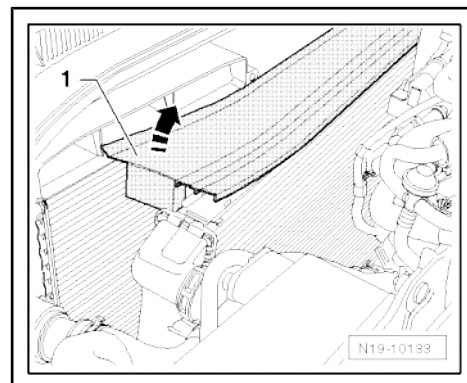
- Lightly fold back radiator and unclip sealing strip -1-.
- Remove radiator upwards.

### Installing radiator

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

- Never reuse old coolant.
- Fill with coolant ➔ [page 126](#) .

Specified torques ➔ [page 122](#) .


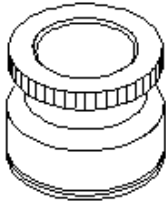



## 1.15 Checking cooling system for leaks





**Special tools and workshop  
equipment required**

<p>V.A.G 1274</p> 	<p>V.A.G 1274/8</p> 
<p>V.A.G 1274/9</p> 	
	<p>G19-0002</p>

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

Checking pressure relief valve in filler cap ➔ [page 139](#) .

- Engine at operating temperature.

**Test sequence**



**WARNING**

*Hot steam may escape when expansion tank is opened. Wear protective goggles and clothing to avoid eye injuries and scalding. Cover cap with a cloth and carefully open.*

- Open cap for coolant expansion tank.

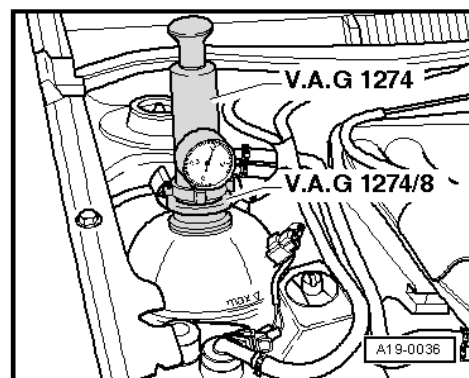




- Set cooling system tester - V.A.G 1274- with adapter - V.A.G 1274/8- on expansion tank.
- Use hand pump on tester to create a pressure of about 1.0 bar.

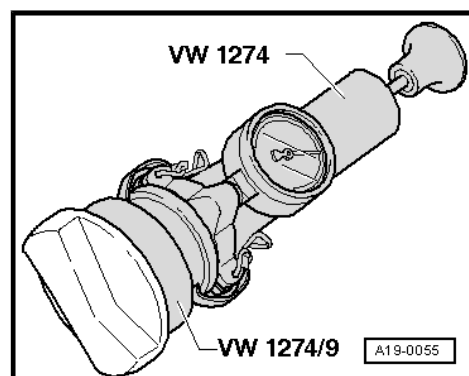
If the pressure drops:

- Find leaks and rectify.



### 1.15.1 Check pressure relief valve in cap.

- Attach cooling system tester - V.A.G 1274- with adapter - V.A.G 1274/9- to cap.
- Operate hand pump.
- The pressure relief valve must open at a pressure of 1.4...1.6 bar





## 20 – Fuel supply system

### 1 Safety precautions

Safety precautions when working on fuel supply system

⇒ [page 140](#) .

Releasing fuel pressure in high-pressure section ⇒ [page 141](#) .

#### 1.1 Safety regulations for working on fuel supply



##### WARNING

- ◆ *The fuel pressure in the high-pressure pipe can reach 120 bar! Observe the safety precautions when releasing pressure in the high-pressure section ⇒ [page 141](#) .*
- ◆ *The fuel system is pressurised! Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*

*For reasons of safety, the power supply to the fuel pump must be interrupted before the fuel system is opened. The fuel pump would otherwise be activated when the driver's door is opened. Use the following options to interrupt the power supply:*

- ◆ *Disconnect battery*

*Or*

- ◆ *Removing fuse for fuel pump control unit - J538-*

*Or*

- ◆ *Pull off connector from fuel delivery unit flange or fuel pump control unit - J538-*



##### Caution

*Observe the following points during all installation work, in particular in the engine compartment, due to the space limitations:*

- ◆ *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 to all moving or hot components.*

To prevent injuries to persons and/or damage to the injection and ignition system, the following must be observed:

- ◆ Do not touch or pull off ignition coils with output stage when engine is running or turning at starter speed.
- ◆ Always switch off the ignition before connecting or disconnecting injection or ignition system lines or tester cables.



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

- ◆ Even before work starts, the extraction hose of a fume extraction system which is switched on must 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<sup>3</sup>/h can be used providing that motor is not in air flow.
- ◆ Prevent skin contact with fuel! Wear fuel-resistant gloves!

**Note the following if testers and measuring instruments have to be used during a road test:**

- ◆ Test and measuring instruments must always be secured to rear seat and operated by a second person from this location.
- ◆ If test and measuring instruments are operated from front passenger seat and the vehicle is involved in an accident, there is a possibility that the person sitting in this seat may receive serious injuries when the airbag is triggered.

## 1.2 Releasing fuel pressure in high-pressure section



### 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.*



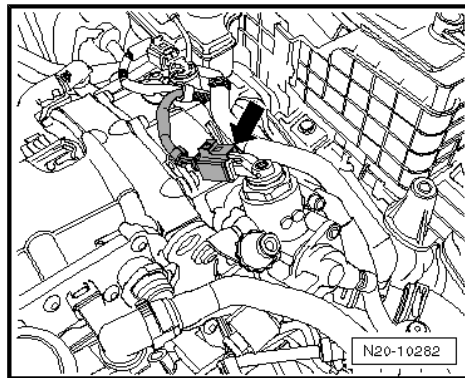
- Pull electrical connector off fuel pressure regulating valve - N276- -arrow-.
- Run engine at idling speed for approx. 10 seconds.



#### Note

- ◆ *When the engine is idling and the electrical connector is pulled off the fuel pressure regulating valve - N276- , the pressure in the high-pressure system will drop to approx. 6 bar.*
- ◆ *When the high-pressure is reduced, the high-pressure system must be opened, because the fuel pressure can rise by warming up.*

- Switch off ignition.



#### WARNING

***The fuel system is pressurised!***

- ◆ ***Wear protective goggles and protective clothing to avoid injury and contact with the skin.***
- ◆ ***Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.***

- 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 fault memory of engine control unit, erase all fault entries that have been created by pulling off connector.



#### Note

*If the fault memory was cleared, the readiness code must be generated ⇒ Vehicle diagnostic tester. "Guided functions".*



## 2 Rules for cleanliness

When working on the fuel supply and injection system, pay careful attention to the following “5 rules”:

- ◆ Thoroughly clean all joints and surrounding areas before dismantling.
- ◆ Place removed parts on a clean surface and cover them over. Use lint-free cloths only.
- ◆ Carefully cover opened components or seal them if repairs cannot be carried out immediately.
- ◆ Install only clean parts; do not remove new parts from packaging until immediately before installing. Do not use parts that have been kept unpackaged (for example in toolboxes).
- ◆ If system is open: do not use compressed air if possible. Try not to move the vehicle.

### 3 Fuel tank, Golf

Safety precautions when working on fuel supply system  
⇒ page 140 .

Rules for cleanliness  $\Rightarrow$  page 143 .

Assembly overview - fuel tank (engine code BPY) ⇒ [page 144](#)

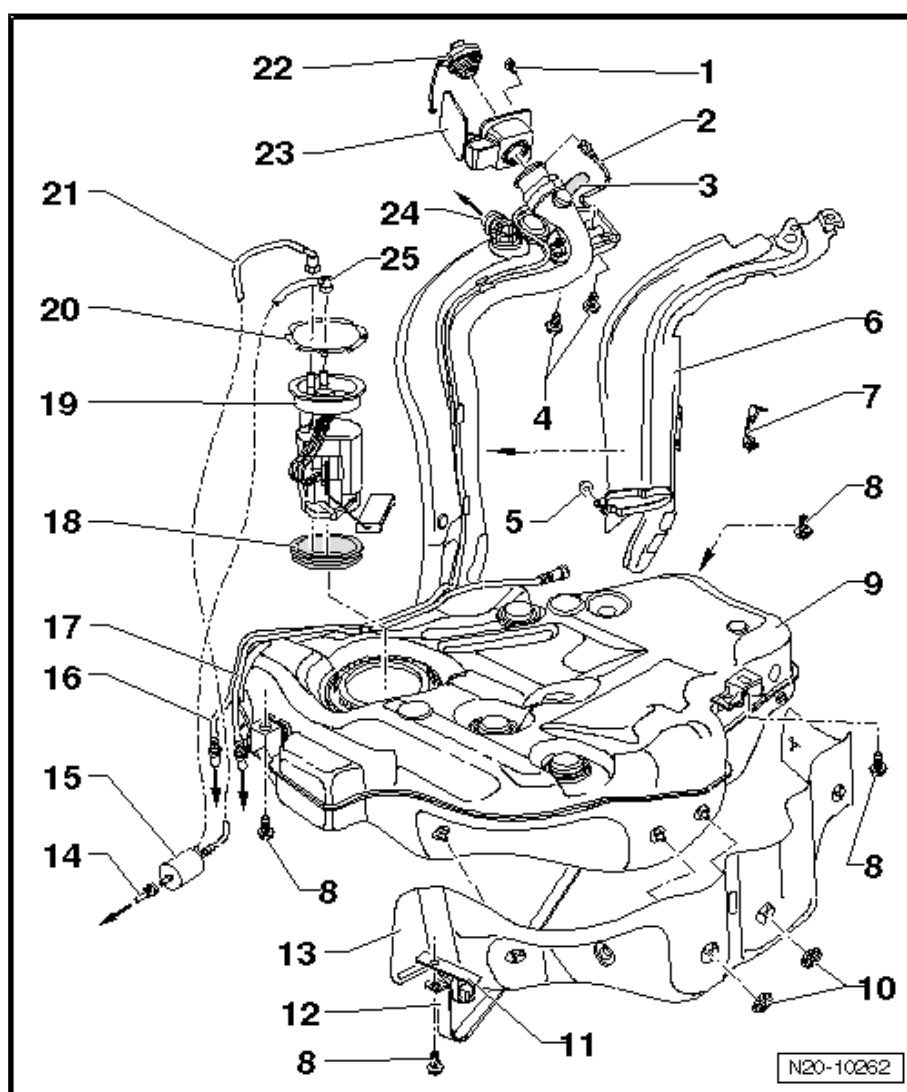
Assembly overview - fuel tank (engine codes AXX, BWA)  
⇒ page 146

Emptying fuel tank  $\Rightarrow$  [page 147](#) .

Removing and installing fuel tank ⇒ **page 152** .

### 3.1 Assembly overview - fuel tank (engine code BPY)

- 1 - Securing bolt
  - 2 - Earth connection
    - ☐ Ensure firm seating
  - 3 - Vacuum line
    - ☐ To fuel system diagnostic pump - V144-
  - 4 - 10 Nm
  - 5 - Rivet
  - 6 - Protective plate
    - ☐ Riveted as standard to bottom clamp
    - ☐ When replacing fuel tank, hold protective plate against filler pipe and rivet to clamp
  - 7 - Cable bracket
    - ☐ Clipped onto protective plate
  - 8 - 25 Nm
    - ☐ Renew
    - ☐ 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. Bolts ⇒ ET-KA (Electronic parts catalogue) .
  - 9 - Fuel tank
    - ☐ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
    - ☐ Removing and installing ⇒ [page 152](#)
  - 10 - Clamping washer
  - 11 - Exhaust system retainer
  - 12 - Securing strap
    - ☐ Observe installation position





### 13 - Heat shield

### 14 - Supply line

- ☐ To fuel rail
- ☐ Ensure firm seating

### 15 - Fuel filter

- ☐ Installation position: arrow indicates direction of flow.

### 16 - Vacuum line

- ☐ From fuel system diagnostic pump - V144- to intake manifold.
- ☐ Clipped onto fuel tank.
- ☐ Ensure firm seating

### 17 - Breather line

- ☐ From activated charcoal filter to activated charcoal filter solenoid valve 1 - N80-
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

### 18 - Sealing ring

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

### 19 - Fuel delivery unit

- ☐ Removing and installing ⇒ [page 179](#)
- ☐ If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".
- ☐ Checking fuel pump ⇒ [page 183](#) .
- ☐ Note installation position on fuel tank ⇒ [page 146](#)
- ☐ With fuel gauge sender - G-
- ☐ Removing and installing fuel gauge sender - G- ⇒ [page 182](#)
- ☐ Clean strainer if soiled

### 20 - Locking ring 110 Nm

- ☐ Ensure firm seating
- ☐ Remove and install using wrench - T10202- .

### 21 - Return line

- ☐ blue
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

### 22 - Sealing cover

- ☐ Renew if damaged

### 23 - 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 .

### 24 - To activated charcoal filter

### 25 - Supply line

- ☐ black
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

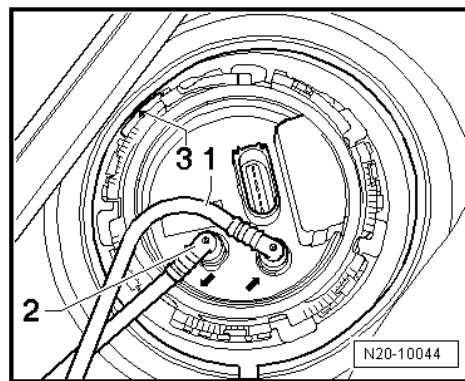


### Installation position of fuel delivery unit

Marking -3- on sender points opposite to direction of travel.

Return line (blue or with blue mark) -1-

Black supply line -2-



## 3.2 Assembly overview - fuel tank (engine codes AXX, BWA)

### 1 - Securing bolt

### 2 - Sealing cover

- ☐ Renew if damaged

### 3 - Earth connection

- ☐ Ensure firm seating

### 4 - 10 Nm

### 5 - Cable bracket

### 6 - 25 Nm

- ☐ Renew
- ☐ 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. Bolts ➔ ET-KA (Electronic parts catalogue) .

### 7 - Fuel tank

- ☐ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ☐ Removing and installing ➔ [page 152](#)

### 8 - Clamping washer

### 9 - Exhaust system retainer

### 10 - Securing strap

- ☐ Observe installation position

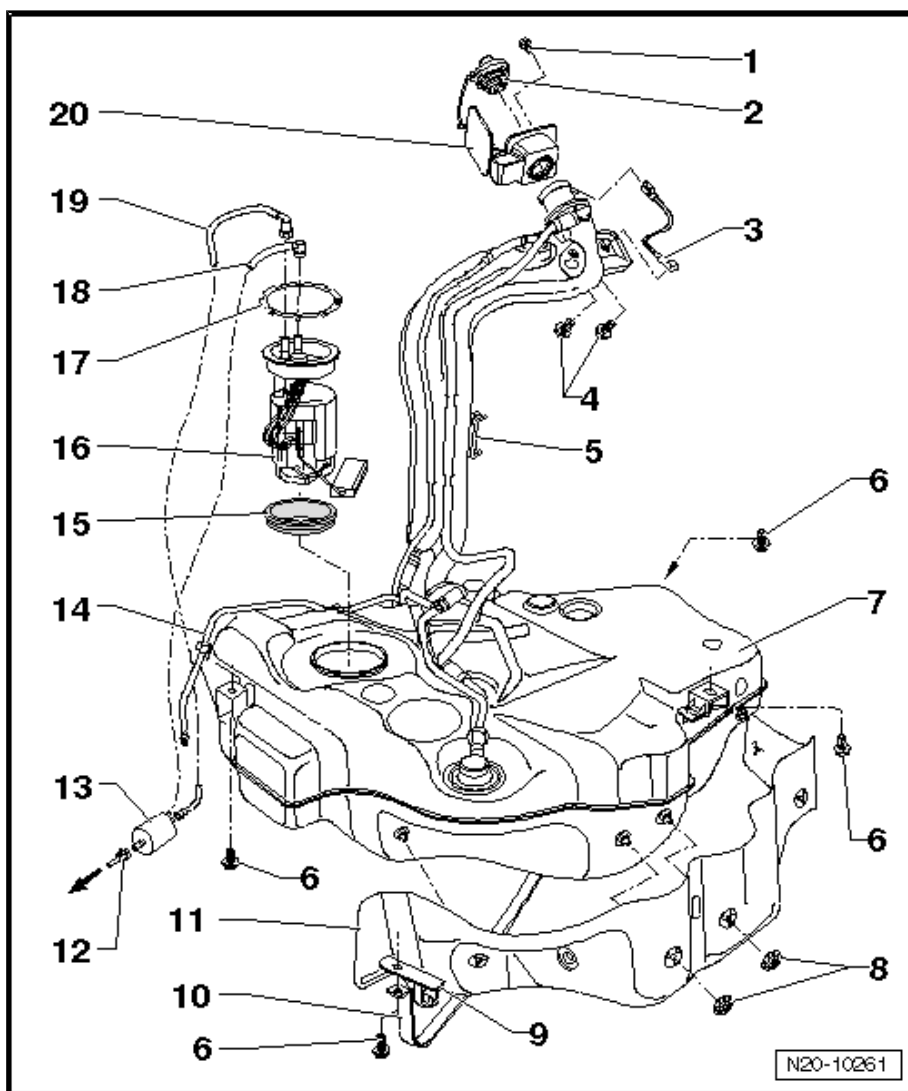
### 11 - Heat shield

### 12 - Supply line

- ☐ To fuel rail
- ☐ Ensure firm seating

### 13 - Fuel filter

- ☐ Installation position: arrow indicates direction of flow.







#### 14 - Breather line

- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

#### 15 - Sealing ring

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

#### 16 - Fuel delivery unit

- ☐ Removing and installing ⇒ [page 179](#)
- ☐ If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".
- ☐ Checking fuel pump ⇒ [page 183](#) .
- ☐ Note installation position on fuel tank ⇒ [page 147](#)
- ☐ With fuel gauge sender - G-
- ☐ Removing and installing fuel gauge sender - G- ⇒ [page 182](#)
- ☐ Clean strainer if soiled

#### 17 - Locking ring 110 Nm

- ☐ Ensure firm seating
- ☐ Remove and install using wrench - T10202- .

#### 18 - Supply line

- ☐ black
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

#### 19 - Return line

- ☐ blue
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

#### 20 - Tank flap unit

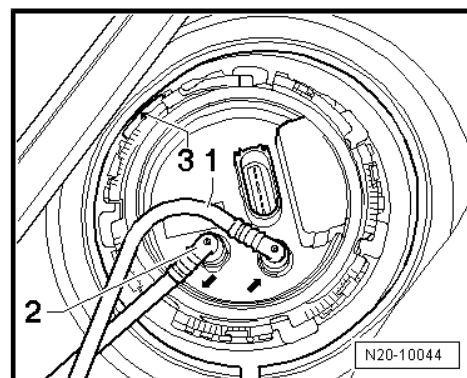
- ☐ With rubber cup.
- ☐ Removing and installing ⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

#### 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-

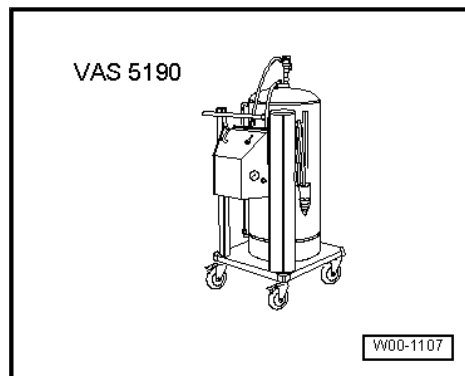


### 3.3 Emptying fuel tank

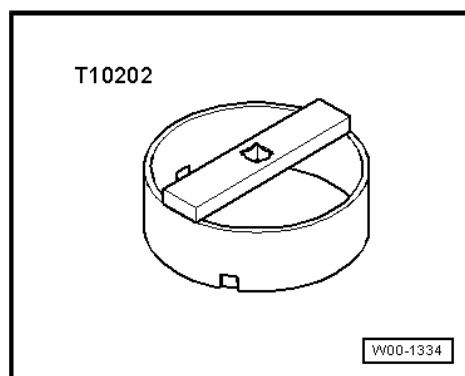
Special tools and workshop equipment required



- ◆ Fuel extraction unit - VAS 5190-



- ◆ Special wrench - T10202-



- ◆ Torque wrench (40 to 200 Nm) - V.A.G 1332-
  - Note safety precautions before beginning work ⇒ [page 140](#) .

Emptying fuel tank when fuel pump is intact ⇒ [page 148](#) .

Emptying fuel tank if it is more than  $\frac{3}{4}$  full ⇒ [page 150](#) .

Emptying fuel tank if it is less than  $\frac{3}{4}$  full ⇒ [page 151](#)

### 3.3.1 Emptying fuel tank when fuel pump is intact

Special tools and workshop equipment required

- ◆ Adapter for fuel extraction - VAS 5190 /3-
- ◆ Test instrument adapter/DSO (5-pin) - VAS 5565-
- ◆ Remote control - V.A.G 1348/3A-



#### WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*
- ◆ *Connect fuel extractor - VAS 5190- earth wire to vehicle earth.*

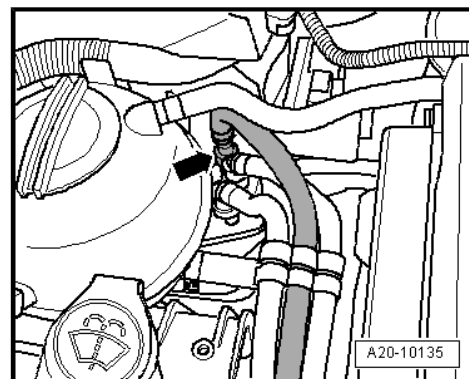


- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.

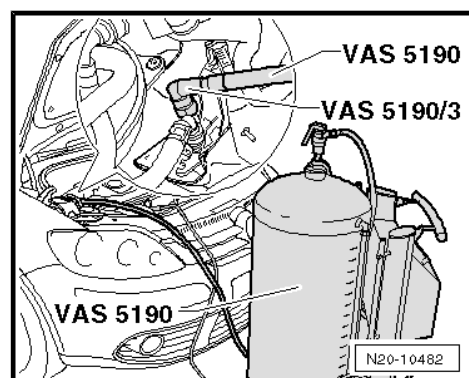


# **Note**

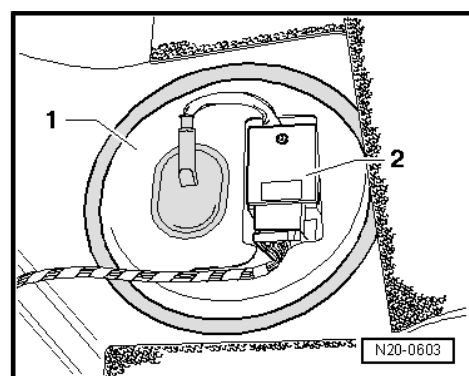
*Press in securing ring to release the fuel lines.*



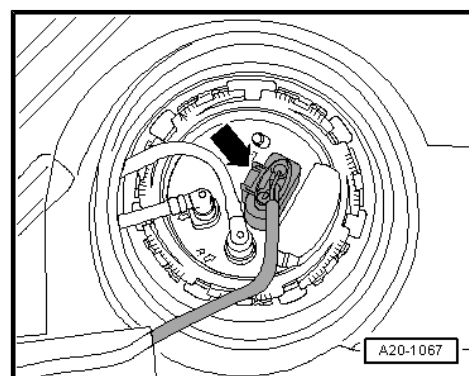
- Connect fuel extractor - VAS 5190- with adapter for fuel extractor - VAS 5190 /3- to fuel supply line.
- Remove bench seat ➔ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .



- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



- Pull 5-pin connector off fuel delivery unit flange.





- 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 (+).



#### Note

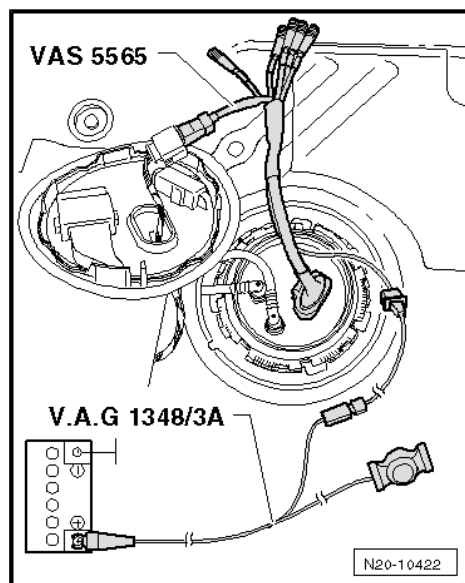
*This step serves only to have the fuel pump running when the engine is stopped.*

- Remove filler cap from fuel tank filler neck.
- Operate remote control - V.A.G 1348/3A- and shut-off tap on fuel extractor - VAS 5190- until fuel tank is empty.



#### Caution

***Fuel pump must not run »dry«.***



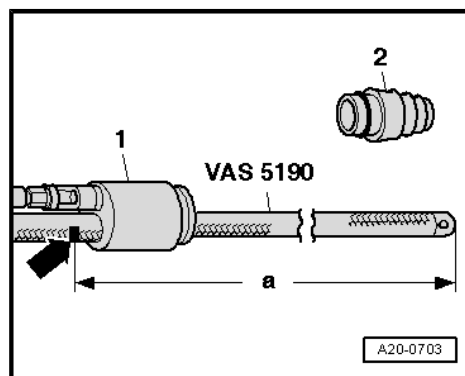
### 3.3.2 Emptying fuel tank if it is more than $\frac{3}{4}$ full



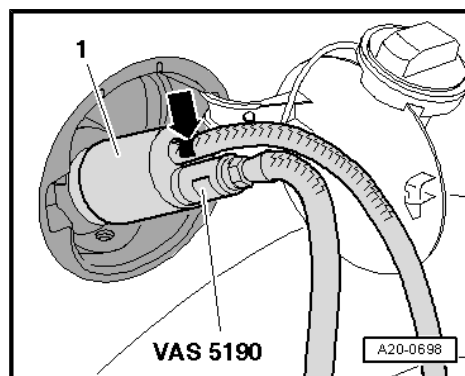
#### Caution

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

- Remove cotter -2- from shaft -1- of fuel extractor - VAS 5190- .
- At a distance of -a- = 1180 mm from the end of the hose, mark extraction hose with insulating tape -arrow-.



- Remove filler cap from fuel tank filler neck.
- Screw shaft end -1- of fuel extractor unit - VAS 5190- onto fuel filler neck.
- Push extraction hose into fuel tank until marking on hose -arrow- coincides with shaft end.





#### Note

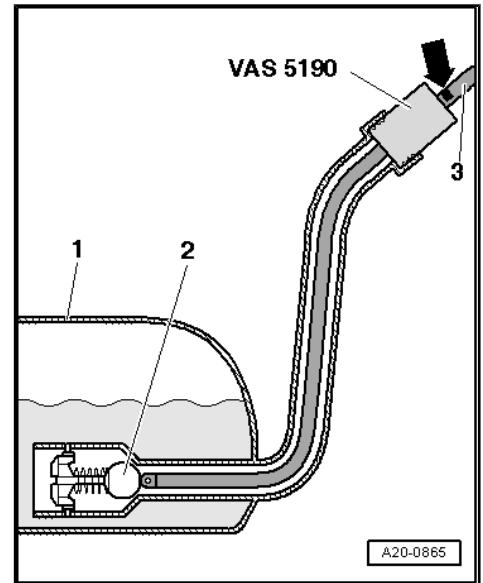
A ball valve -2- is located at the bottom of the filler neck in the fuel tank -1-; it must not be damaged by the extraction hose -3-. Therefore push hose into filler neck only as far as marking -arrow-.

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



#### Note

- ◆ When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger. The tank may be removed while containing remaining fuel.
- ◆ Emptying the fuel tank completely ⇒ [page 151](#).



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

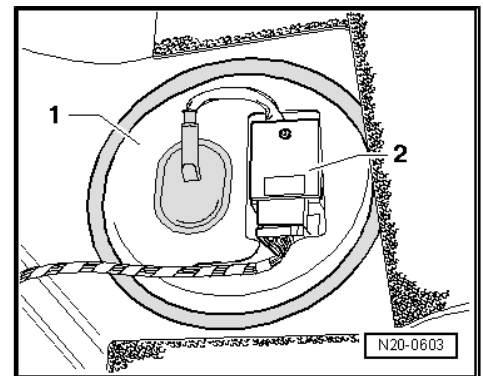
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



#### WARNING

**The fuel system is pressurised!**

- ◆ Wear protective goggles and protective clothing to avoid injury and contact with the skin.
- ◆ Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.

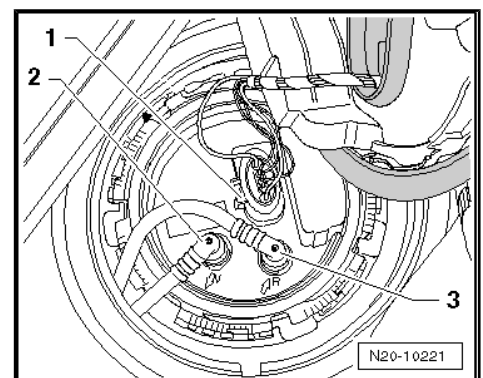


- Pull connector and fuel lines off flange.



#### Note

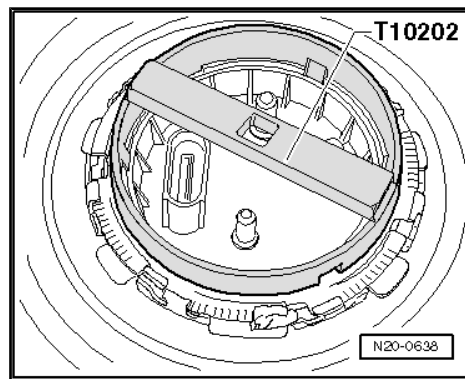
Press buttons on hose couplings to do this.





- Open locking ring using key - T10202- .
- Lift sender flange.
- Insert extraction hose of fuel extractor - VAS 5190- as deeply as possible into fuel tank and extract fuel.

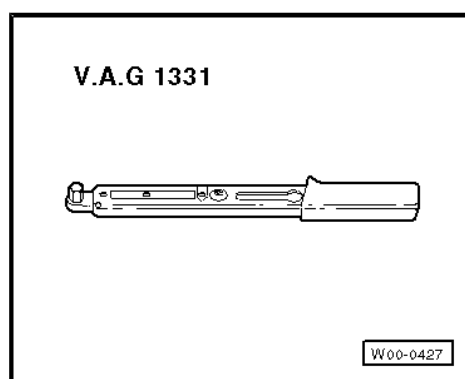
If fuel tank needed only to be emptied, reinstall sender flange  
⇒ [page 179](#) .



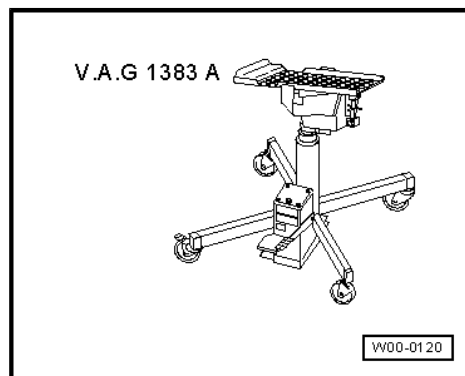
### 3.4 Removing and installing fuel tank

Special tools and workshop equipment required

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



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



Removing fuel tank ⇒ [page 152](#)

Installing fuel tank ⇒ [page 154](#)

#### 3.4.1 Removing

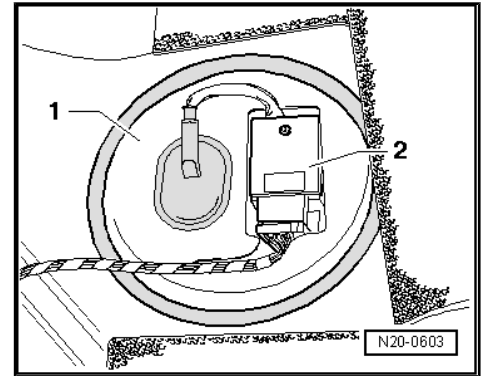
- Note safety precautions before beginning work ⇒ [page 140](#) .
- If necessary, empty fuel tank using fuel extractor - VAS 5190-  
⇒ [page 147](#) .
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .



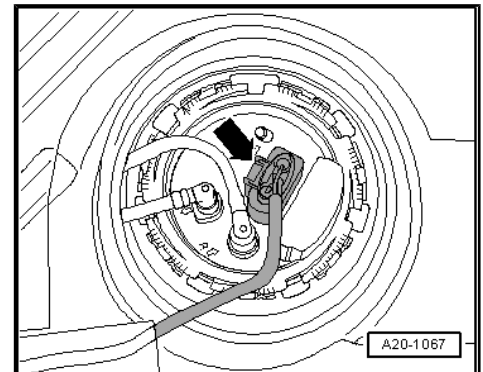
- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.

**i Note**

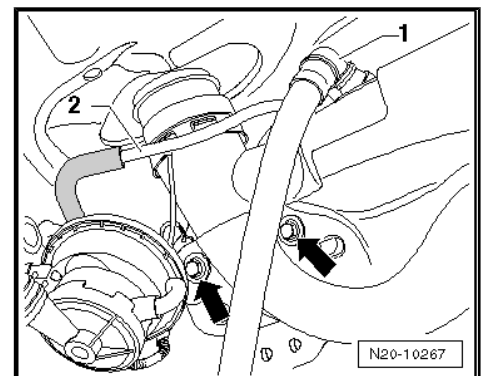
*For vehicles with auxiliary heater the metering pump - V54- connector must be separated additionally.*



- 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 .



- Separate hoses -1- and -2- (only engine code BPY).
- Unbolt fuel filler neck from body -arrows-.
- Unclip electrical wiring from filler neck.
- Remove centre and rear silencers.
- Remove heat shield for centre and rear silencers.



**WARNING**

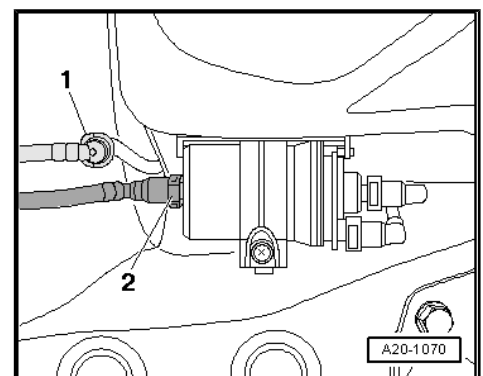
***The fuel system is pressurised!***

- ◆ ***Wear protective goggles and protective clothing to avoid injury and contact with the skin.***
- ◆ ***Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.***

- Disconnect breather line -1- (white) and fuel line -2- (black) at connecting point.

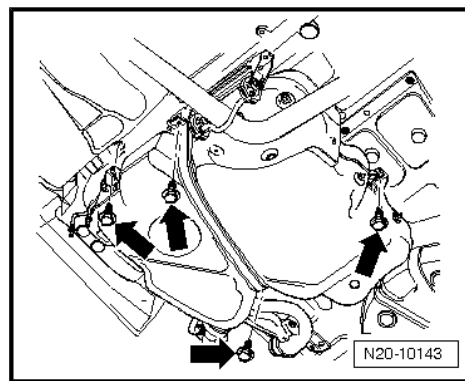
**i Note**

- ◆ ***Press in securing ring to release the fuel lines.***
- ◆ ***Vehicles with auxiliary heater, the fuel line of the metering pump - V54- must also be separated.***
- ◆ ***On vehicles with engine code BPY the vacuum line (green) for the fuel system diagnostic pump - V144- must be separated additionally.***





- Unscrew securing strap and securing bolts. When doing this, support fuel tank with engine and gearbox jack - V.A.G 1383 A- .
- Carefully lower fuel tank.



### 3.4.2 Installing

Install in reverse order of removal. During this step, observe the following:

- ◆ 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.
- ◆ Install breather lines and fuel lines free of kinks.
- ◆ Do not interchange supply line and return line (return line blue or with blue marking, supply line black).
- ◆ Ensure wiring/line connections are secured properly by pulling back.
- ◆ Check earth connection on fuel tank and body to filler neck.
- ◆ If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".

#### Specified torques:

Component	Nm
Fuel tank to body - M6 bolts	10
Fuel tank to body - M8 bolts	25 <sup>1)</sup>

<sup>1)</sup> Renew





## 4 Fuel tank, Eos

Safety precautions when working on fuel supply system  
⇒ [page 140](#) .

Rules for cleanliness ⇒ [page 143](#) .

Assembly overview - fuel tank (engine code BWA) ⇒ [page 155](#)

Assembly overview - fuel tank (engine code BPY) ⇒ [page 157](#)

Emptying fuel tank ⇒ [page 159](#) .

Removing and installing fuel tank ⇒ [page 163](#) .

### 4.1 Assembly overview - fuel tank (engine code BWA)

1 - Securing bolt

2 - Sealing cover

- ☐ Renew if damaged

3 - Earth connection

- ☐ Ensure firm seating

4 - 11 Nm

5 - Cable bracket

6 - 25 Nm

- ☐ Renew
- ☐ 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.

7 - Fuel tank

- ☐ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ☐ Removing and installing  
⇒ [page 163](#)

8 - Clamping washer

9 - Exhaust system retainer

10 - Securing strap

- ☐ Observe installation position

11 - Heat shield

12 - Supply line

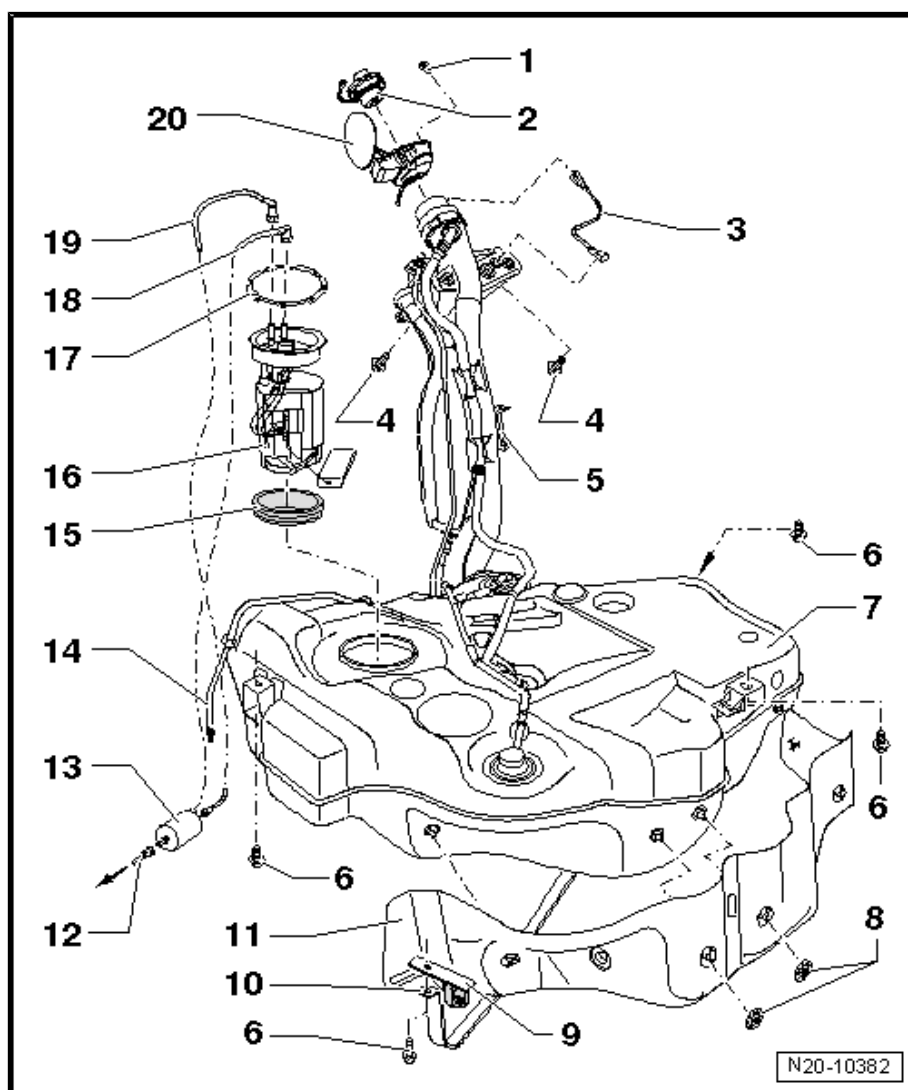
- ☐ To fuel rail

13 - Fuel filter

- ☐ Fitting position ⇒ [page 156](#)
- ☐ Arrow points in direction of flow.

14 - Breather line

- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating





### 15 - Sealing ring

- ☐ Renew
- ☐ When installing, fit dry in fuel tank opening.
- ☐ Only when installing, moisten inside of flange with fuel

### 16 - Fuel delivery unit

- ☐ Removing and installing ➔ [page 179](#)
- ☐ Checking fuel pump ➔ [page 183](#) .
- ☐ Note installation position on fuel tank ➔ [page 156](#)
- ☐ With fuel gauge sender - G-
- ☐ Removing and installing fuel gauge sender - G- ➔ [page 182](#)
- ☐ Clean strainer if soiled

### 17 - Locking ring 110 Nm

- ☐ Ensure firm seating
- ☐ Remove and install using wrench - T10202- .

### 18 - Supply line

- ☐ black
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

### 19 - Return line

- ☐ blue
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

### 20 - Tank flap unit

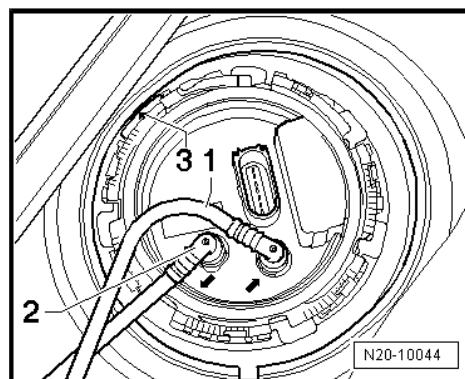
- ☐ With rubber cup.
- ☐ Removing and installing ➔ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit; Removing and installing fuel tank flap unit .

### Installation position of fuel delivery unit

Marking -3- on sender points opposite to direction of travel.

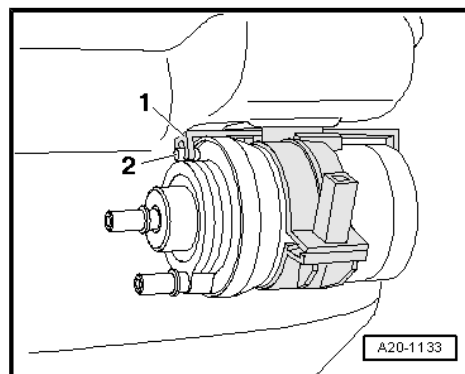
Blue return line -1-

Black supply line -2-



### Installation position of fuel filter

Pin -2- on filter housing must engage in notch of guide -1- on filter bracket.





## 4.2 Assembly overview - fuel tank (engine code BPY)

### 1 - Securing bolt

### 2 - Earth connection

- ☐ Ensure firm seating

### 3 - 11 Nm

### 4 - Rivet

### 5 - Protective plate

- ☐ Riveted as standard to bottom clamp
- ☐ When replacing fuel tank, hold protective plate against filler pipe and rivet to clamp

### 6 - Cable bracket

- ☐ Clipped onto protective plate

### 7 - 25 Nm

- ☐ Renew
- ☐ 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.

### 8 - Fuel tank

- ☐ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ☐ Removing and installing  
⇒ [page 163](#)

### 9 - Clamping washer

### 10 - Exhaust system retainer

### 11 - Securing strap

- ☐ Observe installation position

### 12 - Heat shield

### 13 - Supply line

- ☐ To fuel rail

### 14 - Fuel filter

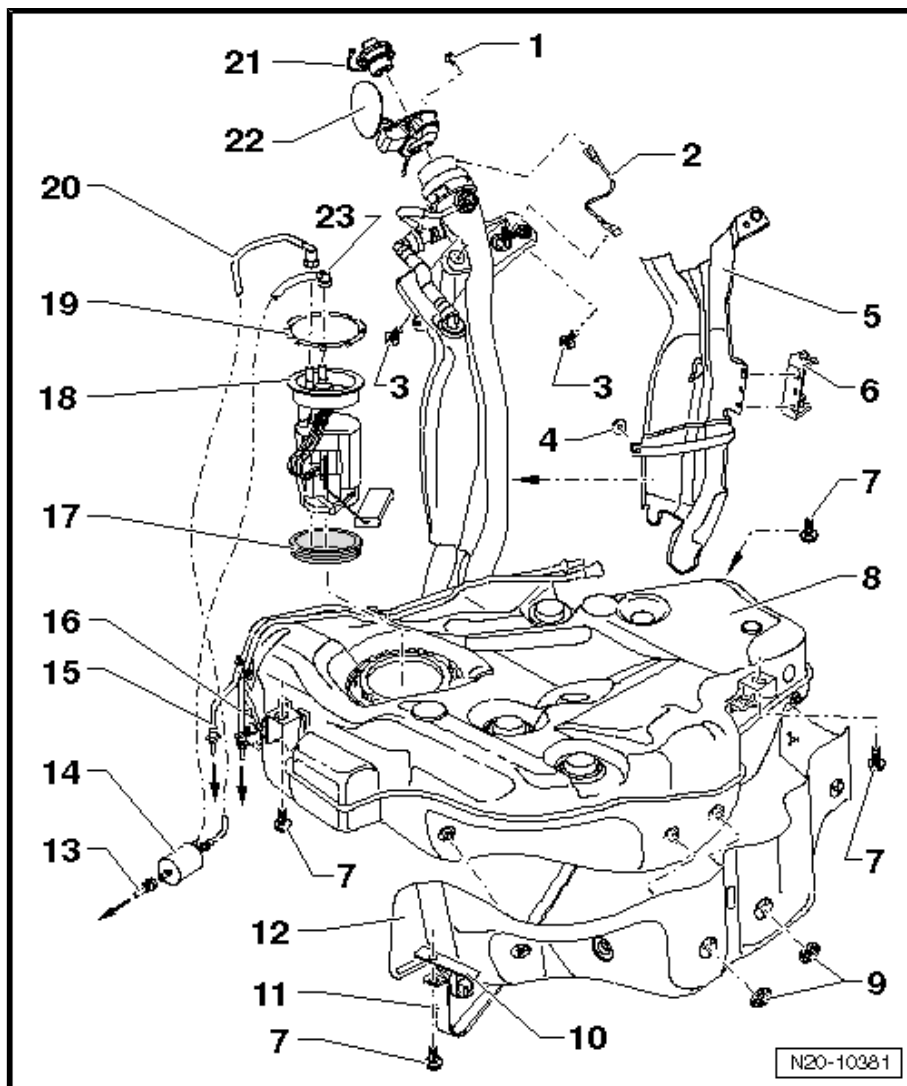
- ☐ Fitting position ⇒ [page 159](#)
- ☐ Arrow points in direction of flow.

### 15 - Vacuum line

- ☐ green
- ☐ From fuel system diagnostic pump - V144- to intake manifold.
- ☐ Clipped onto fuel tank.
- ☐ Ensure firm seating

### 16 - Breather line

- ☐ white





- ☐ From activated charcoal filter to activated charcoal filter solenoid valve 1 - N80-
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

#### 17 - Sealing ring

- ☐ Renew
- ☐ When installing, fit dry in fuel tank opening.
- ☐ Only when installing, moisten inside of flange with fuel

#### 18 - Fuel delivery unit

- ☐ Removing and installing ⇒ [page 179](#)
- ☐ Checking fuel pump ⇒ [page 183](#) .
- ☐ Note installation position on fuel tank ⇒ [page 158](#)
- ☐ With fuel gauge sender - G-
- ☐ Removing and installing fuel gauge sender - G- ⇒ [page 182](#)
- ☐ Clean strainer if soiled

#### 19 - Locking ring 110 Nm

- ☐ Ensure firm seating
- ☐ Remove and install using wrench - T10202- .

#### 20 - Return line

- ☐ blue
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

#### 21 - Sealing cover

- ☐ Renew if damaged

#### 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 .

#### 23 - Supply line

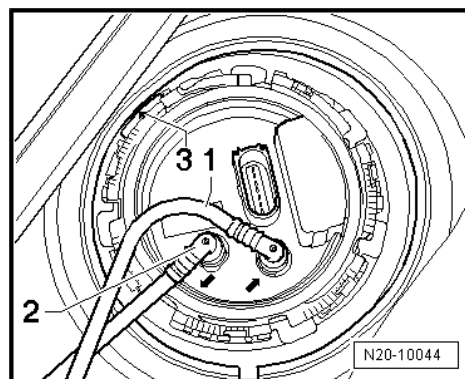
- ☐ black
- ☐ Clipped onto side of fuel tank.
- ☐ Ensure firm seating

#### Installation position of fuel delivery unit

Marking -3- on sender points opposite to direction of travel.

Return line (blue or with blue mark) -1-

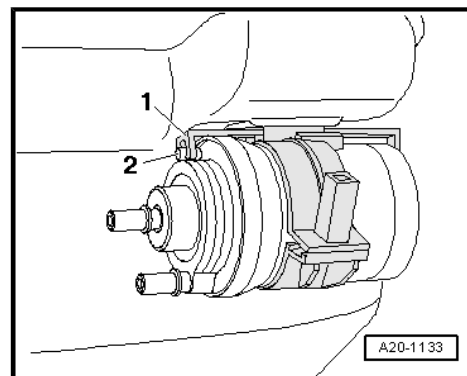
Black supply line -2-





#### Location of fuel filter

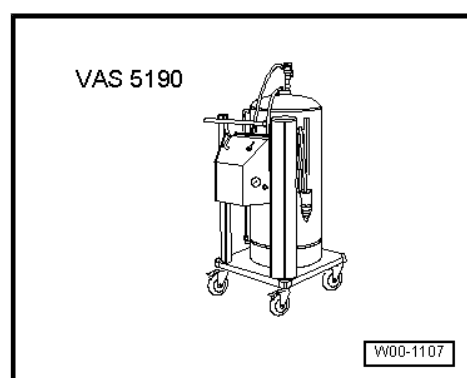
Pin -2- on filter housing must engage in notch of guide -1- on filter bracket.



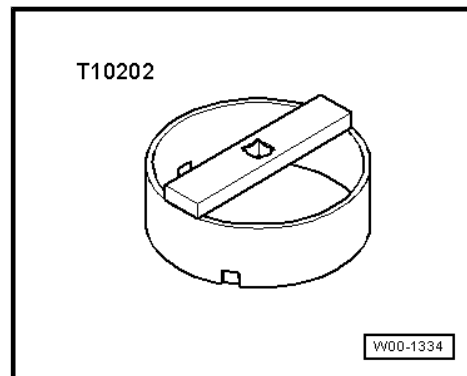
### 4.3 Emptying fuel tank

#### Special tools and workshop equipment required

- ◆ Fuel extraction unit - VAS 5190-



- ◆ Special wrench - T10202-



- ◆ Torque wrench (40 to 200 Nm) - V.A.G 1332-
- Note safety precautions before beginning work ⇒ [page 140](#) .

Emptying fuel tank when fuel pump is intact ⇒ [page 159](#) .

Emptying fuel tank if it is more than  $\frac{3}{4}$  full ⇒ [page 161](#) .

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

#### 4.3.1 Emptying fuel tank when fuel pump is intact

##### Special tools and workshop equipment required

- ◆ Adapter for fuel extraction - VAS 5190 /3-
- ◆ Test instrument adapter/DSO (5-pin) - VAS 5565-
- ◆ Remote control - V.A.G 1348/3A-



## WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*
- ◆ *For safety reasons, the fuse for the fuel pump must be removed before opening the fuel system ➔ **page 140**. Otherwise, the fuel pump could be activated by the driver door contact switch.*
- ◆ *Connect fuel extractor - VAS 5190- earth wire to vehicle earth.*

- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.

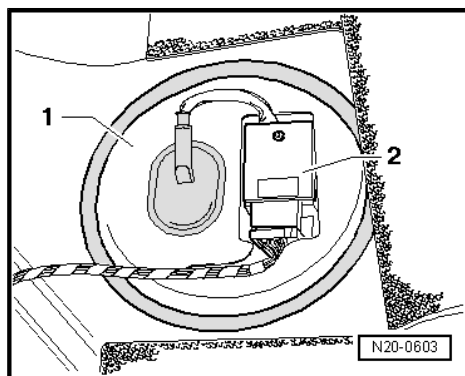
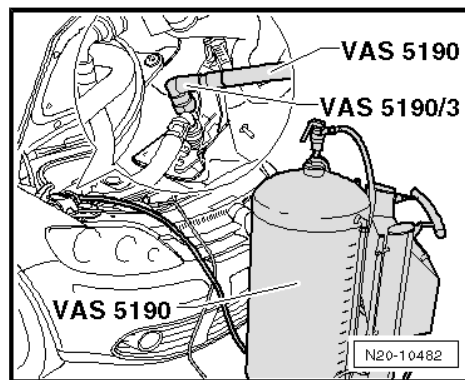
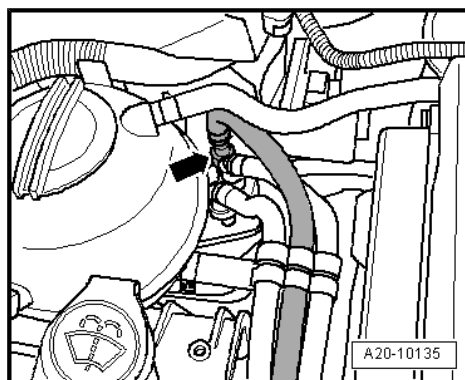


## Note

*Press in securing ring to release the fuel lines.*

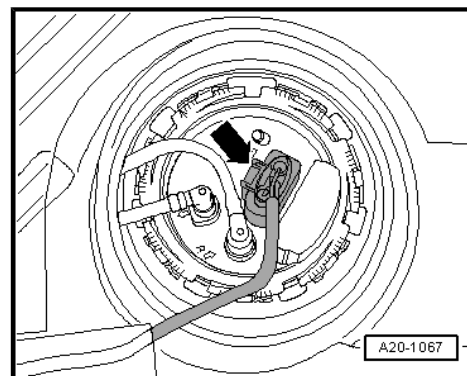
- Connect fuel extractor - VAS 5190- with adapter for fuel extractor - VAS 5190 /3- to fuel supply line.
- Remove bench seat ➔ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.





- Pull 5-pin connector off fuel delivery unit flange.



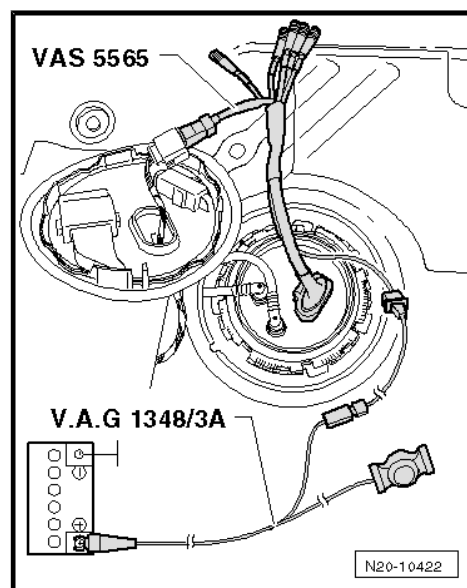
- Connect test instrument adapter/DSO (5-pin) - VAS 5565- to connector and fuel delivery unit.
- Connect remote control - V.A.G 1348/3A- to test instrument adapter/DSO (5-pin) - VAS 5565- and to battery positive (+).



#### Note

*This step serves only to have the fuel pump running when the engine is stopped.*

- Remove filler cap from fuel tank filler neck.
- Operate remote control - V.A.G 1348/3A- and shut-off tap on fuel extractor - VAS 5190- until fuel tank is empty.



#### Caution

**Fuel pump must not run »dry«.**

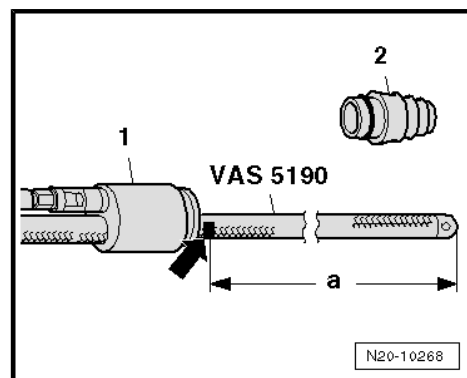
### 4.3.2 Emptying fuel tank if it is more than $\frac{3}{4}$ full



#### Caution

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

- Remove cotter -2- from shaft -1- of fuel extractor - VAS 5190-.
- At a distance of -a- = 820mm from the end of the hose, mark extraction hose with insulating tape -arrow-.
- Push extraction hose into fuel tank until marking -arrow- on hose coincides with filler neck.





#### Note

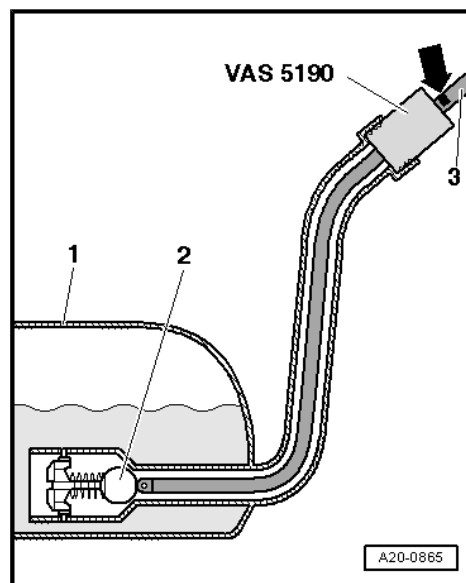
A ball valve -2- is located at the bottom of the filler neck in the fuel tank -1-; it must not be damaged by the extraction hose -3-. Therefore push hose into filler neck only as far as marking -arrow-.

- Empty fuel tank as far as possible.
- Carefully pull out extraction hose.



#### Note

- ◆ When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger.
- ◆ If the fuel tank has to be drained fully, proceed as follows:  
⇒ [page 162](#).



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

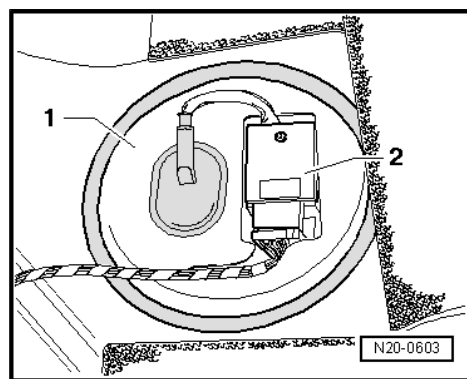
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



#### WARNING

**The fuel system is pressurised!**

- ◆ Wear protective goggles and protective clothing to avoid injury and contact with the skin.
- ◆ Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.

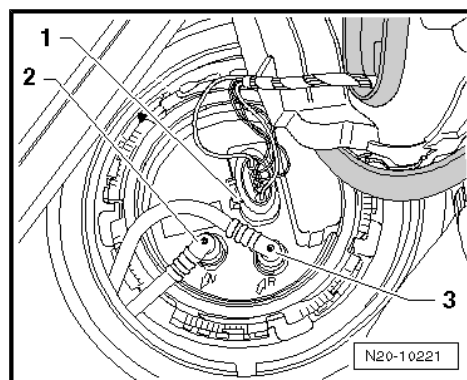


- Pull connector and fuel lines off flange.



#### Note

Press buttons on hose couplings to do this.

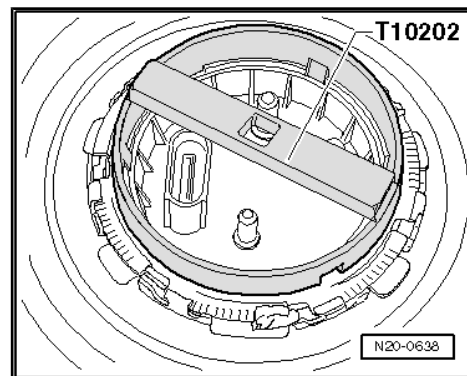






- Open locking ring using key - T10202- .
- Lift sender flange.
- Insert extraction hose of fuel extractor - VAS 5190- as deeply as possible into fuel tank and extract fuel.

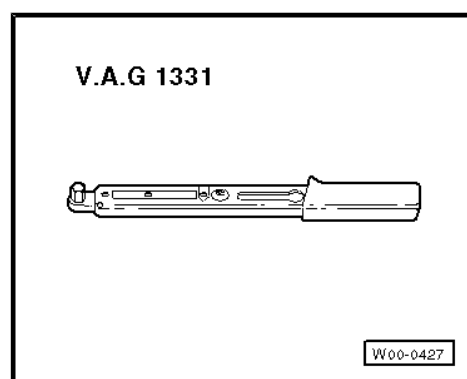
If fuel tank needed only to be emptied, reinstall sender flange  
⇒ [page 179](#) .



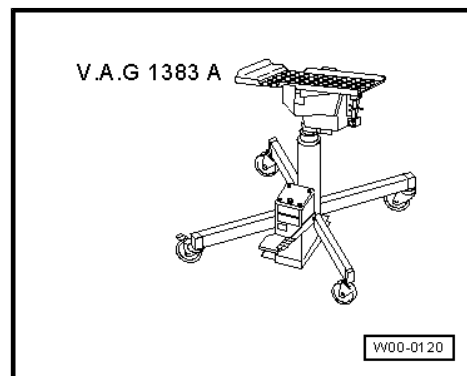
## 4.4 Removing and installing fuel tank

### Special tools and workshop equipment required

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



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



Removing fuel tank ⇒ [page 163](#)

Installing fuel tank ⇒ [page 165](#)

### 4.4.1 Removing

- Note safety precautions before beginning work ⇒ [page 140](#) .
- If necessary, empty fuel tank using fuel extractor - VAS 5190-  
⇒ [page 159](#) .
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

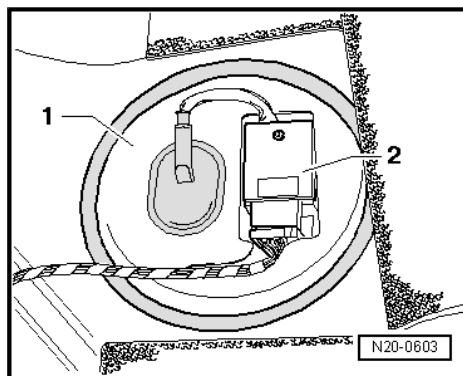


- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.

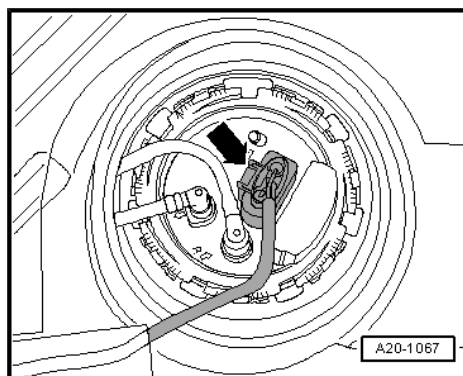


#### Note

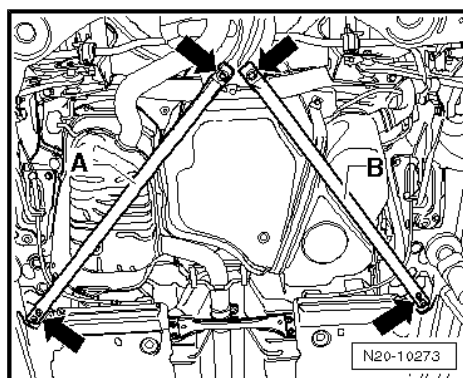
*For vehicles with auxiliary heater the metering pump - V54- connector must be separated additionally.*



- Pull 5-pin connector -arrow- off flange.
- Unscrew tank flap unit securing bolt and remove tank flap unit  
⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit .

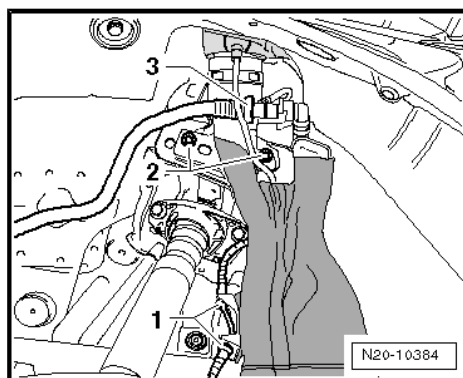


- Remove stiffener braces -A and B- ⇒ Running gear; Rep. gr. 42 ; Removing and installing stiffener braces .
- Remove centre and rear silencers.
- Remove heat shield for centre silencer.
- Remove rear right wheel.
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .



- Unclip wire from filler neck -1-.
- Separate breather line -3- (only engine code BPY).
- Unbolt filler neck from body -2-.

**Only engine code BPY**





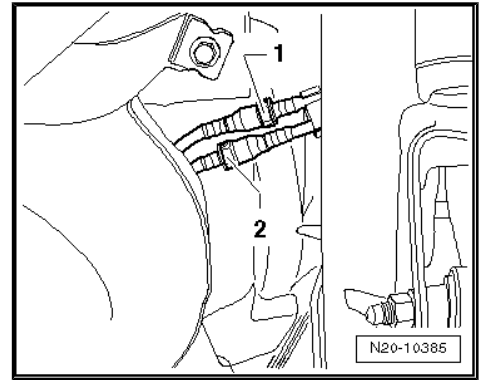
- Disconnect breather line -1- (white) and vacuum line -2- (green) for the fuel system diagnostic pump - V144- behind fuel tank, press securing ring inwards for this.

Continued for all vehicles



#### WARNING

*The fuel system is pressurised! Wear protective goggles and protective clothing to avoid injury and contact with the skin. Wrap a cloth around the connection before loosening hose connections. Then release pressure by carefully pulling hose off connection.*

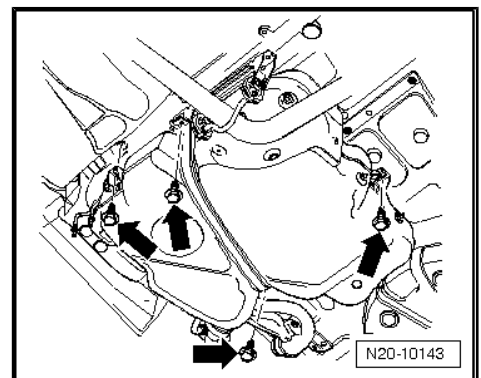
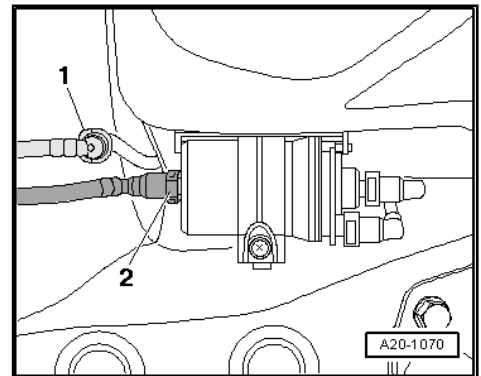


- Disconnect breather line -1- (white) and fuel line -2- (black) at connecting point.



#### Note

- ◆ Press in securing ring to release the fuel lines.
- ◆ Vehicles with auxiliary heater, the fuel line of the metering pump - V54- must also be separated.
- ◆ On vehicles with engine code BPY the vacuum line (green) for the fuel system diagnostic pump - V144- must be separated additionally.
- Remove securing strap and securing bolts -arrows-. When doing this, support fuel tank with engine and gearbox jack - V.A.G 1383 A- .
- Carefully lower fuel tank.



## 4.4.2 Installing fuel tank

Install in reverse order of removal. During this step, observe the following:

- ◆ 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.
- ◆ Install breather lines and fuel lines free of kinks.
- ◆ Do not interchange supply line and return line (return line blue, supply line black).
- ◆ Ensure that line connections are tight.
- ◆ Check earth connection on fuel tank and body to filler neck.
- Install stiffener braces ⇒ Running gear; Rep. gr. 42 ; Removing and installing stiffener braces .



Eos 2006 ➤ , Golf 2004 ➤ , Passat 2006 ➤

4-cylinder injection engine (2.0 l engine, turbocharger) - Edition 03.2017

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**Specified torques:**

Component	Nm
Fuel tank to body - M6 bolts	10
Fuel tank to body - M8 bolts	25 <sup>1)</sup>

<sup>1)</sup> Renew



## 5 Fuel tank, Passat

⇒ ["1 Safety precautions", page 140](#)

⇒ ["2 Rules for cleanliness", page 143](#)

⇒ ["5.1 Assembly overview - fuel tank \(engine code BPY\)", page 167](#)

⇒ ["5.2 Assembly overview - fuel tank \(engine codes AXX, BWA\)", page 169](#)

⇒ ["5.3 Emptying fuel tank", page 170](#)

⇒ ["5.4 Removing and installing fuel tank", page 174](#)

### 5.1 Assembly overview - fuel tank (engine code BPY)

#### 1 - Fuel line

- ☐ Ensure firm seating

#### 2 - Sealing cover

- ☐ 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.
- ☐ Ensure firm seating

#### 6 - Vacuum line

- ☐ Clipped onto fuel tank.
- ☐ Ensure firm seating

#### 7 - Earth connection

- ☐ To protective plate for filler neck.
- ☐ Ensure firm seating

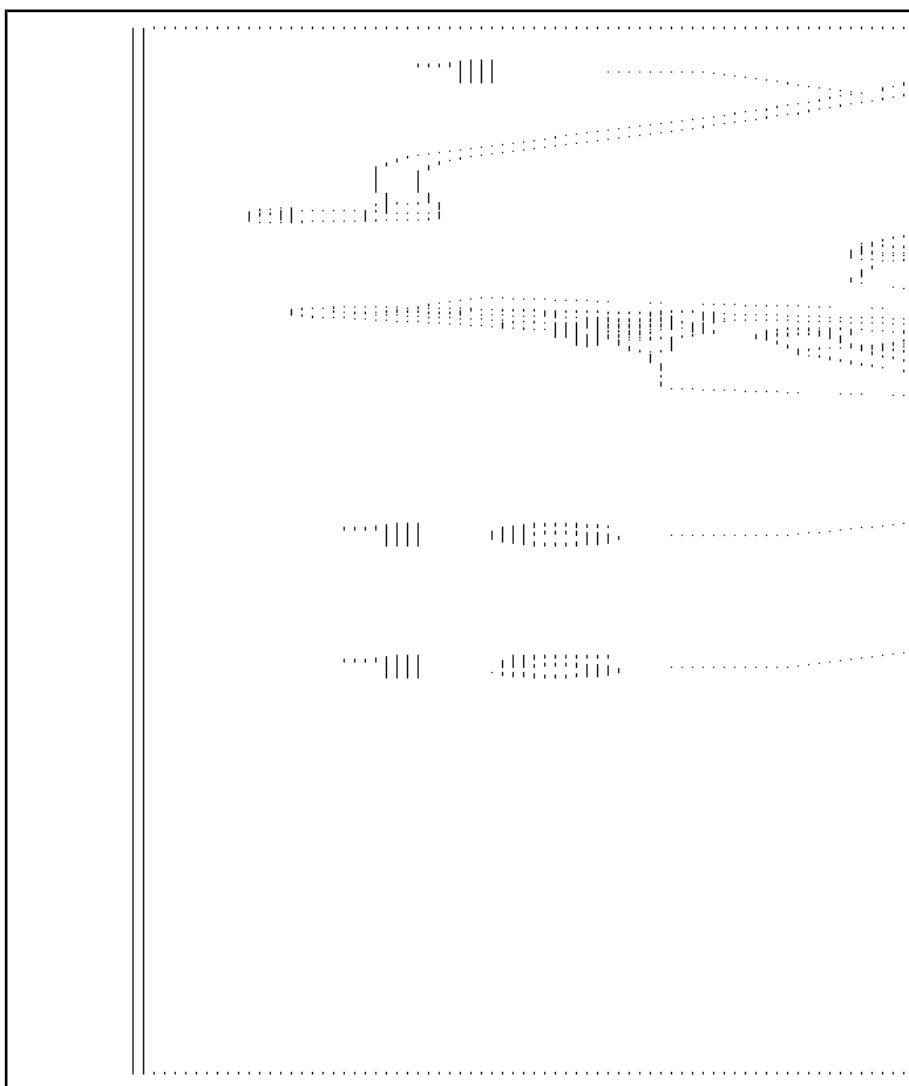
#### 8 - Earth connection

- ☐ Ensure firm seating
- ☐ Ensure good contact to body

#### 9 - Clamps

#### 10 - Fuel tank

- ☐ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ☐ Removing and installing ⇒ [page 174](#)





#### 11 - Securing straps

#### 12 - Heat shield

#### 13 - Clamping washer

#### 14 - 25 Nm

- ☐ 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. Bolts ⇒ ETKA (Electronic parts catalogue) .
- ☐ Renew

#### 15 - Sealing ring

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

#### 16 - Fuel delivery unit

- ☐ Removing and installing ⇒ [page 196](#)

If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".

- ☐ Checking fuel pump ⇒ [page 200](#) .
- ☐ With fuel gauge sender - G-
- ☐ Removing and installing fuel gauge sender ⇒ [page 199](#) .
- ☐ Clean strainer if soiled

#### 17 - 8 Nm

#### 18 - Protective plate

- ☐ For filler neck.

#### 19 - Suction-jet pump

#### 20 - Flange with fuel filter

- ☐ With 6.2 bar pressure relief valve
- ☐ Removing and installing ⇒ [page 196](#)

#### 21 - Locking ring 110 Nm

- ☐ Ensure firm seating
- ☐ Remove and install using wrench - T10202- .



## 5.2 Assembly overview - fuel tank (engine codes AXX, BWA)

### 1 - Fuel line

- ☐ Ensure firm seating

### 2 - Sealing cover

- ☐ 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.
- ☐ Ensure firm seating

### 6 - Earth connection

- ☐ Ensure firm seating

### 7 - Fuel tank

- ☐ When removing, support using engine and gearbox jack - V.A.G 1383 A- .
- ☐ Removing and installing  
⇒ [page 174](#)

### 8 - Securing straps

### 9 - Heat shield

### 10 - Clamping washer

### 11 - 25 Nm

- ☐ 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. Bolts ⇒ ETKA (Electronic parts catalogue) .
- ☐ Renew

### 12 - Sealing ring

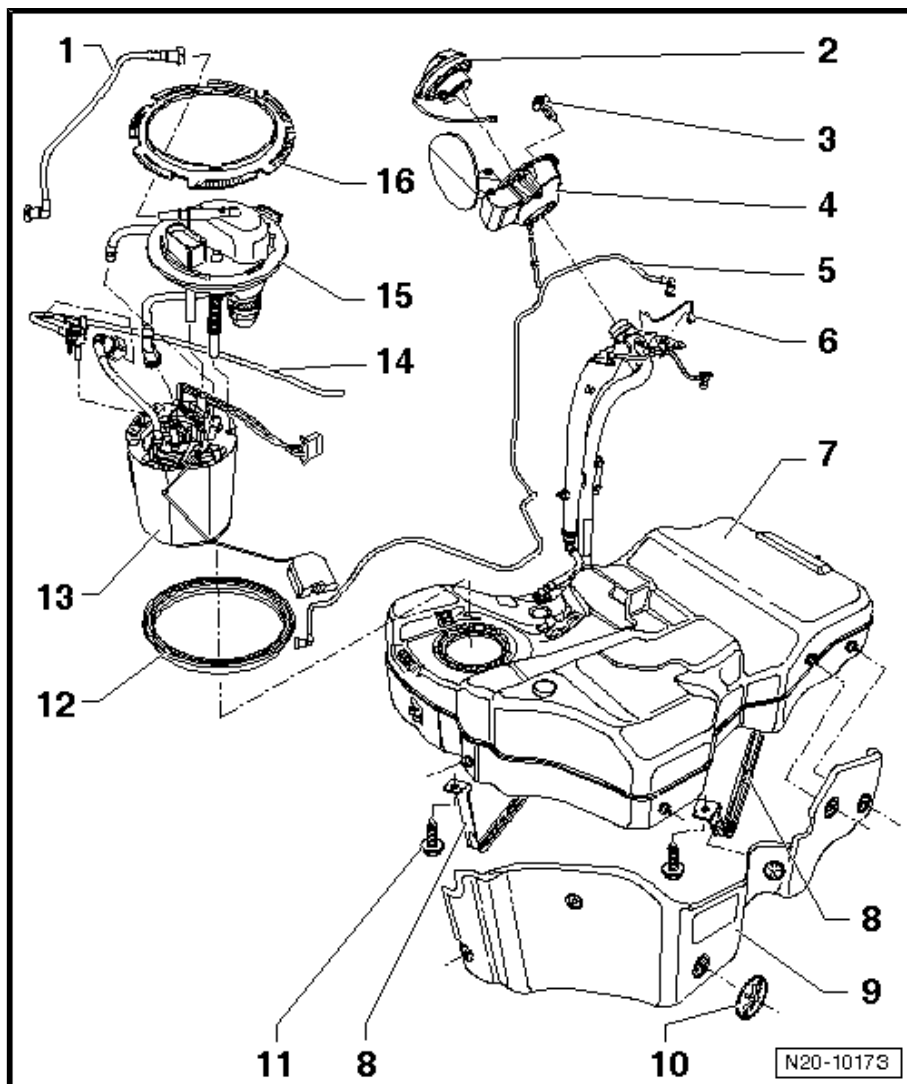
- ☐ Renew if damaged
- ☐ When installing, fit dry in fuel tank opening.
- ☐ Moisten with fuel only when installing flange.

### 13 - Fuel delivery unit

- ☐ Removing and installing ⇒ [page 196](#)

If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".

- ☐ Checking fuel pump ⇒ [page 200](#) .
- ☐ With fuel gauge sender - G-
- ☐ Removing and installing fuel gauge sender ⇒ [page 199](#) .
- ☐ Clean strainer if soiled





#### 14 - Suction-jet pump

#### 15 - Flange with fuel filter

- ☐ With 6.2 bar pressure relief valve
- ☐ Removing and installing ⇒ [page 196](#)

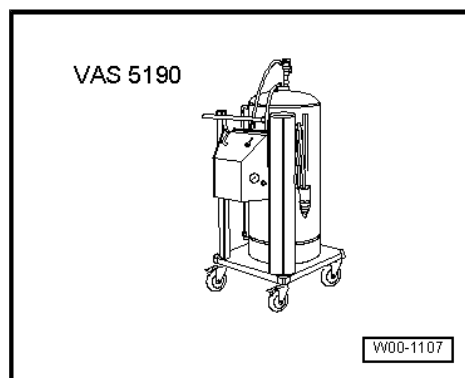
#### 16 - Locking ring 110 Nm

- ☐ Ensure firm seating
- ☐ Remove and install using wrench - T10202- .

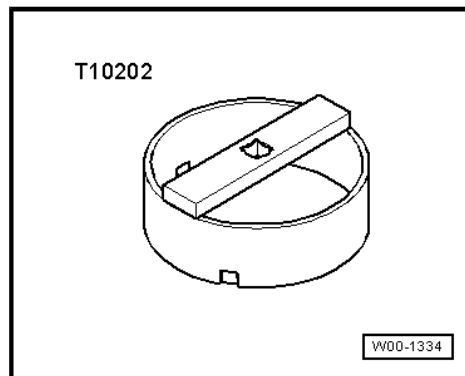
### 5.3 Emptying fuel tank

#### Special tools and workshop equipment required

- ◆ Fuel extraction unit - VAS 5190-



- ◆ Special wrench - T10202-



- ◆ Torque wrench (40 to 200 Nm) - V.A.G 1332-
- Note safety precautions before beginning work ⇒ [page 140](#) .

Emptying fuel tank when fuel pump is intact ⇒ [page 170](#) .

Emptying fuel tank if it is more than  $\frac{3}{4}$  full ⇒ [page 172](#) .

Emptying fuel tank if it is less than  $\frac{3}{4}$  full ⇒ [page 173](#)

#### 5.3.1 Emptying fuel tank when fuel pump is intact

##### Special tools and workshop equipment required

- ◆ Adapter for fuel extraction - VAS 5190 /3-
- ◆ Test instrument adapter/DSO (5-pin) - VAS 5565-
- ◆ Remote control - V.A.G 1348/3A-





## WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*
- ◆ *Connect fuel extractor - VAS 5190- earth wire to vehicle earth.*

- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.

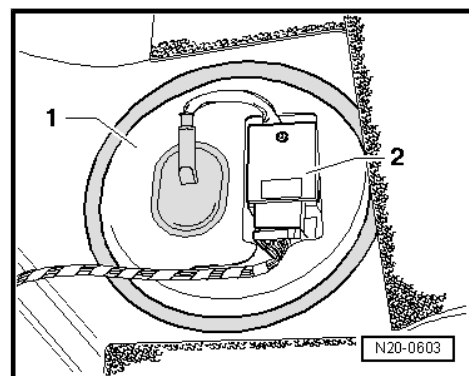
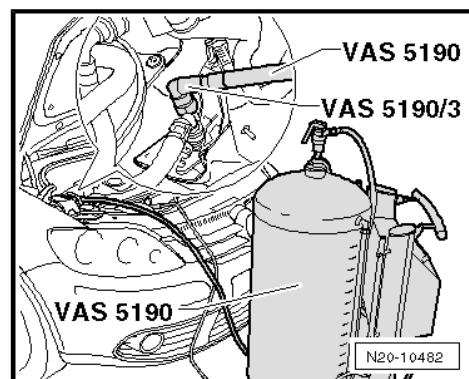
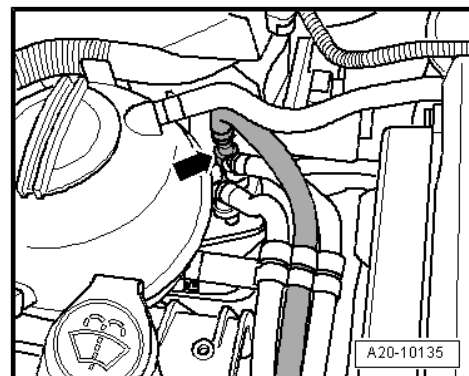


## Note

*Press in securing ring to release the fuel lines.*

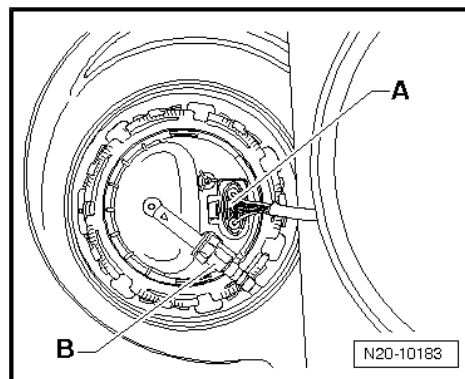
- Connect fuel extractor - VAS 5190- with adapter for fuel extractor - VAS 5190 /3- to fuel supply line.
- Remove bench seat ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .

- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.





- Pull connector -A- off fuel delivery unit flange.



- 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 (+).



#### Note

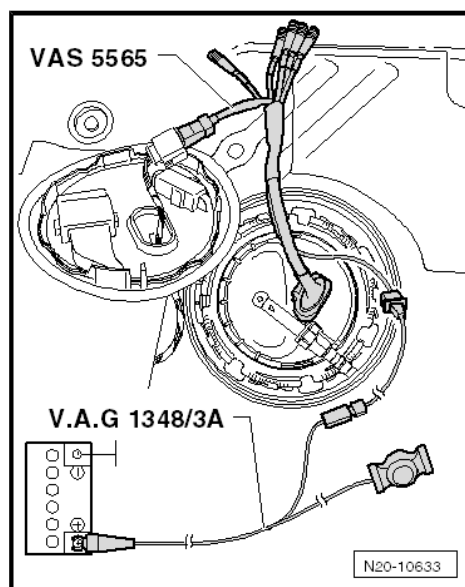
*This step serves only to have the fuel pump running when the engine is stopped.*

- Remove filler cap from fuel tank filler neck.
- Operate remote control - V.A.G 1348/3A- and shut-off tap on fuel extractor - VAS 5190- until fuel tank is empty.



#### Caution

*Fuel pump must not run »dry«.*



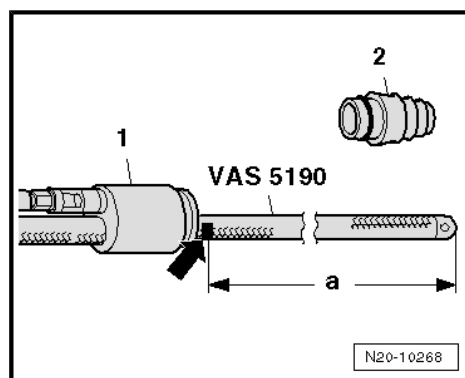
### 5.3.2 Emptying fuel tank if it is more than $\frac{3}{4}$ full



#### Caution

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

- Use insulating tape to mark the extraction hose -arrow- at a distance of -a- = 990 mm from the end of the hose.





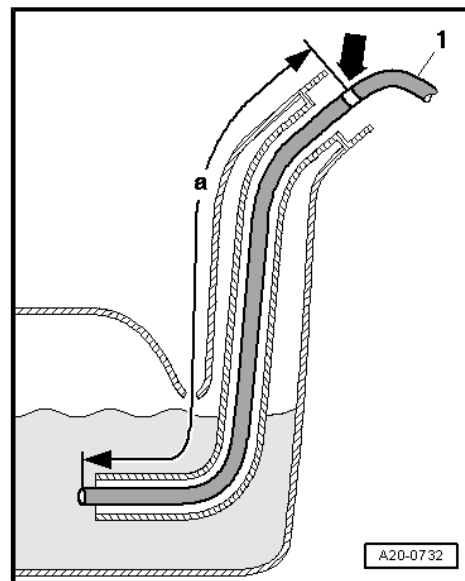
- Push extraction hose into fuel tank until marking -arrow- on hose coincides with filler neck.

**i Note**

- ◆ *The shaft piece -1- is not used.*
- ◆ *There is a flap on the bottom end of the fuel filler neck in the fuel tank, this must not be damaged by the extraction hose. Therefore, only push the hose in as far as the marking.*
- Drain fuel tank as much as possible through fuel filler neck.
- Carefully pull out extraction hose.

**i Note**

- ◆ *When no more fuel is extracted, the tank is emptied just enough for the sender flange to be opened without danger. The tank may be removed while containing remaining fuel.*
- ◆ *Emptying the fuel tank completely ➔ [page 173](#).*



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

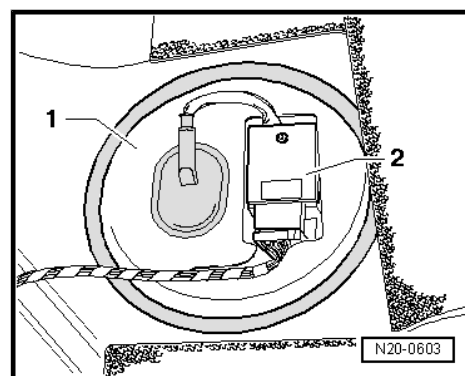
- Remove bench seat ➔ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing bench seat .
- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



**WARNING**

*The fuel system is pressurised!*

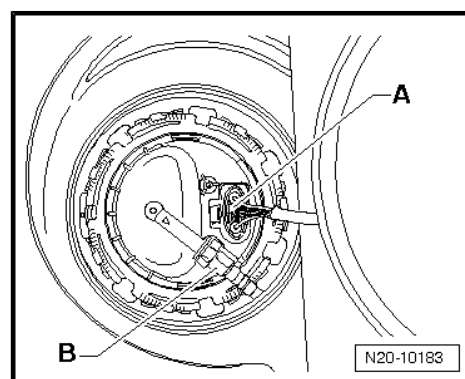
- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



- Pull connector -A- and fuel line -B- off flange.

**i Note**

- ◆ *Press in securing ring to release fuel line.*
- ◆ *On vehicles with auxiliary heater, the connector and the fuel line of the metering pump - V54- must also be disconnected.*





- Open locking ring using key - T10202- .

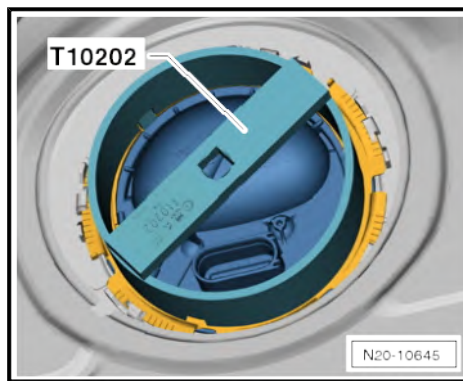


#### Caution

*Do not cant key - T10202- and press against locking ring firmly.  
If the key slips off, the fuel delivery unit can be damaged.*

- Lift sender flange.
- Insert extraction hose of fuel extractor - VAS 5190- as deeply as possible into fuel tank and extract fuel.

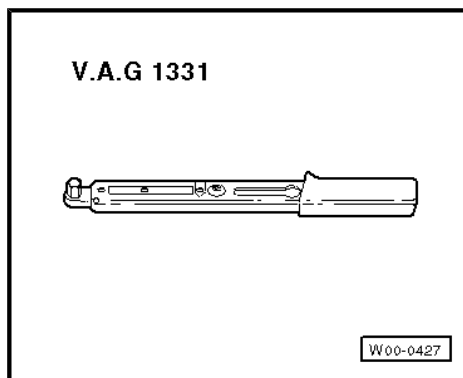
If fuel tank needed only to be emptied, reinstall sender flange  
⇒ [page 196](#) .



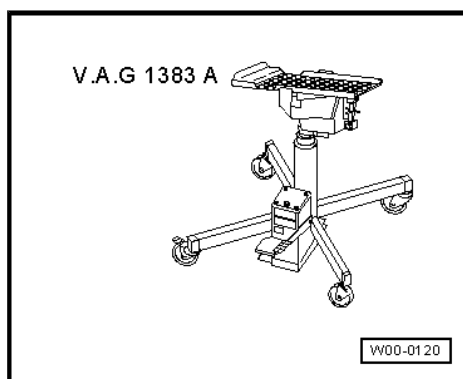
## 5.4 Removing and installing fuel tank

### Special tools and workshop equipment required

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



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



Removing fuel tank ⇒ [page 174](#)

Installing fuel tank ⇒ [page 177](#)

### 5.4.1 Removing fuel tank



#### Note

*The rear axle must be lowered to remove the fuel tank.*

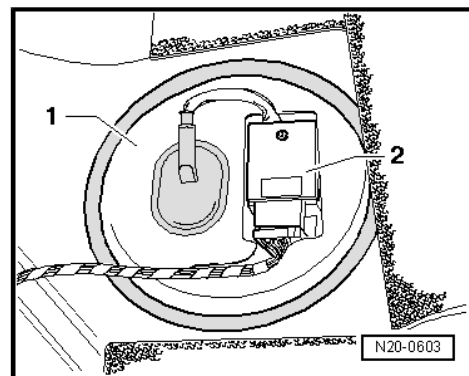
- Note safety precautions before beginning work ⇒ [page 140](#) .

If necessary, empty fuel tank using fuel extractor - VAS 5190-  
⇒ [page 170](#) .

- 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.



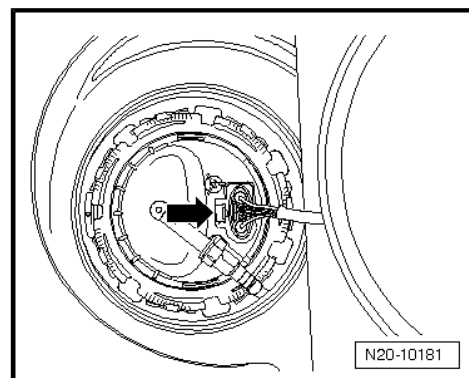
- Pull 5-pin connector off flange.



#### Note

*For vehicles with auxiliary heater the metering pump - V54- connector must be separated additionally.*

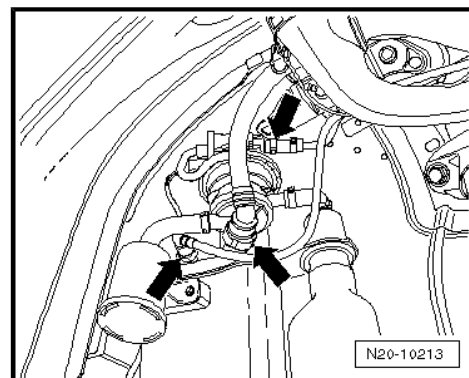
- Remove rear right wheel.
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Removing and installing wheel housing liner; Rear wheel housing liner .



#### Engine code BPY:

- Pull breather lines and vacuum line -arrows- off activated charcoal filter.

#### Engine codes AXX, BWA:



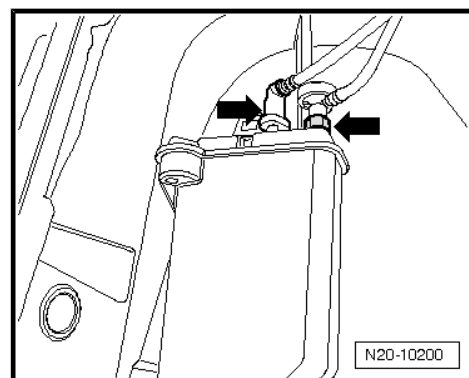
- Pull breather line and pressure retention valve -arrows- off activated charcoal filter.



#### Note

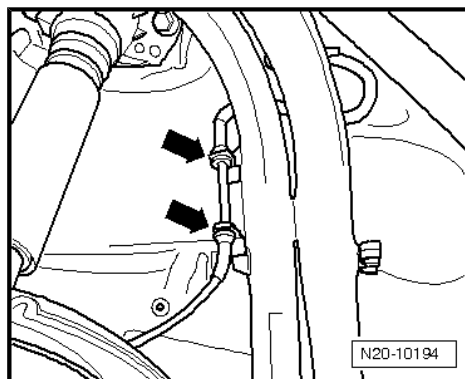
*Grasp securing ring (grey) on pressure retention valve and pull valve off upwards.*

#### Continued for all vehicles:





- Unclip electrical wire on filler neck.
- Unscrew tank flap unit securing bolt and remove tank flap unit  
⇒ General body repairs, exterior; Rep. gr. 55 ; Tank flap unit .



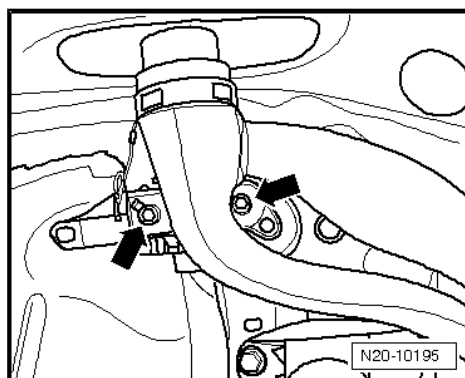
- Unbolt filler neck from body -arrows-.



#### WARNING

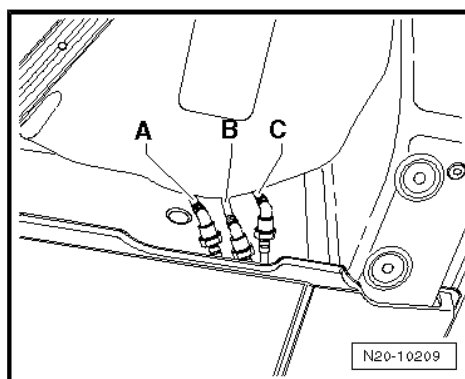
***The fuel system is pressurised!***

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



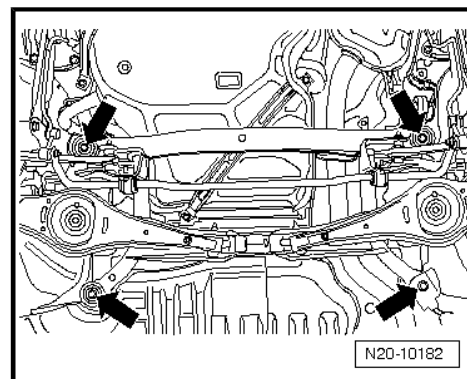
#### Note

- ◆ *Press in securing ring to release fuel line.*
  - ◆ *Vehicles with auxiliary heater, the fuel line of the metering pump - V54- must also be separated.*
  - ◆ *The vacuum line is only installed for engine code BPY.*
- Separate breather line (white), vacuum line (green) and fuel line (black) at union.
  - Support rear axle using engine and gearbox jack - V.A.G 1383 A- .





- Remove securing bolts -arrows- and lower rear axle.

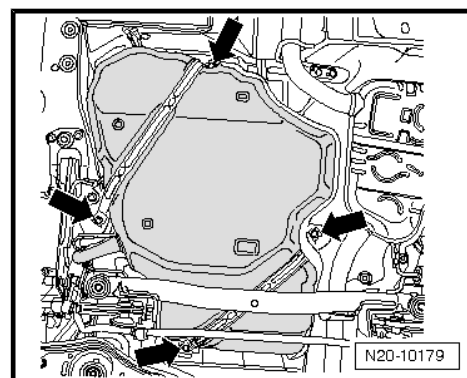


- Unscrew securing bolts for securing straps. First support fuel tank with engine and gearbox jack - V.A.G 1383 A- .
- Slowly lower fuel tank.



#### Note

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



### 5.4.2 Installing fuel tank

- With the aid of a second 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- .



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



#### 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. Bolts ⇒ ETKA (Electronic parts catalogue) .*

- Secure rear axle to body again ⇒ Body; Rep. gr. 42 .

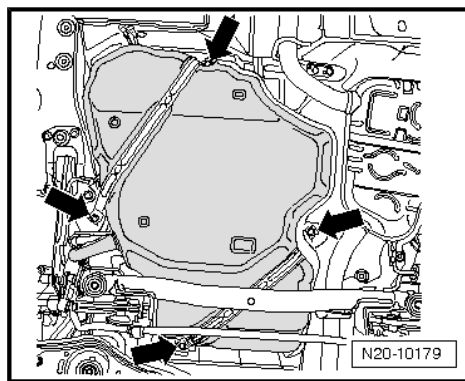
The remaining installation steps are carried out in the reverse sequence of removal. During this step, observe the following:

- ◆ Install breather lines and fuel lines free of kinks.
- ◆ Ensure wiring/line connections are secured properly by pulling back.
- ◆ Check earth connection on fuel tank and body to filler neck.
- ◆ If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester “Guided Functions”.

#### Specified torques:

Component	Nm
Fuel tank to body	25 Nm <sup>1)</sup>
Filler neck to body	8 Nm + 90° (1/4 turn) further

<sup>1)</sup> Renew







## 6 Repairing fuel supply system, Golf, Eos



### Note

- ◆ *Fuel hoses on the engine must only be secured with spring-type clips which conform to the production standard.*
- ◆ *Hose clip pliers - VAS 6362- and -VAS 6499- are recommended for installing spring-type clips.*
- ◆ *If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".*

Safety precautions when working on fuel supply system  
⇒ [page 140](#) .

Comply with rules for cleanliness ⇒ [page 143](#) .

Removing and installing fuel delivery unit ⇒ [page 179](#) .

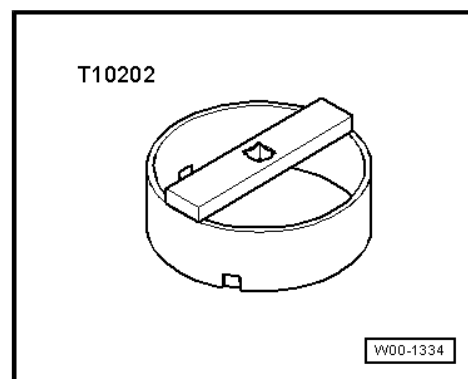
Removing and installing fuel gauge sender - G- ⇒ [page 182](#) .

Check fuel pump ⇒ [page 183](#) .

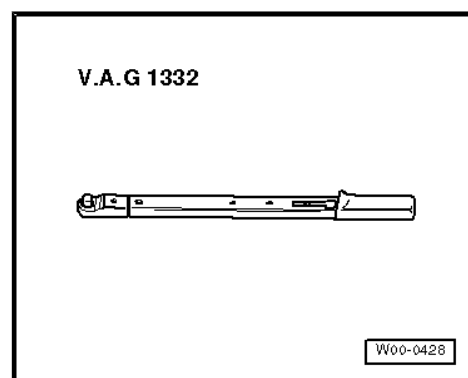
### 6.1 Removing and installing fuel delivery unit

#### Special tools and workshop equipment required

- ◆ Special wrench - T10202-



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





## Removing:



### Caution

#### Condition:

- *Fuel tank must not be more than  $\frac{3}{4}$  full. This ensures that the fill level is below the flange of the fuel delivery unit.*



### Note

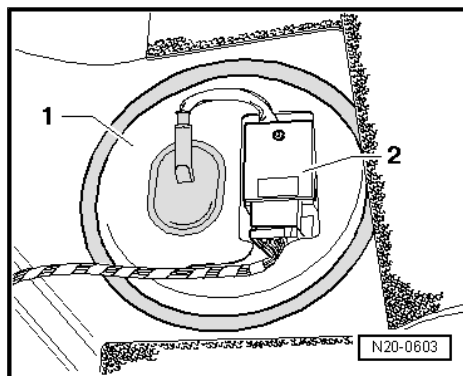
- ◆ *When replacing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.*
- ◆ *If necessary, empty fuel tank using fuel extractor - VAS 5190- ➔ [page 147](#) .*
- ◆ *Note safety precautions before beginning work ➔ [page 140](#) .*
- ◆ *Observe rules for cleanliness ➔ [page 143](#) .*
- 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 -2- from fuel delivery unit.



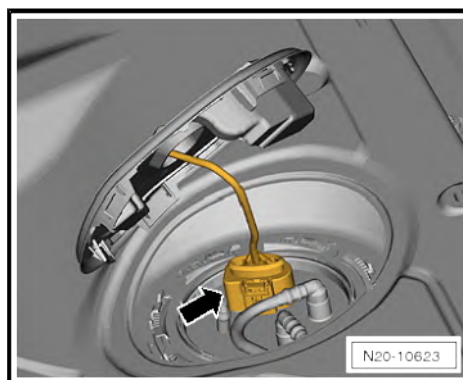
### WARNING

#### *The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



- Pull off connector -arrow-.

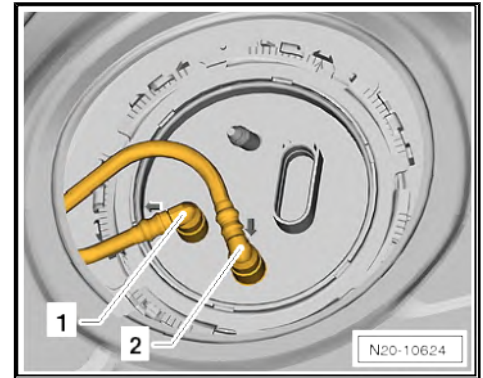




- Pull fuel lines -1- and -2- off the flange.

**i Note**

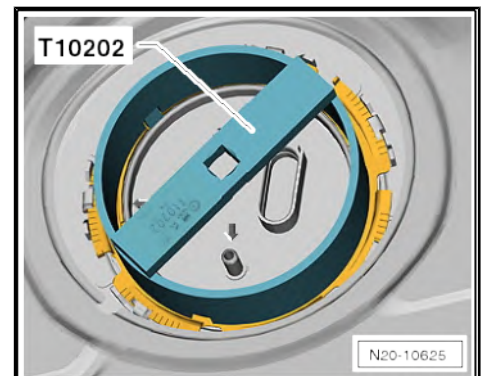
- ◆ Press in securing ring to release the fuel lines.
- ◆ On vehicles with auxiliary heater, the connector and the fuel line of the metering pump - V54- must also be disconnected.



- Open locking ring using key - T10202- and raise flange slightly.
- Pull fuel delivery unit and seal out of the opening in fuel tank.

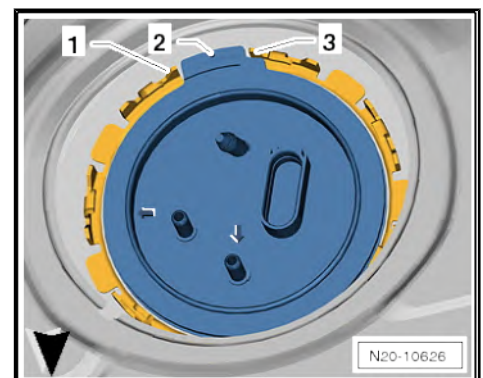
**i Note**

- ◆ If delivery unit is to be renewed, drain old delivery unit before disposal.
- ◆ Observe disposal regulations!

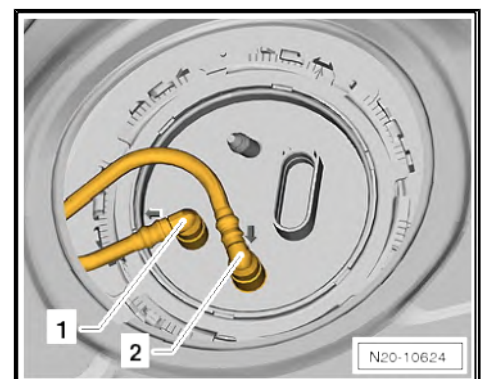


**Installing:**

- Fit gasket.
- 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.
- Press sealing flange down against spring pressure, and move sealing flange to installation position.
  - Tab -2- on flange must be between lugs -1- and -3- on fuel tank.
  - -Arrow- points in direction of travel.
- Tighten sealing flange.
- Specified torque: 110 Nm



- Reconnect supply line-1- (black).
- Reconnect fuel return line -2- (blue or blue marking).

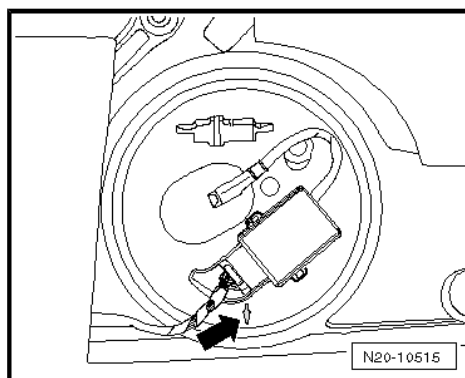
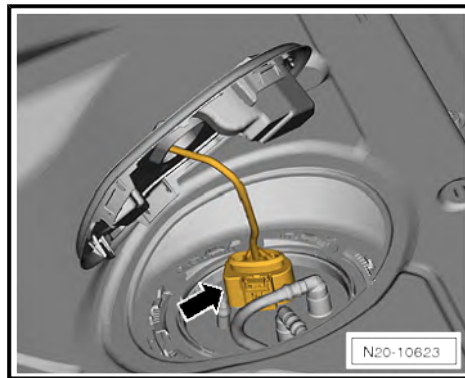




- Reconnect connector -arrow-.
- Ensure push-fit couplings and electrical connectors are secured properly by pulling.

Further assembly is performed in the reverse order of removal. During this step, observe 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.



## 6.2 Removing and installing fuel gauge sender - G-



### Note

*Gradual introduction of fuel delivery units with modified fuel gauge senders - G- .*

#### Removing (old version):

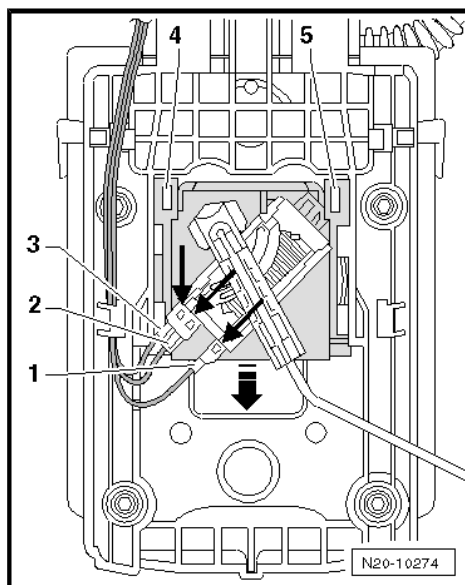
- Remove fuel delivery unit ⇒ [page 179](#) .
- Note colour co-ordination of cables for reinstallation.
- Release connectors -arrows- and pull off connectors -1, 2 and 3-. Then bend back locking lugs of connectors.
- Lift retaining tabs -4- and -5- using a screwdriver, and pull off fuel gauge sender - G- downwards -arrow-.

#### Installing:

- Insert fuel gauge sender - G- into guides on fuel delivery unit and press upwards until it engages.
- Connect connectors -1...3-. Observe colour co-ordination.
- Check connectors are secured properly by pulling.
- Install fuel delivery unit ⇒ [page 179](#) .

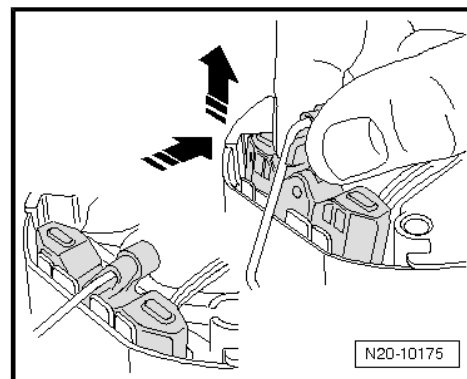
#### Removing (new version):

- Remove fuel delivery unit ⇒ [page 179](#) .

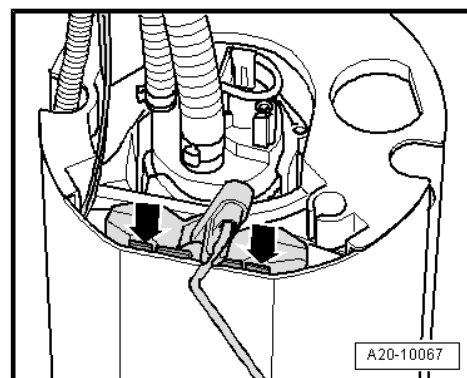




- Pull fuel gauge sender - G- slightly to side and upwards at the same time.

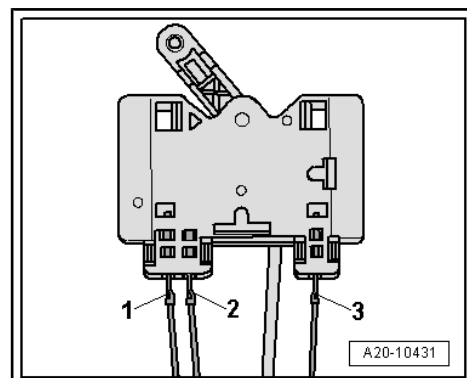


- If the sender cannot be released in this way, the retaining tabs -arrows- must also be pushed to the side slightly.
- Note colour co-ordination of cables for reinstallation.

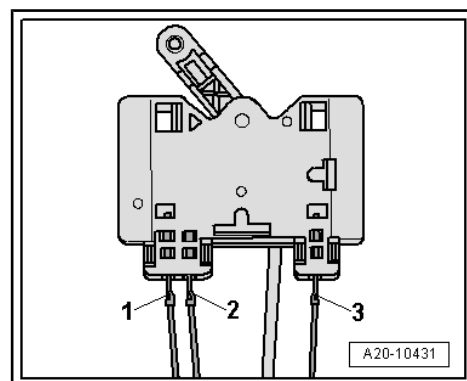


- Release electrical connectors -1 to 3- and pull them off. Then bend back locking lugs of connectors.

#### Installing:



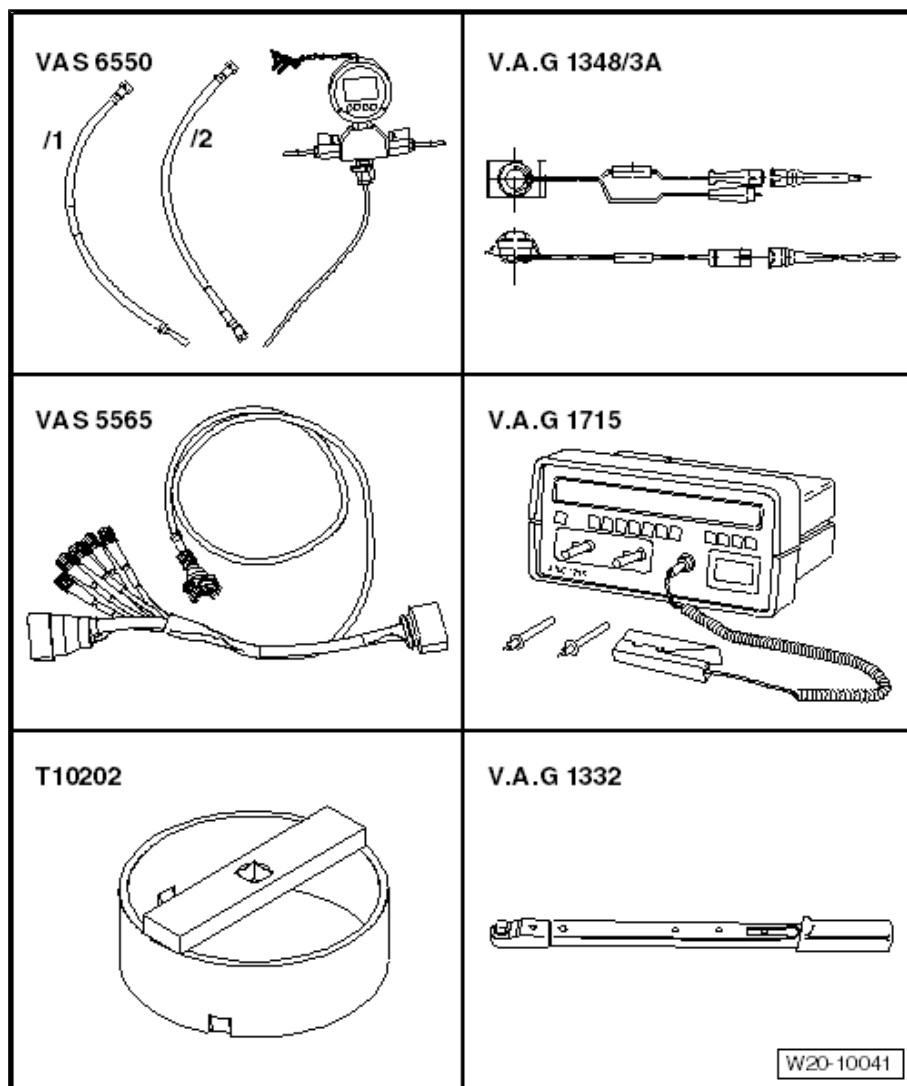
- Connect connectors -1...3-. Observe colour co-ordination.
- Check connectors are secured properly by pulling.
- Insert fuel gauge sender - G- into guide on fuel delivery unit and press down until it engages.
- Install fuel delivery unit ➔ [page 179](#) .



### 6.3 Checking fuel pump - G6-



**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-
- ◆ Special wrench - T10202-
- ◆ Torque wrench - V.A.G 1332-
- ◆ Measuring container, capacity 2 litres

Check function and voltage supply ➔ [page 184](#) .

Check fuel pressure ➔ [page 187](#) .

Checking holding pressure ➔ [page 189](#) .

Checking fuel delivery rate ➔ [page 190](#) .

Checking current draw ➔ [page 194](#) .

### 6.3.1 Checking function and voltage supply

**Test conditions:**

- Battery voltage at least 11.5 V.
- Fuse for Fuel pump control unit - J538- OK.



- Fuel pump control unit - J538- OK.

### Test sequence

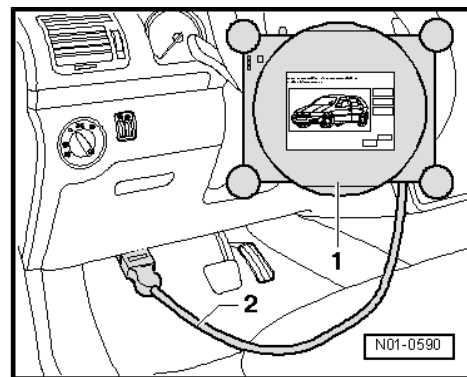


#### Note

*Function of fuel pump is checked using final control diagnosis.*

- Connect vehicle diagnostic tester as follows:
- Push diagnosis cable connector onto diagnosis connection in driver footwell.
- Switch ignition on.
- 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.



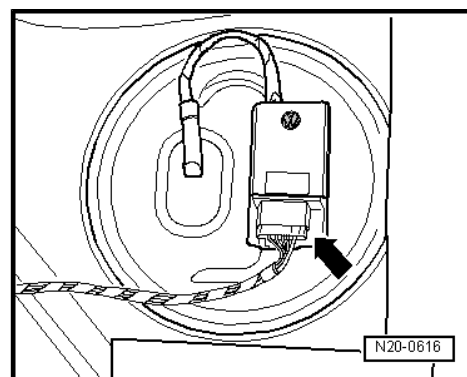
#### Note

*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- .

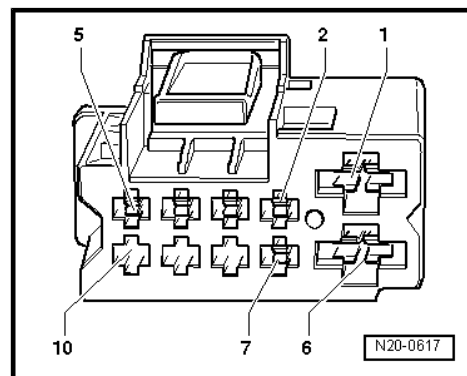


- Check voltage supply between contacts -1- and -6- using multimeter - V.A.G 1715- .
- Specification: approx. battery voltage

#### Voltage supply not OK:

- Locate and eliminate open circuit referring to current flow diagram ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

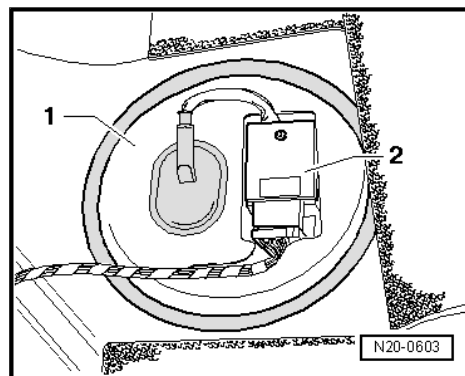
#### Voltage supply OK:



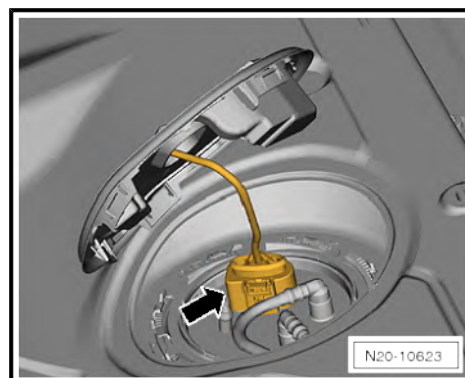




- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



- 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

*The fuel system is pressurised!*

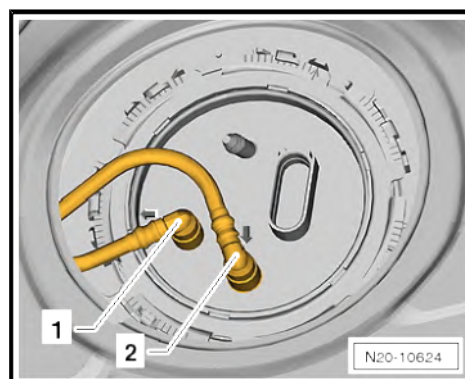
- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*

- Pull fuel lines -1- and -2- off the flange.



#### Note

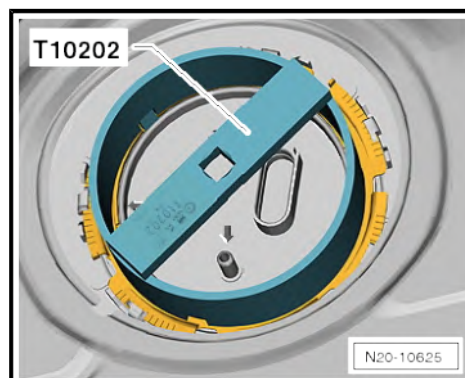
- ◆ *Press in securing ring to release the fuel lines.*
- ◆ *On vehicles with auxiliary heater, the connector and the fuel line of the metering pump - V54- must also be disconnected.*



- Open locking ring using key - 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 179](#) .







## 6.3.2 Checking fuel pressure



Note

*The fuel pump is activated via the final control diagnosis.*



### WARNING

*Fuel supply line is pressurised. Wear protective goggles and protective clothing to avoid injury and contact with the skin. Wrap a cloth around the connection before loosening hose connections. Then release pressure by carefully pulling hose off connection.*

- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.



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 to 7.0 bar

If fuel pressure is OK, check holding pressure ➤ [page 189](#) .

**If the specification is exceeded:**

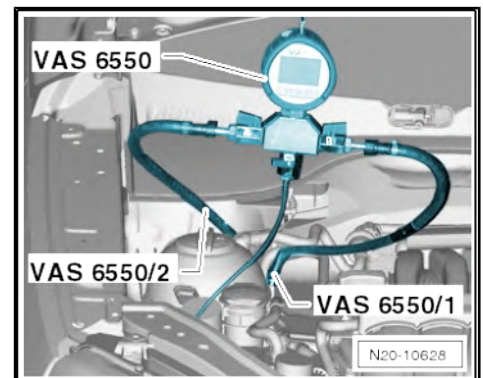
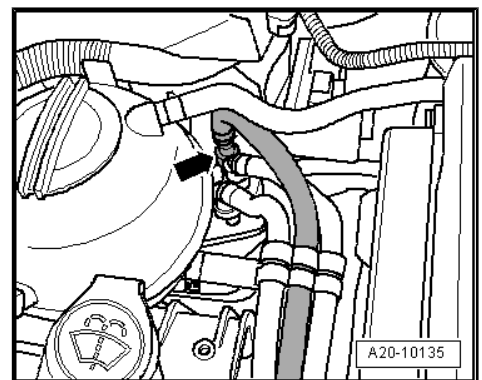
- Check return line between fuel filter and fuel pump for kinks and blockages.

If no fault is found:

- Pressure limit valve in fuel filter is defective. Renew fuel filter.

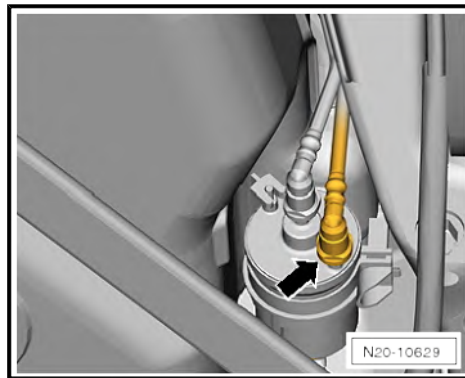
**If specification is not obtained**

- Check fuel pressure upstream of fuel filter; proceed as follows:

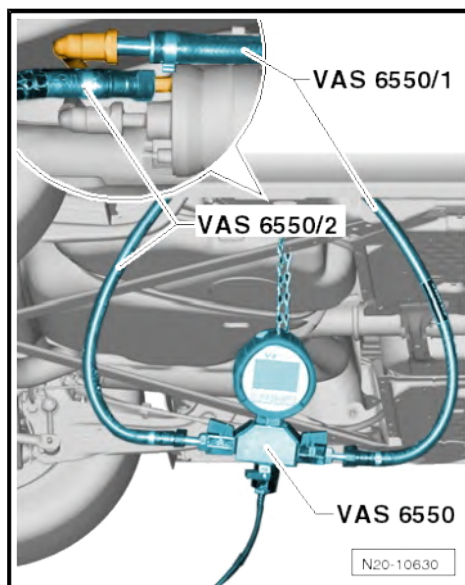




- Pull fuel supply line -arrow- off fuel filter.



- Connect pressure tester - VAS 6550- between fuel filter and fuel supply line with adapter - VAS 6550/1- and -VAS 6550/2- .



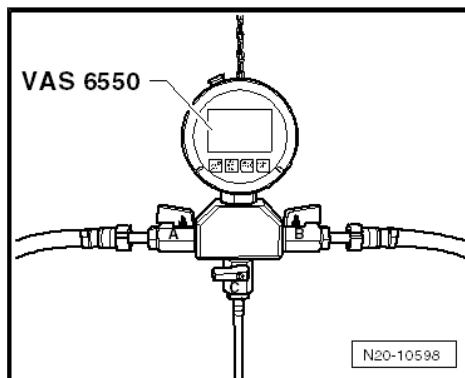
- Make sure that drain tap is closed and cut-off taps are open.
- Switch ignition on and activate the fuel pump with the final control diagnosis function.
- While the fuel pump is operating, close the shut-off tap -A-. Pressure must rise to at least 7.0 bar. When 7.0 bar is reached, open shut-off tap again immediately.

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 179](#) .





### 6.3.3 Checking holding pressure

- Fuel pressure OK and pressure tester - VAS 6550- connected.  
Check fuel pressure ➔ [page 187](#) .

#### Test sequence

- Actuate fuel pump with final control diagnosis to build up fuel pressure.
- Read fuel pressure on pressure gauge.
- Specification: 4.0 to 7.0 bar
- Watch pressure drop on pressure gauge. Pressure must remain above 3.0 bar for 10 minutes.

If the pressure drops further:

- Actuate fuel pump with final control diagnosis to build up fuel pressure.
- 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 289](#) .

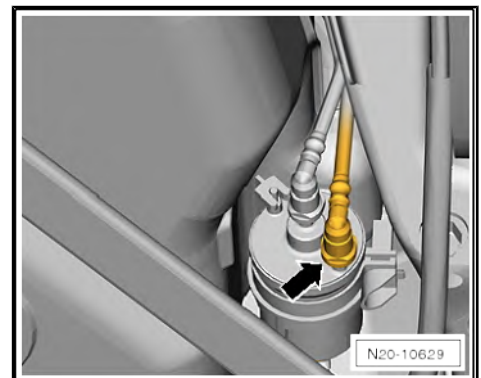
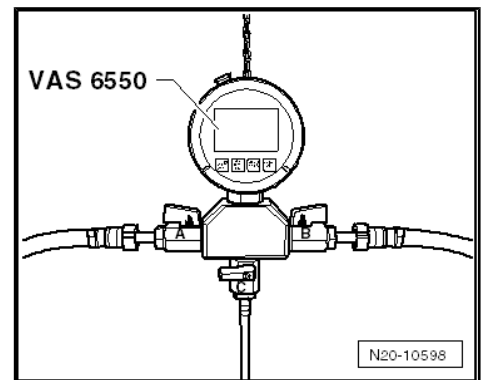
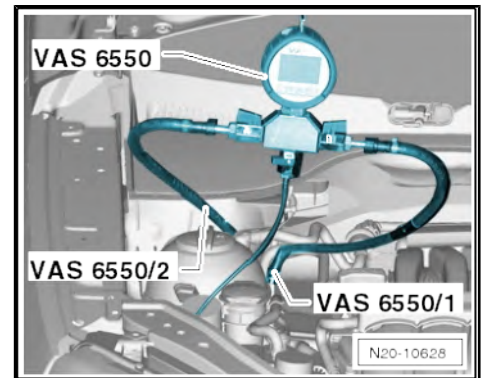
If the pressure drops again:

Leak must be sought on fuel tank side; proceed as follows:

- Check fuel supply line to fuel filter for leaks.

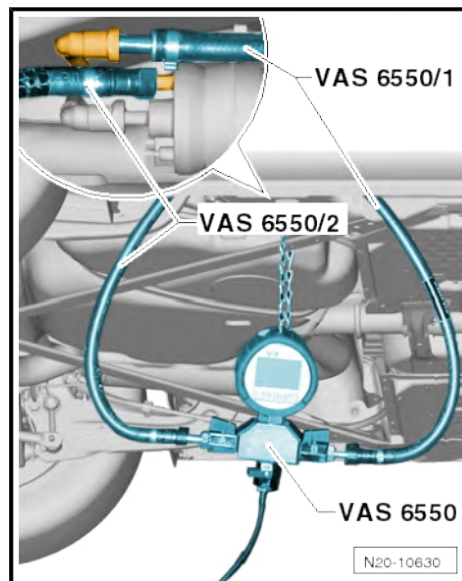
If no fault is found on the fuel line:

- 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 to 7.0 bar



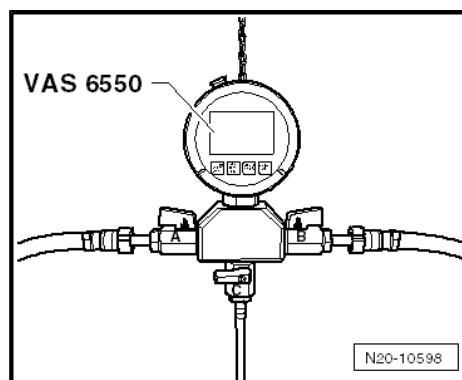
- After pressure has built up, close cut-off tap -A-.
- Watch pressure drop on pressure gauge. Pressure must remain above 3.0 bar for 10 minutes.

If the pressure drops:

- Pressure retention valve in fuel pump defective; renew fuel delivery unit ➔ [page 179](#) .

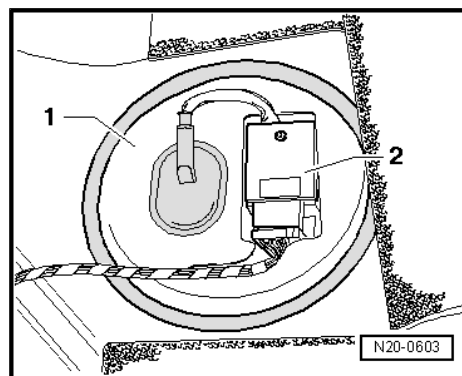
If the pressure does not drop:

- Pressure retention valve in fuel filter is OK, pressure limiting valve in fuel filter is defective. Renew fuel filter.



### 6.3.4 Checking fuel delivery rate

- 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.



- 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

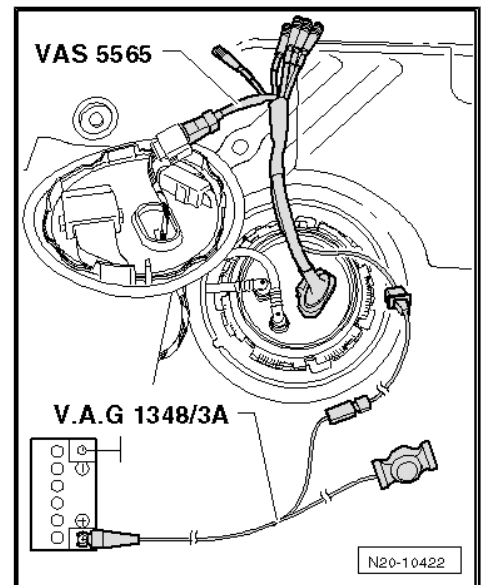
*This step serves only to have the fuel pump running when the engine is stopped.*



#### WARNING

***The fuel system is pressurised!***

- ◆ ***Wear protective goggles and protective clothing to avoid injury and contact with the skin.***
- ◆ ***Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.***

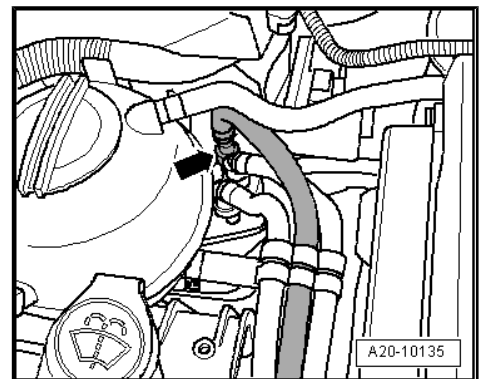


- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.



#### Note

*Press in securing ring to release the fuel lines.*





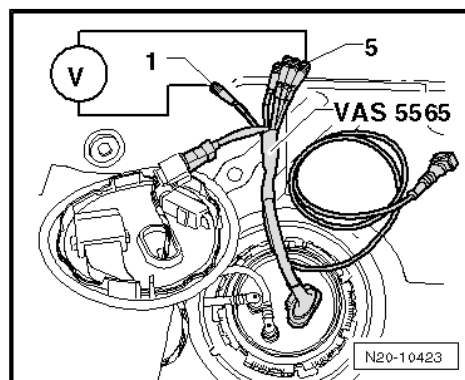
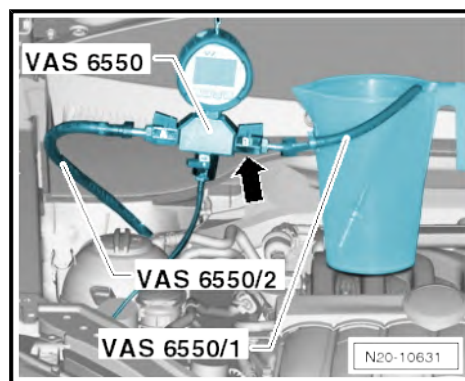
- Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- . Hold adapter - VAS 6550/1- in a measuring container.
- Make sure that drain tap is closed and cut-off taps are open.



#### WARNING

***Danger of spraying! Wear protective goggles and protective clothing to avoid injury and contact with the skin. 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 delivered by the fuel pump depends on the battery voltage. Therefore, also connect multimeter - V.A.G 1715- to outputs -1 and 5- of test instrument/DSO adapter 5-pin - VAS 5565- .
- Operate remote control for 30 seconds while measuring voltage at fuel pump.







- Compare quantity of fuel delivered with specification.

\*) Minimum delivery rate  $\text{cm}^3/30 \text{ s}$

\*\*) Voltage at fuel pump with engine not running and pump running.

Reading example:

During the test a voltage of 10.5 volts is measured. This equates to a minimum delivery rate of approx.  $580 \text{ cm}^3/30 \text{ s}$ .

#### If specification is not obtained

- 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 reading again does not match specification:

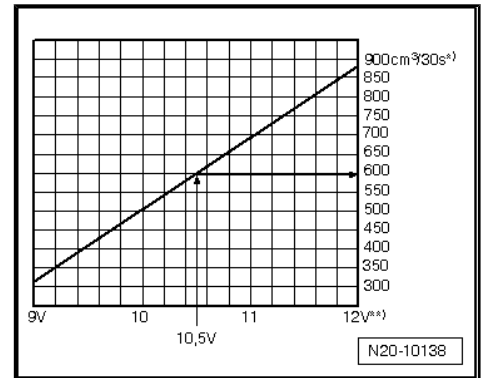
- Check fuel filter (proceed as follows):



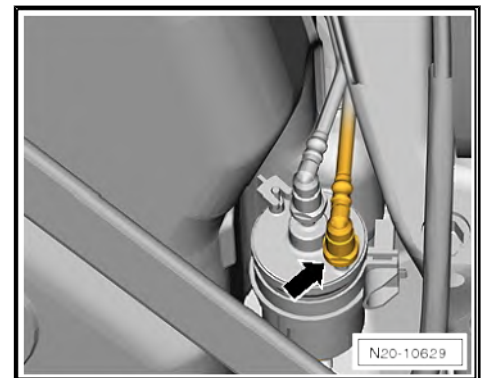
#### WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



- Pull fuel supply line -arrow- off fuel filter.





- 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

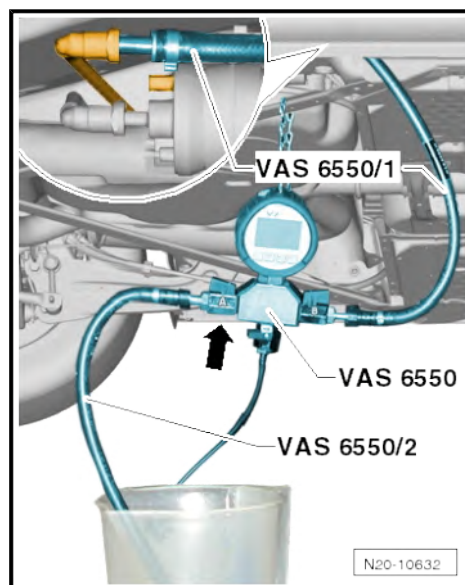
- Remove fuel delivery unit and check filter strainer for soiling.

Only if still no fault has been detected:

- Renew fuel delivery unit.

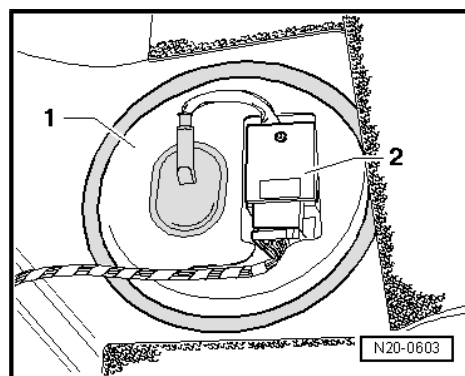
If the fuel delivery rate has been attained but a fault is still suspected in the fuel supply system (e.g. intermittent failure of fuel supply system):

- Measure current draw of fuel pump ⇒ [page 194](#) .

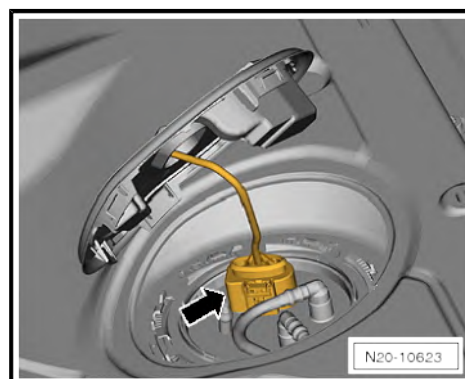


### 6.3.5 Checking current consumption

- 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.







- 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

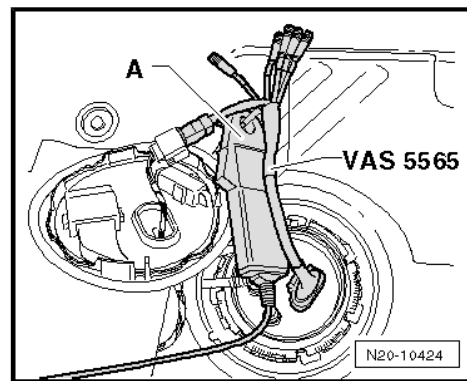


#### Note

- ◆ *The starting current for the fuel pump can be 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 179](#) .





## 7 Repairing fuel supply system, Passat



### Note

- ◆ Fuel hoses on the engine must only be secured with spring-type clips which conform to the production standard.
- ◆ Spring-type clip pliers - VAS 6499- or space saving hose clip pliers - VAS 6362- are recommended for installation/removal of spring-type clips.
- ◆ If fuel delivery unit was renewed, adapt engine control unit to fuel pump ⇒ Vehicle diagnostic tester "Guided Functions".

Safety precautions when working on fuel supply system  
⇒ [page 140](#) .

Rules for cleanliness ⇒ [page 143](#) .

Removing and installing fuel delivery unit ⇒ [page 196](#) .

Checking fuel pump ⇒ [page 200](#) .

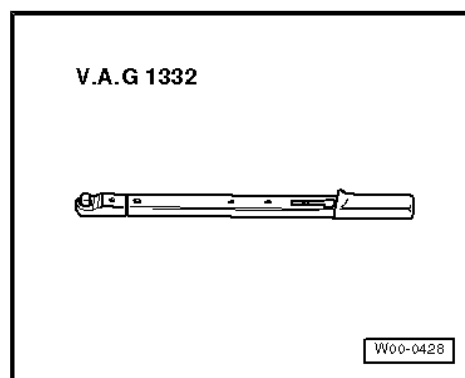
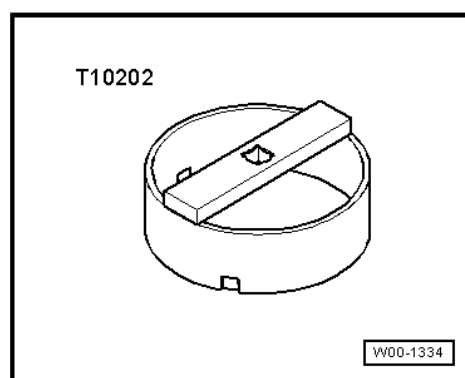
Assembly overview - high-pressure pump ⇒ [page 287](#) .

Removing and installing high-pressure pump ⇒ [page 289](#)

### 7.1 Removing and installing fuel delivery unit

#### Special tools and workshop equipment required

- ◆ Special wrench - T10202-
- ◆ Torque wrench (40 to 200 Nm) - V.A.G 1332-





## Removing:



### Caution

#### Condition:

- *Fuel tank must not be more than  $\frac{3}{4}$  full. This ensures that the fill level is below the flange of the fuel delivery unit.*



### Note

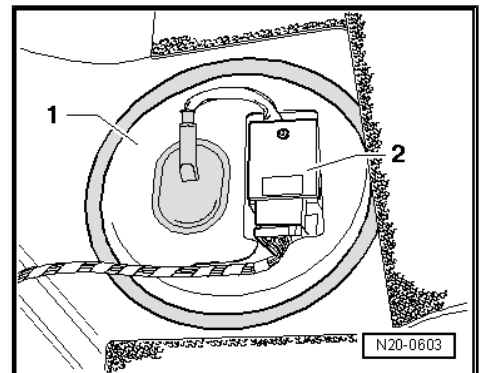
- ◆ *The fuel filter and the pressure relief valve are fitted in the flange of the fuel delivery unit.*
- ◆ *When replacing fuel delivery unit, check fuel tank for heavy soiling and clean if necessary.*
- ◆ *If necessary, empty fuel tank using fuel extractor - VAS 5190- ➔ [page 170](#).*
- ◆ *Note safety precautions before beginning work ➔ [page 140](#).*
- ◆ *Observe rules for cleanliness ➔ [page 143](#).*
- 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 system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*

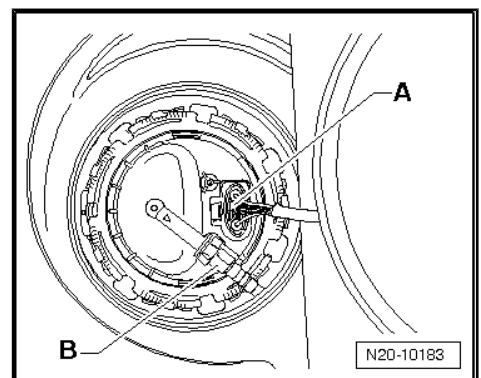


- Pull 5-pin connector -A- and fuel line -B- off flange.



### Note

- ◆ *Press in securing ring to release fuel line.*
- ◆ *On vehicles with auxiliary heater, the connector and the fuel line of the metering pump - V54- must also be disconnected.*





- Open locking ring using key - T10202- .



**Caution**

*Do not cant key - T10202- and press against locking ring firmly.  
If the key slips off, the fuel delivery unit can be damaged.*

- Lift flange.
- Separate coupling -A- and remove suction-jet pump -B-. Do this by pressing lugs -arrows- together.



**Note**

*Press in safety ring of coupling -A- to release fuel line.*

- Pull seal and fuel delivery unit out of opening of fuel tank.



**Note**

- ♦ *If delivery unit is to be renewed, drain old delivery unit before disposal.*
- ♦ *Observe disposal regulations!*

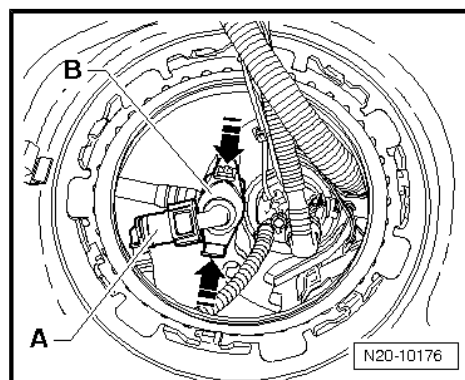
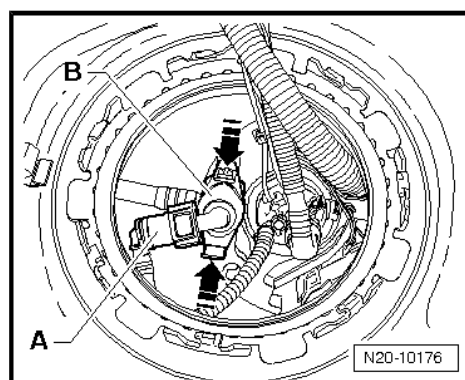
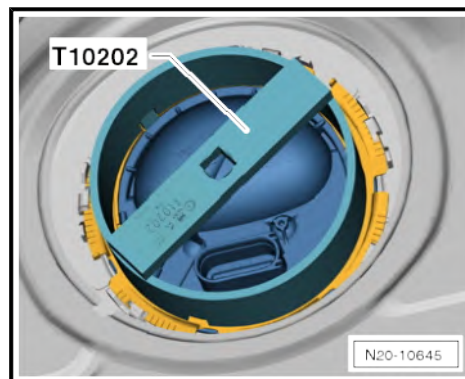
**Install fuel delivery unit:**



**Caution**

*Do not bend float arm of fuel gauge sender - G- when installing.*

- Insert fuel delivery unit (without suction-jet pump) into fuel tank.
- Install suction-jet pump -B- and reconnect coupling -A-. Check coupling is secured properly by pulling.



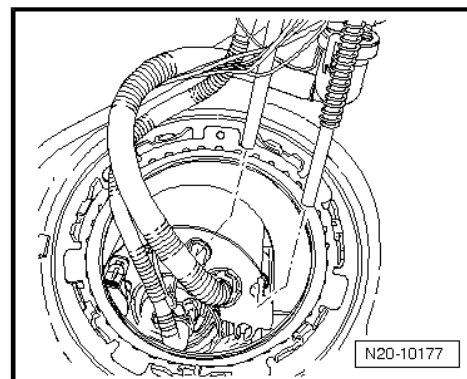


- Push flange onto fuel delivery unit.

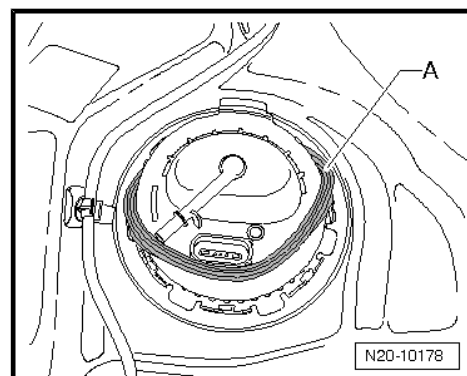


**Note**

*Ensure hoses are secured correctly.*

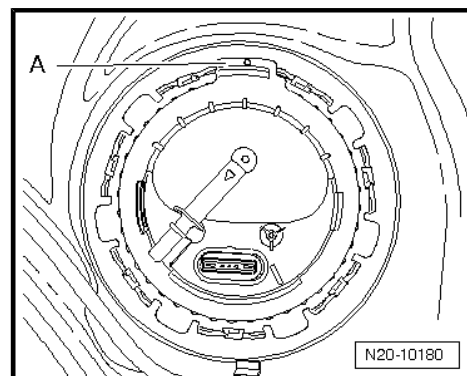


- Now pull seal -A- over the flange and seat it in the opening of the fuel tank.
- Moisten seal lightly with fuel and push flange into fuel tank.

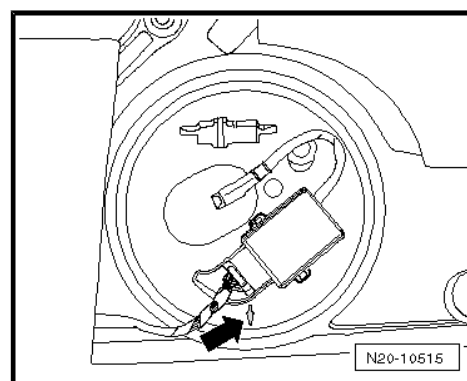


- Observe installation position: Marking -A- points towards rear of vehicle.
- Tighten locking ring using wrench - T10202- . Specified torque ➔ [Item 21 \(page 168\)](#) .

The remaining installation steps are carried out in the reverse sequence of removal. During this step, observe the following:



- ◆ The -arrow- on the cover points forwards.
- ◆ Fuel lines are to be installed free of kinks.
- ◆ Ensure wiring/line connections are secured properly by pulling back.
- ◆ If fuel delivery unit was renewed, adapt engine control unit to fuel pump ➔ Vehicle diagnostic tester "Guided Functions".



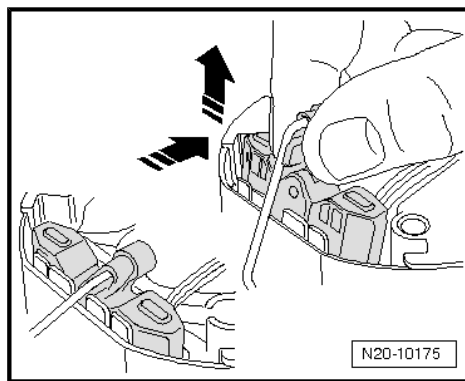
## 7.2 Removing and installing fuel gauge sender - G-

### Removing:

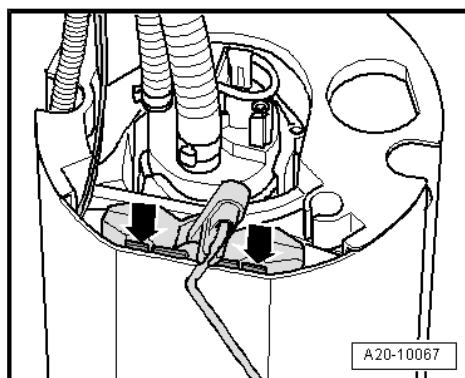
- Remove fuel delivery unit ➔ [page 196](#) .



- Pull fuel gauge sender - G- slightly to side and upwards at the same time.

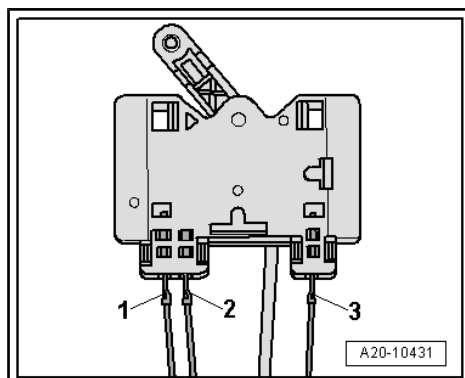


- If the sender cannot be released in this way, the retaining tabs -arrows- must also be pushed to the side slightly.
- Note colour co-ordination of cables for reinstallation.

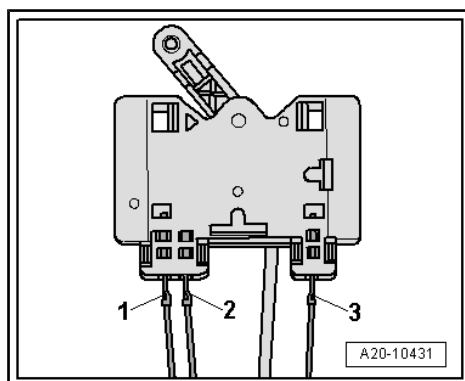


- Release electrical connectors -1 to 3- and pull them off. Then bend back locking lugs of connectors.

#### 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 198](#) .



## 7.3 Checking fuel pump

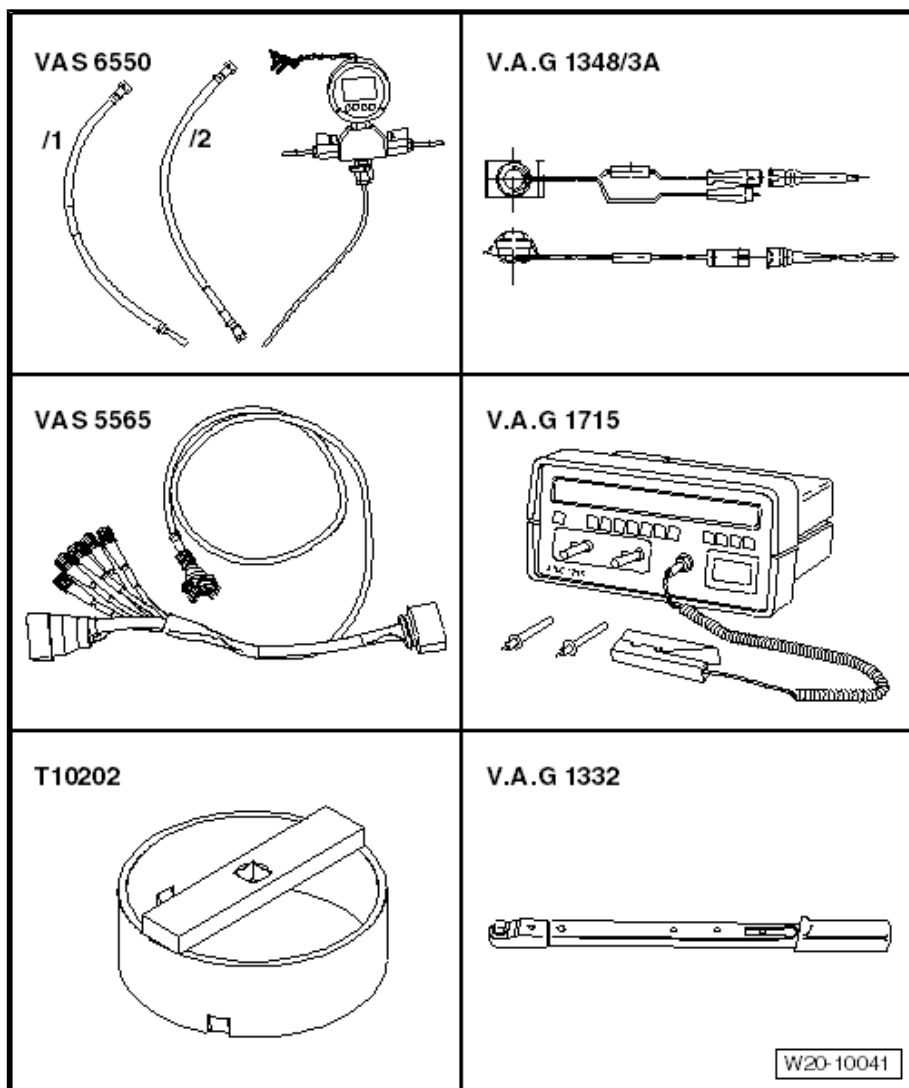


#### Note

*When replacing 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-
- ◆ Special wrench - T10202-
- ◆ Measuring container, capacity 2 litres

### 7.3.1 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.
- Fuel pressure sender for low-pressure - G410- OK.



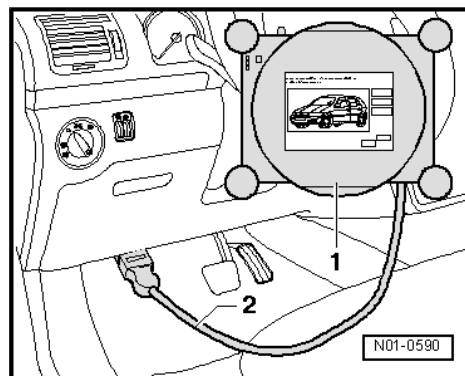
#### Note

*Function of fuel pump is checked using final control diagnosis.*



- Connect vehicle diagnostic tester as follows:
- Push diagnosis cable connector onto diagnosis connection in driver footwell.
- Switch ignition on.
- 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.



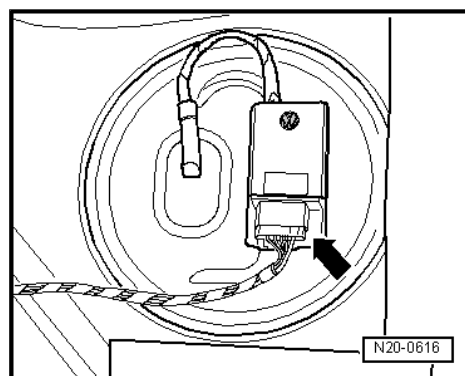
#### Note

*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- .

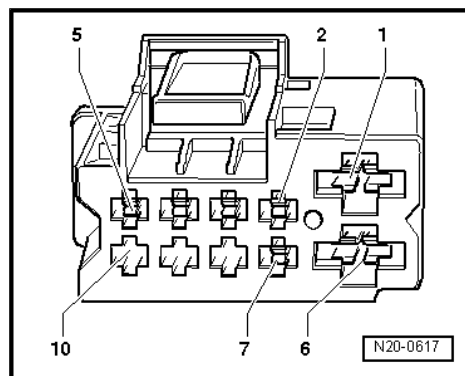


- Check voltage supply between contacts -1- and -6- using multimeter - V.A.G 1715- .
- Specification: approx. battery voltage

#### Voltage supply not OK:

- Locate and eliminate open circuit referring to current flow diagram ➔ Current flow diagrams, Electrical fault finding and Fitting locations.

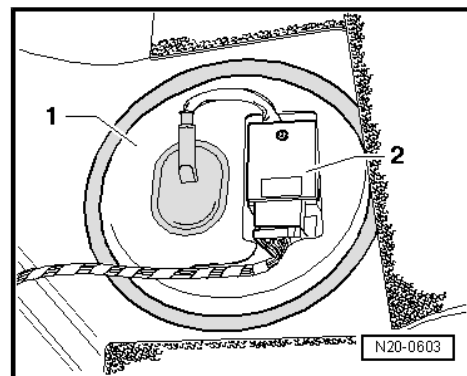
#### Voltage supply OK:



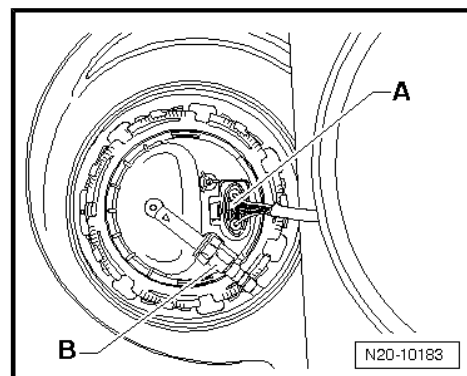




- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



- First check that connector -A- is securely seated 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

**The fuel system is pressurised!**

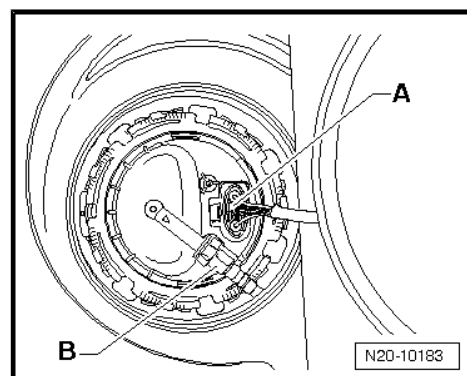
- ◆ **Wear protective goggles and protective clothing to avoid injury and contact with the skin.**
- ◆ **Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.**

- Pull off fuel line -B- from the flange.



#### Note

- ◆ **Press in securing ring to release fuel line.**
- ◆ **On vehicles with auxiliary heater, the connector and the fuel line of the metering pump - V54- must also be disconnected.**



- Open locking ring using key - T10202- .



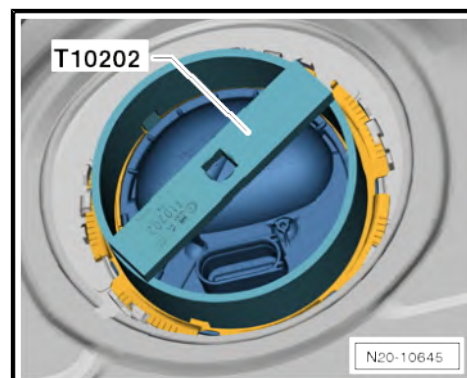
#### Caution

**Do not cant key - T10202- and press against locking ring firmly. If the key slips off, the fuel delivery unit can be damaged.**

- 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 196](#) .





## 7.3.2 Checking fuel pressure

### Test conditions:

- Function of fuel pump has been checked ➔ [page 201](#) .

### Test sequence

Note safety precautions before beginning work ➔ [page 140](#) .

- Observe rules for cleanliness ➔ [page 143](#) .



### WARNING

*The fuel system is pressurised!*

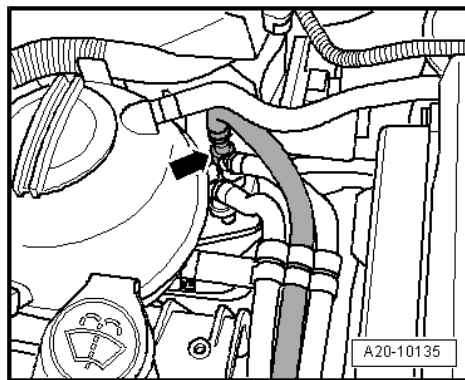
- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*

- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.



### 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 to 7.0 bar

If fuel pressure is OK, check holding pressure ➔ [page 205](#) .

### If the specification is exceeded:

- Pressure limiting valve in flange defective, renew flange with fuel filter ➔ [page 196](#) .

### If specification is not obtained

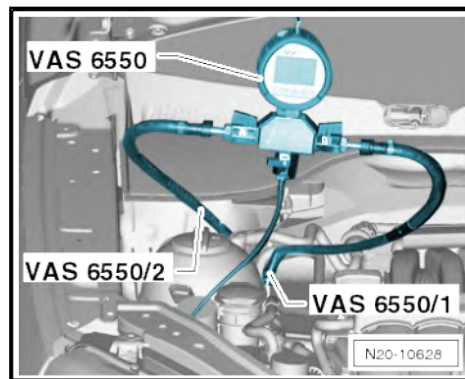
- Check fuel lines for possible restrictions (kinks) or blockages.

If no fault is found:

- Renew flange with fuel filter and pressure limiting valve ➔ [page 196](#) .
- Repeat check.

If reading again does not match specification:

- Fuel pump defective, renew fuel delivery unit ➔ [page 196](#) .





### 7.3.3 Checking holding pressure

#### Prerequisites for check

- Fuel pressure OK and pressure tester - VAS 6550- connected.  
Check fuel pressure ➔ [page 204](#) .

#### Test sequence

- Actuate fuel pump with final control diagnosis to build up fuel pressure.
- Read fuel pressure on pressure gauge.
- Specification: 4.0 to 7.0 bar
- Watch pressure drop on pressure gauge. Pressure must remain above 3.0 bar for 10 minutes.

If the pressure drops further:

- Actuate fuel pump with final control diagnosis to build up fuel pressure.
- 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 289](#) .

If the pressure drops again:

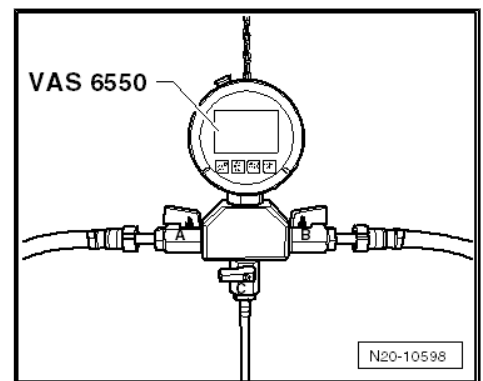
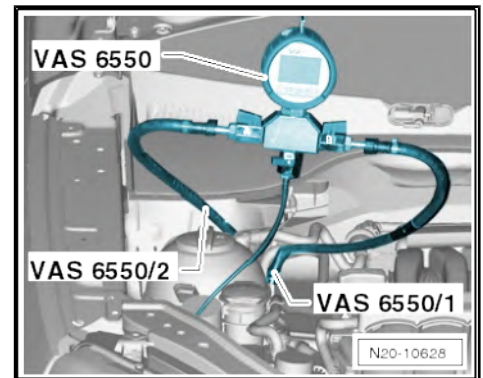
Leak must be sought on fuel tank side; proceed as follows:

- Check fuel line to flange for leaks.

If no fault is found on the fuel line:

Pressure limiting valve in flange defective or pressure retention valve in fuel pump leaking.

- First replace flange with fuel filter and repeat pressure retention check. If leak is still present, renew fuel delivery unit.

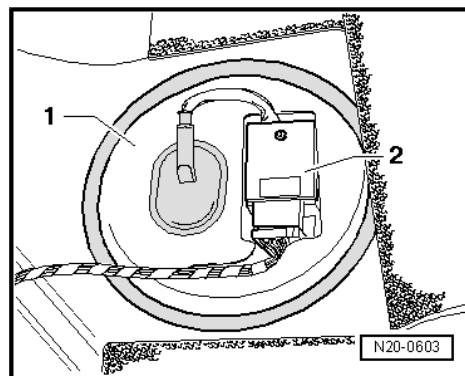


### 7.3.4 Checking fuel delivery rate

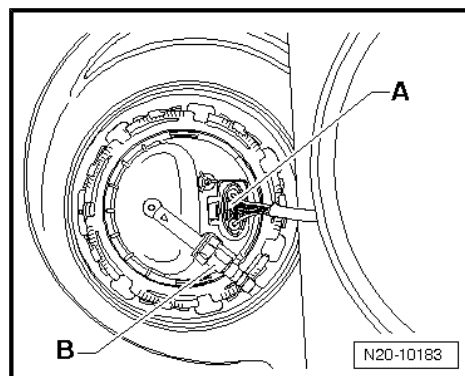
- Remove seat bench ➔ General body repairs, interior; Rep. gr. 72 ; Rear seats .



- Remove cover -1- with fuel pump control unit - J538- -2- from fuel delivery unit.



- First check that connector -A- is securely seated 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.



- 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 (+).



#### Note

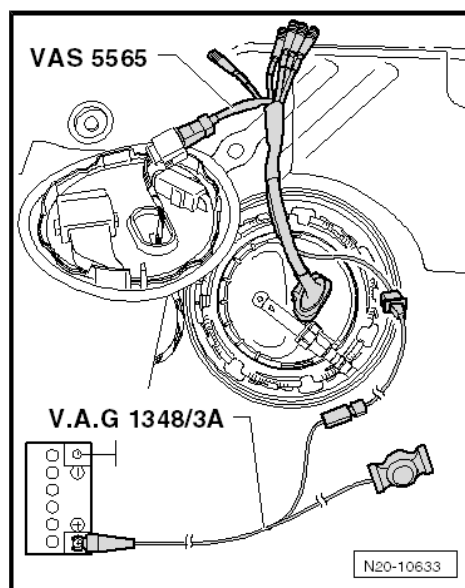
*This step serves only to have the fuel pump running when the engine is stopped.*



#### WARNING

***The fuel system is pressurised!***

- ◆ ***Wear protective goggles and protective clothing to avoid injury and contact with the skin.***
- ◆ ***Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.***



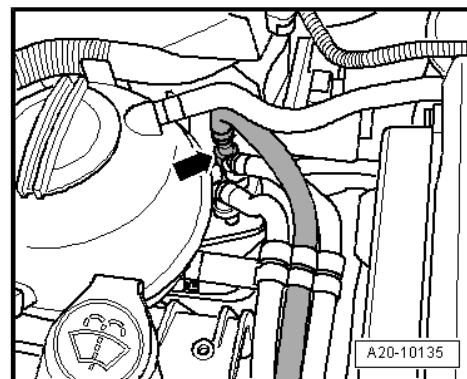


- Pull off supply line (metal coupling) -arrow- and catch escaping fuel with a cloth.



#### Note

*Press in securing ring to release the fuel lines.*

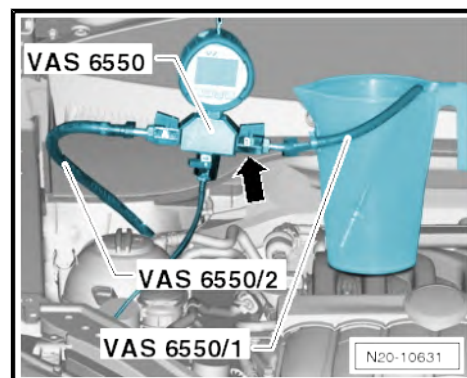


- Connect pressure tester - VAS 6550- to fuel supply line with adapter - VAS 6550/2- . Hold adapter - VAS 6550/1- in a measuring container.
- Make sure that drain tap is closed and cut-off taps are open.

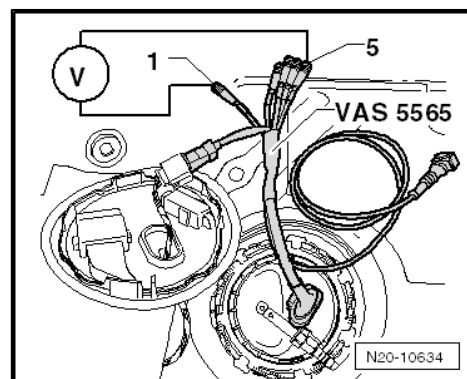


#### WARNING

***Danger of 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 quantity delivered by the fuel pump depends on the battery voltage. Therefore, connect multimeter - V.A.G 1715- to wires -1- and -5- of adapter - VAS 5565- in addition.
- Operate remote control for 30 seconds while measuring voltage at fuel pump.





- Compare quantity of fuel delivered with specification.

\*) Minimum delivery rate  $\text{cm}^3/30 \text{ s}$

\*\*) Voltage at fuel pump with engine not running and pump running.

Reading example:

During the test a voltage of 10.5 volts is measured. This equates to a minimum delivery rate of approx.  $580 \text{ cm}^3/30 \text{ s}$ .

#### If specification is not obtained

- Check fuel line 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 reading again does not match specification:

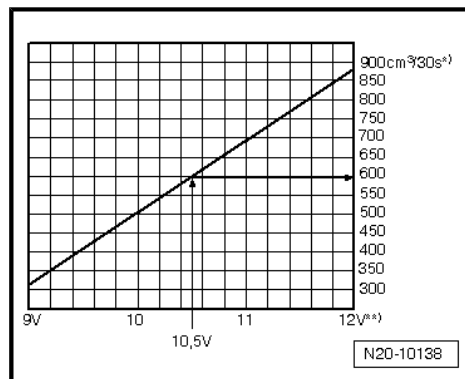
- Remove fuel delivery unit and check filter strainer for soiling.
- If no fault is found here either, renew flange with fuel filter.
- Repeat check.

If reading again does not match specification:

- Fuel pump defective, renew fuel delivery unit ⇒ [page 196](#) .

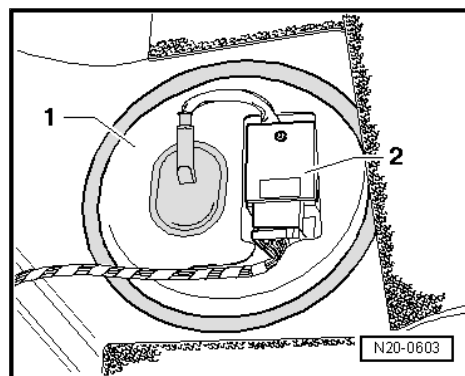
If fuel delivery rate has been attained, but nevertheless you suspect a fuel supply system fault (e.g. intermittent failure of fuel supply system):

- Measure current draw of fuel pump ⇒ [page 208](#) .

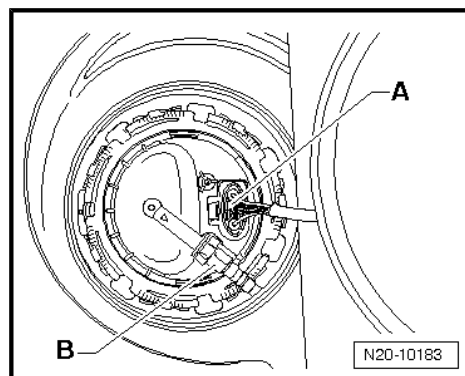


### 7.3.5 Checking current consumption

- 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 connector -A- is securely seated 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.





- 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

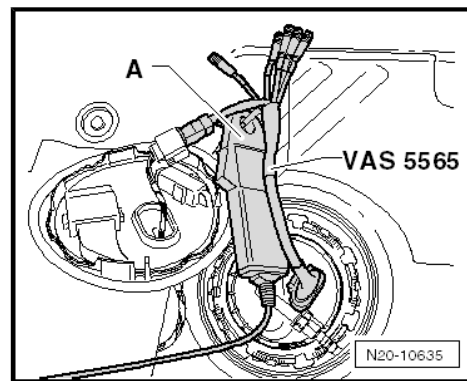


**Note**

- ◆ *The starting current for the fuel pump can be 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 196](#) .







## 8 Electronic power control (EPC)

Function of EPC system ➔ [page 210](#) .

Assembly overview - accelerator module ➔ [page 210](#)

Removing and installing accelerator pedal module ➔ [page 211](#)

### 8.1 Function of EPC system

With the EPC system, the throttle valve is not operated by a cable from the accelerator. There is no mechanical connection between the accelerator and the throttle valve.

The position of the accelerator is transmitted to the engine control unit by two accelerator position senders (variable resistors together in one housing) connected to the accelerator.

The position of the accelerator (driver's requirement) is a main input value for the engine control unit.

The throttle valve is actuated by an electric motor (throttle valve positioner) in the throttle valve control module over the full engine speed and load range.

The throttle valve is operated by the throttle valve positioner which is controlled by the engine control unit.

When the engine is not running and the ignition is switched on, the engine control unit moves the throttle valve exactly as prescribed by the accelerator position sender. That is, when the accelerator is depressed halfway, the throttle valve positioner opens the throttle valve by the same amount. The throttle is then approximately half open.

When the engine is running (under load), the engine control unit can open or close the throttle valve independently of the accelerator position sender.

This means that the throttle valve can already be completely open even though the accelerator is only depressed half way. This has the advantage of preventing throttling losses at the throttle valve.

After evaluating the torque requirements of various components (e.g. air conditioning system, automatic gearbox, ABS/ESP...), the engine control unit calculates the optimal throttle valve opening angle for the respective situation.

This also results in significantly improved consumption and exhaust emission values under certain load conditions.

"EPC" is a system comprising all components which contribute to determining, controlling or monitoring the position of the throttle valve, e.g. accelerator position sender, the throttle valve control module, the electronic power control warning lamp and the engine control unit.

### 8.2 Assembly overview - accelerator module



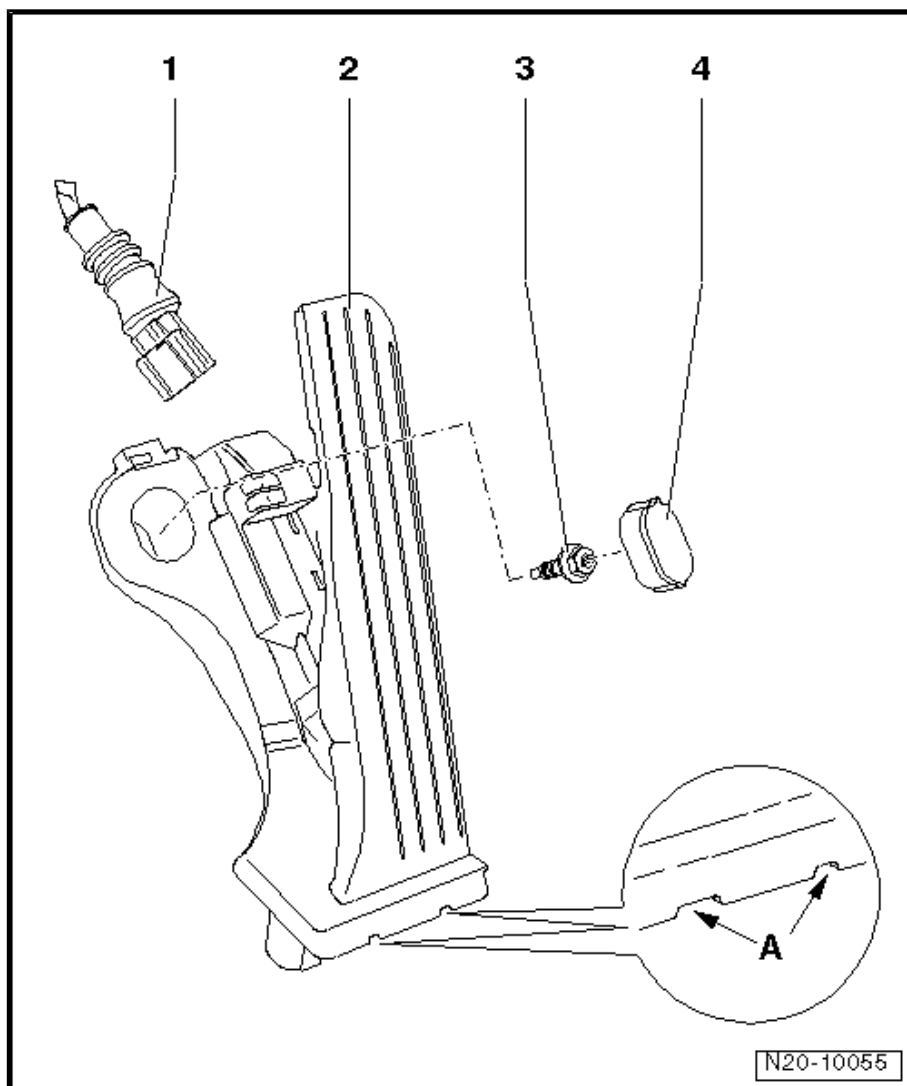
- ❑ Black, 6-pin.

2 - Accelerator position sender  
- G79- with accelerator position sender 2 - G185-

- ❑ Not adjustable.
- ❑ The accelerator position sender passes the position of the accelerator on to the engine control unit.
- ❑ -A- openings for release tool .
- ❑ Removing and installing  
⇒ **page 211**

**3 - 10 Nm**

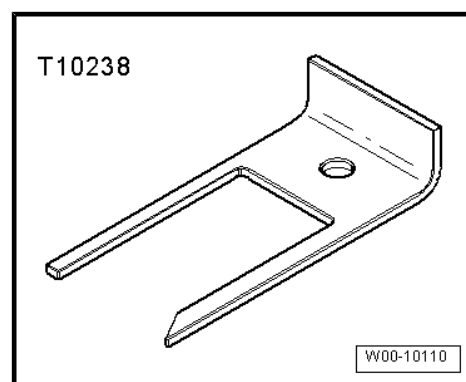
**4 - Cover**



### 8.3 Removing and installing accelerator pedal module

### Special tools and workshop equipment required

- ◆ For left-hand drive vehicles: release tool - T10238-

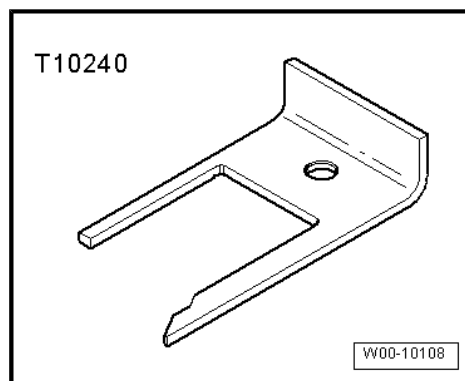


Or

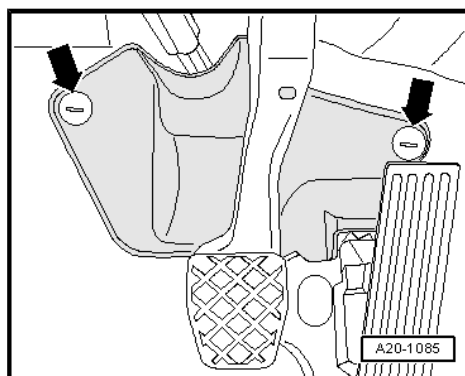


- ◆ For right-hand drive vehicles: release tool - T10240-

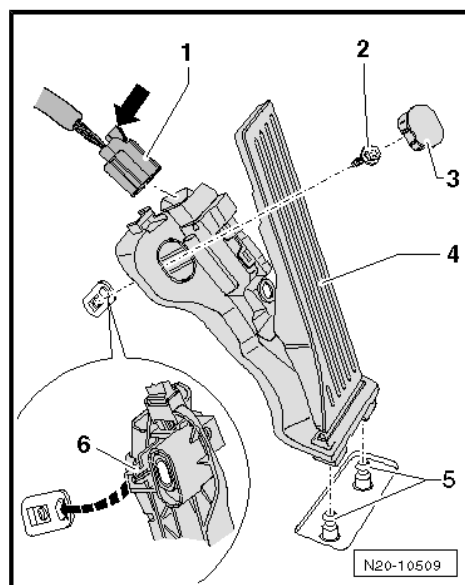
### Removing



- Remove steering column cover -arrows-.

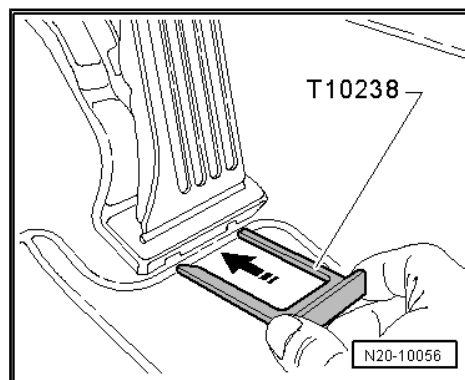


- Prise out cap -3- using a screwdriver.
- Remove bolts -2-.
- Release connector -1- -arrow- and pull off accelerator module.



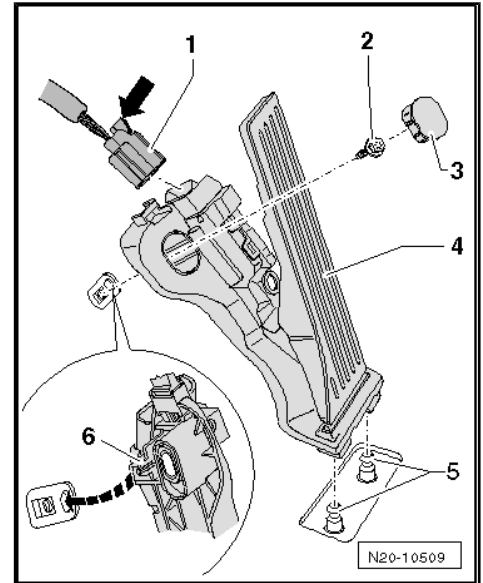
- Push release tool - T10238- into holes as shown to stop and remove accelerator module.

### Installing





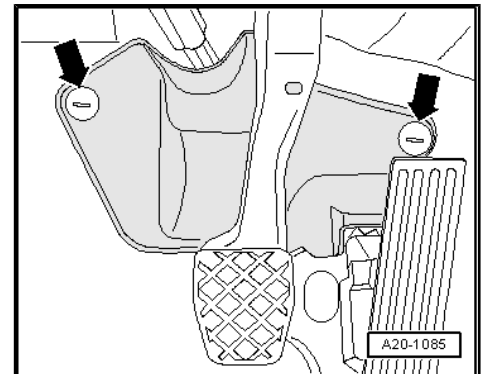
- Reconnect connector -1- to accelerator module -4-. Lock connector -arrow-.
- Press accelerator module onto securing pins -5-.
- Insert centring pin -6- into hole in vehicle floor.
- Secure accelerator module with bolt -2- and install cap -3-.



- Install steering column trim.

**Specified torque:**

Component	Nm
Accelerator module to body	10





## 9 Activated charcoal filter system (Golf, Eos)



### Note

- ♦ *Hose connections are secured with either spring-type or clamp-type clips.*
- ♦ *Spring-type clip pliers - VAS 6340- or hose clip pliers - VAS 6362- are recommended for installation of spring-type clips.*

Definition of colours or colour markings on the plug-in connectors and wiring for fuel, vacuum and breather.

Application	Colour
Fuel supply	black
Fuel return	blue
Breather	white, beige
Vacuum	green

Assembly overview - activated charcoal filter system (engine codes AXX, BWA) ➔ [page 214](#)

Checking fuel tank breather (engine codes AXX, BWA)  
➔ [page 215](#) .

Schematic diagram of activated charcoal filter system (engine code BPY) ➔ [page 217](#)

Assembly overview - activated charcoal filter system (Golf with engine code BPY) ➔ [page 219](#)

Assembly overview - activated charcoal filter system (Eos with engine code BPY) ➔ [page 220](#)

Removing and installing activated charcoal filter (engine code BPY) ➔ [page 221](#)

Removing and installing fuel system diagnostic pump - V144- (Golf with engine code BPY) ➔ [page 222](#)

Removing and installing fuel system diagnostic pump - V144- (Eos with engine code BPY) ➔ [page 223](#)

Checking fuel system for leaks (engine code BPY) ➔ [page 223](#)

### 9.1 Assembly overview - activated charcoal filter system (engine codes AXX, BWA)



**1 - Activated charcoal filter**

- ☐ Location: on right in engine compartment.

**2 - Pressure retention valve with connecting hose**

**3 - Connection hose**

- ☐ Ensure firm seating
- ☐ From fuel tank

**4 - 10 Nm**

**5 - 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

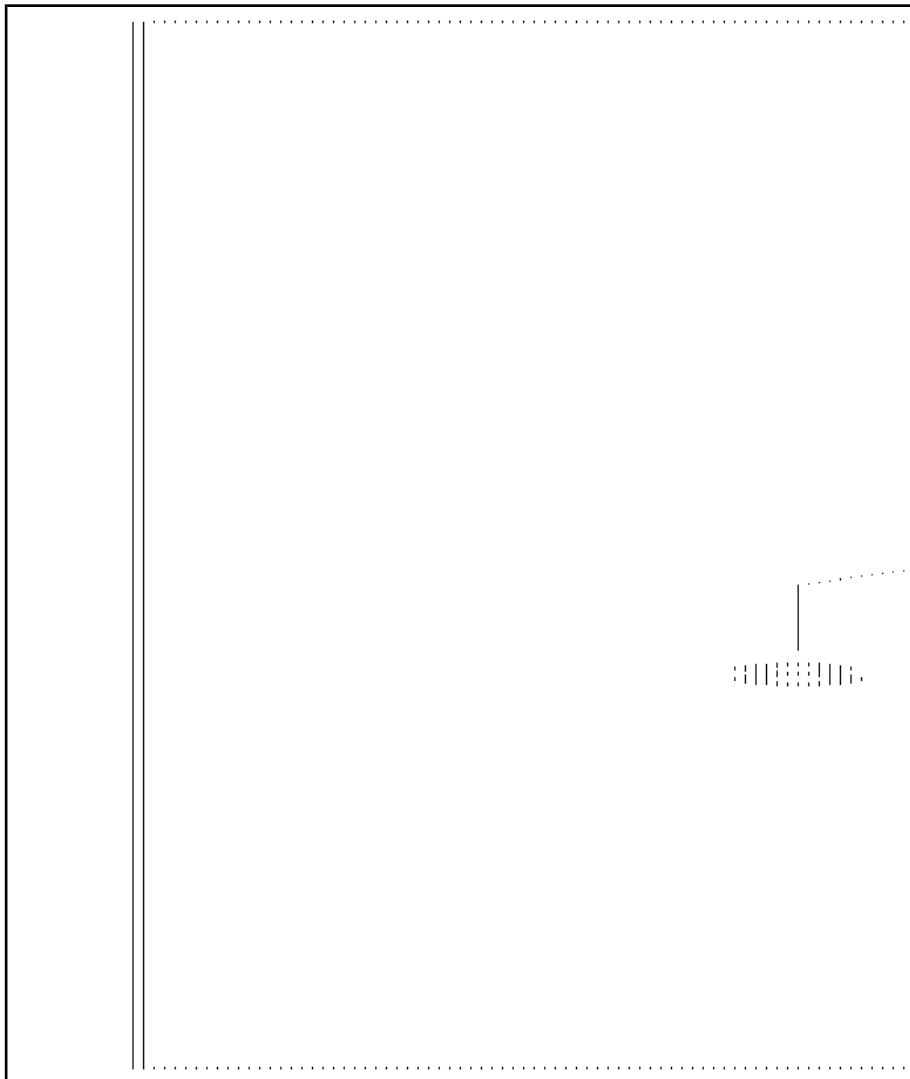
**6 - Connection hose**

- ☐ To intake manifold
- ☐ Ensure firm seating

**7 - Bracket**

- ☐ For activated charcoal filter.

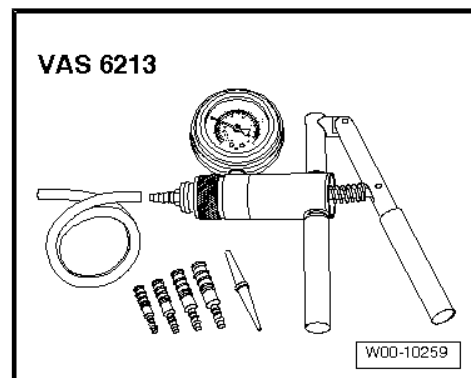
**8 - Vent hole**



## 9.2 Checking fuel tank breather (engine codes AXX, BWA)

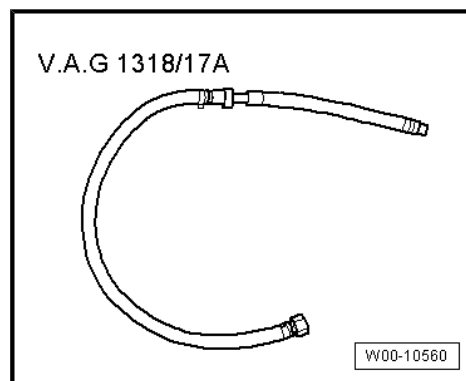
Special tools and workshop equipment required

- ◆ Hand operated vacuum pump - VAS 6213-

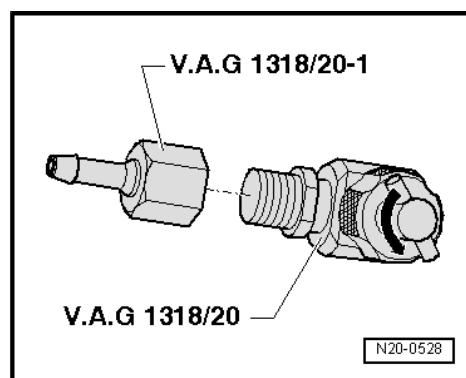




◆ Adapter set - V.A.G 1318/17A-



◆ Adapter - V.A.G 1318/20-1-

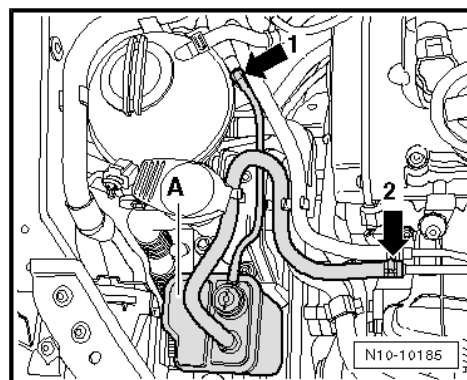


**Test specification:**

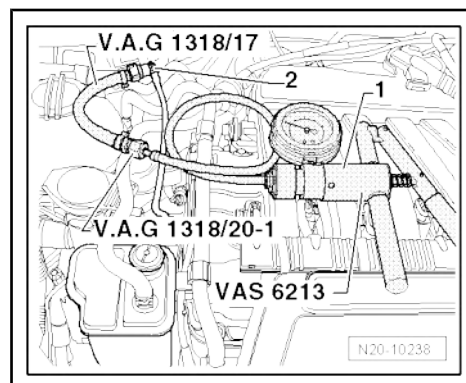
- Ignition must be switched off.

**Test sequence**

- Pull off breather line -1-. To do this, press release button.



- Then connect hand vacuum pump - VAS 6213- -1- to breather line -2- to activated charcoal filter as shown.





- Move slide ring -1- on hand vacuum pump - VAS 6213- to position -A- for “vacuum”.
- Operate hand vacuum pump - VAS 6213- several times. There must be no development of vacuum.

If vacuum builds up:

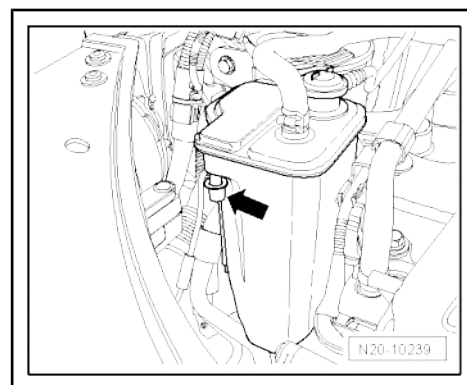
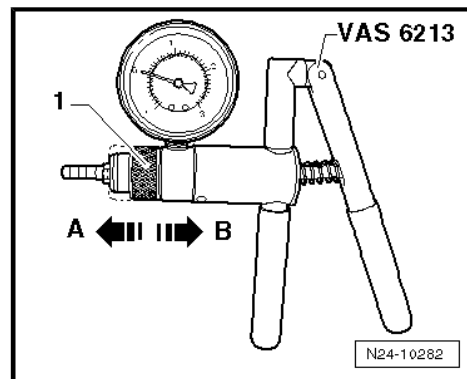
- Check breather hole on activated charcoal filter  
⇒ [Item 8 \(page 215\)](#) for soiling and clean if necessary.

If vacuum does not build up:

- Seal breather hole -arrow- and operate vacuum pump again several times. Vacuum must build up.

If vacuum does not build up:

- Renew activated charcoal filter.



### 9.3 Schematic diagram of activated charcoal filter system (engine code BPY)



### 1 - Separation point

- ❑ Front right in engine compartment under coolant expansion tank

### 2 - Breather line

- ❑ white or white marking
- ❑ From activated charcoal filter to activated charcoal filter solenoid valve 1 - N80-
- ❑ Installation position: On right under vehicle
- ❑ Secured to fuel tank.

### 3 - Breather line

- ❑ green or green marking
- ❑ From engine to fuel system diagnostic pump - V144-
- ❑ Installation position: On right under vehicle
- ❑ Secured to fuel tank.

### 4 - Separation point

- ❑ Front right on fuel tank in vicinity of fuel filter

### 5 - Filler neck

### 6 - Breather line

- ❑ From filler neck to activated charcoal filter

### 7 - Air filter

- ❑ For fuel system diagnosis pump - V144- .

### 8 - Fuel system diagnostic pump - V144-

- ❑ Fitting location: In rear right wheel housing beneath liner
- ❑ Removing and installing ⇒ [page 222](#)
- ❑ Checking fuel system for leaks ⇒ [page 223](#)

### 9 - Connecting cable

- ❑ From fuel system diagnostic pump - V144- to activated charcoal filter.
- ❑ Clip onto bracket

### 10 - Activated charcoal filter

- ❑ Location: down in spare wheel well
- ❑ Removing and installing ⇒ [page 221](#)

### 11 - Separation point

- ❑ Rear right on fuel tank

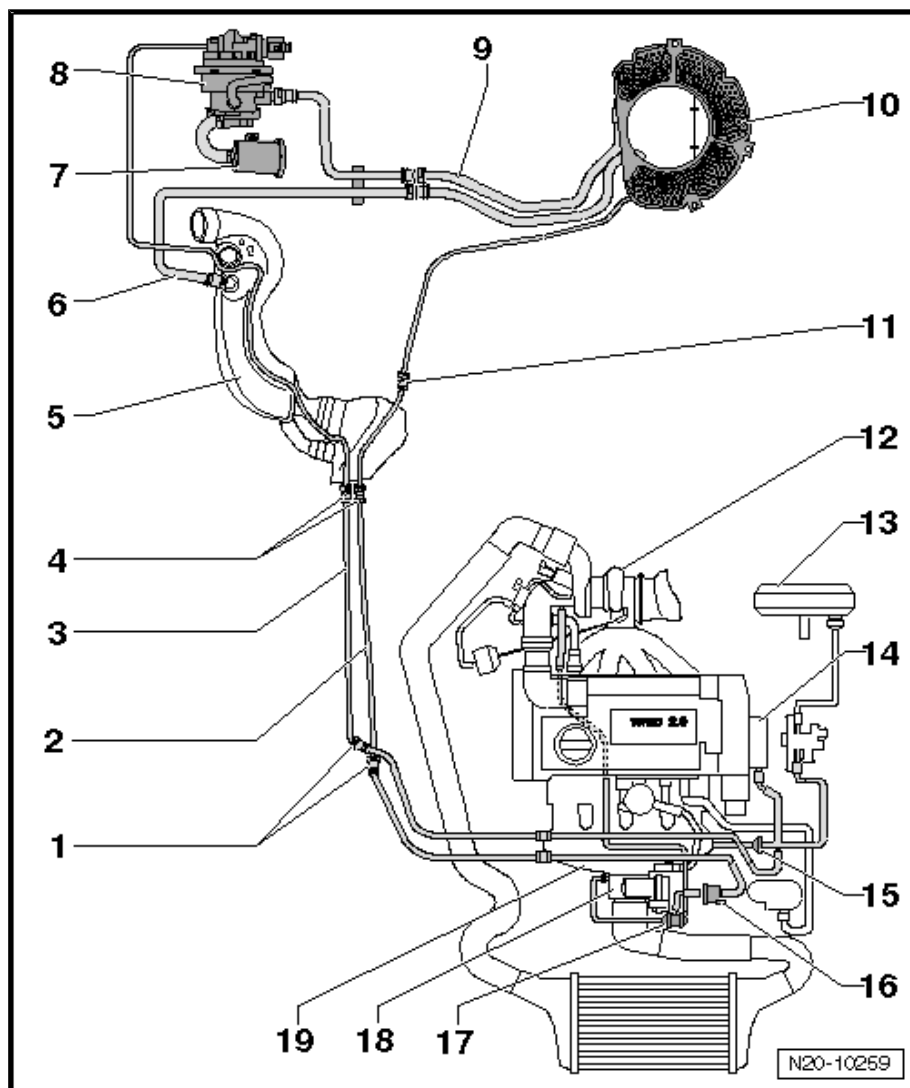
### 12 - Exhaust turbocharger

### 13 - Brake servo

### 14 - Vacuum pump

### 15 - Non-return valve

- ❑ Location: Arrow points in direction of flow







## 16 - Activated charcoal filter solenoid valve 1 - N80-

- ☐ Checking ⇒ Vehicle diagnostic tester

## 17 - Dual non-return valve

- ☐ Checking ⇒ [page 299](#)

## 18 - Throttle valve module - J338-

Removing and installing ⇒ [page 286](#)

## 19 - Intake manifold

# 9.4 Assembly overview - activated charcoal filter system (Golf with engine code BPY)

## 1 - Fuel tank

## 2 - Breather line

- ☐ Behind wheel housing liner

## 3 - Breather line

- ☐ On underbody.

## 4 - Breather line

- ☐ To activated charcoal filter solenoid valve 1 - N80-
- ☐ Press release button to pull off

## 5 - 8 Nm

## 6 - Activated charcoal filter

- ☐ Location: down in spare wheel well
- ☐ Removing and installing ⇒ [page 221](#)

## 7 - Connecting cable

- ☐ On underbody.

## 8 - Connecting cable

- ☐ Behind wheel housing liner

## 9 - 3 Nm

## 10 - Air filter

- ☐ For fuel system diagnosis pump - V144- .

## 11 - Connection hose

## 12 - Bracket

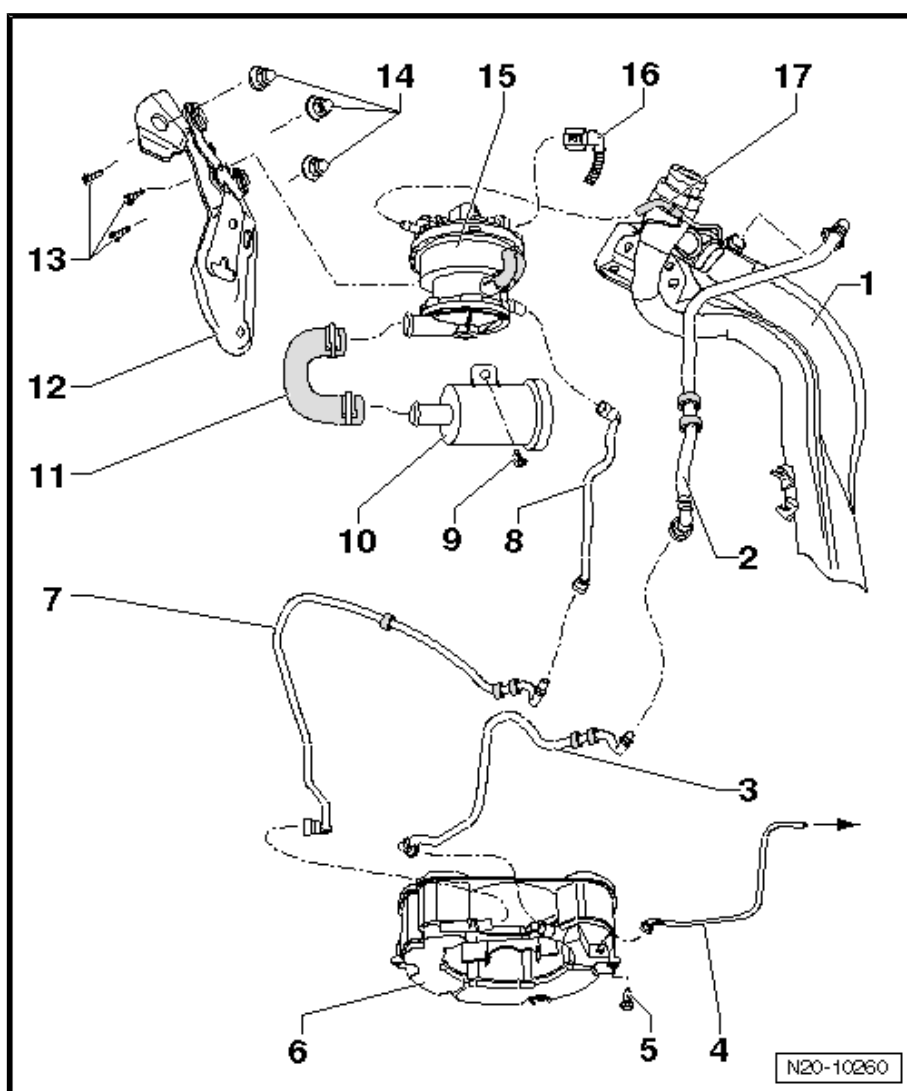
- ☐ For fuel system diagnosis pump - V144- .

## 13 - 2 Nm

## 14 - 6 Nm

## 15 - Fuel system diagnostic pump - V144-

- ☐ Fitting location: In rear right wheel housing beneath liner
- ☐ Removing and installing ⇒ [page 222](#)





- ❑ Checking fuel system for leaks ⇒ [page 223](#)

#### 16 - Connector

#### 17 - Vacuum line

- ❑ From intake manifold

### 9.5 Assembly overview - activated charcoal filter system (Eos with engine code BPY)

#### 1 - Hose retainer

#### 2 - Breather line

- ❑ To remove and install, remove bumper

#### 3 - Air filter

- ❑ For fuel system diagnosis pump - V144- .

#### 4 - 6 Nm

#### 5 - Bracket

- ❑ For fuel system diagnosis pump - V144- .

#### 6 - 3 Nm

#### 7 - Retaining plate

#### 8 - Rubber mounting

#### 9 - 8 Nm

#### 10 - Fuel system diagnostic pump - V144-

- ❑ Location: Behind rear right wheel housing
- ❑ Removing and installing ⇒ [page 222](#)
- ❑ Checking fuel system for leaks ⇒ [page 223](#)

#### 11 - Hose clamp

#### 12 - Connection hose

#### 13 - Breather line

- ❑ Behind wheel housing liner

#### 14 - Fuel tank

#### 15 - Breather line

- ❑ To activated charcoal filter solenoid valve 1 - N80-
- ❑ Press release button to pull off

#### 16 - Breather line

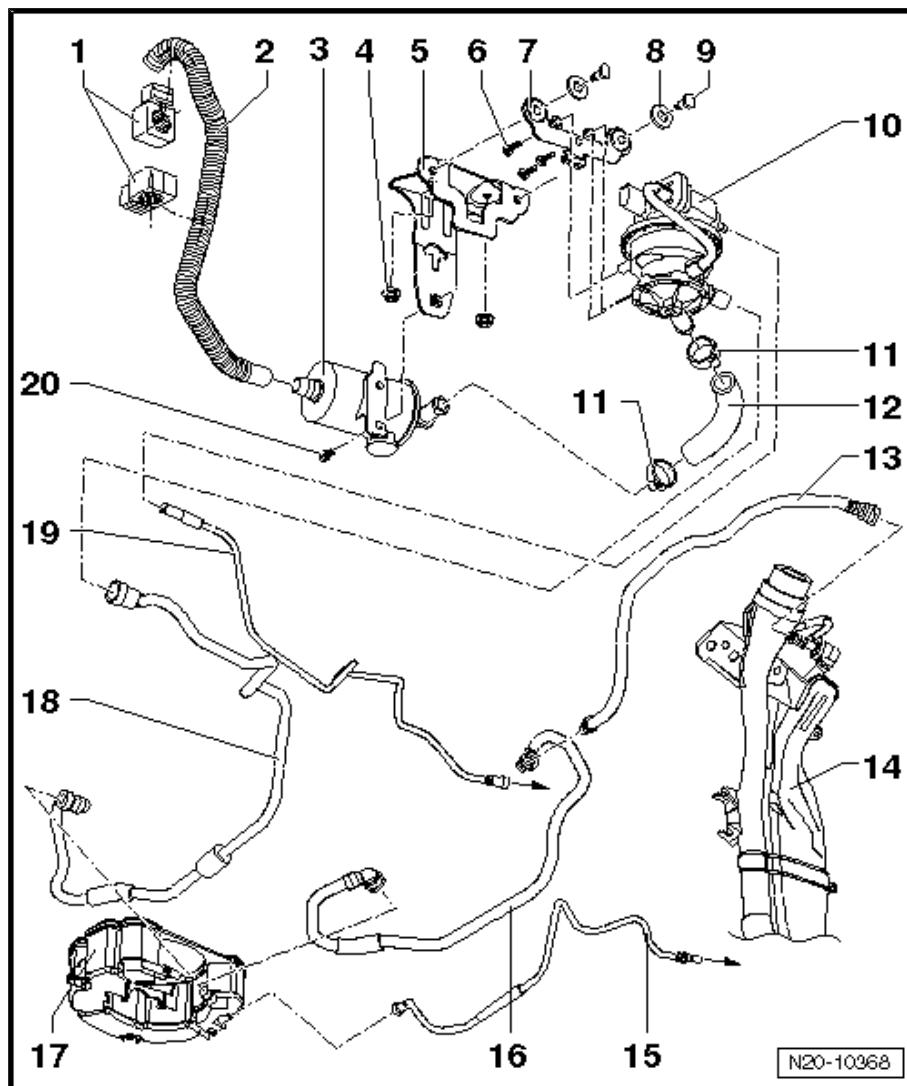
- ❑ On underbody.

#### 17 - Activated charcoal filter

- ❑ Location: down in spare wheel well
- ❑ Removing and installing ⇒ [page 221](#)

#### 18 - Connecting cable

- ❑ Activated charcoal filter / fuel system diagnostic pump - V144-





## 19 - Vacuum line

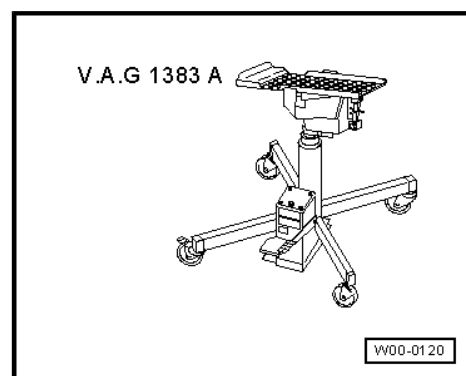
- To intake manifold

20 - 2 Nm

## 9.6 Removing and installing activated charcoal filter (engine code BPY)

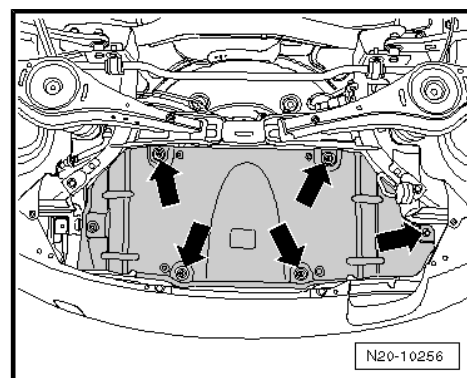
Special tools and workshop equipment required

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

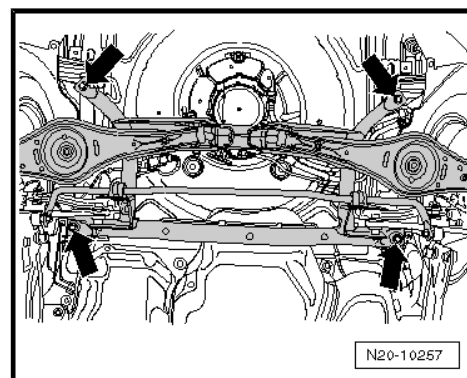


### Removing:

- Remove centre and rear silencers.
- Remove heat shield -arrows-.
- Position engine and gearbox jack - V.A.G 1383 A- below rear axle to support.



- Loosen securing bolts of rear axle -arrows- and unscrew them approx. 20 mm.
- Lower rear axle slowly using engine and gearbox jack - V.A.G 1383 A- .





- Pull off breather lines -A- by pressing release tab.
- Remove bolts -B-.



#### Note

A reinforcement plate is installed in the Eos. To loosen and tighten securing bolts -B-, use T-bar and 10 mm socket - 3185- .

- Release retaining tabs -A- using a screwdriver. Turn activated charcoal filter approx. 90° to right -B- and remove activated charcoal filter.

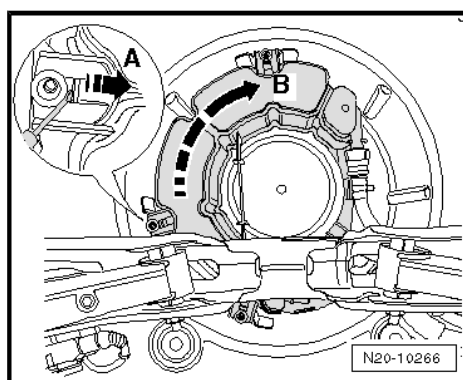
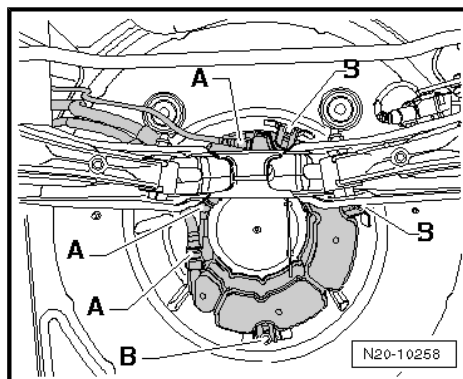
#### Installing:

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

- Fit breather lines so that they engage audibly.
- Install rear axle ⇒ Running gear; Rep. gr. 42 .

#### Specified torque

Component	Nm
Activated charcoal filter to body	8



## 9.7 Removing and installing fuel system diagnostic pump - V144- (Golf with engine code BPY)

#### Removing:

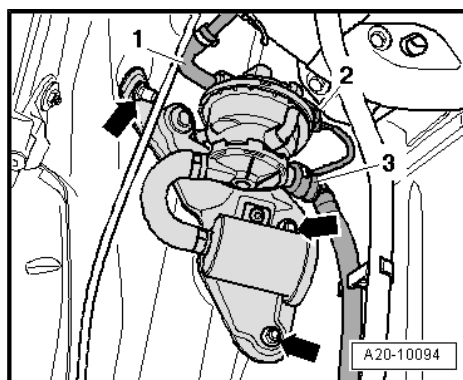
- Remove rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 .
- Detach vacuum line -1-.
- Separate electrical connector -2-.
- Pull off breather line -3- by pressing release tab.
- Unscrew nuts -arrows-.
- Detach diagnostic pump with bracket.

#### Installing:

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

- The breather line -3- must engage audibly.
- Install rear right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 .

Specified torques: ⇒ [page 219](#)





## 9.8 Removing and installing fuel system diagnostic pump - V144- (Eos with engine code BPY)

### Removing:

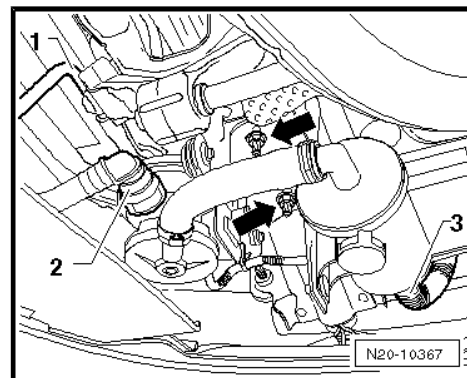
- Pull off vacuum line -1-, breather line (air outlet) -2- and breather line (air inlet) -3-.
- Unscrew nuts -arrows-.
- Remove diagnostic pump with bracket and disconnect electrical connector.

### Installing:

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

- ◆ Reconnect electrical connector before securing diagnostic pump with bracket.
- ◆ Breather line -2- must audibly engage.

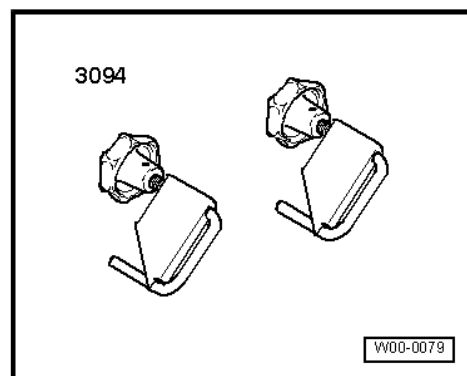
**Specified torques:** ➔ [page 220](#)



## 9.9 Checking fuel system for leaks

### Special tools and workshop equipment required

- ◆ Fuel system tester (so-called smoke tester) - KLI 9210-
- ◆ Adapter hose - KLI 9210/55-1-
- ◆ Vehicle diagnostic tester - VAS 5051B- , -VAS 5052- or -VAS 5053-
- ◆ Hose clamps to 25 mm - 3094-



The plug-in connectors for fuel, vacuum and breather lines are colour coded. There is either a coloured dot on the plug-in connector or the release button is coloured.

Plug-in connector	Colour code on plug-in connector
Fuel supply	black
Fuel return	blue
Breather	white, beige
Vacuum	green

### Test specification:

- A leak has been detected by the fuel system diagnostic pump - V144- .
- Guided fault finding has been performed with the vehicle diagnostic tester .



## Preparation of fuel system tester - KLI 9210- :



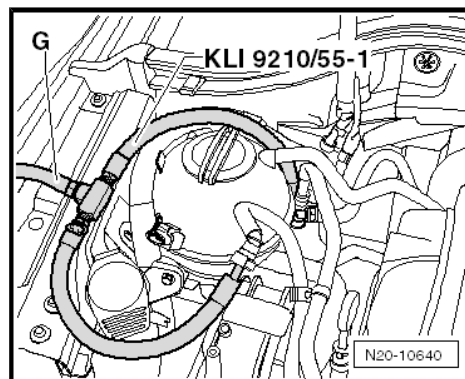
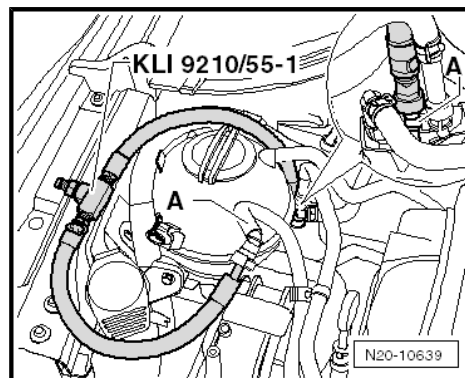
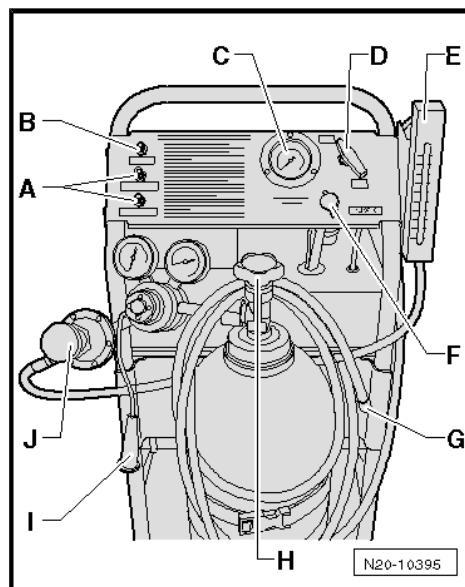
### Note

*The fuel system tester - KLI 9210- may differ in appearance depending on the version.*

- Check on fuel system tester - KLI 9210- if there is enough fluid in smoke generator.
- Set valve -D- to “Hold”.
- Open nitrogen bottle -H-.
- Connect test hose -G- to self-test connection -B-.
- Set valve -D- to “Test”.
- Regulate pressure to 10 in. H<sub>2</sub>O (25 mbar) with pressure reducer -J-.
- Set valve -D- to “Hold”.
- Now pressure must be maintained for at least 2 minutes. Check tester if pressure is not maintained.

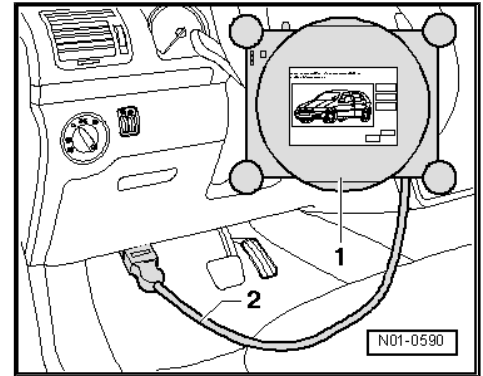
### Checking fuel system for leaks:

- Connect adapter hose - KLI 9210/55-1- to breather line -A- as shown. (colour marking: white)
- Connect measuring hose -G- from fuel system tester - KLI 9210- to adapter hose - KLI 9210/55-1- .
- Set valve -D- to “Hold”.





- Connect vehicle diagnostic tester to vehicle.
- Start engine and run at idling speed.
- On vehicle diagnostic tester, select operating mode Guided functions.
- Select guided function “Checking tank ventilation system for leaks”.
- Initiate test.
- Observe pressure gauge - KLI 9210- while test is running.
  - Fuel system diagnostic pump - V144- must pump up pressure in fuel system to at least 7 in. H<sub>2</sub>O (18 mbar).



The minimum pressure was not reached, but the available pressure does not drop.

- Switch off ignition and perform a pressure retention test ➔ [page 225](#) . If no pressure drop can be detected: Check vacuum supply of fuel system diagnostic pump - V144- ➔ [page 229](#) .

The minimum pressure was not reached and the available pressure drops immediately:

- Clamp off hose to activated charcoal filter solenoid valve 1 - N80- using a hose clip -arrow-.
- Repeat check. If the minimum pressure is reached now, renew activated charcoal filter solenoid valve 1 - N80- .

If the minimum pressure was again not reached and the available pressure drops immediately:

- Leak in fuel system, perform test “leak detection in fuel system” ➔ [page 227](#) .

**Switch off ignition if the minimum pressure is reached.**

The valve in the fuel system diagnostic pump - V144- closes and the pressure is retained.

- Observe pressure gauge:

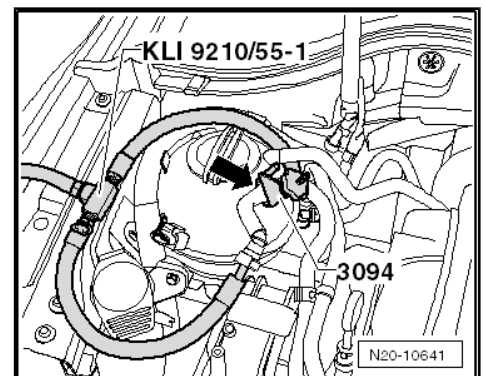
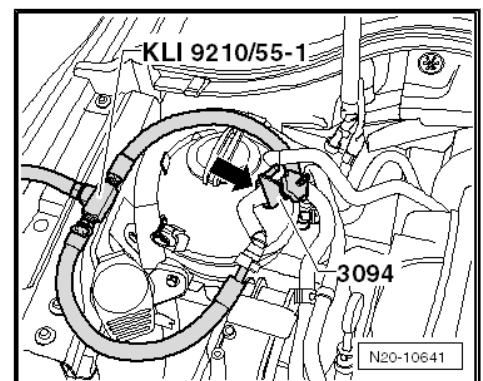
If the pressure does not drop at first, perform a pressure retention test to localise any potential small leaks ➔ [page 225](#) .

If the pressure drops, clamp off hose to activated charcoal filter solenoid valve 1 - N80- using a hose clip -arrow-.

- If the pressure does not drop again, renew activated charcoal filter solenoid valve 1 - N80- .

If the pressure still drops, perform “leak detection in fuel system” ➔ [page 227](#) .

**Pressure retention test**







- Set valve -D- to "Test". Set the available pressure to 10 in. H<sub>2</sub>O (25 mbar).
- Observe pressure gauge -C- and flow meter -E-. When the throughput quantity decreases and the pressure increases to 10 in. H<sub>2</sub>O (25 mbar), the fuel system is filled.



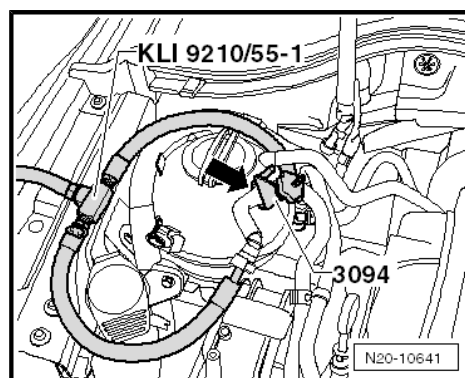
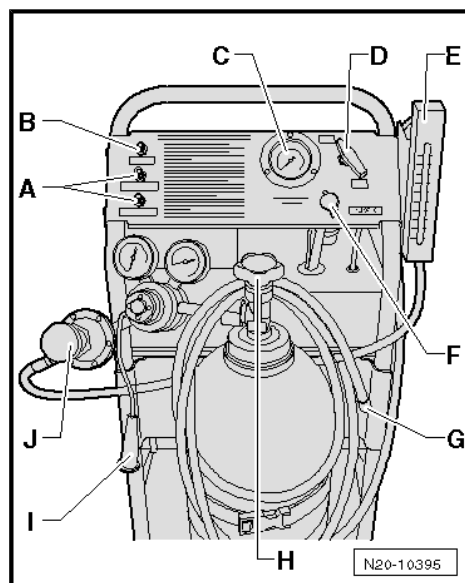
#### Note

*Depending on the filling level of the fuel tank, this process can take up to 3 minutes.*

- Once pressure has stabilised, set valve -D- to "Hold".
- After 5 minutes the pressure must not drop below 8 in. H<sub>2</sub>O (20 mbar).

**If the pressure is not held for at least 5 minutes, localise leak as follows:**

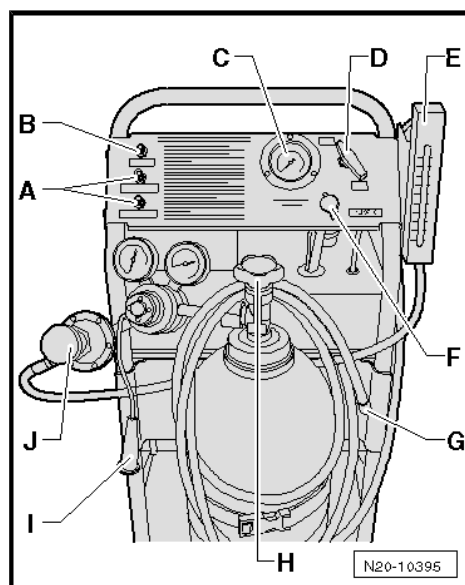
- First check activated charcoal filter solenoid valve 1 - N80- for leaks. To do this, clamp off hose to activated charcoal filter solenoid valve 1 - N80- using a hose clip -arrow-.



- Repeat pressure test by setting valve -D- again to "Test".
- Observe pressure gauge and flow meter. When the throughput quantity decreases and the pressure increases to 10 in. H<sub>2</sub>O (25 mbar), the fuel system is filled.
- Once pressure has stabilised, set valve -D- to "Hold".
- If the pressure does not drop again, renew activated charcoal filter solenoid valve 1 - N80- .

If the pressure still drops, perform "leak detection in fuel system" ⇒ [page 227](#) .

After completing work, perform guided function "Checking fuel tank breather system for leaks" using ⇒ Vehicle diagnostic tester.



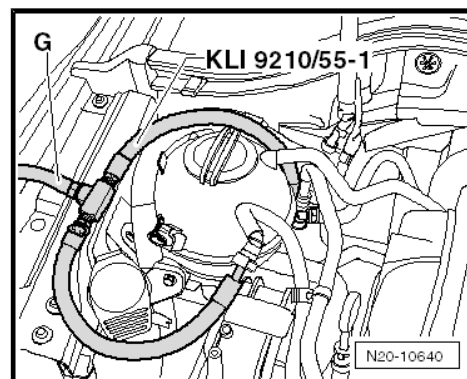




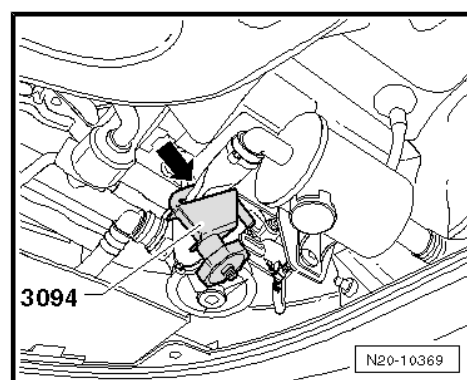
## 9.9.1 Leak detection in fuel system

### Test specification:

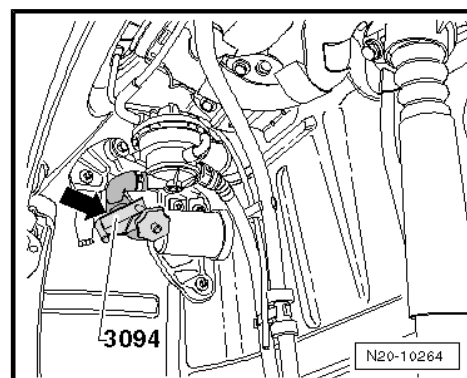
- Procedure for “checking fuel system for leaks” has been completed ➤ [page 223](#) .
- Fuel system tester - KLI 9210- is connected to vehicle via adapter hose - KLI 9210/55-1- .
  - Connect fuel system tester - KLI 9210- to vehicle battery.
  - Remove rear right wheel housing liner.
  - Clamp off hose between fuel system diagnostic pump - V144- and air filter -arrow-.



### Eos



### Golf





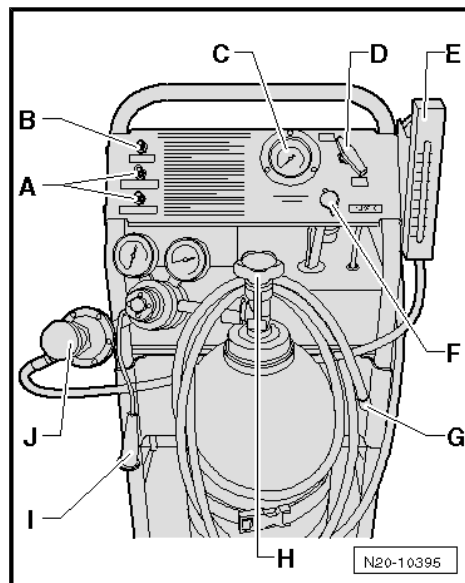
- Set valve -D- to “Test”.
- Observe pressure gauge -C- and flow meter -E-. When the throughput quantity decreases and the pressure increases to 10 in. H<sub>2</sub>O (25 mbar), the fuel system is filled.
- Once pressure has stabilised, set valve -D- to “Hold”.
- After 5 minutes the pressure must not drop below 8 in. H<sub>2</sub>O (20 mbar).
- If the pressure no longer drops, renew fuel system diagnostic pump - V144- .

**If the pressure is not held for at least 5 minutes or does not build up, localise leak as follows:**

- Fill fuel system with smoke, set valve -D- again to “Test” for this.
- While fuel system is being filled, press button -I- for smoke generator for approx. one minute.

The fuel system is now pressurised and filled with smoke.

- Check whether smoke escapes from any fuel system line or hose. Also check fuel tank cap.



#### Note

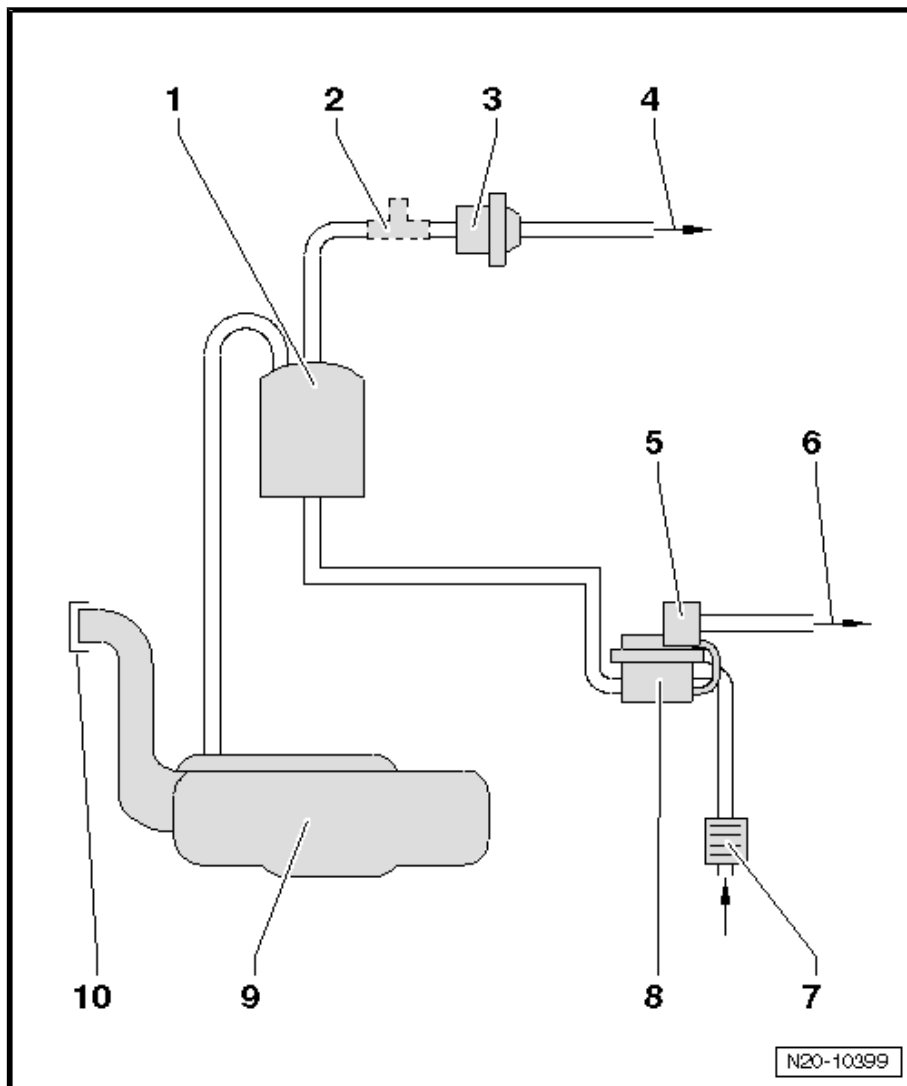
- ◆ *Light up the components and hoses with a strong floodlight. In the floodlight, smoke is more visible.*
  - ◆ *For leak detection in accessible areas, also use ultrasonic detector or commercially available leak detecting spray.*
  - ◆ *Depending on how long the fault finding takes, it may be necessary to press the smoke generator button from time to time. This ensures that sufficient smoke is present in the fuel system.*
  - ◆ *To inspect flanges for fuel pump and fuel filter, open assembly opening in vehicle interior.*
- Renew leaking hoses or components.

After completing work, perform guided function “Checking fuel tank breather system for leaks” using ⇒ Vehicle diagnostic tester.

## 9.9.2 Schematic overview of activated charcoal filter system



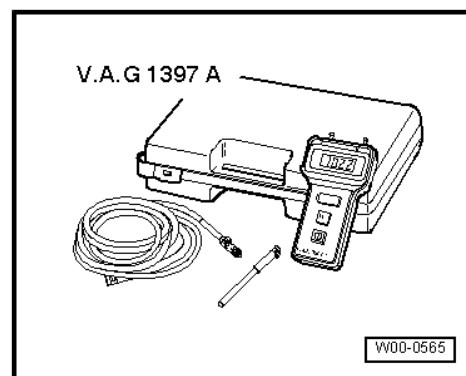
- 1 - Activated charcoal filter**
- 2 - Location of adapter hose - KLI 9210/55-1-**
  - ❑ For leak detection in fuel system
- 3 - Activated charcoal filter solenoid valve 1 - N80-**
- 4 - Breather line**
  - ❑ Throttle valve module - J338-
- 5 - Solenoid valve**
  - ❑ For fuel system diagnosis pump - V144- .
- 6 - Vacuum line**
  - ❑ To intake manifold
- 7 - Air filter**
  - ❑ For fuel system diagnosis pump - V144- .
- 8 - Fuel system diagnostic pump - V144-**
- 9 - Fuel tank**
- 10 - Sealing cover**



### 9.9.3 Checking vacuum supply of fuel system diagnostic pump - V144-

Special tools and workshop equipment required

- ◆ Turbocharger tester - V.A.G 1397A-



- ◆ T-piece - 251 201 346-
- ◆ Hose Ø 6mm



## Note

- ♦ *Fitting location of fuel system diagnostic pump - V144- .*
- ♦ *Golf: In rear right wheel housing below wheel housing liner.*
- ♦ *Eos: Behind rear right wheel.*

### Golf:

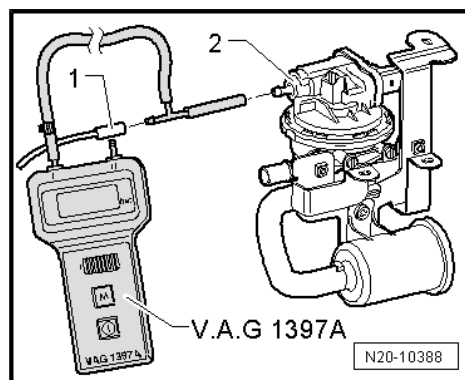
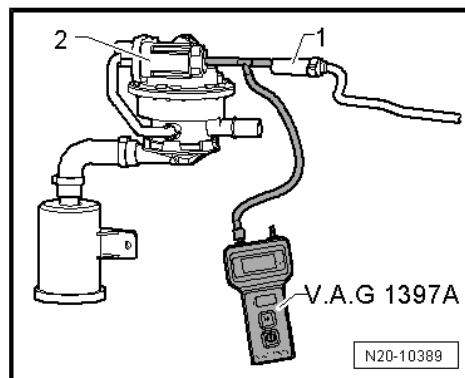
- Remove rear right wheel and wheel housing liner.
- Pull off vacuum line -1- from fuel system diagnostic pump - V144- .
- Connect turbocharger tester - V.A.G 1397A- with T-piece and hose Ø 6mm, between vacuum line -1- and fuel system diagnostic pump - V144- -2-.

### Eos:

- Pull off vacuum line -1- from fuel system diagnostic pump - V144- .
- Connect turbocharger tester - V.A.G 1397A- with T-piece and hose Ø 6mm, between vacuum line -1- and fuel system diagnostic pump - V144- -2-.

### All vehicles:

- Switch on measuring range **I** (absolute pressure measurement).
- Connect vehicle diagnostic tester and start engine.
- On vehicle diagnostic tester, select operating mode **Guided functions**.
- Select guided function “Checking tank ventilation system for leaks”.
- Initiate test.
- Observe display on turbocharger tester - V.A.G 1397A- while test is running.
- Pressure must pulsate and must not exceed 0.7 bar (absolute pressure) during test.
- If pressure exceeds 0.7 bar during test, vacuum supply is too low. Check vacuum line to intake manifold for possible kinks or blockages.





## 10 Activated charcoal filter system (Passat)



### Note

- ◆ *Hose connections are secured with either spring-type or clamp-type clips.*
- ◆ *Spring-type clip pliers - VAS 6340- or space saving hose clip pliers - VAS 6362- are recommended for installing and removing spring-type clips.*

The plug-in connectors for fuel, vacuum and breather lines are colour coded. There is either a coloured dot on the plug-in connector or the release button is coloured.

Plug-in connector	Colour code on plug-in connector
Fuel supply	black
Fuel return	blue
Breather	white, beige
Vacuum	green

Assembly overview - activated charcoal filter system (engine codes AXX, BWA) ➔ [page 231](#)

Checking fuel tank breather (engine codes AXX, BWA)  
➔ [page 232](#) .

Schematic diagram of activated charcoal filter system (engine code BPY) ➔ [page 233](#)

Assembly overview - activated charcoal filter system (engine code BPY) ➔ [page 235](#)

Checking fuel system for leaks (engine code BPY) ➔ [page 223](#)

### 10.1 Assembly overview - activated charcoal filter system (engine codes AXX, BWA)



**1 - Activated charcoal filter**

- ☐ Location: in rear right wheel housing.
- ☐ To remove, unscrew securing bolts and pull activated charcoal filter downwards out of retainer.

**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

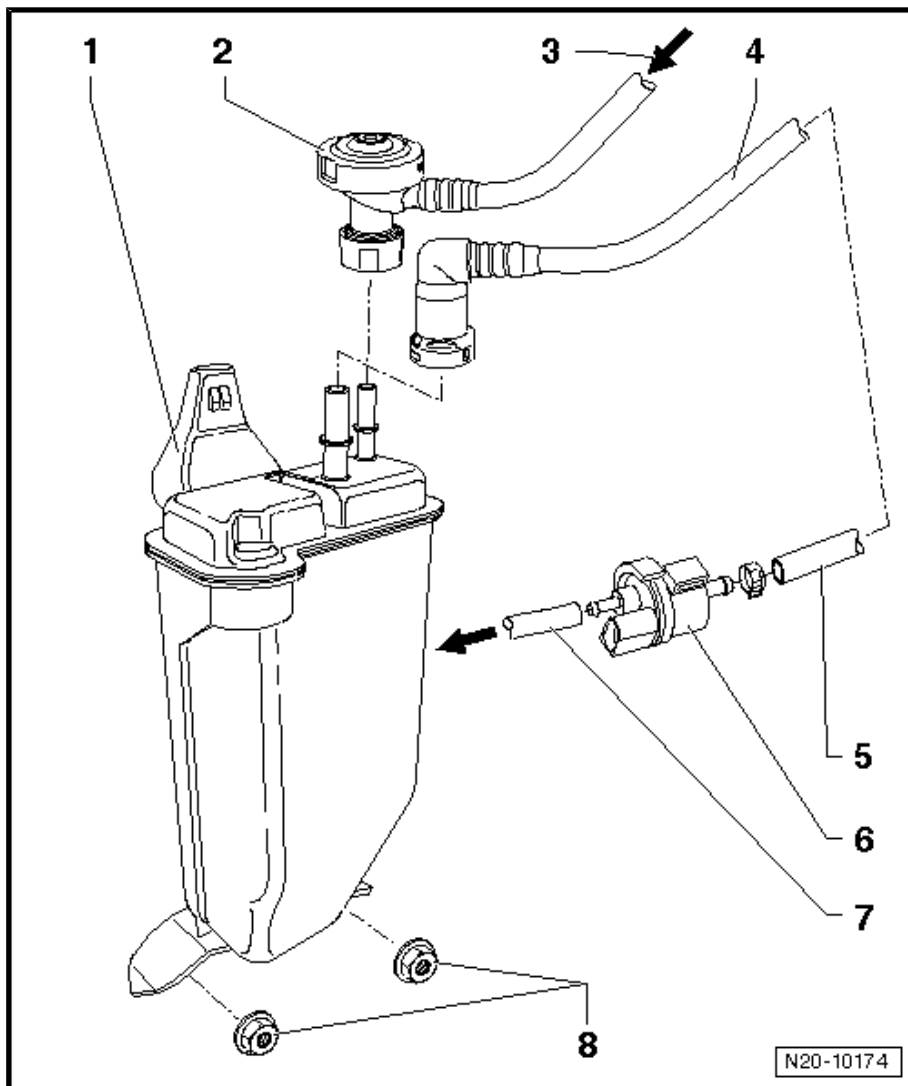
**6 - Activated charcoal filter solenoid valve 1 - N80-**

- ☐ Valve closed with ignition switched off
- ☐ When engine is warm, valve will be activated (pulsed) by engine control unit

**7 - Connection hose**

- ☐ To intake manifold
- ☐ Ensure firm seating

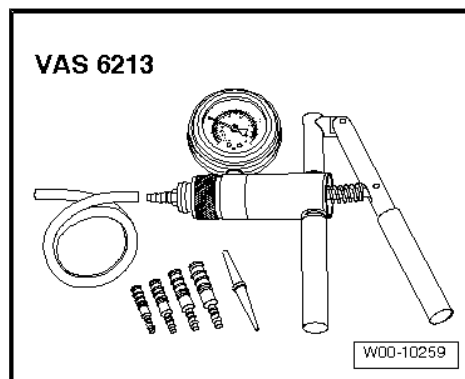
**8 - 10 Nm**



## 10.2 Checking fuel tank breather (engine codes AXX, BWA)

Special tools and workshop equipment required

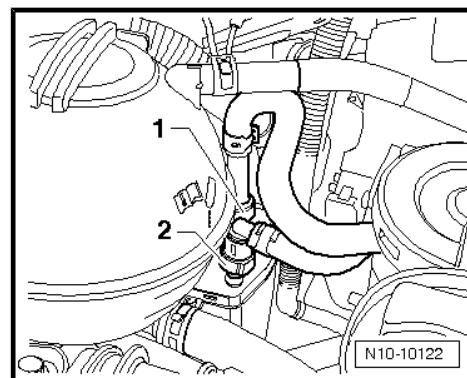
- ◆ Hand operated vacuum pump - VAS 6213-



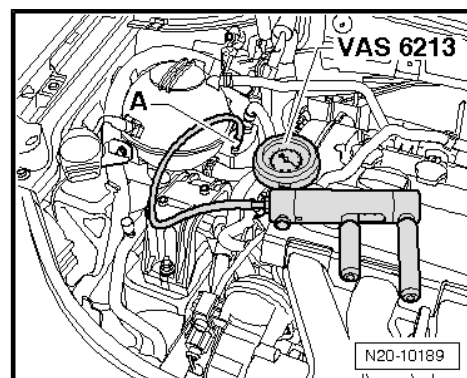


### Test sequence

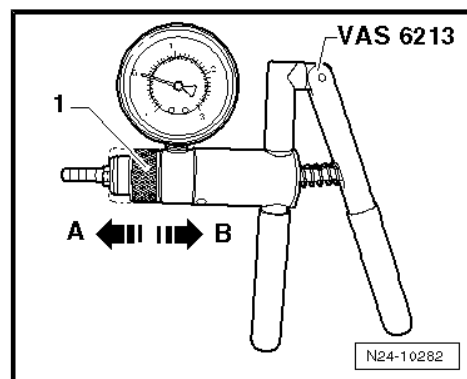
- Pull off breather line -2-. To do this, press release button.



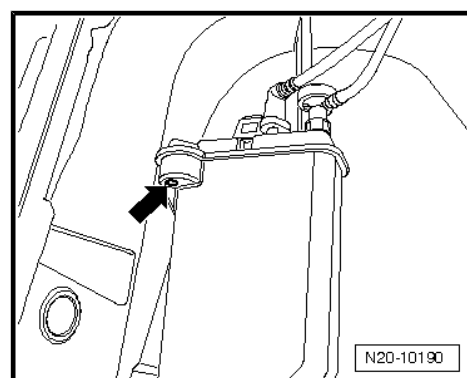
- Then connect hand vacuum pump - VAS 6213- as shown to breather line.



- Move slide ring -1- on hand vacuum pump - VAS 6213- to position -A- for "vacuum".
- Operate hand vacuum pump - VAS 6213- several times. There must be no development of vacuum.



- Seal breather hole on activated charcoal filter -arrow- and operate vacuum pump several times again. Vacuum must build up.



## 10.3 Schematic diagram of activated charcoal filter system (engine code BPY)



**1 - Vacuum line**

- ☐ green or green marking

**2 - Breather line**

- ☐ white or white marking
- ☐ From activated charcoal filter to activated charcoal filter solenoid valve 1 - N80-

**3 - Activated charcoal filter**

- ☐ Location: Behind rear right wheel housing

**4 - Fuel system diagnostic pump - V144-**

- ☐ Checking fuel system for leaks ➔ [page 223](#)

**5 - Exhaust turbocharger**

**6 - Brake servo**

**7 - Non-return valve**

**8 - Activated charcoal filter solenoid valve 1 - N80-**

**9 - Dual non-return valve**

- ☐ Checking ➔ [page 299](#)

**10 - Throttle valve module - J338-**

**11 - Intake manifold**

**12 - Separation point**

- ☐ In engine compartment on right.

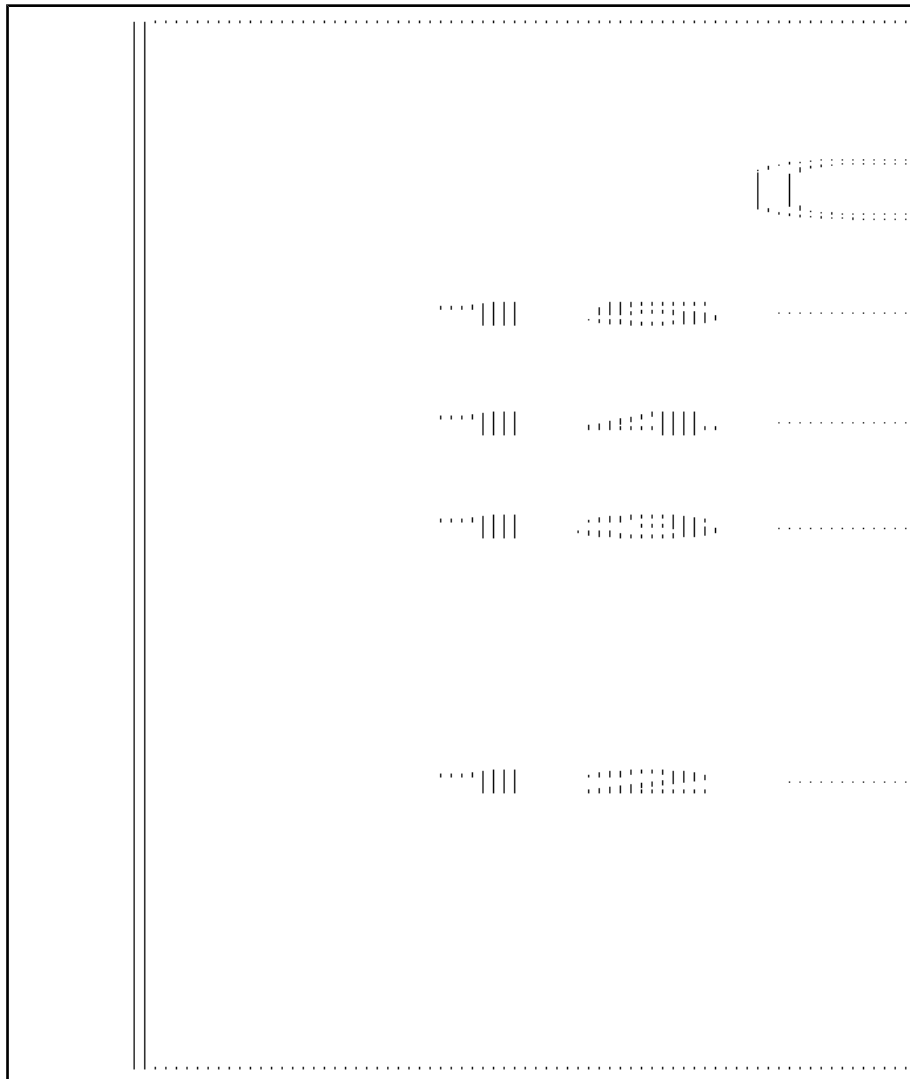
**13 - Separation point**

- ☐ On fuel tank at front right

**14 - Filler neck**

**15 - Breather line**

- ☐ From fuel tank to activated charcoal filter







## 10.4 Assembly overview - activated charcoal filter system (engine code BPY)

### 1 - Securing bolts

### 2 - Fuel system diagnostic pump - V144-

- ☐ Location: Behind rear right wheel housing
- ☐ Checking fuel system for leaks ➔ [page 235](#)

### 3 - Vacuum line

- ☐ To intake manifold

### 4 - Clip

### 5 - Connection hose

- ☐ Activated charcoal filter / fuel system diagnostic pump - V144-

### 6 - Vacuum hose

### 7 - Connection hose

- ☐ Fuel system diagnostic pump - V144- / air filter.

### 8 - Air filter

### 9 - 10 Nm

### 10 - Activated charcoal filter

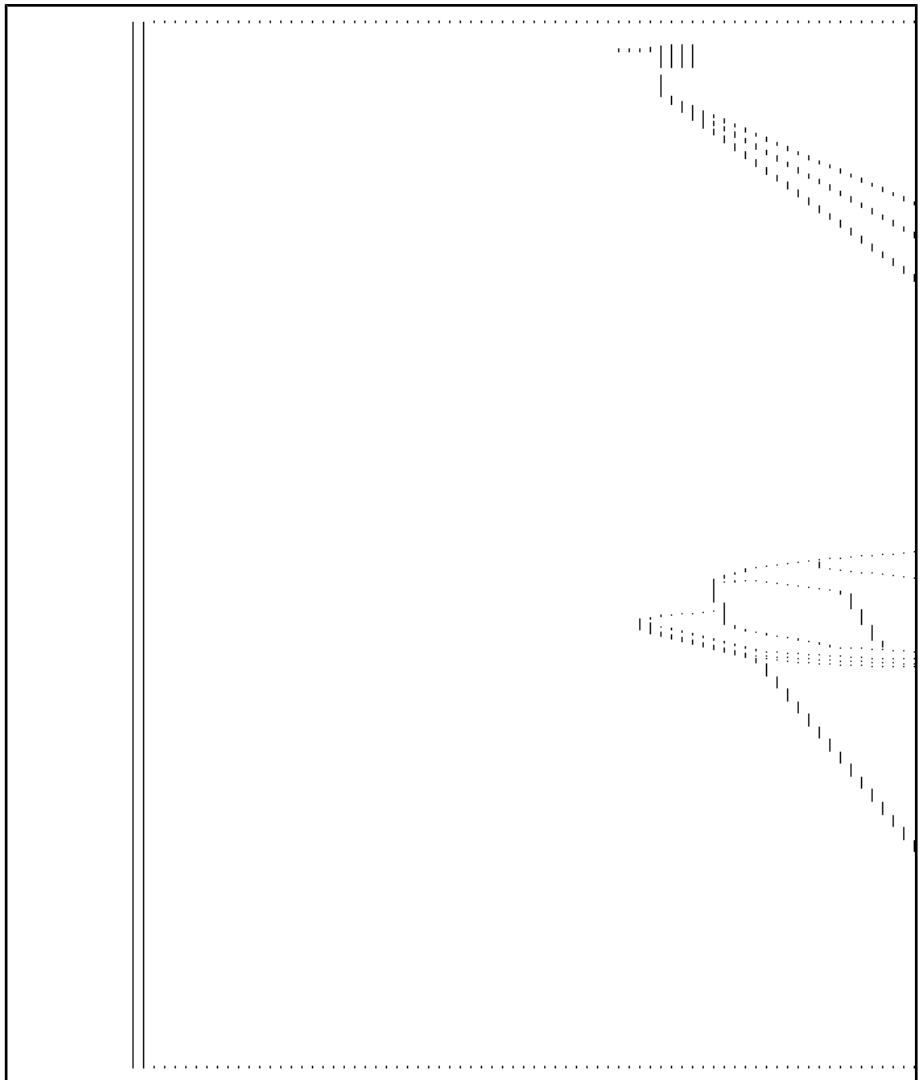
- ☐ Location: in rear right wheel housing.
- ☐ To remove, unscrew securing bolts and pull activated charcoal filter downwards out of retainer.

### 11 - Breather line

- ☐ To activated charcoal filter solenoid valve 1 - N80-
- ☐ Clipped onto fuel tank.

### 12 - Breather line

- ☐ From fuel tank



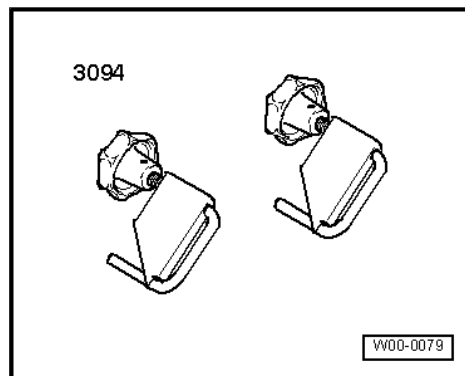
## 10.5 Checking fuel system for leaks

### Special tools and workshop equipment required

- ◆ Fuel system tester (so-called smoke tester) - KLI 9210-
- ◆ Adapter hose - KLI 9210/55-1-
- ◆ Vehicle diagnostic tester - VAS 5051B- , -VAS 5052- or -VAS 5053-



- ◆ Hose clamps to 25 mm - 3094-



#### Test specification:

- A leak has been detected by the fuel system diagnostic pump - V144- .
- Guided fault finding has been performed with the vehicle diagnostic tester .

#### Preparation of fuel system tester - KLI 9210- :

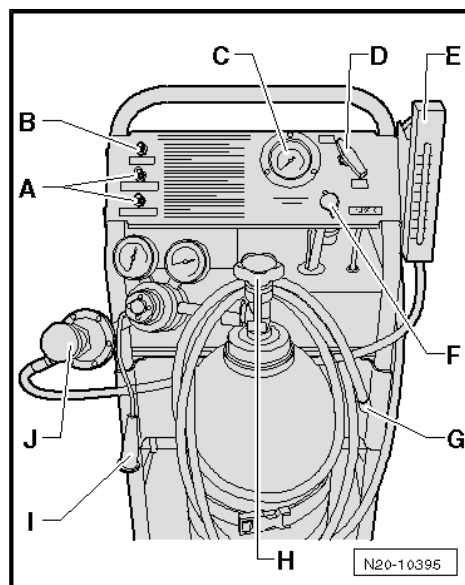


#### Note

*The fuel system tester - KLI 9210- may differ in appearance depending on the version.*

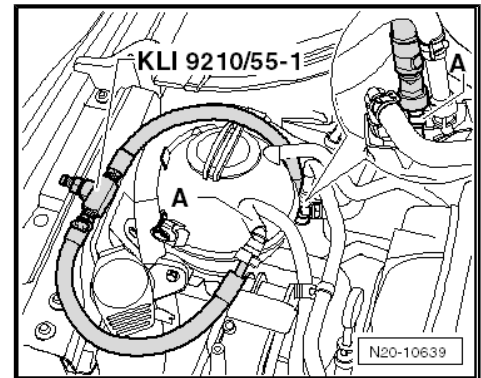
- Check on fuel system tester - KLI 9210- if there is enough fluid in smoke generator.
- Set valve -D- to "Hold".
- Open nitrogen bottle -H-.
- Connect test hose -G- to self-test connection -B-.
- Set valve -D- to "Test".
- Regulate pressure to 10 in. H<sub>2</sub>O (25 mbar) with pressure reducer -J-.
- Set valve -D- to "Hold".
- Now pressure must be maintained for at least 2 minutes. Check tester if pressure is not maintained.

#### Checking fuel system for leaks:

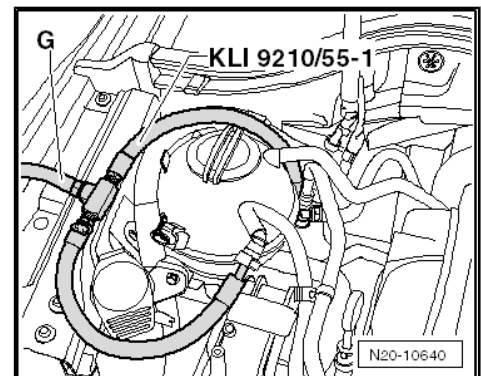




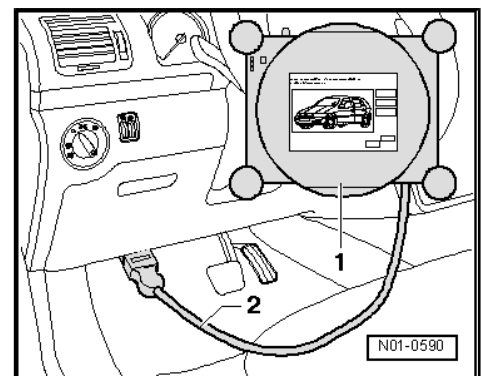
- Connect adapter hose - KLI 9210/55-1- to breather line -A- as shown. (colour marking: white)



- Connect measuring hose -G- from fuel system tester - KLI 9210- to adapter hose - KLI 9210/55-1- .
- Set valve -D- to “Hold”.



- Connect vehicle diagnostic tester to vehicle.
- Start engine and run at idling speed.
- On vehicle diagnostic tester, select operating mode Guided functions.
- Select guided function “Checking tank ventilation system for leaks”.
- Initiate test.
- Observe pressure gauge - KLI 9210- while test is running.
- Fuel system diagnostic pump - V144- must pump up pressure in fuel system to at least 7 in. H<sub>2</sub>O (18 mbar).



The minimum pressure was not reached, but the available pressure does not drop.

- Switch off ignition and perform a pressure retention test  
⇒ [page 238](#) . If no pressure drop can be detected: Check vacuum supply of fuel system diagnostic pump - V144-  
⇒ [page 241](#) .

The minimum pressure was not reached and the available pressure drops immediately:



- Clamp off hose to activated charcoal filter solenoid valve 1 - N80- using a hose clip -arrow-.
- Repeat check. If the minimum pressure is reached now, renew activated charcoal filter solenoid valve 1 - N80- .

If the minimum pressure was again not reached and the available pressure drops immediately:

- Leak in fuel system, perform test “leak detection in fuel system” ➔ [page 239](#) .

#### Switch off ignition if the minimum pressure is reached.

The valve in the fuel system diagnostic pump - V144- closes and the pressure is retained.

- Observe pressure gauge:

If the pressure does not drop at first, perform a pressure retention test to localise any potential small leaks ➔ [page 238](#) .

If the pressure drops, clamp off hose to activated charcoal filter solenoid valve 1 - N80- using a hose clip -arrow-.

- If the pressure does not drop again, renew activated charcoal filter solenoid valve 1 - N80- .

If the pressure still drops, perform “leak detection in fuel system” ➔ [page 239](#) .

#### Pressure retention test

- Set valve -D- to “Test”. Set the available pressure to 10 in. H<sub>2</sub>O (25 mbar).
- Observe pressure gauge -C- and flow meter -E-. When the throughput quantity decreases and the pressure increases to 10 in. H<sub>2</sub>O (25 mbar), the fuel system is filled.

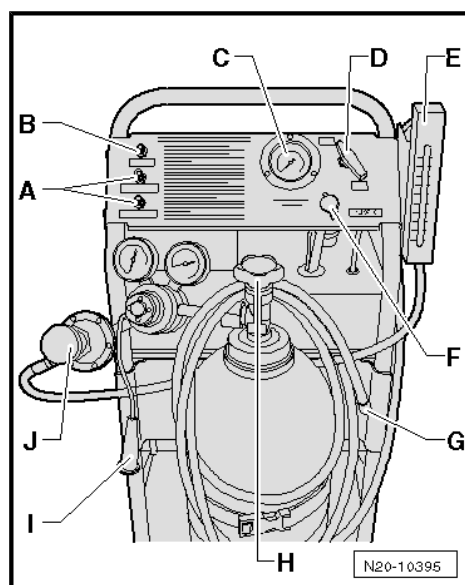
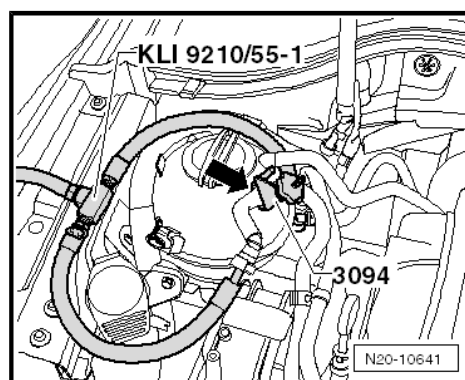
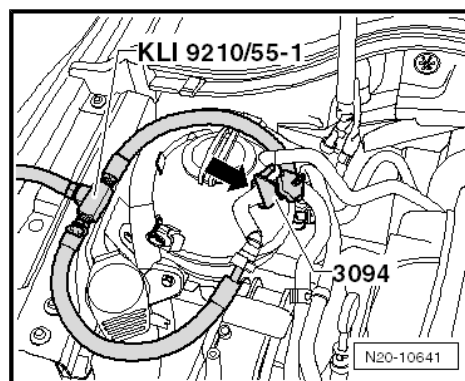


#### Note

*Depending on the filling level of the fuel tank, this process can take up to 3 minutes.*

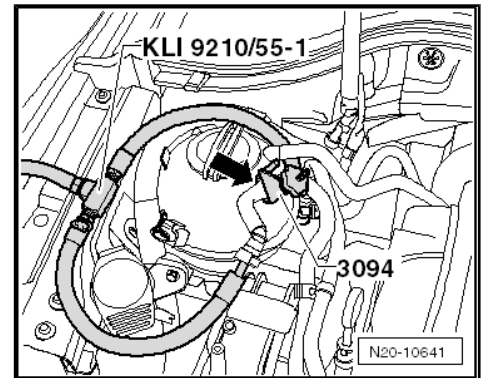
- Once pressure has stabilised, set valve -D- to “Hold”.
- After 5 minutes the pressure must not drop below 8 in. H<sub>2</sub>O (20 mbar).

**If the pressure is not held for at least 5 minutes, localise leak as follows:**





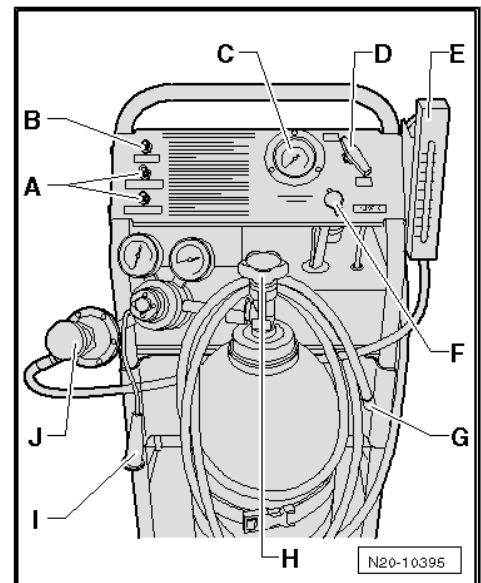
- First check activated charcoal filter solenoid valve 1 - N80- for leaks. To do this, clamp off hose to activated charcoal filter solenoid valve 1 - N80- using a hose clip -arrow-.



- Repeat pressure test by setting valve -D- again to “Test”.
- Observe pressure gauge and flow meter. When the throughput quantity decreases and the pressure increases to 10 in. H<sub>2</sub>O (25 mbar), the fuel system is filled.
- Once pressure has stabilised, set valve -D- to “Hold”.
- If the pressure does not drop again, renew activated charcoal filter solenoid valve 1 - N80- .

If the pressure still drops, perform “leak detection in fuel system”  
⇒ [page 239](#) .

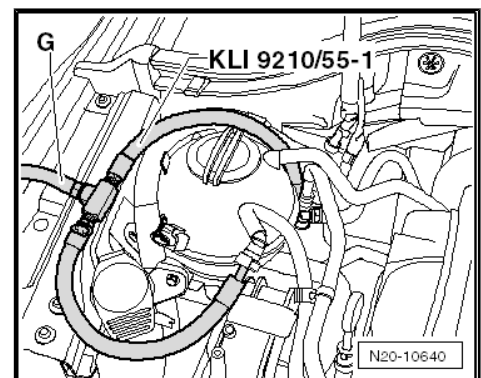
After completing work, perform guided function “Checking fuel tank breather system for leaks” using ⇒ Vehicle diagnostic tester.



## 10.5.1 Leak detection in fuel system

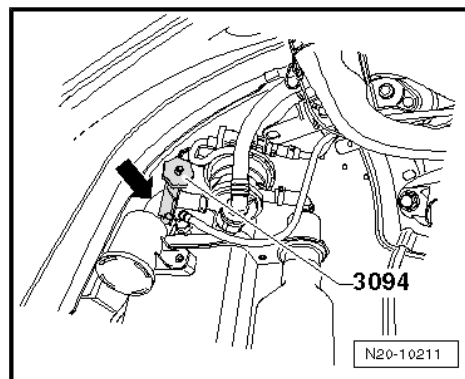
### Test specification:

- Procedure for “checking fuel system for leaks” has been completed ⇒ [page 235](#) .
- Fuel system tester - KLI 9210- is connected to vehicle via adapter hose - KLI 9210/55-1- .
- Connect fuel system tester - KLI 9210- to vehicle battery.
- Remove rear right wheel housing liner.





- Clamp off hose between fuel system diagnostic pump - V144- and air filter -arrow-.



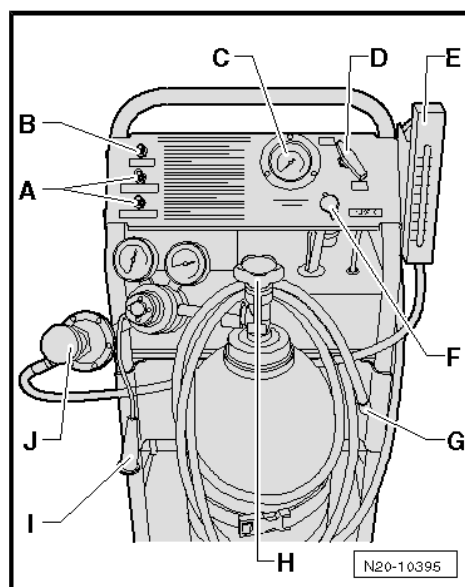
- Set valve -D- to “Test”.
- Observe pressure gauge -C- and flow meter -E-. When the throughput quantity decreases and the pressure increases to 10 in. H<sub>2</sub>O (25 mbar), the fuel system is filled.
- Once pressure has stabilised, set valve -D- to “Hold”.
- After 5 minutes the pressure must not drop below 8 in. H<sub>2</sub>O (20 mbar).
- If the pressure no longer drops, renew fuel system diagnostic pump - V144- .

**If the pressure is not held for at least 5 minutes or does not build up, localise leak as follows:**

- Fill fuel system with smoke, set valve -D- again to “Test” for this.
- While fuel system is being filled, press button -I- for smoke generator for approx. one minute.

The fuel system is now pressurised and filled with smoke.

- Check whether smoke escapes from any fuel system line or hose. Also check fuel tank cap.



#### Note

- ♦ *Light up the components and hoses with a strong floodlight. In the floodlight, smoke is more visible.*
- ♦ *For leak detection in accessible areas, also use ultrasonic detector or commercially available leak detecting spray.*
- ♦ *Depending on how long the fault finding takes, it may be necessary to press the smoke generator button from time to time. This ensures that sufficient smoke is present in the fuel system.*
- ♦ *To inspect flanges for fuel pump and fuel filter, open assembly opening in vehicle interior.*

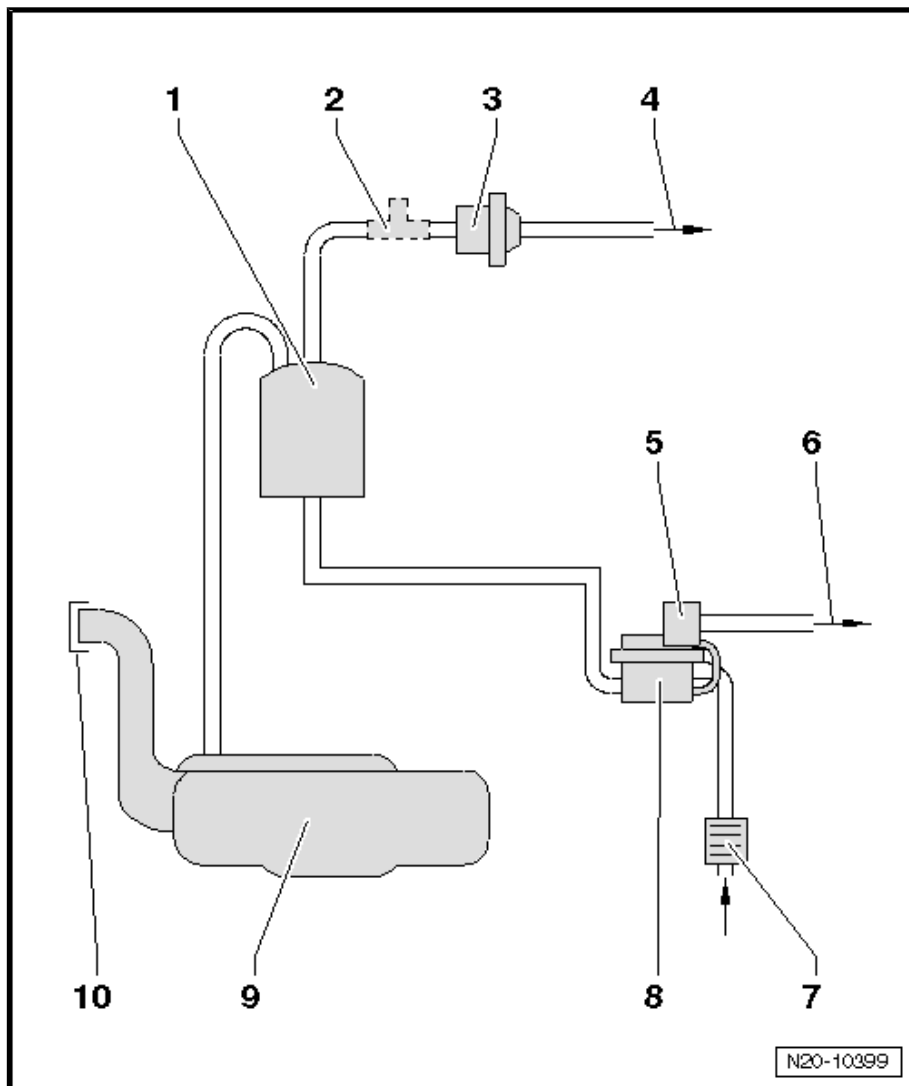
- Renew leaking hoses or components.

After completing work, perform guided function “Checking fuel tank breather system for leaks” using ⇒ Vehicle diagnostic tester.

## 10.5.2 Schematic overview of activated charcoal filter system



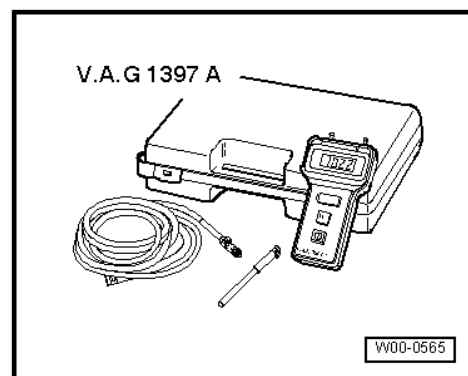
- 1 - Activated charcoal filter**
- 2 - Location of adapter hose - KLI 9210/55-1-**
  - ☐ For leak detection in fuel system
- 3 - Activated charcoal filter solenoid valve 1 - N80-**
- 4 - Breather line**
  - ☐ Throttle valve module - J338-
- 5 - Solenoid valve**
  - ☐ For fuel system diagnosis pump - V144- .
- 6 - Vacuum line**
  - ☐ To intake manifold
- 7 - Air filter**
  - ☐ For fuel system diagnosis pump - V144- .
- 8 - Fuel system diagnostic pump - V144-**
- 9 - Fuel tank**
- 10 - Sealing cover**



### 10.5.3 Checking vacuum supply of fuel system diagnostic pump - V144-

Special tools and workshop equipment required

- ◆ Turbocharger tester - V.A.G 1397A-



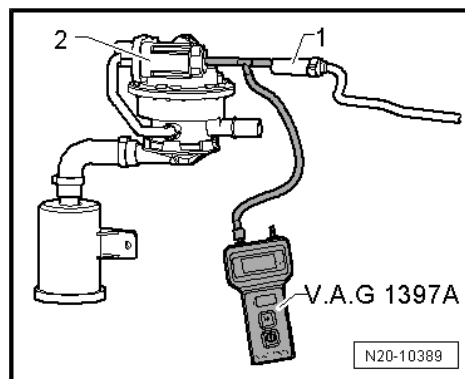
- ◆ T-piece - 251 201 346-
- ◆ Hose Ø 6mm



## Note

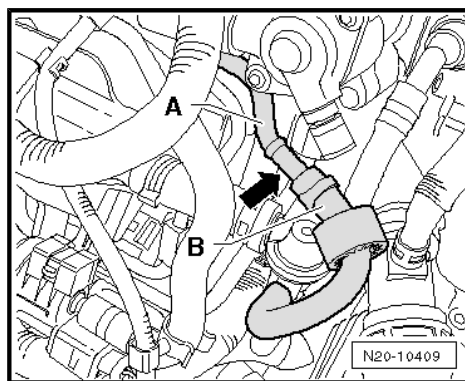
*The fuel system diagnostic pump - V144- is fitted in the rear right wheel housing behind the wheel housing liner.*

- Remove rear right wheel and wheel housing liner.
- Pull off vacuum line -1- from fuel system diagnostic pump - V144- .
- Connect turbocharger tester - V.A.G 1397A- with T-piece and hose Ø 6mm, between vacuum line -1- and fuel system diagnostic pump - V144- -2-.
- Switch on measuring range **I** (absolute pressure measurement).
- Connect vehicle diagnostic tester and start engine.
- On vehicle diagnostic tester, select operating mode Guided functions.
- Select guided function “Checking tank ventilation system for leaks”.
- Initiate test.
- Observe display on turbocharger tester - V.A.G 1397A- while test is running.
- Pressure must pulsate and must not exceed 0.7 bar (absolute pressure) during test.
- If pressure exceeds 0.7 bar during test, vacuum supply is too low. Check vacuum line to intake manifold for possible kinks or blockages.



## Note

*A throttle is fitted in the vacuum hose on the intake manifold -arrow-. Disconnect the cable -A- and the hose -B- and check the throttle.*







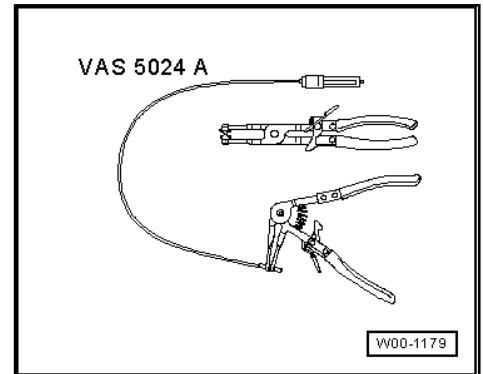
## 21 – Turbocharging/supercharging

### 1 Exhaust 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. The oil seals and sealing surfaces must be oiled lightly only for plug-in connectors ⇒ [page 243](#).
- ◆ Charge air system must be free of leaks.
- ◆ Renew self-locking nuts.
- ◆ Hose clip pliers - VAS 6499- or hose clip pliers - V.A.G 1921- 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 idling speed and do not rev up immediately. This ensures that the turbocharger is fully primed with oil.



Fitting hose connections with plug-in connectors ⇒ [page 243](#)

Assembly overview - turbocharger ⇒ [page 244](#).

Removing and installing turbocharger ⇒ [page 248](#).

Checking turbocharger vacuum unit ⇒ [page 256](#).

Adjusting vacuum unit for turbocharger ⇒ [page 257](#).

Removing and installing vacuum unit for turbocharger  
⇒ [page 257](#).

#### 1.1 Fitting hose connections with plug-in connectors



#### Caution

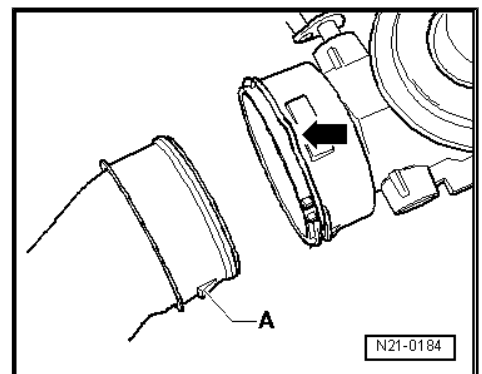
*The seal for the push-on coupling can be damaged if the retaining clip is in the locked position during installation. This would result in leaking. Observe installation instructions.*

#### Removing:

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

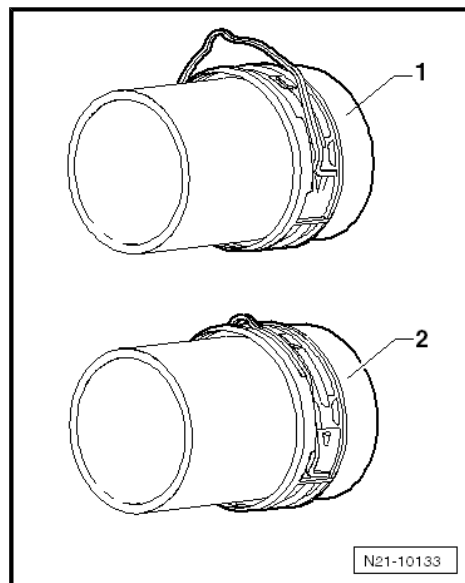
#### Installing

- If renewed, place seal in groove of charge air hose. Make sure that the seal is correctly seated in the groove all around the complete circumference and that it is not twisted.
- Lubricate sealing surface and seal with oil.





- Bring retaining clip to release position -1-.
- Push charge air hose into coupling to stop.
- Bring securing clip to locking position -2- and then push charge air hose again.
- Check if plug-in connector seats correctly and is properly engaged by pulling hose.



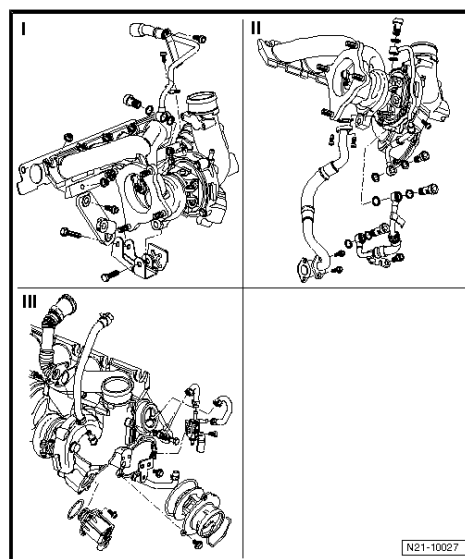
## 1.2 Rules for cleanliness

When working on the turbocharger, pay careful attention to the following "5 rules" for cleanliness:

- ◆ Thoroughly clean all joints and surrounding areas before dismantling.
- ◆ Place removed parts on a clean surface and cover them over. Use lint-free cloths only.
- ◆ Carefully cover opened components or seal them if repairs cannot be carried out immediately.
- ◆ Install only clean parts; do not remove new parts from packaging until immediately before installing. Do not use parts that have been kept unpackaged (for example in toolboxes).
- ◆ If system is open: do not use compressed air if possible. Try not to move the vehicle.

## 1.3 Assembly overview - turbocharger

- ◆ Part I ➔ [page 244](#)
- ◆ Part II ➔ [page 246](#)
- ◆ Part III ➔ [page 247](#)



### 1.3.1 Part I



# **1 - Seal**

- ☐ Renew

# **2 - 20 Nm**

- ☐ Renew
- ☐ Coat studs of exhaust manifold with high-temperature paste.
- ☐ High-temperature paste  
⇒ Electronic Parts Catalogue (ETKA)

# **3 - 35 Nm**

# **4 - Sealing ring**

- ☐ Renew

# **5 - 9 Nm**

# **6 - 23 Nm**

- ☐ On coolant return line only fitted with two retainers

# **7 - Coolant return line**

- ☐ Gradual introduction of coolant return lines with one retainer

# **8 - Exhaust turbocharger**

- ☐ Removing and installing  
⇒ [page 248](#)

# **9 - Bracket**

# **10 - 30 Nm**

- ☐ Coat bolt with high-temperature paste
- ☐ High-temperature paste  
⇒ Electronic Parts Catalogue (ETKA)

# **11 - 30 Nm**

- ☐ Coat bolt with high-temperature paste
- ☐ High-temperature paste ⇒ Electronic Parts Catalogue (ETKA)

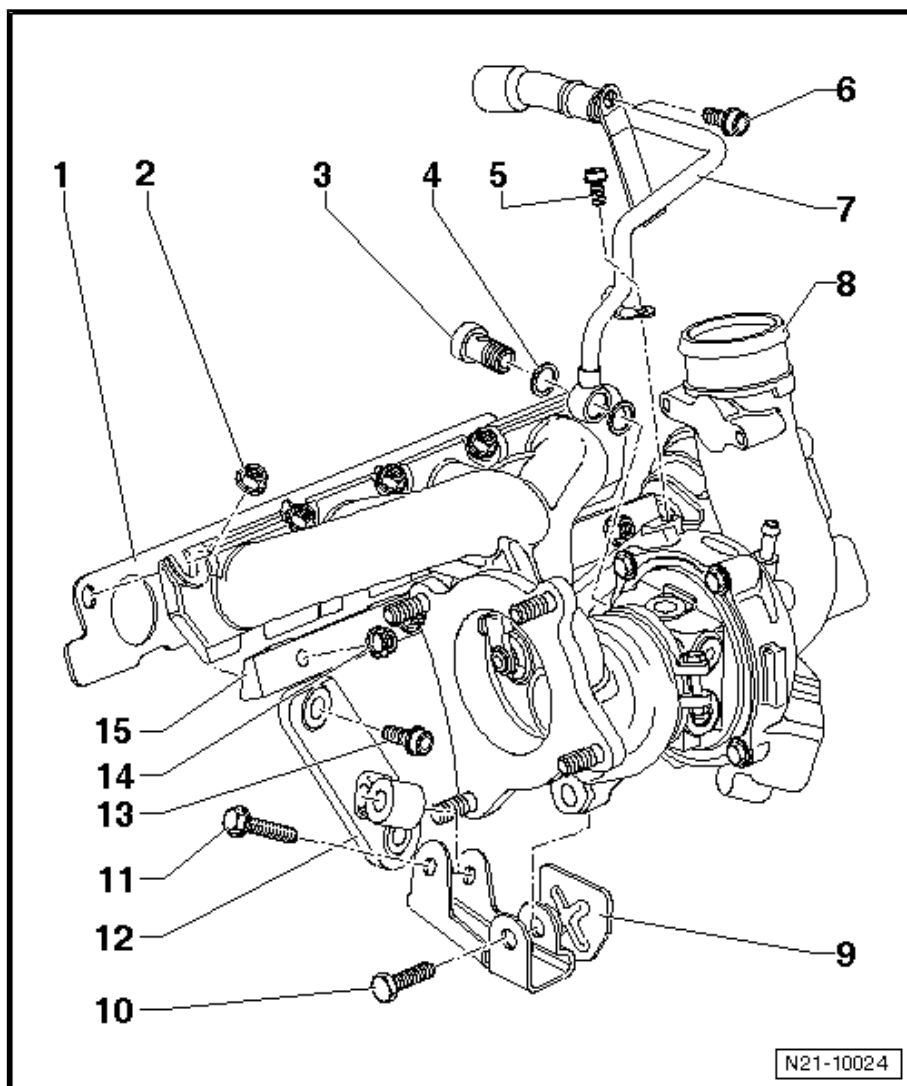
# **12 - Bracket**

# **13 - 23 Nm**

# **14 - 30 Nm**

- ☐ Do not loosen to remove turbocharger
- ☐ Renew
- ☐ Coat studs of exhaust manifold with high-temperature paste.
- ☐ High-temperature paste ⇒ Electronic Parts Catalogue (ETKA)

# **15 - Clamping rail**





## 1.3.2 Part II

**1 - Sealing ring**

☐ Renew

**2 - 30 Nm**

**3 - Oil supply line**

**4 - Exhaust turbocharger**

☐ Removing and installing  
⇒ [page 248](#)

**5 - 9 Nm**

**6 - 30 Nm**

**7 - Sealing ring**

☐ Renew

**8 - 35 Nm**

**9 - Sealing ring**

☐ Renew

**10 - Coolant supply line**

**11 - 23 Nm**

**12 - 35 Nm**

**13 - 9 Nm**

**14 - Sealing ring**

☐ Renew

**15 - Seal**

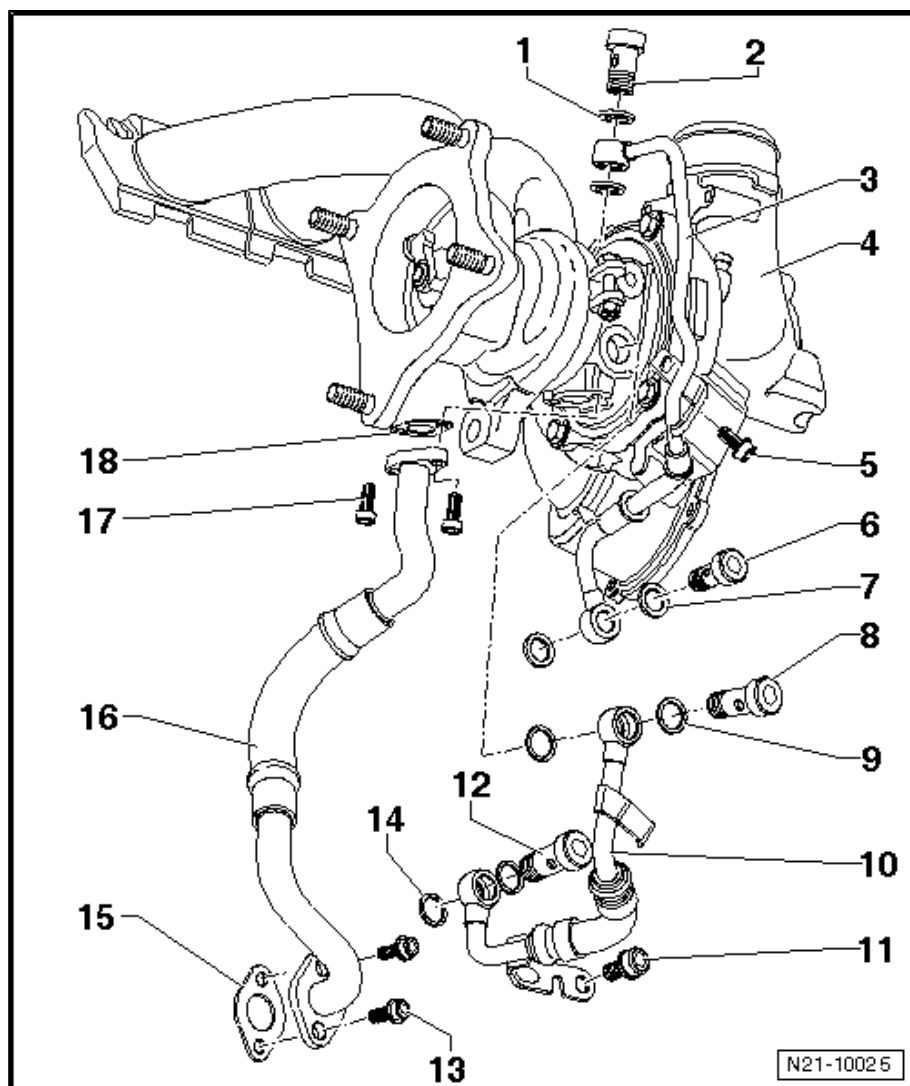
☐ Renew

**16 - Oil return line**

**17 - 9 Nm**

**18 - Seal**

☐ Renew





### 1.3.3 Part III

#### 1 - Exhaust turbocharger

- ☐ Removing and installing  
⇒ [page 248](#)

#### 2 - Seal

- ☐ Renew

3 - 9 Nm

#### 4 - Crankcase breather line

#### 5 - Heat shield

#### 6 - Connection hose

#### 7 - Pressure canister

- ☐ Removing and installing  
⇒ [page 257](#)
- ☐ Adjusting ⇒ [page 257](#)

#### 8 - Banjo union

#### 9 - Sealing ring

- ☐ Renew

#### 10 - Hose

#### 11 - Hose

12 - 3 Nm

#### 13 - Charge pressure control solenoid valve - N75-

14 - 8 Nm

#### 15 - Sealing ring

#### 16 - Connection

#### 17 - Retaining clip

18 - 7 Nm

#### 19 - Hose

20 - 7 Nm

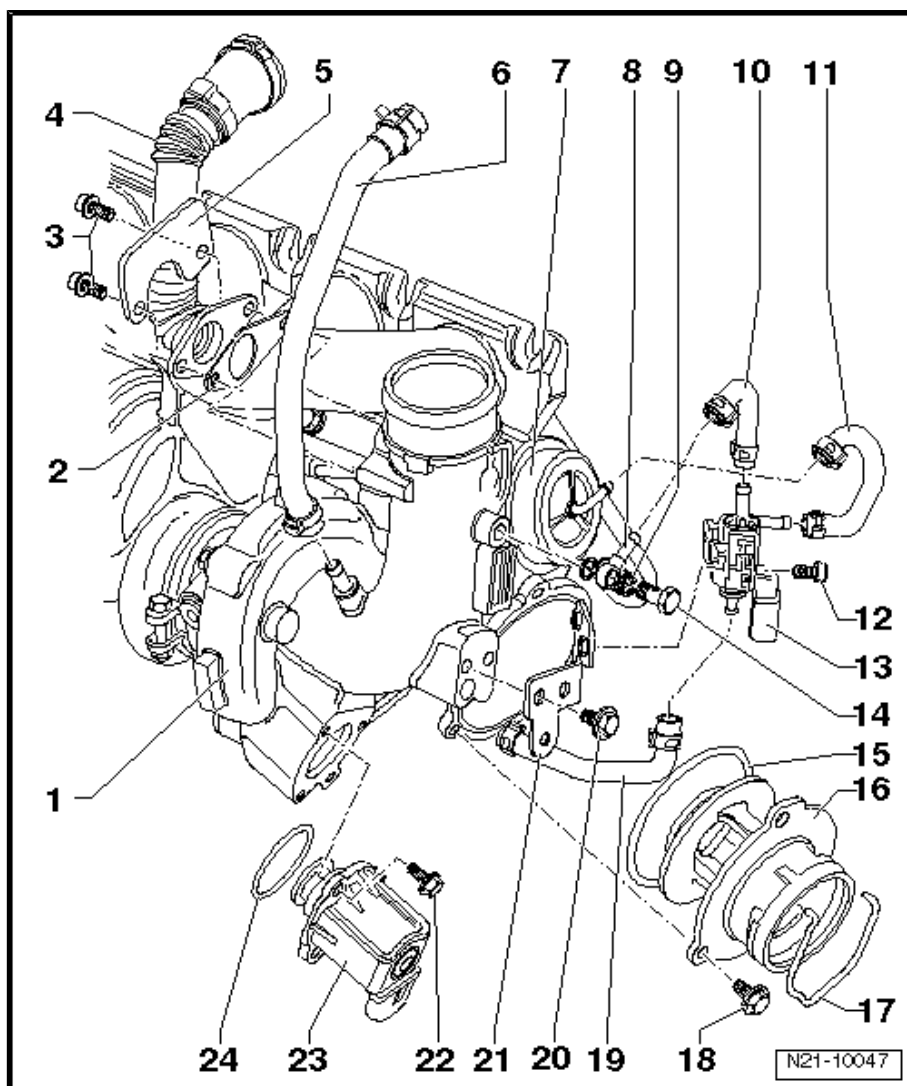
#### 21 - Bracket

22 - 7 Nm

#### 23 - Turbocharger air recirculation valve - N249-

- ☐ Note installation position ⇒ [page 248](#)

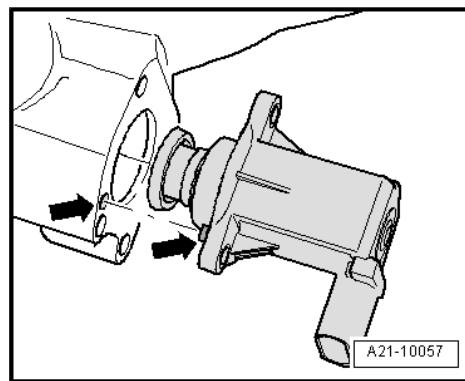
#### 24 - Sealing ring





### Installation location of turbocharger air recirculation valve - N249-

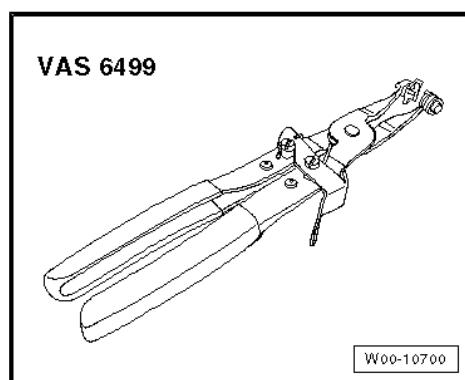
- Observe installation position -arrows-



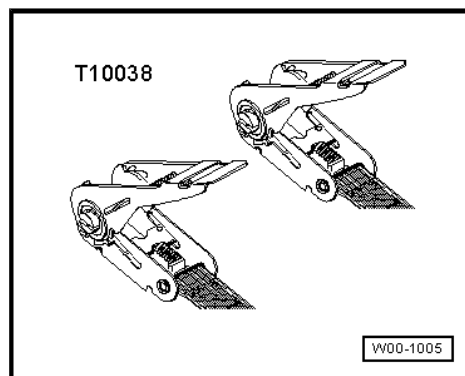
## 1.4 Removing and installing turbocharger

### Special tools and workshop equipment required

- ◆ Spring-type clip pliers - VAS 6499-



- ◆ Tensioning strap - T10038-



### Caution

*If a mechanical fault is found on the turbocharger, e.g. a destroyed compressor impeller, just renewing the turbocharger is not enough. To prevent this from causing further damage, perform the following repairs:*

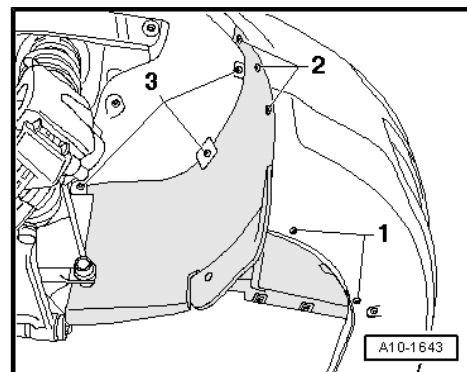
- ◆ Check air filter housing, air filter element and intake hoses for soiling.
- ◆ Check complete charged air routing and charge air cooler for foreign objects.

*If foreign objects are found in the charge air system, the charged air routing must be cleaned and the charge air cooler must be renewed, if necessary.*

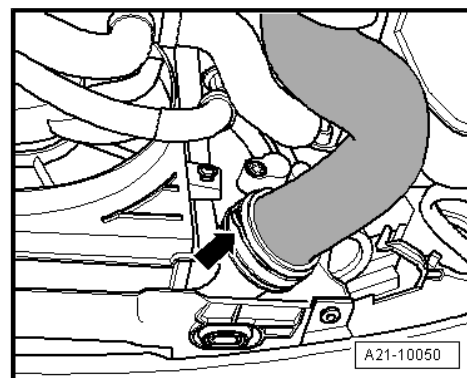


### Removing:

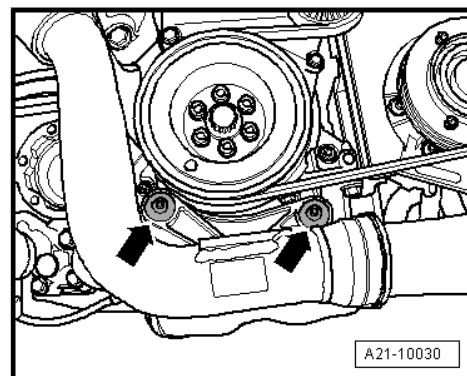
- Remove engine cover panel/air filter ➔ [page 273](#) and remove intake hose ➔ [Item 11 \(page 273\)](#) from turbocharger.
- Drain coolant ➔ [page 126](#) .
- Remove right front part of wheel housing liner.



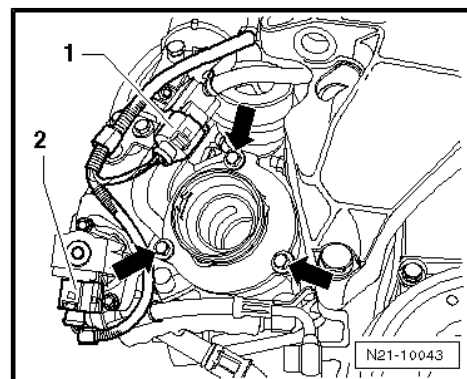
- Pull charge air hose -arrow- off charge air cooler.



- Unscrew bolts -arrows- and remove charge air pipe.



- Pull off connectors -1 and 2- and unclip wire.
- Unscrew bolts -arrows- and remove union from turbocharger.





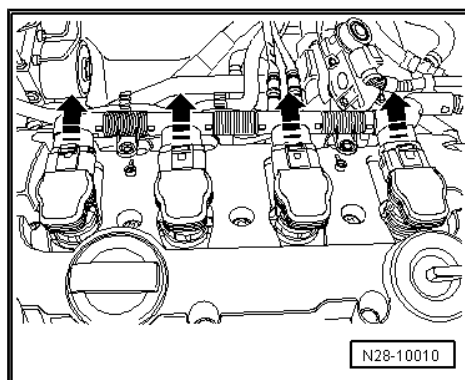
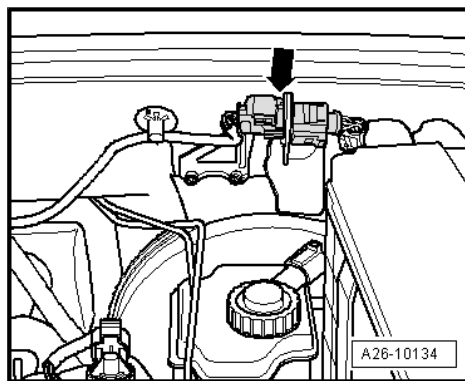
- Disconnect connector for Lambda probe - G39- -arrow- and lay cable to side.

**Golf, Eos:**

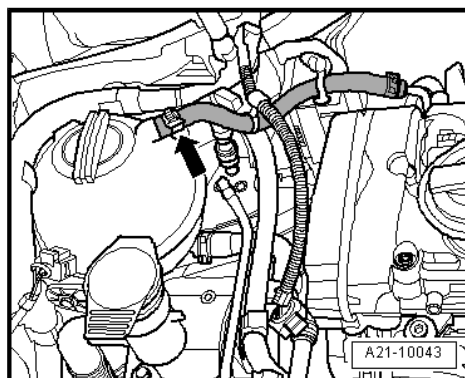
- Remove wiper arms, plenum chamber cover and plenum bulkhead ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .

**All vehicles:**

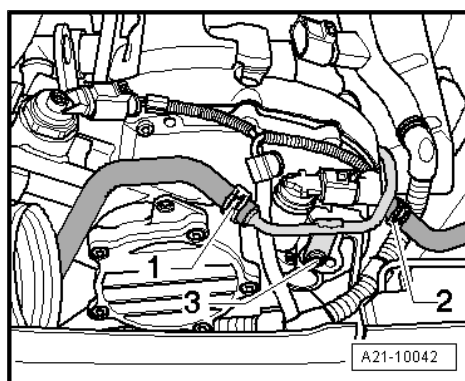
- Pull connectors off ignition coils and lay wiring harness to side.



- Disconnect coolant line to coolant expansion tank -arrow-.



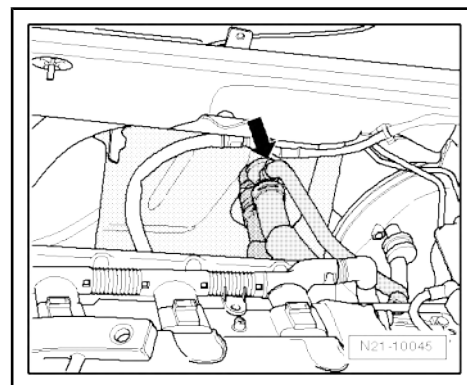
- Pull off coolant hoses -1- and -2-.
- Disconnect coolant line -3-.



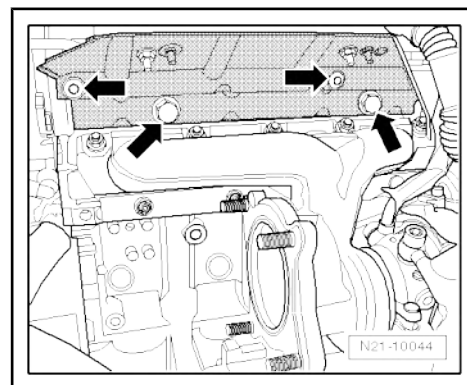




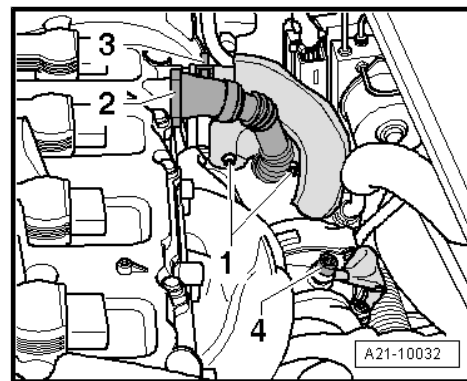
- Pull upper coolant hose off heat exchanger -arrows-.



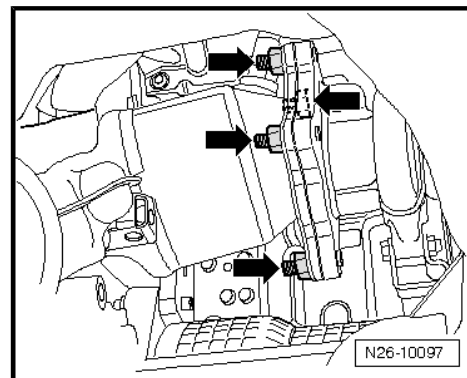
- Remove heat shield and coolant pipe -arrows-.



- Unbolt crankcase breather line with heat shield from turbocharger -1-.
- Disconnect crankcase breather line from cylinder head cover -2- and remove.
- Remove activated charcoal filter line to turbocharger from cylinder head cover -3-.
- Loosen turbocharger oil supply line -4-.

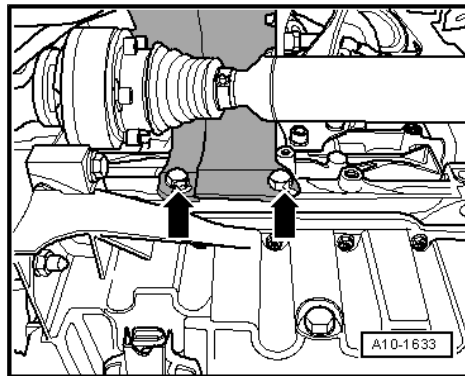


- Remove the two upper securing nuts for front exhaust pipe/ turbocharger.

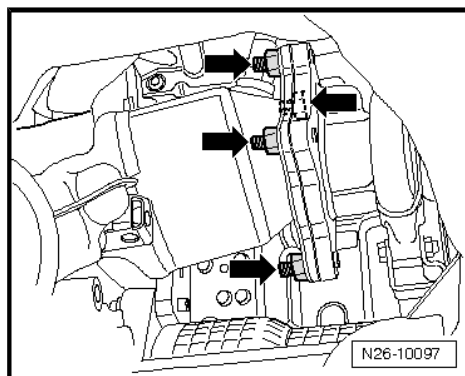




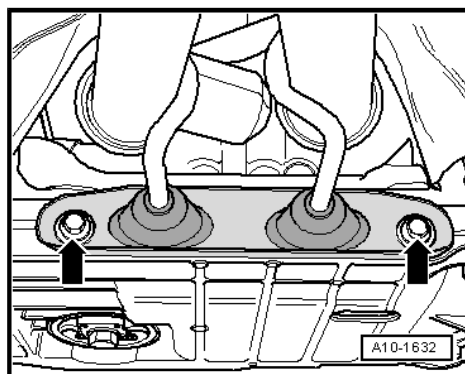
- Unbolt heat shield for right-hand drive shaft -arrows-.
- Remove right drive shaft ⇒ Running gear, axles, steering;  
Rep. gr. 40 ; Removing and installing drive shafts .



- Remove the two lower securing nuts for front exhaust pipe/turbocharger.



- Unbolt bracket for exhaust system -arrows-.

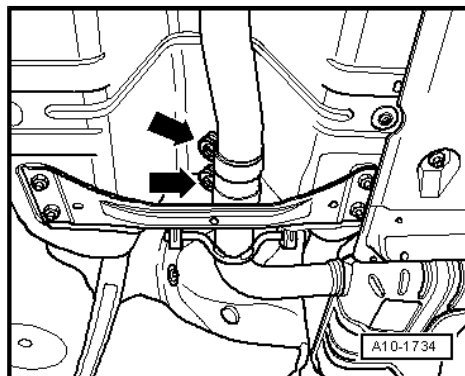


- Separate exhaust system at clamp -arrows-.
- Pull front exhaust pipe off turbocharger and slightly push to rear.



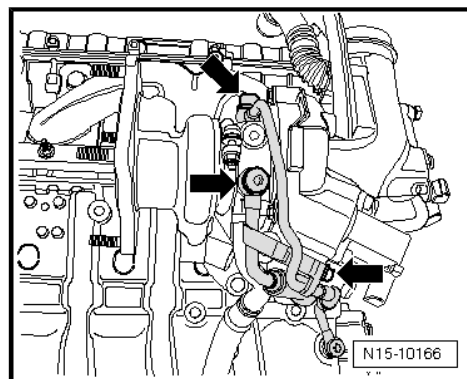
**Note**

*The catalytic converter is not removed and the Lambda probe connector is not separated.*

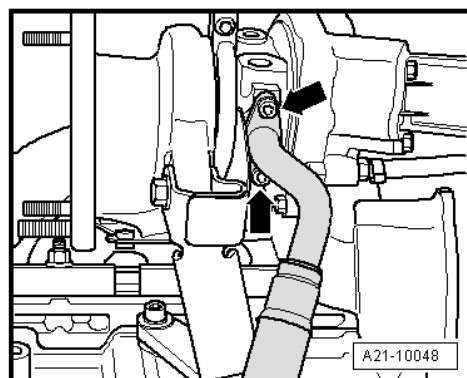




- Unbolt oil supply line and coolant supply line from turbocharger -arrows-.



- Remove oil return line -arrows- at turbocharger.

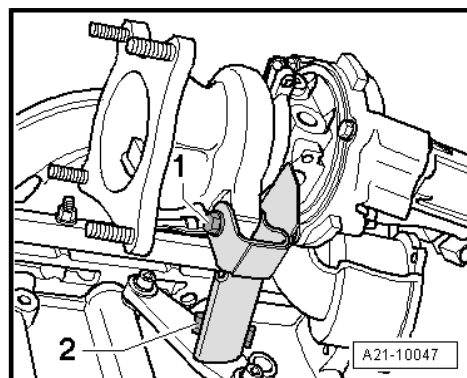


- Remove bolts -1- and -2- and remove support for turbocharger.

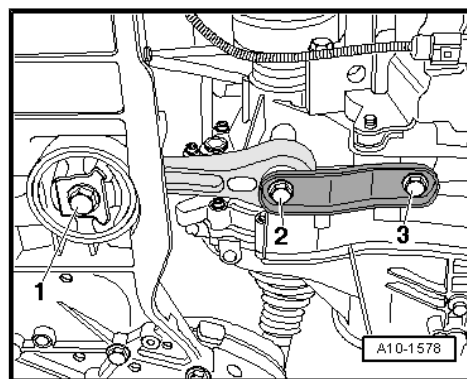


#### Note

*The following procedure is necessary to provide more space between the cylinder head and plenum chamber bulkhead.*

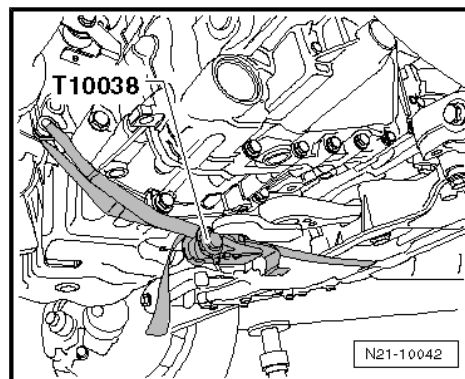


- Remove bolts -2 and 3-.





- Pull engine approx. 20 mm to rear using tensioning strap - T10038- .

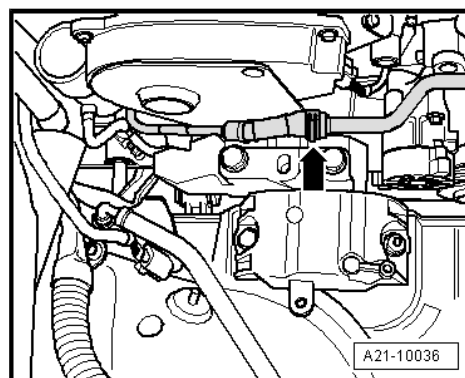


- Disconnect coolant pipe -arrow-.



**Note**

- ◆ *The clamping strip nuts need not be loosened.*
- ◆ *Bolt -1- is only fitted on coolant pipes with two retainers.*





- Unscrew bolt -1- for coolant pipe and remove upper nuts -arrows-.
- Remove turbocharger/exhaust manifold upwards.

Installing:

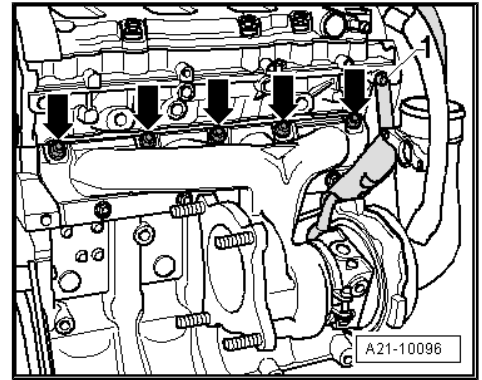


#### Caution

*If a mechanical fault is found on the turbocharger, e.g. a destroyed compressor impeller, just renewing the turbocharger is not enough. 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.*



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

- ◆ Fitting hose connections with plug-in connectors ➔ [page 243](#)
- ◆ Renew seals, gaskets and self-locking nuts.
- ◆ Fill turbocharger with engine oil at oil supply line connection.
- ◆ The coolant return line ➔ [Item 7 \(page 245\)](#) must be installed together with the turbocharger.
- ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly. The oil seals and sealing surfaces must be oiled lightly only for plug-in connectors ➔ [page 243](#) .
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ➔ ETKA (Electronic parts catalogue) .
- ◆ After installing turbocharger, run engine for about 1 minute at idling speed to ensure that oil is supplied to turbocharger.

Specified torques ➔ [page 244](#)

Component	Nm
Pendulum support to gearbox	➔ <a href="#">page 13</a>
Exhaust manifold/turbocharger to cylinder head	20 <sup>1)</sup>
Oil supply line to turbocharger	30
Oil return line to turbocharger	9
Coolant supply line to turbocharger	35
Turbocharger bracket to cylinder block	30 <sup>2)</sup>
Turbocharger bracket to turbocharger	30 <sup>2)</sup>
Air intake pipe (right side) to sump	10

1) Renew nuts.

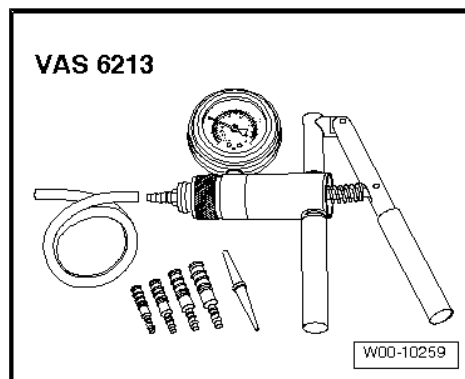
2) Use high-temperature paste ➔ ETKA (Electronic parts catalogue) .



## 1.5 Checking vacuum unit for turbocharger

### Special tools and workshop equipment required

- ◆ Hand operated vacuum pump - VAS 6213-

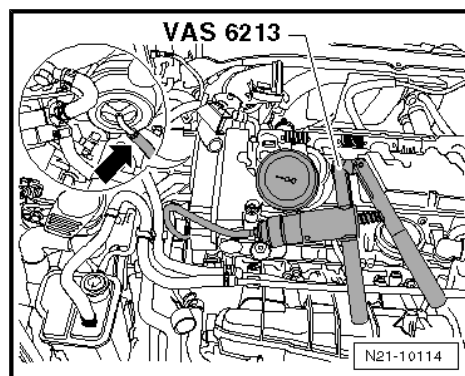


### Test specification:

- ◆ Hose from turbocharger via charge pressure control solenoid valve - N75- to vacuum unit must have through-flow (not blocked).
- ◆ Charge pressure control solenoid valve - N75- OK.

### Procedure

- Remove engine cover panel/air filter ➔ [page 273](#) .
- Connect hand-operated vacuum pump - VAS 6213- to vacuum unit -arrow-.



- Move slide ring -1- on hand vacuum pump - VAS 6213- to position -B- for "pressure".

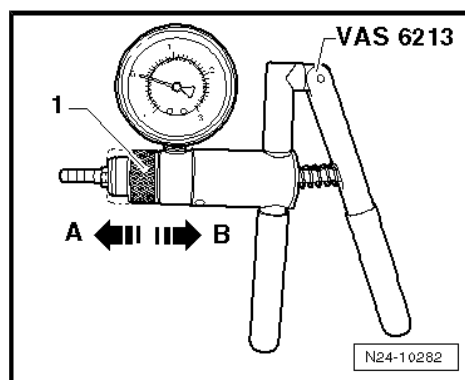


### Caution

*The pressure must not exceed 750 mbar! If the pressure is exceeded, the vacuum unit can be damaged.*

- Operate hand vacuum pump - VAS 6213- several times and observe the linkage.

The linkage -A- should start to move at a pressure of approx. 300 mbar and be at its limit stop at a pressure of approx. 700 mbar.



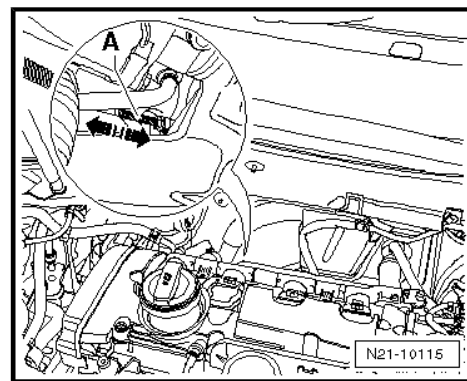


The stroke of the rod is approx. 10 mm.



#### Note

*If no pressure can be built up using hand vacuum pump - VAS 6213- , or if the pressure drops immediately again, check hand vacuum pump - VAS 6213- and connecting hoses for leaks. If no fault is found: renew vacuum unit ➔ [page 257](#) .*



## 1.6 Removing and installing vacuum unit for turbocharger

### Removing:

- Remove turbocharger ➔ [page 248](#) .
- Detach locking plate above turbocharger linkage.
- Loosen lock nut -2-.
- Separate rod from turbocharger -3-.
- Remove vacuum unit -1- from turbocharger -arrows-.

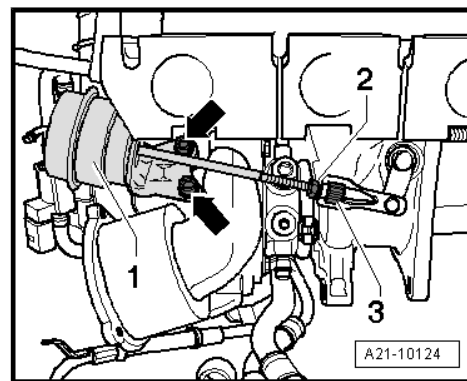
### Installing:

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

- Adjust turbocharger vacuum unit ➔ [page 257](#) .
- Install turbocharger ➔ [page 248](#) .

### Specified torques

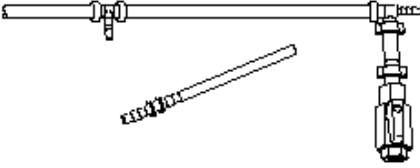
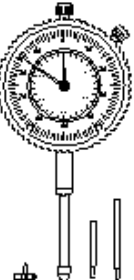
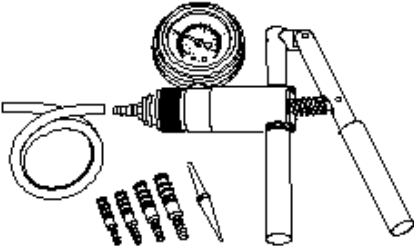
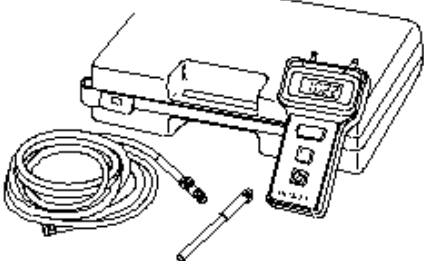
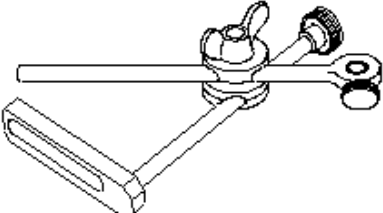
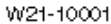
Component	Nm
Vacuum unit to turbocharger	10



## 1.7 Adjusting vacuum unit for turbocharger



**Special tools and workshop  
equipment required**

<b>VAS 6342</b> 	<b>VAS 6341</b> 
<b>VAS 6213</b> 	<b>V.A.G 1397 A</b> 
<b>VW 387</b> 	

- ◆ Universal dial gauge holder - VW 387-
- ◆ Hand operated vacuum pump - VAS 6213-
- ◆ Pressure regulating valve - VAS 6342-
- ◆ Turbocharger tester - V.A.G 1397A-
- ◆ Dial gauge - VAS 6341/1-
- ◆ Extension, 30 mm - VAS 6341/3-
- ◆ Flat probe - VAS 6341/4-



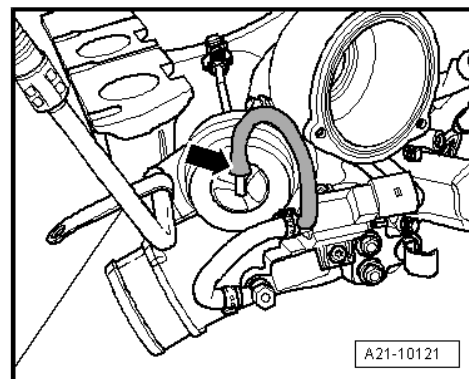
**Note**

- ◆ *This procedure is used to adjust the vacuum unit. When checking already adjusted vacuum units the values can differ.*
- ◆ *The vacuum unit must be adjusted only if the linkage has been loosened.*
- ◆ *Adjustment is carried out when turbocharger is removed.*

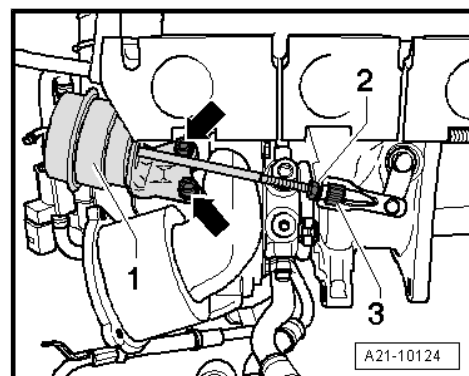




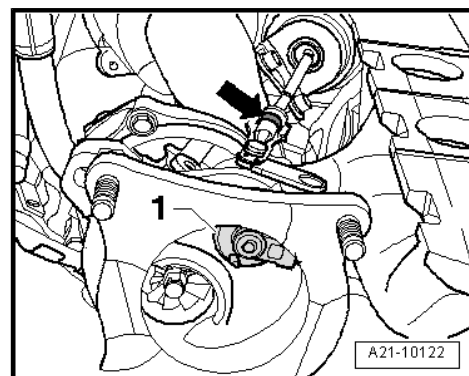
- Pull hose -arrow- from vacuum unit on turbocharger.
- Detach locking plate above turbocharger linkage.



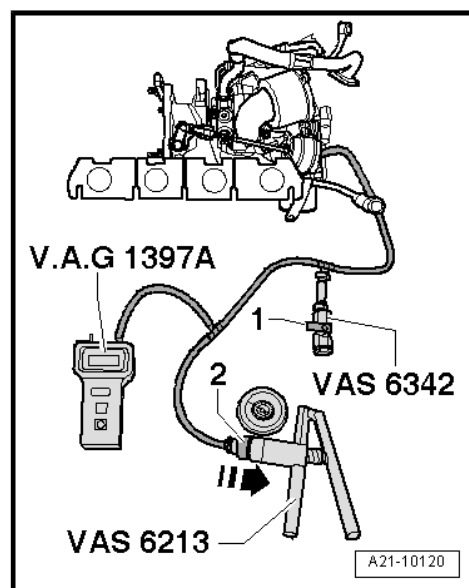
- Loosen lock nut -2-.



- Pre-adjust bypass flap -1- above rod of vacuum unit -arrow-, so that the bypass flap can just be turned by hand.
- Tighten lock nut hand-tight.

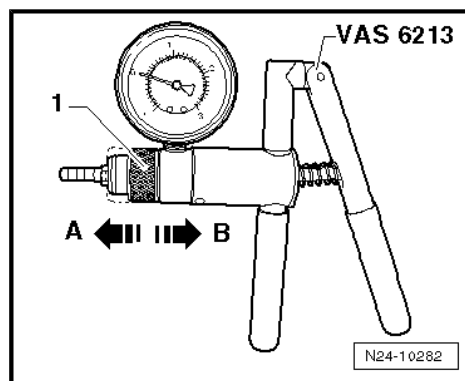


- Connect up hand-operated vacuum pump - VAS 6213- , turbocharger tester - V.A.G 1397A- (connection II) and pressure control valve - VAS 6342- as shown in illustration.
- Close pressure control valve - VAS 6342- at lever -1-.



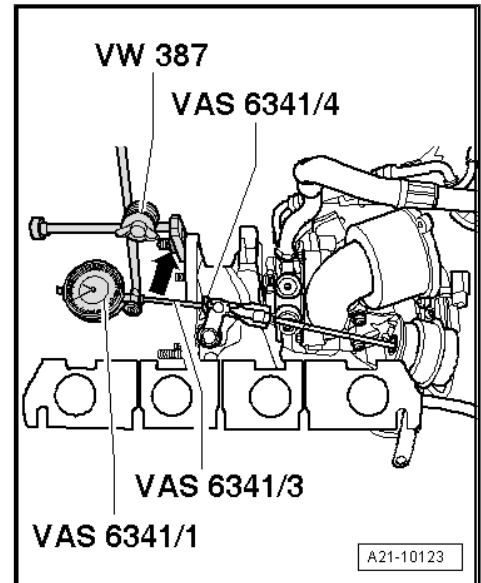


- Move slide ring -1- on hand vacuum pump - VAS 6213- to position -B- for "pressure".
- Switch on turbocharger tester - V.A.G 1397A- and set sliding switch to position II.





- Secure universal dial gauge bracket - VW 387- to turbocharger -arrows-.
- Secure dial gauge - VAS 6341/1- with dial gauge extension, 30 mm - VAS 6341/3- and flat pickup - VAS 6341/4- to universal dial gauge bracket - VW 387- .
- With pressure at 0 bar, set dial gauge - VAS 6341/1- to 1 mm preload.
- Turn dial of dial gauge - VAS 6341/1- to 0.
- Make sure that dial gauge can move freely.
- Operate vacuum pump - VAS 6213- until turbocharger tester - V.A.G 1397A- indicates 350 +/- 5 mbar.
- The dial gauge must indicate between 4.1 mm and 4.3 mm; otherwise, turn rod of vacuum unit until the value is indicated.
- Tighten lock nut hand-tight.
- Repeat adjustment.



#### Note

*The values in mm refer to the read value (includes 1 mm pre-tension).*

- Vent system via pressure control valve - VAS 6342- so that pressure reading drops to 0 mbar.
- Set dial gauge - VAS 6341/1- to 0.



#### Note

*The following measurements must be performed in continuous sequence. Do not allow the pressure to drop to 0 between measurements.*

- Operate vacuum pump - VAS 6213- until turbocharger tester - V.A.G 1397A- indicates 350 +/- 5 mbar.
- Read off and note value indicated on dial gauge - VAS 6341/1- .
- Actuate hand vacuum pump - VAS 6213- until turbocharger tester - V.A.G 1397A- indicates 650 mbar to 700 mbar.
- Vent system via pressure control valve - VAS 6342- so that pressure reading drops to 350 +/- 5 mbar.
- Read off and note value indicated on dial gauge - VAS 6341/1- .
- Add values 1 and 2 together and divide by 2.
- The result (mean value) should be 5 +/- 0.25 mm.
- Correct setting if the result (average) is not 5 +/- 0.25 mm, tighten lock nut hand-tight and repeat measurement.
- If the result (mean value) is 5 +/- 0.25 mm, tighten the lock nut to 5 Nm and secure with sealing paint.
- Secure locking plate above turbocharger linkage.



## 2 Charge air system

Assembly overview - charge air cooling, Golf ➤ [page 262](#) .

Assembly overview - sound amplifier; Golf ➤ [page 263](#)

Assembly overview - charge air cooling, Eos, Passat  
➤ [page 264](#) .

Removing and installing charge air cooler, Golf, Eos  
➤ [page 264](#) .

Removing and installing charge air cooler (Passat) ➤ [page 266](#) .

Fitting hose connections with plug-in connectors ➤ [page 243](#)

Schematic diagram of turbocharging system ➤ [page 267](#) .

Checking charge air system for leaks ➤ [page 268](#)

### 2.1 Assembly overview - charge air cooling, Golf



#### Note

Assembly overview - sound amplifier ➤ [page 263](#) .

1 - 5 Nm

2 - Mounting

- ☐ For charge air cooler.

3 - Intercooler

- ☐ Removing and installing  
➤ [page 264](#)

4 - Charge air pipe

5 - 8 Nm

6 - Charge air hose

- ☐ Fitting hose connections with plug-in connectors ➤ [page 243](#)

7 - Charge air pipe

- ☐ To sound amplifier

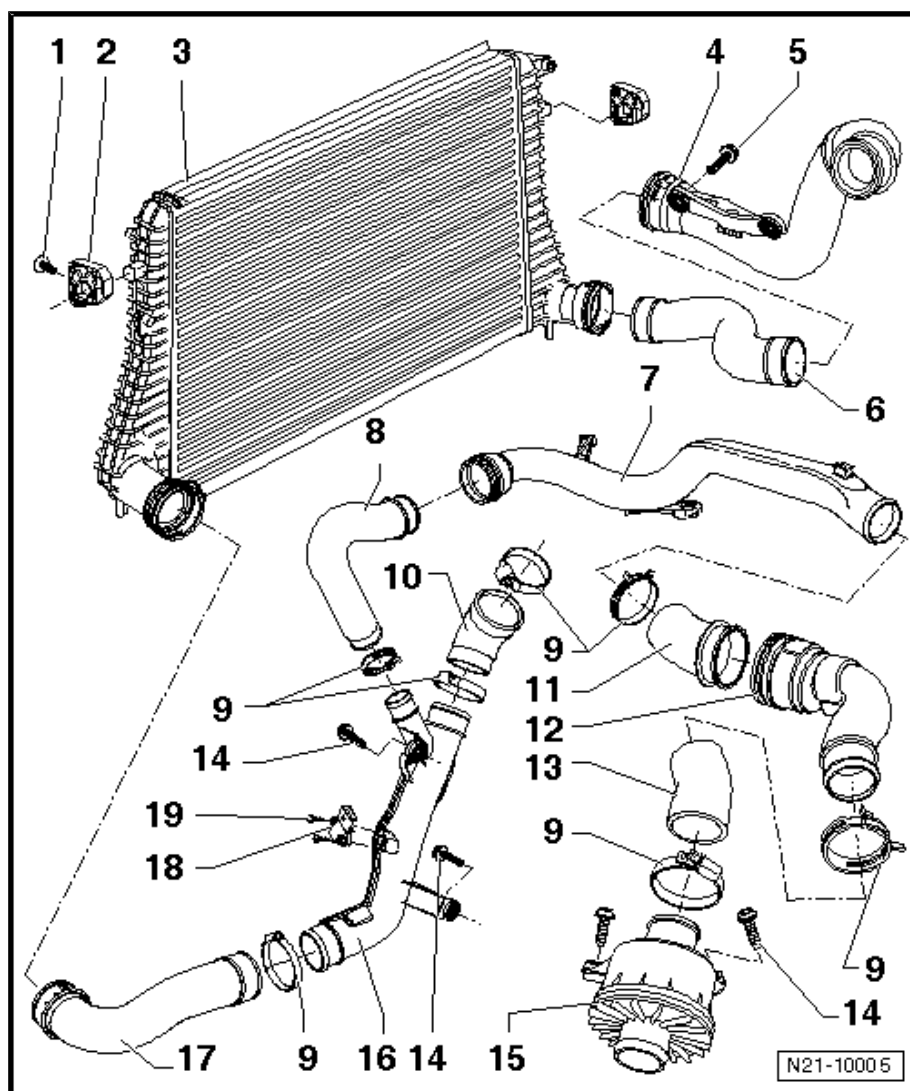
8 - Charge air hose

- ☐ Fitting hose connections with plug-in connectors ➤ [page 243](#)

9 - Hose clamp

10 - Charge air hose

- ☐ To throttle valve module - J338- .

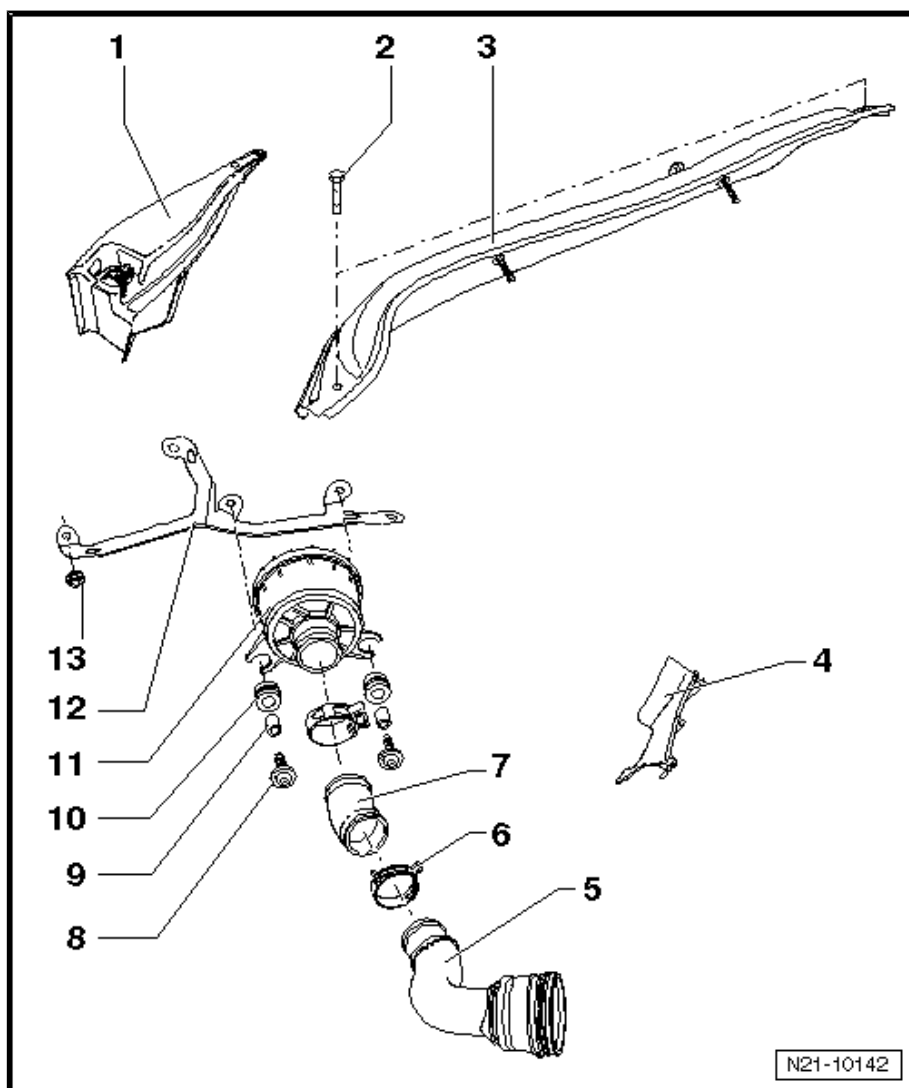




- 11 - Charge air hose
- 12 - Charge air pipe
- 13 - Charge air hose
- 14 - 8 Nm
- 15 - Sound amplifier
  - ☐ Fasteners ➔ [page 263](#)
- 16 - Charge air pipe
- 17 - Charge air hose
  - ☐ Fitting hose connections with plug-in connectors ➔ [page 243](#)
- 18 - Charge air pressure sender - G31-
- 19 - 5 Nm

## 2.2 Assembly overview - sound amplifier, Golf

- 1 - Cover
- 2 - 8 Nm
- 3 - Plenum chamber bulkhead
- 4 - Trim
  - ☐ For feed-through in plenum chamber bulkhead
- 5 - Charge air pipe
- 6 - Clip
- 7 - Charge air hose
- 8 - 8 Nm
- 9 - Spacer sleeve
- 10 - Rubber mounting
- 11 - Sound amplifier
  - ☐ Before removing, remove cover  
➔ [Item 1 \(page 263\)](#) .
- 12 - Bracket
  - ☐ For sound amplifier
- 13 - 8 Nm



N21-10142



## 2.3 Assembly overview - charge air cooling, Eos, Passat

1 - 5 Nm

2 - Mounting

- ☐ For charge air cooler.

3 - Intercooler

- ☐ Removing and installing charge air cooler (Passat) ⇒ [page 266](#) .
- ☐ Removing and installing charge air cooler, Eos ⇒ [page 264](#) .

4 - Charge air pipe

5 - 8 Nm

6 - From turbocharger

7 - Charge air hose

- ☐ Note installation instructions ⇒ [page 243](#)

8 - To throttle valve module - J338- .

9 - Charge air hose

10 - 10 Nm

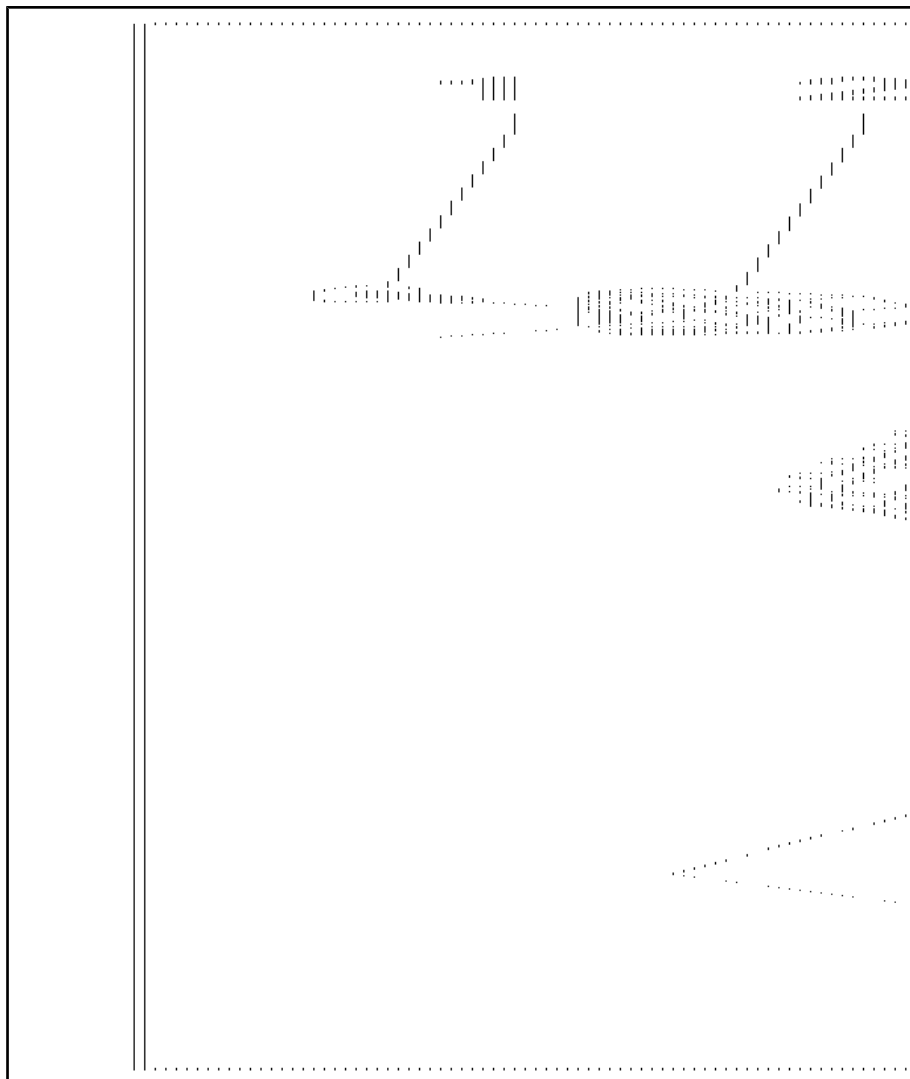
11 - 5 Nm

12 - Charge air pressure sender - G31-

13 - Charge air pipe

14 - Charge air hose

- ☐ Note installation instructions ⇒ [page 243](#)



## 2.4 Removing and installing charge air cooler (Golf, Eos)

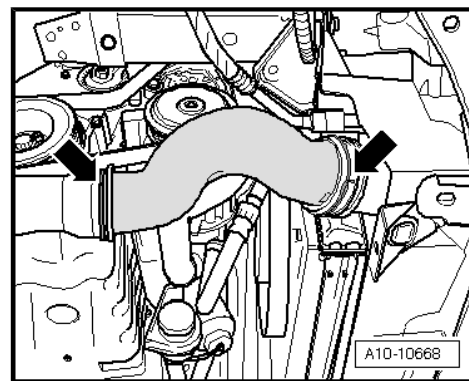
### Removing:

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Noise insulation .
- Remove bumper cover ⇒ Bumpers; Rep. gr. 63 ; Removing and installing front bumper cover .
- Drain coolant ⇒ [page 126](#) .

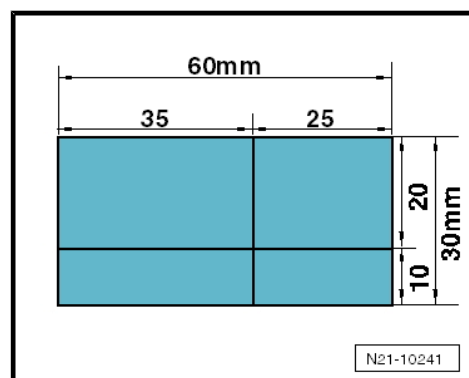


- Remove right air hose -arrows-.
- Remove radiator cowl ⇒ [page 134](#) .
- Removing radiator ⇒ [page 134](#) .

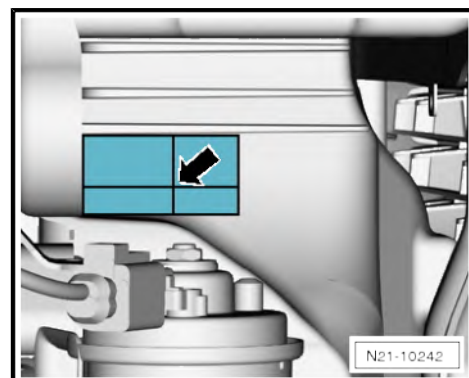
Pipes of condenser are bolted to right-hand side of charge air cooler. To unscrew securing bolts, proceed as follows:



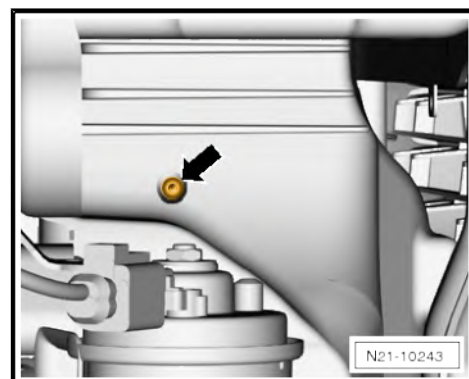
- Make a paper template with the specified dimensions.



- Fit the template on the plastic bracket at the front right so that it rests against the edges at the top and left.
- Mark the intersection on the template -arrow- with a centre punch.
- Drill a hole into the plastic bracket with a 5-mm drill bit.
- Drill or cut the hole to 16 mm.



- Unscrew securing bolt -arrow- for condenser pipes.





- Unscrew bolts -1- for charge air cooler mountings.



#### Note

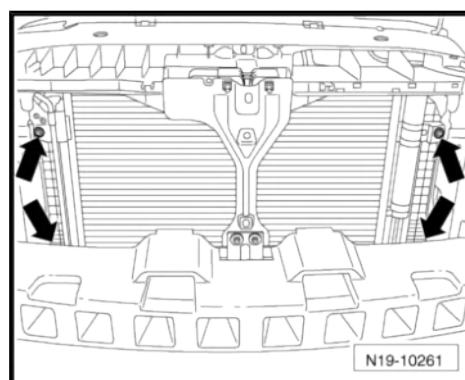
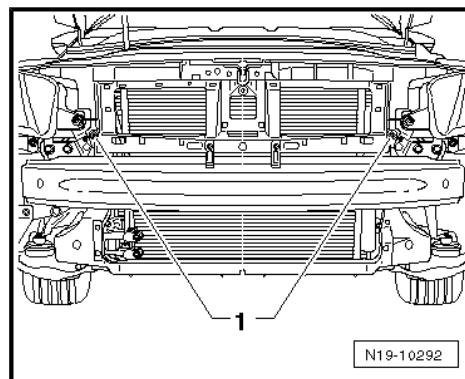
*The securing bolts of the condenser are difficult to access. With the aid of a second mechanic, lift the charge air cooler out of the radiator mountings. The charge air cooler can now be moved »back and forth« to allow access to the securing bolts.*

- Unbolt condenser from charge air cooler -arrows-.
- Attach condenser to lock carrier using cable ties.
- Take out charge air cooler from underneath.

#### Installing:

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

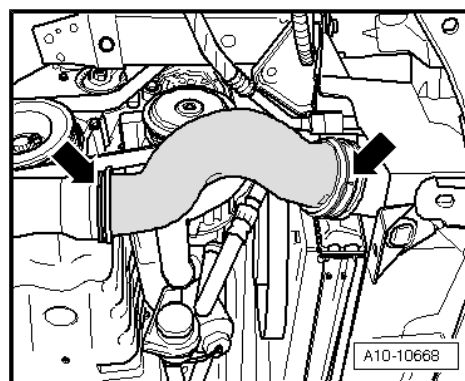
- ♦ Hose connections and hoses for charge air system must be free of oil and grease before assembly. The seal and sealing surface must be oiled lightly only for plug-in connectors  
⇒ [page 243](#) .



## 2.5 Removing and installing charge air cooler, Passat

#### Removing:

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Noise insulation .
- Remove bumper cover ⇒ Bumpers; Rep. gr. 63 ; Removing and installing front bumper cover .
- Drain coolant ⇒ [page 126](#) .
- Remove right air hose -arrows-.
- Remove radiator cowl ⇒ [page 134](#) .
- Removing radiator ⇒ [page 136](#) .
- Remove air deflector elements on lock carrier ⇒ Body - front; Rep. gr. 50 ; Assembly overview - air deflector elements on lock carrier .





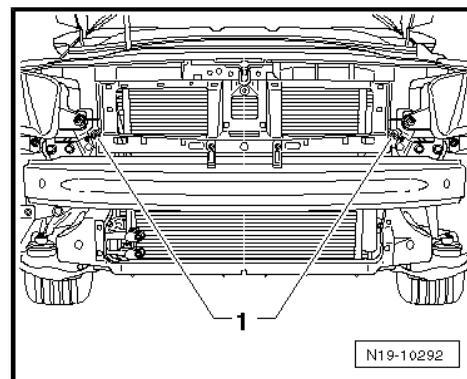


- Unscrew bolts -1- for charge air cooler mountings.

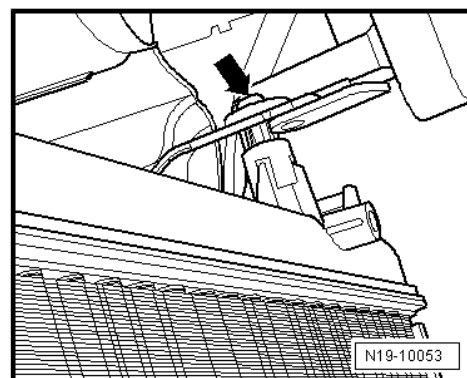


#### Note

*The securing bolts of the condenser are difficult to access. With the aid of a second mechanic, lift the charge air cooler out of the radiator mountings. The charge air cooler can now be moved »back and forth« to allow access to the securing bolts.*



- On the right-hand side of the charge air cooler unscrew pipes of condenser -arrow-.

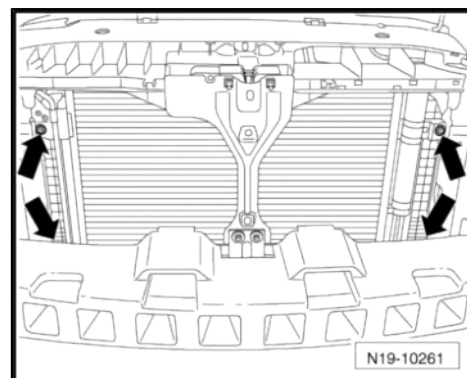


- Unbolt condenser from charge air cooler -arrows-.
- Attach condenser to lock carrier using cable ties.
- Take out charge air cooler from underneath.

#### Installing:

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

- ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly. The seal and sealing surface must be oiled lightly only for plug-in connectors  
⇒ [page 243](#) .



## 2.6 Schematic diagram of turbocharging system



#### 1 - Pressure canister

- ☐ Removing and installing  
⇒ [page 257](#)
- ☐ Adjusting ⇒ [page 257](#)
- ☐ Checking ⇒ [page 256](#)

#### 2 - Charge pressure control solenoid valve - N75-

#### 3 - Turbocharger air recirculation valve - N249-

#### 4 - Exhaust turbocharger

#### 5 - Brake servo

#### 6 - Non-return valve

#### 7 - Coolant connection

#### 8 - Vacuum pump

#### 9 - Non-return valve

#### 10 - Oil filter bracket

#### 11 - Activated charcoal filter solenoid valve 1 - N80-

#### 12 - Dual non-return valve

- ☐ Checking ⇒ [page 299](#)

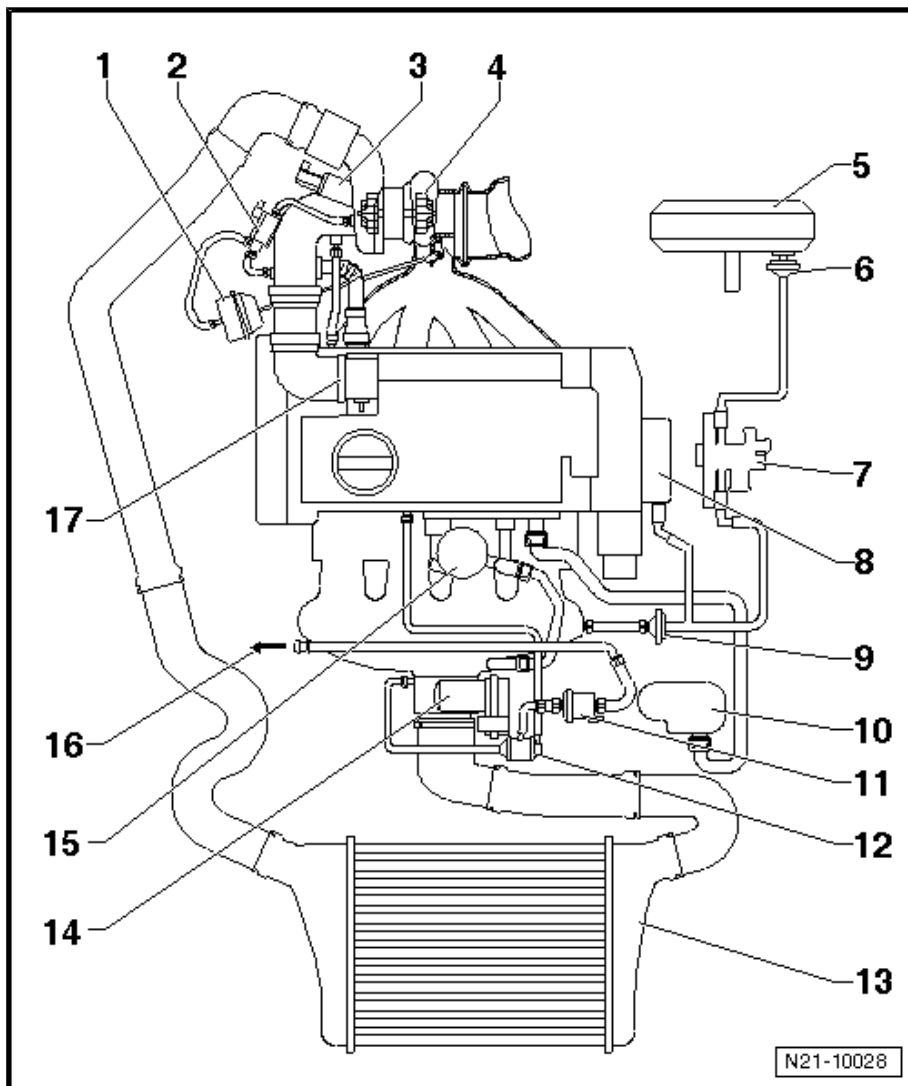
#### 13 - Intercooler

#### 14 - Throttle valve module - J338-

#### 15 - Pressure regulating valve

#### 16 - To activated charcoal filter

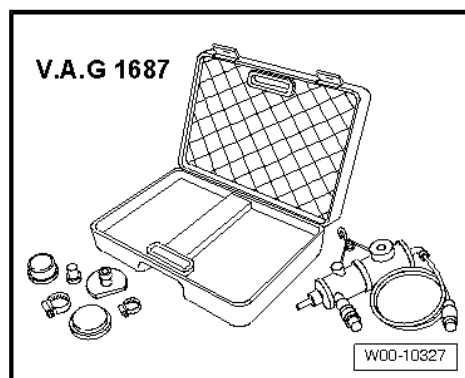
#### 17 - Air mass meter - G70-



## 2.7 Checking charge air system for leaks

### Special tools and workshop equipment required

- ◆ Charge air system tester - V.A.G 1687-

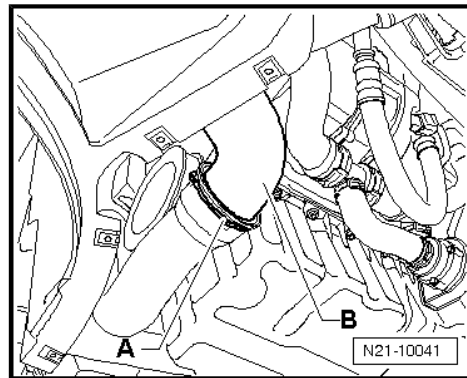


- ◆ Adapter - V.A.G 1687/5-

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

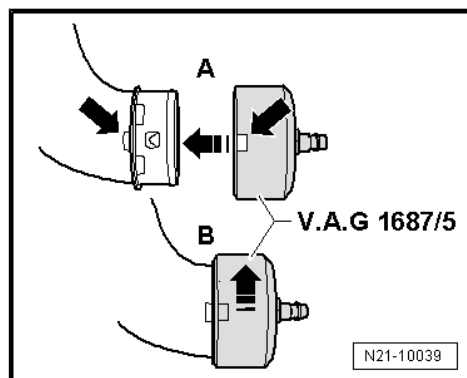


- Release clip -A- and detach hose -B- from charge air pipe.



- Fit adapter - V.A.G 1687/5- onto charge air hose -A- and turn adapter through approx. 90° -B-.

Prepare charge air system tester - V.A.G 1687- as follows:

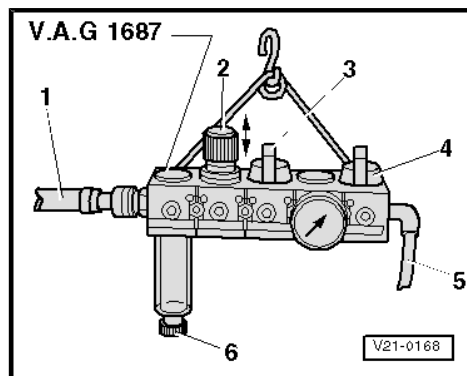


- Turn pressure control valve -2- anti-clockwise onto stop.
- Close valves -3- and -4-.

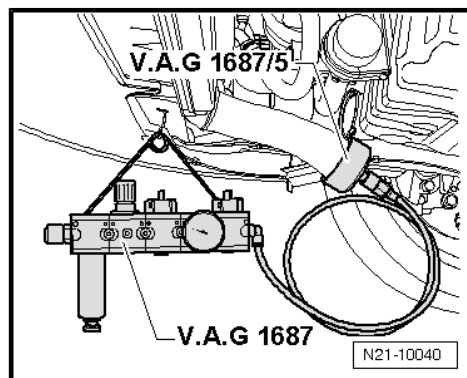


#### Note

*To turn the pressure regulating valve -2- the knob must be pulled upwards.*



- Connect charge air system tester - V.A.G 1687- as shown.





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



**Note**

*If there is water in the sight glass, drain at water drain screw -6-.*

- Open valve -3-.
- Adjust pressure to 0.5 bar with pressure regulating valve -2-.



**Caution**

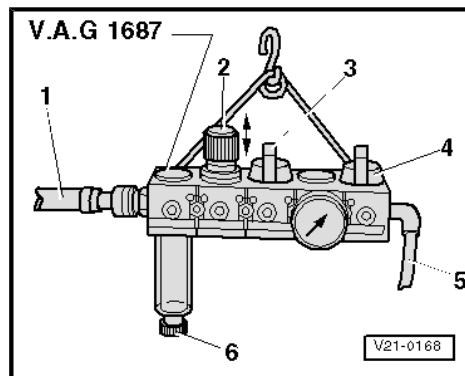
***The pressure must not exceed 0.5 bar. If the pressure is too high this can cause damage to the engine.***

- Open valve -4- and wait until the test circuit is filled. If necessary readjust pressure to 0.5 bar.
- Check the charge air system for leaks by hearing, touching, with commercially available leak detector spray or using ultrasonic tester - V.A.G 1842- .



**Note**

- ◆ *Fitting hose connections with plug-in connectors ⇒ [page 243](#)*
- ◆ *A small amount of air escapes through the valves and enters the engine. Therefore a holding pressure test is not possible.*
- ◆ *Ultrasonic tester - V.A.G 1842- ⇒ operating instructions*
- ◆ *Depressurise test circuit by detaching coupling from adapter - V.A.G 1687/5- before removing adapter.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*





## 24 – Mixture preparation - injection

### 1 Injection system

General notes on injection ⇒ [page 271](#) .

Safety precautions ⇒ [page 140](#) .

Rules for cleanliness ⇒ [page 143](#) .

Technical data ⇒ [page 272](#) .

Assembly overview - intake manifold ⇒ [page 275](#) .

Assembly overview - fuel rail (vehicles up to 05.2007)  
⇒ [page 282](#)

Assembly overview - fuel rail (vehicles from 05.2007)  
⇒ [page 282](#)

Assembly overview - air filter ⇒ [page 272](#)

Removing and installing engine cover panel/air filter  
⇒ [page 273](#)

Removing and installing air filter element ⇒ [page 274](#)

Removing and installing throttle valve module - J338-  
⇒ [page 286](#)

Removing and installing intake manifold ⇒ [page 277](#) .

Removing and installing intake manifold flap motor - V157- along  
with intake manifold flap potentiometer - G336- ⇒ [page 280](#)

Removing and installing fuel rail ⇒ [page 285](#) .

Removing and installing fuel pressure sender - G247-  
⇒ [page 290](#) .

Checking fuel pressure sender - G247- ⇒ [page 292](#) .

Removing and installing injectors ⇒ [page 295](#) .

Renew Teflon seal on injector ⇒ [page 296](#)

#### 1.1 General notes on injection

- ◆ Fuel hoses in engine compartment must be secured only with spring-type clips which conform to production standard. The use of crimp-type or screw-type clips is not permissible.
- ◆ The battery must be disconnected only with ignition switched off. If a coded radio is installed, ascertain code before disconnecting battery.
- ◆ Observe required procedures after connecting battery ⇒ Electrical system; Rep. gr. 27 ; Disconnecting and reconnecting battery.
- ◆ 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.
- ◆ If, after fault finding, repairs or component tests, the engine starts, runs for a short period and then stops, then the fault may be that the immobilizer is blocking the engine control unit. In this case, the control unit must be adapted.
- ◆ After completing work, read fault memory of engine control unit, clear all fault entries that have been stored during checks and repairs. If the fault memory was cleared, the readiness



code must be generated ⇒ Vehicle diagnostic tester. "Guided functions".

- ◆ Vehicles with an airbag are fitted with a crash fuel shut-off. It reduces the danger of a fire in a crash as the fuel pump is switched off via the fuel pump relay.
- ◆ When driver door is opened, fuel pump is activated for 2 seconds to generate pressure in fuel system. This improves the quality of the start behaviour.

Safety precautions ⇒ [page 140](#) .

Rules for cleanliness ⇒ [page 143](#) .

Technical data ⇒ [page 272](#) .

## 1.2 Technical data

Engine code	AXX, BWA, BPY
Idling check	
Idling speed <sup>1)</sup> rpm	620...800
Engine control unit <sup>2)</sup>	
System designation	Motronic MED 9.1
Part number	⇒ ETKA (Electronic parts catalogue)
Governed speed rpm	approx. 6800

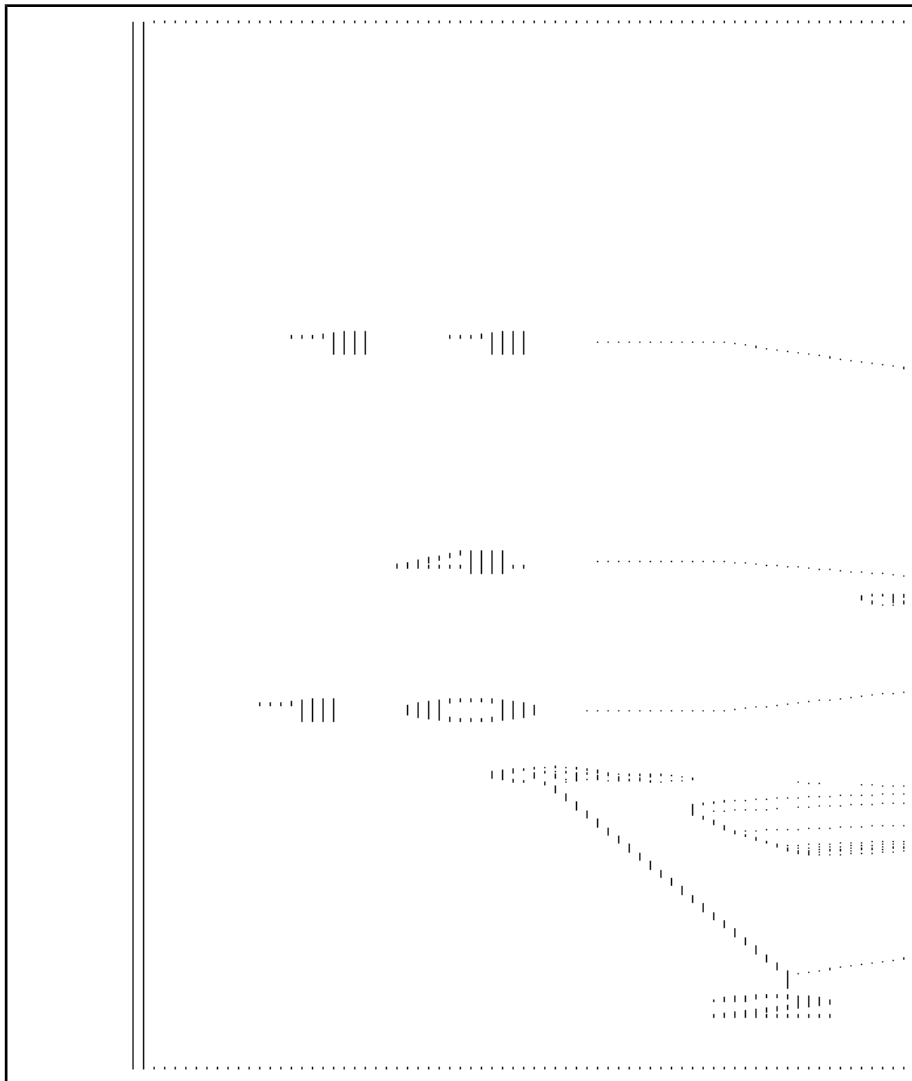
<sup>1)</sup> If voltage supply to engine control unit drops below 12 volt, idling speed will be raised incrementally up to 990 rpm. The idling speed cannot be adjusted.

<sup>2)</sup> Renew engine control unit ⇒ [page 300](#) .

## 1.3 Assembly overview - engine cover panel/air filter



- 1 - Air mass meter - G70-
- 2 - 3 Nm
- 3 - Upper part of air filter/engine cover panel
- 4 - Spring-type clip
- 5 - Intake air guide
- 6 - Filter element
- 7 - Air filter lower part
- 8 - 3 Nm
- 9 - Heat shield
- 10 - Rubber grommet
  - ☐ Observe fitting marks
- 11 - Intake hose
  - ☐ Observe fitting marks

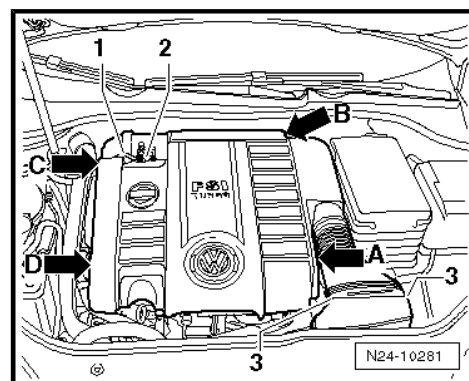


## 1.4 Removing and installing engine cover panel/air filter

### Removing:

- Remove intake hose -1-.
- Pull off connector -2-.
- Unscrew bolts -3-.
- Pull engine cover panel off upwards in sequence -A...D- at points indicated.

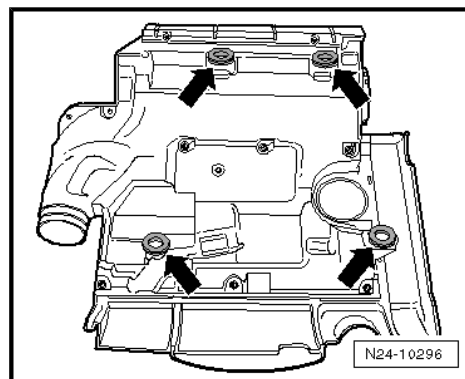
### Installing:





- Ensure that the four rubber mountings -arrows- are inserted in engine cover panel.
- Position engine cover panel in installation position and at the same time push the rubber mountings onto retaining pins.

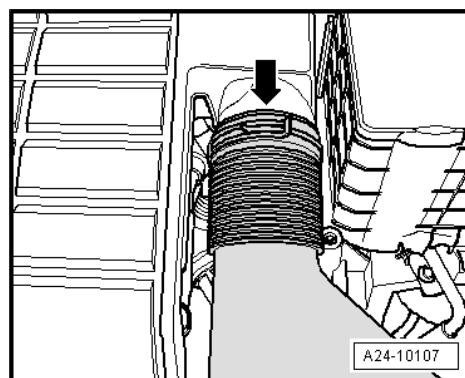
Further assembly is carried out in the reverse order.



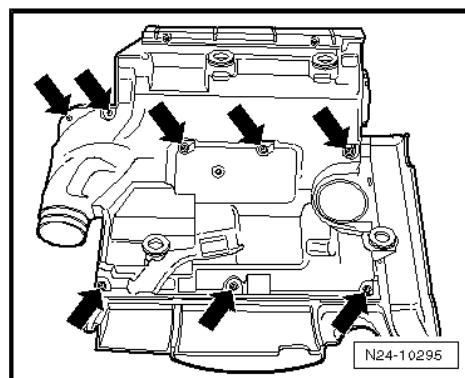
## 1.5 Removing and installing air filter element

### Removing:

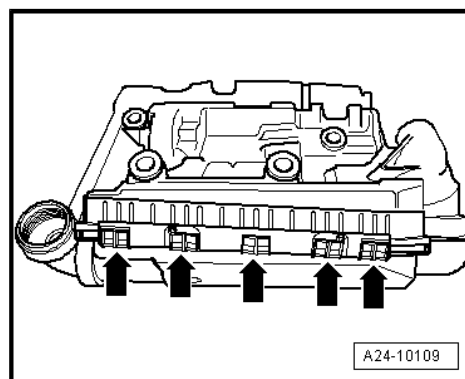
- Remove engine cover panel/air filter ⇒ [page 273](#) .
- Remove intake air duct -arrow-.



- Remove all bolts -arrows-.



- Detach engine cover panel (note retainers -arrows-).







- Pull air filter element out of engine cover panel.

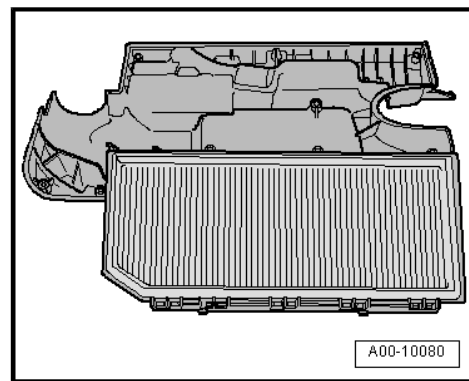
#### Installing air filter element:



#### Note

- ◆ *Always use genuine part for air filter element.*
  - ◆ *The air filter housing must be clean.*
  - ◆ *When blowing out the air filter housing with compressed air note the following: to prevent malfunctions, cover air mass meter - G70- with a clean cloth.*
- Check air mass meter - G70- and intake air duct  
⇒ [Item 5 \(page 273\)](#) for salt deposits, dirt and leaves.
  - When installing the air filter element, check that it is properly centred in the retainer in the lower part of air filter.
  - Place upper part of air filter carefully on lower part of air filter without exerting excessive force. Make sure the upper part of the air filter is fitted straight on the air filter element (note position of sealing lip on air filter element).

Further assembly is carried out in the reverse order.



## 1.6 Assembly overview - intake manifold



1 - 10 Nm

2 - Clamp

3 - 3 Nm

4 - Stud, 10 Nm

5 - Seal

☐ Renew

6 - Intake manifold

☐ With intake manifold flaps

☐ Removing and installing  
⇒ [page 277](#)

7 - Coupling rod

8 - Intake manifold flap motor - V157- and intake manifold flap potentiometer - G336-

☐ Removing and installing  
⇒ [page 280](#)

9 - 7 Nm

10 - To activated charcoal filter

11 - Hose

12 - Activated charcoal filter solenoid valve 1 - N80-

13 - Hose

14 - Dual non-return valve

☐ Checking ⇒ [page 299](#)

15 - Intake manifold support

16 - 25 Nm

17 - 10 Nm

18 - Bonded rubber mounting

19 - Throttle valve module - J338-

☐ Including throttle valve drive (electric throttle operation) - G186- , angle sender 1 for throttle valve drive (electric throttle operation) - G187- and angle sender 2 for throttle valve drive (electric throttle operation) - G188- .

☐ Removing and installing ⇒ [page 286](#)

20 - 7 Nm

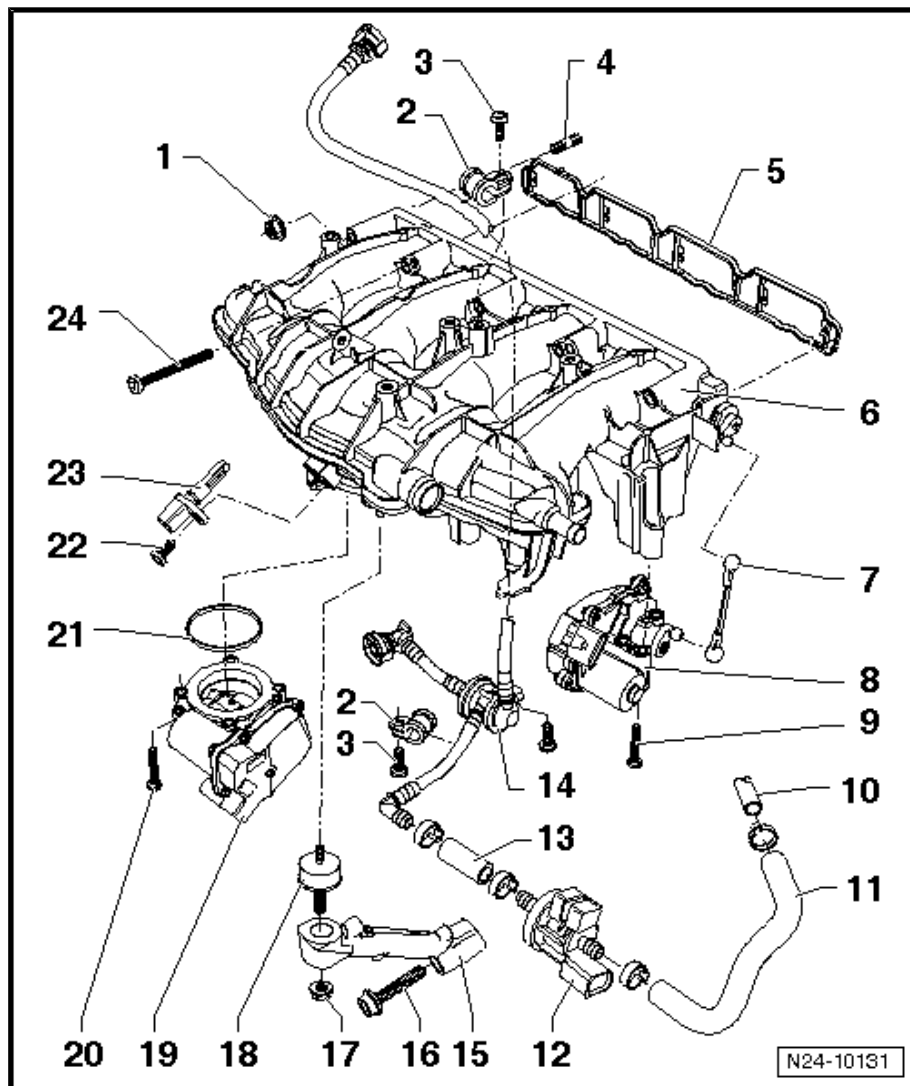
21 - Sealing ring

☐ Renew if damaged

22 - 5 Nm

23 - Intake air temperature sender - G42-

24 - 10 Nm





## 1.7 Removing and installing intake manifold

Removing:



### WARNING

*Observe safety precautions when releasing fuel pressure in high-pressure section ➔ [page 141](#)*



### Note

- ◆ *Observe rules for cleanliness ➔ [page 143](#).*
- ◆ *If an injector was pulled out of the cylinder head when the intake manifold was removed, the Teflon seal must be renewed ➔ [page 296](#).*
- ◆ *Assembly overview - intake manifold ➔ [page 275](#).*
- Remove throttle valve module - J338- ➔ [page 286](#).
- Disconnect all electrical connectors as necessary.
- Disconnect vacuum hose between intake manifold and vacuum pump at intake manifold.



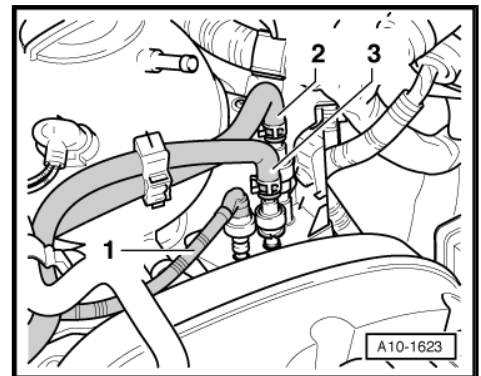
### WARNING

*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*

Engine code BPY:

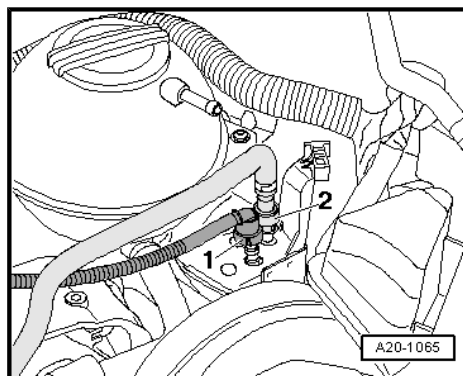
- Disconnect lines -1, 2 and 3-. Do this by operating release buttons.





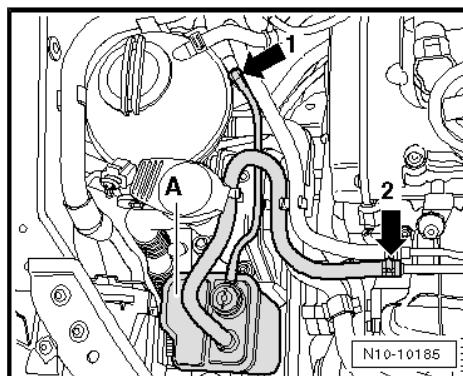
### Engine codes AXX, BWA:

- Disconnect fuel supply line -2-.



- Disconnect breather line -2-.

### Continued for all vehicles:



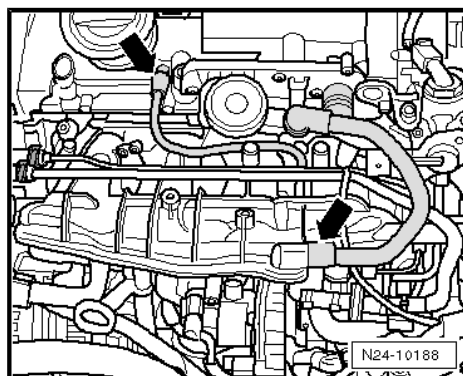
Pull vacuum lines -arrows- off intake manifold and cylinder head cover.



### WARNING

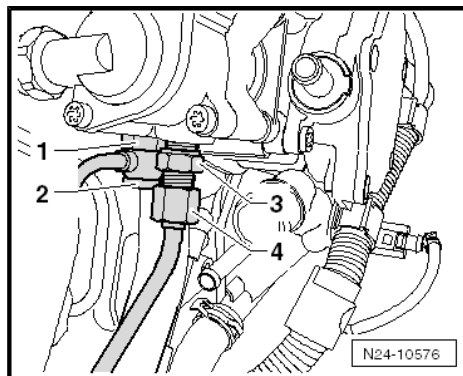
*The fuel system is pressurised!*

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*



### Vehicles up to 05.2006:

- Unscrew fuel pipe -4- from connection -3-. At the same time counterhold connection -3-.
- Unscrew banjo bolt -2-, at the same time counterhold connection -1-.



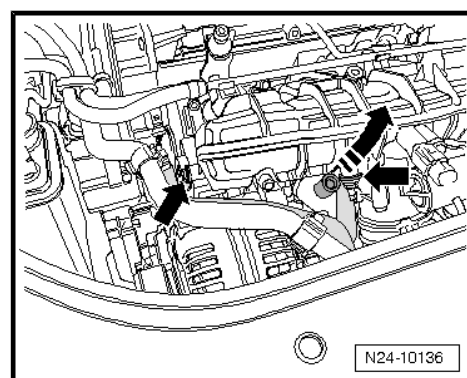
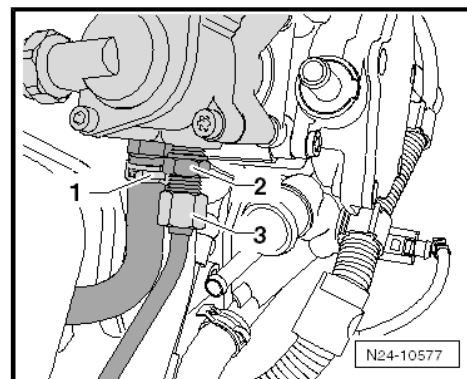


### Vehicles from 05.2006:

- Open hose clip -1- and pull fuel hose off.
- Unscrew fuel pipe -3-, at the same time counterhold connection -2-.

### Continued for all vehicles:

- Disconnect coolant pipe and oil dipstick tube from intake manifold -arrows- and remove oil dipstick tube from engine by pulling it upwards.



- Remove intake manifold support -arrows- and disconnect connector -1- from fuel pressure sender - G247- .
- Unscrew all bolts from intake manifold.
- Carefully pull intake manifold and fuel rail off cylinder head.

### Installing:

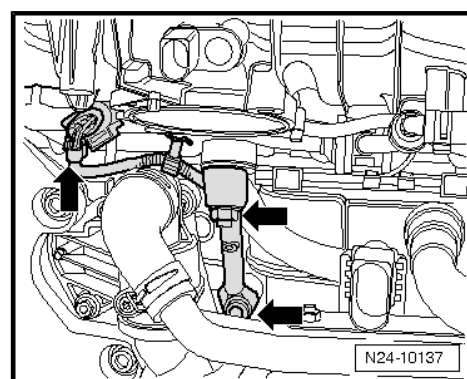
Installation is carried out in the reverse order. When installing, note the following:

If an injector was pulled out of the cylinder head when the intake manifold was removed, renew the Teflon seal of the injector  
⇒ [page 296](#) .

Renew O-rings between injector and fuel rail and moisten slightly with clean engine oil.

Fit intake manifold with fuel rail on cylinder head and evenly press onto injectors.

If the intake manifold flap motor - V157- or the intake manifold was renewed, the intake manifold flap potentiometer - G336- must be adapted to the engine control unit ⇒ Vehicle diagnostic tester "guided functions".



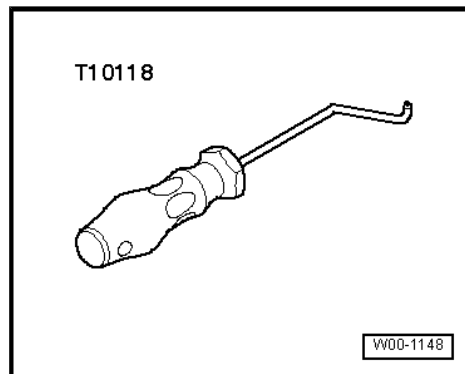
Specified torque	Nm
Securing bolts for intake manifold	10
Bolt for intake manifold support	23
Nut for intake manifold support	10
Fuel lines on high-pressure pump	⇒ <a href="#">page 287</a>
Bolts for intake manifold flap motor - V157-	7



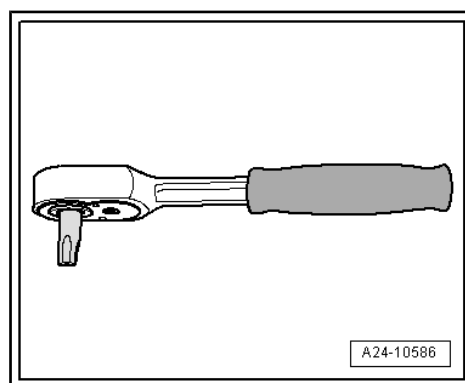
## 1.8 Removing and installing intake manifold flap motor - V157- and intake manifold flap potentiometer - G336-

Special tools and workshop equipment required

◆ Assembly tool - T10118-



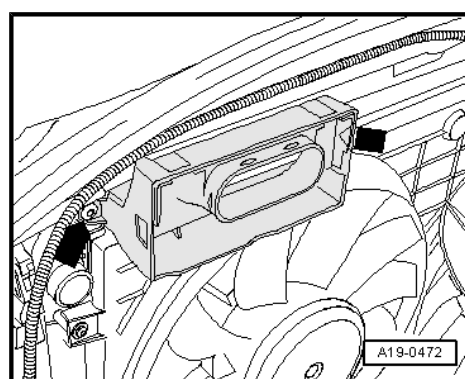
◆ Commercially available 1/4" drive ratchet handle e.g.. Hazet 2264



◆ T30 bit insert

**Removing:**

- Remove engine cover panel/air filter ➔ [page 273](#) .
- Unscrew air duct on lock carrier -arrows-.



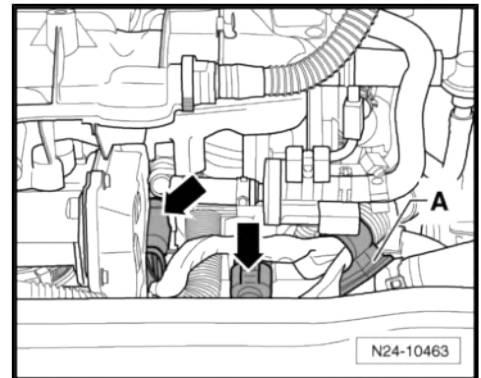
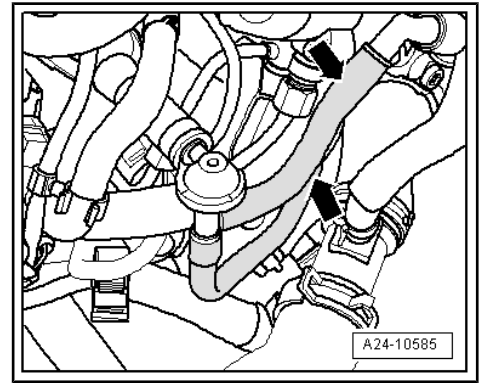


- Pull off vacuum lines -arrows-.
- Remove connectors as follows:

**i Note**

*Use assembly tool - T10118- to facilitate release of connectors which are less accessible*

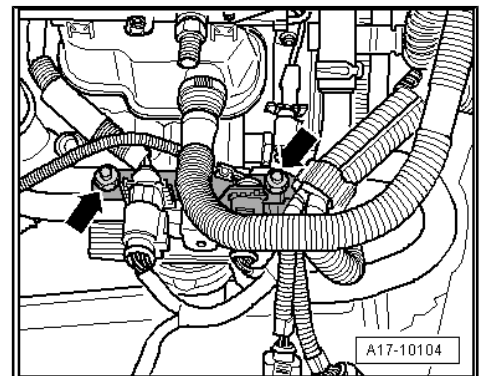
- ◆ Connector for intake manifold flap motor - V157-
- ◆ Connector for activated charcoal filter system solenoid valve 1 - N80-
- ◆ Connector for intake manifold pressure sender - G71- .
- ◆ Connector for throttle valve module - J338-
- ◆ Connector for fuel pressure sender for low pressure - G410-
- Disconnect additional electrical connectors -arrows-.
- Loosen cable retainer -A- and place complete wiring harness to side.



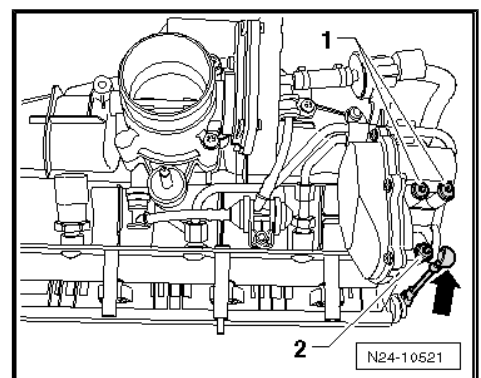
- Unbolt retainer for connectors -arrows- from coolant pipe.

**i Note**

- ◆ *Only loosen the nut with the left arrow until the retainer can be moved to the side.*
- ◆ *Plastic retainers are clipped.*
- ◆ *For clarity, the illustration shows the intake manifold removed from the engine.*



- Prise coupling rod -arrow- off intake manifold flap motor - V157- .
- Unscrew bolts -1- and -2- using 1/4" drive ratchet handle and T30 bit insert .





#### Note

*The rear bolt -arrow- can only be unscrewed with a ratchet handle . The space between the bolt and the coolant pipe is very constricted.*

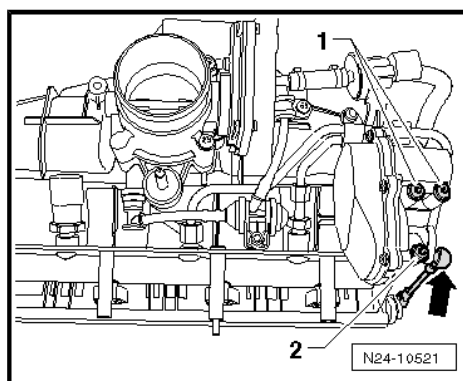
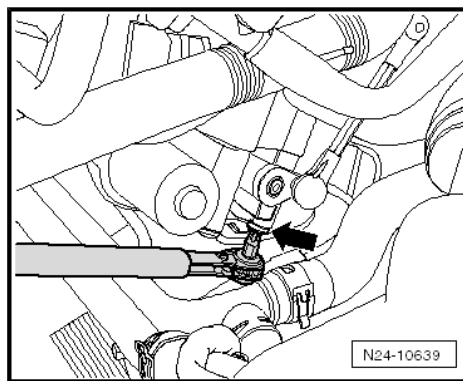
- Remove intake manifold flap motor - V157- from intake manifold.

#### Installing:

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

- Insert bolts -1- and -2- by hand to prevent damage to the thread.

If the intake manifold flap motor - V157- or the intake manifold were renewed, the intake manifold flap potentiometer - G336- must be adapted to the engine control unit ⇒ vehicle diagnostic tester "guided functions".



## 1.9 Assembly overview - fuel rail (vehicles up to 05.2006)



#### WARNING

*Observe safety precautions when releasing fuel pressure in high-pressure section ⇒ [page 141](#)*





**1 - Injector, cylinder 1 - N30- to injector, cylinder 4 - N33-**

- ☐ Removing and installing  
⇒ [page 295](#)

**2 - 8 Nm**

**3 - Fuel distributor**

- ☐ Removing and installing  
⇒ [page 285](#)

**4 - Panel nut**

**5 - Pressure limiting valve**

- ☐ 30 Nm
- ☐ To remove and install, remove intake manifold  
⇒ [page 277](#) .

**6 - Low pressure pipe**

- ☐ When removing, counterhold pressure limiting valve
- ☐ Before installing, check pressure of pressure limiting valve.
- ☐ Install free of tension.
- ☐ Tighten union nut to 22 Nm.

**7 - Bracket**

**8 - High-pressure pipe**

- ☐ Install free of tension.
- ☐ Tighten high-pressure pump union nuts to 27 Nm.
- ☐ Tighten fuel rail union nuts to 33 Nm.

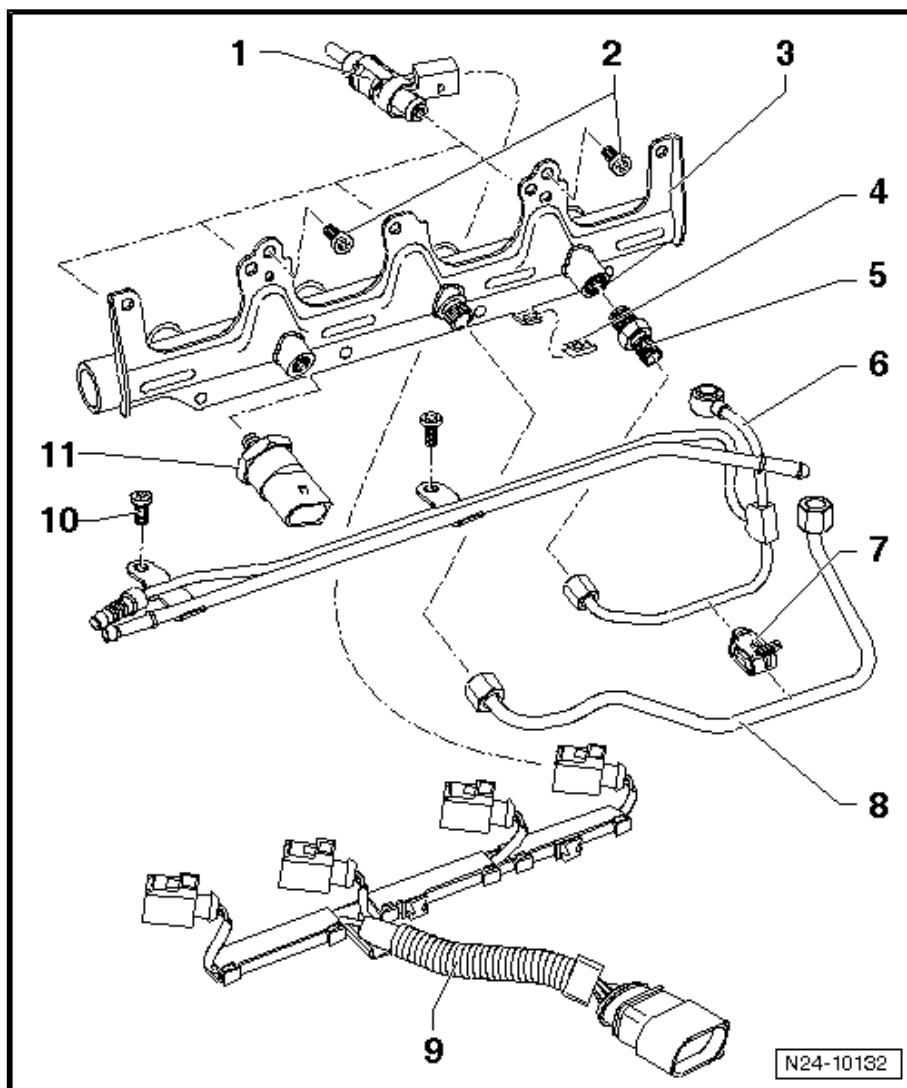
**9 - Connector**

- ☐ For injectors.

**10 - 5 Nm**

**11 - Fuel pressure sender - G247-**

- ☐ 22 Nm
- ☐ Coat thread and sealing taper with clean engine oil.
- ☐ Removing and installing ⇒ [page 290](#)
- ☐ Checking ⇒ [page 292](#)



## 1.10 Assembly overview - fuel rail (vehicles from 05.2006)



**WARNING**

*Observe safety precautions when releasing fuel pressure in high-pressure section ⇒ [page 141](#)*



**1 - Injector, cylinder 1 - N30- to injector, cylinder 4 - N33-**

- ❑ Removing and installing  
⇒ [page 295](#)

**2 - 8 Nm**

**3 - Fuel distributor**

- ❑ Removing and installing  
⇒ [page 285](#)

**4 - Low pressure fuel hose**

- ❑ To high-pressure pump

**5 - Pressure limiting valve**

- ❑ 30 Nm
- ❑ To remove and install, remove intake manifold  
⇒ [page 277](#) .

**6 - Panel nut**

**7 - Low pressure pipe**

- ❑ Counterhold pressure limiting valve when loosening union nut.
- ❑ Before installing, check pressure of pressure limiting valve.
- ❑ Install free of tension.
- ❑ Tighten union nut to 22 Nm.

**8 - Bracket**

**9 - High-pressure pipe**

- ❑ Counterhold threaded connection when loosening union nut.
- ❑ Before installing, check torque of threaded connection
- ❑ Install free of tension.
- ❑ Tighten union nuts to 27 Nm.

**10 - 3 Nm**

**11 - Connector**

- ❑ For injectors.

**12 - Connector**

- ❑ For ⇒ [Item 16 \(page 284\)](#) and ⇒ [Item 17 \(page 284\)](#)

**13 - Connector**

- ❑ For ⇒ [Item 11 \(page 284\)](#)

**14 - Cable channel**

**15 - Clip**

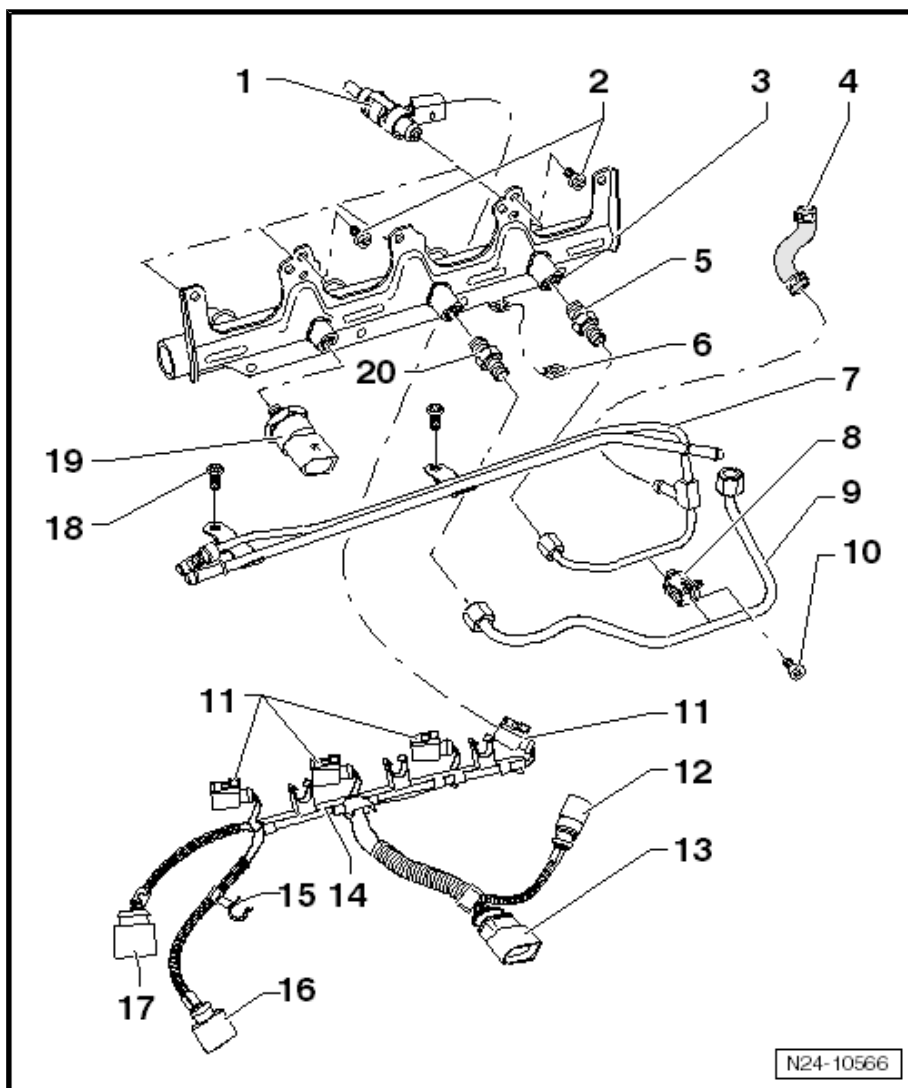
- ❑ Attach on lower right sleeve of intake manifold

**16 - Connector**

- ❑ For Hall sender - G40- .

**17 - Connector**

- ❑ For fuel pressure sender - G247- .





18 - 5 Nm

**19 - Fuel pressure sender - G247-**

- ☐ 22 Nm
- ☐ Coat thread and sealing taper with clean engine oil.
- ☐ Removing and installing ⇒ [page 290](#)
- ☐ Checking ⇒ [page 292](#)

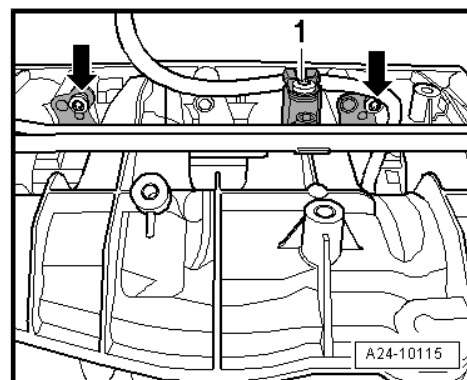
**20 - Connecting union**

- ☐ 30 Nm

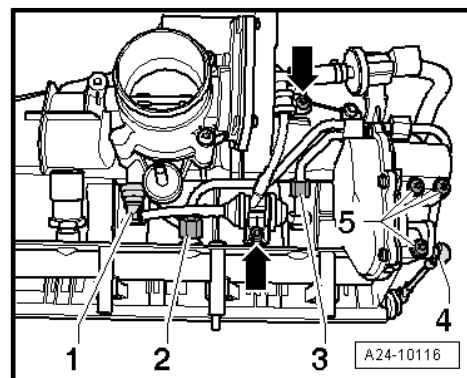
## 1.11 Removing and installing fuel rail

**Removing:**

- Remove intake manifold ⇒ [page 277](#) .
- Remove hoses from activated charcoal filter.
- To do this, open hose clip -1-.
- Unscrew two bolts -arrows- on fuel rail.



- Disconnect hose connection -1- from intake manifold and loosen the two bolts -arrows-.
- Disconnect union nuts of the two fuel pipes -2 and 3-. At the same time counterhold pressure limiting valve.
- Carefully pry off linkage from intake manifold flap motor - V157- -4-.
- Unbolt intake manifold flap motor - V157- -5-.



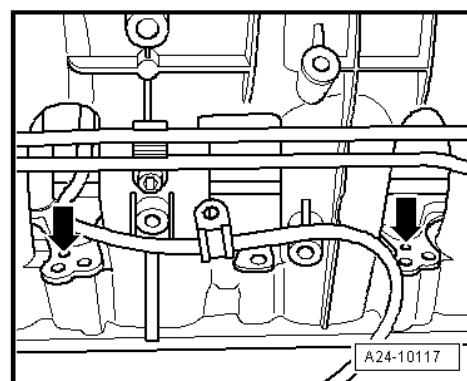
- Remove fuel rail from intake manifold.

**Installing:**

- Install in reverse order of removal.

Specified torques (vehicles to 05.2006) ⇒ [page 282](#) .

Specified torques (vehicles from 05.2006) ⇒ [page 283](#) .





## 1.12 Removing and installing throttle valve module - J338-

### Removing:

- Remove engine cover panel/air filter ⇒ [page 273](#) .

### Golf:

- Remove pipe -A- and hose -B- -arrows-.

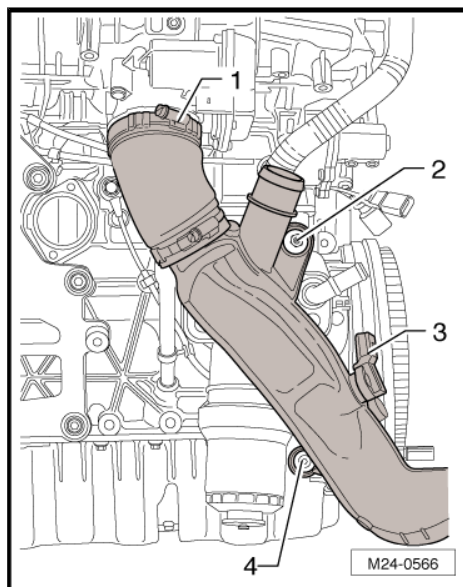
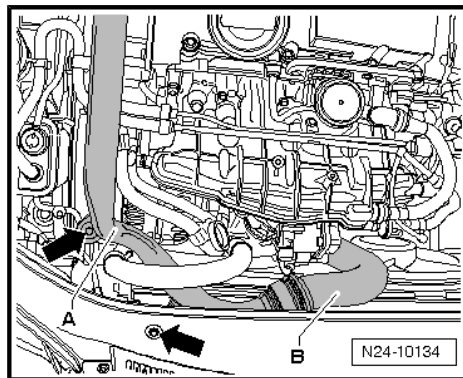
### All vehicles:

- Release hose clip -1-.
- Unscrew bolt -2-.
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 50 ; Noise insulation .
- Separate electrical connector -3-.
- Remove bolt -4- pull air pipe off charge air cooler and take downwards.
- Remove four bolts of throttle valve module - J338- and remove throttle valve module - J338- .

### Installing:

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

- If a new throttle valve module - J338- was installed, adapt the engine control unit to throttle valve module - J338- ⇒ Vehicle diagnostic tester “guided functions”.



## 1.13 Cleaning throttle valve module - J338-

### Special tools and workshop equipment required

- ♦ Acetone



### Note

- ♦ *Observe all relevant safety precautions ⇒ [page 140](#) .*
- ♦ *Observe rules for cleanliness ⇒ [page 143](#) .*
- ♦ *When cleaning the throttle valve housing it must not be scratched.*

### Procedure

- Remove throttle valve module ⇒ [page 286](#) .



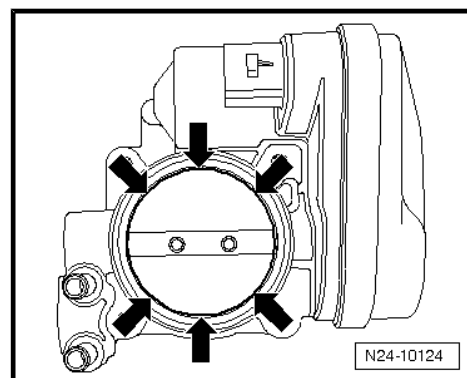
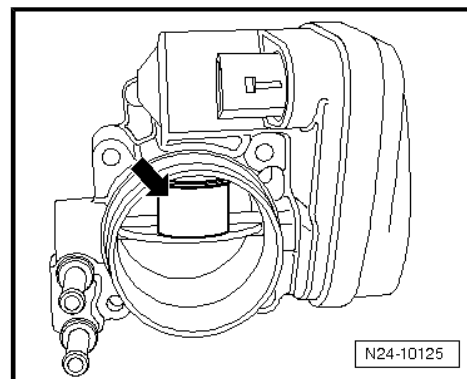
- Open throttle valve by hand and block throttle valve in open position with a suitable object -arrow-.



#### WARNING

*Acetone is highly inflammable. Please comply with the accident prevention regulations and the safety instructions when handling highly inflammable fluids. Do not use compressed air when cleaning the throttle valve. Wear protective goggles and protective clothing to avoid injury and contact with the skin.*

- Thoroughly clean throttle valve housing, especially around closed throttle valve, using commercially available acetone and a cleaning brush.
- Wipe off throttle valve housing using a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning.
- Adapt the engine control unit to throttle valve module ⇒ Vehicle diagnostic tester "Guided Functions".



## 1.14 Assembly overview - high-pressure pump



#### Note

*From 05.2006 on the low pressure line on high-pressure pump, the pipe with banjo bolt was replaced by a hose connection with spring-type clip.*



#### 1 - Plunger

- ☐ Renew if damaged

#### 2 - O-ring

- ☐ Renew
- ☐ Before installing, moisten lightly with clean engine oil.

#### 3 - High-pressure pump with fuel pressure regulating valve - N276-

- ☐ Removing and installing  
⇒ [page 289](#)

#### 4 - 10 Nm

#### 5 - Union nut

- ☐ 27 Nm
- ☐ When loosening, counterhold threaded connection
- ☐ Before installing, check torque of threaded connection in high-pressure pump
- ☐ Install fuel pipe free of tension.

#### 6 - High-pressure pipe

- ☐ Observe safety precautions when releasing fuel pressure in high-pressure section  
⇒ [page 141](#)

#### 7 - Connecting union

- ☐ Vehicles from 05.2006
- ☐ 30 Nm
- ☐ Only renew if loosened.

- ☐ Always leave old seal in high-pressure pump when renewing threaded connection. When initially installed at the factory, it is crushed and cannot be removed. To seal, the new threaded connection is fitted with a »grip edge«.

#### 8 - Low pressure fuel hose

- ☐ Vehicles from 05.2006
- ☐ Secure with spring-type clip.

#### 9 - Banjo bolt with conical sealing seat

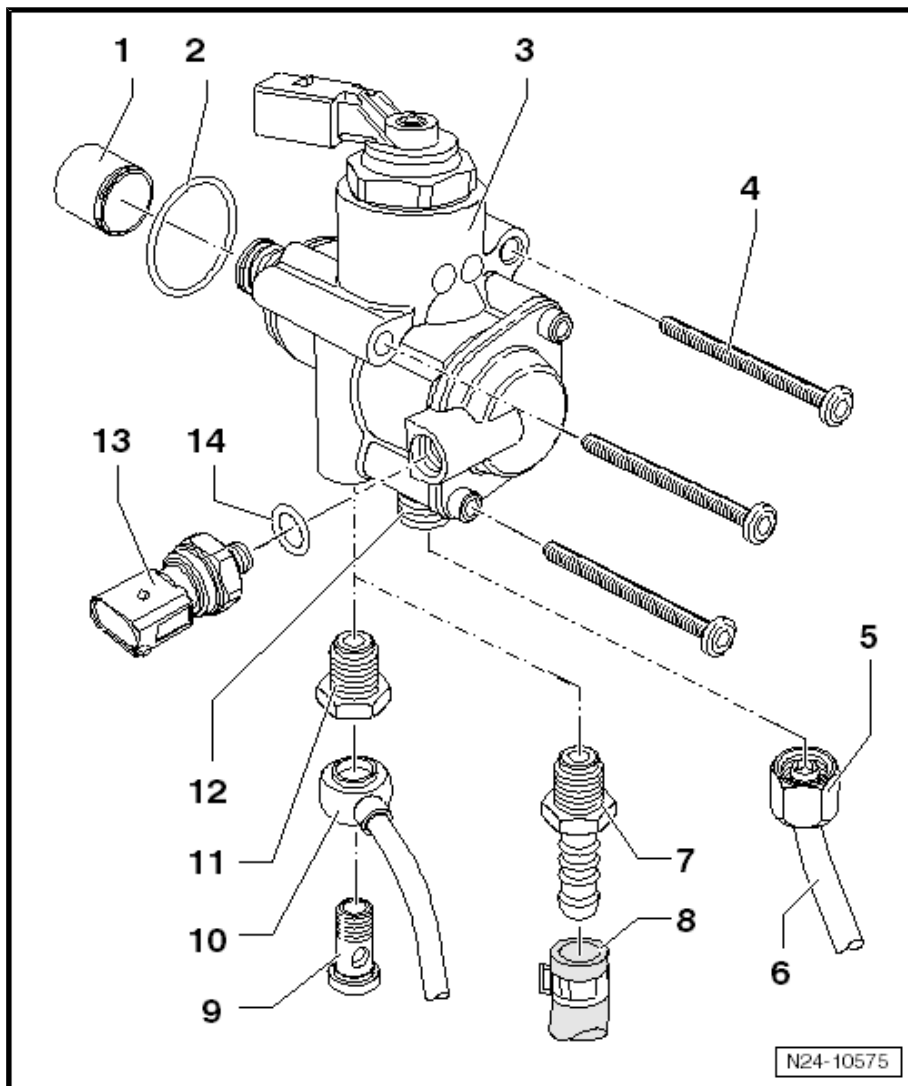
- ☐ 15 Nm
- ☐ Renew
- ☐ Install fuel pipe free of tension.
- ☐ When loosening, counterhold threaded connection
- ☐ Vehicles up to 05.2006

#### 10 - Fuel line

- ☐ Vehicles up to 05.2006
- ☐ Low pressure

#### 11 - Connecting union

- ☐ Vehicles up to 05.2006
- ☐ 30 Nm





- ☐ Only renew if loosened.
- ☐ Always leave old seal in high-pressure pump when renewing threaded connection. When initially installed at the factory, it is crushed and cannot be removed. To seal, the new threaded connection is fitted with a »grip edge«.

#### 12 - Threaded connection for high-pressure pipe

- ☐ 40 Nm
- ☐ Do not loosen threaded connection, only retighten

#### 13 - Fuel pressure sender for low-pressure - G410-

- ☐ 15 Nm

#### 14 - Sealing ring

- ☐ Renew

### 1.15 Removing and installing high-pressure pump



#### WARNING

- ◆ *Observe safety precautions when releasing fuel pressure in high-pressure section ➔ [page 141](#)*
- ◆ *For safety reasons, the fuse for the fuel pump must be removed before opening the fuel system ➔ [page 140](#). Otherwise, the fuel pump could be activated by the driver door contact switch.*



#### Note

- ◆ *The high-pressure pump must not be dismantled.*
- ◆ *Note safety precautions before beginning work ➔ [page 140](#).*
- ◆ *Observe rules for cleanliness ➔ [page 143](#).*

#### Removing:

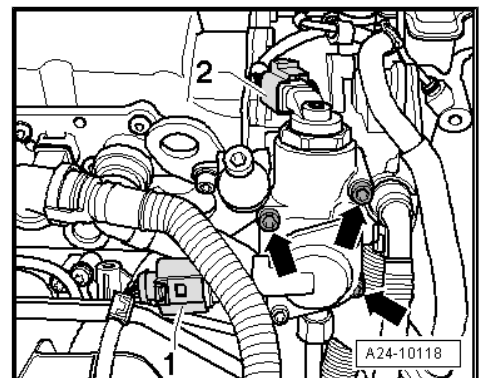
- Remove engine cover panel/air filter ➔ [page 273](#).
- Set engine to TDC.
- Pull off connectors -1 and 2-.



#### WARNING

***The fuel system is pressurised!***

- ◆ *Wear protective goggles and protective clothing to avoid injury and contact with the skin.*
- ◆ *Before loosening line connections, wrap a cloth around the connection. Then release pressure by carefully pulling off line.*

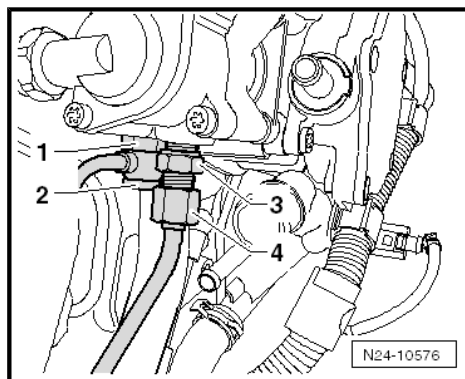






#### Vehicles up to 05.2006:

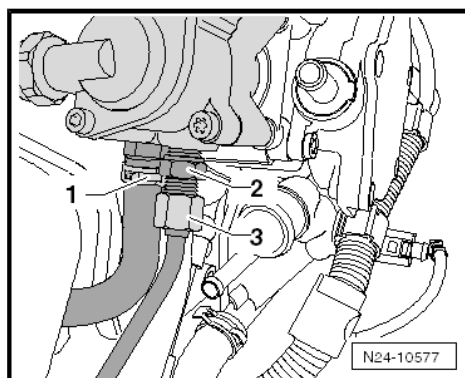
- Unscrew fuel pipe -4- from connection -3-. At the same time counterhold connection -3-.
- Unscrew banjo bolt -2-, at the same time counterhold connection -1-.



#### Vehicles from 05.2006:

- Open hose clip -1- and pull fuel hose off.
- Unscrew fuel pipe -3-, at the same time counterhold connection -2-.

#### Continued for all vehicles:

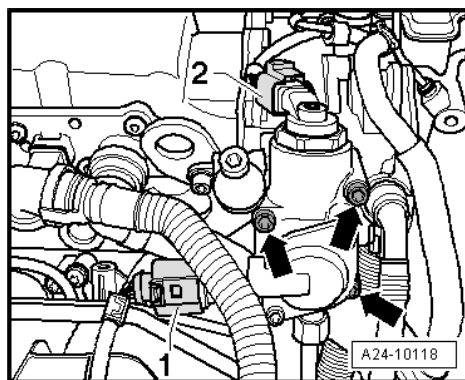


- Remove bolts -arrows- and carefully remove high-pressure pump.



#### Note

*Under certain circumstances, the plunger ➔ [Item 1 \(page 288\)](#) may become stuck in the cylinder head.*



#### Installing:

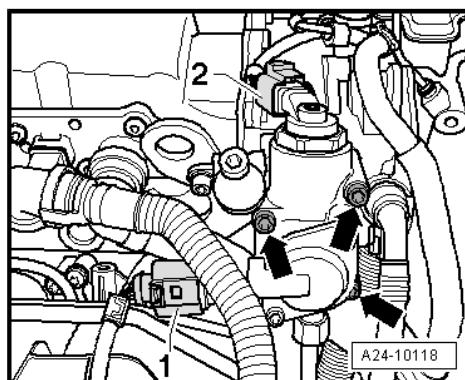
- Renew O-ring for high-pressure pump (lubricate lightly with clean engine oil before fitting).
- Check plunger ➔ [Item 1 \(page 288\)](#) for damage and insert in cylinder head.
- Carefully place high-pressure pump in position on cylinder head and tighten bolts -arrows- hand tight.
- Bolt on fuel pipes hand-tight.



#### Note

*Before installing fuel pipes, check torque for threaded unions.*

- Then tighten all bolts and fuel pipes to specified torque ➔ [page 287](#).
- Reconnect current supply.



Further assembly is performed in the reverse order of removal.

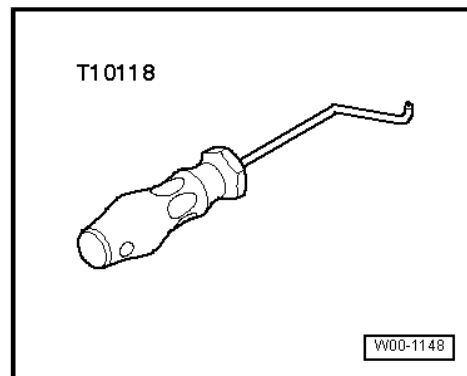
## 1.16 Removing and installing fuel pressure sender - G247-

### Special tools and workshop equipment required





- ◆ Assembly tool - T10118-



- ◆ Double hexagon socket, 27 mm - VAS 5301/7-

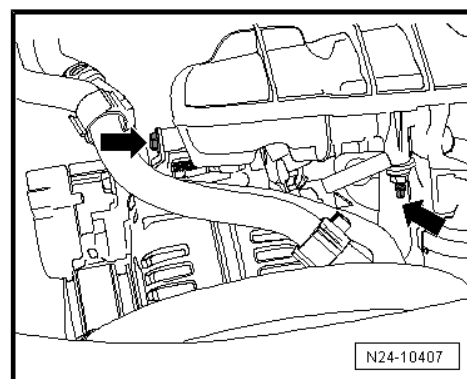


#### WARNING

- ◆ *Observe safety precautions when releasing fuel pressure in high-pressure section ➔ [page 141](#)*
- ◆ *For safety reasons, the fuse for the fuel pump must be removed before opening the fuel system ➔ [page 140](#). Otherwise, the fuel pump could be activated by the driver door contact switch.*

#### Removing:

- Remove engine cover panel/air filter ➔ [page 273](#) .
- Detach coolant pipe and oil dipstick tube from intake manifold -arrows-.



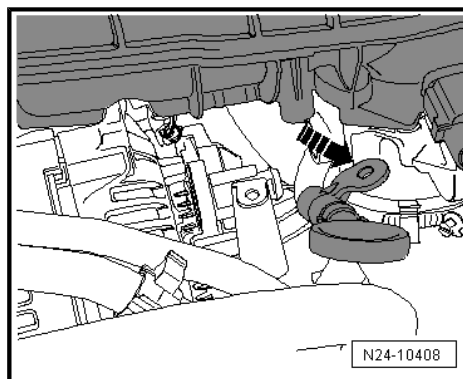


- Push oil dipstick tube downwards to right -arrow-.
- Release connector from fuel pressure sender - G247- using assembly tool - T10118- .



#### WARNING

*The fuel rail is pressurized. Wear protective goggles and protective clothing to avoid injury and contact with the skin. Before loosening the fuel pressure sender - G247- wrap a cloth around the connection. Then release pressure by carefully loosening the connection.*



- Unscrew fuel pressure sender - G247- using deep hexagon socket, 27 mm - VAS 5301/7- .

#### Installing:

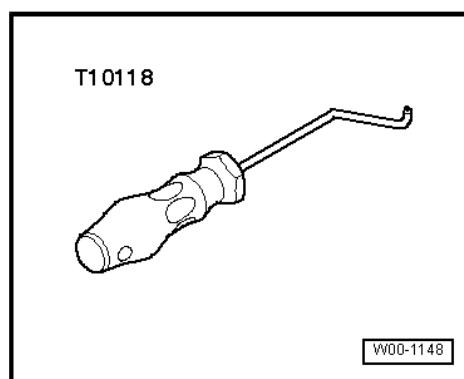
Installation is carried out in the reverse order. When installing, note the following:

Specified torques ➔ [Item 19 \(page 285\)](#) .

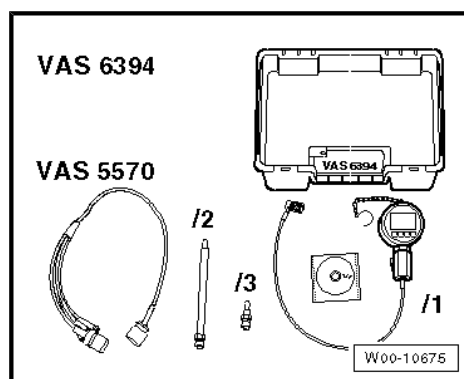
### 1.17 Checking fuel pressure sender - G247-

#### Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



- ◆ Double hexagon socket, 27 mm - VAS 5301/7-
- ◆ Pressure sensor tester - VAS 6394-



- ◆ Test adapter - VAS 5570-



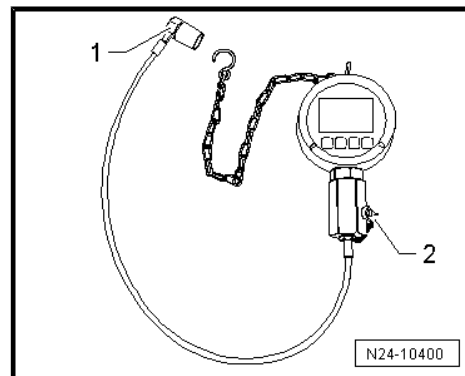
## Procedure



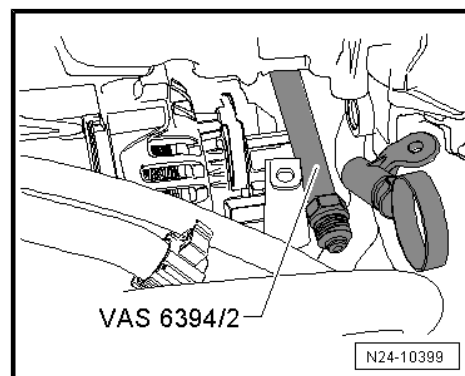
### WARNING

- ◆ *The fuel pressure sender is under pressure! Wear protective goggles and protective clothing to avoid injury and contact with the skin. Before loosening fuel pressure sender, wrap a cloth around the connection. Then release pressure by carefully loosening the connection.*

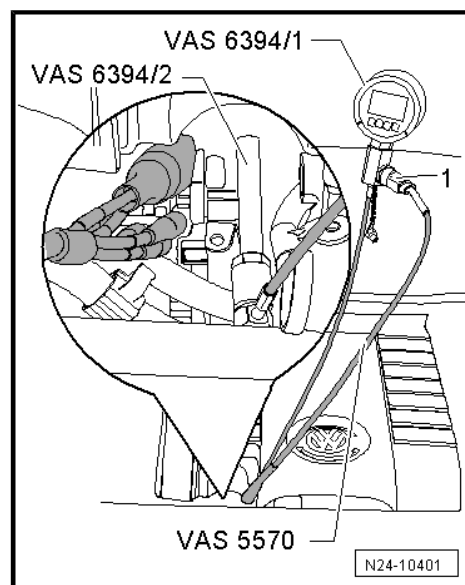
- Remove fuel pressure sender - G247- ➔ [page 290](#)
- Unscrew plug -2- and screw fuel pressure sender - G247- into tester - VAS 6394/1- . Specified torque: 22 Nm



- Moisten tapered seal of adapter - VAS 6294/2- with clean engine oil and screw into fuel rail. 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- .
- Install engine cover panel/air filter again and reconnect the air mass meter - G70- .





- 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 ignition on.
- Press following buttons on display of diagnostic tester one after the other:

Vehicle self-diagnosis

Self-diagnosis ►

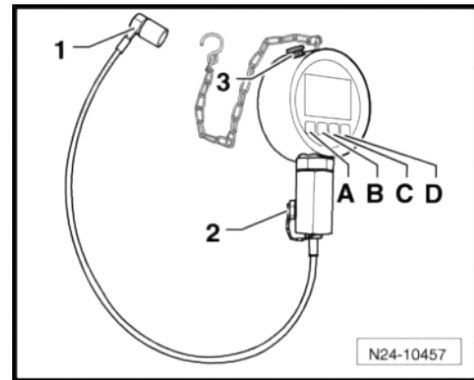
01 - Engine electronics ►

011 - Measured values ►

- Select measured value block **1** **4** **0** and confirm with **Q**.

The actual fuel pressure value is shown in display zone 3, 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 tester - VAS 6394- is under extreme fuel pressure! With engine running, pull connector off fuel pressure sender - G247- . This reduces fuel pressure to approx. 6 bar. Switch off ignition. Place a cleaning cloth around fuel pressure sender - G247- , then reduce residual pressure by carefully loosening fuel pressure sender - G247- .*

- Repeat the test with the new fuel pressure sender - G247- and compare both measured values.

**If measured values again fail to correspond:**

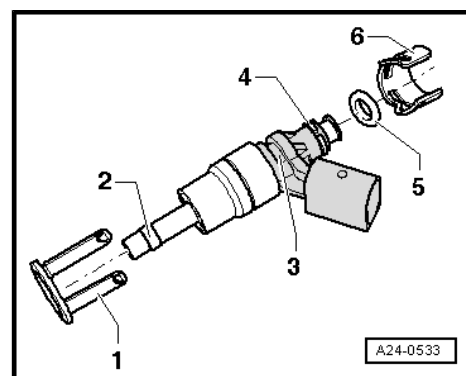
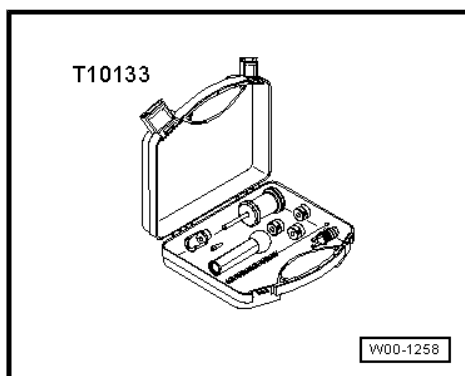
- Check wiring ⇒ Vehicle diagnostic tester.



## 1.18 Removing and installing injectors

**Special tools and workshop equipment required**

- ◆ Tool set - T10133-



### Injector components

- 1 - Radial compensation element (renew)
- 2 - Combustion chamber ring seal (Teflon ring seal), renew; when fitting, do not grease ring or use any other lubricant.
- 3 - Groove in injector.
- 4 - Support washer (renew).
- 5 - O-ring (renew; to install, lightly lubricate with clean engine oil).
- 6 - Support ring

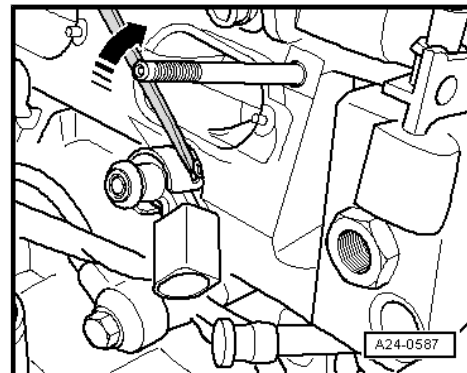
### Removing:

- Remove intake manifold ➔ [page 277](#) .
- Seal intake ports with a clean cloth.
- Use a screwdriver to bend retaining hooks of radial compensation element to side, and pull support ring off injector.



### Note

*The retaining hooks of radial compensation element are damaged by this action (retaining hooks bend or break). The radial compensation element must be renewed before injector is refitted.*





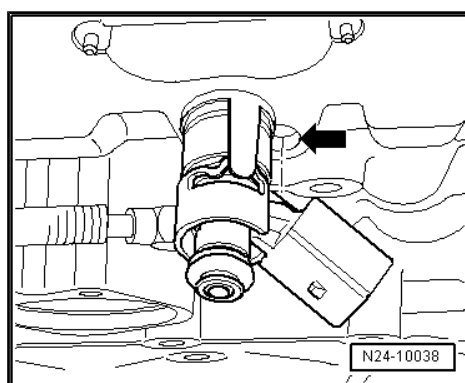
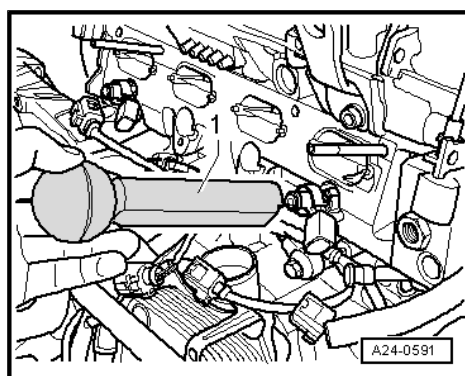
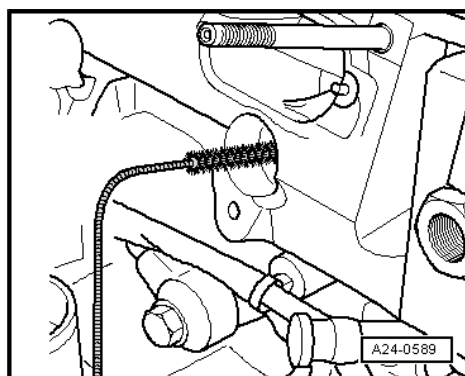
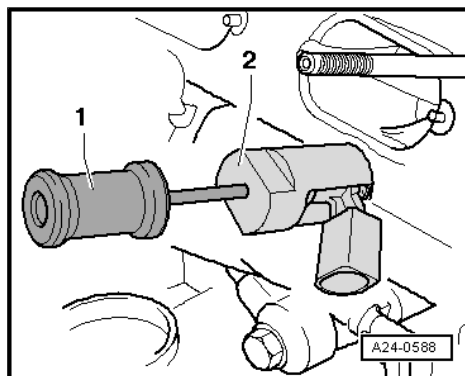
- Screw slide hammer - T10133/3- to puller - T10133/2- . Then guide puller - T10133/2- into groove in injector and carefully hammer injector out.

Installing:



**Note**

- ♦ *The Teflon seal on the injector must not be oiled or greased.*
- ♦ *It is possible that an open inlet valve hinders cleaning. In this case, turn engine by hand at crankshaft using a spanner.*
- Thoroughly clean holes of high-pressure injectors in cylinder head using a nylon brush - T10133/4- .
- Renew O-ring, radial compensation element, support washer and Teflon seal of injector ⇒ [page 296](#) .
- Insert injector in hole in cylinder head to stop using drift - T10133/9- .
- Ensure correct position of injectors in cylinder head.

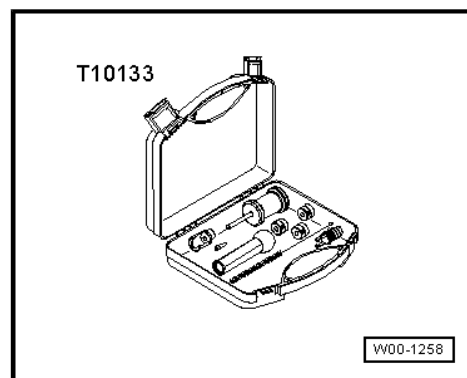


## 1.19 Renewing Teflon seal on injector

Special tools and workshop equipment required



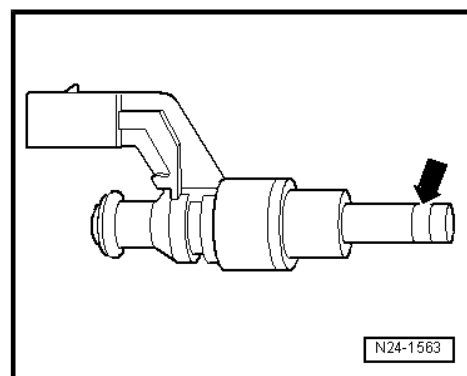
◆ Tool set - T10133-



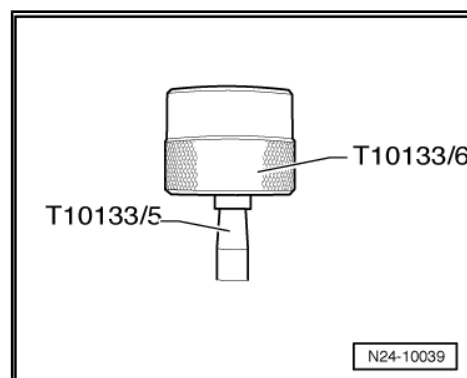
**Note**

*The Teflon ring must not be lubricated.*

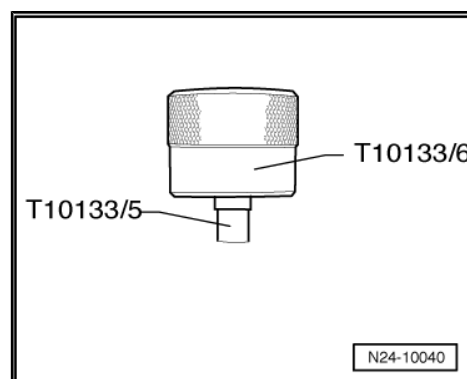
- Carefully clean injector in area of seal -arrow-. Remove coking deposits using a brass wire brush.
- Carefully cut open seal with a knife.
- Clean groove for seal.



- Fit new seal onto assembly cone - T10133/5- . Push seal as far as possible onto assembly cone - T10133/6- using assembly sleeve - T10133/5- .

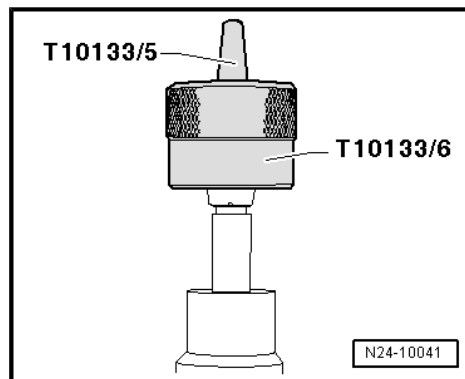


- Turn assembly sleeve - T10133/6- around and push seal to end of assembly cone - T10133/5- .

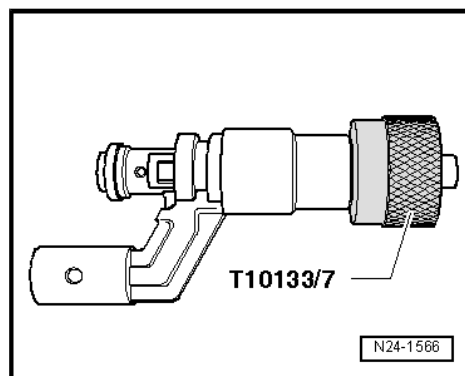




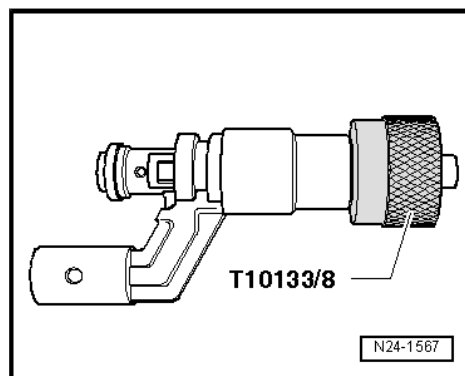
- Fit assembly cone - T10133/5- onto injector and push seal on- to injector using assembly sleeve - T10133/6- .
- Remove assembly cone - T10133/5- and push seal into groove using assembly sleeve - T10133/6- .



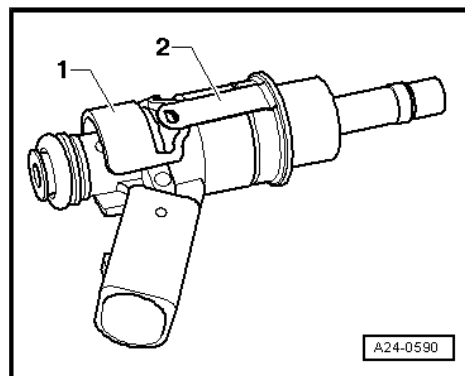
- Push calibration sleeve - T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve - T10133/7- off again by turning it in the opposite direction.



- Now press calibration sleeve - T10133/8- onto injector to stop by turning gently (approx. 180°).
- Pull calibration sleeve - T10133/8- off again by turning it in the opposite direction.
- Renew O-ring on injector and on support washer.



- Attach support ring -1- to injector and clip radial compensation -2- into support ring.



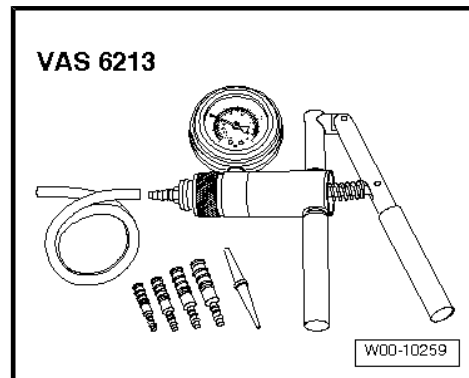


## 2 Checking components

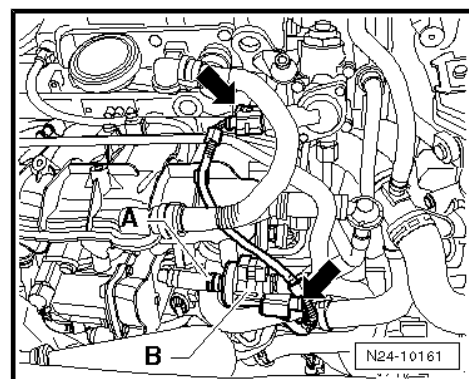
### Checking double non-return valve

#### Special tools and workshop equipment required

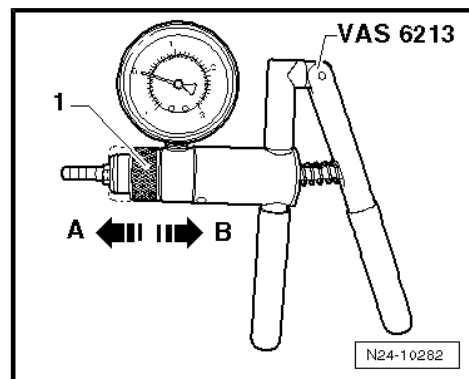
- ◆ Hand operated vacuum pump - VAS 6213-



- Remove connectors from activated charcoal filter solenoid valve 1 - N80- and fuel pressure sender for low-pressure - G410- -arrows-.
- Remove activated charcoal filter solenoid valve 1 - N80- -B- from hose -A-.

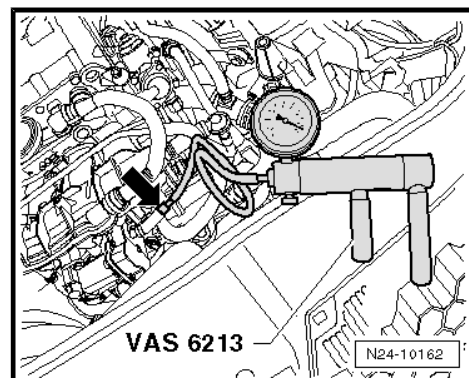


- Move slide ring -1- on hand vacuum pump - VAS 6213- to position -A- (vacuum).



- Connect hand vacuum pump - VAS 6213- to hose to double non-return valve -arrow-.
- Operate hand vacuum pump - VAS 6213- several times, vacuum must build up.

If no vacuum builds up, renew double non-return valve.





### 3 Engine control unit - J623- , Golf, Eos

Removing and installing engine control unit - J623- ➔ [page 300](#)

Removing and installing anti-theft engine control unit - J623-  
➔ [page 300](#)

#### 3.1 Removing and installing engine (motor) control unit - J623-



##### Note

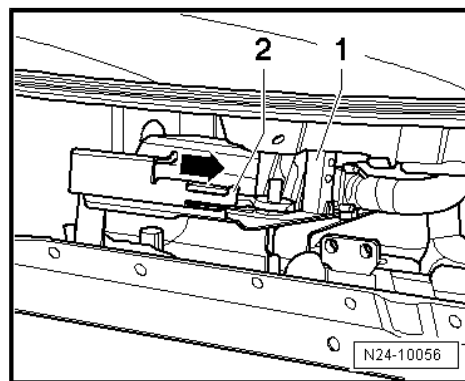
*If you wish to renew the engine control unit, connect the vehicle diagnostic tester and perform the guided function "Renewing engine control unit".*

##### Removing

- Switch off ignition.
- Remove wiper arms, plenum chamber cover and plenum chamber bulkhead: ➔ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .
- Release front connector -1- from engine control unit and pull it off.
- Lever up catch -2- slightly.
- Then push engine control unit out of retainer -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 plenum chamber bulkhead, plenum chamber cover and wiper arms ➔ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .



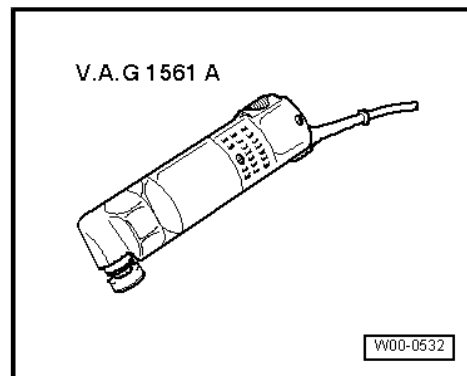
#### 3.2 Removing and installing anti-theft engine control unit - J623-

##### Special tools and workshop equipment required

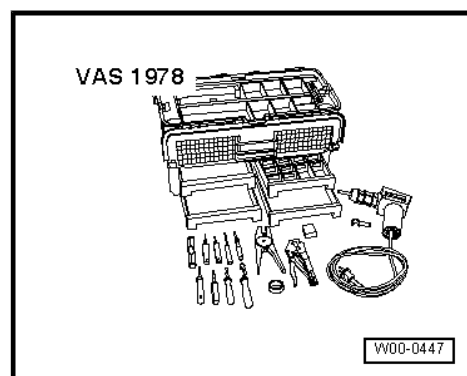
- ◆ Electric cutter - V.A.G 1561 A-
- ◆ Saw set - V.A.G 1561/14-



◆ Grip pliers



◆ Hot air blower from wiring harness repair set - VAS 1978-



**Note**

*If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system - VAS 5051B- and perform "Renewing engine control unit" in guided functions.*

**Removing:**

- Switch off ignition.
- Remove wiper arms, plenum chamber cover and plenum chamber bulkhead: ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .



**Note**

*The shear-head bolt threads are coated with locking compound. Heating the shear-head bolt with a hot air blower releases the locking effect of the locking compound.*



**Caution**

*Cover lines, connections and control units in the vicinity of the engine control unit to prevent damage through heat (scorching/melting of plastics etc.).*

Perform settings on hot air blower -4- as shown:



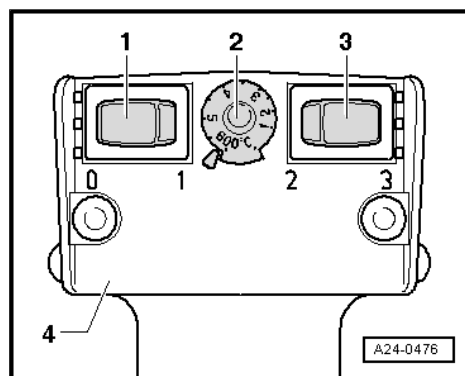
- Turn temperature setting potentiometer -2- to maximum heat output (600°C).
- Set two-stage switch for volume of air -3- to position 3.



#### 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.*

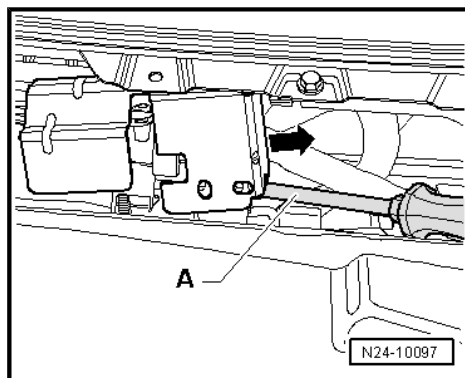
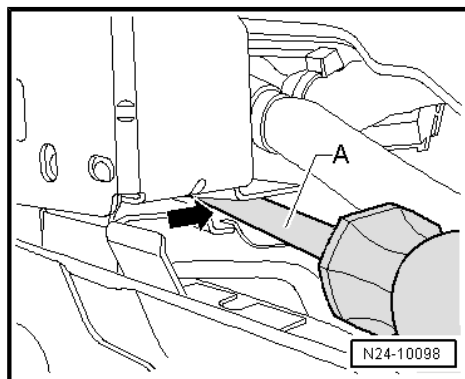
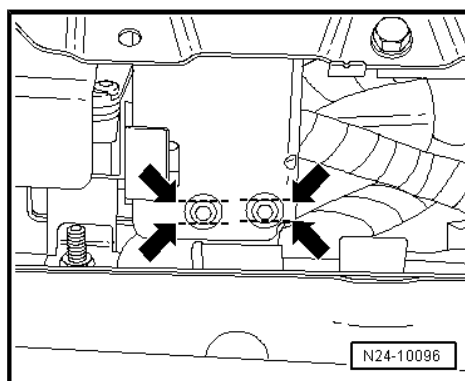
- Place nozzle of hot air blower close to shear-head bolt.
- Switch on hot air blower and heat the bolts.
- Remove bolts with grip pliers .



#### Note

*If the bolts will not move, saw into heads of shear-head bolts so that two parallel slots are created -arrows- and then remove the bolts.*

- Insert a screwdriver between protective housing -A- and bracket -arrow-.
- Lever up protective housing using screwdriver -A- and pull to side off bracket -arrow-.

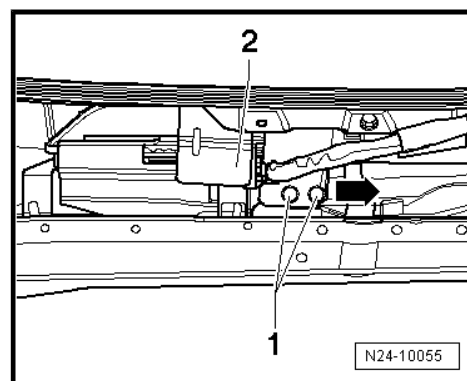
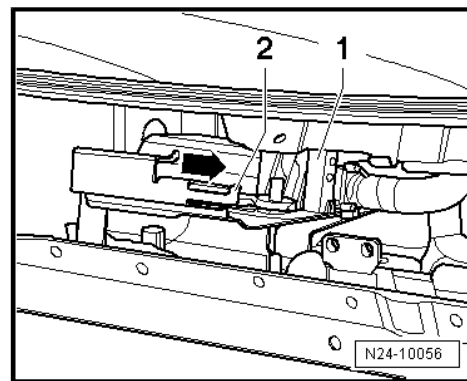




- Release front connector -1- from engine control unit and pull it off.
- Lever up catch -2- slightly.
- Then push engine control unit out of retainer -arrow-.
- Then release rear connector on engine control unit and pull it off.

**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.
- Push protective housing onto bracket.
- Tighten new shear-head bolts -1- evenly until heads shear off.
- Install plenum chamber bulkhead, plenum chamber cover and wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing windscreen wiper system .





## 4 Engine control unit - J623- (Passat)



### Note

*From November 2006 a modified anti-theft protection has been introduced. Identification: Locking clip instead of locking plate*

Removing and installing engine control unit - J623- ➔ [page 304](#)

Removing and installing anti-theft engine control unit - J623- (with locking plate) ➔ [page 305](#)

Removing and installing anti-theft engine control unit - J623- (with locking plate) ➔ [page 309](#)

### 4.1 Removing and installing engine (motor) control unit - J623-



### Note

*If you wish to renew the engine control unit, connect the vehicle diagnostic tester and perform the guided function "Renewing engine control unit".*

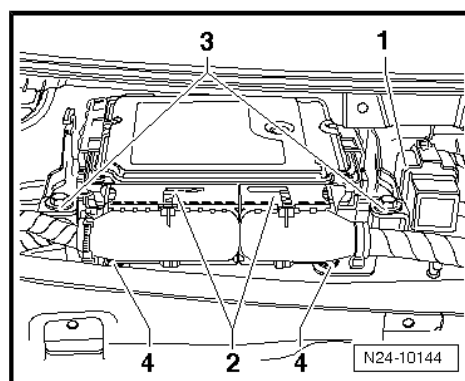


### DANGER!

*For vehicles with heavy duty running gear; vehicle must be restricted to a maximum of 210 km/h via the engine control unit. Drive shafts can be damaged at speeds above 210 km/h. Perform function "Restricting maximum speed" in Guided function using ➔ Vehicle diagnostic tester.*

#### Removing:

- Switch off ignition.
- Remove wiper arms ➔ Electrical system; Rep. gr. 92 ; Wind-screen wiper system; Removing and installing wiper arms .
- Remove plenum chamber cover ➔ General body repairs, exterior; Rep. gr. 64 ; Flush-bonded windows; Assembly over-view - 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.

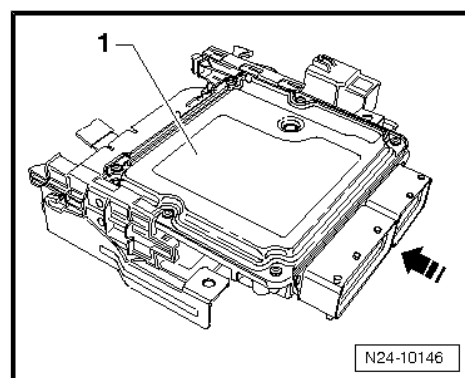
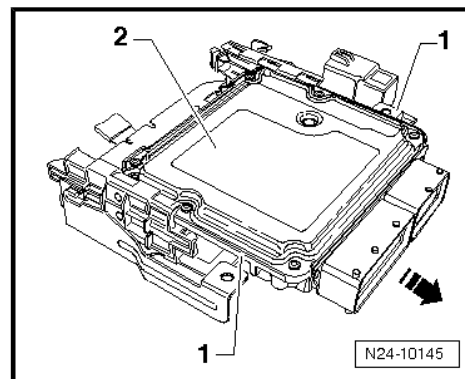




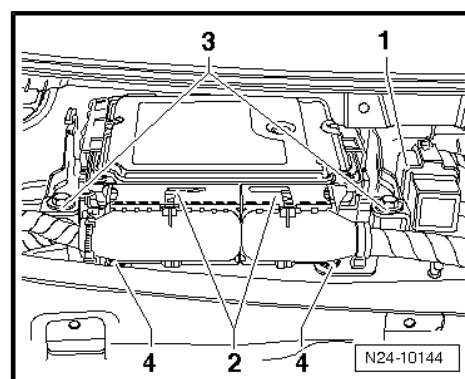
- Press locking device -1- outwards and slide engine control unit -2- from retaining frame.

**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: 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 ; Flush-bonded windows; Assembly overview - plenum chamber cover .
  - Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Wind-screen wiper system; Removing and installing wiper arms.



## 4.2 Removing and installing anti-theft engine control unit - J623- (with locking plate)



**Note**

*If you wish to renew the engine control unit, connect the vehicle diagnostic tester and perform the guided function "Renewing engine control unit".*



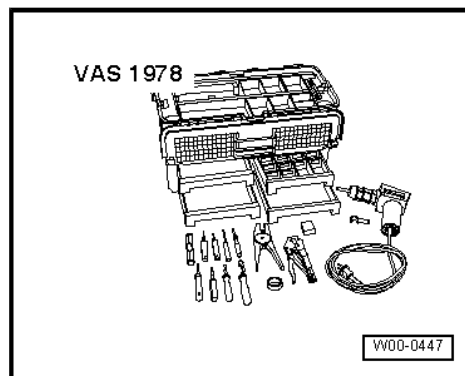
**DANGER!**

*For vehicles with heavy duty running gear; vehicle must be restricted to a maximum of 210 km/h via the engine control unit. Drive shafts can be damaged at speeds above 210 km/h. Perform function "Restricting maximum speed" in Guided function using ⇒ Vehicle diagnostic tester.*



### 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-
- ♦ Grip pliers

### Removing:

- Switch off ignition.
- Remove wiper arms ⇒ Electrical system; Rep. gr. 92 ; Wind-screen wiper system; Removing and installing wiper arms .
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 64 ; Flush-bonded windows; Assembly overview - plenum chamber cover .



### Note

*The shear-head bolt threads are coated with locking compound. Heating the shear-head bolt with a hot air blower releases the locking effect of the locking compound.*



### Caution

*Cover lines, connections and control units in the vicinity of the engine control unit to prevent damage through heat (scorching/melting of plastics etc.).*

Perform settings on hot air blower -4- as shown:

- Turn temperature setting potentiometer -2- to maximum heat output (600°C).
- Set two-stage switch for volume of air -3- to position 3.

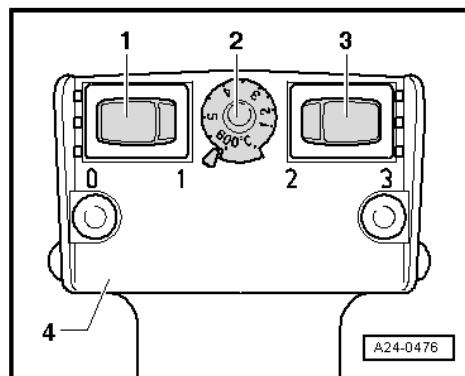


### WARNING

*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 the bolts.
- Unscrew shear-head bolt -2- using pliers on bolt head.

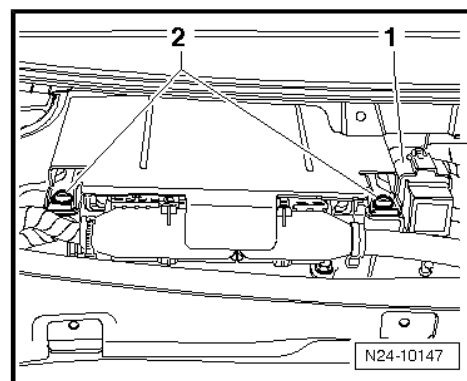
The procedure for the second shear-head bolt is exactly the same.



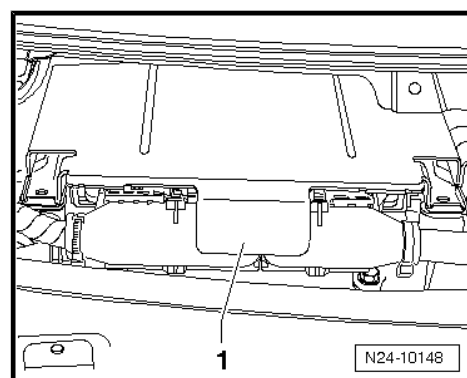




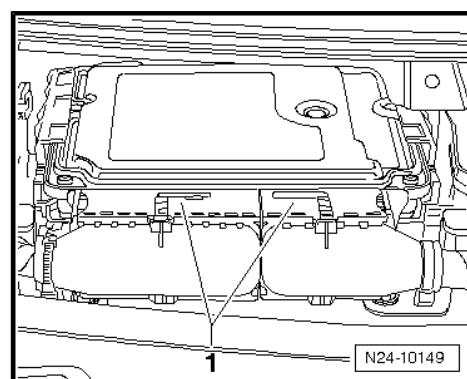
- Pull connector -1- off heated windscreen control unit - J505- .



- Lift cover -1- and pull it forwards.

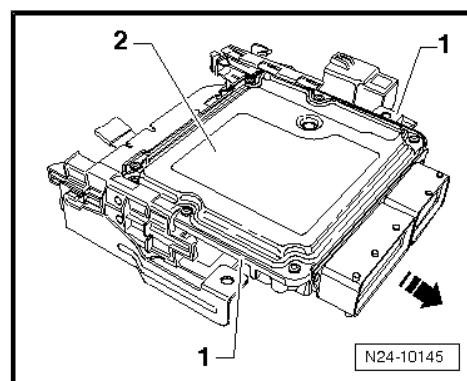


- Slide connector locking devices -1- on engine control unit outwards and pull off both connectors.
- Remove retainer frame with engine control unit from plenum chamber.



- Press locking device -1- outwards and slide engine control unit -2- from retaining frame.

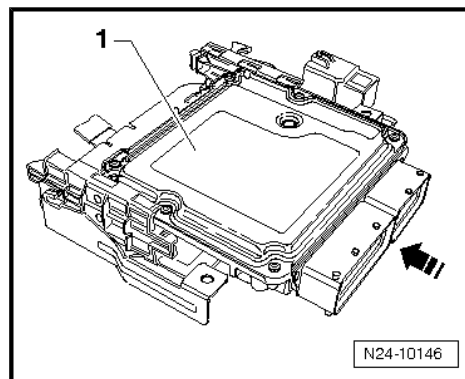
**Installing:**



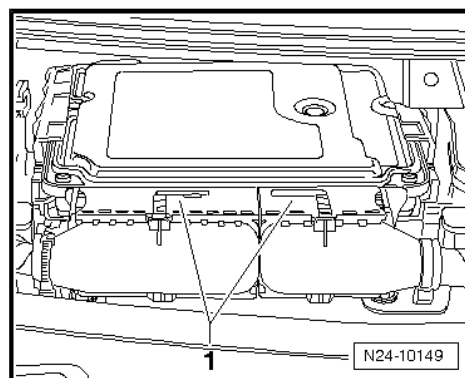


- Slide engine control unit -1- into retaining frame in direction of arrow.
- Fit retainer frame with engine control unit onto retainer in plenum chamber.

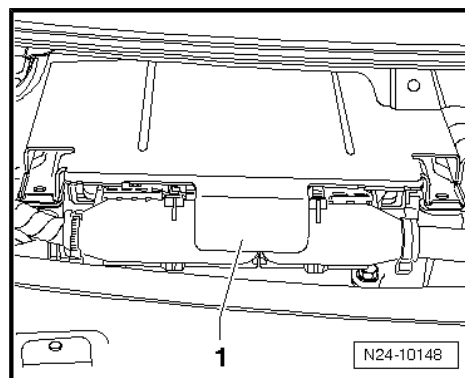
Specified torque of securing nuts for retainer: 6 Nm.



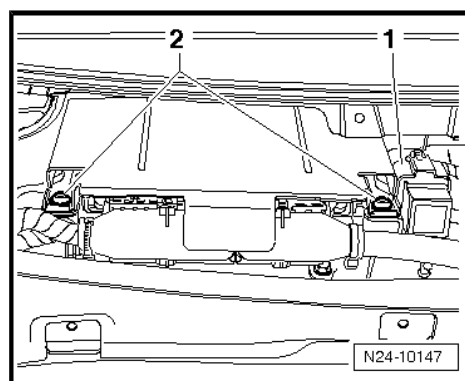
- Fit connectors to engine control unit and slide locking devices -1- inwards.



- Slide cover -1- over engine control unit and press it downwards.



- Tighten new shear-head bolts -2- evenly until bolt head shears off.
- Fit connector -1- to heated windscreen control unit - J505- .
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 64 ; Flush-bonded windows; Assembly overview - plenum chamber cover .
- Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms.





### 4.3 Removing and installing anti-theft engine control unit - J623- (with locking clip)



#### Note

*If you wish to renew the engine control unit, connect the vehicle diagnostic tester and perform the guided function "Renewing engine control unit".*



#### DANGER!

*For vehicles with heavy duty running gear, vehicle must be restricted to a maximum of 210 km/h via the engine control unit. Drive shafts can be damaged at speeds above 210 km/h. Perform function "Restricting maximum speed" in Guided function using ➔ Vehicle diagnostic tester.*

#### Special tools and workshop equipment required

##### ◆ Grip pliers

- If the engine control unit is to be renewed, connect vehicle diagnostic, testing and information system - VAS 5051 B- and perform "Renewing engine control unit" in guided functions.

#### Removing:

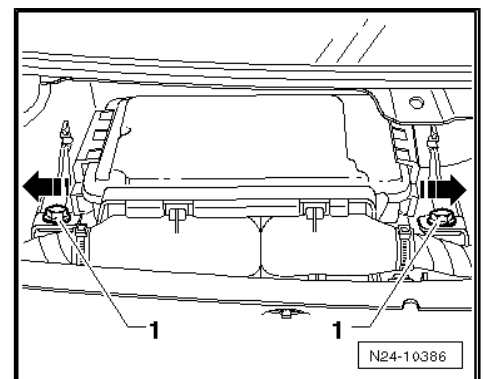
- Switch off ignition.
- Remove wiper arms ➔ Electrical system; Rep. gr. 92 ; Wind-screen wiper system; Removing and installing wiper arms .
- Remove plenum chamber cover ➔ General body repairs, exterior; Rep. gr. 64 ; Flush-bonded windows; Assembly overview - plenum chamber cover .



#### Note

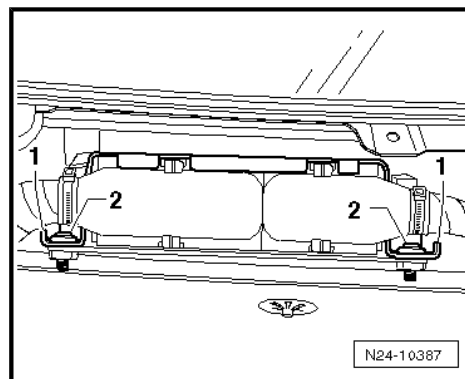
*In some vehicles covers are installed to protect the engine control unit from water. These are tightened to the engine control unit by bolts -1-.*

- Unscrew bolts -1-.
- Remove cover, if fitted.
- Cover the plenum chamber with a clean cloth so that it is not scratched.
- Raise engine control unit with control unit bracket slightly.
- Release engine control unit -arrows- and pull out slightly.



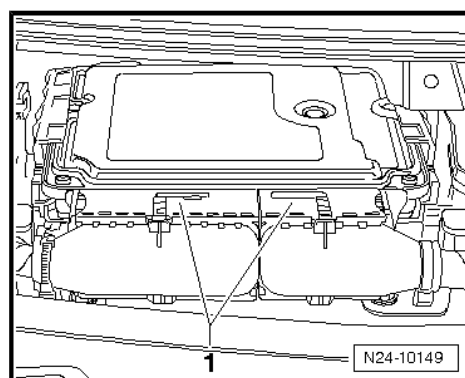


- Bend the upper ends -1- of locking clip outwards.
- Remove shear-head bolts -2- using grip pliers and remove locking clip.

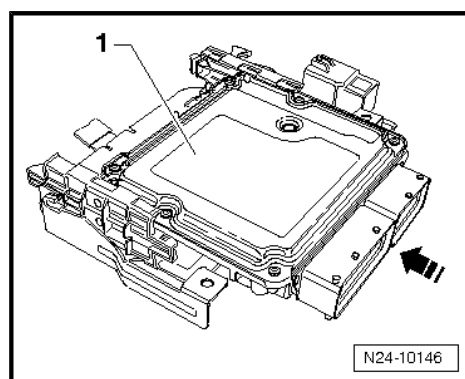


- Slide connector locking devices -1- on engine control unit outwards and pull off both connectors.
- Remove engine control unit.

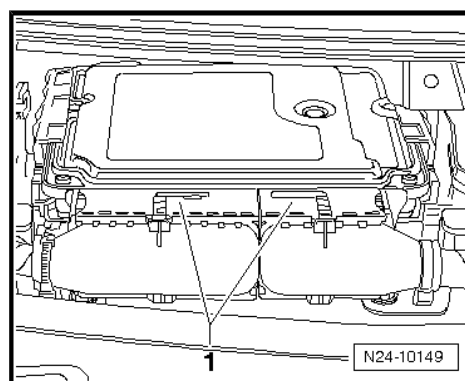
**Installing:**



- Slide engine control unit -1- in direction of -arrow- into control unit retainer until it engages.



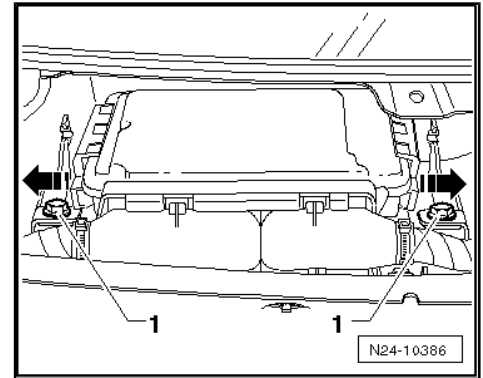
- Fit connectors to engine control unit and slide locking devices -1- inwards.
- Take a new locking clip and tighten new shear-head bolts evenly until heads shear off.





- Tighten control unit bracket and, if fitted, the cover to bracket with bolts -1-.
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 64 ; Flush-bonded windows; Assembly overview - plenum chamber cover .
- Install wiper arms ⇒ Electrical system; Rep. gr. 92 ; Wind-screen wiper system; Removing and installing wiper arms.

Specified torque	
Control unit bracket to bracket	6 Nm





## 26 – Exhaust system

### 1 Removing and installing parts of exhaust system



#### Note

- ◆ *Do not bend the decoupling element in the front exhaust pipe by more than 10° because it might otherwise be damaged.*
- ◆ *Renew seals, gaskets and self-locking nuts.*
- ◆ *After working on the exhaust system, ensure that the system is not under stress and that there is sufficient clearance to the bodywork. If necessary, loosen clamp and align silencers and exhaust pipe so that sufficient clearance is maintained to the bodywork at all points and the mountings are evenly loaded.*
- ◆ *The exhaust manifold and the turbocharger are one component, removing and installing ⇒ [page 248](#) .*

Assembly overview - exhaust system ⇒ [page 312](#) .

Separating centre and rear silencers ⇒ [page 316](#)

Removing and installing front exhaust pipe with catalytic converter ⇒ [page 318](#)

Aligning exhaust system free of tension ⇒ [page 320](#) .

#### 1.1 Assembly overview - exhaust system; Golf, Eos



### 1 - 40 Nm

- ☐ Renew
- ☐ Coat studs of exhaust manifold with high-temperature paste.

### 2 - Catalytic converter

- ☐ With front exhaust pipe
- ☐ Protect from damage by knocks and impact.
- ☐ With decoupling element.
- ☐ Do not bend flexible joint more than 10° - otherwise it can be damaged.
- ☐ Removing and installing  
⇒ [page 318](#)
- ☐ Aligning exhaust system free of tension  
⇒ [page 320](#).

### 3 - Lambda probe after catalytic converter - G130-

- ☐ 55 Nm
- ☐ Bank 1, probe 2
- ☐ Grease only the threads with high-temperature paste. The paste must not penetrate into the slots on the probe body

### 4 - Retainer

- ☐ Renew if damaged

### 5 - 25 Nm

### 6 - Rear silencer

- ☐ In initial equipment, component with centre silencer. Can be renewed individually for repair purposes.
- ☐ Aligning exhaust system free of tension ⇒ [page 320](#).
- ☐ Separate exhaust system ⇒ [page 316](#)

### 7 - Mounting

- ☐ Renew if damaged

### 8 - 25 Nm

### 9 - Rear clamp

- ☐ For separate replacement of centre and rear silencers
- ☐ Fitting position ⇒ [page 315](#)
- ☐ Tighten bolted connections evenly.

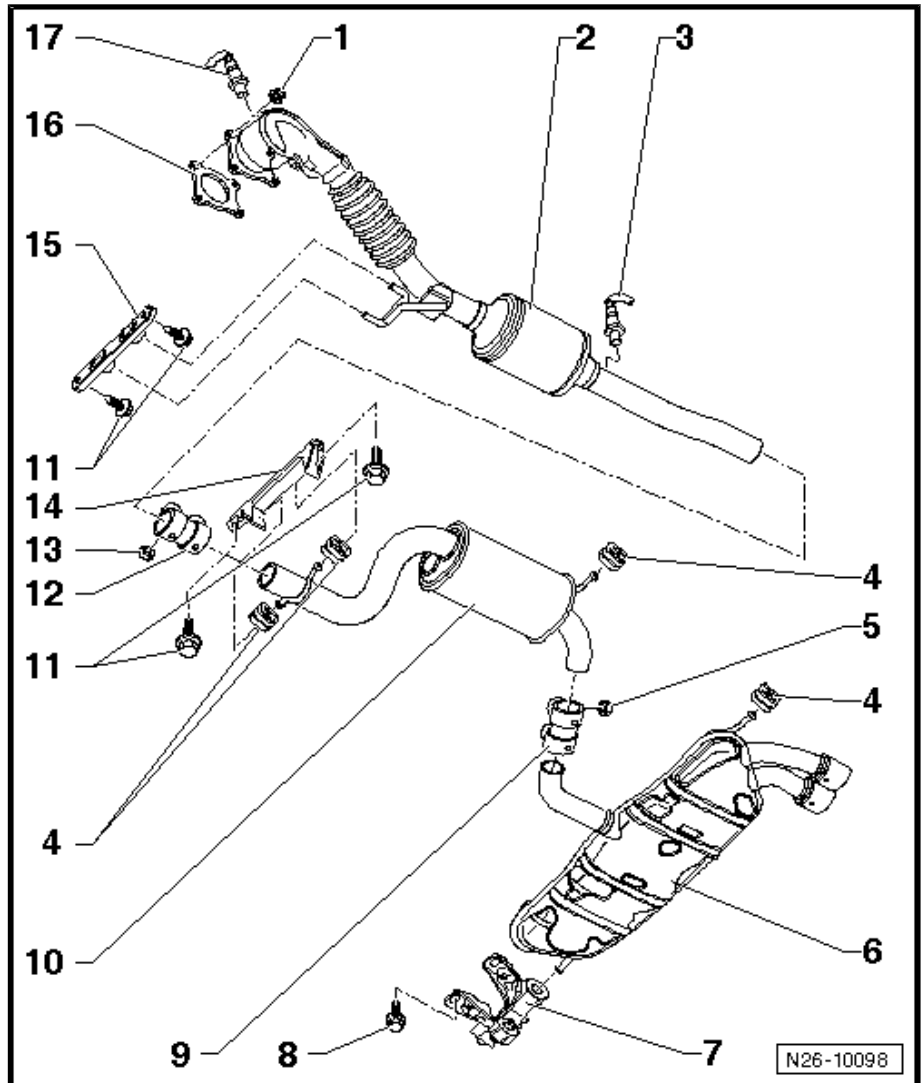
### 10 - Centre silencer

- ☐ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes.
- ☐ Aligning exhaust system free of tension ⇒ [page 320](#).
- ☐ Separate exhaust system ⇒ [page 316](#)

### 11 - 25 Nm

### 12 - Front clamp

- ☐ Align exhaust system so it is free of stress before tightening clamp ⇒ [page 320](#)
- ☐ Fitting position ⇒ [page 315](#)





- ☐ Tighten bolted connections evenly.

**13 - 25 Nm**

**14 - Mounting**

**15 - Mounting**

**16 - Seal**

- ☐ Renew

**17 - Lambda probe - G39-**

- ☐ 55 Nm
- ☐ Bank 1, probe 1
- ☐ Grease only the threads with high-temperature paste. The paste must not penetrate into the slots on the probe body

## 1.2 Assembly overview - exhaust system, Passat

**1 - Seal**

- ☐ Renew

**2 - Lambda probe - G39-**

- ☐ Bank 1, probe 1
- ☐ 55 Nm
- ☐ Grease only the threads with high-temperature paste. The paste must not penetrate into the slots on the probe body

**3 - 40 Nm**

- ☐ Renew
- ☐ Coat studs of exhaust manifold with high-temperature paste.

**4 - Heat shield**

**5 - Catalytic converter**

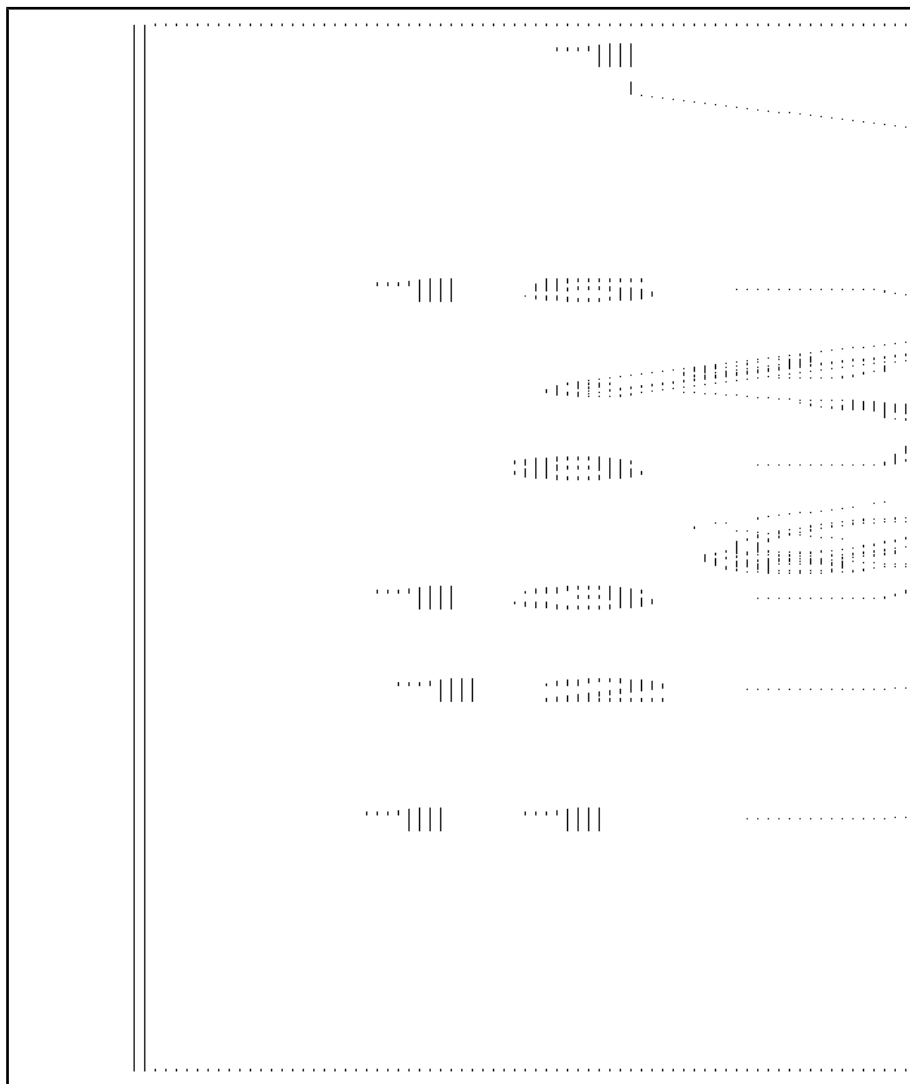
- ☐ With front exhaust pipe
- ☐ Protect from damage by knocks and impact.
- ☐ With decoupling element.
- ☐ Do not bend flexible joint more than 10° - otherwise it can be damaged.
- ☐ Removing and installing  
⇒ [page 318](#)

**6 - Lambda probe after catalytic converter - G130-**

- ☐ 55 Nm
- ☐ Bank 1, probe 2
- ☐ Grease only the threads with high-temperature paste. The paste must not penetrate into the slots on the probe body

**7 - Retainer**

- ☐ Renew if damaged







8 - 25 Nm

#### 9 - Mounting

- ☐ Renew if damaged

#### 10 - Rear silencer

- ☐ In initial equipment, component with centre silencer. Can be renewed individually for repair purposes.
- ☐ Separate exhaust system ⇒ [page 317](#)

#### 11 - Rear clamp

- ☐ For separate replacement of centre and rear silencers
- ☐ Fitting position ⇒ [page 315](#)
- ☐ Tighten bolted connections evenly.

#### 12 - Centre silencer

- ☐ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes.
- ☐ Separate exhaust system ⇒ [page 317](#)

#### 13 - Front clamp

- ☐ Fitting position ⇒ [page 315](#)
- ☐ Tighten bolted connections evenly.

#### 14 - Mounting

- ☐ For centre silencer

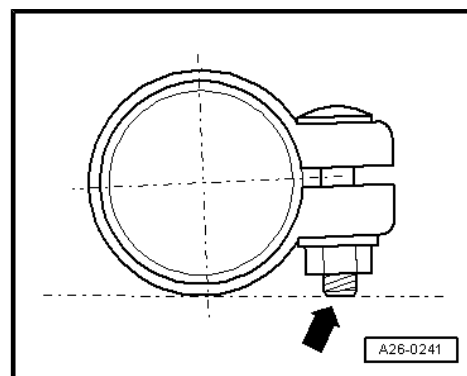
#### 15 - Mounting

- ☐ For catalytic converter
- ☐ Renew if damaged

## 1.3 Clamps

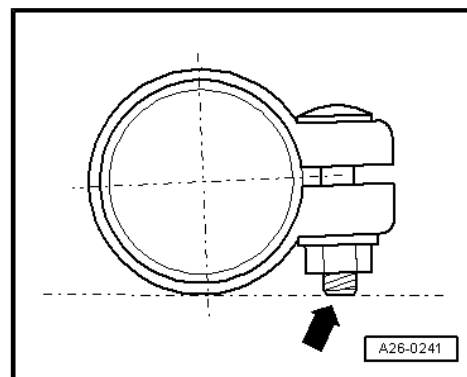
#### Installation position of front clamp

- Install clamp so that end of bolt -arrow- does not extend beyond lower edge of clamp.
- Bolted connection faces to right.



#### Installation position of rear clamp

- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.
- Bolted connection faces to right (Passat) or to rear (Golf, Eos).





## 1.4 Separating centre and rear silencers, Golf, Eos

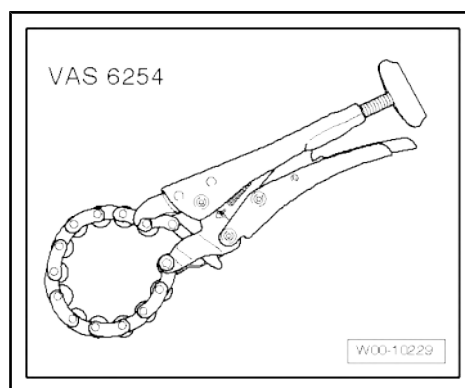


### Note

- ◆ *The connecting pipe can be cut through at the cutting location in order to renew the centre and rear silencers separately.*
- ◆ *The cutting point is marked by indentations on the periphery of the exhaust pipe.*

### Special tools and workshop equipment required

- ◆ Chain-type pipe cutter - VAS 6254-



Or

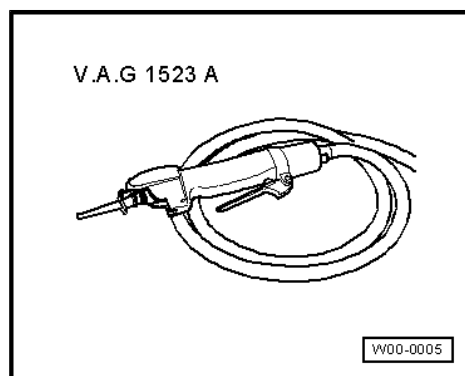
- ◆ Pneumatic sabre saw - V.A.G 1523A-

### Procedure

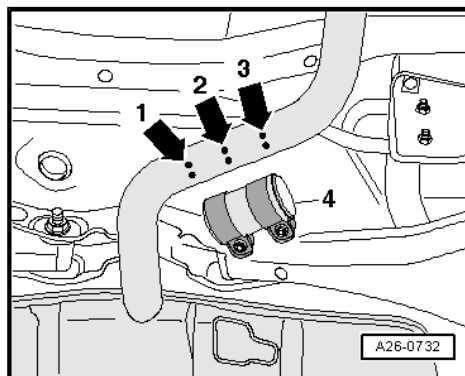


### WARNING

*To avoid injury from metal shavings, wear eye protection and protective clothing.*



- 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 clamp -4- centrally at side marks when installing, arrows -1- and -3-.

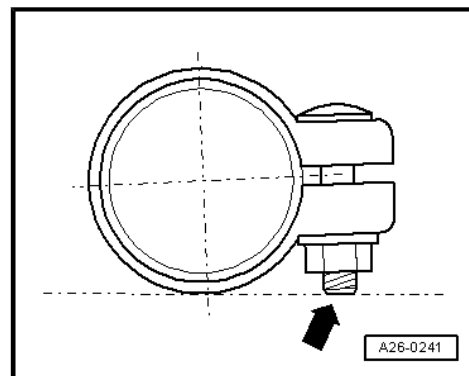




- Install clamp so that bolt ends do not protrude beyond lower edge of clamp -arrow-.
- Threaded connection faces to rear.
- Align exhaust system free of stress ➔ [page 320](#) .

#### Specified torques

Component	Nm
Clamping sleeve	25



## 1.5 Separating centre and rear silencers, Passat

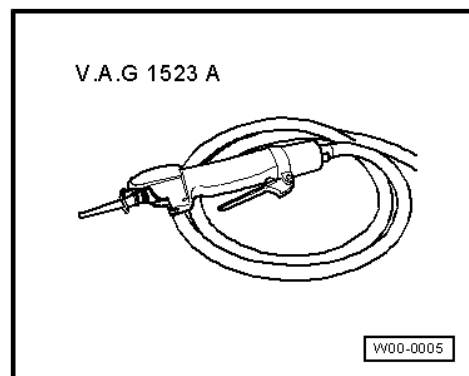


#### Note

- ◆ *The connecting pipe can be cut through at the cutting location in order to remove and install or renew the centre and rear silencers separately.*
- ◆ *The cutting point is marked by an indentation on the outside of the exhaust pipe.*

#### Special tools and workshop equipment required

- ◆ Pneumatic sabre saw - V.A.G 1523 A-



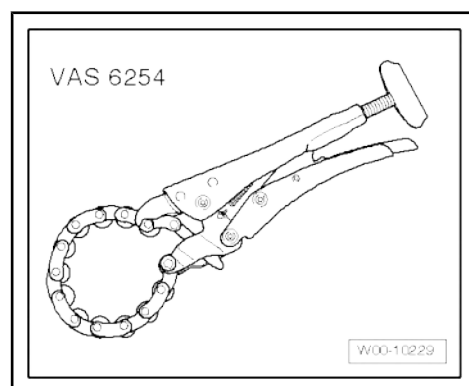
Or

- ◆ Chain-type pipe cutter - VAS 6254-



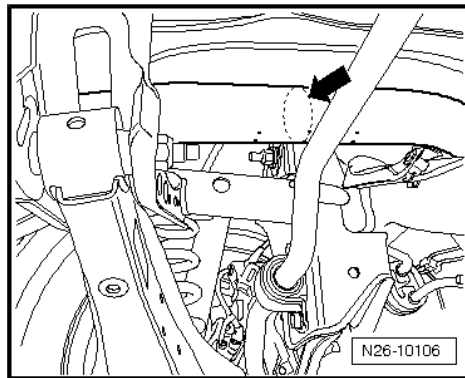
#### WARNING

*To avoid injury from metal shavings, wear eye protection and protective clothing.*

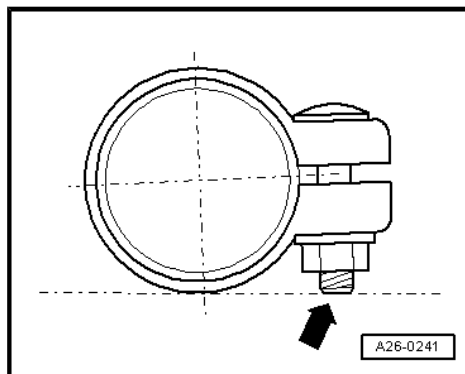




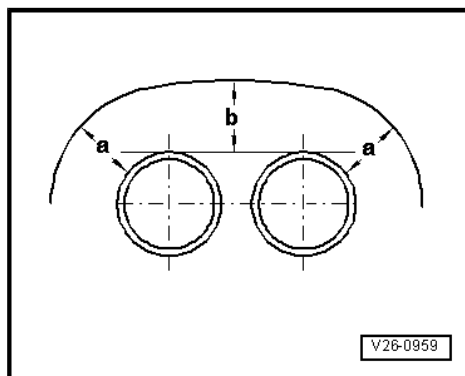
- Cut through exhaust pipe at right angles using e.g. body saw - V.A.G 1523 A- at separating point -arrow-.
- Position clamping sleeve between side markings when installing.



- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.



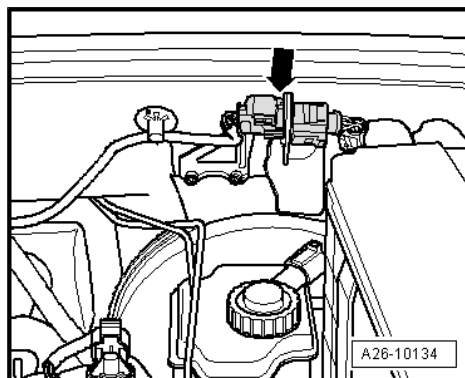
- Align exhaust system so that the distance -a- on left and right is even.



## 1.6 Removing and installing front exhaust pipe with catalytic converter

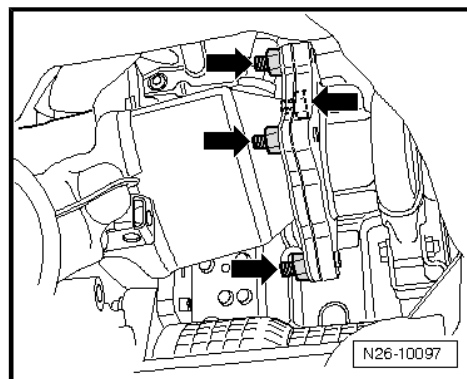
### Removing:

- Remove engine cover panel/air filter ➔ [page 273](#) .
- Disconnect connector for Lambda probe - G39- -arrow- and lay cable to side.

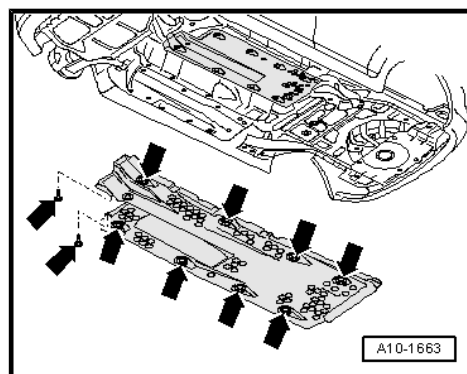




- Remove securing nuts -arrows- for front exhaust pipe/turbocharger.



- Remove right underbody panel -arrows-.

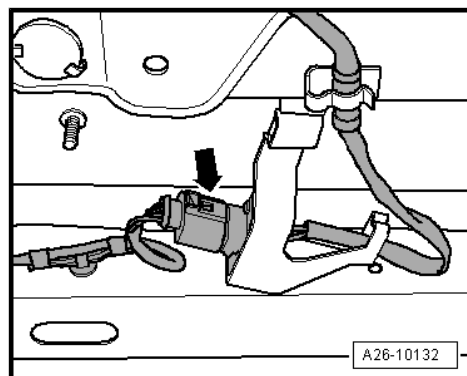


- Disconnect connector for Lambda probe after catalytic converter - G130- -arrow- and lay cable to side.

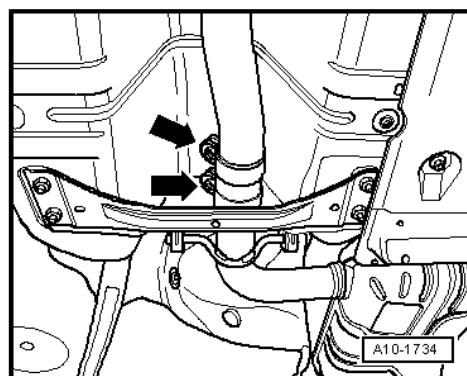


#### Note

*The flexible joint in front exhaust pipe must not be bent more than 10° - risk of damage.*

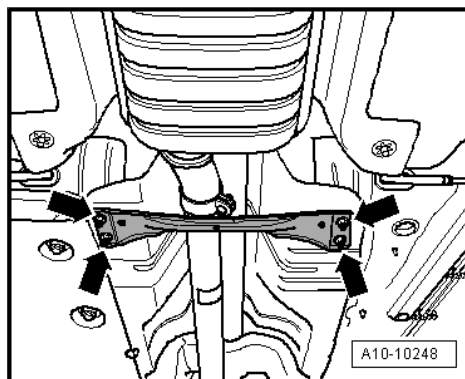


- Separate exhaust system at clamp -arrows-.





- Remove front cross member for underbody -arrows-.

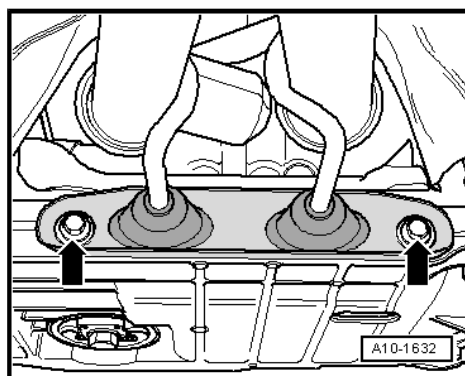


- Unbolt bracket for exhaust system -arrows-.
- Remove catalytic converter with front exhaust pipe.

#### Installing:

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

- ♦ Coat turbocharger studs with high-temperature paste; high-temperature paste ⇒ ETKA (Electronic Parts Catalogue) .
- ♦ Renew seals, gaskets and self-locking nuts.
- ♦ Align exhaust system free of stress ⇒ [page 320](#) .

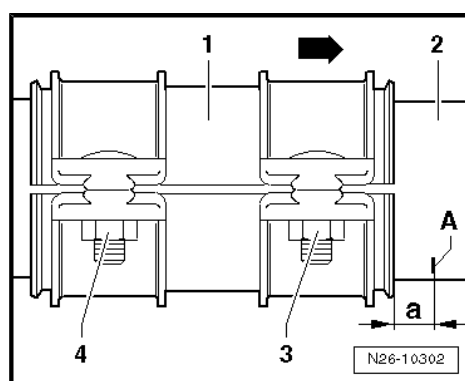


#### Specified torques

Component	Nm
Front exhaust pipe to turbocharger	40
Tunnel cross-piece to body	25
Mounting to subframe	25
Clamping sleeve	25

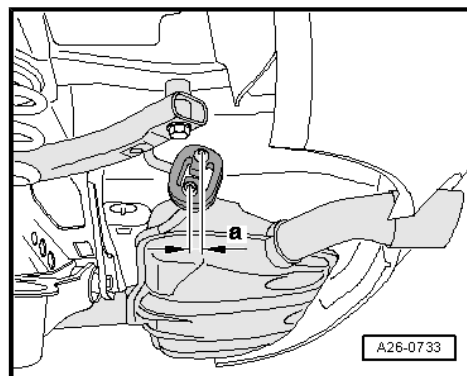
### 1.7 Aligning exhaust system free of stress

- The exhaust system must be aligned when cold.
- Loosen bolts -3 and 4- on front clamp -1-.
- Align front clamp -1- to marking -A- on front exhaust pipe -2- (-arrow- points forwards).
- Dimension -a- = 5 mm
- The bolts must be on the right and the ends of the bolts must not protrude beyond the lower edge of the clamp.
- Tighten front clamp bolts -3- hand-tight.

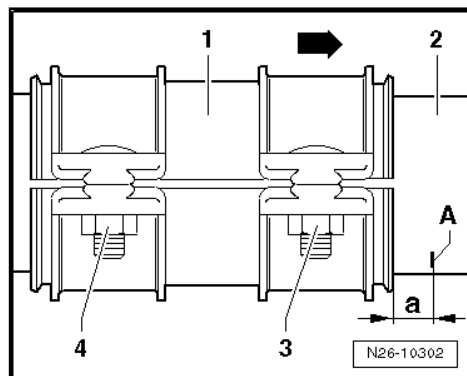




- Push exhaust system forward until preload on rear silencer retainer is dimension -a- 15...17 mm.

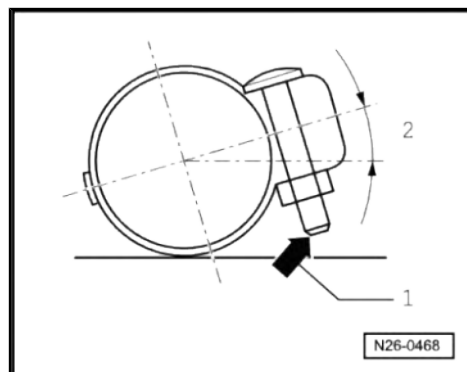


- In this position, tighten bolts -3 and 4- on front clamp evenly to 25 Nm.



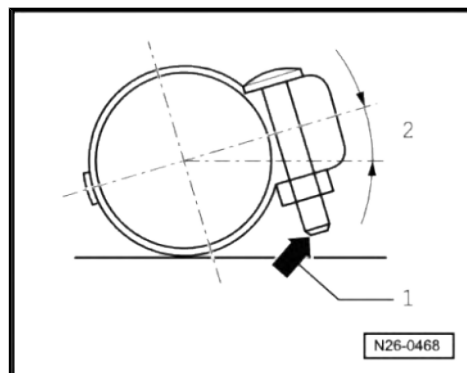
#### Installation position of front clamp

- 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.
- Bolted connection faces to right (Passat) or to rear (Golf, Eos).





## 28 – Ignition system

### 1 Repairing ignition system

General notes on ignition system ⇒ [page 322](#) .

Safety precautions ⇒ [page 322](#) .

Assembly overview - ignition system ⇒ [page 322](#) .

Removing and installing ignition coils with output stage  
⇒ [page 323](#) .

Test data, spark plugs ⇒ [page 324](#)

#### 1.1 General notes on ignition system

- ◆ For trouble-free operation of electrical components, a voltage of at least 11.5 V is necessary.
- ◆ To complete work, read fault memory of engine control unit. Delete all fault entries which may have occurred during tests and repairs. If the fault memory was cleared, the readiness code must be generated ⇒ Vehicle diagnostic tester. "Guided functions".
- ◆ If, after fault finding, repairs or component tests, the engine starts, runs for a short period and then stops, then the fault may be that the immobilizer is blocking the engine control unit. In this case, the control unit must be adapted ⇒ Vehicle diagnostic tester "Guided Functions".

#### 1.2 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 pull off ignition coils with output stage when engine is running or turning 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.

#### 1.3 Assembly overview - ignition system



##### Note

*The engine speed sender - G28- can be found on the cylinder block ⇒ [Item 14 \(page 22\)](#) .*





**1 - Knock sensor 1 - G61-**

- ☐ To remove, the coolant thermostat housing must be removed  
⇒ [page 133](#)

- ☐ Gold-plated contacts

**2 - Knock sensor 2 - G66-**

- ☐ To remove, the oil filter bracket must be removed ⇒ [page 111](#)

- ☐ Gold-plated contacts

**3 - Ignition coil with output stage - (N70, N127, N291, N292)-**

- ☐ Removing and installing  
⇒ [page 323](#)

**4 - Spark plug**

- ☐ 25 Nm
- ☐ Type and electrode gap  
⇒ [page 324](#) .
- ☐ Remove and install with spark plug socket and extension - 3122 B-

**5 - 20 Nm**

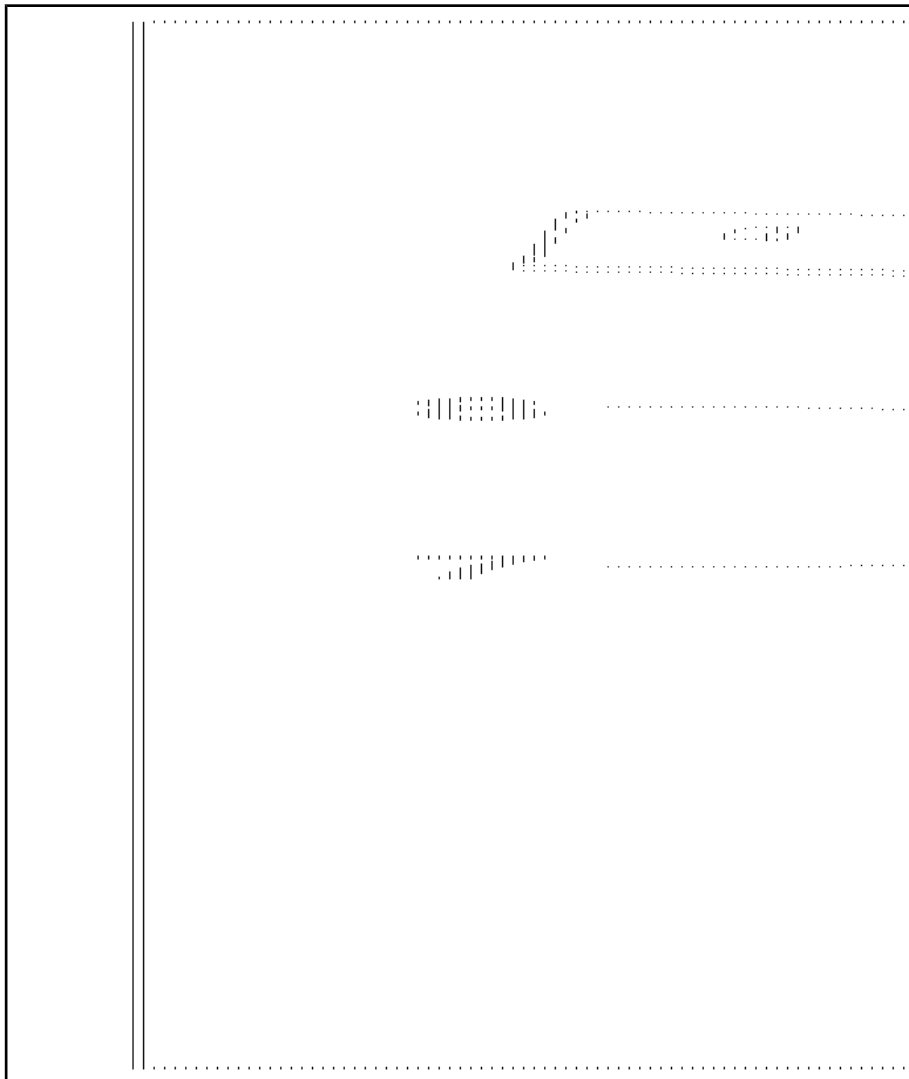
- ☐ The specified torque influences the function of the knock sensor.

**6 - 10 Nm**

**7 - Hall sender - G40-**

- ☐ Gold-plated contacts

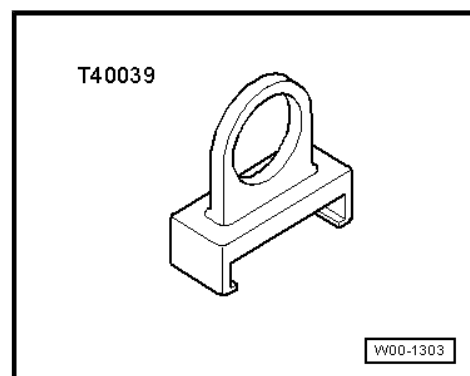
**8 - O-ring**



## 1.4 Removing and installing ignition coils with output stage

Special tools and workshop equipment required

- ◆ Puller - T40039-





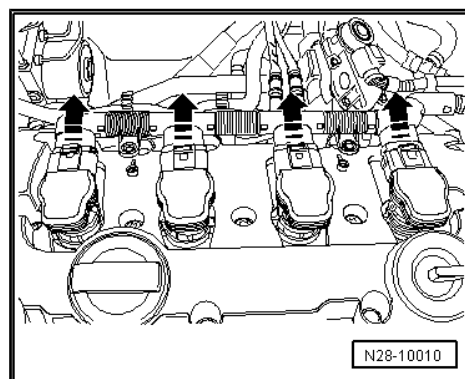
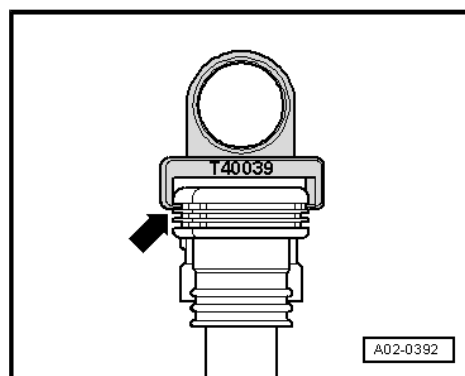
## Removing ignition coils with output stages



### Note

- ◆ Observe all relevant safety precautions ⇒ [page 322](#) .
- ◆ Assembly overview - ignition system ⇒ [page 322](#) .
- ◆ To pull off spark plugs, fit puller - T40039- onto uppermost, thick rib -arrow- of ignition coils with final output stages.
- ◆ If the lower ribs are used, they could be damaged.

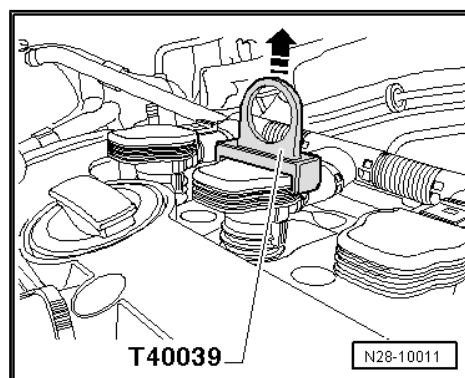
- Release connectors and pull all connectors off ignition coils at the same time.



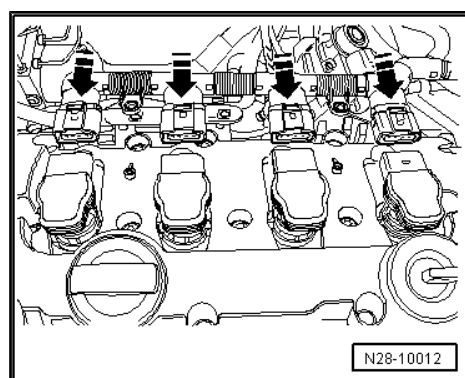
- Pull all ignition coils out of spark plug recess using puller - T40039- .

## Installing ignition coils with output stages

- Fit all ignition coils loosely into spark plug recess.



- Align the ignition coils with the connectors and attach all connectors onto ignition coils simultaneously.
- Press ignition coils onto spark plugs by hand with uniform pressure.



## 1.5 Test data, spark plugs

Engine code	AXX, BWA, BPY
Firing order	1-3-4-2
Spark plugs VW/Audi	101 905 631 H <sup>1)</sup>



Engine code	AXX, BWA, BPY
Electrode gap	0.7...0.8 mm
Specified torque	25 Nm
Change interval	⇒ Maintenance ; Booklet ; Service tables

<sup>1)</sup> For current part numbers, please see ⇒ Electronic Parts Catalogue (ETKA)