

Cooling system components, removing and installing

WARNING!

Hot steam can escape when opening the cap on the expansion tank: Cover the cap with a cloth and open carefully.

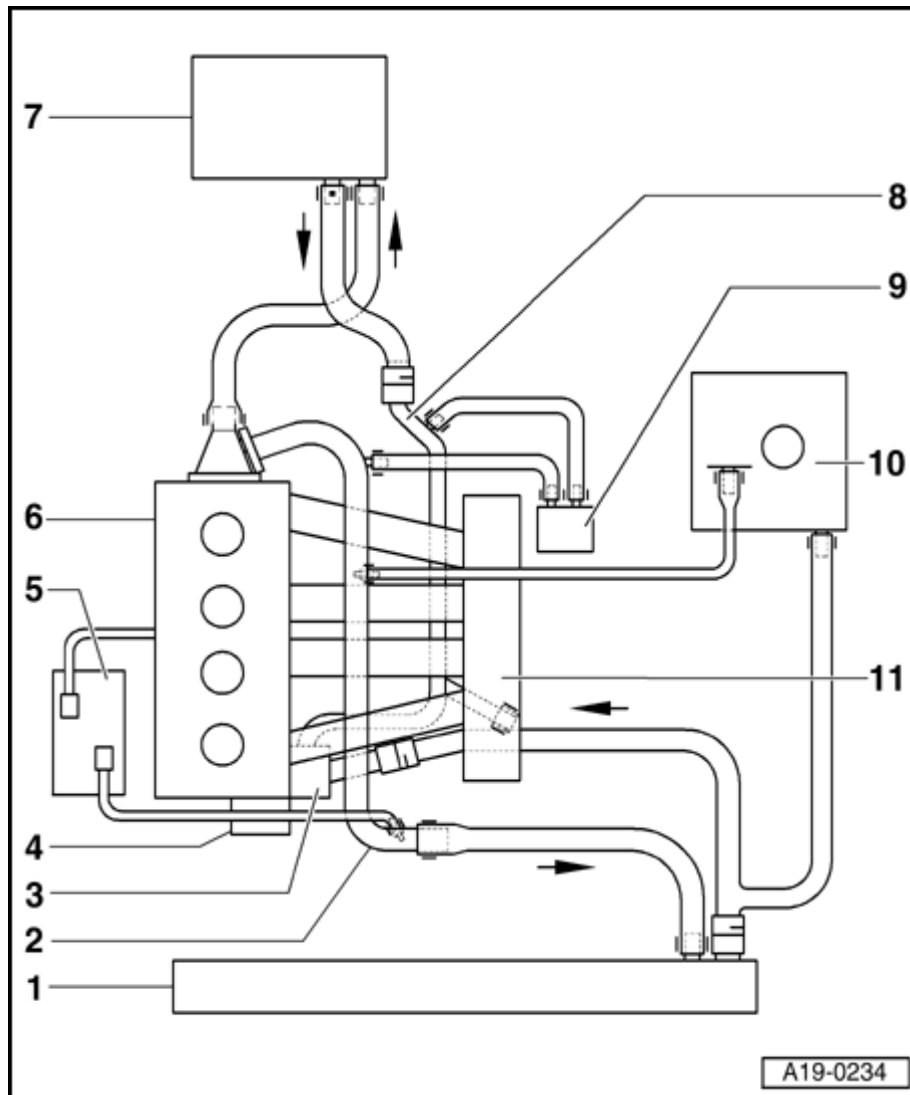
Note:

- ◆ *When the engine is warm the cooling system is under pressure. If necessary release pressure before beginning repair work.*
- ◆ *Secure all hose connections with the correct hose clips (same as original equipment):*

⇒ *Parts Catalog*

- ◆ *Hose clip pliers VAG 1921 are recommended when installing spring type clips.*
- ◆ *Replace all gaskets and seals.*
- ◆ *The arrow markings on the coolant lines and on the ends of the hoses must be aligned with each other.*

◆ *Removing and installing viscous fan* ⇒ [Page 13-21](#) .



Cooling system diagram

1 - Radiator

- ◆ Removing and installing ⇒ [Page 19-26](#)
- ◆ After replacing, fill with fresh coolant

2 - Upper coolant line

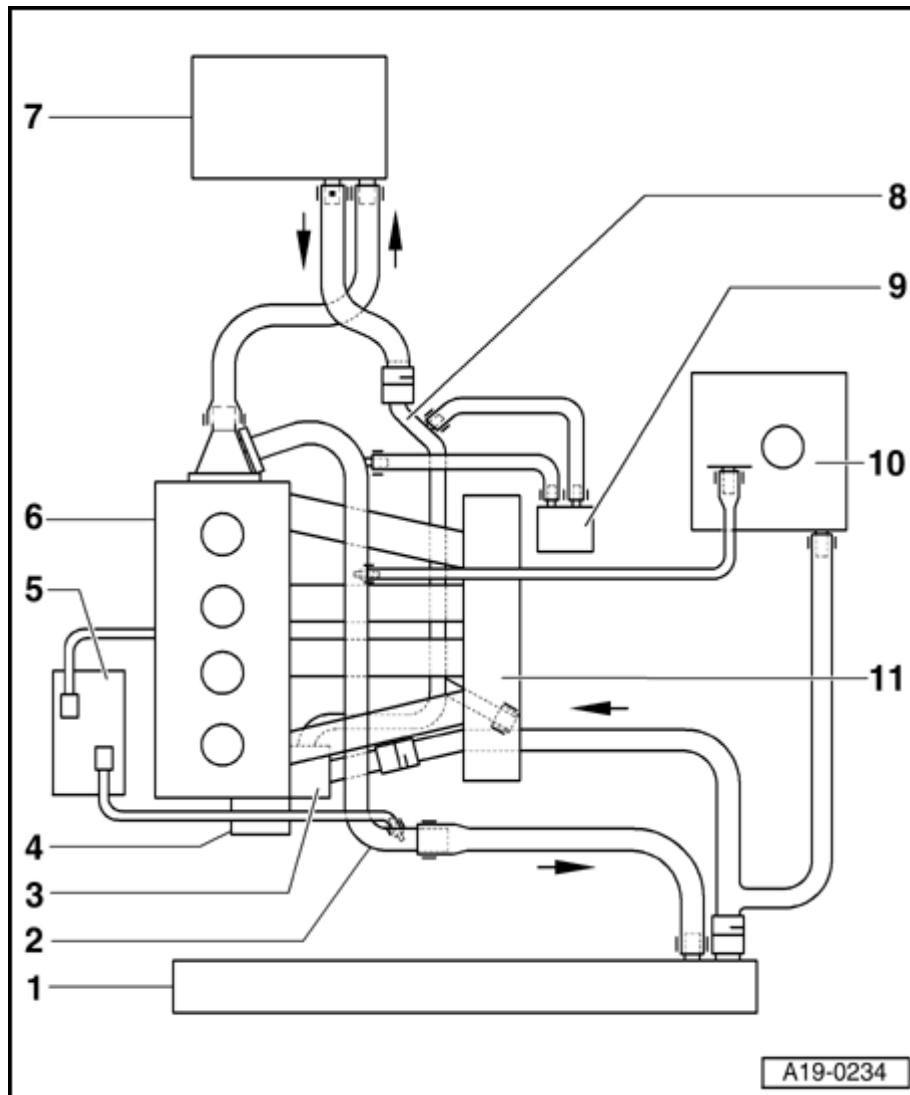
3 - Thermostat

- ◆ Removing and installing coolant pump ⇒ [Page 19-12](#)
- ◆ Checking ⇒ [Page 19-22](#)

4 - Coolant pump

- ◆ Removing and installing ⇒ [Page 19-12](#)
- ◆ Check for ease of movement

5 - Turbocharger



6 - Cylinder head/cylinder block

- ◆ After replacing, fill with fresh coolant

7 - Heating system heat exchanger

- ◆ After replacing, fill with fresh coolant

8 - Lower coolant line

- ◆ Removing and installing ⇒ [Page 19-23](#)

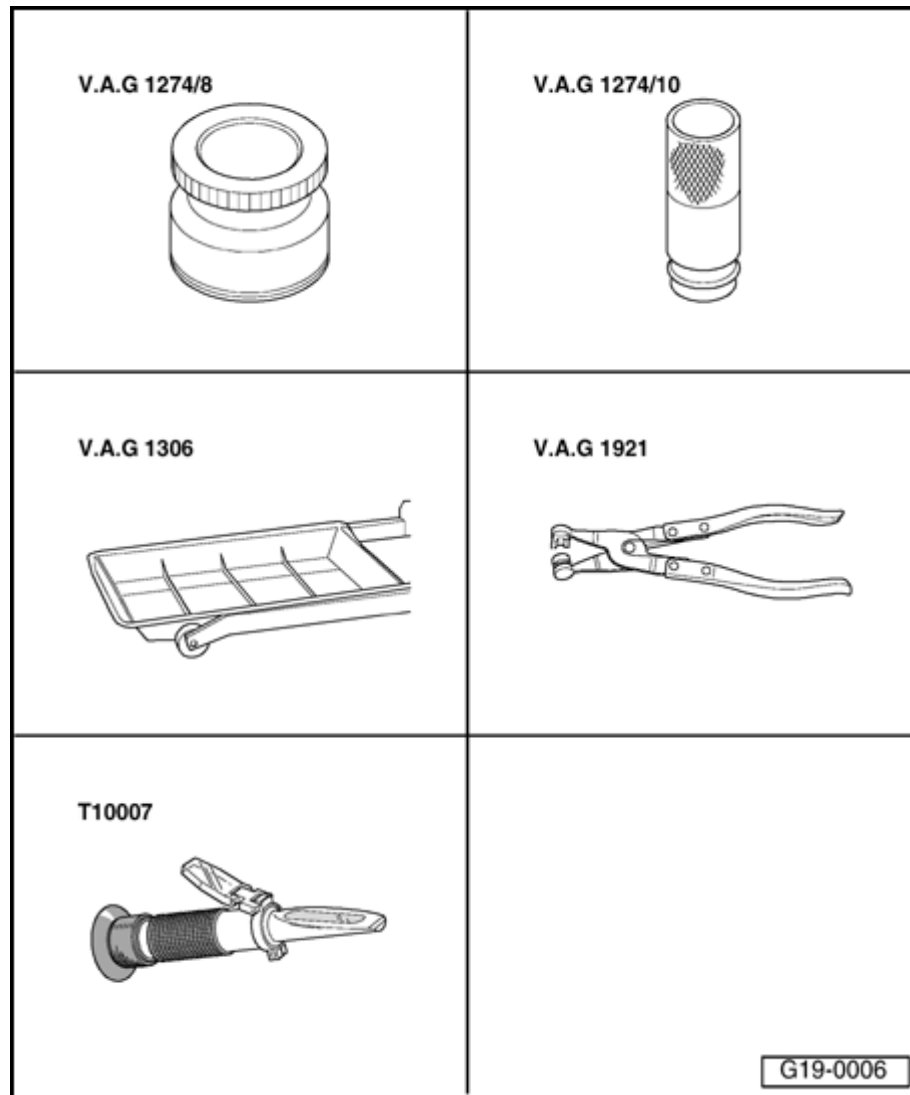
9 - Oil cooler

- ◆ Removing and installing ⇒ Item 23 , ⇒ [Page 17-10](#)

10 - Expansion tank

- ◆ With filler cap
- ◆ Testing pressure relief valve in filler cap ⇒ [Page 19-33](#)

11 - Intake manifold



Cooling system, draining and filling

Special tools and equipment

- ◆ Adapter 1274/8
- ◆ Line VAG 1274/10
- ◆ Drip tray VAG 1306
- ◆ Hose clamp pliers VAG 1921
- ◆ Special tool T10007

Draining

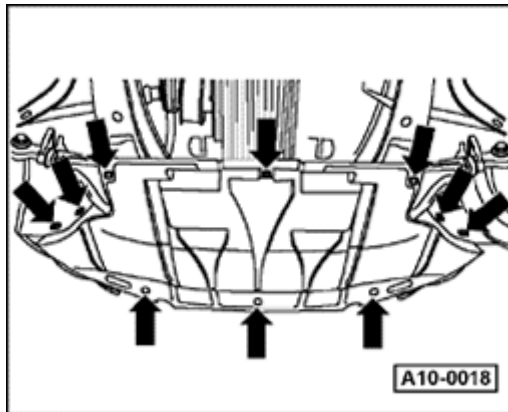
Note:

Catch drained off coolant in a clean container for re-use or disposal.

WARNING!

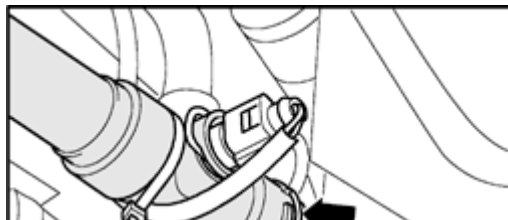
Hot steam can escape when opening the cap on the expansion tank: Cover the cap with a cloth and open carefully.

- Open cover of coolant expansion tank
- Remove sound insulation -arrows-.
- Place drip tray VAG 1306 below engine.

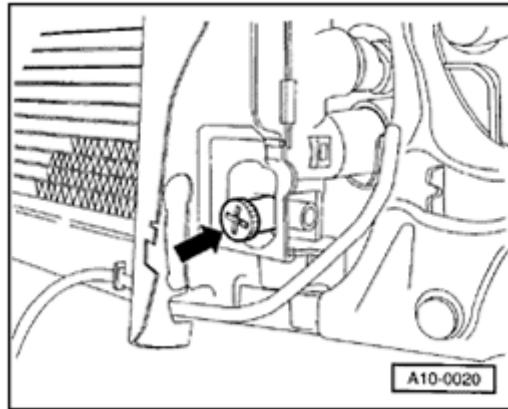


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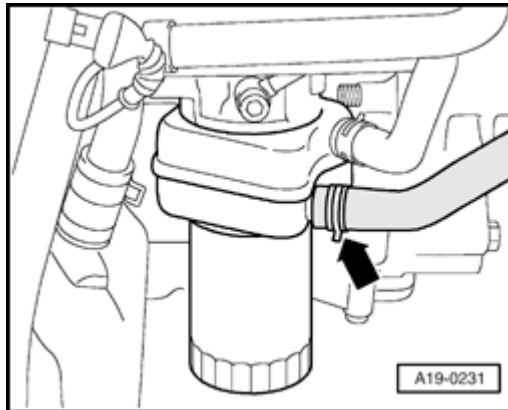
- Remove lower coolant hose retaining clip -arrow- and remove coolant hose from radiator.



A

**Note:**

- ▲ *With bumper and air duct in front of charge air cooler removed, the coolant can also be drained from the radiator via the drain screw -arrow-. If necessary use an auxiliary hose.*



- ▲ - Disconnect lower coolant hose on oil cooler -arrow-, and drain off remaining coolant.

Filling

Note:

- ◆ *The cooling system is filled all year round with a mixture of water and an antifreeze/corrosion protection agent.*
- ◆ *Only use coolant additive G 012 A8 D meeting specification TL VW 774 D. Identification color: red*

CAUTION!

G 012 A8 D and other coolant additives cannot be mixed. Otherwise, serious damage to the engine may result.

- ◆ *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 fill with fresh coolant. To flush the system, fill it with clean water and run the engine for about 2 minutes. This should remove as much of the old coolant as possible.*
- ◆ *G 012 A8 D and coolant additives marked "meeting specification TL VW 774 D" prevent frost and corrosion damage and stop scaling while at the same time raising the boiling point of the 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.*
- ◆ *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 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). Otherwise, frost protection is reduced again and cooling effectiveness is also reduced.*
- ◆ *Only use clean drinking water for mixing the coolant.*
- ◆ *If radiator, heat exchanger, cylinder head or cylinder head gasket is replaced, do not reuse old coolant.*
- ◆ *Use special tool T10007 to check frost protection of coolant additive G012 A8 D in*

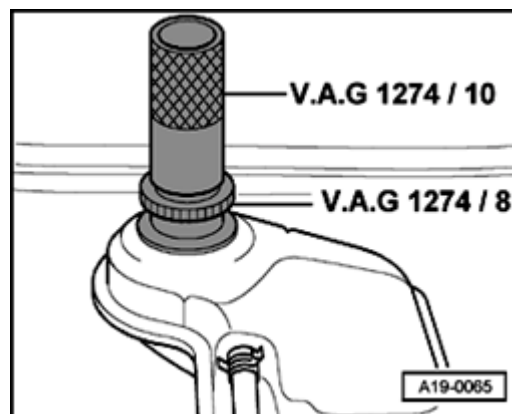
cooling system.

Recommended mixture ratios:

Frost protection to	Anti-freeze concentration	G 012A8 D ¹⁾	Water ¹⁾
-25 ° C	40%	3.0 l	4.0 l
-35 ° C	50%	3.5 l	3.5 l

¹⁾ Coolant quantity: 7.0 liters (may vary depending upon the vehicle equipment)

- Install lower coolant hose and secure.



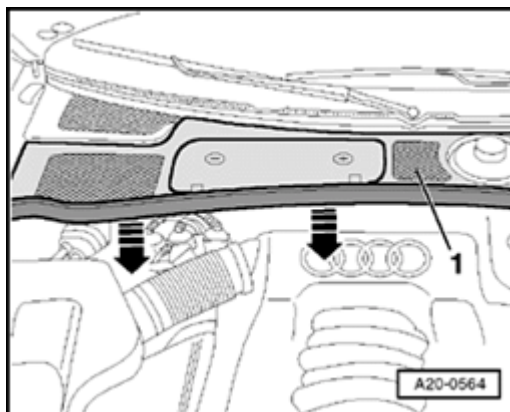
A

- Screw adapter VAG 1274/8 onto coolant expansion tank.

- Fit special tool VAG 1274/10 onto adapter.

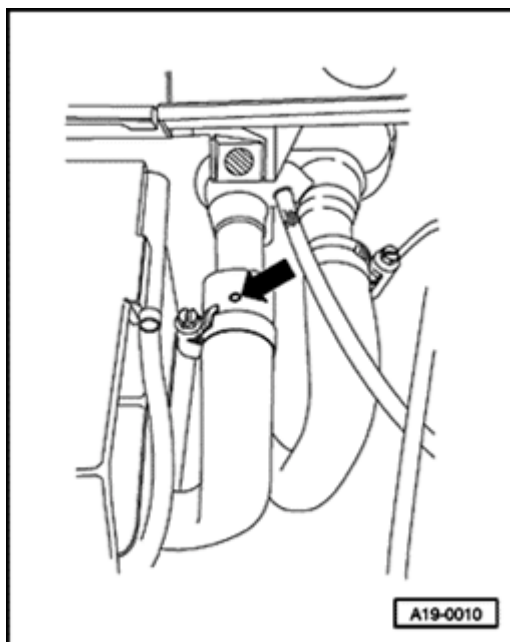
Note:

To fill expansion tank without special tools, remove expansion tank and temporarily raise it about 100 mm.



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- Remove seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from front.
- Push back protective cover for coolant hose at connection of heat exchanger.



A

- Release coolant hose to heat exchanger and pull back hose until bleeder hole in coolant hose -arrow- is no longer covered by connection.
- Top up coolant until it flows out at bleeder hole in coolant hose.
- Push coolant hose on connection and tighten.
- Install expansion tank cap.

- 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.

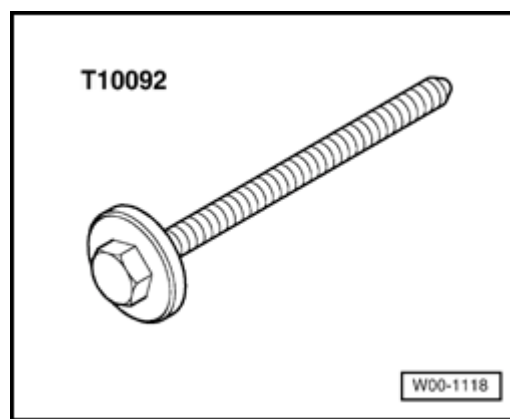
WARNING!

Hot steam can escape when opening the cap on the expansion tank: Cover cap with a cloth and open carefully.

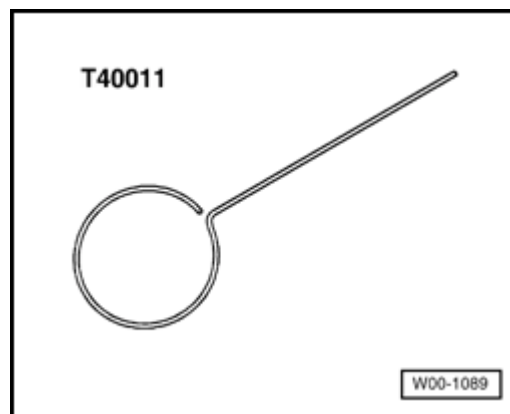
- Check coolant level and top up if necessary. If engine is warm, coolant level must be at max. mark; if cold, between min. and max. marks.
- Stop engine.

Coolant pump, removing and installing

Special tools and equipment



- ◆ Socket head fastener T10092



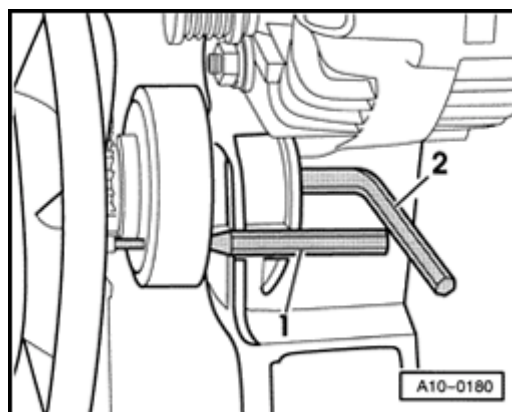
- ◆ Pin T40011

Removing

- Engine in vehicle.
- Lock carrier must be in service position ⇒ [Page 13-1](#) .

- Drain coolant ⇒ [Page 19-4](#) .

- Remove ribbed belt and tensioner for ribbed belt
⇒ [Page 13-18](#) .



A

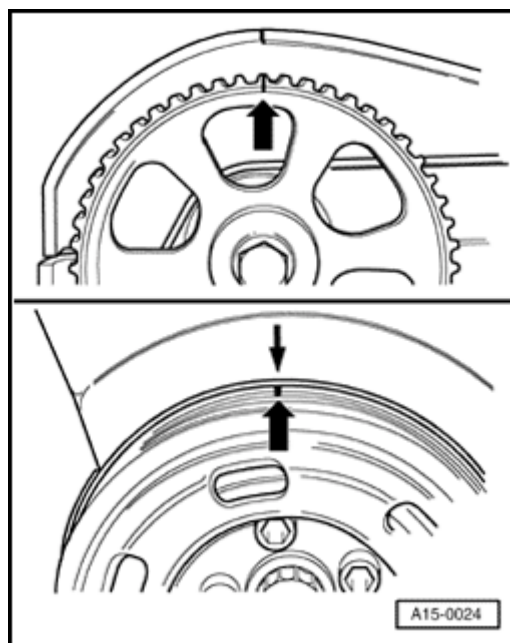
- Secure pulley for viscous fan with pin punch -1- and unfasten using Allen key -2-.
- Remove viscous fan from mounting.



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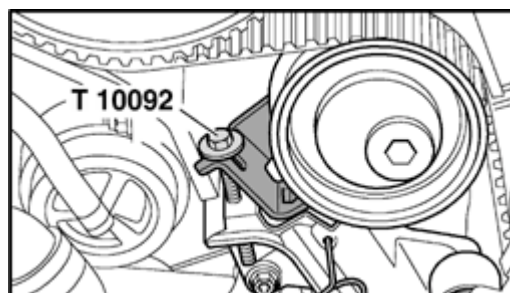
- Remove engine cover -arrows-.

- Mark direction of rotation of belt with chalk or felt pen.
- Remove top and center toothed belt guard ⇒ [Page 13-35](#) .



A

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



A

- Thread socket head fastener T10092 into tensioner for toothed belt.

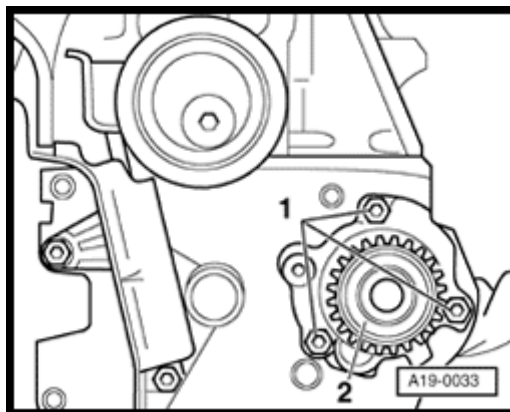
Note:

Only tension pressure piston of tensioner until the piston is secured with pin T40011.

- Take toothed belt off camshaft sprocket and coolant pump.

Note:

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



A

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

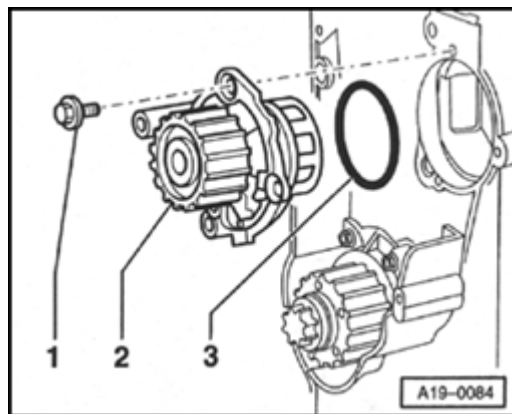
Installing

Installation is carried out in the reverse order of removal; note the following:

Note:

Always replace seals and gaskets.

- Clean and smooth down sealing surface for O-ring as required.



A

- Lightly coat new O-ring -3- with coolant G 012 A8 D.
- Install coolant pump -2-.
 - ◆ Installation position: Sealing plug in housing faces downward.
- Tighten bolts -1- of coolant pump to 15 Nm.
- Install toothed belt (adjust valve timing) ⇒ [Page 13-44](#) .

Note:

Observe all instructions on removing and installing the toothed belt ⇒ [Page 13-40](#) .

- Install ribbed belt and tensioner for ribbed belt ⇒ [Page 13-20](#) .
- Install viscous fan ⇒ [Page 13-21](#) .
- Install lock carrier ⇒ [Page 13-1](#) .
- Top up coolant ⇒ [Page 19-7](#) .

Tightening torque

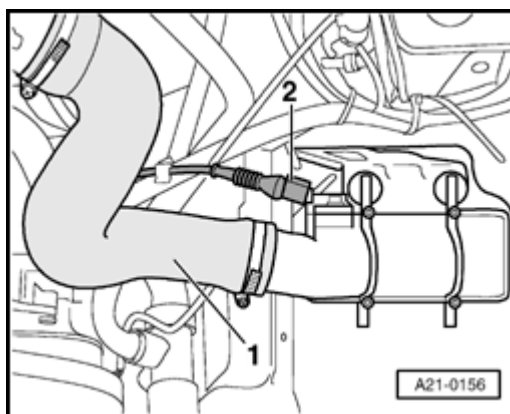
Component	Nm
Coolant pump to cylinder block	15
Center section of toothed belt guard to cylinder block	10 1)
Hose clamps for coolant hoses	2

1) Install with locking fluid D 000 600 A2

Coolant thermostat, removing and installing, checking

Removing

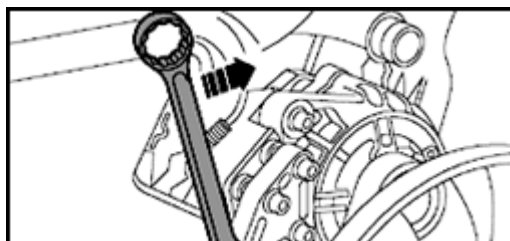
- Observe or obtain radio code on vehicles with coded radio.
- Disconnect Ground strap at battery with ignition switched off.
- Drain coolant ⇒ [Page 19-4](#) .



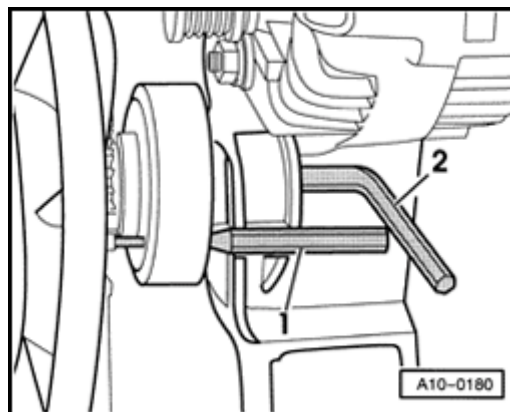
- A** - Remove air duct hose -1-.

Note:

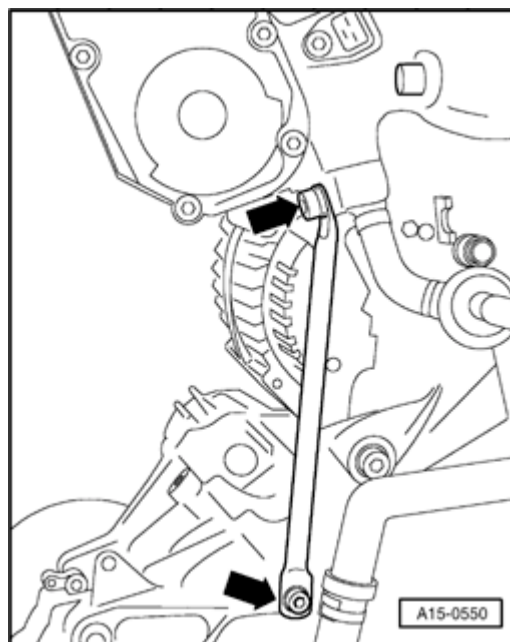
Connector -2- remains plugged in.



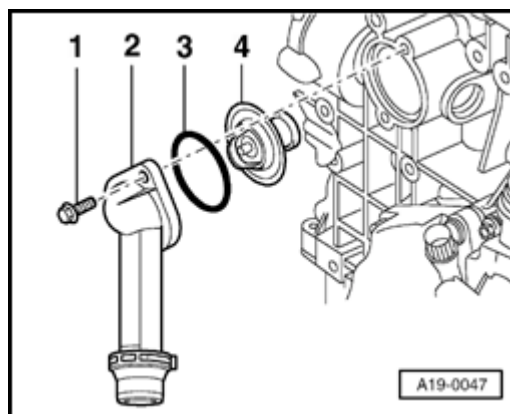
- A** - Loosen ribbed belt by turning tensioner in direction of arrow.
- Remove ribbed belt from Generator pulley.



- A**
- Secure pulley for viscous fan with pin punch -1- and unfasten using Allen key -2-.
 - Remove viscous fan from mounting and place in front of radiator cowl.
 - Disconnect wiring from rear of Generator.
 - Loosen connections for Generator from top and bottom and remove Generator.



- A**
- Remove intake line support -arrows-.



A

- Release clip and disconnect coolant hose from connection -2-.
- Remove bolts -1- remove connection, O-Ring -3- and coolant thermostat -4-.

Installing

Installation is carried out in the reverse order of removal; note the following:

Note:

Always replace seals and gaskets.

- Clean and smooth down sealing surface for O-ring as required.
- Lightly coat new O-ring with coolant G 012 A8 D.
- Insert coolant thermostat.
 - ◆ Installation position: Cross-piece on thermostat should be vertical.

- Install viscous fan ⇒ [Page 13-21](#) .
- Install ribbed belt and tensioner for ribbed belt ⇒ [Page 13-20](#) .
- After connecting battery, enter anti-theft code for radio.

⇒ *Radio operating instructions*

- Close windows fully using power window switches.
- Actuate all power window switches again for at least one second in the "close" direction to activate automatic open/close function.
- Set clock to correct time.
- Top up coolant ⇒ [Page 19-7](#) .

Tightening torques

Component	Nm
Connection to cylinder block	15
Support for intake manifold to intake manifold	20
to bracket	20
Generator at bracket	
M8	23
M10	46
Hose clamps for air duct hoses	
	3.5

Check coolant thermostat

- Heat thermostat in water bath.

Starts to open	Fully open	Opening travel
approx. 87 ° C	approx. 102 ° C 1)	at least 8 mm

1) cannot be tested

Lower coolant line, removing and installing

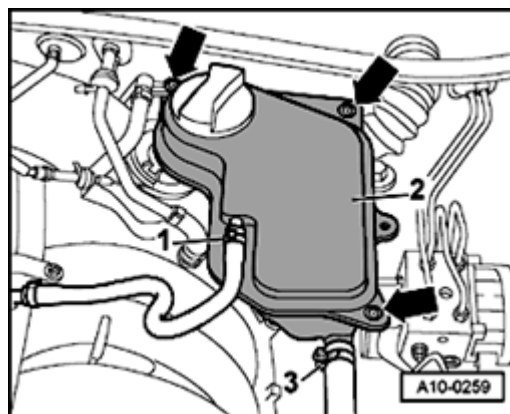
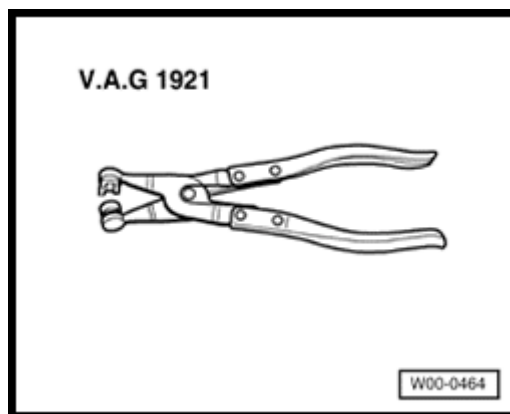
Special tools and equipment

A

- ◆ VAG 1921

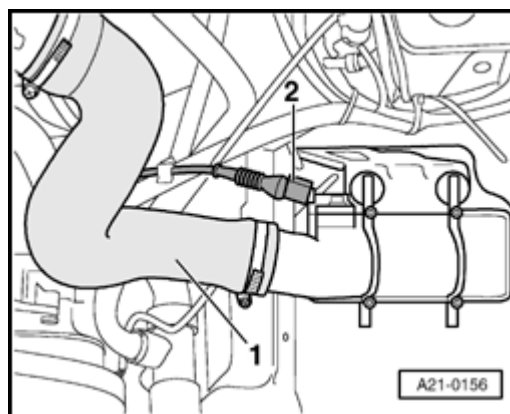
Removing

- Drain coolant ⇒ [Page 19-4](#) .



A

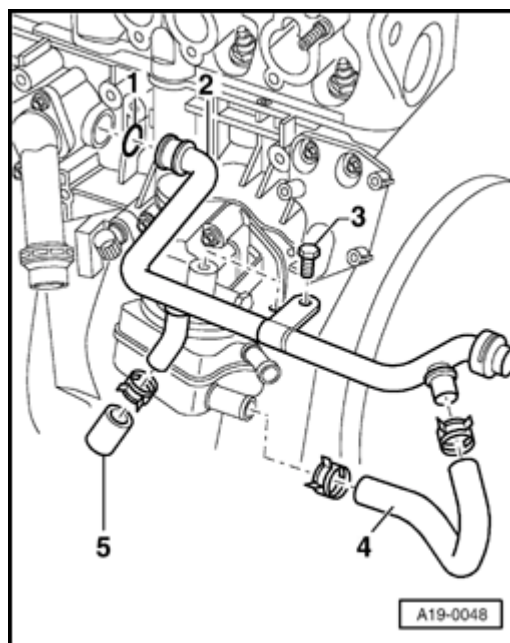
- Disconnect coolant hoses -1- and -3-.
- Unbolt coolant expansion tank -2- (-arrows-).
- Disconnect electrical wiring to coolant level display switch -F66- on underside of expansion tank.



- A**
- Remove air duct hose -1-.

Note:

Connector -2- remains plugged in.



- A**
- Disconnect heater hose at rear of coolant line -2-. To do this, release retaining clip on connecting flange.
 - Pull off coolant hose to oil cooler -4- at coolant line.
 - Remove bolt -3-.
 - Push lower coolant line toward rear of vehicle and remove.
 - Remove plug -5- if necessary.

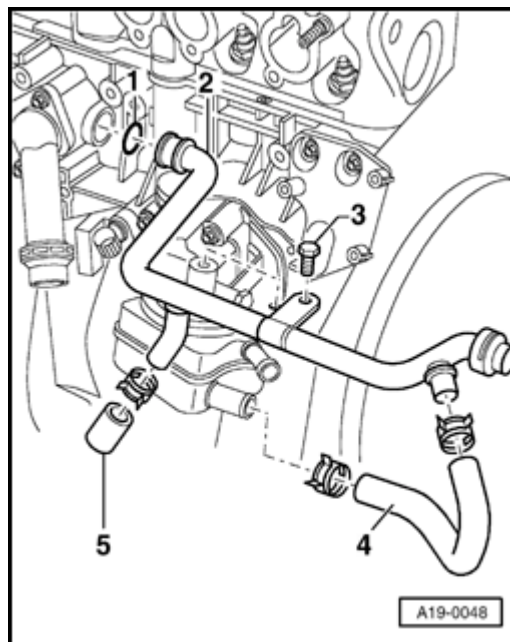
Installing

Installation is carried out in the reverse order of removal; note the following:

Note:

Always replace seals and gaskets.

- Before installing, clean and smooth down sealing surface for O-ring.
- **A** - Moisten new O-ring -1- with G 012 A8 D coolant and slide onto coolant line -2-.
- Push coolant line into opening in cylinder block.
- Top up coolant ⇒ [Page 19-7](#) .

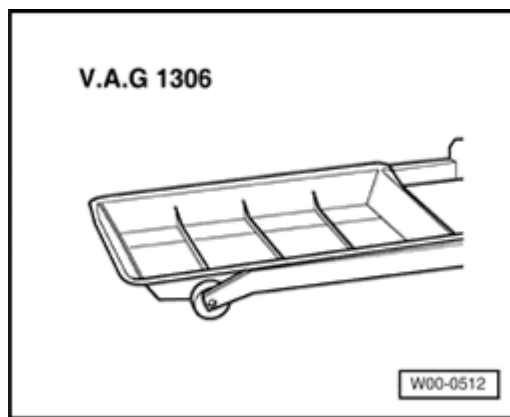


Tightening torques

Component	Nm
Coolant line to oil filter bracket	20
Hose clamps for coolant hoses	2
Hose clamps for air duct hoses	3.5

Radiator, removing and installing

Special tools and equipment



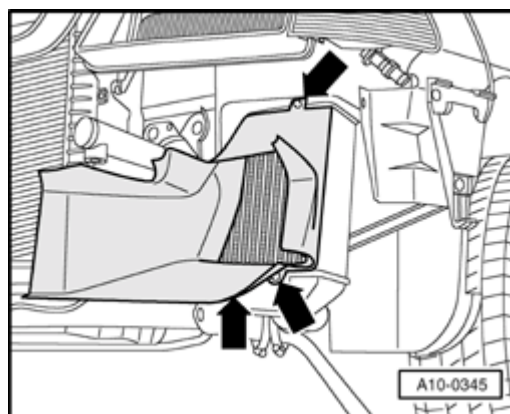
A

- ◆ VAG 1306

Removing

- Remove front bumper:

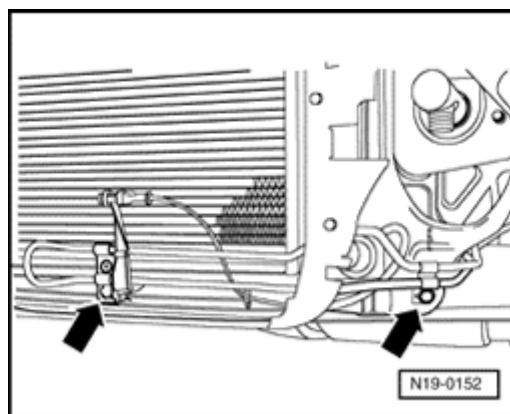
⇒ [Repair Manual, Body Exterior, Repair Group 63](#)



A

- Remove air cowl in front of charge air cooler -arrows-.

19-27

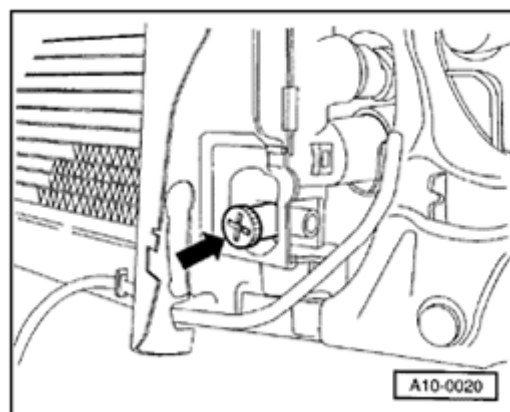


- A
- Disconnect cooling lines for power steering hydraulic fluid -arrows-.

WARNING!

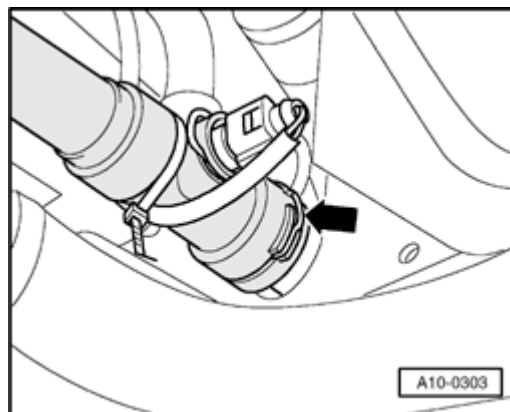
**Hot steam can escape when opening the cap on the expansion tank:
Cover cap with a cloth and open carefully.**

- Open cover of coolant expansion tank
- Place drip tray VAG 1306 below engine.

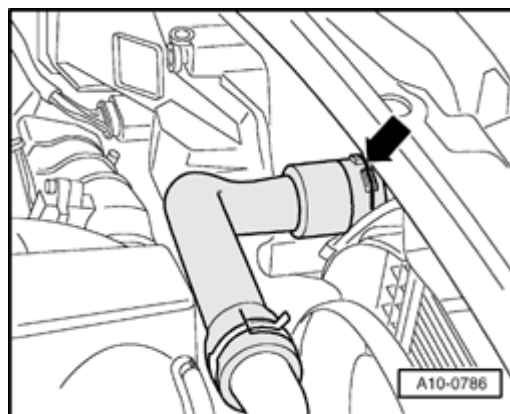


- A
- Turn drain screw -arrow- on radiator counter-clockwise. If necessary, install a drain hose on connection.

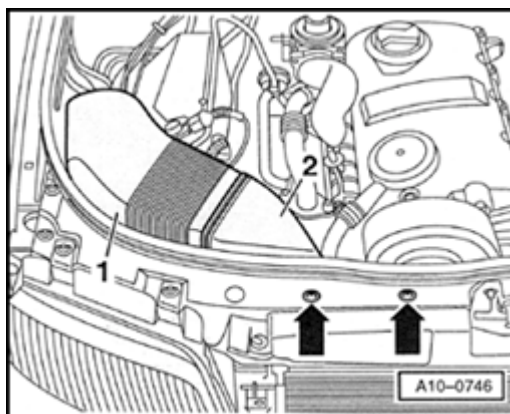
19-28



- A** - Release coolant hose retaining clip -arrow- and remove coolant hose from radiator.



- A** - Disconnect coolant hose from top of radiator -arrow-.

**Vehicles with automatic transmission:**

A

- Remove bolts -arrows-.
- Remove air duct -1- and -2-.

Note:

Observe cleanliness rules when working on the automatic transmission:

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

- Place drip tray underneath to collect oil.
- Remove ATF lines/hoses from radiator:

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

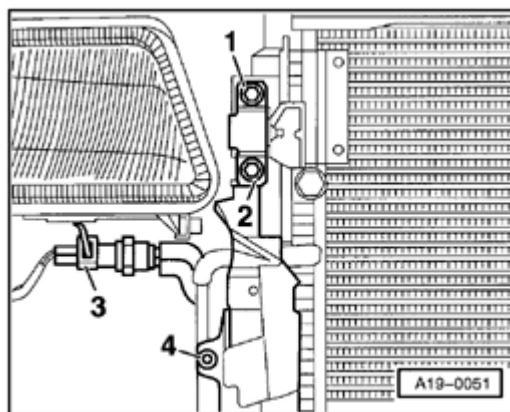
- Tie ATF lines to longitudinal member to avoid leakage of fluids.

All models:**CAUTION!**

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.

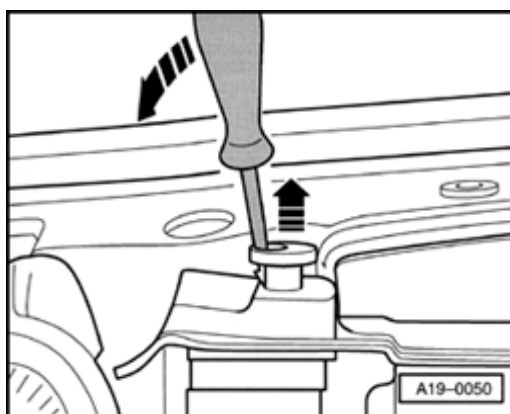


A

- Remove air cowls from radiator -4- (left and right).
- Remove securing bolts -1- and -2- for condenser.
- Disconnect connector -3- from air conditioner pressure switch -F129-.
- Pull condenser up out of its bracket, pivot toward side and secure to right-hand front wheel with wire.

Note:

Protect fender panel from damage.



A

- Release two retaining pins for radiator and pull out upward -arrows-.
- Pivot radiator toward front and lift out.

Installing

Installation is carried out in the reverse order of removal; note the following:

- Install front bumper:

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

- Top up coolant ⇒ [Page 19-7](#) .

Vehicles with automatic transmission:

- Attach ATF lines.

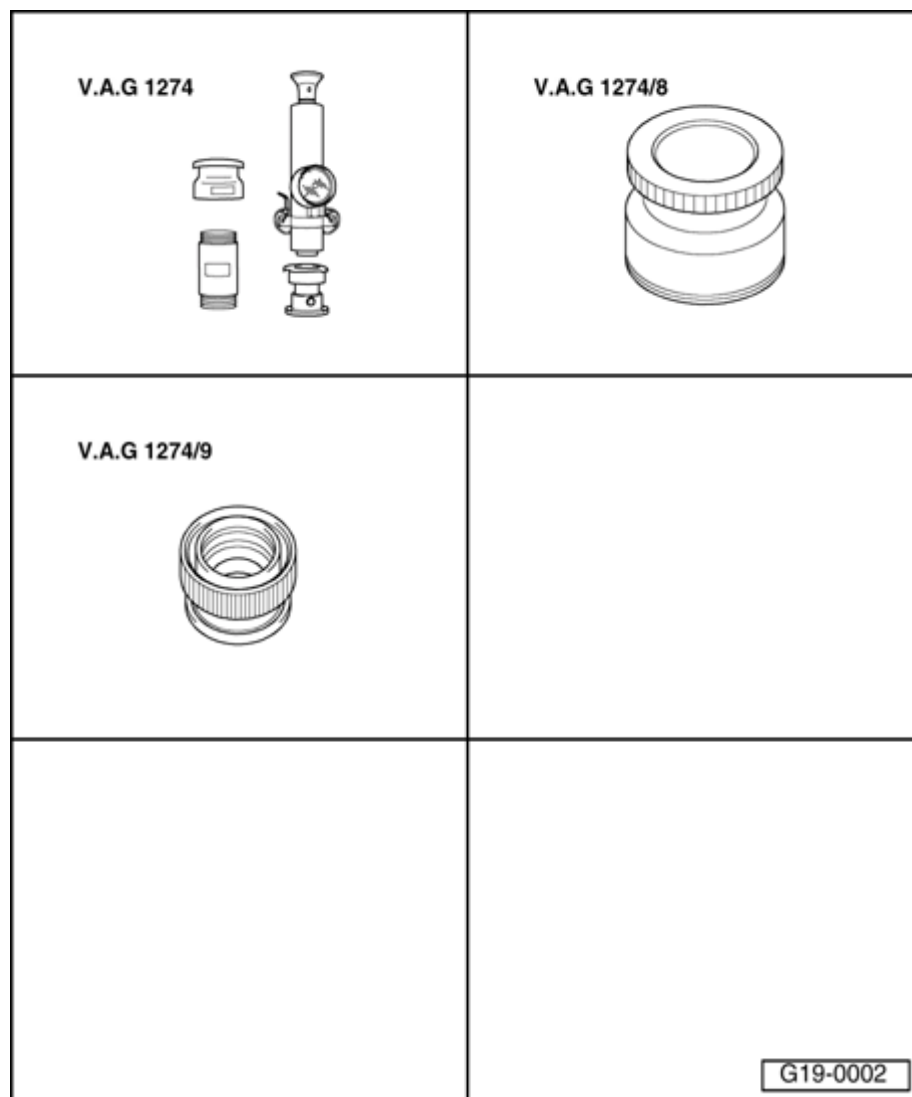
⇒ [Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37](#)

- Check ATF level:

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

Tightening torques

Component	Nm
Condenser to radiator	10
Cooling lines to radiator	10
Hose clamps for coolant hoses	2



Cooling system, checking for leaks

Special tools and equipment

- ◆ VAG 1274
- ◆ Adapter 1274/8
- ◆ Adapter 1274/9

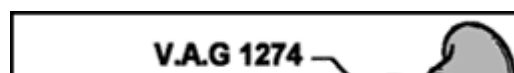
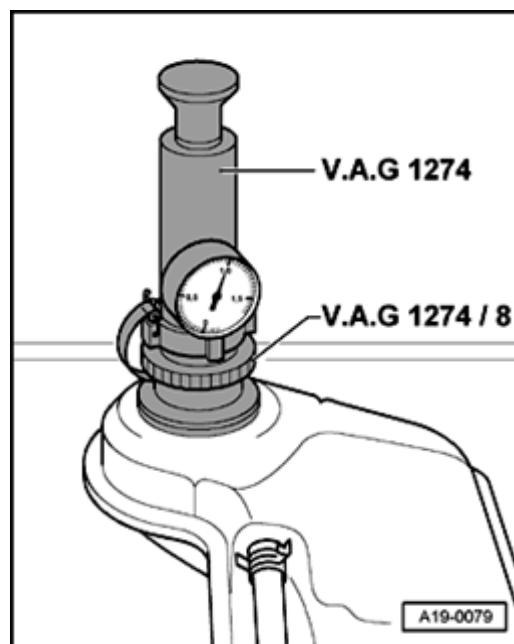
Test requirements:

- Engine at operating temperature.

WARNING!

Hot steam can escape when opening the cap on the expansion tank: Cover cap with a cloth and open carefully.

- Open cover of 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 is not maintained, locate and repair leaks.



- Install tester VAG 1274 with adapter VAG 1274/9 onto sealing cover.
- Operate hand pump.
 - Pressure relief valve must open at a pressure of 1.4 to 1.6 bar.