

## Cooling system component servicing

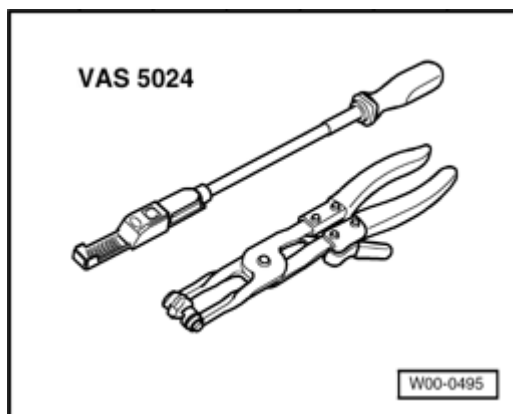
### **CAUTION!**

**When performing repair work, especially to the confined conditions in the engine compartment, pay attention to the following:**

- ◆ **Route all types of lines (e.g. for fuel, hydraulics, EVAP system, coolant, refrigerant, brake fluid and vacuum) as close as possible to the original positions so that the original positions are restored.**
- ◆ **Make sure sufficient clearance to all moving or hot components.**

### **Note:**

- ◆ *When the engine is warm the cooling system is under pressure. If necessary release pressure before commencing repair work.*
- ◆ *Hoses are secured with spring-type clips; in cases of repair only use spring-type clip.*
- ◆ *Assembly tool VAS 5024 or hose clip pliers VAG 1921 are recommended for installing spring-type clips.*
- ◆ *When installing coolant hoses route them so that they do not come into contact with other components (observe markings on coolant connection and hose).*



Perform cooling system leakage test with cooling system tester VAG 1274 and adapters VAG 1274/8 and VAG 1274/9.

Parts of cooling system, body side ⇒ [Page 19-3](#) .

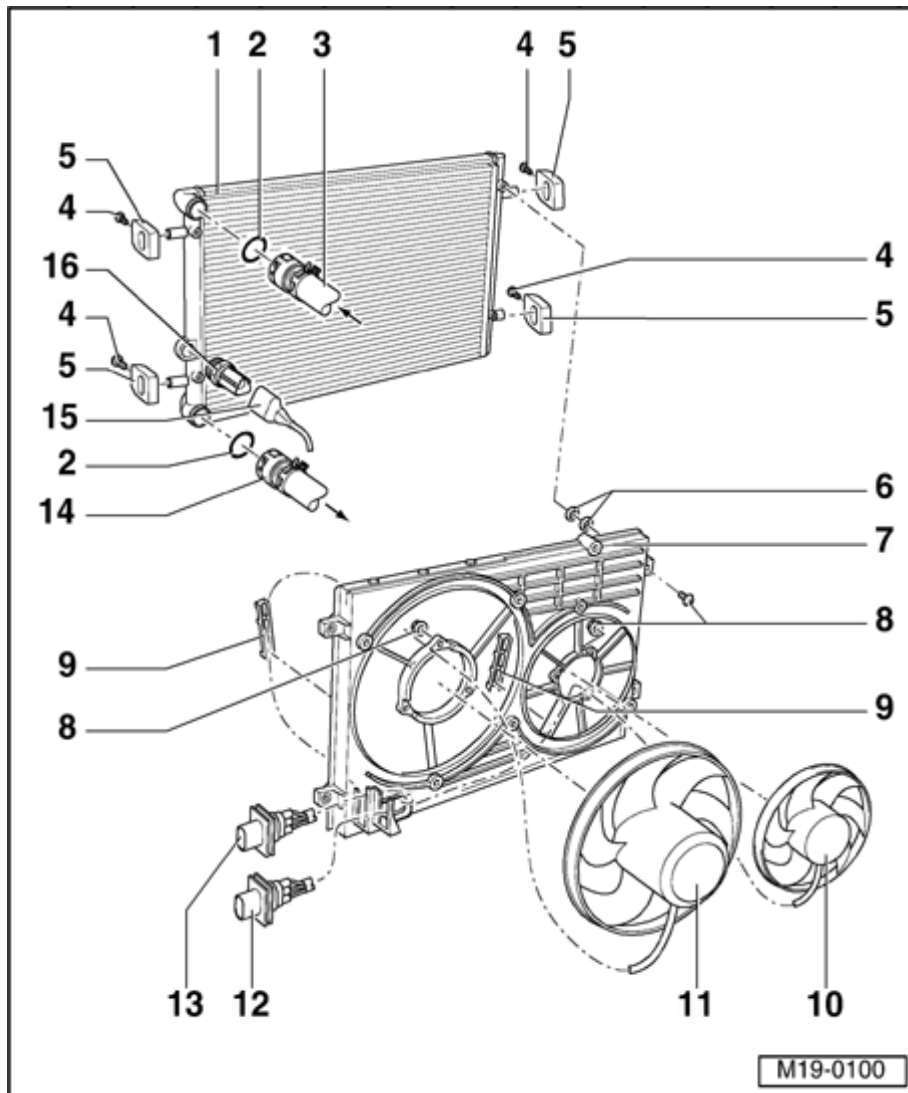
Parts of cooling system, engine side ⇒ [Page 19-6](#) .

Coolant hose connection diagram ⇒ [Page 19-11](#)

Disassembling and assembling coolant thermostat housing ⇒ Page ⇒ [Page 19-13](#) .

Draining and filling coolant ⇒ [Page 19-15](#) .

Coolant mixing ratios ⇒ [Page 19-15](#) ,  
Draining and filling coolant.



## Components of cooling system, body side

### 1 - Radiator

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

- ◆ After replacement also replace entire coolant

### 2 - O-ring

- ◆ Replace if damaged

### 3 - Upper coolant hose

- ◆ Secured to radiator with a quick release coupling
- ◆ Check seated securely

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

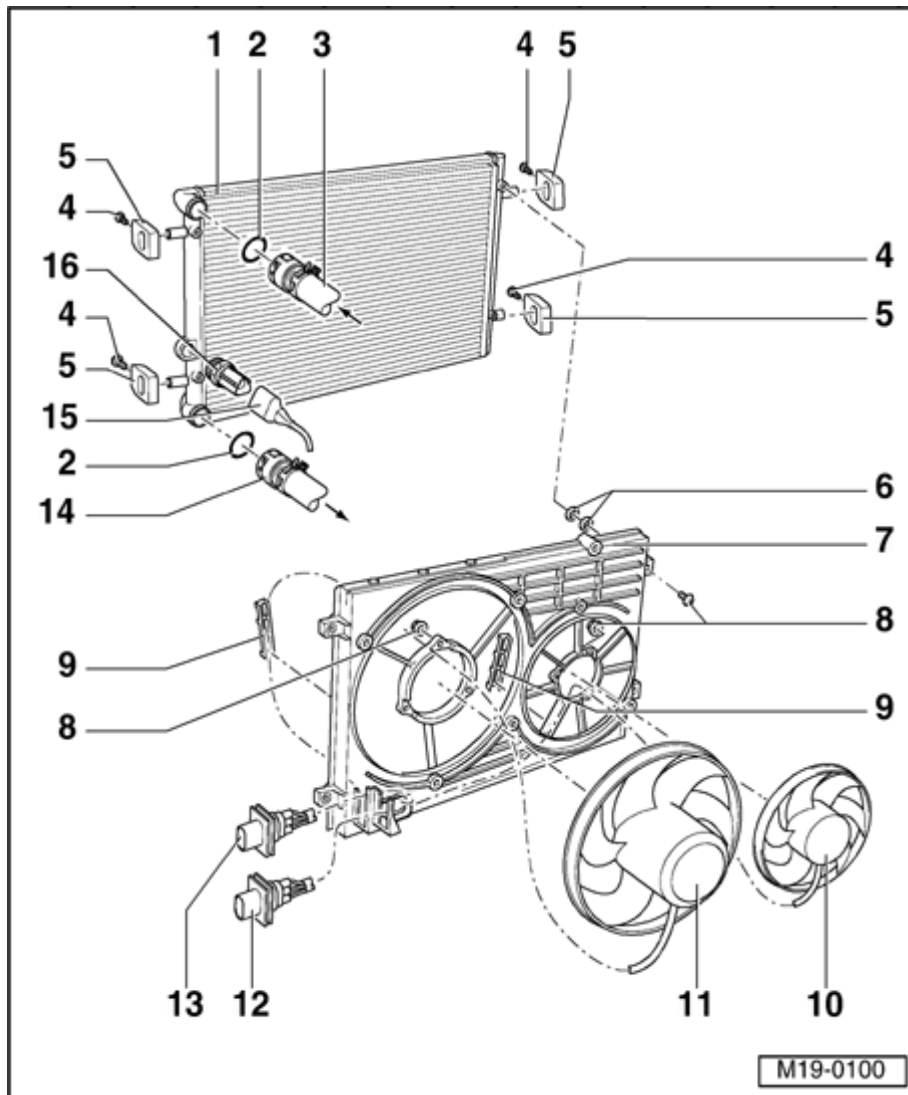
### 4 - 15 Nm

### 5 - Bracket

- ◆ For radiator

- ◆ Observe installation position

**6 - Washer**



**7 - Air ducting**

**8 - 5 Nm**

**9 - Retaining clip**

- ◆ Check for secure seating

**10 - Right coolant fan - V35-**

- ◆ Checking ⇒ [Page 19-31](#)

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

**11 - Coolant fan -V7-**

- ◆ Checking ⇒ [Page 19-31](#)

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

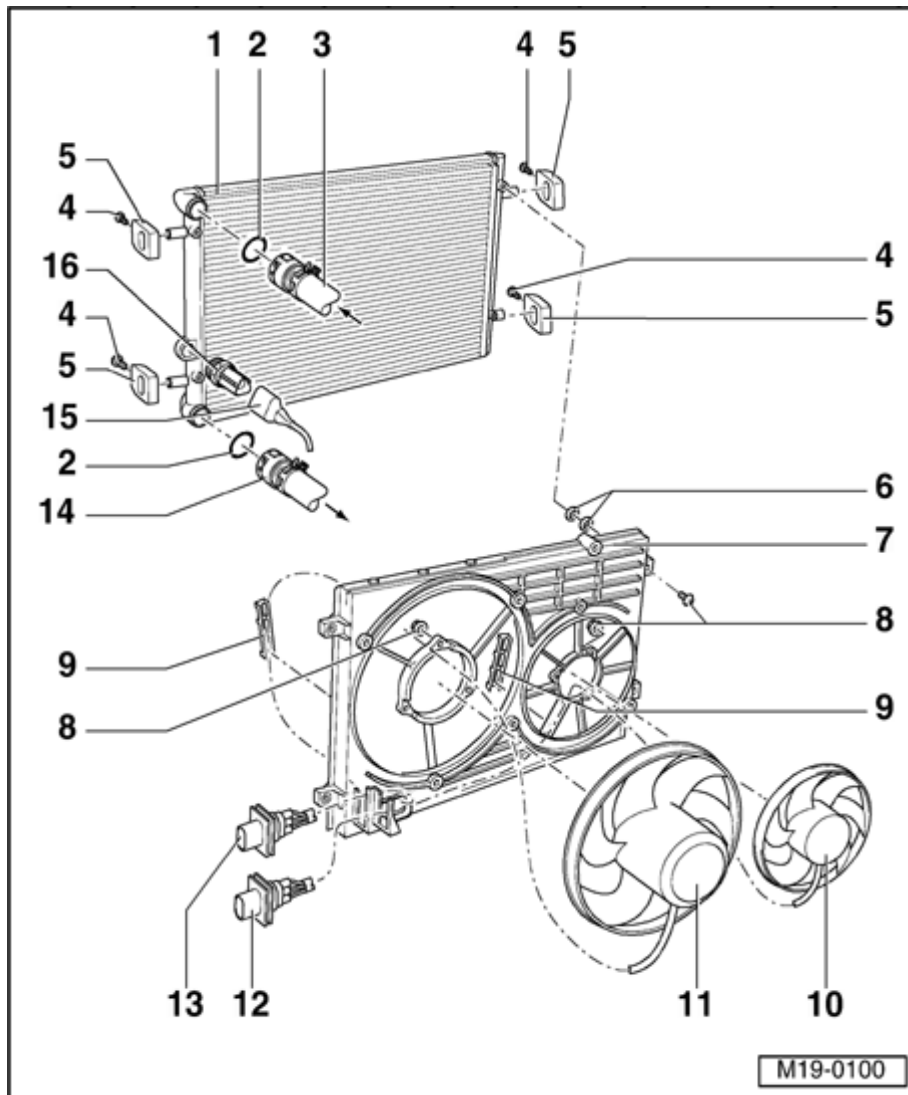
**12 - Connector**

- ◆ For Right coolant fan - V35-

**13 - Connector**

- ◆ For Coolant

fan -  
V7-



#### 14 - Lower coolant hose

- ◆ Secured to radiator with a quick release coupling

- ◆ Check seated securely

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

#### 15 - Connector

- ◆ For Coolant Fan Control (FC) Thermal switch - F18-

#### 16 - Coolant Fan Control (FC) Thermal switch - F18-, 35 Nm

- ◆ For electric fan

- ◆ Switching temperatures:

1st speed

-

On:

92...97

° C, Off:

84...91

° C

2nd.

speed -

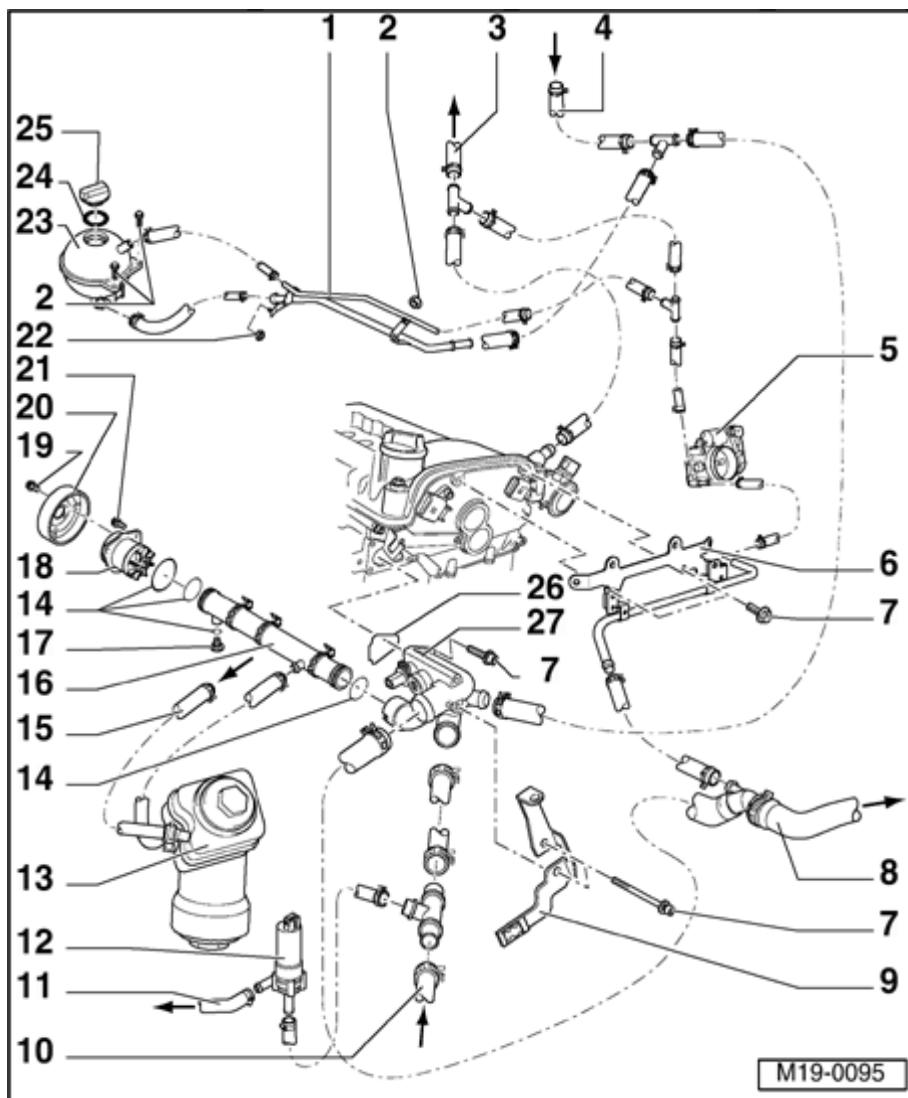
On:

99...105

° C, Off:

91...98

° C



## Components of cooling system, engine side

### 1 - Coolant pipe

- ◆ Secured to exhaust gas manifold together with heat shield

### 2 - 10 Nm

### 3 - To heat exchanger

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

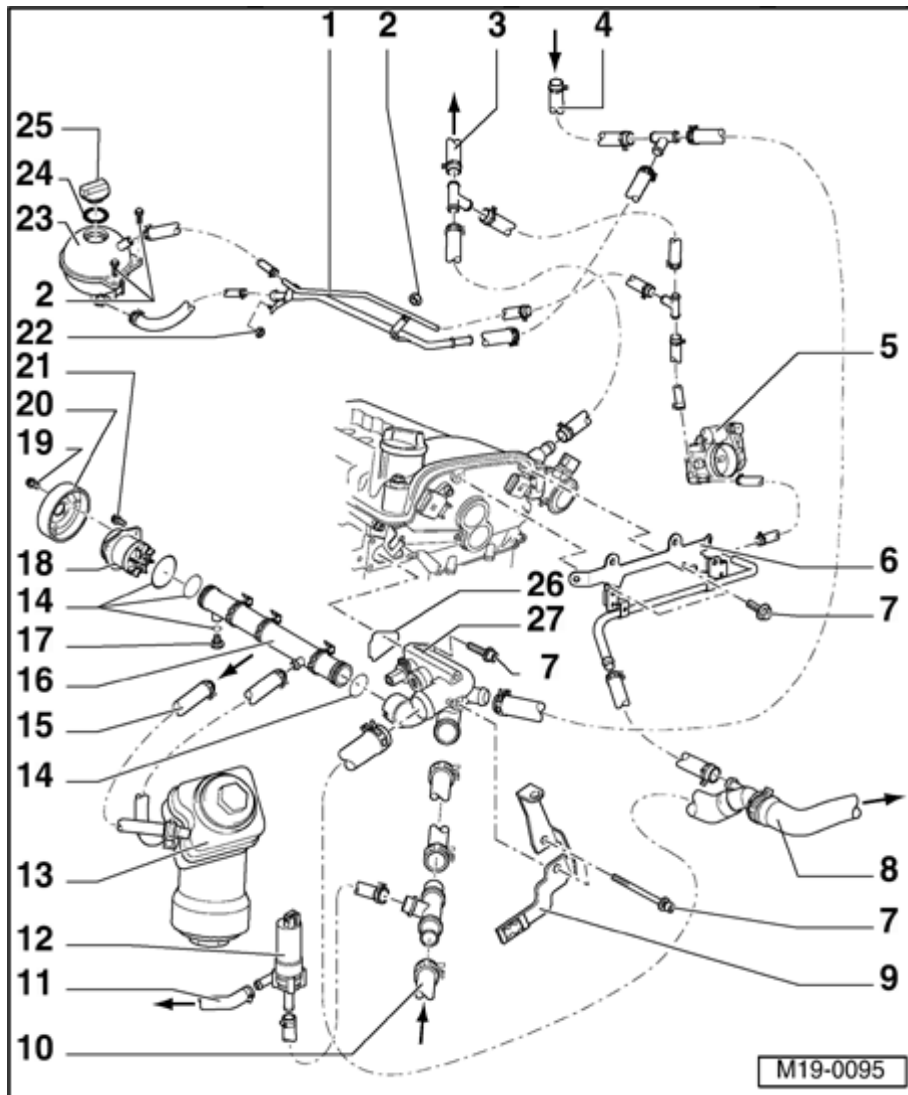
### 4 - From heat exchanger

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

### 5 - Throttle valve control module -J338-

- ◆ Heated by coolant
- ◆ Removing and installing:

⇒ [Repair  
Manual, 2.8  
Liter VR6 4V  
Fuel Injection &  
Ignition, Engine  
Code\(s\): BDF,  
Repair Group  
24](#)



### 6 - Cable guide

- ◆ For coolant hoses and wiring harness

### 7 - 8 Nm

### 8 - Upper coolant hose

- ◆ To top off radiator
- ◆ Check for secure seating

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

### 9 - Bracket

- ◆ For wiring harness

### 10 - Lower coolant hose

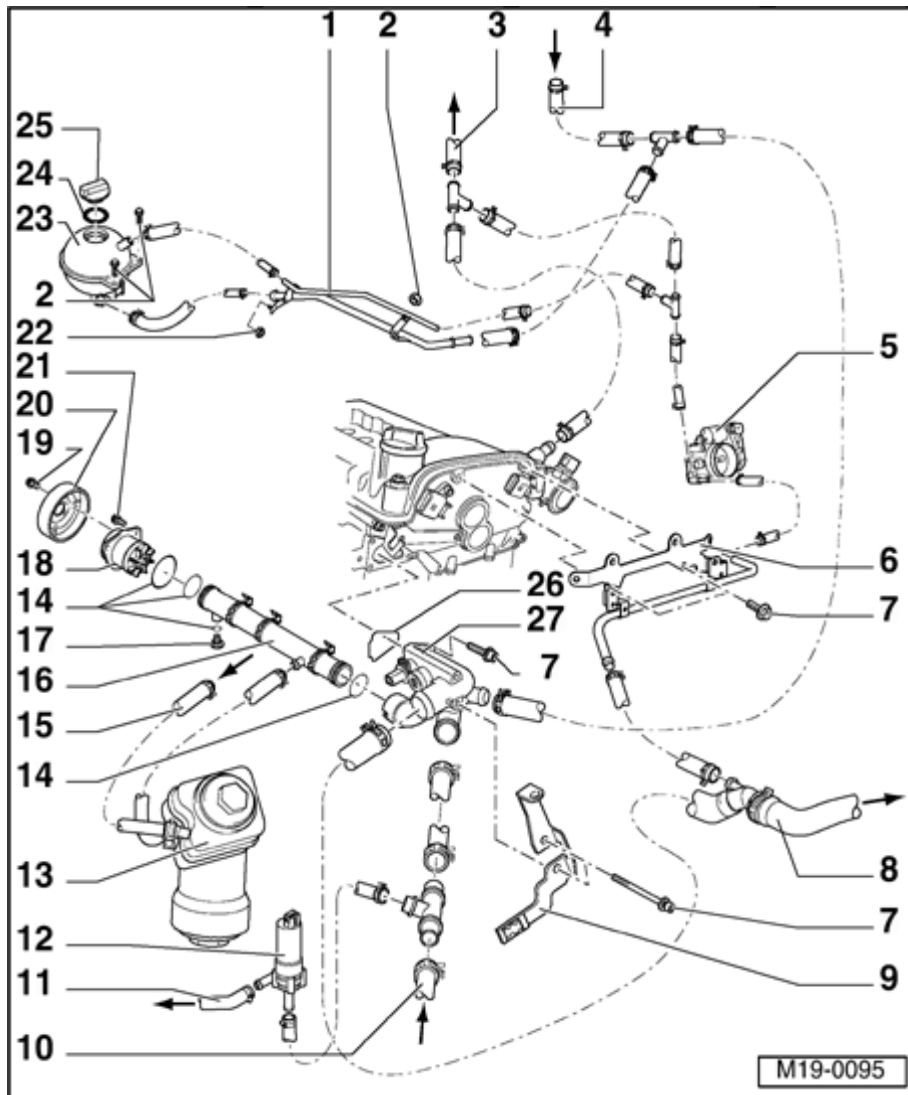
- ◆ From bottom of radiator
- ◆ Check for secure seating

- ◆ Coolant hose

connection  
diagram ⇒  
[Page 19-  
11](#)

**11 - To  
cylinder  
block**

◆ Coolant  
hose  
connection  
diagram ⇒  
[Page 19-  
11](#)



### 12 - After-Run Coolant pump - V51-

- ◆ Secured to cylinder block by a bracket
- ◆ Checking ⇒ [Page 19-33](#)

### 13 - Oil cooler

- ◆ Disassembling and assembling ⇒ [Page 17-9](#), Disassembling and assembling oil filter housing

### 14 - O-ring

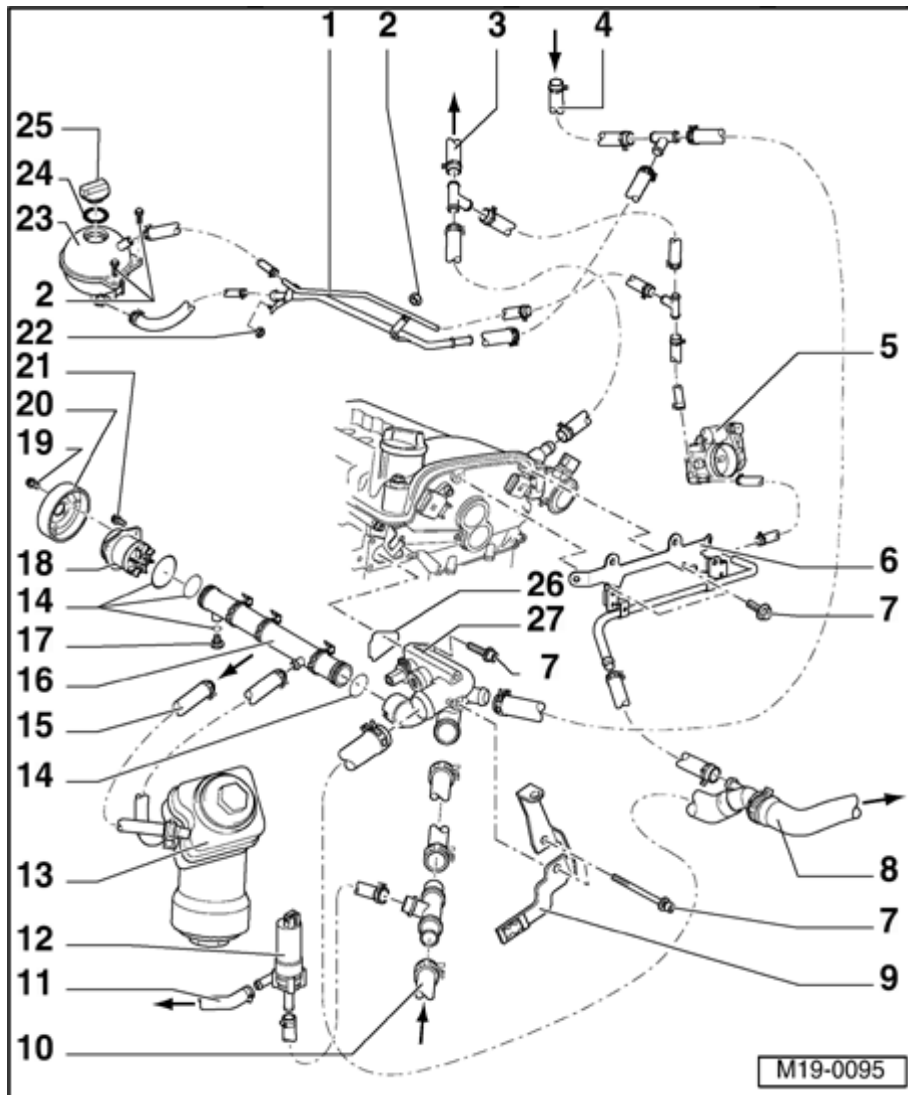
- ◆ Replace

### 15 - From cylinder block

- ◆ Coolant hose connection diagram ⇒ [Page 19-11](#)

### 16 - Coolant pipe

### 17 - Sealing plug, 2 Nm



### 18 - Coolant pump

- ◆ Observe installation position
- ◆ Check for ease of movement
- ◆ If damaged or leaking replace complete
- ◆ Removing and installing ⇒ [Page 19-26](#)

19 - 20 Nm

### 20 - Belt pulley

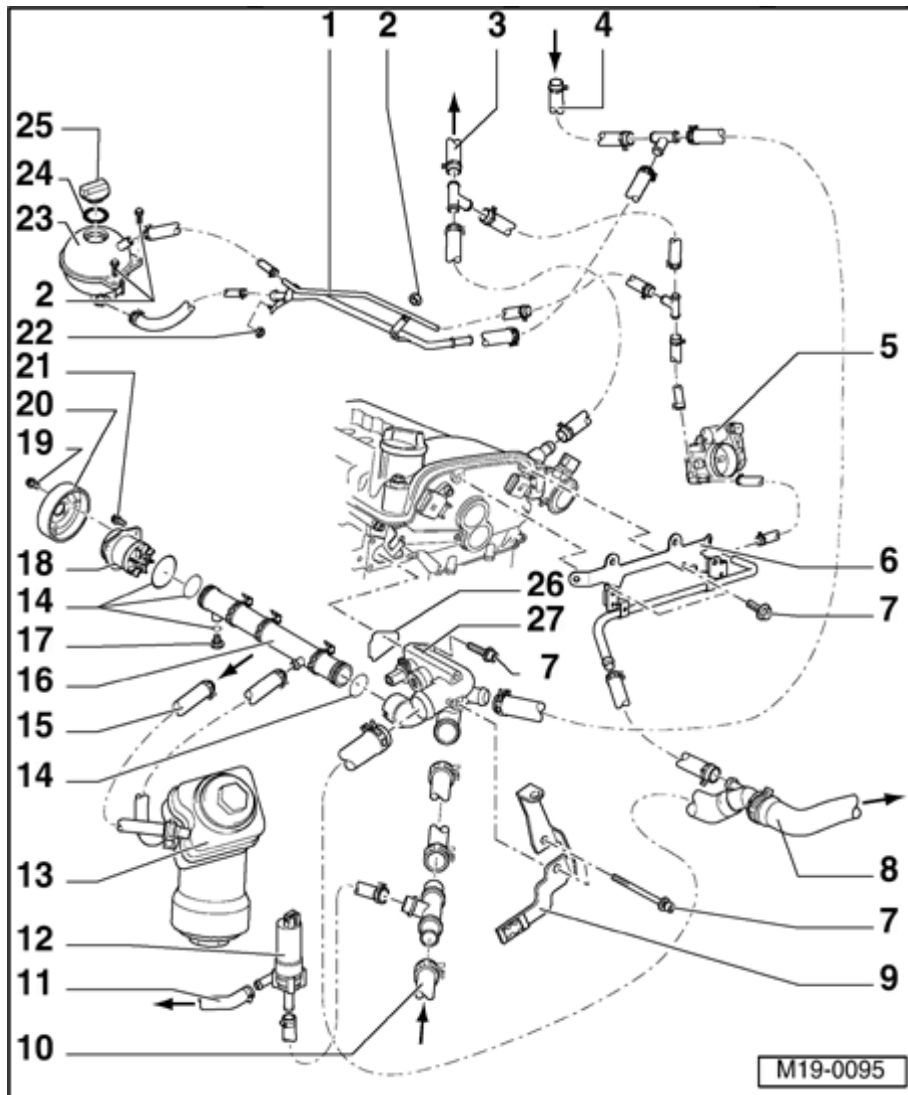
- ◆ For coolant pump
- ◆ Removing and installing ribbed belt ⇒ [Page 13-19](#)
- ◆ Removing and installing ⇒ [Page 19-26](#), Removing and installing coolant pump

21 - 20 Nm

- ◆ Use coolant pump wrench VAG 1590 to loosen and tighten ⇒ [Page 19-26](#) , Removing and installing coolant pump

**22 - 25 Nm**

19-10



### 23 - Expansion tank

- ◆ Perform leak test on cooling system with cooling system tester VAG 1274 and adapter VAG1274/8
- ◆ Test pressure: 1.4...1.6 bar
- ◆ Observe markings ⇒ [Page 19-15](#), Draining and filling cooling system

### 24 - Seal

- ◆ Replace if damaged

### 25 - Sealing cap

- ◆ Check with cooling system tester VAG 1274 and adapter VAG 1274/9
- ◆ Pressure relief valve must

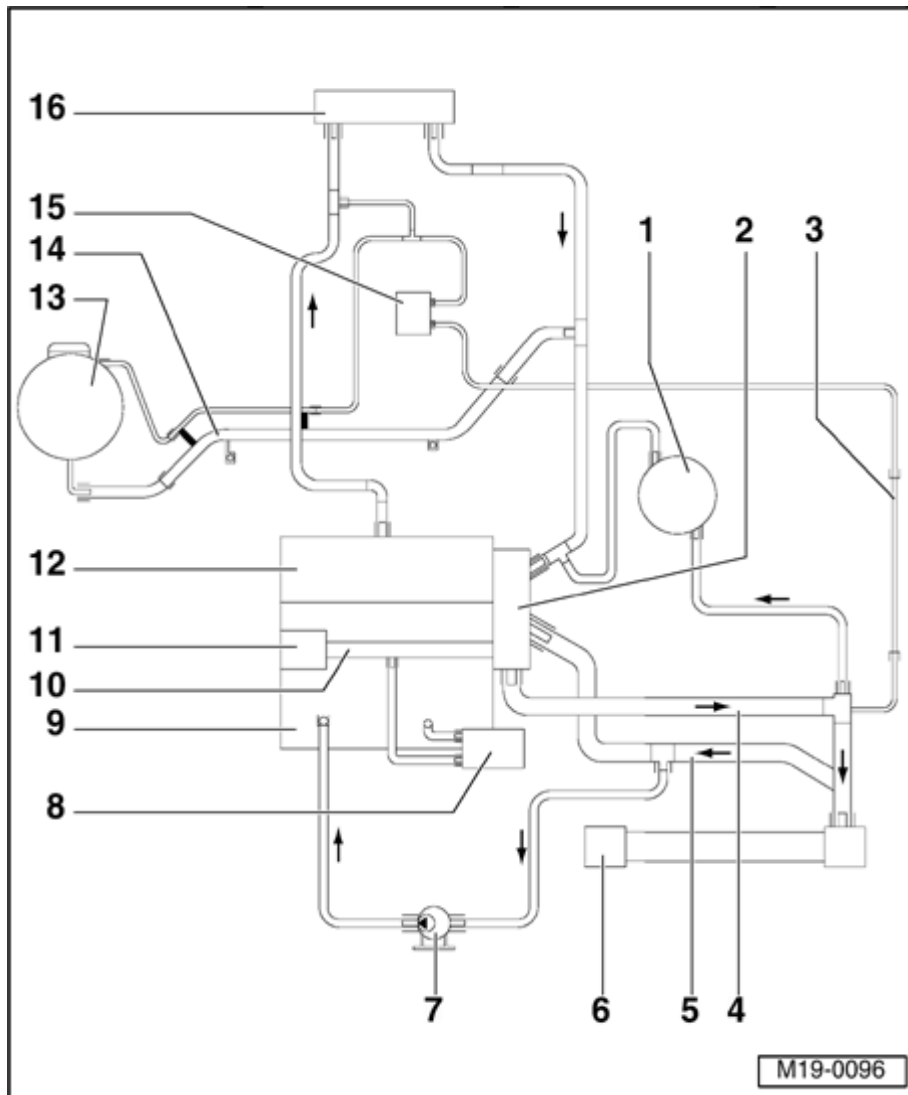
open at a  
pressure  
of  
1.4...1.6  
bar

**26 - Seal**

- ◆ Replace

**27 - Thermostat  
housing**

- ◆ Disassembling  
and  
assembling ⇒  
[Page 19-13](#)



### Coolant hose connection diagram

#### 1 Transmission - oil cooler

- ◆ Only models with an automatic transmission

#### 2 - Thermostat housing

#### 3 - Cable guide

- ◆ For coolant hoses and wiring harness

#### 4 - Upper coolant hose

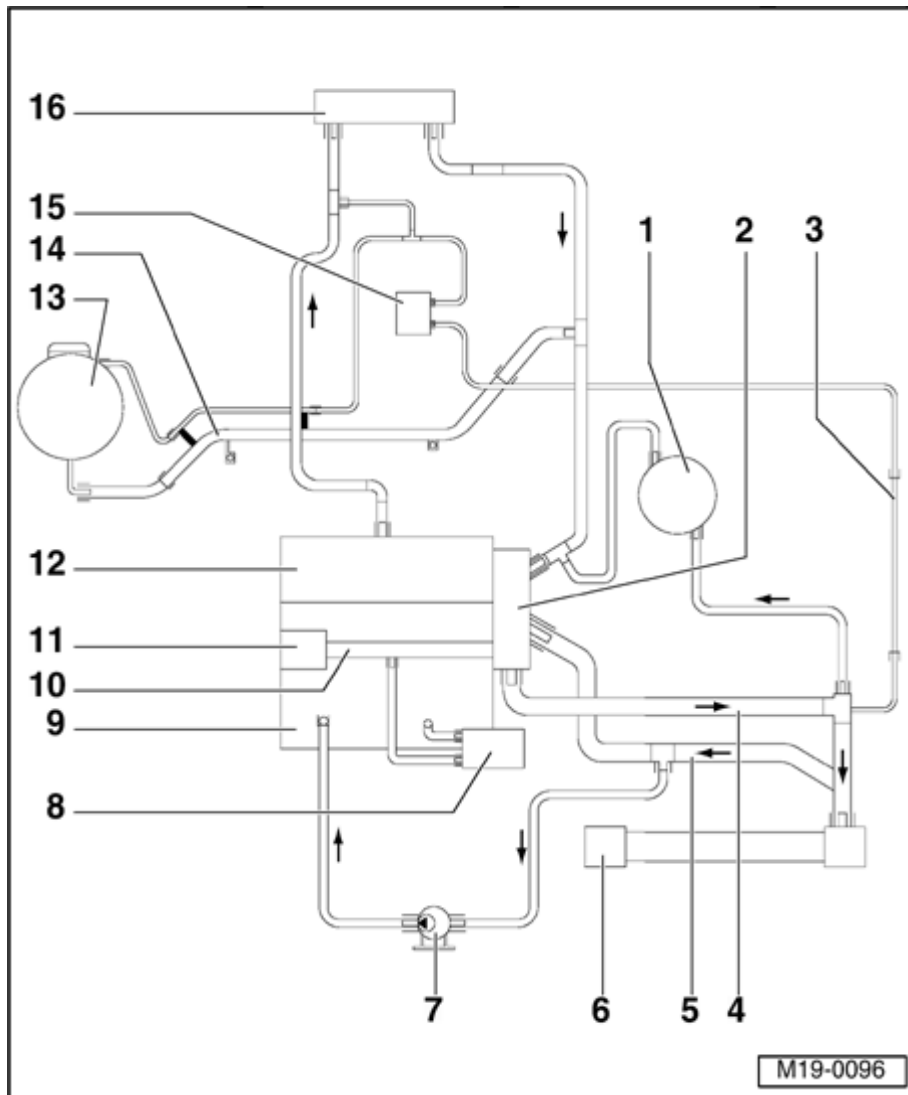
#### 5 - Lower coolant hose

#### 6 - Radiator

#### 7 - After-Run Coolant pump - V51-

#### 8 - Oil cooler

#### 9 - Cylinder block



**10 - Coolant pipe**

- ◆ Between coolant pump and thermostat housing

**11 - Coolant pump**

**12 - Cylinder head**

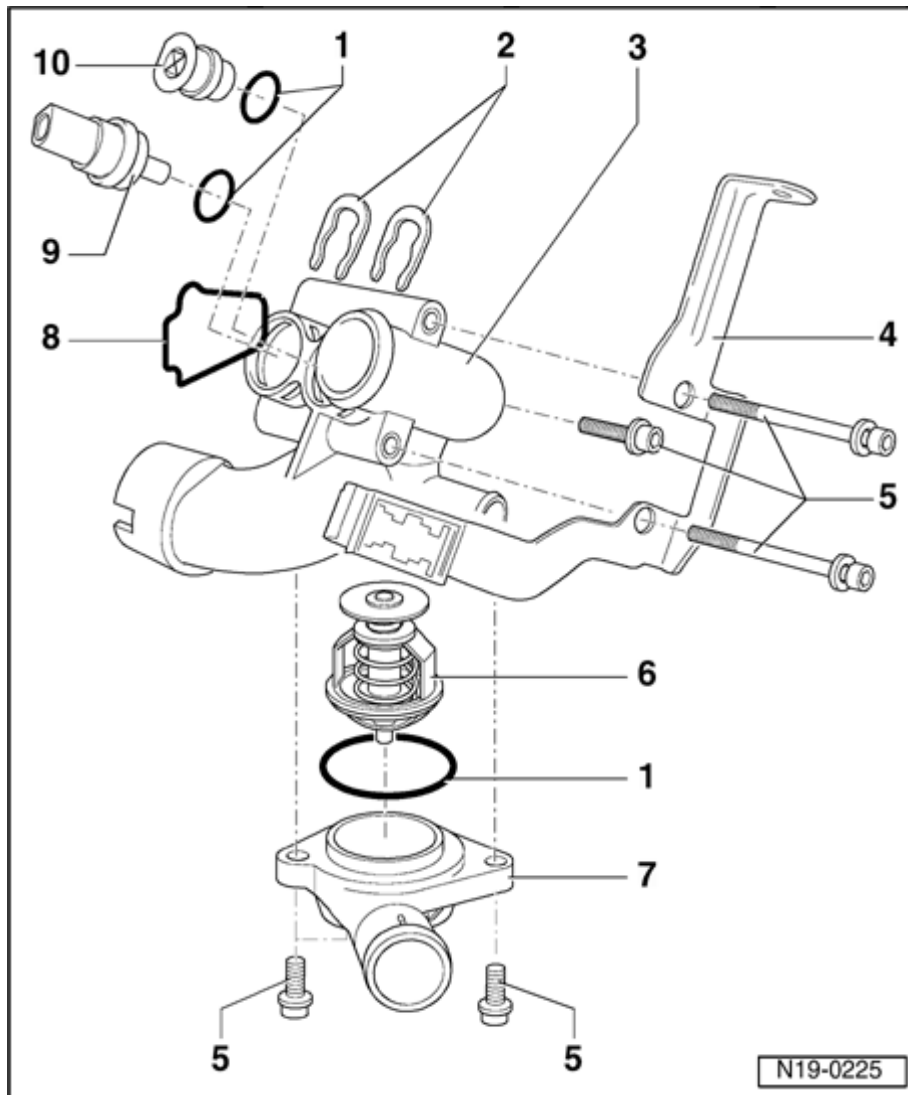
**13 Expansion - tank**

**14 - Coolant pipe**

- ◆ Secured to exhaust manifold together with heat shield

**15 - Throttle valve control module**

**16 Heat - exchanger for heating system**



## Coolant thermostat housing, disassembling and assembling

### Note:

Routing coolant hoses to thermostat housing ⇒ [Page 19-6](#), Parts of cooling system, engine side.

#### 1 - O-ring

- ◆ Replace if damaged

#### 2 - Retaining clip

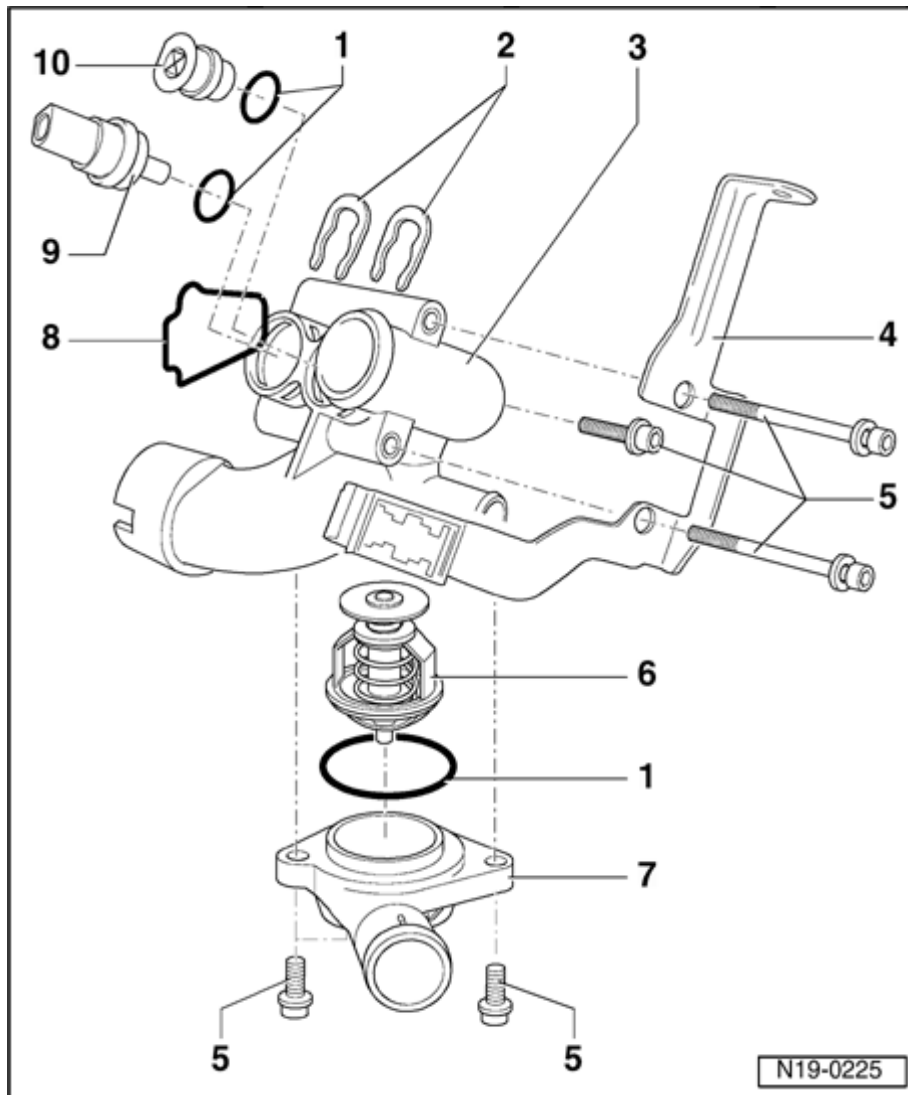
- ◆ Check seated securely

#### 3 - Thermostat housing

#### 4 - Bracket

#### 5 - 8 Nm

19-14



### 6 - Coolant thermostat

- ◆ Observe installation position
- ◆ Checking: Heat up thermostat in water
  - ◆ Starts to open at approx. 80 °C
  - ◆ Ends at approx. 105 °C
  - ◆ Opening stroke at least 7 mm

### 7 - Unions

### 8 - Seal

- ◆ Replace

### 9 Engine - Coolant Temperature (ECT) sensor - G62-

- ◆ For engine control module
- ◆ With ECT sensor -G2-
- ◆ Release pressure in cooling system if

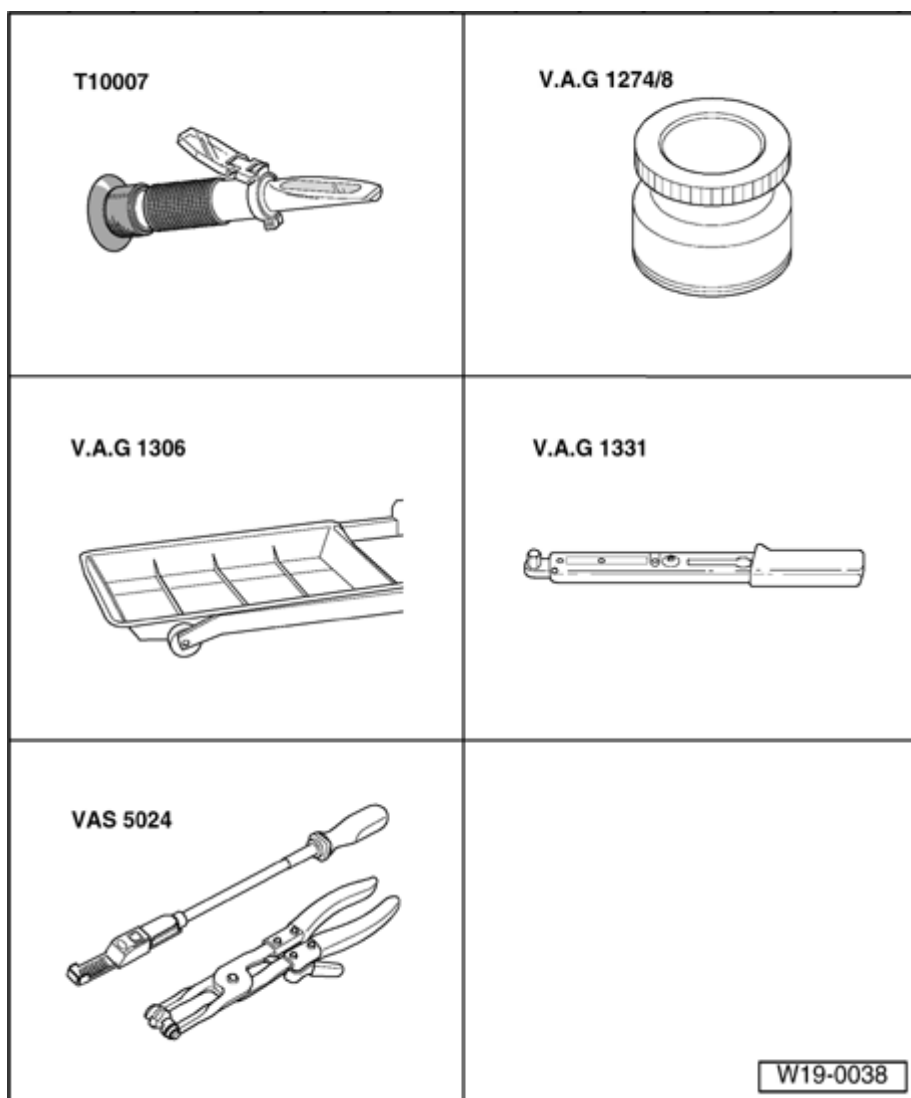
necessary  
before  
removing  
components

◆ Checking:

⇒ [Repair  
Manual, 2.8  
Liter VR6 4V  
Fuel Injection &  
Ignition, Engine  
Code\(s\): BDF,  
Repair Group  
01](#)

### **10 - Plug**

◆ Release  
pressure in  
cooling  
system if  
necessary  
before  
removing  
components



## Cooling system, draining and filling

### Special tools and equipment

- ◆ T10007 Refractometer
- ◆ VAG1274/8 Adapter
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clips

Not illustrated:

- ◆ VAS 6096 Coolant system charging unit

## Draining

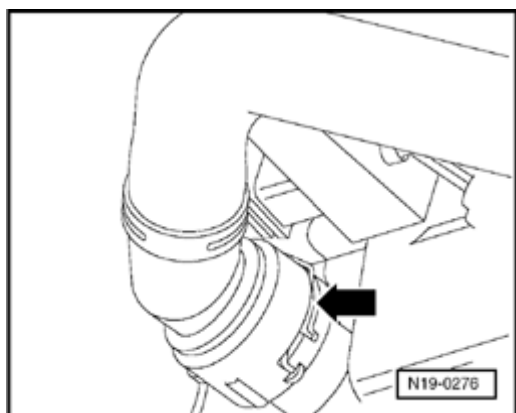
- Open cap on coolant expansion tank.

### **WARNING!**

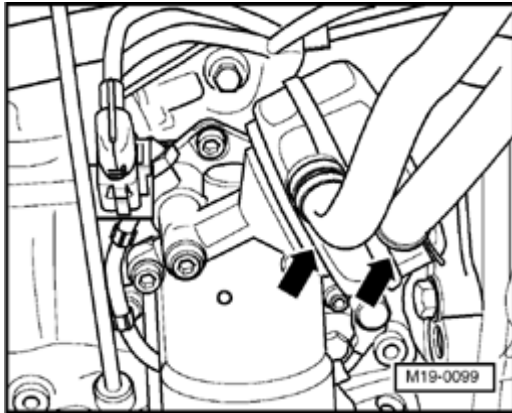
**Steam can be released when removing the cap from the expansion tank. Cover the cap with a cloth and open carefully.**

- Remove center insulation tray:

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



- Pull out lower coolant hose retaining clip (arrow) and remove coolant hose from radiator.



- ✦ - To drain coolant from engine also remove coolant hoses from oil cooler (arrows).

**Note:**

*Observe waste disposal regulations!*

**Filling**

**Note:**

- ◆ *Only use coolant additive G 12 in accordance with TL VW 774 D. Identification color: red*
- ◆ *Under no circumstances must G 12 be mixed with other coolant additives!*
- ◆ *If the fluid in expansion tank is brown, G 12 has been mixed with another coolant. In this case the coolant must be changed.*
- ◆ *G 12 and coolant additives marked "In accordance with TL VW 774 D" prevent frost and corrosion damage, scaling and also raise the boiling point of 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.*

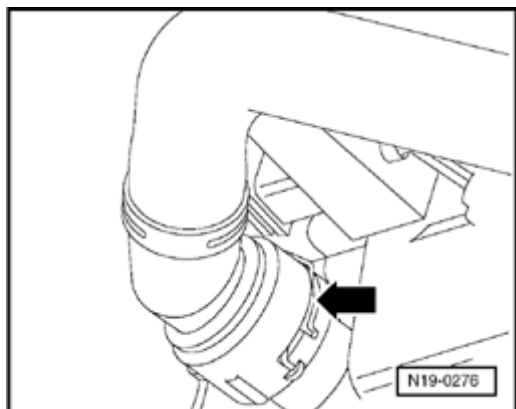
- ◆ *Protection against frost must be assured to approx. -25 ° C (in arctic climatic countries to approx. -35 ° C).*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The anti-freeze ratio must be at least 40%.*
- ◆ *If for climatic reasons a higher frost protection is required, the amount of G 12 can be increased, but only up to 60% (frost protection to about -40 ° C), as otherwise frost protection is reduced again and cooling effectiveness is also reduced.*
- ◆ *Refractometer T10007 is recommended for determining the current density of the anti-freeze.*
- ◆ *If radiator, heat exchanger, cylinder head or cylinder head gasket are replaced, do not reuse old coolant.*

Recommended mixture ratios:

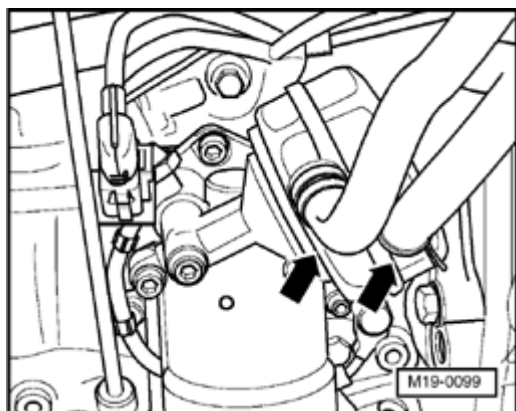
Anti-freeze to	Anti-freeze proportion	G 12 1)	Water 1)2)
-25 ° C	40%	3.7 l	5.5 l
-35 ° C	50%	4.6 l	4.6 l

1) The quantity of coolant can vary in accordance with the equipment fitted to the vehicle.

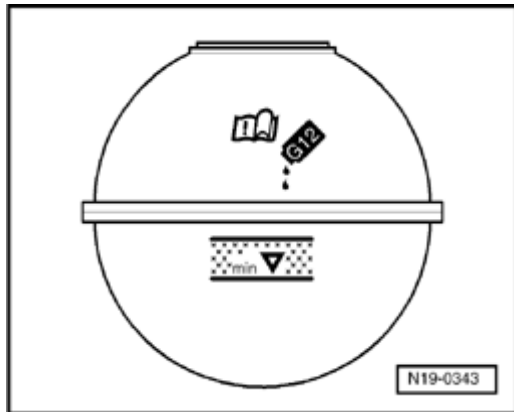
2) Only use clean drinking water.

**Work sequence**

- ◀ - Install lower coolant hose and secure with retaining clamp (arrow).



- ◀ - Slide coolant hoses onto oil cooler unions (arrows) and secure with spring-type clamps.
- Install center insulation tray:  
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)



### Without using coolant system charging unit VAS 6096

- Fill coolant slowly up to top mark of hatched field on expansion tank.

### Using coolant system charging unit VAS 6096

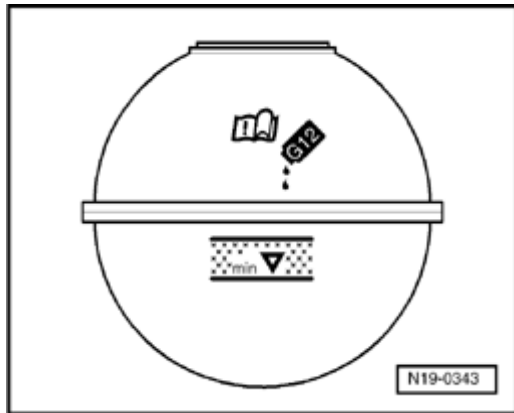
- Screw adapter V.A.G1274/8 onto expansion tank.
- Fill coolant system using coolant system charging unit VAS 6096:

⇒ See instruction manual for coolant system charging unit VAS 6096

### With and without coolant system charging unit VAS 6096

- Seal expansion tank.
- Switch off heater and air conditioner.
- Start engine and maintain an engine speed of about 2000 rpm for approx. 3 minutes.
- Allow engine to run at idling speed until lower hose on radiator becomes hot.
- Switch ignition off.


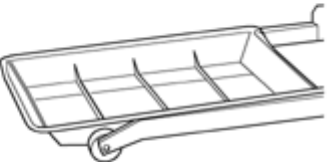

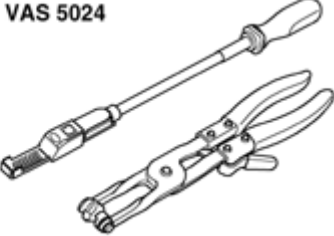
19-21



- Check coolant level and top up coolant if necessary:

At normal engine operating temperature coolant level must reach top mark of hatched field.

When engine is cold coolant level should be around middle of hatched field.

<p>T10007</p> 	<p>V.A.G 1306</p> 
<p>V.A.G 1331</p> 	<p>VAS 5024</p> 
	<p>W19-0019</p>

## Radiator and coolant fan, removing and installing

### Special tools and equipment

- ◆ T10007 Refractometer
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clips

## Removing

- Remove center, left and right insulation trays:

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

- Disconnect connectors from thermal switch and coolant fan.

- Remove front bumper:

⇒ [Repair Manual, Body Exterior, Repair Group 63](#)

- Bring lock carrier into service position:

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

- Drain coolant ⇒ [Page 19-15](#) .

- Pull out upper coolant hose retaining clip (arrow) and remove coolant hose from radiator quick release coupling.

## Models with air conditioning:

- Observe additional information and removal work ⇒ [Page 19-24](#) .

- Remove radiator securing bolts from side of radiator and take radiator with fans out downward.

### Installing

Install in reverse sequence ; note the following points:

- Check electrical connections and routing:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Fill with coolant ⇒ [Page 19-15](#) .

### Additional information and assembly work on models with air conditioning

#### **CAUTION!**

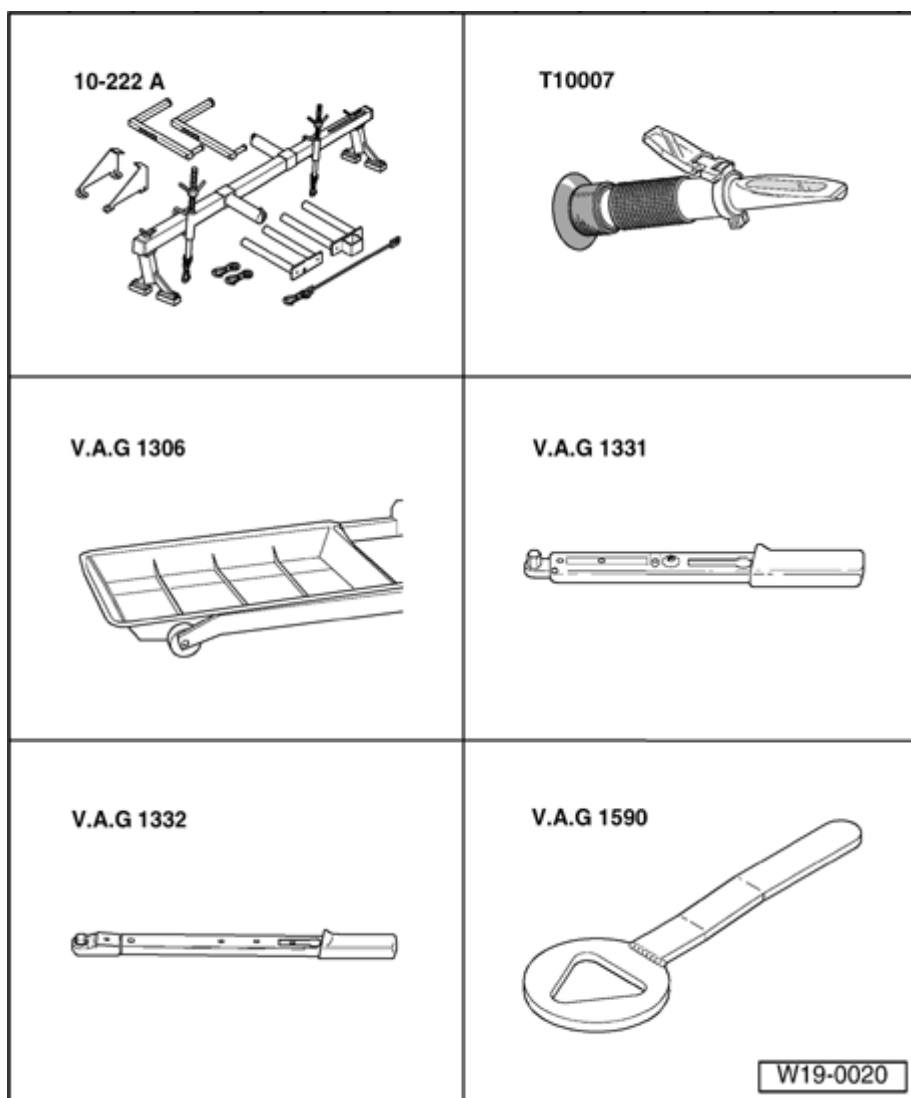
***The air conditioning refrigerant circuit must not be opened.***

#### **Note:**

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

- Remove retaining clamp(s) from refrigerant lines.

- Remove securing bolts from fan shroud and remove fan shroud and fan.
- Remove radiator securing bolts from side of radiator.
- Remove condenser from radiator.
- Secure condenser to body, so that refrigerant lines/hoses are not under stress.
- Swing radiator out downward.

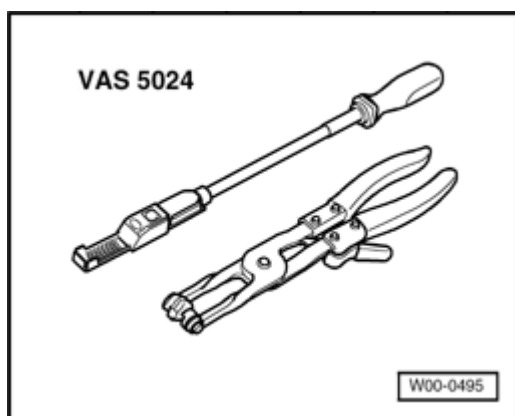


## Coolant pump, removing and installing

(with engine installed)

### Special tools and equipment

- ◆ 10-222A Engine support bracket with legs 10-222A/1
- ◆ T10007 Refractometer
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5...50 Nm)
- ◆ VAG 1332 Torque wrench (40...200 Nm)
- ◆ VAG 1590 Coolant pump wrench



- ◆ VAS 5024 Assembly tool for spring-type clips
- ◆ VAS 5085 Ladder

### Removing

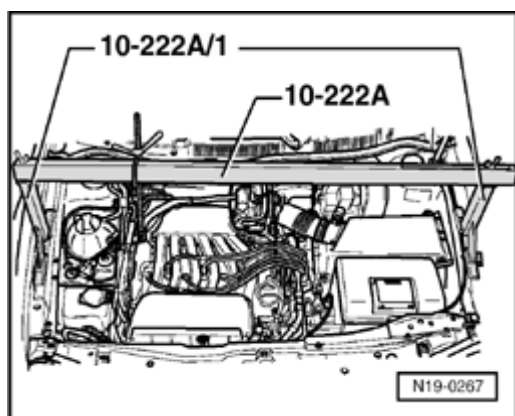
- Remove engine cover.
- Remove center and right insulation trays:  
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Remove ribbed belt ⇒ [Page 13-19](#) .
- Pull off crankcase breather connecting hose between cylinder head cover and intake hose on cylinder head cover.

### Note:

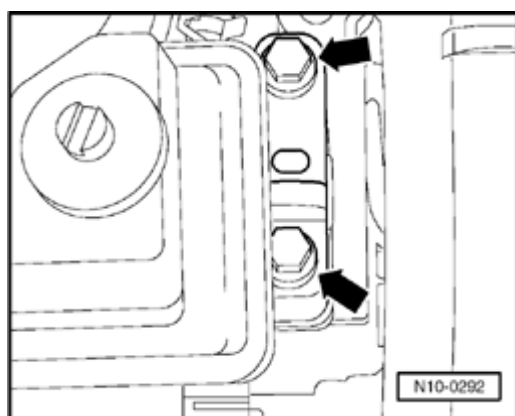
*Press buttons on hose couplings to disconnect.*

- Drain coolant ⇒ [Page 19-15](#) .

19-28



- Install engine support bracket 10-222A with legs 10-222A/1.
- Insert securing hook of supporting device in right lifting eye of cylinder block and put engine under slight tension.

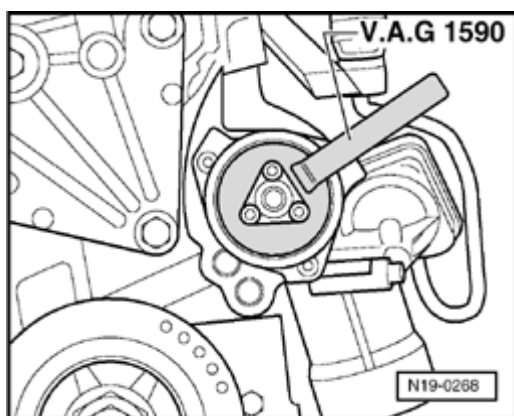


- Unbolt engine side of assembly mounting from top of engine bracket (arrows).

**Note:**

*Use ladder VAS 5085 to remove securing bolts.*

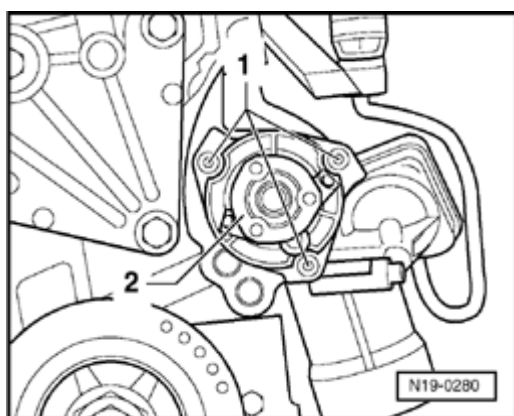
- Lower engine on supporting device only as far as necessary to remove coolant pump.



- ◀ - Remove belt pulley. Counter-support belt pulley with water pump wrench VAG 1590 when doing this.

**Note:**

*If engine has been removed, it is not necessary to remove belt pulley. The coolant pump securing bolts can be unscrewed through the holes in the pulley.*



- ◀ - Unscrew coolant pump securing bolts -1- and remove coolant pump -2-.

**Note:**

*To remove the coolant pump, push the engine to one side using a lever if necessary.*

## Installing

Install in reverse sequence; note the following points:

- Moisten new O-ring with coolant.
- Insert coolant pump into cylinder block and tighten securing bolts to 20 Nm.
- Fit pulley and tighten securing bolts to 20 Nm.
- Align engine assembly mountings ⇒ [Page 10-18](#) , Aligning engine and transmission mountings.

### **Note:**

*Torque settings for assembly mountings* ⇒ [Page 10-21](#) .

- Install ribbed belt ⇒ [Page 13-19](#) .
- Fill with coolant ⇒ [Page 19-15](#) .

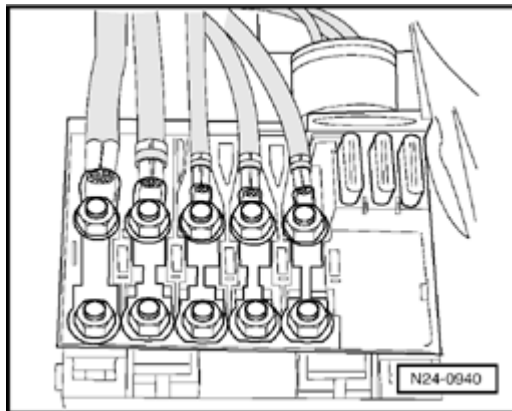
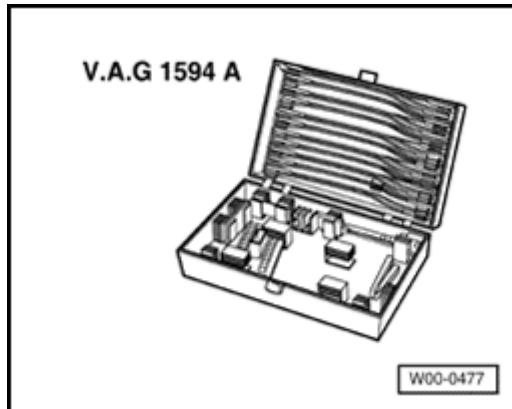
## Coolant fan, checking

### Special tools and equipment

- ◆ VAG 1594 A Adapter set
- ◆ Wiring diagram

### Test conditions

- Main fuses must be OK.
- Coolant Fan Control (FC) Thermal switch -F18- is OK.

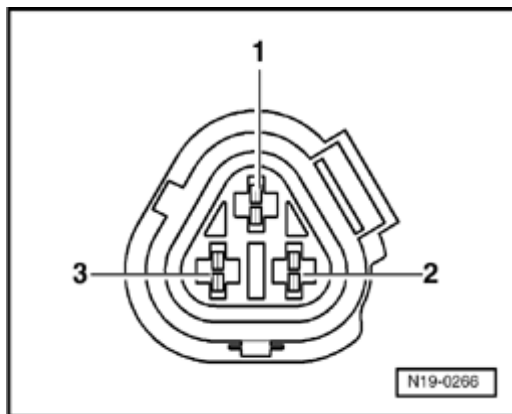


### Test sequence

- Remove left-hand insulation tray:

⇒ [Repair Manual, Body Exterior, Repair Gr 50](#)

- Disconnect 3-pin connector from Coolant Control (FC) Thermal switch -F18-.



- Bridge contact -1- and contact -2- of connector using adapter cables from VAG 1594 A.

1st speed for Coolant fans -V7- and -V35 start.

- Switch ignition on.

- Bridge contact -2- and contact -3- of connector with adapter cables from VAG 1594 A.

2nd speed for Coolant fans -V7- and -V35 start.

If 1st or 2nd speeds of fans do not run:

- Locate and eliminate open circuit referring wiring diagram:

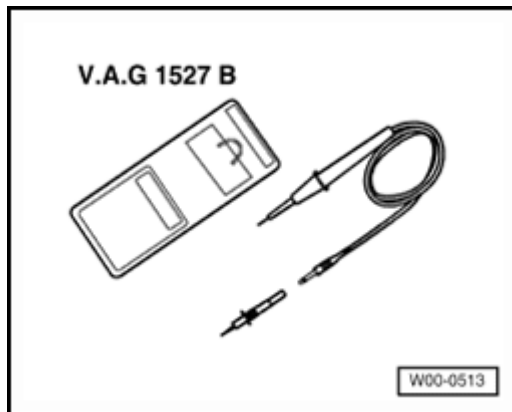
⇒ [Electrical Wiring Diagrams, Troubleshooting Component Locations](#)

If no wiring fault is detected:

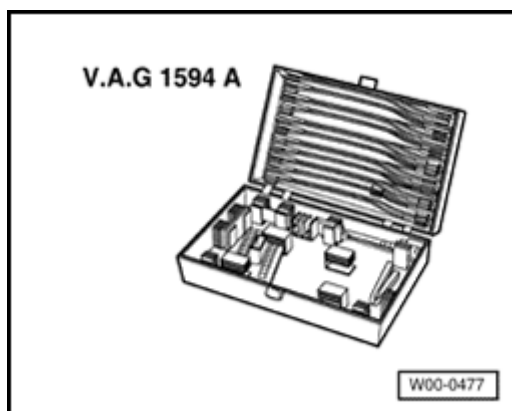
- Replace Coolant fan -V7- or -V35-.

## After-Run Coolant pump -V51-, checking

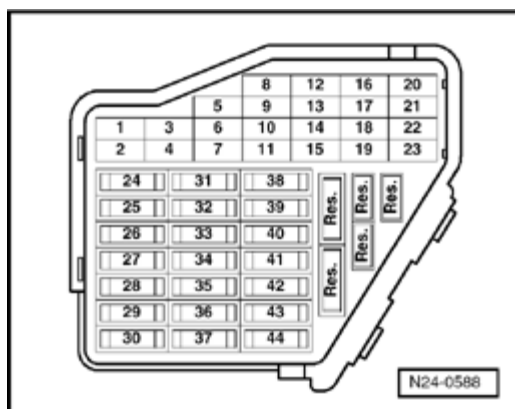
### Special tools and equipment



- ◆ VAG 1527 B Diode test lamp



- ◆ VAG 1594 A Adapter set
- ◆ Wiring diagram



### Test conditions



- All fuses must be OK.

### Test sequence

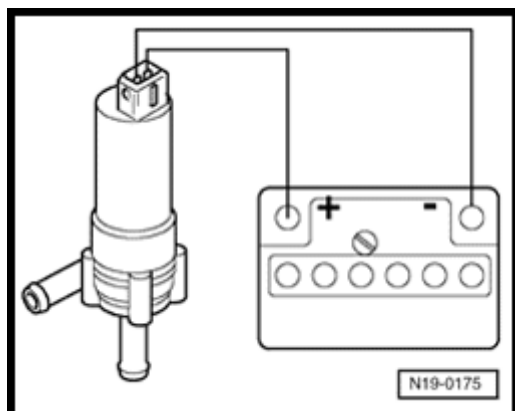
- Remove center insulation tray:  
⇒ [Repair Manual, Body Exterior, Repair Group 50](#)
- Disconnect 2-pin connector from After-Run Coolant pump -V51- (arrow).

### Checking function



- Connect contacts of After-Run Coolant pump -V51- to battery using adapter cables from VAG 1594.

After-Run Coolant pump -V51- must start.



If the coolant pump does not start:

- Replace After-Run Coolant pump -V51-.

If the coolant pump starts:

### Checking activation

- Switch ignition off and on again.
- Connect diode test lamp VAG 1527 B to disconnected connector for After-Run Coolant pump -V51- with adapter cables from VAG 1594 A.

LED must light up.

### Note:

*This check must be performed within 10 minutes after switching ignition off.*

If the LED does not light up:

- Locate and eliminate open circuit referring to wiring diagram:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

