



## Parts of cooling system, removing and installing

### **Note:**

- ◆ *When the engine is warm, the cooling system is under pressure. If necessary release pressure before beginning repair work.*
- ◆ *Hoses are secured with spring-type clips. In cases of repair use spring-type clips.*
- ◆ *VAG 1921 pliers are recommended when installing spring-type clips.*

Perform cooling system leakage check with cooling system tester VAG 1274 and adapter 1274/3.

Parts of cooling system body side ⇒ [Page 19-2](#) .

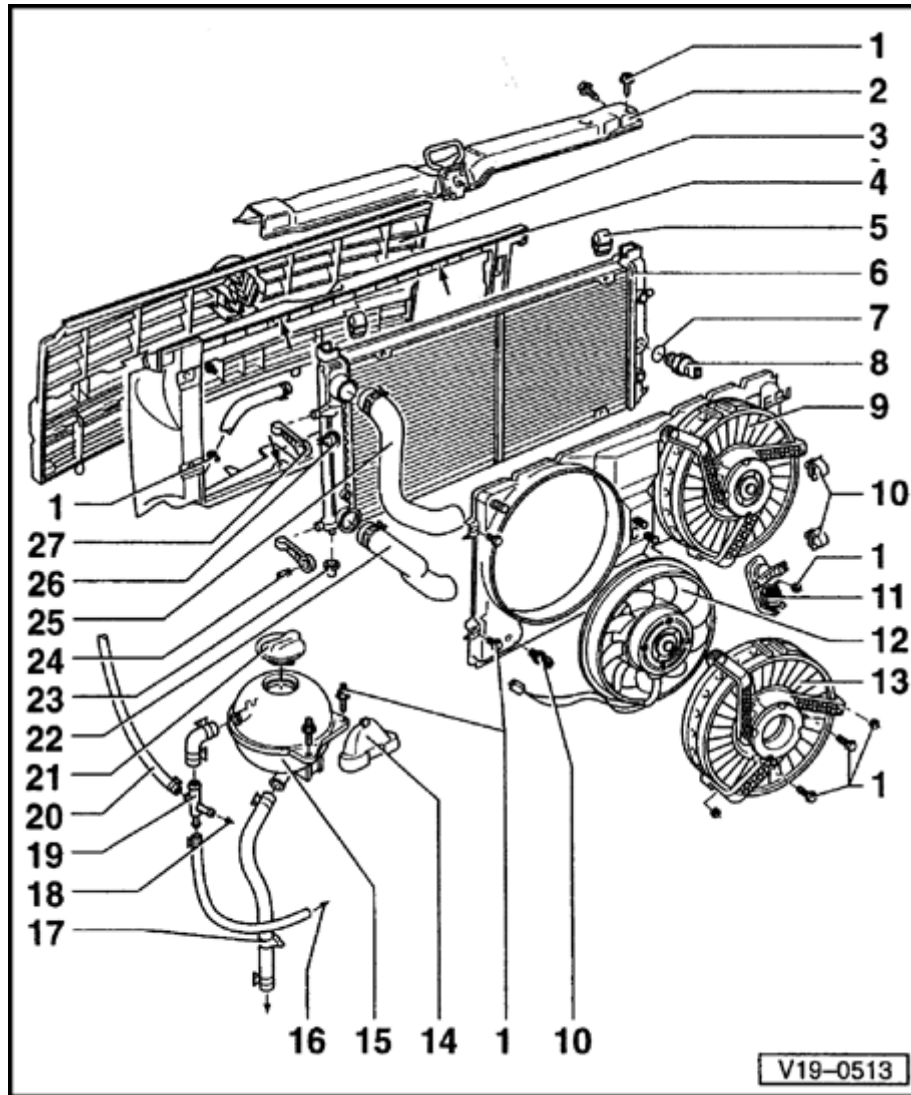
Parts of cooling system engine side ⇒ [Page 19-10](#) .

Coolant hose connection diagram ⇒ [Page 19-14](#) .

Draining and filling with coolant ⇒ [Page 19-16](#) .

Coolant mixture ratios ⇒ [Page 19-16](#) , draining and filling with coolant.

Checking thermo switch and coolant circulation pump or continued coolant circulation pump ⇒ [Page 19-27](#) .



## Parts of cooling system, body side

Vehicles ➤ 12.95

Vehicles 01.96 ➤ ⇒ [Page 19-6](#)

**1 - 10 Nm**

**2 - Lock carrier**

**3 - Radiator grille**

**4 - Air ducting**

◆ Secured at radiator:

Vertically 4 screws, horizontally 4 rivets or 4 screws - arrows-

**5 - Securing rubber**

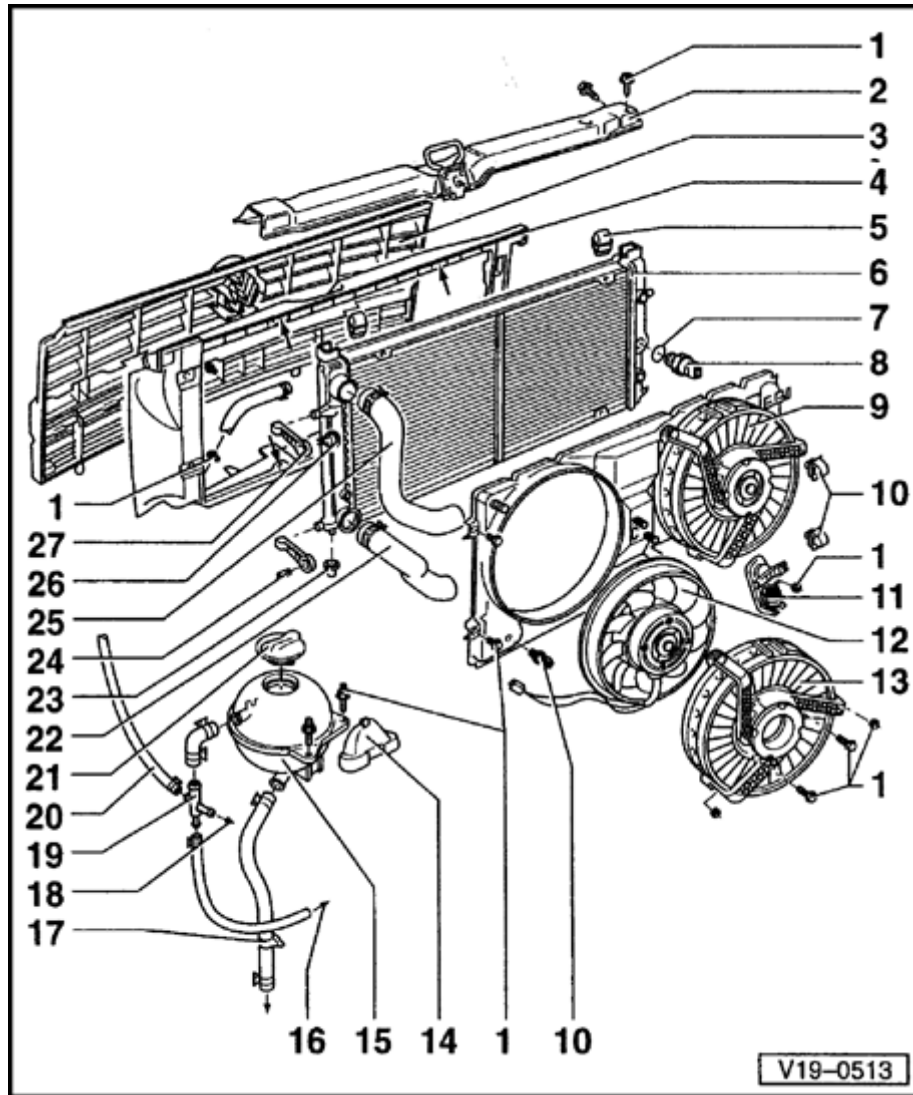
**6 - Radiator**

◆ Removing and installing ⇒ [Page 19-22](#)

◆ After replacing, replace coolant

**7 - Seal**

◆ Always replace



### 8 - Coolant fan control (FC) thermal switch -F18-, 35 Nm

◆ Switching temperatures:

1st speed on: 84 - 89 °C

off: 76 - 83 °C

2nd speed

on: 90 - 95 °C

off: 82 - 89 °C

### 9 - Radiator cowling

- ◆ With electric fan and adjustable shut-off ring (only vehicles with optional equipment)

### 10 - Cable clip

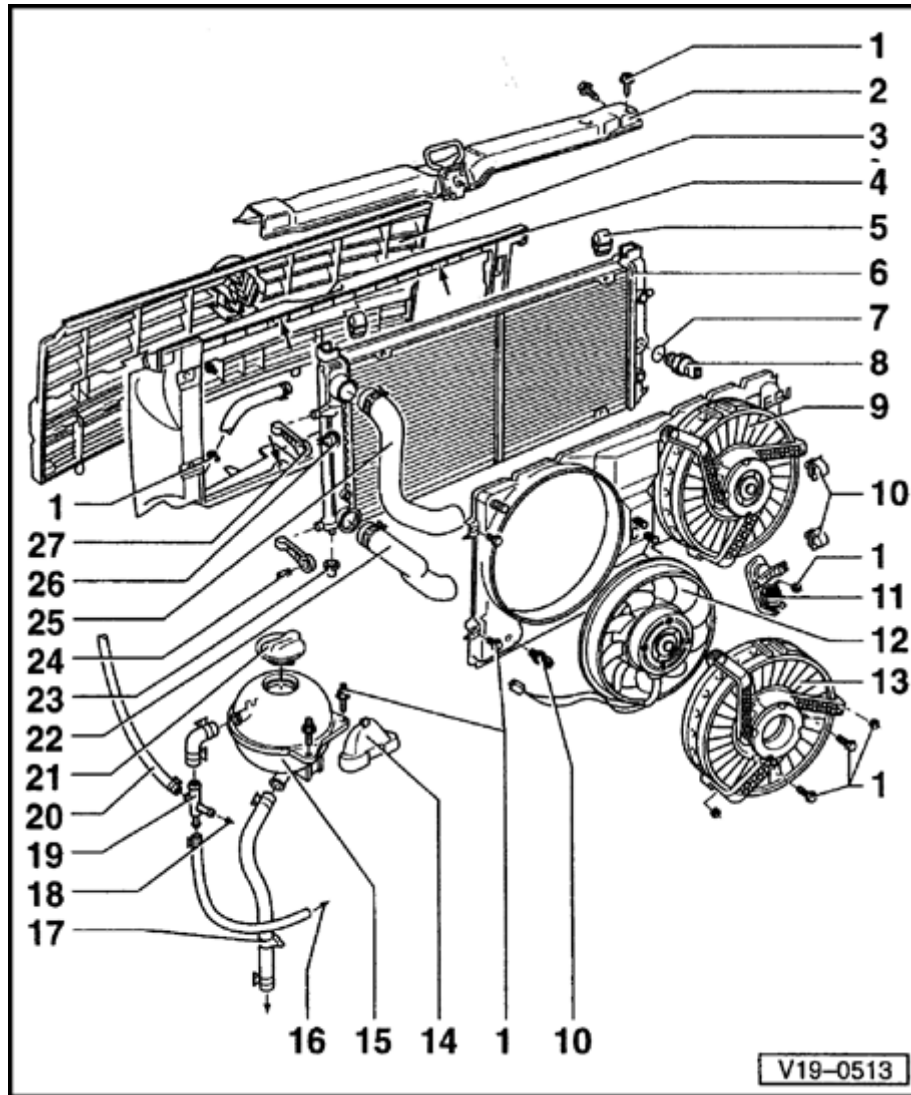
### 11 - Adjusting device

- ◆ Only vehicles with optional equipment

- ◆ Checking:

Engine cold (coolant temperature below 25 °C) shut-off ring item - 13 - closed

### 12 - Radiator fan



### 13 - Shut-off ring

- ◆ Only vehicles with optional equipment

### 14 - Cover

### 15 - Expansion tank

### 16 - To cylinder head

- ◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

### 17 - To coolant line

- ◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

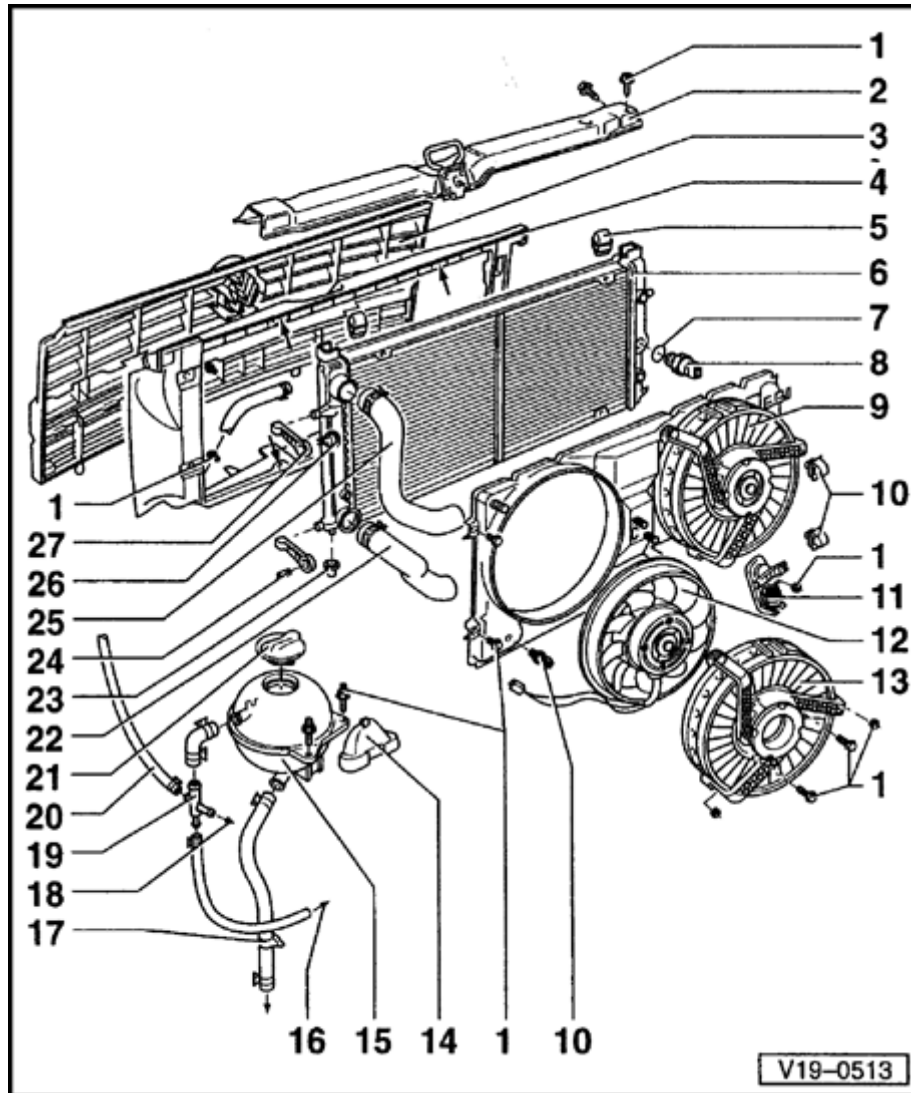
### 18 - To heat exchanger

- ◆ Only vehicles with optional equipment

### 19 - Junction piece

### 20 - Coolant breather hose

- ◆ To top of radiator



### 21 - Cap

- ◆ Check with cooling system tester VAG 1274 and adapter VAG 1274/4
- ◆ Test pressure 1.3 - 1.5 bar

### 22 - Lower coolant hose

- ◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

### 23 - Rubber washer

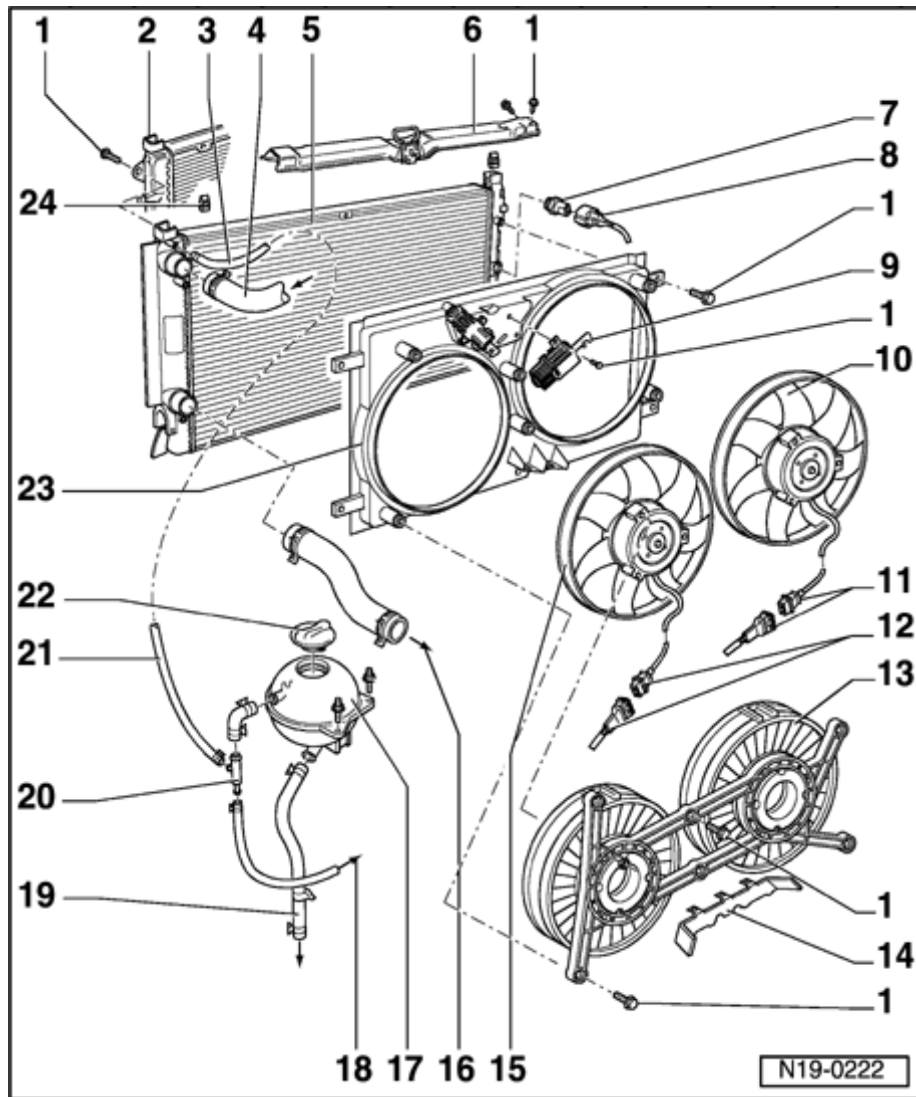
### 24 - Pin

### 25 - Upper coolant hose

- ◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

### 26 - Spreader clip

### 27 - Bracket



### Vehicles 01.96 ➤

1 - 10 Nm

2 - Charge air cooler

3 - Coolant breather hose

4 - Upper coolant hose

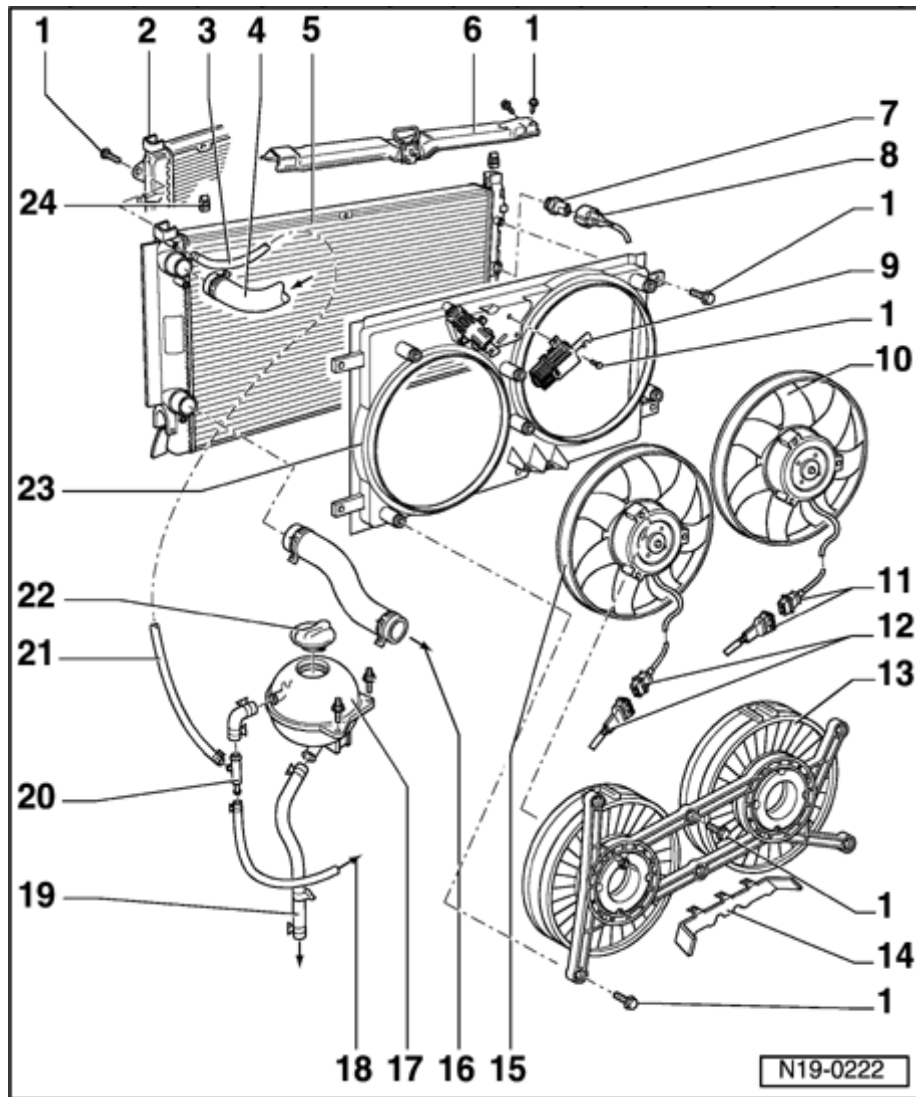
◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

5 - Radiator

◆ Removing and installing ⇒ [Page 19-22](#)

◆ After replacing, replace coolant

6 - Lock carrier



### 7 - Coolant fan control (FC) thermal switch -F18-, 35 Nm

#### ◆ Switching temperatures:

1st speed

on: 84 - 89 °C

off: 76 - 83 °C

2nd speed

on: 90 - 95 °C

off: 82 - 89 °C

### 8 - Connector

#### ◆ Black, 3 pin

#### ◆ For radiator fan thermo switch

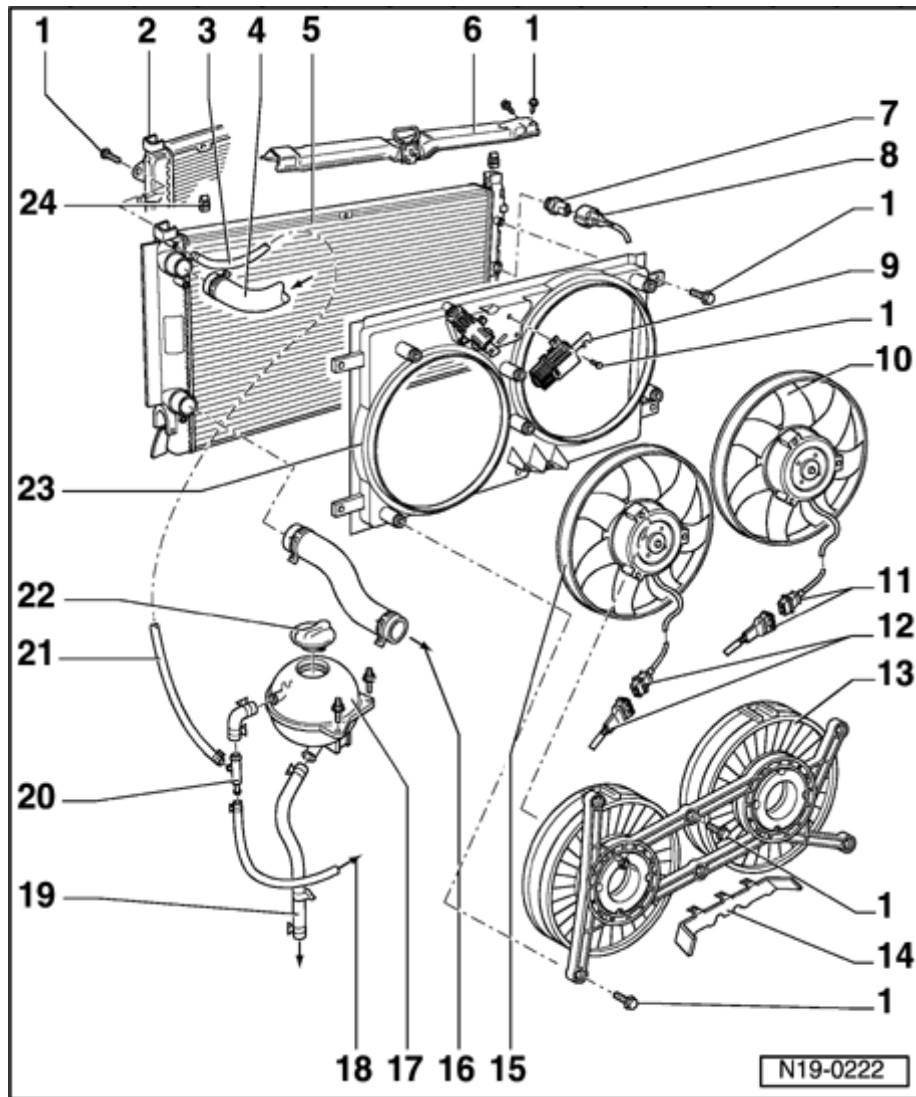
### 9 - Adjusting device

#### ◆ Checking:

Engine cold (coolant temperature below 25 °C) shut-off ring item - 13 - closed

### 10 - Right coolant fan -V35-

#### ◆ Removing and installing ⇒ [Page 19-22](#)



**11 - 2 pin connector**

- ◆ Black
- ◆ For right coolant fan -V35-

**12 - 2 pin connector**

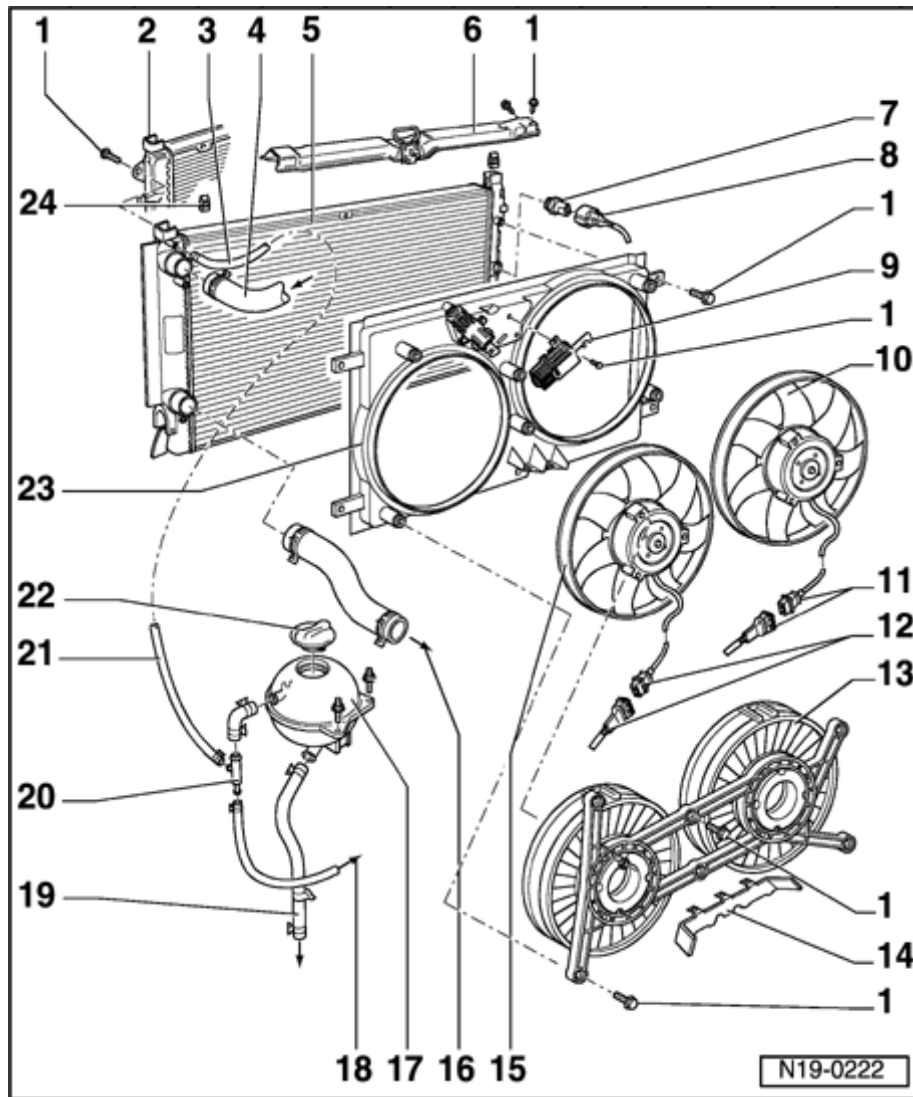
- ◆ Black
- ◆ For left coolant fan -V7-

**13 - Shut-off ring**

**14 - Cable guide**

**15 - Left coolant fan -V7-**

- ◆ Removing and installing ⇒ [Page 19-22](#)



### 16 - Lower coolant hose

- ◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

### 17 - Expansion tank

### 18 - To cylinder head

- ◆ Coolant hose connection diagram ⇒ [Page 19-14](#)

### 19 - To coolant line

### 20 - Junction piece

### 21 - Coolant breather hose

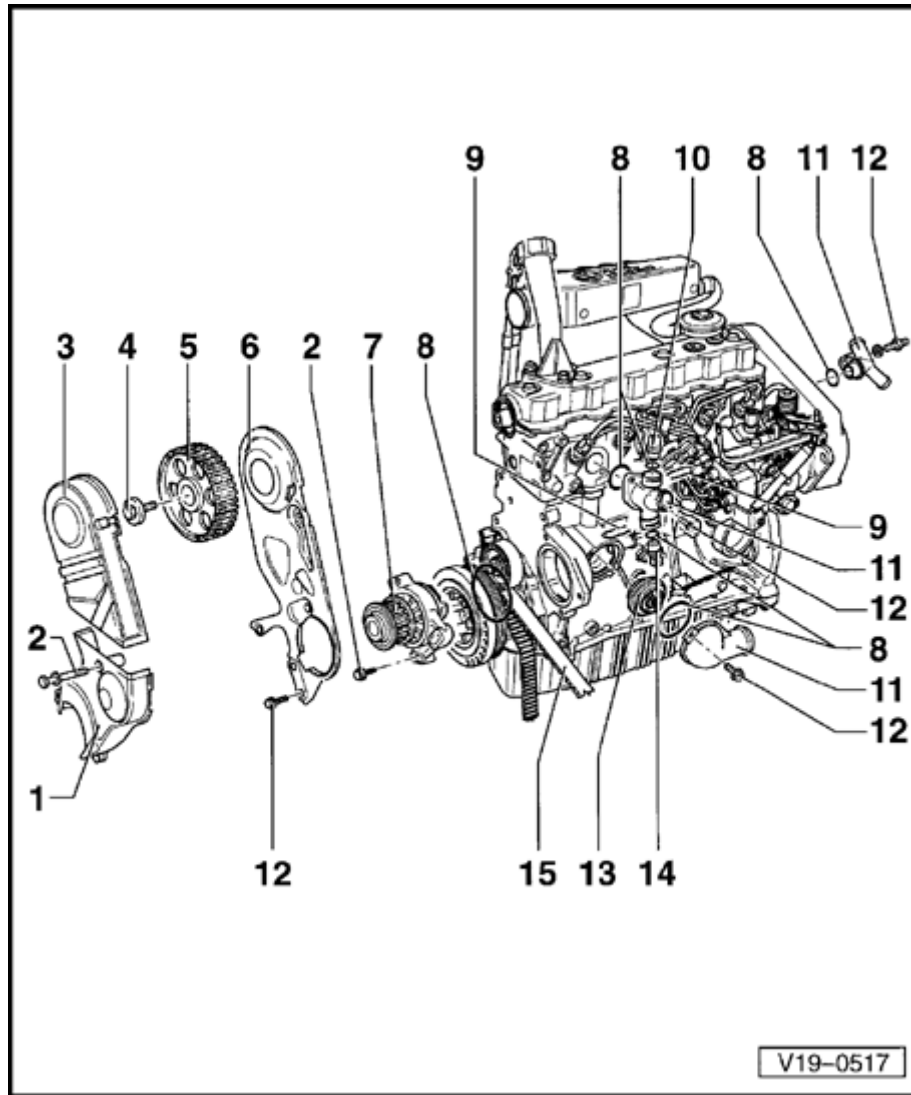
### 22 - Cap

- ◆ Check with cooling system tester VAG 1274 and adapter VAG 1274/4

- ◆ Test pressure 1.3 - 1.5 bar

### 23 - Air intake ducting

### 24 - Securing rubber



## Parts of cooling system - engine side

### 1 - Toothed belt guard - lower part

◆ ➤01.95

### 2 - 20 Nm

### 3 - Toothed belt guard - upper part

### 4 - Camshaft sprocket securing bolt

◆ Observe steel type marking on bolt head:

8.8 = 85 Nm

10.9 = 100 Nm

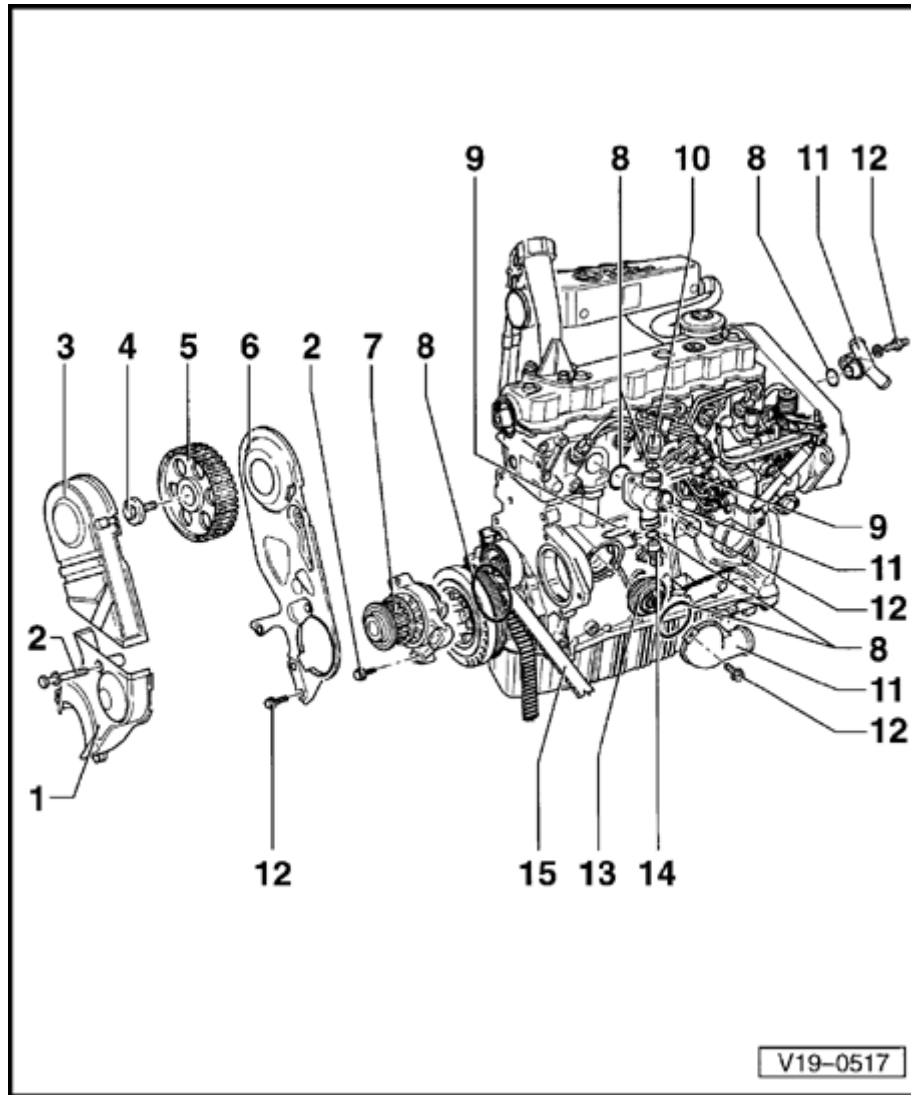
◆ Counter-hold with 3036 to loosen and tighten

### 5 - Camshaft sprocket

◆ Note position when installing toothed belt:

Vehicles ➤01.95 ⇒ [Page 13-34](#) , Removing, installing and tensioning camshaft toothed belt;

Vehicles 02.95 ➤ ⇒ [Page 13-45](#) , Removing, installing and tensioning camshaft toothed belt



### 6 - Rear toothed belt guard

- ◆ ➤01.95
- ◆ 02.95 ➤ ⇒ [Page 13-12](#) , item 5

### 7 - Coolant pump

- ◆ Check for ease of movement
- ◆ Replace complete if damaged or leaking
- ◆ ➤01.95 with elongated holes:

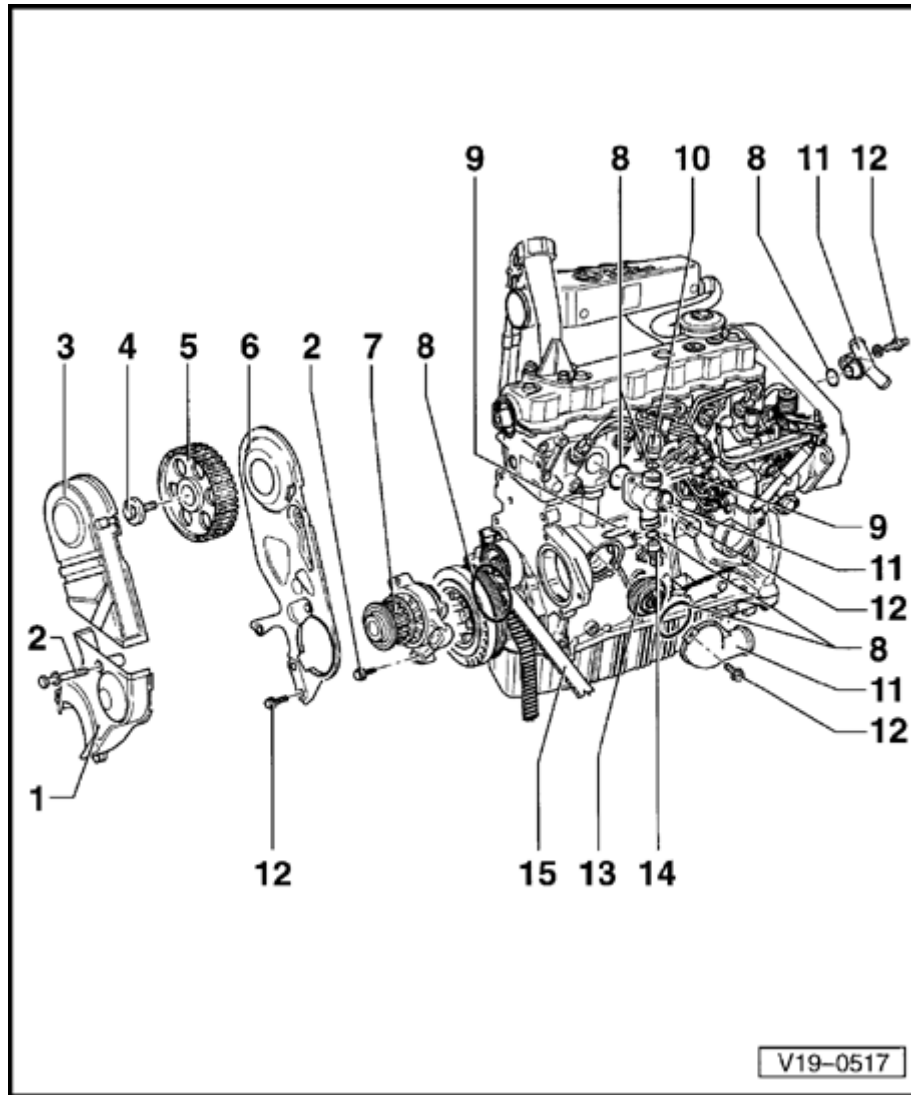
To tension the toothed belt, loosen slightly and turn using a screwdriver ⇒ [Page 13-34](#) , Removing, installing and tensioning camshaft toothed belt

### 8 - O-Ring

- ◆ If leaking and damaged replace

### 9 - Retaining clip

- ◆ Check seated securely



**10 - Coolant circulation engine coolant temperature (ECT) thermal switch -F51- or After-run coolant thermal switch -F95-**

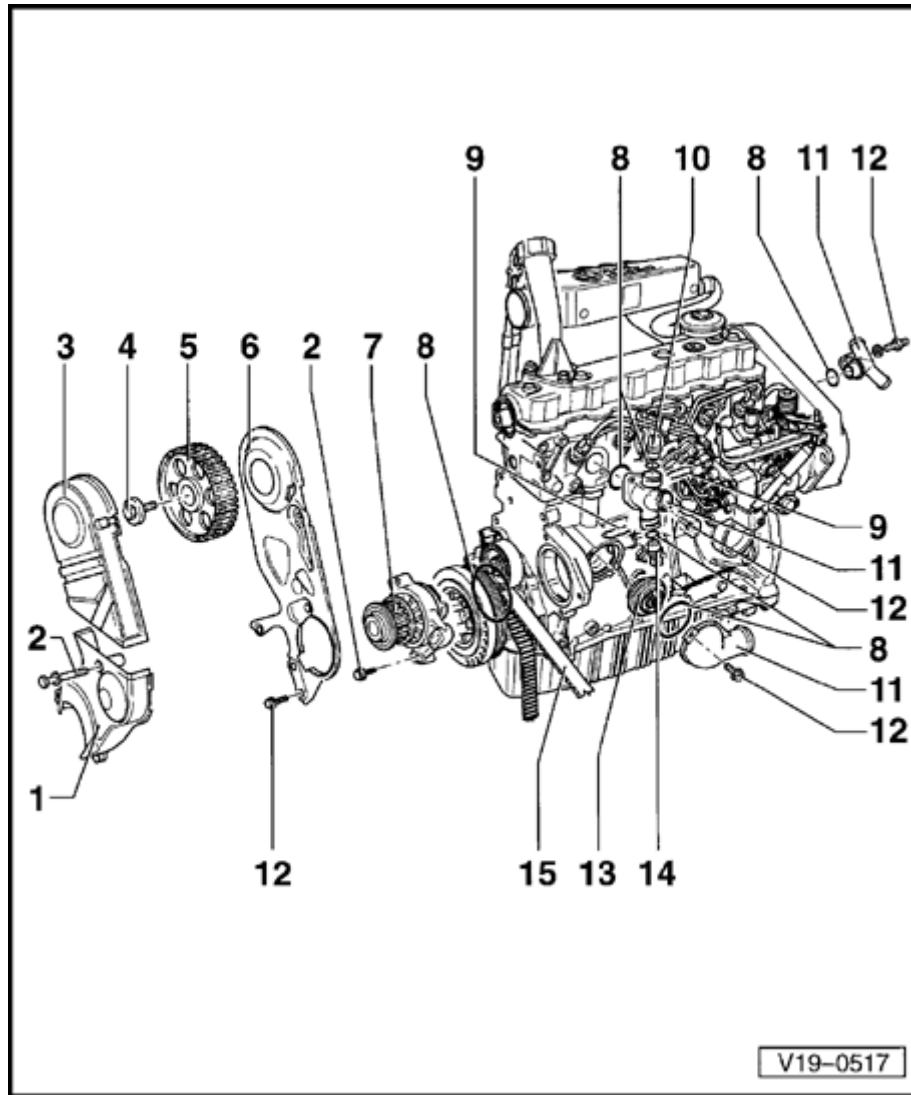
- ◆ Checking engine coolant temperature thermal switch -F51- or after-run coolant thermal switch ⇒ [Page 19-27](#)

**11 - Connection**

**12 - 10 Nm**

**13 - Coolant thermostat**

- ◆ Checking: heat-up thermostat in water
- ◆ Opening commences approx. 87 °C
- ◆ Ends approx. 102 °C
- ◆ Opening lift min. 7 mm



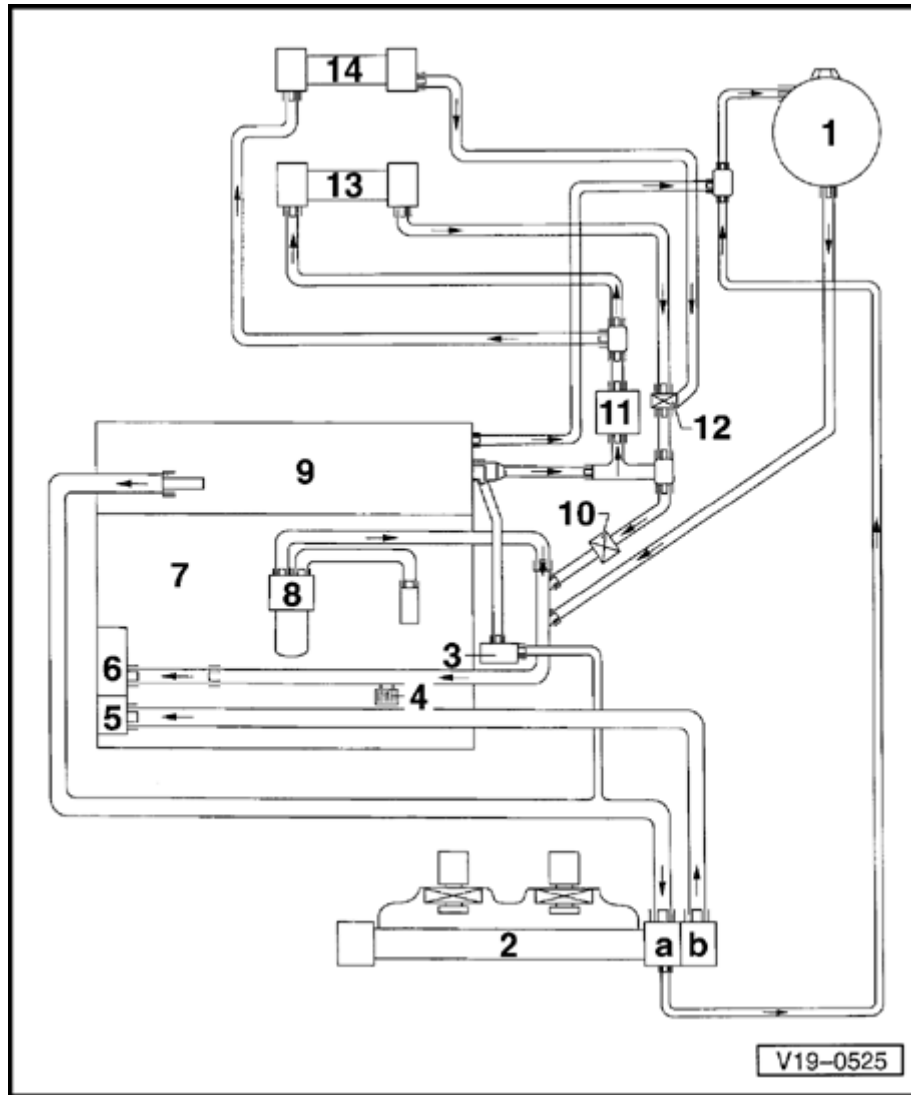
#### 14 - Engine coolant temperature (ECT) sensor -G62-

- ◆ With temperature gauge sensor -G2-
- ◆ Engine code AAB
- ◆ Checking:

⇒ *Electrical Wiring Diagrams, Electrical Malfunction Finding and Installing Locations Binder*

#### 15 - Camshaft toothed belt

- ◆ Mark direction of rotation before removing
- ◆ Check for wear
- ◆ Do not kink
- ◆ Removing, installing and tensioning: Vehicles ➤  
01.95 ⇒ [Page 13-34](#) ; Vehicles 02.95 ➤ ⇒ [Page 13-45](#)



## Coolant hose connection diagram

Vehicles with engine codes AAB, ACV

1 - Expansion tank

2 - Radiator

◆ a = top

◆ b = bottom

3 - Coolant pump -V50- or after-run coolant pump - V51-

◆ Checking ⇒ [Page 19-27](#)

4 - Drain screw, 10 Nm

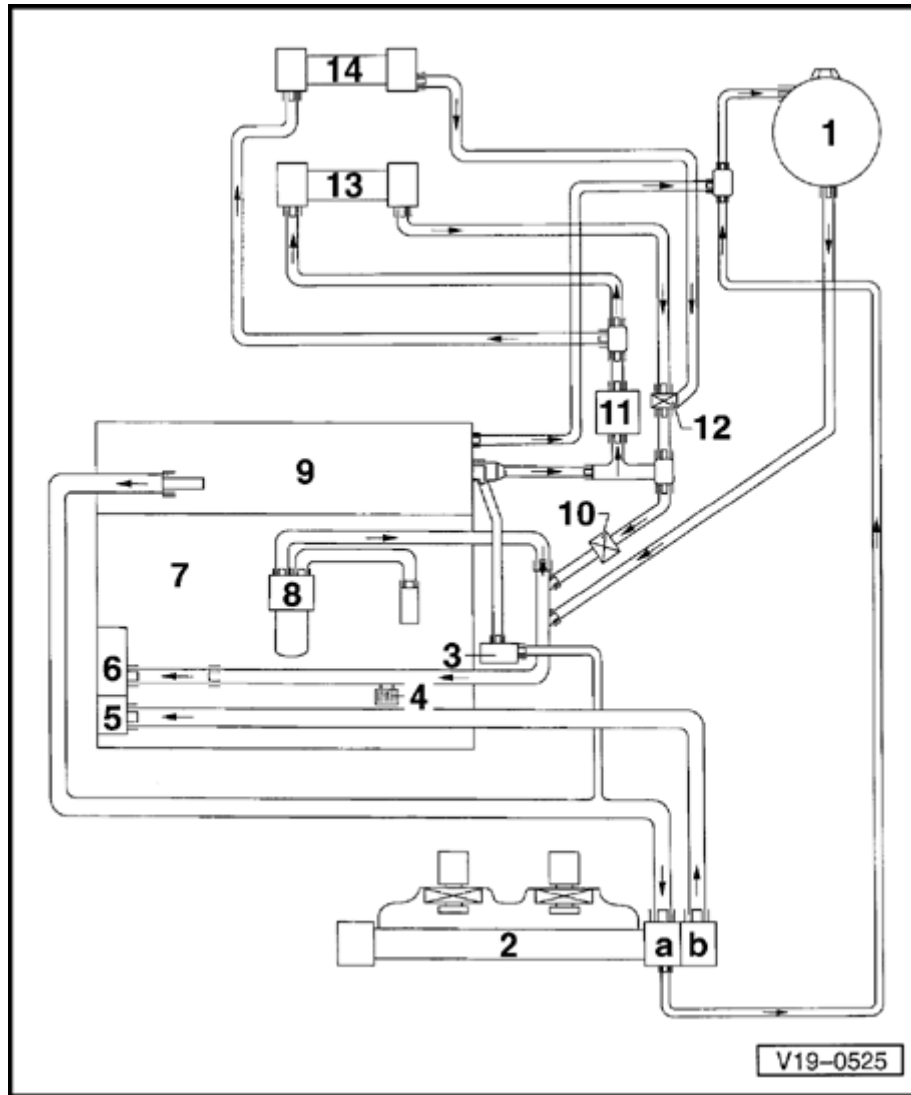
5 - Coolant thermostat

6 - Coolant pump

7 - Cylinder block

8 - Oil cooler

9 - Cylinder head



#### 10 - Solenoid valve

- ◆ Only vehicles with optional equipment

#### 11 - Additional heater

- ◆ Only vehicles with optional equipment

#### 12 - Control valve

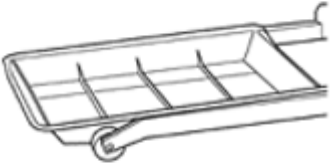


- ◆ Only vehicles with optional equipment

#### 13 - Heating system heat exchanger

#### 14 - Additional heat exchanger

- ◆ Only vehicles with optional equipment



<p>V.A.G 1306</p> 	<p>V.A.G 1331</p> 
<p>V.A.G 1921</p> 	
	<p>W19-0001</p>

## Coolant, draining and filling

### Special tools and equipment required

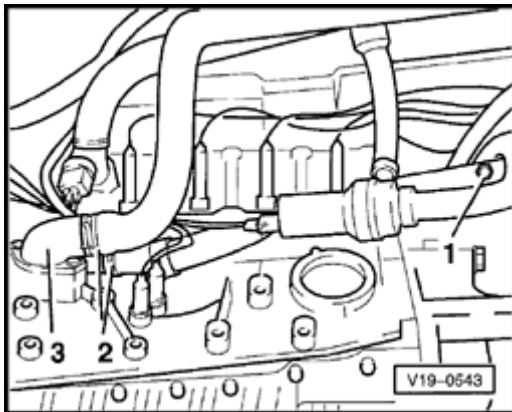
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAG 1921 Spring-type clip pliers
- ◆ Anti-freeze tester



## Draining

- Remove cap from coolant expansion tank.
- Remove insulation tray:

⇒ [Repair Manual , Body Exterior, Repair Group 50; Removing and installing lock carrier with attachments](#)



A

- Drain coolant:
  - ◆ Either via drain plug -1- and coolant hose -2-,
  - ◆ or via thermostat connection -3-.

If the cooling system was filled with G 11 anti-freeze -colored green-:

- Before reinstalling the coolant hose or flange and filling with new anti-freeze G 12 -colored red-, the cooling system must be flushed out.
- Remove as much of the coolant remains as is possible from the cooling system. To do this e.g. blow compressed air into the coolant expansion tank.
- Close cooling system and top off with with pure water.



- Run engine at idling speed for approx. 2 minutes.
- Drain off coolant and blow out the cooling system again with compressed air.

**Note:**

*Observe disposal regulations!*

- Insert drain plug and tighten to 10 Nm.

**Filling**

**Note:**

- ◆ *When refilling the coolant system only use G 12.*
- ◆ *The frost and corrosion protection additive G 11 must only be used for topping off purposes, when the cooling system is still filled with G 11.*

*Identification: Green in color*

- ◆ *On no account must G 12 be mixed with other coolant additives!*

**WARNING!**

***On no account must the coolant additives -G 11- and -G 12- be mixed. If these additives are mixed it will cause serious engine damage.***



- ◆ *If the fluid in expansion tank is brown, G 12 has been mixed with other coolant. In this case the coolant must be changed.*
- ◆ *G 12 (G 11) and coolant additives marked "In accordance with TL VW 774 D (C)" prevent frost and corrosion damage, scaling and also raise boiling point of the coolant. For this reason the system must be filled all year round with frost and corrosion protection additives.*
- ◆ *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- ◆ *Protection against frost must be assured to about -25 ° C (in arctic climatic countries to about -35 ° C).*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The anti-freeze ratio must be at least 40%.*
- ◆ *If for climatic reasons a greater frost protection is required, the amount of G 12 can be*

*increased, but only up to 60% (frost protection to about -40° C), otherwise frost protection is reduced again and cooling effectiveness is also reduced.*

- ◆ *If radiator, heat exchanger, cylinder head or cylinder head gasket is replaced, do not reuse old coolant.*



Recommended mixture ratios:

Frost protection to	Anti-freeze amount <sup>1)</sup>	G 11 <sup>2)</sup>	Water <sup>2)</sup>
-25 °C	40 %	3.6 ltr.	5.4 ltr.
-35 °C	50 %	4.5 ltr.	4.5 ltr.

1) The amount of anti-freeze must not exceed 60%; frost protection and cooling effect will decrease if amount of anti-freeze is too high.

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

- Open bleeder screw in coolant hose to heat exchanger.

- Press down top radiator hose.

- Slowly fill with coolant up to max. mark on expansion tank (filling time approx. 5 minutes).

- Close bleeder screw.



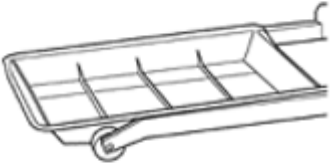


A

- Start engine and run at approx. 1500 rpm for max. 2 minutes and at the same time fill with coolant up to over-flow hole on expansion tank.



- Install expansion tank cap.
  
- Run engine until radiator fan cuts-in.
  
- Check coolant level and top off if necessary.  
When the engine is at normal operating temperature, the coolant level must be on the max. mark, when the engine is cold, between the min. and max. marks.



<p>V.A.G 1306</p> 	<p>V.A.G 1331</p> 
<p>V.A.G 1921</p> 	
	<p>W19-0001</p>

## Radiator and fan, removing and installing

### Special tools and equipment required

- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5 - 50 Nm)
- ◆ VAG 1921 Spring-type clip pliers
- ◆ Anti-freeze tester



## Removing

- Removing insulation tray:

⇒ [Repair Manual , Body Exterior, Repair Group 50; Body front](#)

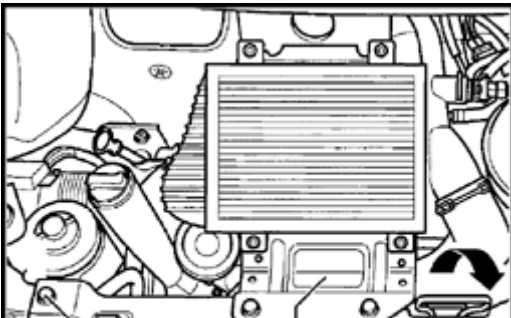
- Drain coolant ⇒ [Page 19-16](#)
- Remove coolant hoses off radiator using hose clip pliers VAG 1921.
- Disconnect connectors off engine coolant temperature (ECT) thermal switch -F51- and coolant fan.

## Engine code ACV

A

- Remove charge air cooler bracket -1-.
- Remove charge air cooler with air hoses ⇒ [Page 21-7](#) , Removing and installing parts of charge air cooling system.

**Continued for all vehicles**



- Removing radiator grille:

⇒ [\*Repair Manual , Body Exterior, Repair Group 66; Trims\*](#)



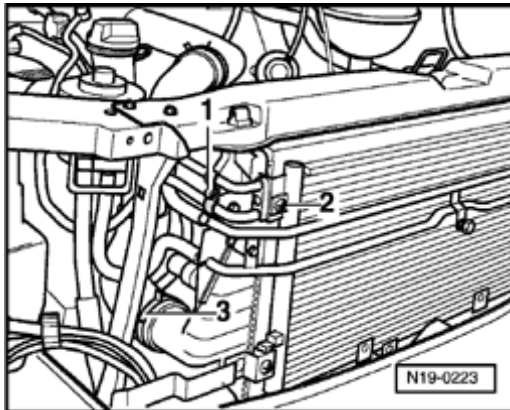
### Vehicles 10.91 ➤

- Disconnect power steering hydraulic line from radiator.

### Vehicles with air conditioner

#### **Note:**

Observe additional information and removal work  
⇒ [Page 19-26](#) .



A

- Remove retaining clamp -1- from refrigerant lines.
- Remove securing screws -2- on left and right of condenser.
- Lift condenser out of brackets and place on cross member.

### Continued for all vehicles

- Unclip radiator/charge air cooler securing rubber from lock carrier.
- Remove lock carrier:

⇒ [Repair Manual , Body Exterior, Repair Group 50; Removing and installing lock carrier with its attachments](#)



### Continued for all vehicles

- Lift out radiator with fan and air guide.

### Installing

Installation is carried out in the reverse order, when doing this note the following:

- Fill with coolant ⇒ [Page 19-16](#)

Electrical connections and routing:

⇒ *Repair Manual, Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Check headlight adjustment and adjust if necessary:

⇒ [Repair Manual, Maintenance](#)



**Additional information and removal work on vehicles with air conditioner**

***WARNING!***


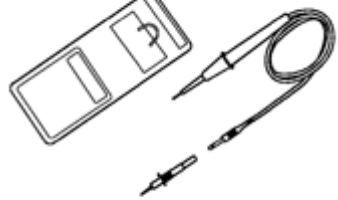
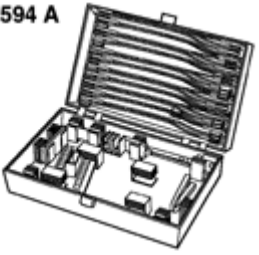
***The air conditioner refrigerant circuit must not be opened.***

**Note:**

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

- Unbolt condenser and secure to body so that refrigerant lines/hoses are not stressed.



<p>V.A.G 1526 A</p> 	<p>V.A.G 1527 B</p> 
<p>V.A.G 1594 A</p> 	
	<p>W19-0005</p>

## Coolant circulation engine coolant temperature (ECT) thermal switch -F51- or after-run coolant thermal switch -F95-, checking

### Special tools and equipment required

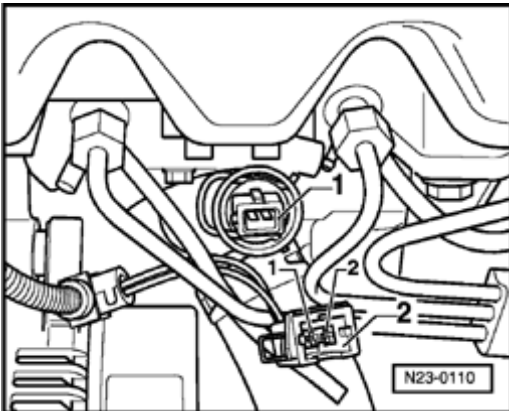
- ◆ VAG 1526 Multimeter
- ◆ VAG 1527 B LED voltage tester
- ◆ VAG 1594 A Adapter set
- ◆ Wiring diagram



## Test sequence

- Remove insulation tray:

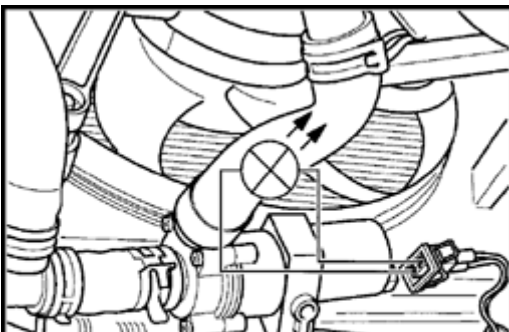
⇒ [Repair Manual , Body Exterior, Repair Group 50; Noise insulation assembly overview](#)



A

- Disconnect 2-pin connector -2- off thermal switch for after-run coolant thermal switch -F95- -1-.
  - Bridge contacts 1 and 2 of connector -2- using auxiliary cables from VAG 1594 A.
- Coolant circulation pump must start.

When coolant circulation pump does not run:



A

- Disconnect 2-pin connector from coolant pump -V50- or continued after-run coolant pump -V51- -1- and connect LED voltage tester VAG 1527 with aux. cables from VAG 1594 to disconnected connector.

The LED must flash or light up.

LED flashes or lights up (voltage supply OK.):

- Replace coolant pump -V50- or after-run coolant pump -V51-.

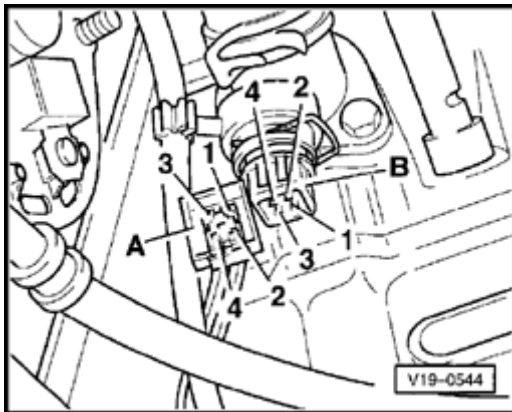


If LED does not light up or flash:

- Locate and correct open circuit using wiring diagrams:

⇒ *Wiring diagrams, Electrical Troubleshooting and Installing Locations Binder*

### Checking thermal switch resistance



A

- Connect multimeter VAG 1526 or multimeter VAG 1715 using cables from VAG 1594 to thermal switch -B- connector contacts -1- and -4- to measure resistance.

- Specifications:

below approx. 103 °C = ∞ Ω

above approx.: 104 °C = 0 Ω

If the specifications are not attained:

- Replace coolant circulation engine coolant temperature (ECT) thermal switch -F51- or after-run coolant thermal switch -F95- with engine coolant temperature (ECT) sensor -G2-.