

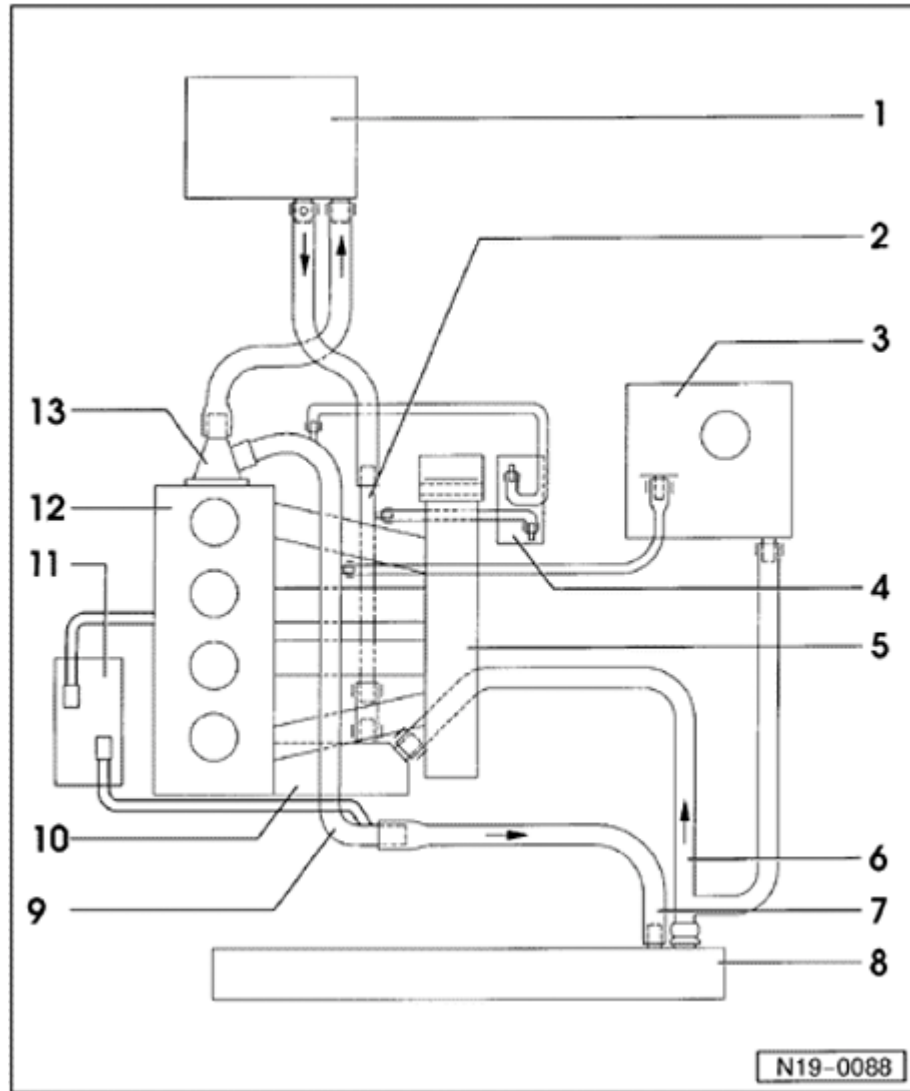
Cooling system components, removing and installing

WARNING!

The cooling system is pressurized when the engine is warm. When opening the expansion tank, wear gloves and other appropriate protection, cover the cap using a cloth, and open carefully to relieve system pressure slowly.

Note:

- ◆ *Cooling system is under pressure when engine is warm. If necessary reduce pressure before repair.*
- ◆ *Secure all hose connections using production-type clamps ⇒ parts catalog.*
- ◆ *VAG1921 pliers are recommended for installing spring clips.*
- ◆ *Always replace gaskets, seals and O-rings.*
- ◆ *Arrows on coolant lines and hoses must align.*



Cooling system components

Coolant hose connection diagram

1 - Heater core

- ◆ After replacing, replace coolant

2 - Lower coolant line

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

3 - Expansion tank

- ◆ With cap
- ◆ Pressure relief valve in cap, checking ⇒ [Page 19-30](#)

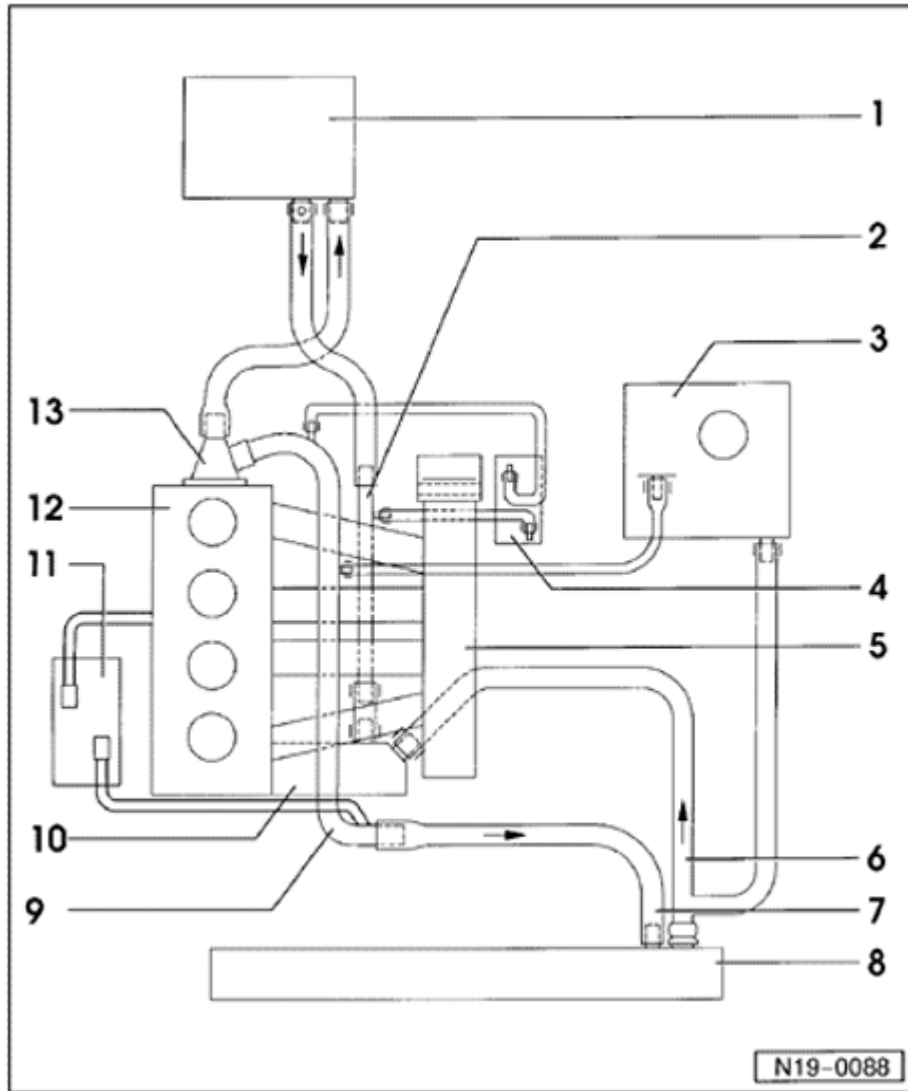
4 - Oil cooler

- ◆ Removing and installing ⇒ [Page 17-7](#) , item 14

5 - Intake manifold

6 - Lower coolant hose

7 - Upper coolant hose

**8 - Radiator**

- ◆ Removing and installing ⇒ [Page 19-24](#)
- ◆ After replacing, replace coolant

9 - Upper coolant line**10 - Coolant pump/coolant thermostat**

- ◆ Coolant pump, removing and installing ⇒ [Page 19-13](#)
- ◆ Check for ease of movement
- ◆ Coolant thermostat, removing and installing ⇒ [Page 19-20](#)
- ◆ Checking ⇒ [Page 19-21](#)

11 - Turbocharger**12 - Cylinder head/cylinder block**

- ◆ After replacing, replace coolant

13 - Connector

Cooling system, draining and filling

Special tools and equipment

- ◆ VAG1306 drip tray
- ◆ VAG1274/10 with VAG1274/1 adapter or VAG1274/8
- ◆ T40007 refractometer

Draining

Note:

Drain coolant into a clean container for recycling or reuse.

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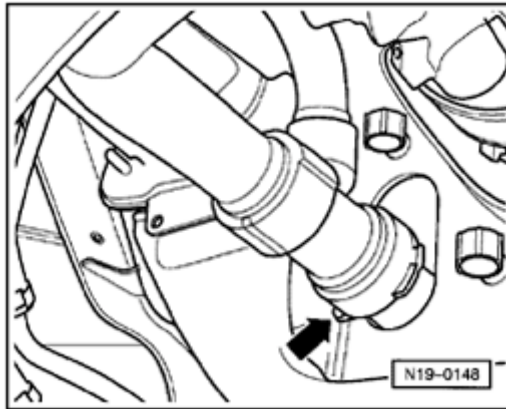
- Open coolant expansion tank cap.
- Remove noise insulation panel (arrows).



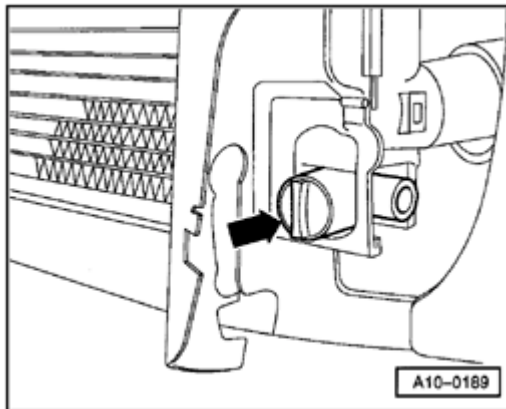
- Place VAG1306 drip tray underneath engine.

CAUTION!

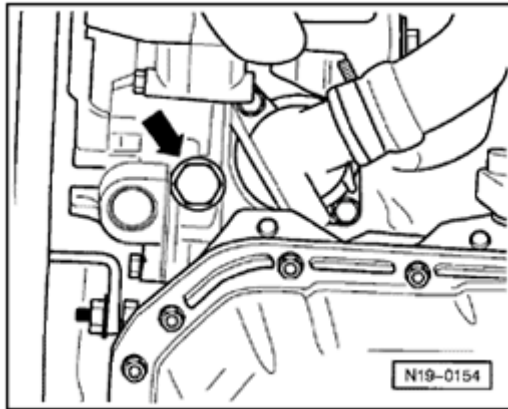
Observe disposal regulations for coolant!



- A** - Remove retaining clip (arrow) from lower coolant hose and remove coolant hose from radiator.

Note:

- A** *With bumper removed, coolant can be drained through radiator drain plug (arrow).*



A

- Remove drain plug from coolant pump (arrow).

Filling

Note:

- ◆ The cooling system is filled year-round with frost and corrosion protection additives.
- ◆ Until 6/96, G 011 A8 C coolant (green color) was used.
- ◆ From 7/96 on, only G 012 A8 D coolant (red color) is used.

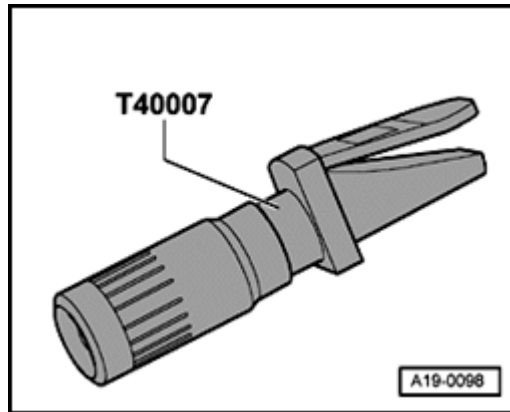
CAUTION!

- ◆ **Coolants G 011 A8 C and G 012 A8 D CANNOT be mixed. Mixing them will cause severe engine damage.**
- ◆ **Part numbers are for reference only. Always check with your Parts department for the latest information.**
- ◆ If the fluid in the expansion tank is brown, G012 A8 D has been mixed with other coolant. In this case, flush cooling system and change coolant. To flush, fill cooling system with clear water and run engine for approx. 2 minutes. Flushing the system should remove most of the coolant residue.

Note (continued from page ⇒ [Page 19-6](#)):

- ◆ *G 011 A8 C or G 012 A8 D and coolant additives marked with "according to TL VW 774C" or "according to TL VW 774 D", prevent frost and corrosion damage as well as calcium deposits. They also raise the boiling point. Therefore, cooling system must be filled year-round with frost and corrosion protection additives.*
- ◆ *A higher boiling point improves engine reliability under heavy load, particularly in countries with tropical climates.*
- ◆ *Frost protection additives must protect against frost to about -25° C (-13° F) and to about -35° C (-31° F) in arctic climates.*
- ◆ *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 greater frost protection is required, the amount of G 011 A8 C or G 012 A8 D can be increased, but only up to 60% to obtain frost protection to about -40° C (-40° F). Otherwise frost protection and cooling effectiveness will be reduced.*

- ◆ *If the radiator, heater core, cylinder head or cylinder head gasket is replaced, completely replace the engine coolant.*



- ▲ For coolant G 012 A8 D, use T40007 refractometer to test frost protection in cooling system.

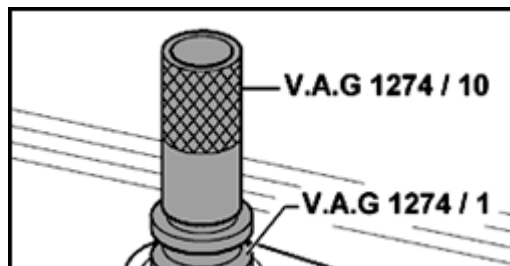
Recommended mixture ratios:

Frost protection to	Anti-freeze amount	G 012 A8 D ¹⁾	Water ¹⁾
-25 ° C (-13 ° F)	40 %	3.0 ltr. (3.2 qts.)	4.0 ltr. (4.2 qts.)
-35 ° C (-13 ° F)	50 %	3.5 ltr. (3.7 qts.)	3.5 ltr. (3.7 qts.)

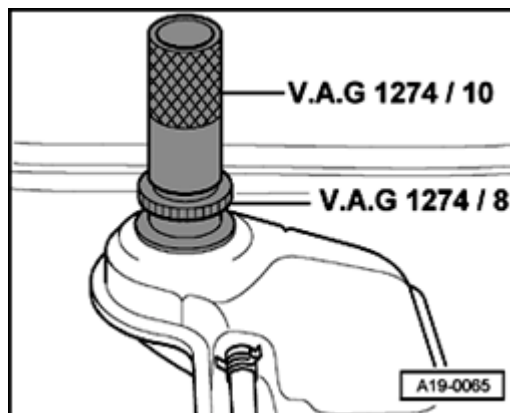
¹⁾ The quantity of coolant: 7.0 liters (7.4 qts.) can vary depending upon vehicle options.

- Install lower radiator hose and secure.
 - Replace O-ring and install coolant pump drain plug.
- Tightening torque: 30 Nm (22 ft lb)

Vehicles with small cap



- ▲
- Screw VAG1274/1 adapter onto coolant expansion tank.
 - Attach VAG1274/10 special tool to VAG1274/1 adapter.



Vehicles with large cap

A

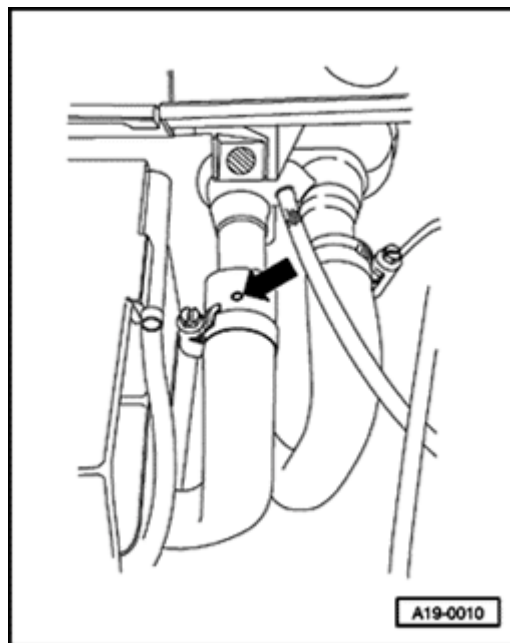
- Screw VAG1274/8 adapter onto coolant expansion tank.
- Attach VAG1274/10 special tool to VAG1274/1 adapter.

All models

Note:

To fill without using special tools, loosen coolant expansion tank and lift approx. 100 mm (approx. 4 in.).

- Remove grommet holding clip at heater core and pull back grommet.



A

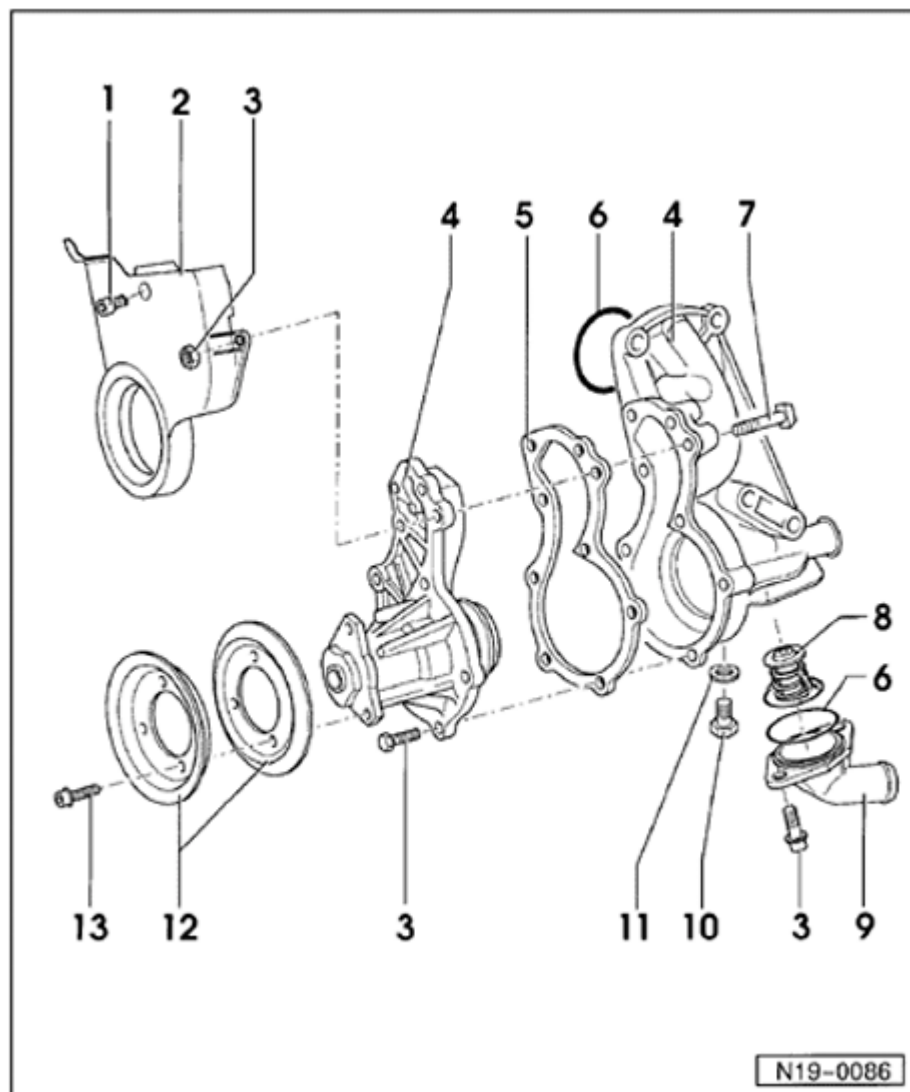
- Loosen coolant hose on heater core and pull back hose sufficiently so that bleeder hole (arrow) is no longer sealed by connection.
- Top up coolant until it flows out of coolant hose bleeder hole.
- Push coolant hose on connection and tighten.
- Install coolant expansion tank cap.

- Start engine and maintain an engine speed of about 2000 RPM for approx. 3 minutes.
- Allow engine to idle until the lower radiator hose is hot. Check coolant level and top up if necessary. When engine is at normal operating temperature, coolant level must be at max. mark; when engine is cold, between min. and max. marks.

WARNING!

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- Switch engine off.



Coolant pump and coolant thermostat, servicing

1 - Bolt

- ◆ M6: 10 Nm (7 ft lb)
- ◆ M8: 20 Nm (15 ft lb)

2 - Lower toothed belt cover

- ◆ Removing and installing ⇒ [Page 13-29](#)

3 - Nut

- ◆ 10 Nm (7 ft lb)

4 - Coolant pump

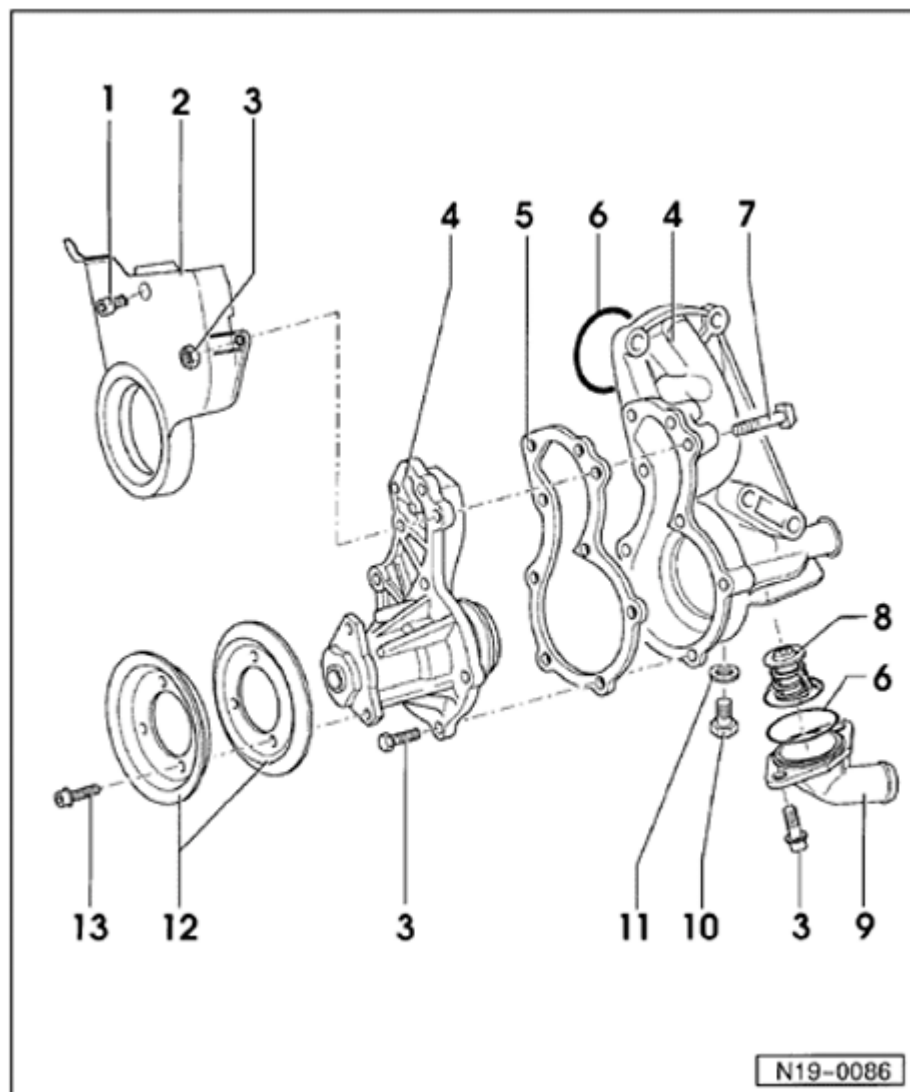
- ◆ Removing and installing ⇒ [Page 19-13](#)
- ◆ Check for ease of movement

5 - Gasket

- ◆ Always replace

6 - O-ring

- ◆ Always replace

**7 - T-head bolt**

- ◆ Insert before installation

8 - Coolant thermostat

- ◆ Removing and installing ⇒ [Page 19-20](#)
- ◆ Checking ⇒ [Page 19-20](#)

9 - Connector**10 - Drain plug**

- ◆ 30 Nm (22 ft lb)

11 - O-ring

- ◆ Always replace

12 - Belt pulley

- ◆ Installed position: flat pulley half faces coolant pump

13 - Socket-head bolt

- ◆ 25 Nm (18 ft lb)

Coolant pump, removing and installing

Note:

Coolant pump is bolted to bracket for generator, power steering pump and viscous fan.

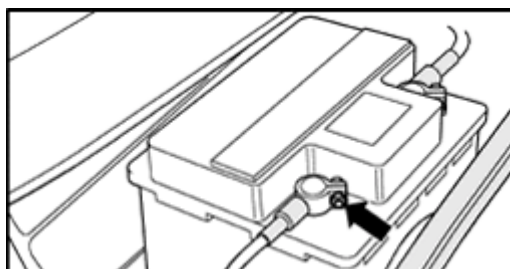
- Lock carrier in service position ⇒ [Page 13-1](#)

Removing

CAUTION!

Before disconnecting the battery:

- ♦ **Stop the engine.**
- ♦ **Determine the correct coding for the anti-theft radio.**
- ♦ **Switch the ignition off (also applies when connecting the battery). Failure to do so may damage the Engine Control Module (ECM).**

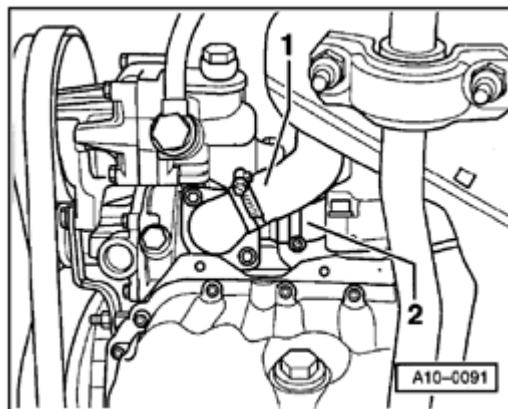


A

- Switch ignition off and disconnect battery Ground (GND) strap.
- Remove ribbed belt ⇒ [Page 13-15](#) .
- Remove viscous fan (with belt pulley) ⇒ [Page 13-14](#) , Fig. ⇒ [1](#) .
- Remove V-belt ⇒ [Page 13-18](#) .

Note:

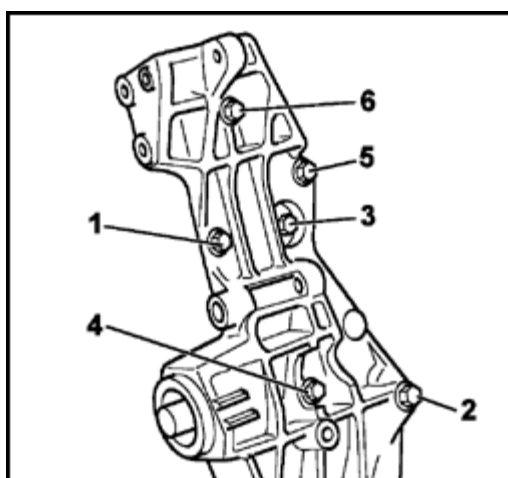
Ribbed belt for A/C compressor and torque support remains installed.



- Drain coolant ⇒ [Page 19-4](#) .

A

- Loosen clamps for coolant hoses -1- and -2-.
- Remove coolant hose to radiator at coolant line.
- Remove intake air duct between intake manifold and charge air cooler.
- Remove mounting bolts for generator.
- Remove generator toward front.
- Disconnect wiring from removed generator.
- Unbolt following supports and braces from bracket for generator, power steering pump and viscous fan:
 - ◆ Intake manifold support
 - ◆ Support for torque support bracket
 - ◆ Brace to cylinder block (remove completely)



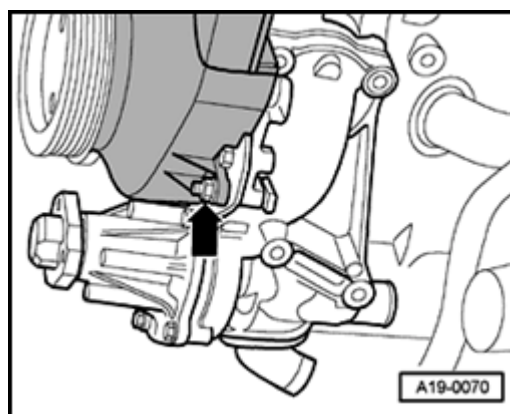
A

- Remove bracket for generator, power steering pump and viscous fan bolts -1- through -6-.
- Secure bracket for generator, power steering pump and viscous fan to left side using wire.

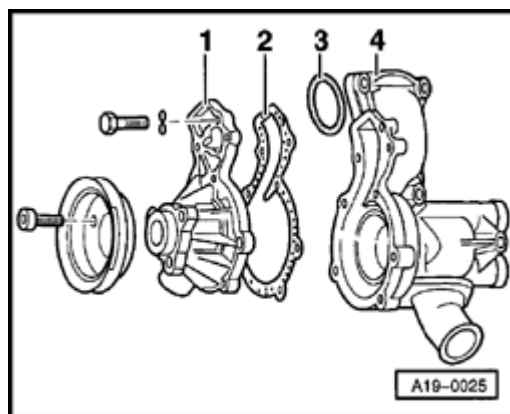
Note:

Power steering pump remains installed.

- Pull off coolant hoses from coolant pump and coolant thermostat housing.



- A** - Unbolt coolant pump housing from toothed belt cover (arrow).
- Remove coolant pump.

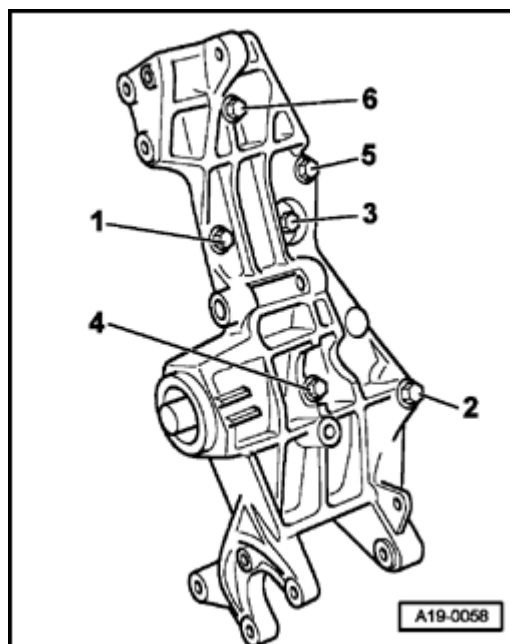


- A** - Unbolt impeller housing -1- from pump housing -4-.

Installing

Installation is the reverse of removal, noting the following:

- Clean sealing surfaces of both housings.
 - Replace gasket and O-ring.
 - Insert T-head bolt into coolant pump bore.
 - Mount bracket for generator, power steering pump and viscous fan with coolant pump on cylinder block and tighten bolts in numerical sequence.
- 1 - M8 x 70 bolt
2 - M8 x 110 bolt
3 - M8 x 50 bolt
4 - M8 x 90 bolt
5 - M8 x 70 bolt
6 - M8 x 100 bolt
- Install viscous fan ⇒ [Page 13-14](#) , Fig. ⇒ [1](#) .
 - Install ribbed belt ⇒ [Page 13-17](#) .



Note:

When installing ribbed belt, check for correct seating on belt pulley.

- Install V-belt ⇒ [Page 13-18](#) .
- Fill up with coolant ⇒ [Page 19-6](#) .

WARNING!

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CAUTION!

Be sure the ignition is switched OFF. Failure to do so may damage the Engine Control Module (ECM).

- Switch ignition off and reconnect battery Ground (GND) strap.
- After connecting battery, enter anti-theft code for radio.

⇒ *Radio Operating Manual*

- Fully close power windows to stop.

- Operate all power window switches again for at least one second in "close" direction to activate "one-touch" opening/closing function.

- Set clock to correct time.

Tightening torques

Component	Tightening torques
Impeller to pump housing	10 Nm (7 ft lb)
Pump housing to toothed belt cover	10 Nm (7 ft lb)
Bracket for generator, power steering pump and viscous fan to cylinder block	25 Nm (18 ft lb)
Left brace for cylinder block/bracket for generator, power steering pump and viscous fan	
to cylinder block	25 Nm (18 ft lb)
to bracket M10	40 Nm (30 ft lb)
Brace for torque support/bracket for generator, power steering pump and viscous fan	
to torque support	25 Nm (18 ft lb)
to bracket	20 Nm (15 ft lb)
Intake duct support	

to intake duct	20 Nm (15 ft lb)
to bracket	20 Nm (15 ft lb)

Component	Tightening torques
Generator to bracket for generator, power steering pump and viscous fan	
M8	25 Nm (18 ft lb)
M10	40 Nm (30 ft lb)
Belt pulley to coolant pump	25 Nm (18 ft lb)
Viscous fan to bearing	45 Nm (33 ft lb)

Coolant thermostat, removing, installing and checking

Removing

- Drain coolant ⇒ [Page 19-4](#) .
- Remove bolts -4-, remove connector -3-, O-ring -2- and coolant thermostat -1-.

Installing

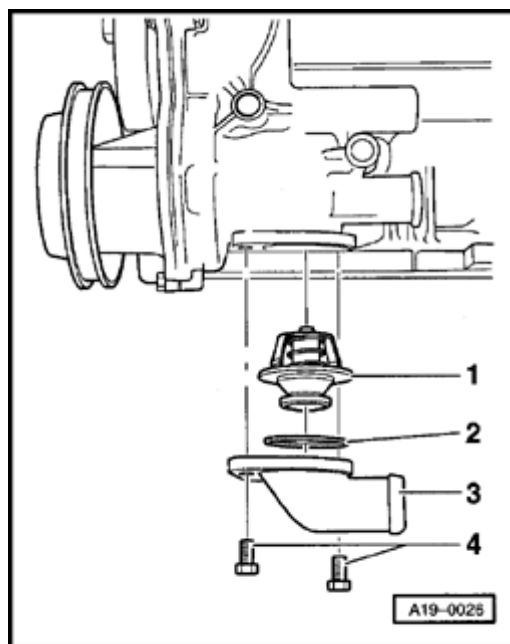
- Clean and/or smooth O-ring sealing surface.
- Install coolant thermostat.
- Fill up with coolant ⇒ [Page 19-6](#) .

WARNING!

The cooling system is pressurized when the engine is warm. When opening the expansion tank, wear gloves and other appropriate protection, cover the cap using a cloth, and open carefully to relieve system pressure slowly.

Tightening torque

Component	Tightening torque
Connector to pump housing	10 Nm (7 ft lb)



Coolant thermostat, checking

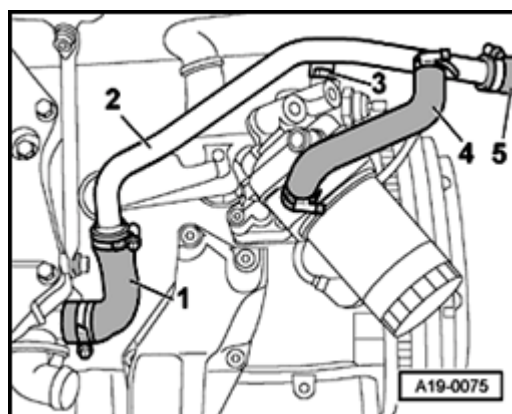
- Warm thermostat in hot water bath.

Starts to open	Fully open	Stroke
approx. 87 °C (189 °F)	approx. 102 °C ¹⁾ (216 °F)	min. 8 mm (0.315 in.)
1) Cannot be tested.		

Coolant line (lower), removing and installing

Removing

- Drain coolant ⇒ [Page 19-4](#) .
- Remove intake air duct between intake manifold and charge air cooler.
- Remove hose -4- to oil cooler at lower coolant line -2-.
- Remove hose -5- to heater core at lower coolant line.
- Remove lower coolant line from hose -1- at coolant pump.
- Unbolt lower coolant line from oil filter bracket -3-.



Installing

Installation is the reverse of removal, noting the following:

- Fill with coolant ⇒ [Page 19-6](#) .

WARNING!

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Radiator, removing and installing

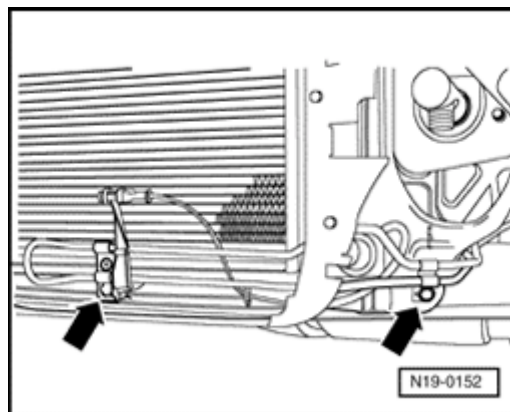
Special tools and equipment

VAG1306 drip tray

Removing

- Remove front bumper.

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



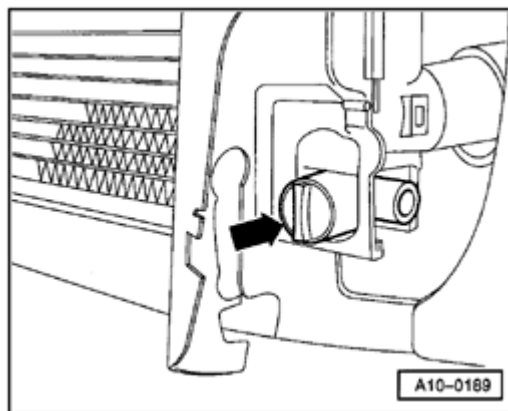
A

- Unbolt cooling pipe for power steering hydraulic oil (arrows).
- Place VAG1306 drip tray underneath engine.

WARNING!

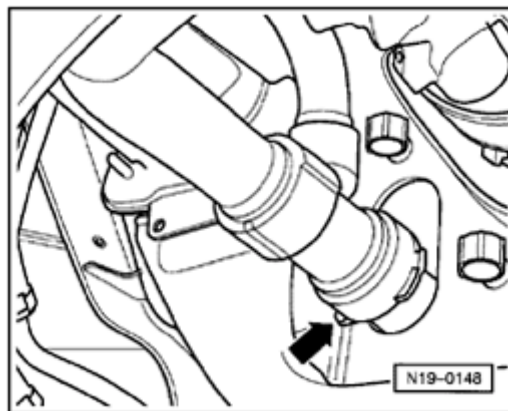
The cooling system is pressurized when the engine is warm. When opening the expansion tank, wear gloves and other appropriate protection, cover the cap using a cloth, and open carefully to relieve system pressure slowly.

- Open coolant expansion tank cap.



A

- Turn radiator drain plug (arrow) counterclockwise; if needed attach accessory hose to connection flange.



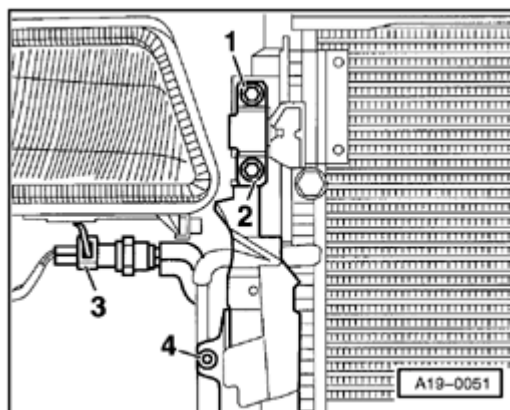
A

- Remove coolant hoses at radiator and remove clip from connecting flange (arrow).

Vehicles with automatic transmission

- Remove ATF lines from radiator.

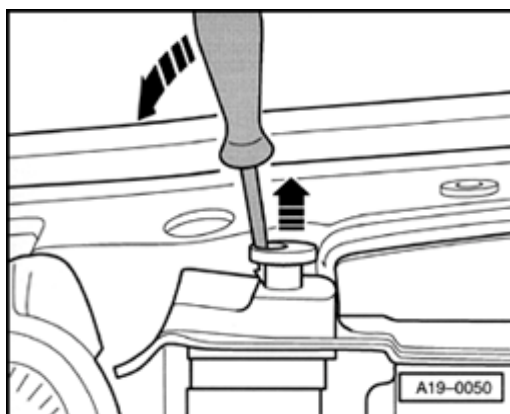
⇒ [Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37](#)



- A**
- Remove bolts -4- for air guides at radiator on left and right sides.
 - Remove retaining bolts -1- and -2- from condenser.
 - Disconnect harness connector -3- at A/C pressure switch -F129-.
 - Pull condenser upward, out of retaining bracket, swing to side and hang at right-front wheel using wire loop.

Note:

Make sure fender is protected against possible damage.



- A**
- Unlock both radiator retaining bolts and pull upward to remove (arrows).
 - Tilt radiator forward and remove toward top.

Installing

Installation is the reverse of removal, noting the following:

- Fill up with coolant ⇒ [Page 19-6](#) .

WARNING!

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Tightening torques

Component	Tightening torques
Condenser to radiator	10 Nm (7 ft lb)
Coolant line to radiator	10 Nm (7 ft lb)

Cooling system, pressure test

Special tools and equipment

- ◆ VAG1274 cooling system tester
- ◆ VAG1274/1 adapter or VAG1274/8 with VAG1274/9

Test condition:

- Engine at operating temperature

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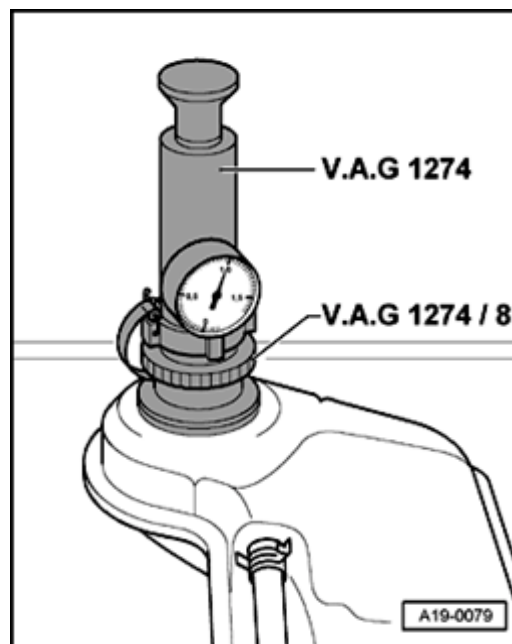
- Open coolant expansion tank cap.

Vehicles with small cap



A

- Using VAG1274/1 adapter, attach VAG1274 cooling system tester to coolant expansion tank.



Vehicles with large cap

A

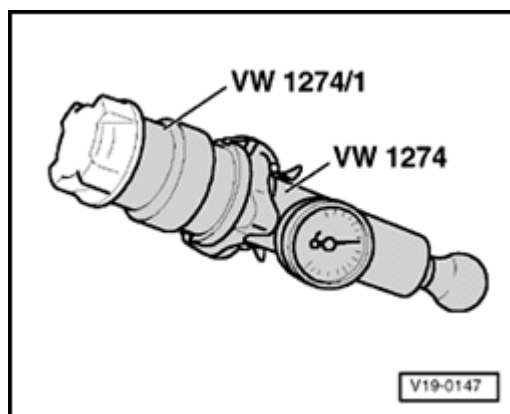
- Using VAG1274/8 adapter, attach VAG1274 cooling system tester to coolant expansion tank.

All models

- Use tester hand pump to create approx. 1.0 bar (14.5 psi) pressure.
- If pressure drops, check for leaks and repair.

Pressure relief valve in cap, checking

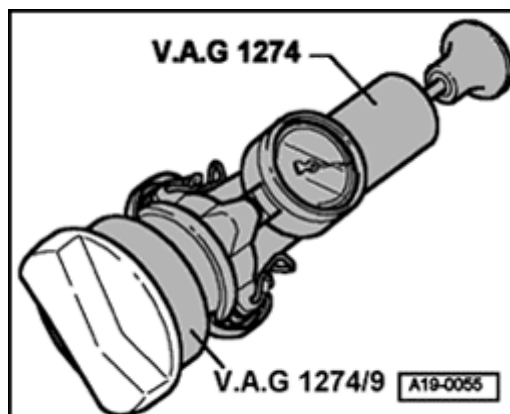
Vehicles with small cap



A

- Using VAG1274/1 adapter (2 parts), attach VAG1274 cooling system tester to coolant expansion tank cap.
- Pump using hand pump.
Pressure relief valve must open at 1.2-1.5 bar (17.4-21.75 psi).

Vehicles with large cap



A

- Using VAG1274/9 adapter attach VAG1274 cooling system tester to coolant expansion tank cap.
- Pump using hand pump.
Pressure relief valve must open at 1.4-1.6 bar (20.3-23.2 psi).