

## Cooling system components, removing and installing

### Notes:

- ◆ *When the engine is warm the cooling system is under pressure. If necessary release pressure before commencing repair work.*
- ◆ *Secure all hose connections with hose clamps of the same type as those installed at the factory.*

⇒ *Parts Catalog*

- ◆ *VAG 1921 hose clip pliers are recommended when installing spring-type clips.*
- ◆ *Replace all gaskets and seals.*
- ◆ *The arrow markings on the coolant pipes and on the ends of the hoses must be aligned with each other.*
- ◆ *Tightening torque for screw clamps: 2 Nm.*

Draining and filling cooling system ⇒ [Page 19-4](#) .

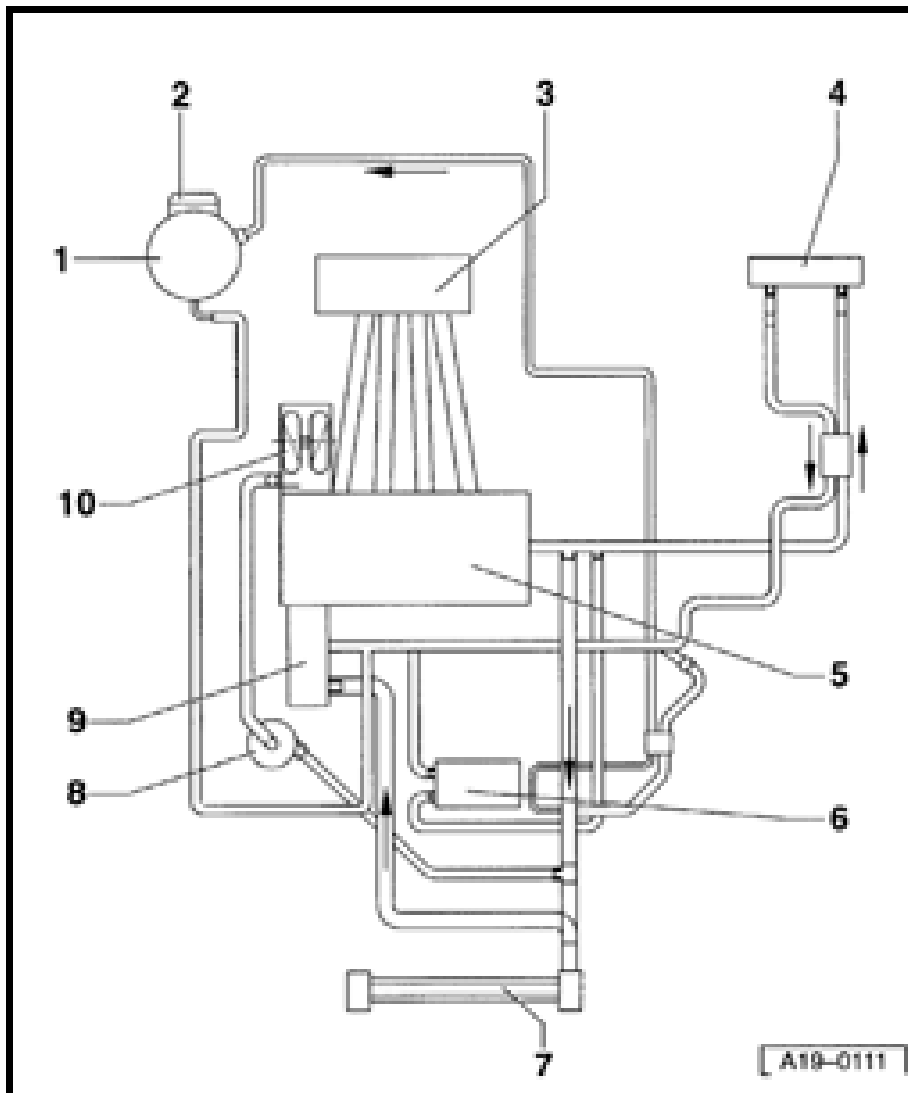
Anti-freeze concentration ⇒ [Page 19-6](#) .

Coolant hose connection diagram ⇒ [Page 19-2](#) .

Checking cooling system for leaks with VAG 1274 and 1274/8 ⇒ [Page 19-29](#) .

Removing coolant pump ⇒ [Page 19-10](#) .

Removing coolant thermostat ⇒ [Page 19-14](#) .



## Cooling system components

**1 Expansion - tank**

**2 Filler cap - for expansion tank**

◆ Testing  
⇒ [Page 19-30](#)

**3 - Intake manifold**

**4 Heating - system heat exchanger**

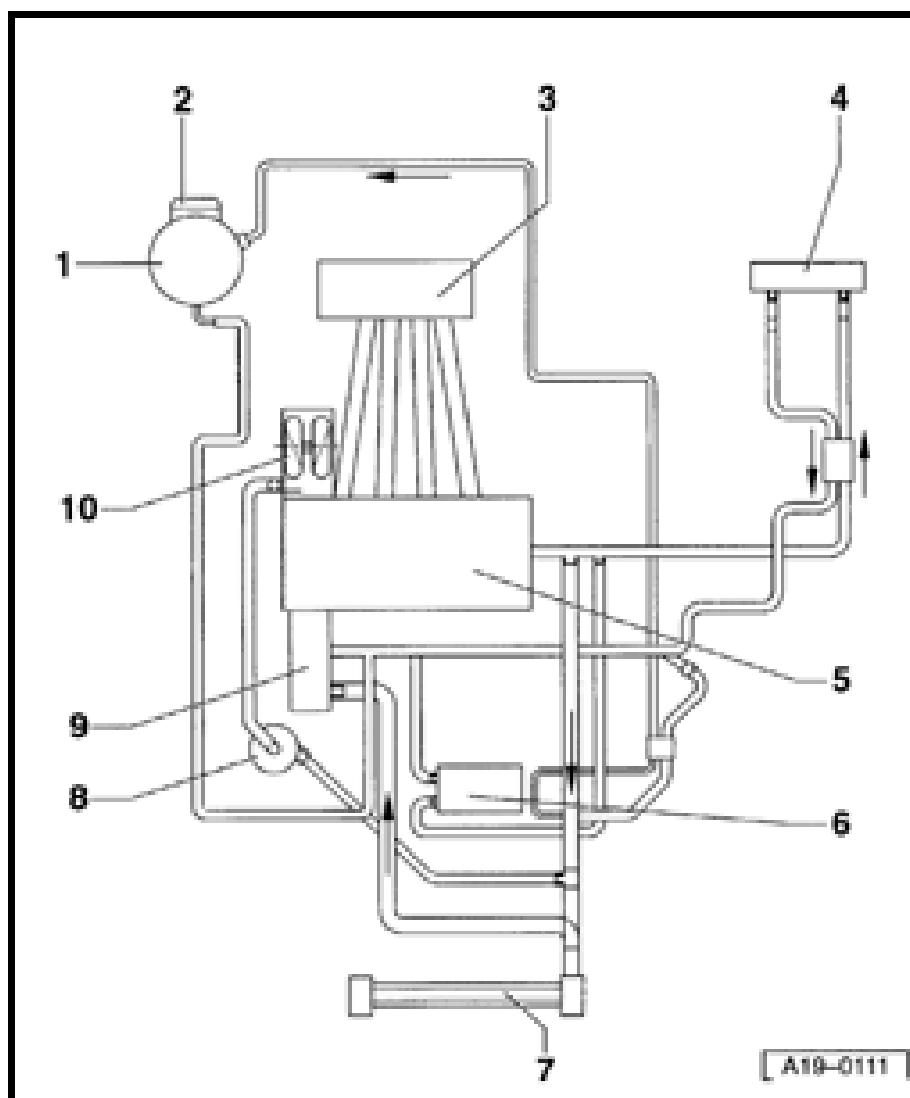
**5 - Cylinder block**

**6 - Oil cooler**

◆ Removing and installing  
⇒ [Page 17-9](#),  
Item 22

**7 - Radiator**

◆ After replacing, refill complete system with fresh coolant



### 8 - After-run coolant pump - V51-

- ◆ Testing ⇒ [Page 19-9](#)

### 9 - Coolant pump, coolant thermostat

- ◆ Removing and installing coolant pump ⇒ [Page 19-10](#)
- ◆ Check for ease of movement
- ◆ Removing and installing coolant thermostat ⇒ [Page 19-14](#)
- ◆ Testing, operating data ⇒ [Page 19-17](#)

### 10 - Turbocharger

## Cooling system, draining and filling

### Draining

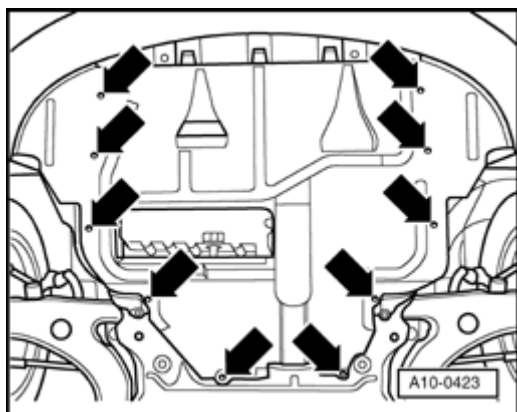
#### Notes:

- ◆ Catch drained-off coolant in a clean container for re-use or disposal.
- ◆ Coolant must only be mixed with clean water.

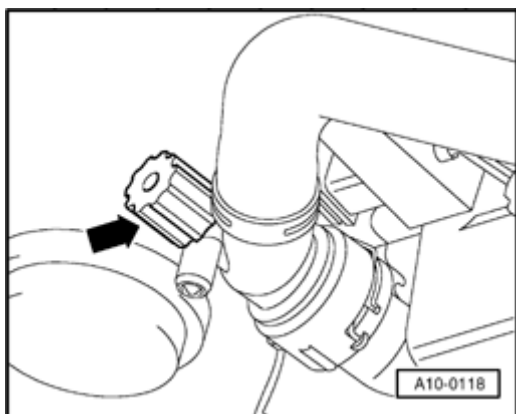
- Remove cap from coolant expansion tank

#### **WARNING!**

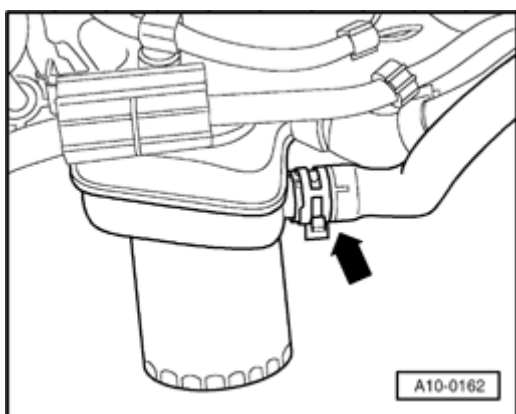
**Hot steam can escape when the cap on the expansion tank is opened. Cover the cap with a cloth, and open it carefully.**



- Remove center section of noise insulation
- Place drip tray VAG 1306 below engine.



- Turn drain screw -arrow- on radiator anti-clockwise, install an extension hose to the connection if necessary.



- Also disconnect coolant hose at bottom of oil cooler -arrow-, and drain off remaining coolant.

## Filling

### Notes:

- ◆ Only use coolant additive G 012 A8 D - meeting specification TL VW 774 D. Identifiable by red color

### **CAUTION!**

**Do not use G 011 A8 C. The two different coolant additives G 011 A8 C and G 012 A8 D must not be mixed together. Otherwise this can result in serious damage to the engine.**

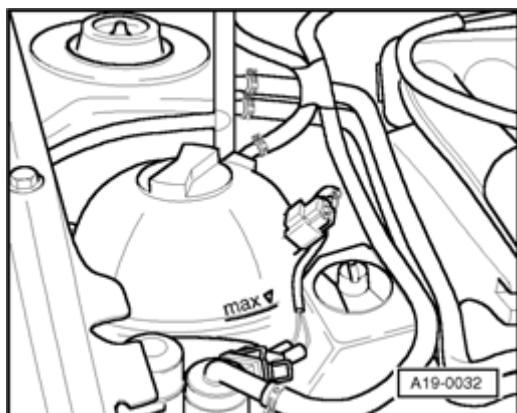
- ◆ If the fluid in the expansion tank is brown, this means G 012 A8 D has been mixed with another type of coolant. In this case, flush out the cooling system and put in fresh coolant. To flush the system, fill it with clean water and run the engine for about 2 minutes. This should remove very nearly all of the old coolant.
- ◆ G 012 A8 D and coolant additives marked "meeting specification TL VW 774 D" prevent frost and corrosion damage, stop scaling and at the same time raise the boiling point of coolant. For these reasons the cooling system must be filled all year round with the correct anti-freeze and anti-corrosion additive.
- ◆ Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.

- ◆ *Frost protection is required down to about -25 ° C (in countries with arctic climates down to about -35 ° C).*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The anti-freeze ratio must be at least 40 %.*
- ◆ *If greater frost protection is required in very cold climates, the amount of G 012 A8 D can be increased, but only up to 60 % (this gives frost protection to about -40 ° C), as 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:

<b>Frost protection to</b>	<b>Anti-freeze concentration</b>	<b>Quantity of G 012A8 D 1)</b>	<b>Quantity of water<sup>1)</sup></b>
-25 ° C	40 %	2.0 ltr.	3.0 ltr.
-35 ° C	50 %	2.5 ltr.	2.5 ltr.

<sup>1)</sup> Coolant quantity: 5.0 liters (may vary depending upon the vehicle equipment)



- Screw in coolant drain plug.
- Top up coolant to max. mark on expansion tank.
- 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.
- Stop engine.
- Check coolant level and top-up 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.

**WARNING!**

**Hot steam can escape when the cap on the expansion tank is opened. Cover the cap with a cloth, and open it carefully.**



## After-run coolant pump -V51-, checking

### Note:

✦ *After-run coolant pump -V51- is located on the fan cowl to the right of the radiator fan.*

- Switch on ignition.

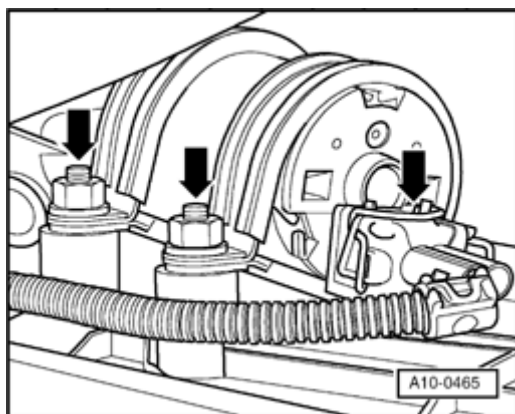
After-run coolant pump -V51- should start running (pump can be felt and heard).

If pump does not run:

Check fuse and wiring according to wiring diagram.

If the fuse is OK and there is no open circuit in the wiring:

**Replace after-run coolant pump -V51-**

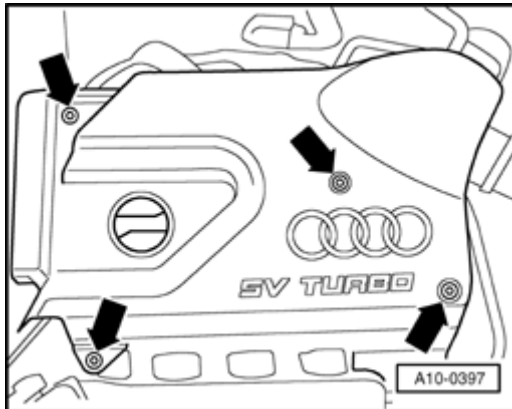


## Coolant pump, removing and installing

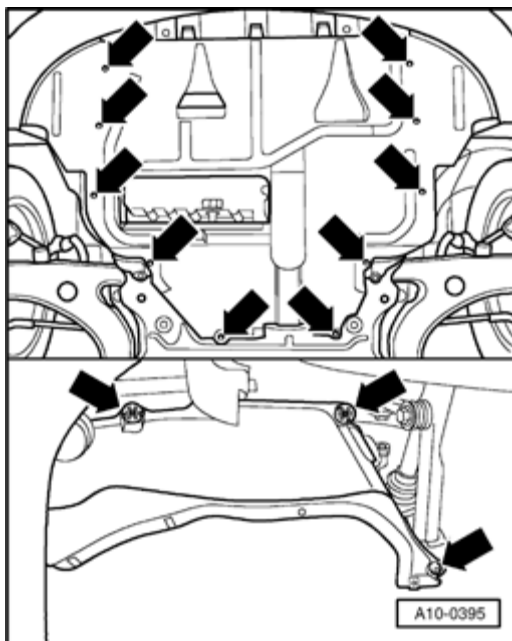
### Note:

*Always replace seals and gaskets.*

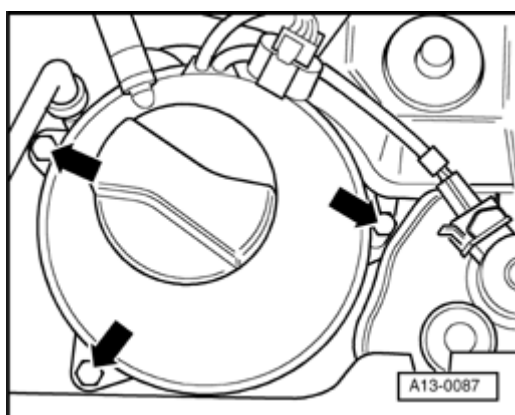
### Removing



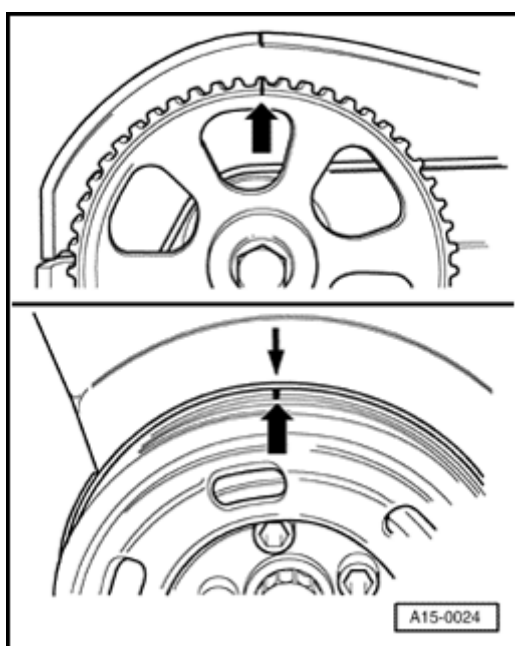
- ✦ - Remove engine cover.
- Drain cooling system ⇒ [Page 19-4](#)



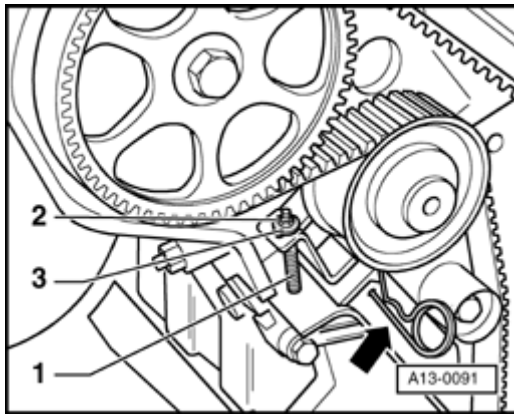
- ✦ - Remove center and right-hand sections of noise insulation - arrows-.
- Removing ribbed belt and tensioning element ⇒ [Page 13-1](#) .
- Disconnect vacuum hose from activated charcoal filter and from throttle valve connection.



- Remove coolant expansion tank (see left-hand arrows) together with hoses.
- Unbolt power steering reservoir (see right-hand arrow). Do not disconnect the hoses.
- Remove toothed belt guards (upper and center) ⇒ [Page 13-13](#).



- Set crankshaft to markings for TDC of No. 1 cylinder -arrows- by turning central bolt on crankshaft sprocket in direction of rotation.



- Screw M5x55 stud -1- into toothed belt tensioning element. Screw hex nut -2- onto stud -1- using a large washer -3-.
- Tension pressure piston of tensioning element only until it can be secured with a locking pin (e.g. from lifting appliance 2024 A) -arrow-.

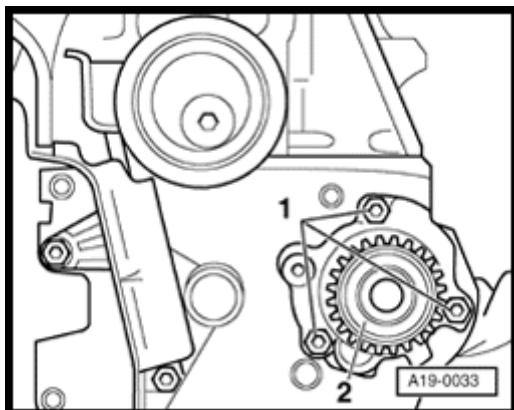
**Note:**

*If it is not possible to insert the locking pin, carefully tension the pressure piston of the tensioning element just enough to allow the toothed belt to be removed.*

- Take toothed belt off camshaft sprocket.

**Notes:**

- ◆ *The vibration damper and bottom toothed belt guard do not have to be removed.*
- ◆ *The toothed belt should be left in position on the crankshaft sprocket.*
- ◆ *Cover toothed belt with a cloth to protect it from coolant before removing coolant pump.*



- Remove coolant pump securing bolts -1- and remove coolant pump -2-.

## Installing

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

- Clean and smooth down sealing surface for O-ring as required.
- Moisten new O-ring with coolant G 012 A8 D.
- Install coolant pump. Installation position: plug in housing faces downward.
- Install toothed belt (adjust valve timing) ⇒ [Page 13-19](#)

### Note:

*Follow all the instructions on removing and installing the toothed belt ⇒ [Page 13-10](#) .*

- Installing ribbed belt and tensioning element ⇒ [Page 13-1](#) .
- Fill up with coolant ⇒ [Page 19-6](#) .

## Tightening torque

Component	Nm
Coolant pump to cylinder block	15

## Coolant thermostat, removing, installing and checking

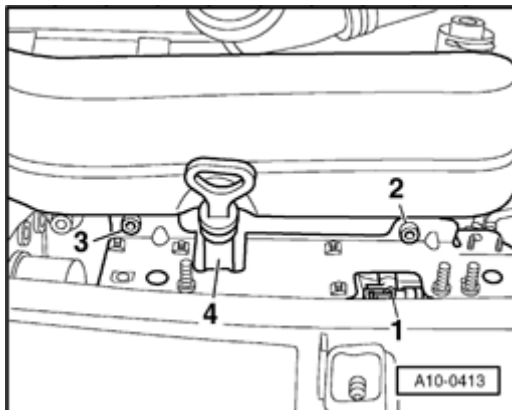
### Removing

#### Notes:

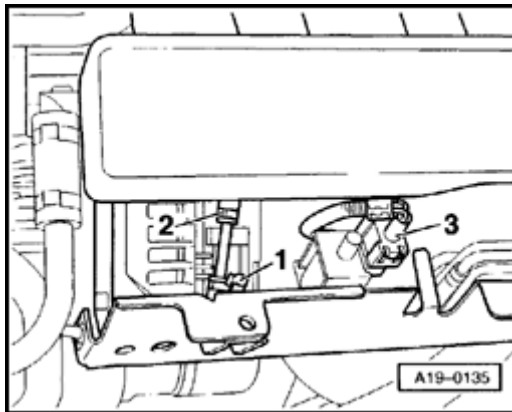
- ◆ Always replace seals and gaskets.
- ◆ Obtain radio anti-theft code on vehicles coded radio.
- ◆ Secure all hose connections with hose clamps of the same type as those installed at the factory.

⇒ Parts catalog

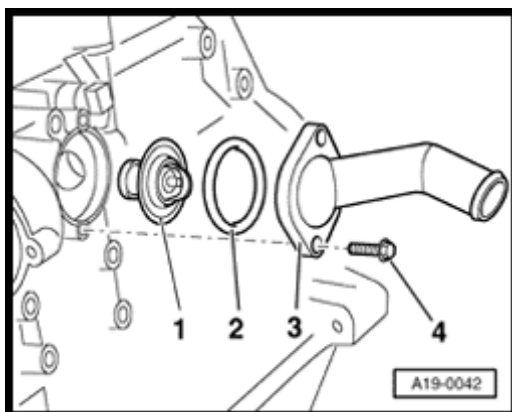
- With the ignition switched off, disconnect battery Ground strap.
- Drain cooling system ⇒ [Page 19-4](#)
- Detach coolant hose at bracket for solenoid valves above alternator.
- Unbolt bracket for solenoid valves -2- and front of intake manifold and detach dipstick guide tube -4-.



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- ✦ - Pull connector -3- and vacuum hose -1- out of bracket.
- Lay bracket clear to the side without detaching remaining connections.



- ✦ - Disconnect coolant hose from elbow connection -3-.
- Remove bolts -4- and take off elbow connection, O-ring and thermostat -1-.

## Installing

- Clean and smooth down sealing surface for O-ring as required.
- Insert coolant thermostat. Installation position: bowed metal strip on thermostat must be vertical.
- Moisten new O ring with coolant G 012 A8 D.
- Tighten bolts.
- Fill up with coolant ⇒ [Page 19-6](#) .

## Tightening torque

Component	Nm
Elbow connection to cylinder block	15
Bracket for solenoid valves to intake manifold	10

- After connecting battery terminals, enter anti-theft code for radio

⇒ *Radio operating instructions*

### **WARNING!**

***If a battery charger is used to give the engine an assisted start, there is a risk that the control units in the vehicle will be damaged.***



- Close electric windows in front doors all the way to their top positions using electric switches.
- Then operate all electric window switches again for at least one second in the "close" direction to activate the automatic one-touch function.
- Set clock to correct time.
- Interrogate DTC memory:

⇒ Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code(s): AMU, Repair Group 01; On Board Diagnostic , checking and erasing DTC memory

**Note:**

*DTCs will have been stored in the memory because connectors have been disconnected. Therefore interrogate and erase DTC memory after installing engine.*

**Testing coolant thermostat**

- Heat thermostat in water bath.

<b>Starts to open</b>	<b>Fully open</b>	<b>Opening travel</b>
approx. 87 ° C	approx. 102 ° C 1)	at least 7 mm

1) cannot be tested

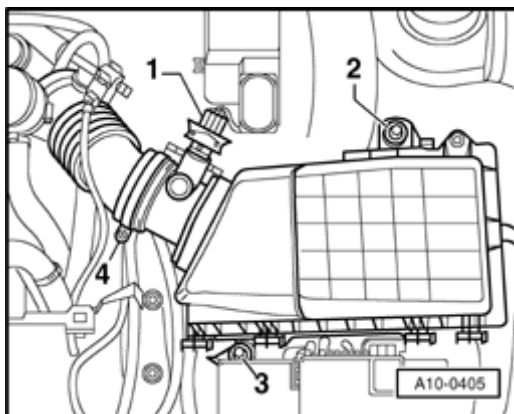
## Coolant line, removing and installin

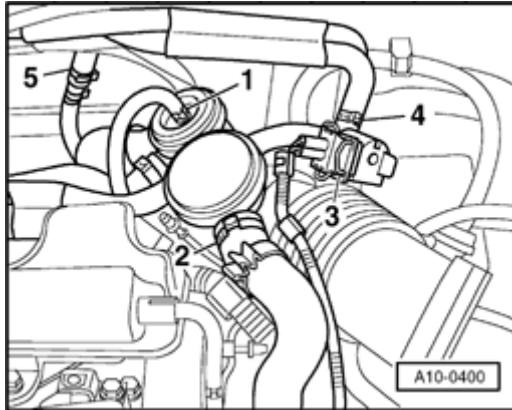
### Removing

#### **Note:**

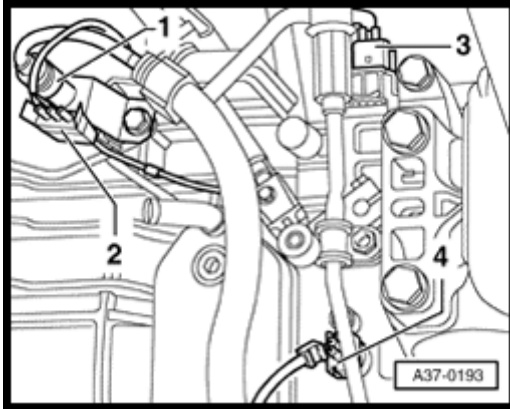
*Always replace seals and gaskets.*

- Obtain radio anti-theft code on vehicles w coded radio.
- With the ignition switched off disconnect battery Ground strap.
- Drain cooling system ⇒ [Page 19-4](#)
- Remove intake manifold ⇒ [Page 15-7](#) .
- Disconnect air duct -4- from air mass me
- Disconnect electrical connectors for air m meter -1-.
- Remove bolts -2- and -3- and take off air housing.





- Detach air intake hose from connection of turbocharger as follows:
  - Disconnect vacuum hose -1- from air recirculation valve.
  - Disconnect hose from pressure control for crankcase breather -2-.
  - Disconnect electrical connector from charge pressure control valve -3- (-N75-).
  - Disconnect hose -4- from charge pressure control valve -N75-.
  - Disconnect hose -5- at bulkhead (hose leads from solenoid valve to turbocharger).
    - Take solenoid charge pressure control out of air intake hose and place it to one side on the engine.
    - Pull retainer off turbocharger connection to detach air intake hose.
  - Disconnect coolant hose from coolant line (leads to heat exchanger for heater).



### Vehicles with automatic transmission

- Disconnect connectors:
  - 1 - for solenoid valves (10-pin connector)
  - 2 - for road speed sender -G68-

### All vehicles:

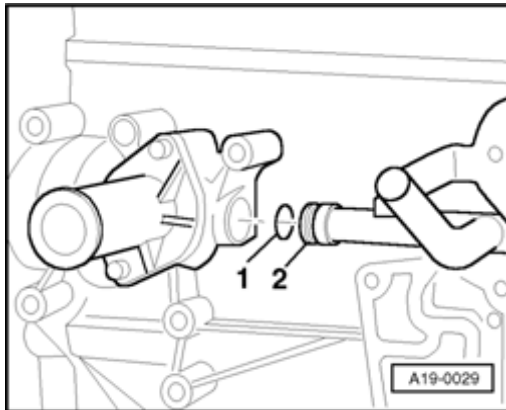
- Unbolt coolant pipe retainer from coolant line flange on left of cylinder head.
- Disconnect hose (leading to oil cooler) from coolant line.
- Remove crankcase breather line.
- Unbolt coolant line retainer from cylinder block.
- Disconnect hose (leading to coolant expansion tank) from coolant line (right).
- Unbolt coolant line retainer from tensioning element for ribbed belt.
- Pull tapered collar off oil dipstick tube.

- Disconnect wires/connectors as follows:
  - Knock sensor I -G61-
  - Engine speed sensor -G28- (middle, grey)
  - Knock sensor II -G66-
- Take connectors out of retainer.
- Remove oil line leading to turbocharger and unbolt retainer for oil line (both are attached to the oil filter bracket).
- Unbolt retainer for connectors.
- Unbolt knock sensors I and II.
- Unbolt left-hand coolant line flange from cylinder head.
- Detach coolant line.

## Installing

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

- Before installing, clean and smooth down sealing surface for O-ring as required.



- Moisten new O-ring -1- with G 012 A8 D and slide onto coolant pipe -2-.
- Push coolant pipe into opening in cylinder
- Fill up with coolant ⇒ [Page 19-6](#) .
- After connecting battery terminals, enter theft code for radio

⇒ *Radio operating instructions*

- Close electric windows in front doors all the way to their top positions using electric switch
- Then operate all electric window switches for at least one second in the "close" direction to activate the automatic one-touch function
- Set clock to correct time.

- Interrogate DTC memory:

⇒ Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code(s): AMU, Repair Group 01; On Board Diagnostic , checking and erasing DTC memory

**Note:**

*DTCs will have been stored in the memory because connectors have been disconnected. Therefore interrogate and erase DTC memory after installing engine.*

**Tightening torques**

Component	Nm
Coolant line bracket to cylinder block	10
Coolant line bracket to oil filter bracket	20
Coolant line bracket to coolant line flange	10

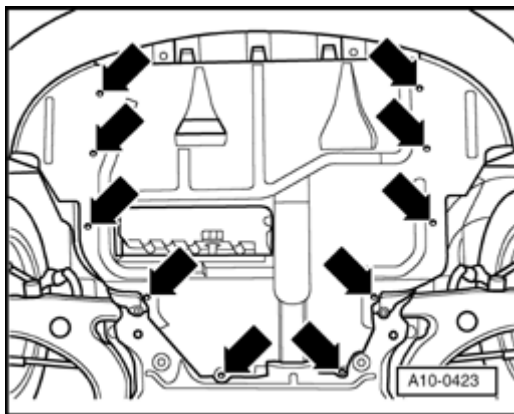
## Radiator, removing and installing

### Note:

*Always replace gaskets and seals.*

### Removing

- Obtain radio anti-theft code on vehicles w coded radio.
- With ignition switched off disconnect batt Ground strap.
- Remove noise insulation -arrows-.
- Drain cooling system ⇒ [Page 19-4](#)
- Release clamps and disconnect coolant l from connections on radiator (top and bo
- Remove front bumper:

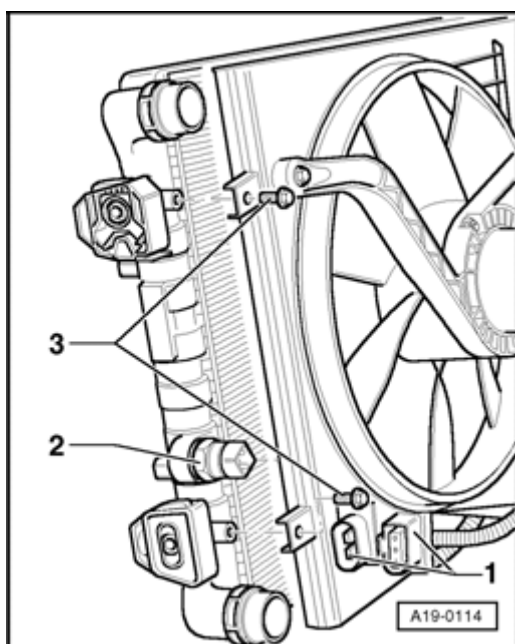


⇒ [Repair Manual , Body Exterior, Repair G Front bumper, removing and installing](#)

### Note:

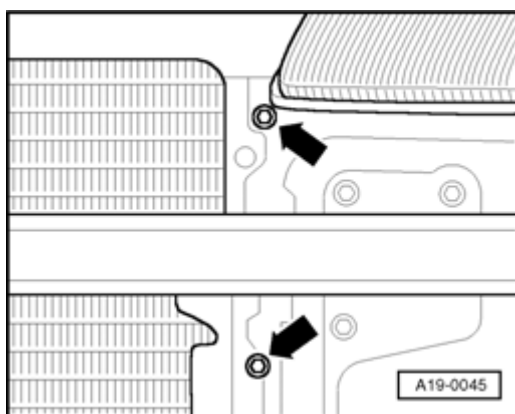
*Only remove the cover section for the front*



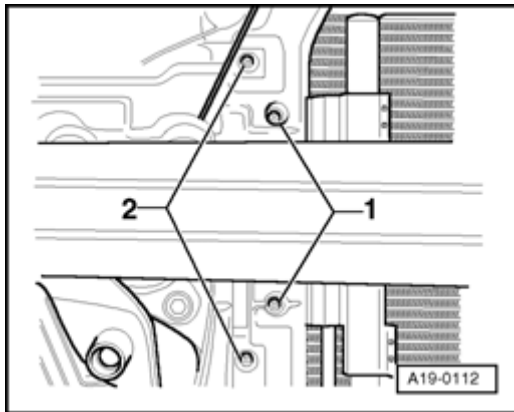


- ✦ - Disconnect connectors -1- on radiator fan cowl.
- Disconnect connector -2- from coolant Fan Control (FC) thermal switch → -F18-.
- Unbolt radiator cowl -3- together with radiator fans (4 bolts) and pull downward to remove.

**Vehicles without air conditioner:**



- ✦ - Remove the 4 securing bolts - arrows- on the radiator.
- Lower radiator out of vehicle.

**Vehicles with air conditioner:**

- Remove the four securing bolts - 1- for the condenser.
- Remove the four securing bolts - 2- for the radiator.

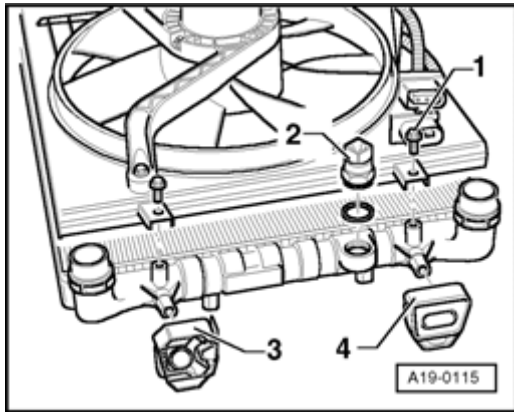
**WARNING!**

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

**Note:**

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

- Unbolt radiator fan control unit - J293- from left-hand longitudinal member (in front of battery).
- Carefully lower radiator between engine and condenser and remove from below.



## Installing

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

- Install mounts -3- and -4- on radiator as illustrated.
- Install radiator securing bolts (the help of a 2nd mechanic is required).
- Install front bumper:

⇒ [Repair Manual , Body Exterior, Repair Group 63; Front bumper, removing and installing](#)

- Replace O rings in the coolant hose connections.
- Fill up with coolant ⇒ [Page 19-6](#) .
- After connecting battery terminals, enter anti-theft code for radio

⇒ *Radio operating instructions*

- Close electric windows in front doors all the way to their top positions using electric switches.
- Then operate all electric window switches again for at least one second in the "close" direction to activate the automatic one-touch function.

- Set clock to correct time.
- Interrogate DTC memory:

⇒ Repair Manual , 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code(s): AMU, Repair Group 01; On Board Diagnostic , checking and erasing DTC memory

**Note:**

*DTC will have been stored in the memory because connectors have been disconnected. Therefore interrogate and erase DTC memory after installing engine.*

**Tightening torques**

Components	Nm
Radiator fan cowl to radiator	10
← Thermal switch → to radiator	35
Radiator to lock carrier	10
Condenser to radiator	10
Control unit to longitudinal member	10

## Cooling system, checking for leaks

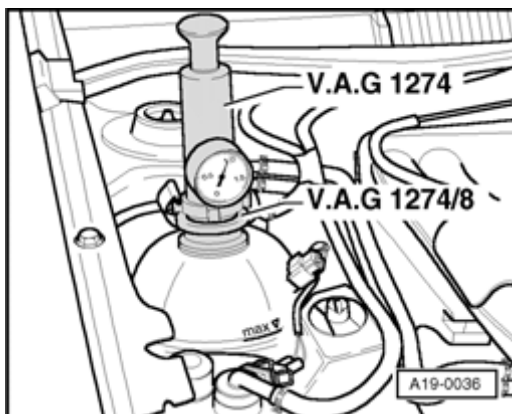
### Test requirement:

- Engine at operating temperature.

### **WARNING!**

**Hot steam can escape when the cap on the expansion tank is opened. Cover the cap with a cloth, and open it carefully.**

- Remove cap from coolant expansion tank.



- Install tester VAG 1274 with adapter VAG 1274/8 onto expansion tank.
- Using hand pump on tester, build up a pressure of approx. 1.0 bar.
- If this pressure drops, locate the leak and repair.

**Testing pressure relief valve in filler cap**

- Screw filler cap onto tester with adapter \ 1274/9.
- Attach hand pump and build up pressure
- The pressure relief valve should open at pressure of 1.4 - 1.6 bar.

