



Cooling system components

Caution!

When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- **Route lines of all types (e.g. for fuel, hydraulic, EVAP canister system, coolant and refrigerant, brake fluid, vacuum) and electrical wiring so that the original path is followed.**
- **To prevent damage to the lines, make sure there is 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.*
- *Secure all hose connections with hose clamps, allocation ⇒ Electronic Parts Catalog "ETKA" .*
- *Hose clamp pliers V.A.G 1921 or pliers for spring clamps VAS 5024 A are recommended for installing spring clamps.*
- *Always replace gaskets and seals.*
- *Arrows on coolant pipes and coolant hoses must line up across from each other.*

Cooling system components (on engine), assembly overview ⇒ [19-1, Cooling system components \(on engine\), assembly overview](#) .

Cooling system components (on body), assembly overview ⇒ [19-1, Cooling system components \(on body\), assembly overview](#) .

Coolant hose connection diagram ⇒ [19-1, Coolant hose connection diagram](#)

Coolant, draining and refilling ⇒ [19-1, Cooling system, draining and filling](#)

Coolant pump, removing and installing ⇒ [19-1, Coolant pump, removing and installing](#)

Thermostat, removing and installing ⇒ [19-1, Coolant thermostat, removing and installing](#)

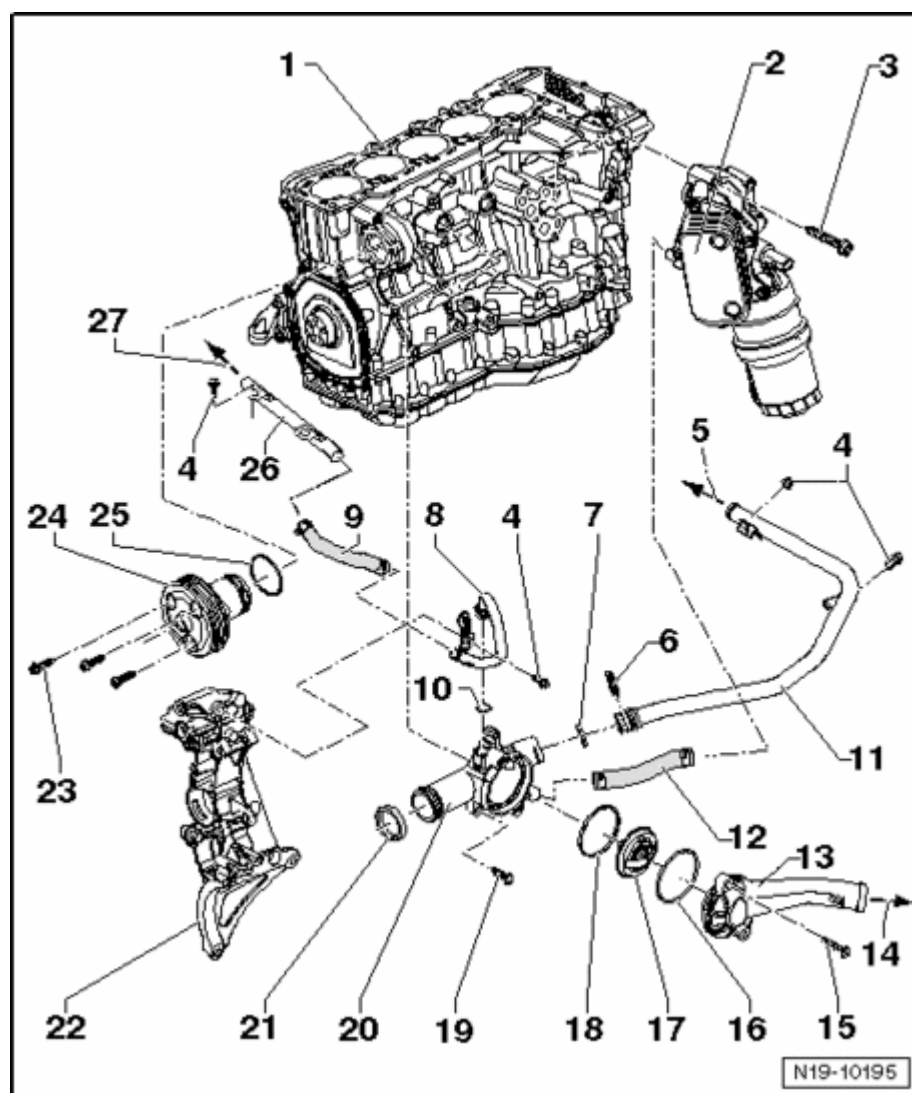
Removing and installing Coolant Fan V7 and Coolant Fan 2 V177 ⇒ [19-1, Coolant Fan V7 and Coolant Fan 2 V177, removing and installing](#)

Radiator, removing and installing ⇒ [19-1, Radiator, removing and installing](#)

Cooling system, checking for leaks ⇒ [19-1, Cooling system, checking for leaks](#)

Cooling system components (on engine), assembly overview

Part 1



Part 2 ⇒ [Topic 19-1](#)

- **Cylinder block**
- **Oil cooler**
- **25 Nm**
- **10 Nm**
- **To heater core of heater, bottom**
- **Retaining clip**
- **O-ring**
 - Replace
- **Front coolant line**
- **Connecting hose**
- **O-ring**
 - Replace
- **Coolant line**
- **Connecting hose**
- **Connecting piece**
- **To radiator, bottom**
- **5 Nm**
- **O-ring**
 - Replace
- **Coolant thermostat**
 - Removing and installing ⇒ [19-1, Coolant thermostat, removing and installing](#)
 - Note installation position:

Valve must be at top

- checking, coolant thermostat installed:

**⇒Vehicle Diagnosis, Testing
and Information System VAS
5051 "Guided functions"**

- Checking, coolant
thermostat removed:

Heat up thermostat in water

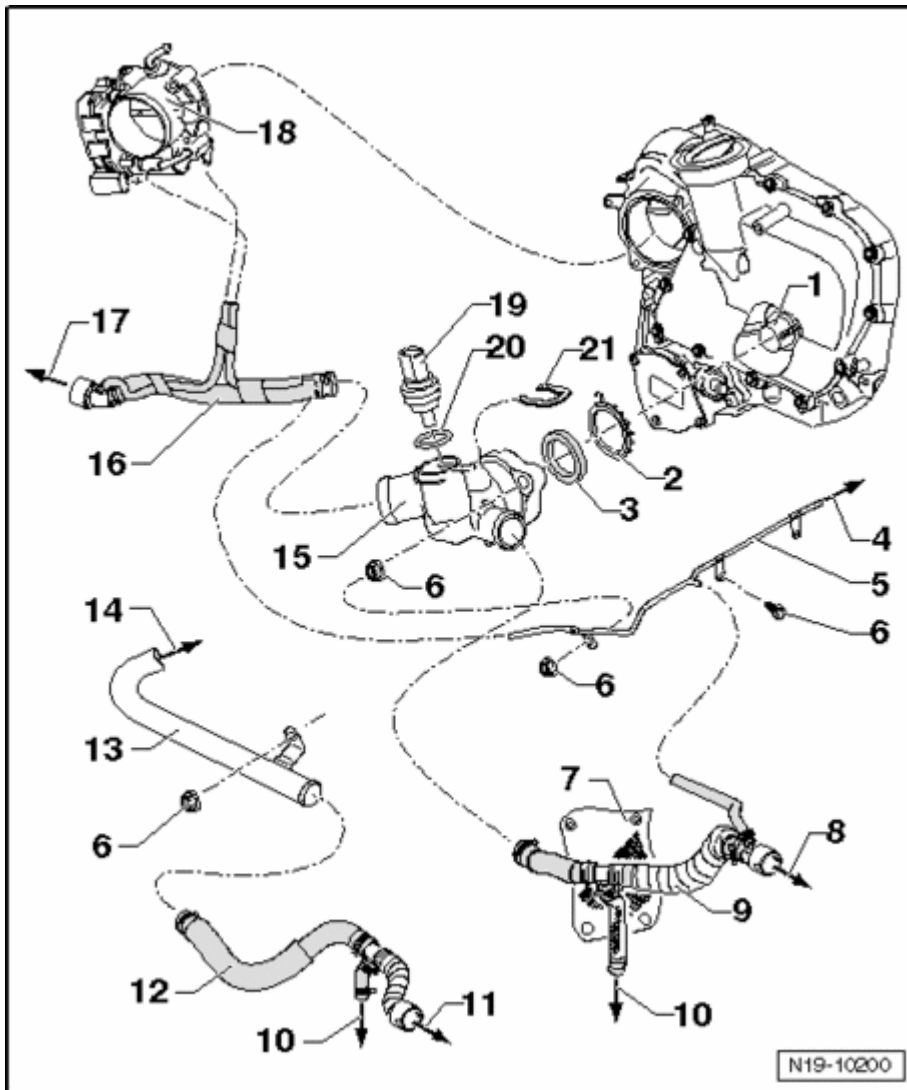
Starts to open: approx. 87 ° C

**End of opening: approx. 102 °
C**

Open distance: at least 7 mm

- **Seal**
 - Replace
- **25 Nm**
- **Coolant thermostat housing**
- **Seal**
 - Replace
- **Bracket for assemblies**
- **10 Nm**
- **Coolant pump**
 - Removing and installing ⇒
[19-1, Coolant pump,
removing and installing](#)
- **O-ring**
 - Replace
- **Right coolant line**
 - Secured to engine mount
- **To expansion tank, bottom**

Part 2



Part 1 ⇒ [Topic 19-1](#)

■ Pipe connection

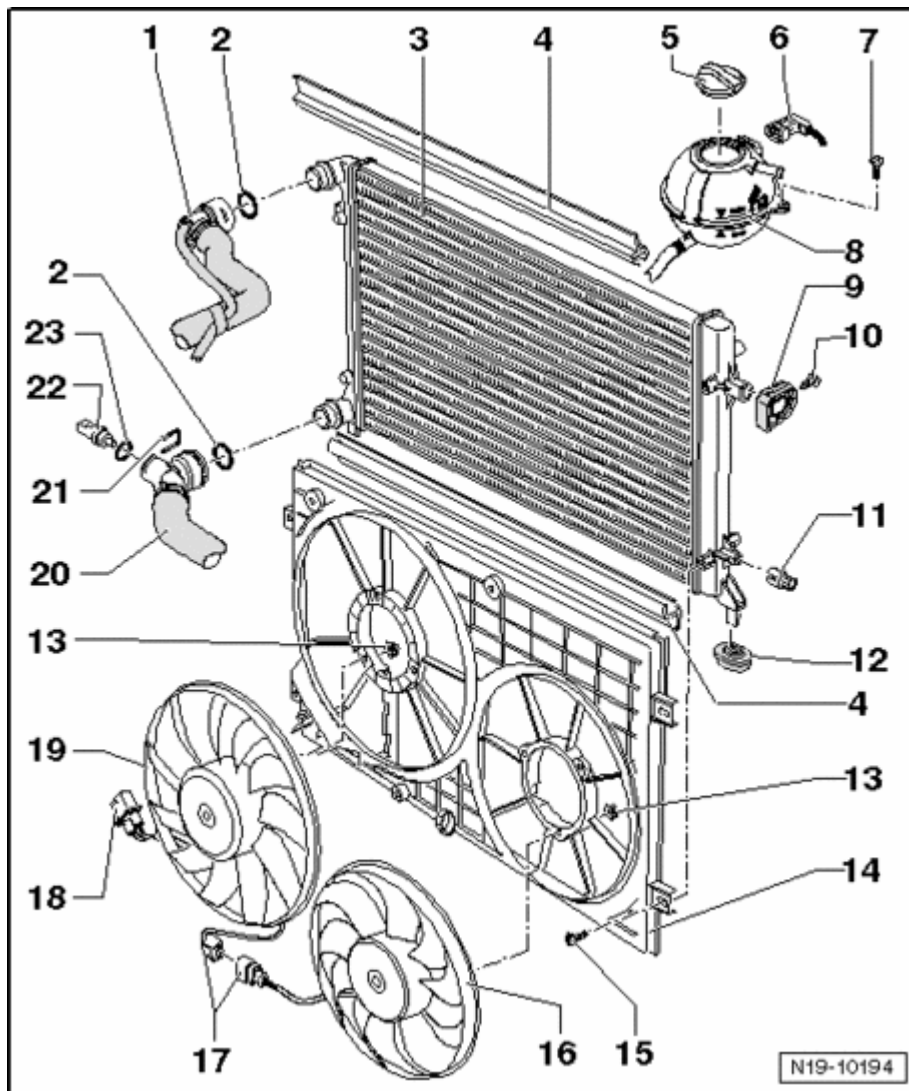
- Pressed in cylinder head
- Clean before installing coolant distribution housing
⇒ [Item - 15 -](#)

- If necessary, remove coolant deposits using a copper wire brush or fine sandpaper (minimum 100 grit).

- Circlip
- Seal

- Replace after removing coolant distribution housing
⇒ [Item - 15 -](#)
- **To expansion tank, top**
- **Rear coolant pipe**
- **10 Nm**
- **Heat shielding**
- **To heater core, top**
- **Supply hose**
- **To ATF cooler**
 - Only for vehicles with automatic transmission
- **To lower heat exchanger**
- **Return hose**
- **Coolant line**
 - Bolted to coolant regulator housing ⇒ [Item - 15 -](#)
- **To coolant regulator housing**
- **Coolant distribution housing**
- **Supply hose**
- **To top of radiator**
- **Throttle valve control module J338**
 - Coolant heated
- **Engine Coolant Temperature (ECT) Sensor G62**
- **O-ring**
 - Replace
- **Retaining clip**

Cooling system components (on body), assembly overview



■ Upper coolant hose

- For coolant distribution housing on cylinder head

■ O-ring

- Replace if damaged

■ Radiator

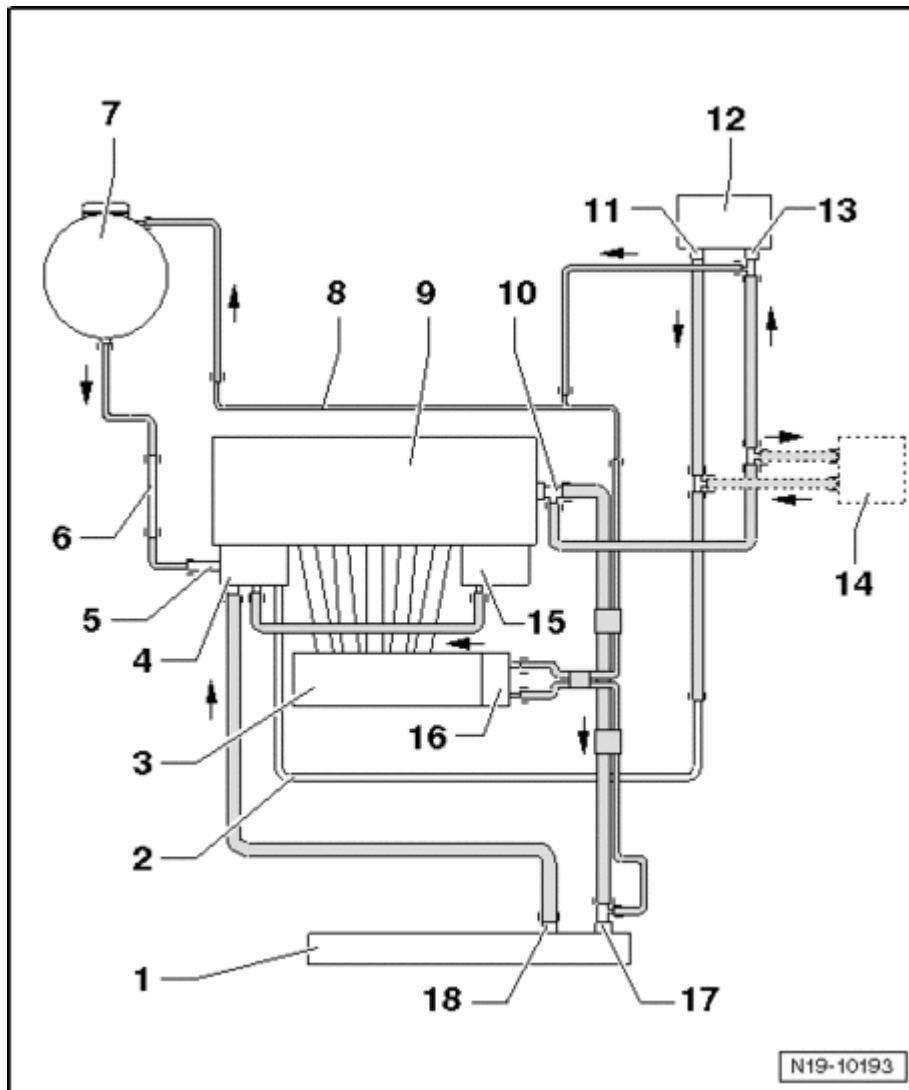
- Removing and installing ⇒ [19-1, Radiator, removing and installing](#)
- After replacing replace entire amount of coolant

- **Gasket**
- **Cap**
 - Check using cooling system tester V.A.G 1274 and adapter V.A.G 1274/9 ⇒ [Topic 19-1](#) .
 - Pressure release valve must open at a pressure of 1.4 to 1.6 bar.
- **Connector**
- **3 Nm**
- **Expansion tank**
 - Perform leak test of cooling system using cooling system tester V.A.G 1274 and adapter V.A.G 1274/8 ⇒ [19-1, Cooling system, checking for leaks](#) .
- **Bracket**
 - For radiator
- **5 Nm**
- **Spacer piece**
 - For coolant line bracket
- **Support**
 - Insert in lock carrier
- **5 Nm**
- **Air shroud**
- **5 Nm**
- **Coolant Fan 2 V177**
 - Removing and installing ⇒ [19-1, Coolant Fan V7 and Coolant Fan 2 V177](#) ,

[removing and installing](#)

- **Connector**
- **Connector**
- **Coolant Fan V7**
 - Removing and installing ⇒ [19-1, Coolant Fan V7 and Coolant Fan 2 V177, removing and installing](#)
 - With Coolant Fan Control (FC) Control Module J293
- **Lower coolant hose**
 - From connection for coolant regulator
- **Retaining clip**
- **Engine Coolant Temperature (ECT) Sensor (on Radiator) G83**
- **O-ring**
 - Replace

Coolant hose connection diagram



■ Radiator

- Removing and installing ⇒ [19-1, Radiator, removing and installing](#)
- Replace coolant after replacing

■ Coolant line

■ Intake manifold

■ Coolant pump and coolant thermostat

- Coolant pump, removing and installing ⇒ [19-1, Coolant pump, removing and installing](#)
- Thermostat, removing and

installing ⇒ [19-1, Coolant thermostat, removing and installing](#)

- Checking coolant regulator
⇒ [Item - 17 -](#)

- **Front coolant line**

- Secured to bracket for assemblies

- **Right coolant line**

- Secured to engine mount

- **Expansion tank**

- With sealing cap
 - Pressure relief valve in cap, checking ⇒ [Topic 19-1](#)

- **Rear coolant pipe**

- **Cylinder head/cylinder block**

- Replace coolant after replacing

- **Coolant distribution housing**

- **Quick-release coupling**

- Lower connection

- **Heater core of heater**

- Replace coolant after replacing

- **Quick-release coupling**

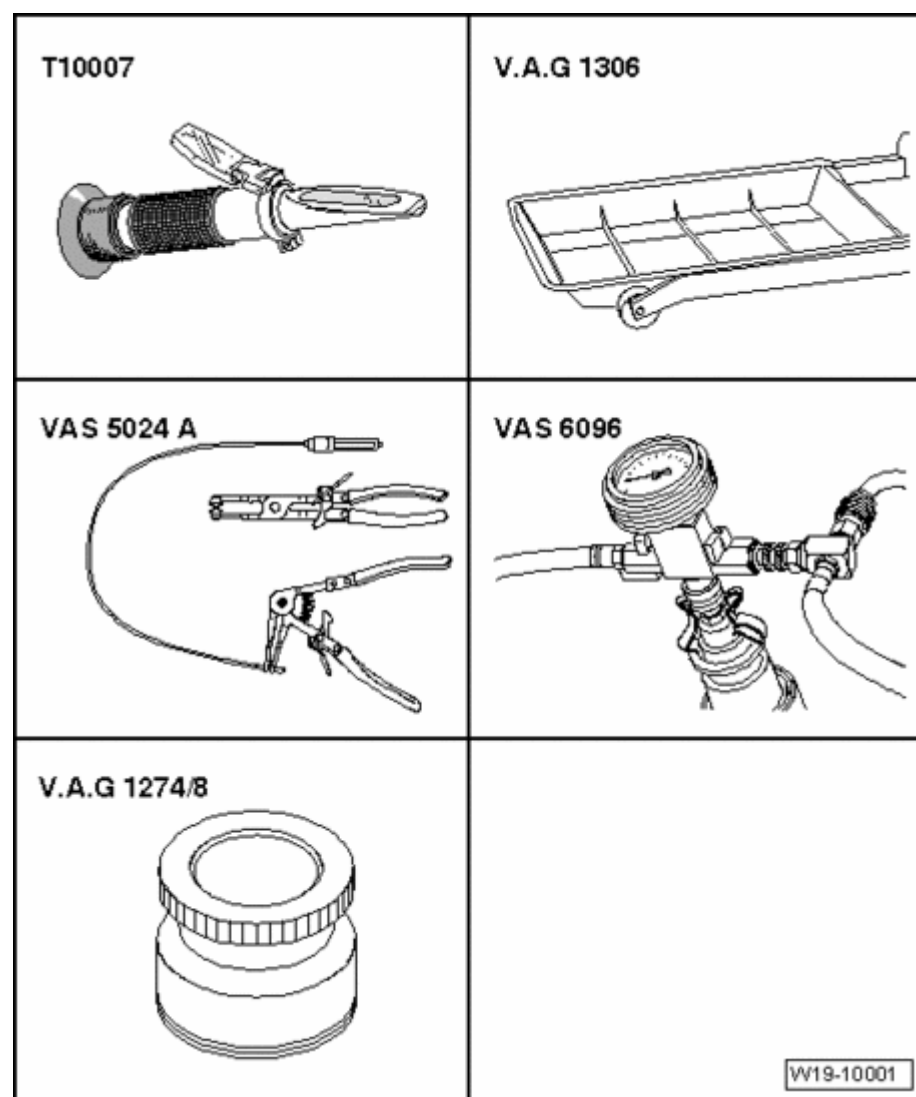
- Upper connection

- **ATF cooler**

- Only for vehicles with automatic transmission

- Oil cooler
- Throttle valve control module J338
- Quick-release coupling
 - Upper connection
- Quick-release coupling
 - Lower connection

Cooling system, draining and filling



Special tools, testers and auxiliary items required

- Refractometer T10007

- Drip tray V.A.G 1306 or drip tray for workshop crane VAS 6208
- Spring-type clip pliers VAS 5024 A
- Cooling system charge unit VAS 6096
- Adapter V.A.G 1274/8

Draining

Note:

- *Drained coolant must be stored in a clean container for disposal or reuse.*
- *Follow disposal regulations.*

Warning!

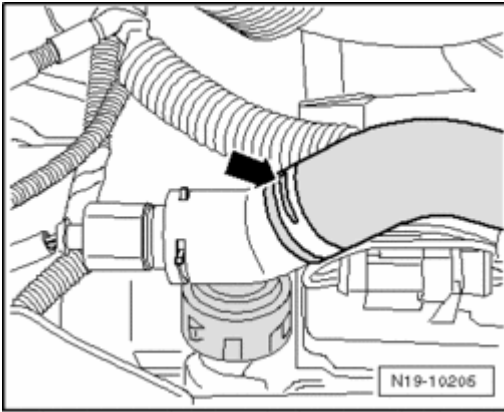
Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Open cap of coolant expansion tank.
- Remove noise insulation

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

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- Place Drip tray V.A.G 1306 or drip tray for workshop crane VAS 6208 underneath.



- Open spring clamp - **arrow** - and disconnect coolant hose.

If quick acting coupling at lower radiator connection is pulled off, a large amount of coolant flows on to bumper.

Filling

Note:

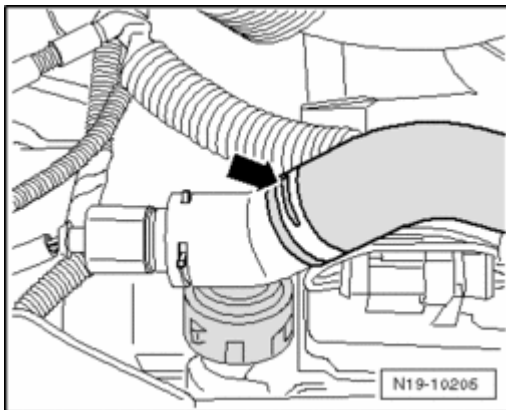
- *Only coolant additive G 12 plus (according to TL VW 774 F) must be used. Distinguishing feature: colored violet*
- *G 12 plus (according to TL VW 774 F) may be mixed with previous coolant additive G 12!*
- *G 12 plus and coolant additives marked "in accordance with TL VW 774 F" prevent frost and corrosion damage, scaling and also raise the boiling point of the coolant. For this reason the system must be filled all year round with frost and corrosion protection additives.*
- *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- *Protection against frost must be assured to about - 25 ° C (in arctic climatic countries to about -35 ° C).*
- *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The coolant additive portion must be at least 40%.*

- *If for climatic reasons a greater frost protection is required, the amount of G 12 plus 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.*
- *If radiator, heat exchanger, cylinder head or cylinder head gasket is replaced, do not reuse old coolant.*

Recommended mixture ratios:

Frost protection to	Anti-freeze portion	G 12 ¹⁾	Water ¹⁾
-25 ° C	40%	3.6 l	5.4 l
-35 ° C	50%	4.5 l	4.5 l

¹⁾ The quantity of coolant can vary depending upon the vehicle equipment.



- Connect coolant hose onto connection and secure using spring-type clamp.
- Install noise insulation

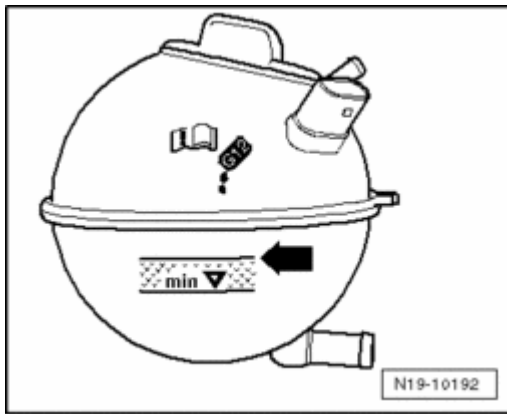
⇒ [Repair Manual, Body Exterior, Repair Group 50,](#)

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Fill using cooling system filler unit VAS 6096 .

- Thread adapter V.A.G 1274/8 on expansion tank.
- Fill coolant circuit using cooling system filling unit VAS 6096 ⇒ *Operating instructions for cooling system filler unit VAS 6096 .*

Filling without cooling system filler unit VAS 6096



- Slowly fill coolant up to top marking of hatched area - **arrow** - on expansion tank.
- Close expansion tank.
- Turn off heater and air conditioning.

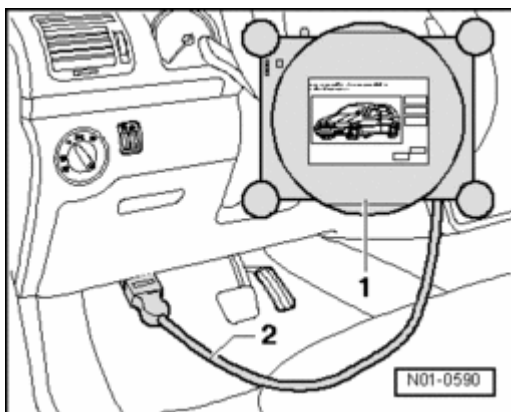
Vehicles without auxiliary heater

- Start engine and maintain an engine speed of about 2000 rpm for approx. 3 minutes.
- Allow engine to run until Coolant Fan V7 starts running.

Vehicles with auxiliary heater

Caution!

Auxiliary heater should only be switched on if coolant circuit is filled as described below.



- Connect vehicle diagnosis, testing and information system VAS 5051 as follows:
- Connect diagnostic cable connector to Data Link Connector (DLC) in drivers footwell.
- Start engine and maintain an engine speed of about 2000 rpm for approx. 3 minutes.

- Press buttons for "Vehicle Self-Diagnosis" , "18 - Auxiliary Heater" and "03 - Output Diagnostic Test Mode (DTM)" on display in succession.
- Press right arrow button on display until you reach Engine Coolant (EC) Switch-Off Valve (heater) N279 Output Diagnostic Test Mode (DTM).
- Conduct Engine Coolant (EC) Switch-Off Valve (heater) N279 Output Diagnostic Test Mode (DTM). Continue to maintain 2000 RPM (for approx. 1 min.).
- Allow engine to run until Coolant Fan V7 starts running.

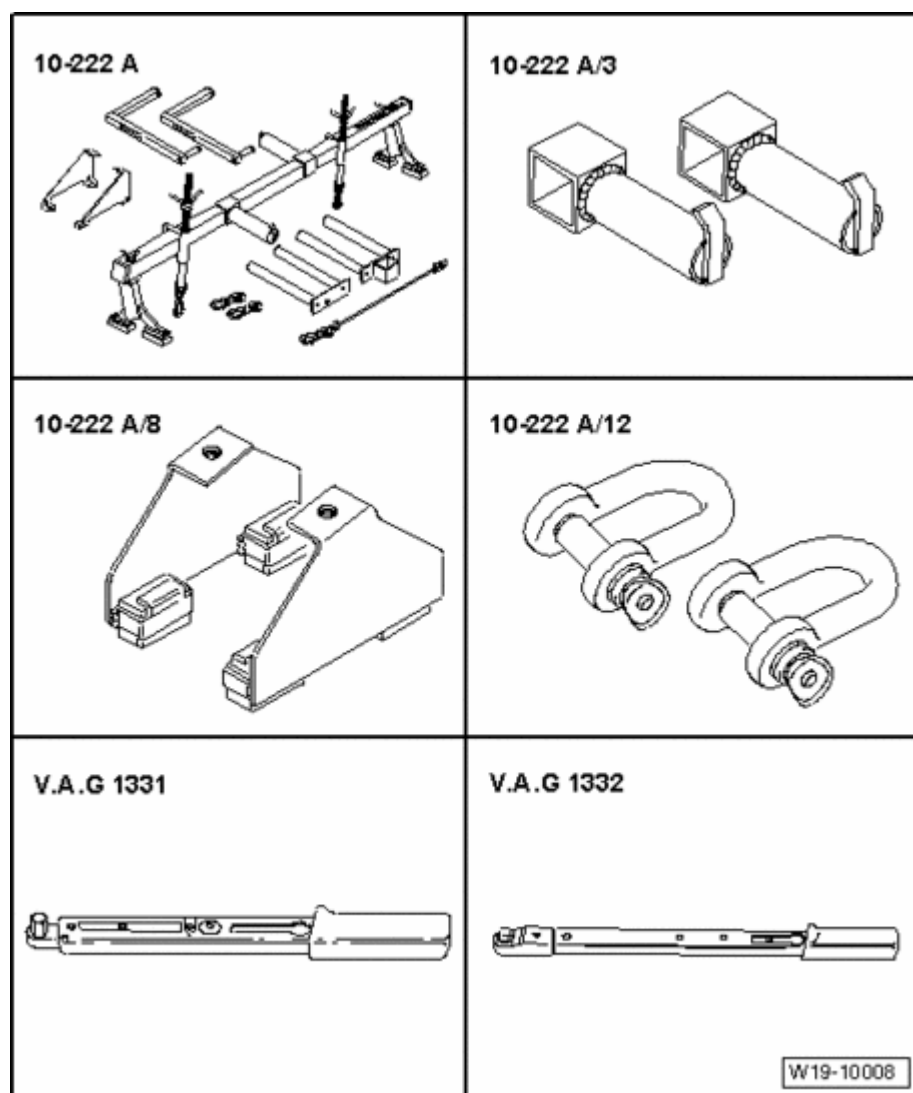
Continuation for all vehicles

Warning!

Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Check coolant level and top off as necessary.
 - With engine at operating temperature, coolant level must lie at top marking of hatched area - **arrow** - .
 - With engine cold, coolant level should be located approximately in center of hatched area.

Coolant pump, removing and installing



Special tools, testers and auxiliary items required

- Engine support bridge 10-222 A
- Adapter 10-222 A/3
- Adapter 10-222 A/8
- Shackle 10-222 A/12
- Torque wrench V.A.G 1331
- Torque wrench V.A.G 1332

Caution!

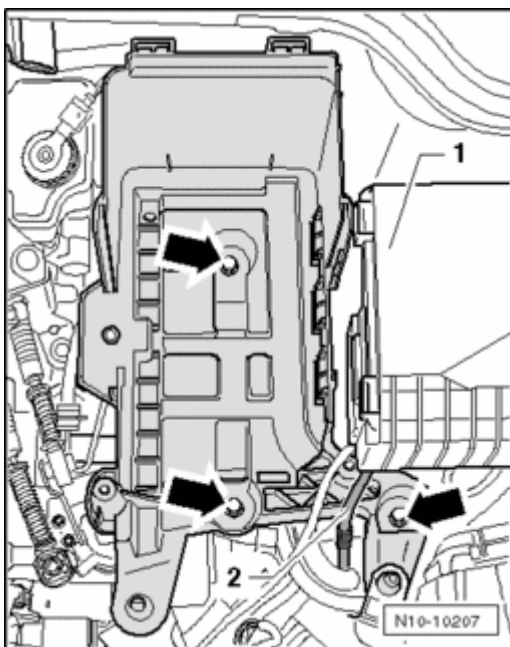
When doing any repair work, especially in the engine compartment, pay attention to the following due to clearance issues:

- **Route lines of all types (e.g. for fuel, hydraulic, EVAP canister system, coolant and refrigerant, brake fluid, vacuum) and electrical wiring so that the original path is followed.**
- **To prevent damage to the lines, make sure there is sufficient clearance to all moving or hot components.**

Removing

- Remove engine cover with air filter ⇒ [24-1, Engine cover with air filter, removing and installing](#) .
- Remove battery

⇒ [Repair Manual, Electrical Equipment, Repair Group 27,](#)

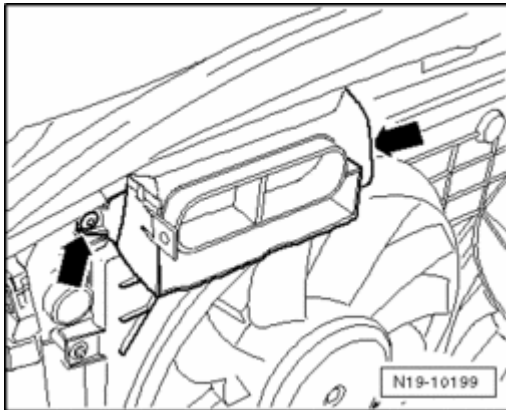


- Open cover - **1** - of E-box and unscrew wire - **2** - .
- Remove bolts - **arrows** - and remove battery holder from vehicle.

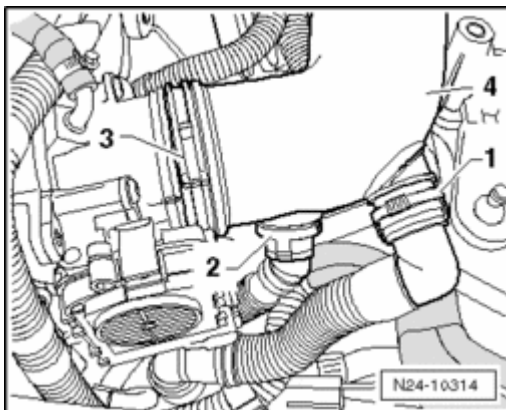
Warning!

Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Drain coolant ⇒ [19-1, Cooling system, draining and filling](#) .



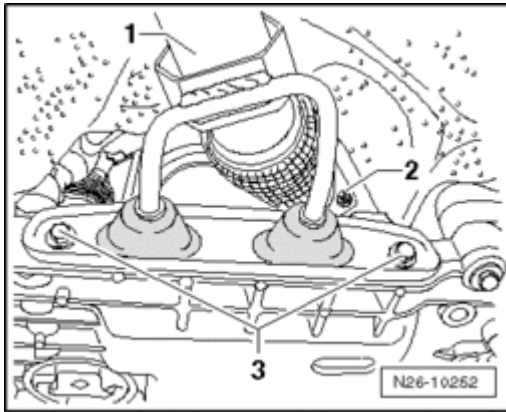
- Remove air guide on lock carrier - **arrows** - .



- Remove intake hose - **4** - . To do so, disconnect air hoses - **1** - and - **2** - (compress securing ring) and remove spring clamp - **3** - .
- Remove front and rear sections of right front wheel housing liner

⇒ [Repair Manual, Body Exterior, Repair Group 66](#).

- Remove ribbed belt for generator and coolant pump ⇒ [13-1, Ribbed belt, removing and installing](#) .



- Remove 4 nuts - **2** - and bolts - **3** - .
- Pull off exhaust pipe - **1** - from manifold and tie up firmly to side ⇒ [26-1, Front exhaust pipe with catalytic converter, removing and installing](#) .

Note:

- *Flex joint in front exhaust pipe must not be bent more than 10 ° , otherwise it may be damaged.*

- Remove pendulum support

⇒ [Repair Manual, Suspension, Wheels, Steering, Repair Group 40,](#)

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Vehicles with manual transmission

- Remove shift mechanism from transmission

⇒ *Repair Manual, 5 Spd. Manual Transmission 0A4, Repair Group 34,*

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Vehicles with automatic transmission

- Remove selector lever cable from transmission

⇒ *Repair Manual, 6 Spd. Automatic Transmission 09G, Repair Group 37,*

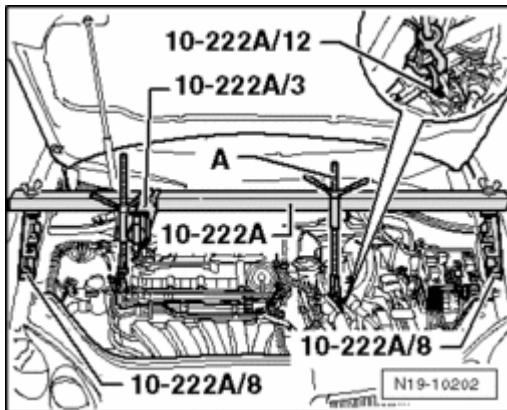
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- Remove selector lever cable from transmission

⇒ *Repair Manual, Automatic Transmission 09G, Repair Group 37,*

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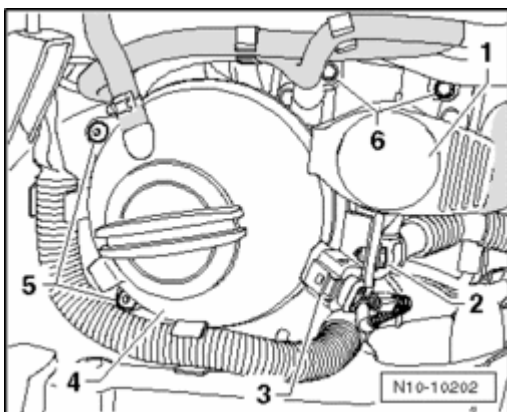
Continuation for all vehicles



- Install engine support bridge 10-222A with adapters 10-222A/8 and support engine/transmission assembly in installation position using adapter 10-222A/3 and shackle 10-222 A/12 .

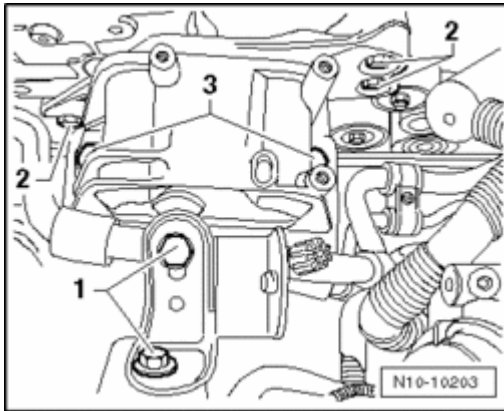
Note:

- *Illustration shows the arrangement with automatic transmission.*
- *In vehicles with manual transmission, spindle - A - is to be located toward rear and secured to reinforcement brace of transmission.*



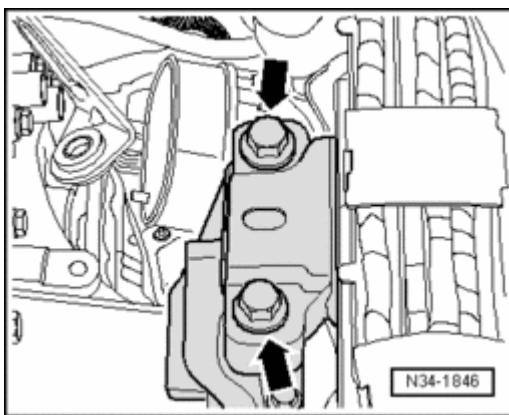
- Remove bolt - 2 - and place windshield washer reservoir
- 1 - toward front.

- Remove bolts - **6** - and disconnect connector - **3** - .
- Remove bolts - **5** - and set down coolant expansion tank with connected hoses on to engine.

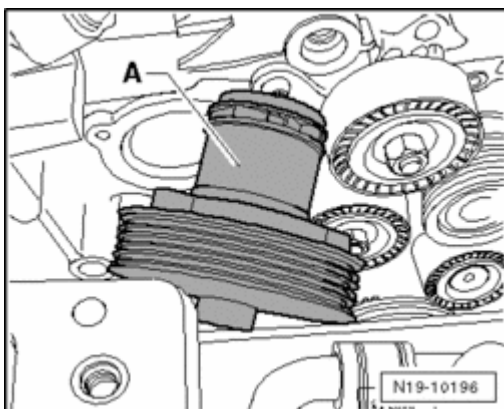


- Remove bolts - **1** - , - **2** - and - **3** - and remove engine mount.

The rear bolt in cylinder block is accessible above wheel housing liner.



- Remove transmission-side subframe bracket bolts - **arrows** - .
- Slide engine as far as possible toward front and toward left.



- Remove 3 mounting bolts ⇒ [Item - 23 -](#) and swivel coolant pump - **A** - out as depicted.

Installing

Installation is in reverse order of removal. Note the following:

- Replace O-ring for coolant pump.
- Note installation position of coolant pump. Sealing plug in housing points downward.
- Fill with coolant ⇒ [19-1, Cooling system, draining and filling](#) .
- Install battery

⇒ [Repair Manual, Electrical Equipment, Repair Group 27,](#)

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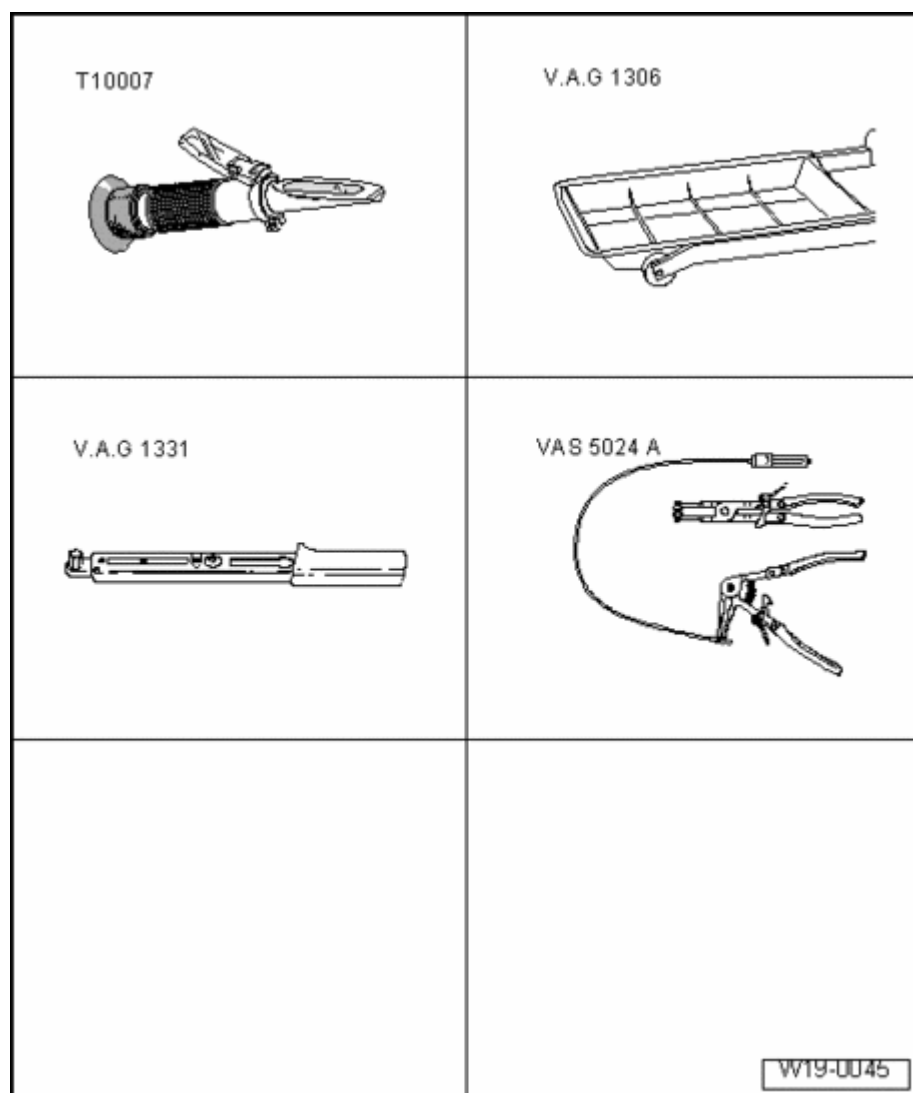
Tightening torques:

Component	Nm
Install subframe mount	⇒ 10-1, Assembly mounting
Coolant pump to cylinder block	10

Coolant thermostat, removing and installing

Note:

- Checking coolant regulator ⇒ [Item - 17 -](#) .



Special tools, testers and auxiliary items required

- Refractometer T10007
- Drip tray V.A.G 1306 or drip tray for workshop crane VAS 6208
- Torque wrench V.A.G 1331
- Spring-type clip pliers VAS 5024 A

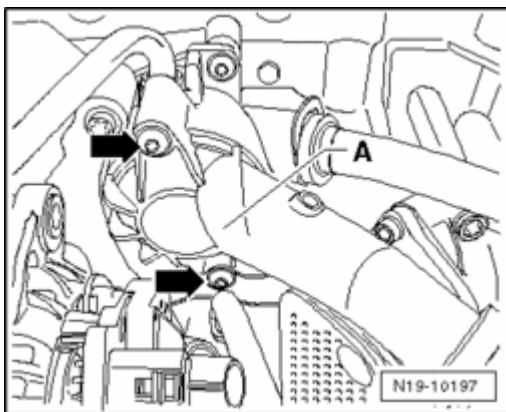
Removing

Warning!

Hot steam may escape when opening expansion tank.

Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Drain coolant ⇒ [19-1, Cooling system, draining and filling](#) .
- Remove engine cover with air filter ⇒ [24-1, Engine cover with air filter, removing and installing](#) .
- Remove intake manifold ⇒ [24-1, Intake manifold, removing and installing](#) .
- Insert guide tube for oil dipstick into cylinder block again and screw it tightly so that no escaping coolant can run into engine.
- Place a suitable container under coolant regulator housing to catch coolant flowing out.

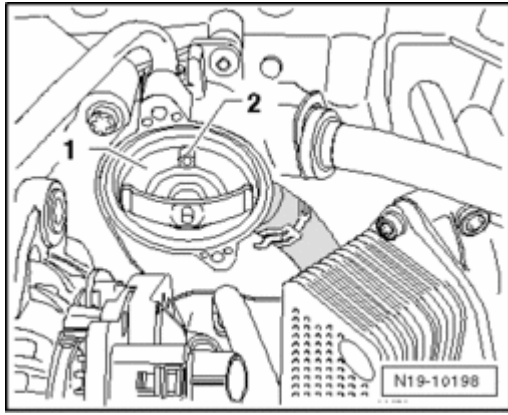


- Remove bolts - **arrows** - , disconnect connection - **A** - and remove coolant regulator.

Installing

Installation is in reverse order of removal. Note the following:

- Replace sealing ring ⇒ [Item - 18 -](#) and O-ring ⇒ [Item - 16 -](#) .



- Note installation position of coolant regulator - **1** - .
Valve - **2** - must point upward.
- Fill with coolant ⇒ [19-1, Cooling system, draining and filling](#) .

Tightening torque:

Component	Nm
Connection to coolant regulator housing	5

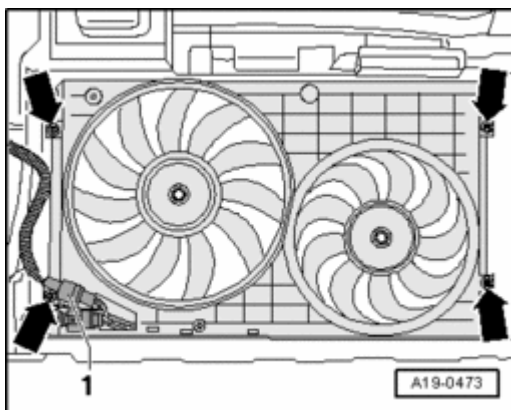
Coolant Fan V7 and Coolant Fan 2 V177 , removing and installing

Removing

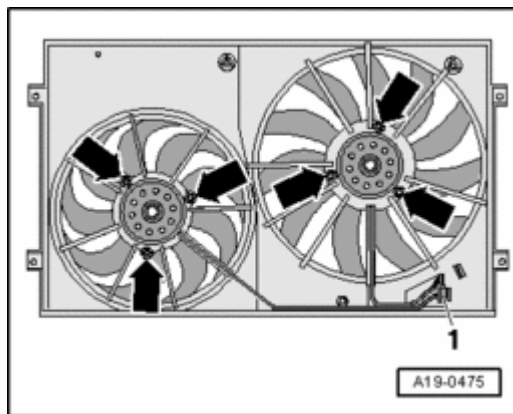
- Remove noise insulation

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

- Unclip lower coolant hose from intake air elbow.



- Disconnect electrical harness connector - **1** - and remove mounting bolts of intake air elbow - **arrows** - .
- Remove air intake elbow downward.



- Disconnect electrical harness connector - **1** - and lay cable free. Installation position of harness connector deviates from illustration.
- Remove nuts - **arrows** - and remove fans.

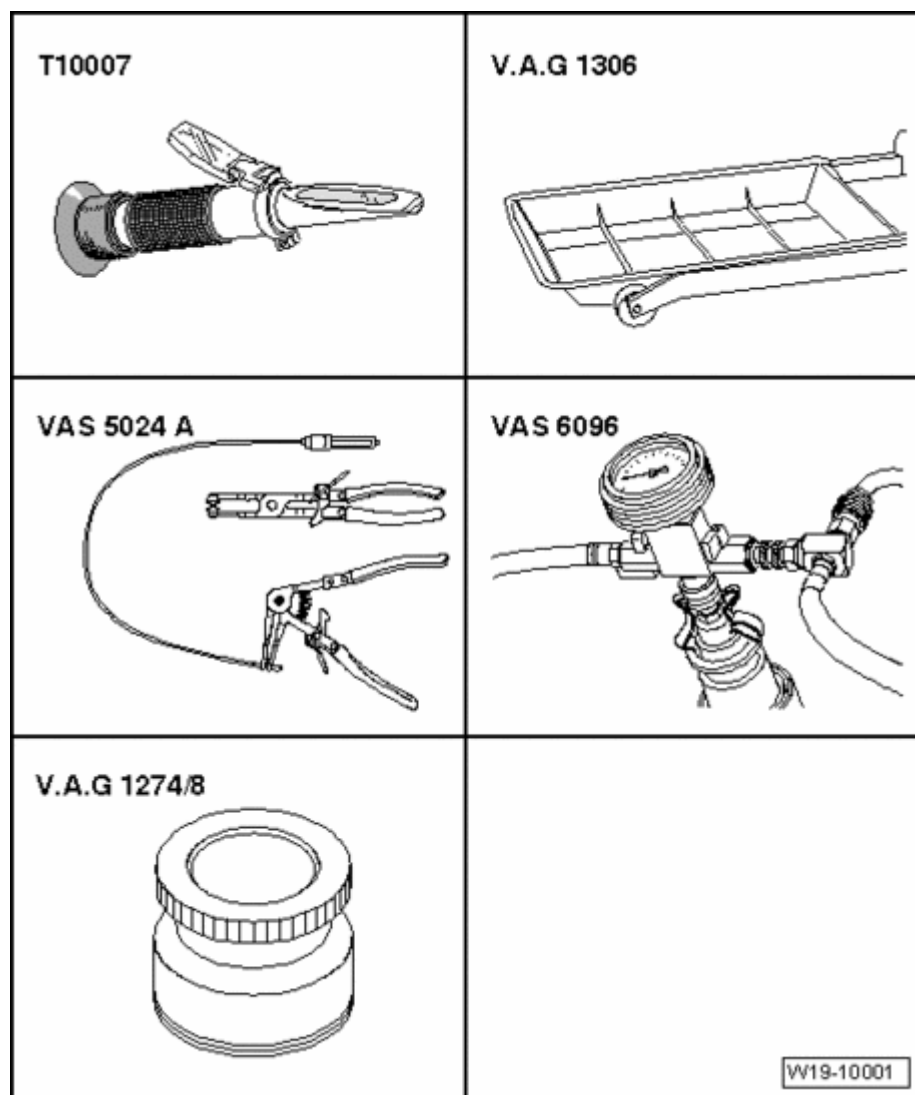
Installing

Installation is in reverse order of removal. Note the following:

Tightening torques:

Component	Nm
Coolant fan to intake air elbow	5
Intake air elbow to radiator	5

Radiator, removing and installing



Special tools, testers and auxiliary items required

- Refractometer T10007
- Drip tray V.A.G 1306 or drip tray for workshop crane VAS 6208
- Spring-type clip pliers VAS 5024 A
- Cooling system charge unit VAS 6096
- Adapter V.A.G 1274/8

Removing

Warning!

Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Drain coolant ⇒ [19-1, Cooling system, draining and filling](#) .
- Bring lock carrier into service position

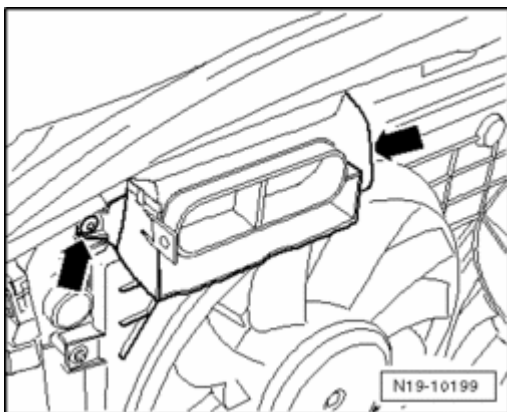
⇒ [Repair Manual, Body Exterior, Repair Group 50,](#)

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- Disconnect coolant connections on radiator at top and bottom (quick acting couplings).
- Remove air intake elbow with coolant fans ⇒ [19-1, Coolant Fan V7 and Coolant Fan 2 V177 , removing and installing](#) .
- Remove bumper cover guide piece on left and right

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

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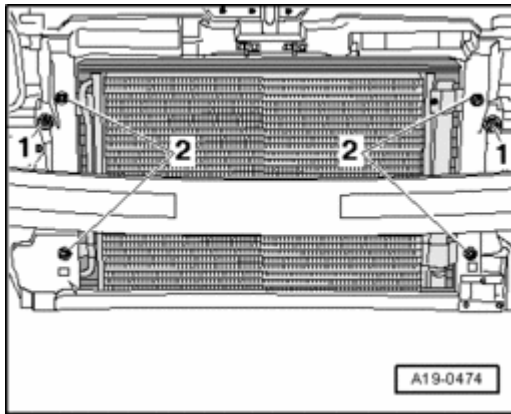


- Remove intake air connection on lock carrier - **arrows** -

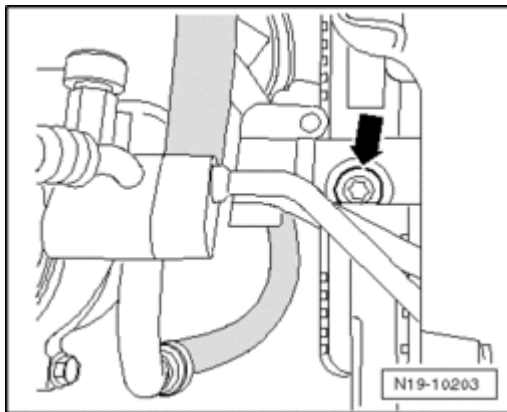
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Note:

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



- Remove bolts - **1** - from radiator bearings.
- Swing radiator slightly toward rear.
- Remove condenser mounting bolts - **2** - .



- Remove bolt - **arrow** - for mount of refrigerant line.
- Take radiator up and out.

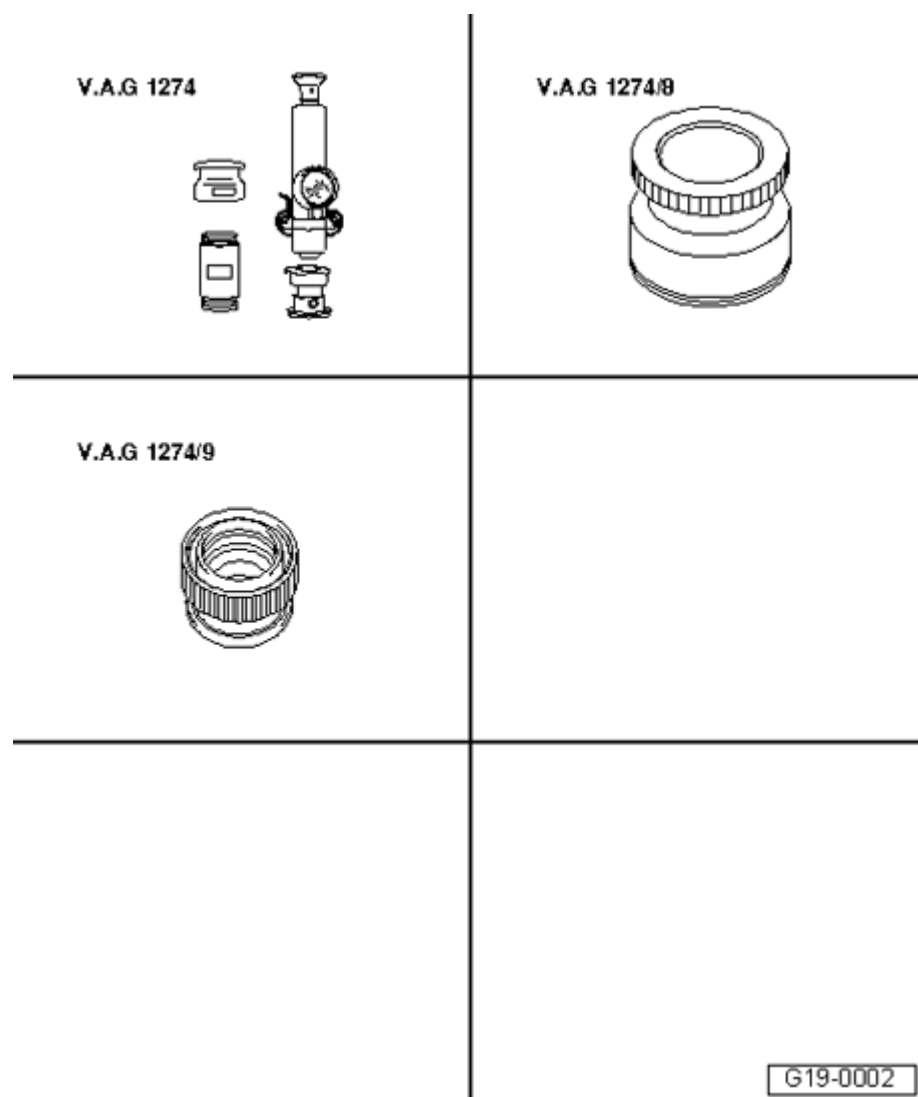
Installing

Installation is in reverse order of removal. Note the following:

- Replace coolant if a new radiator was installed.
- Fill with coolant ⇒ [19-1, Cooling system, draining and filling](#) .

Tightening torques:

Component	Nm
Radiator mounting to lock carrier	5
Condenser to radiator	5
Intake air elbow to radiator	5

Cooling system, checking for leaks**Special tools, testers and auxiliary items required**

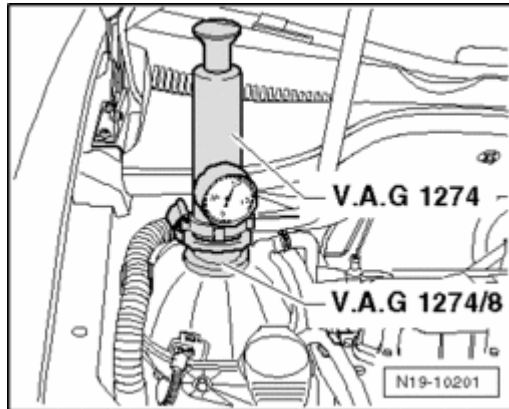
- Cooling system tester V.A.G 1274
- Adapter V.A.G 1274/8
- Adapter V.A.G 1274/9
- Engine at operating temperature

Test sequence:

Warning!

Hot steam may escape when opening expansion tank. Wear protective goggles and protective clothing to prevent damage to eyes and scalding. Cover the cap with a rag and open very carefully.

- Open cap of coolant expansion tank.

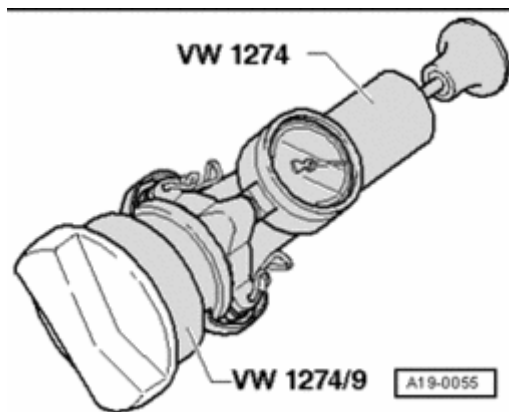


- Position cooling system tester V.A.G 1274 with adapter V.A.G 1274/8 on expansion tank.
- Generate a positive pressure of approx. 1.0 bar using hand pump of tester.

If pressure drops:

- Search for leaking areas and repair malfunction.

Checking pressure relief valve in sealing cap



- Attach cooling system tester V.A.G 1274 with adapter V.A.G 1274/9 on sealing cap.
- Operate hand pump.
 - Pressure release valve must open at a positive pressure of 1.4 to 1.6 bar.