

Cooling system components, removing and installing

WARNING!

Observe the following for all installations, especially in engine compartment due to lack of room:

- ◆ **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.**
- ◆ **Watch for sufficient clearance to all moving or hot components.**

Notes:

- ◆ *The cooling system is under pressure when engine is warm. If necessary reduce pressure before repair.*
- ◆ *All hose connections are secured with spring clips. If replacing, only use spring clips.*
- ◆ *VAS 5024 spring clip installation tool is*

recommended for installing spring clips.

- ◆ *When installing coolant hoses, make sure they are free of stress and do not come into contact with other components (observe markings on coolant connections and hoses).*



Use VAG 1274 cooling system tester with VAG 1274/8 and VAG 1274/9 adapters to test coolant system for proper seal

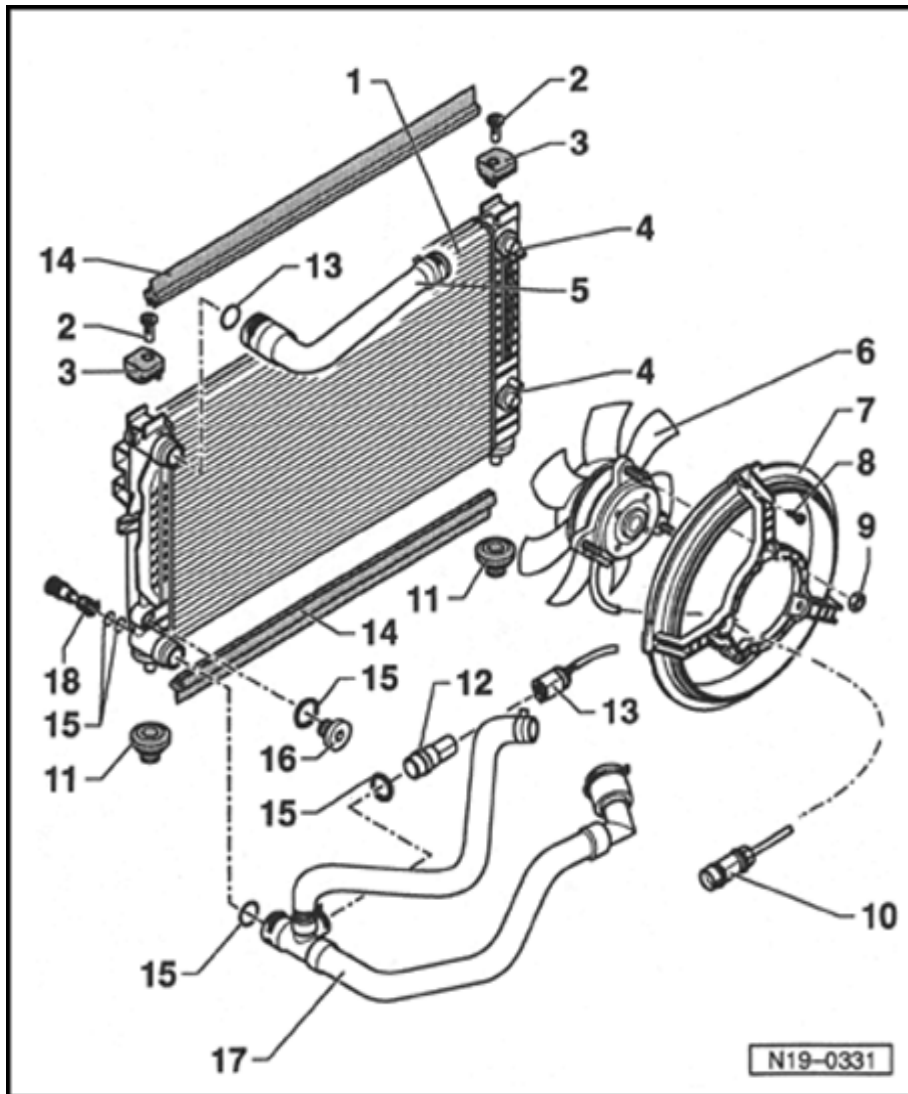
Cooling system components (on body) ⇒ [Page 19-3](#) .

Cooling system components (on engine) ⇒ [Page 19-7](#) .

Coolant hose connection diagram ⇒ [Page 19-15](#) .

Draining and refilling coolant ⇒ [Page 19-16](#) .

Coolant mixture values ⇒ [Page 19-16](#) , draining and refilling coolant.



Cooling system components (on body)

1 - Radiator

- ◆ Removing and installing ⇒ [Page 19-22](#)
- ◆ After replacing, completely replace coolant
- ◆ With ATF cooler on vehicles with automatic transmission:

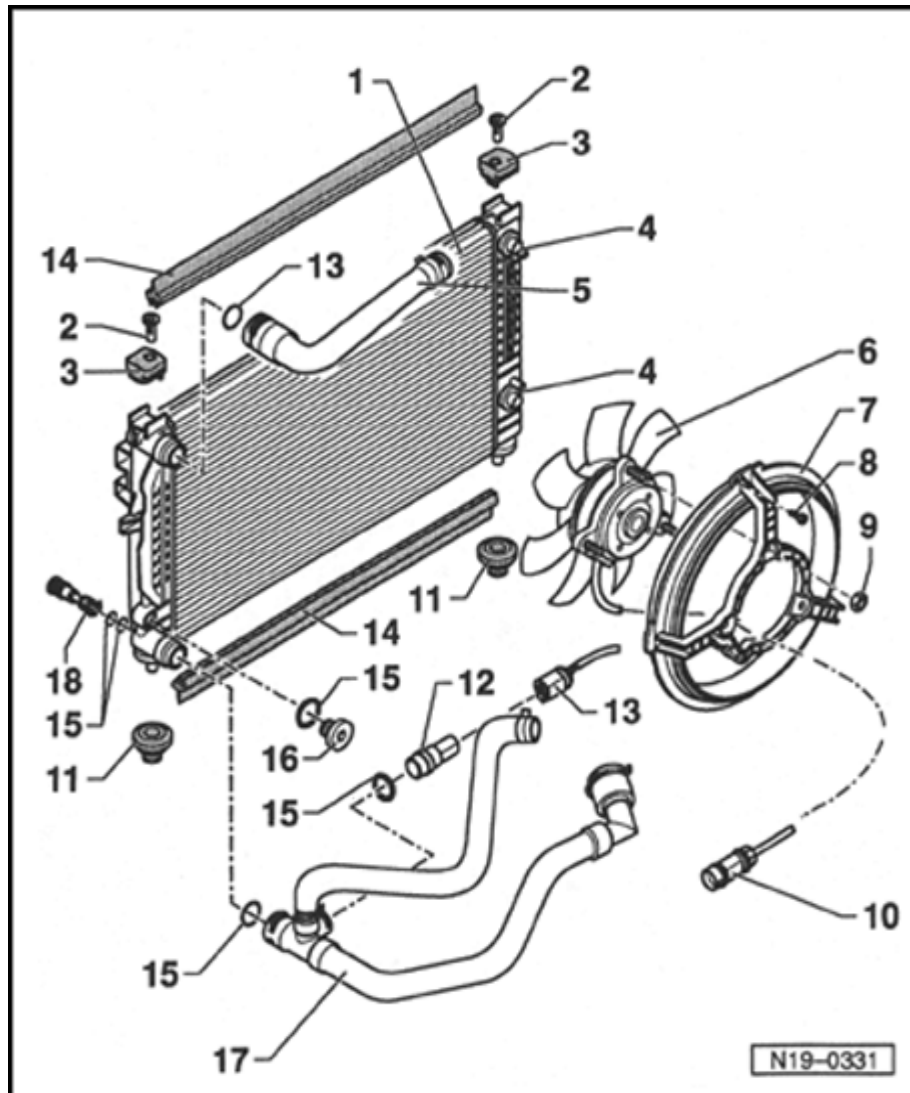
⇒ Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37, Transmission disassembling and assembling; ATF lines, removing and installing.

- ◆ Clean ATF-cooler

⇒ Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37; Disassembling and assembling transmission; Cleaning ATF-lines and ATF-cooler

2 - Securing pin

3 - Securing rubber



4 - Connecting piece for ATF- line

- ◆ Only for vehicles with automatic transmission

5 - Upper coolant hose

- ◆ Secured to radiator with retaining clip
- ◆ Check for secure fitting
- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

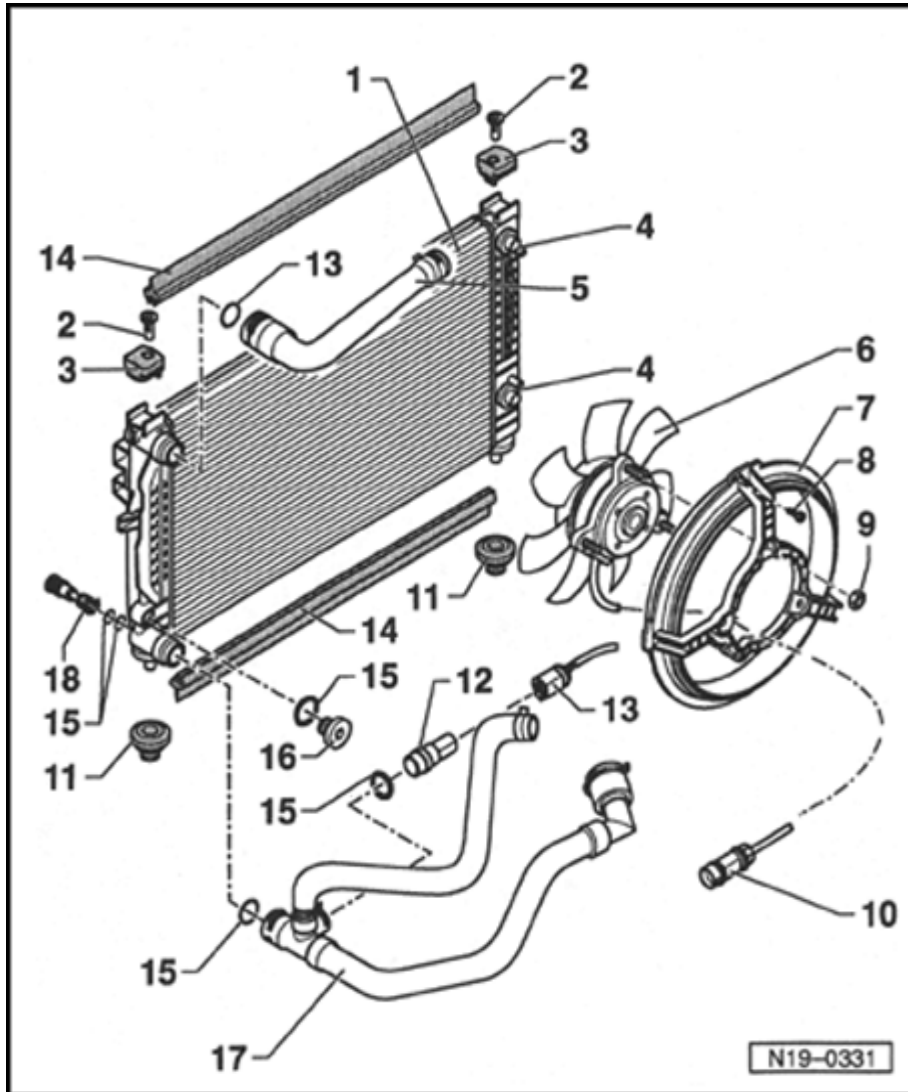
6 - Coolant fan -V7-

- ◆ Electric fan as M-equipment

7 - Fan ring

- ◆ Is clipped into the intake air elbow and secured with securing bolt item 8

8 - Mounting bolt



9 - 10 Nm

10 - 2-way connector

11 - Rubber bearing

12 - Coolant Fan Control (FC) thermal switch - F18-

◆ For electric fan.

◆ Switching temperatures, 1st level on: 92 to 97 °C, off: 84 to 91 °C. 2nd level on: 99 to 105 °C, off: 91 to 98 °C

◆ Secured with retaining clip

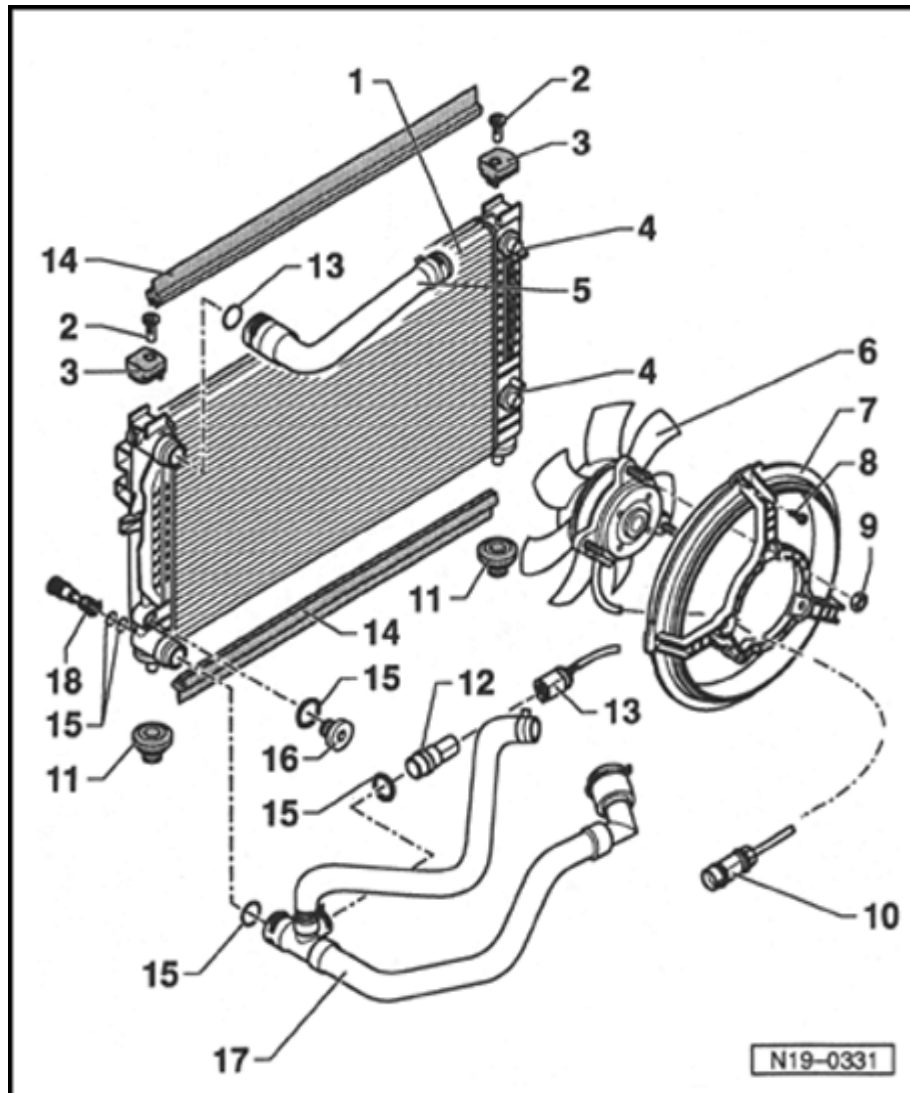
13 - Connector

◆ Black, 4-pin

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

14 - Sealing strip

◆ Installed on radiator at top and bottom



15 - O-ring

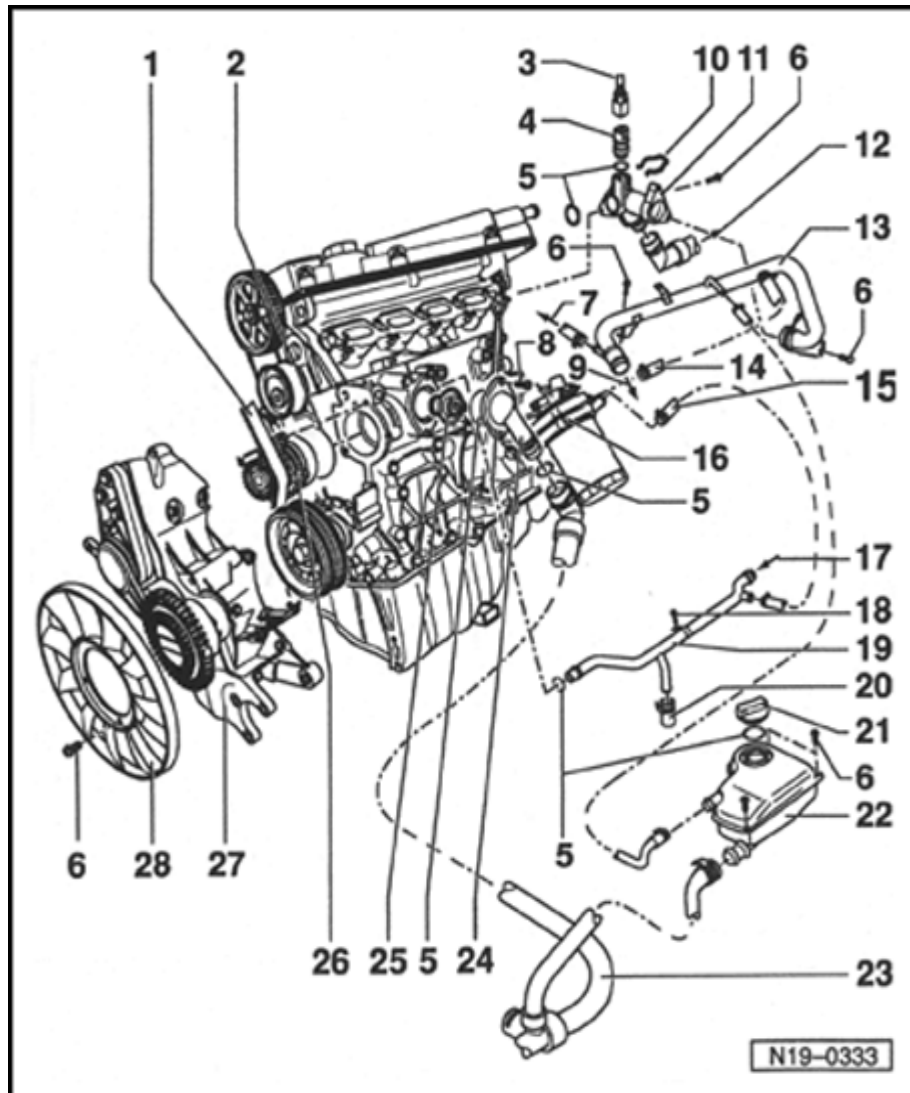
- ◆ Replace if damaged

16 - Locking screw, 10 Nm

17 - Lower coolant hose

- ◆ Secured with retaining clip at radiator and connecting piece
- ◆ Check for secure fitting
- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

18 - Drain plug, 10 Nm



Cooling system components (on engine)

1 - Toothed belt

- ◆ Mark direction of travel before removing
- ◆ Check for wear
- ◆ Do not bend
- ◆ Removing, installing and tensioning ⇒ [Page 15-6](#)

2 - O-ring

- ◆ Always replace

3 - Connector

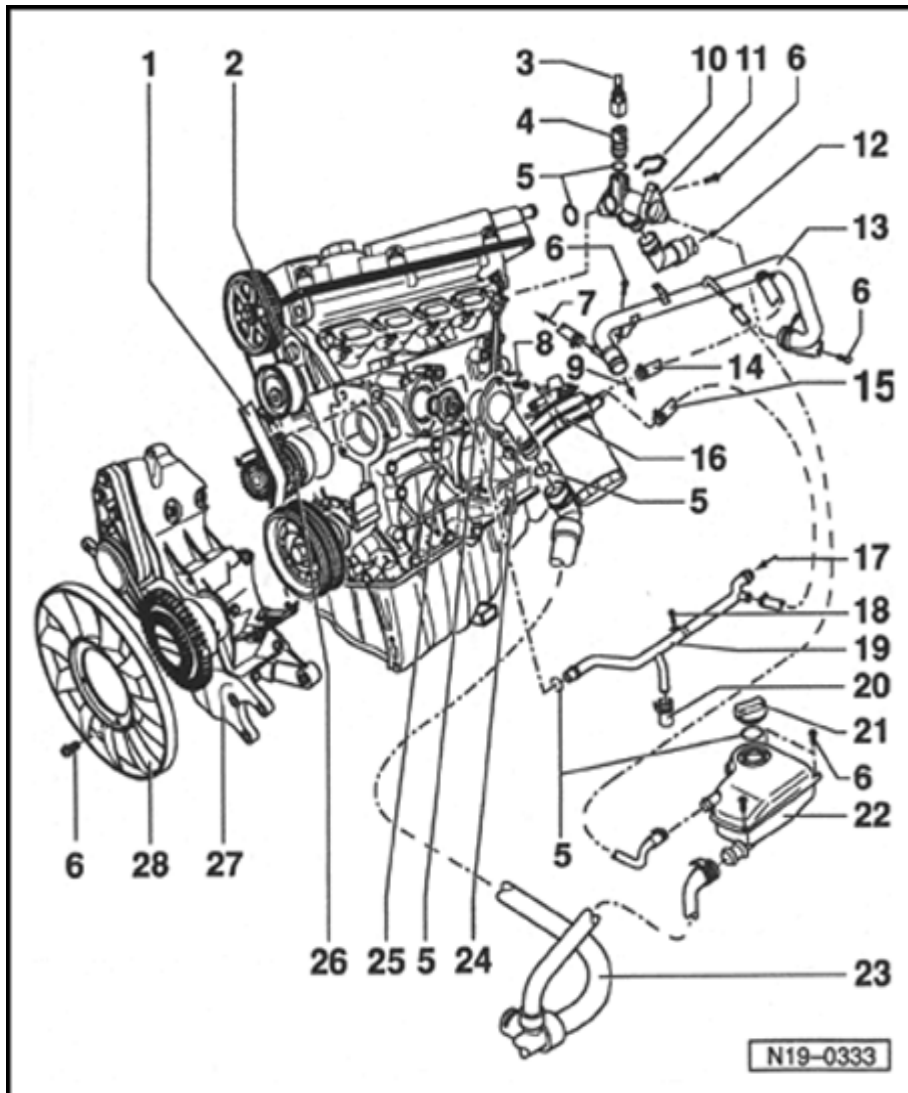
- ◆ 4 pin

4 - Engine Coolant Temperature (ECT) sensor -G62-

- ◆ For Engine Control Module (ECM)
- ◆ If necessary, release pressure in cooling system before removing
- ◆ Checking:

⇒ [Repair Manual, 1.8 Liter 4-Cyl. 5V Turbo Fuel Injection & Ignition, Engine Code\(s\): ATW, AUG, AWM, Repair Group 01, DTC memory; Engine Control Module \(ECM\) DTC memory, checking and](#)

erasing



5 - O-ring

- ◆ Replace if damaged

6 - 10 Nm

7 - To turbocharger

8 - 15 Nm

9 - To top of radiator

- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

10 - Retaining clip

- ◆ Check for secure fitting

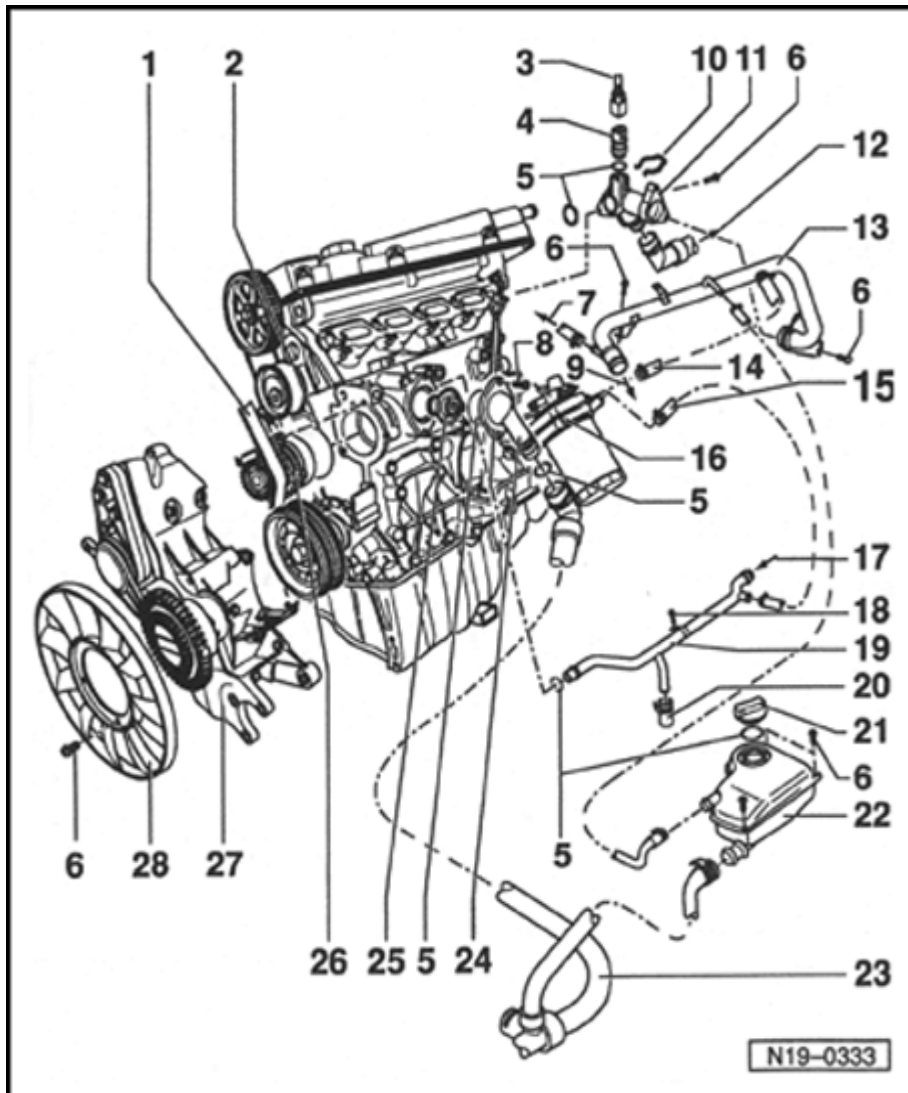
11 - Connecting piece

12 - To heater core

- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

13 - Upper coolant line

- ◆ Secured at cylinder head
- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)



14 - Coolant hose

- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

15 - Coolant hose

- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

16 - Oil cooler

- ◆ Removing and installing ⇒ [Page 17-8](#) , item 22

17 - From heater core

- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

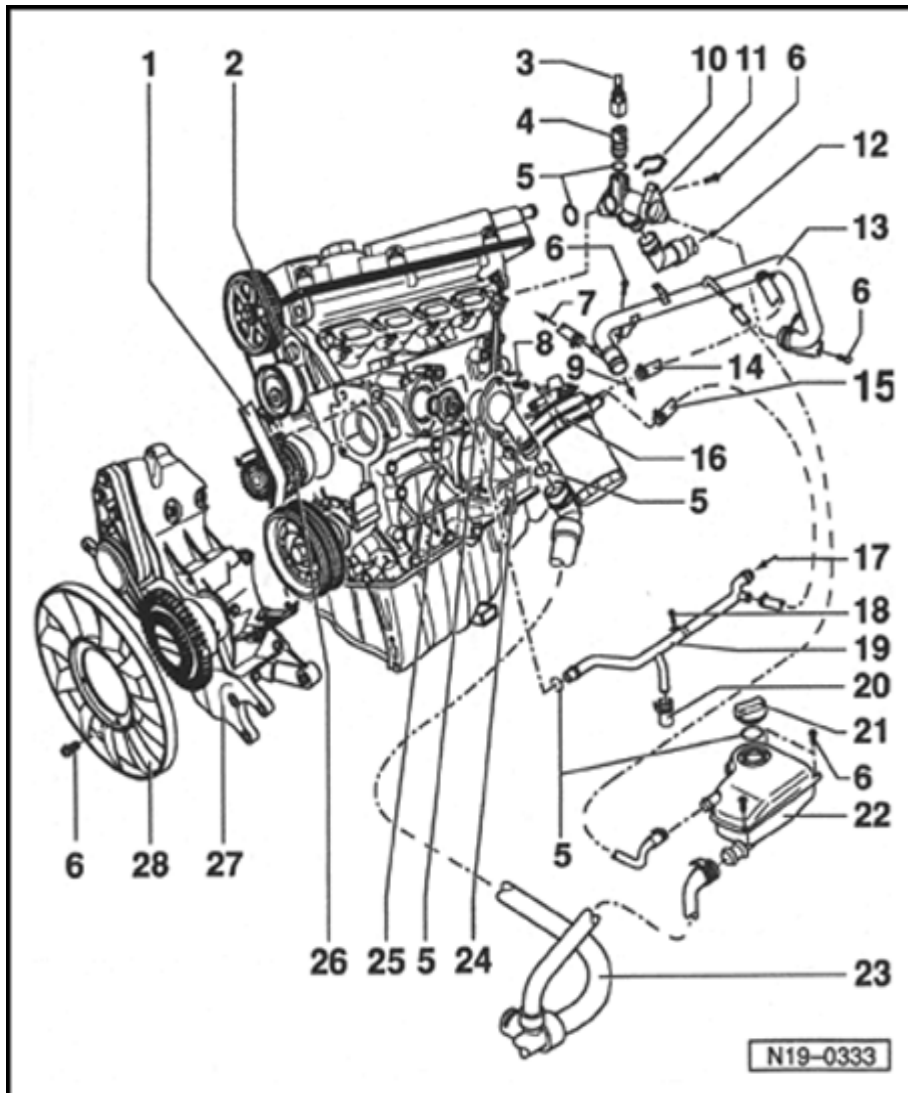
18 - 20 Nm

19 - Lower coolant line

- ◆ Secured at oil filter bracket
- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)

20 - Sealing plug

- ◆ Check for secure fitting



21 - Cap

- ◆ Check using VAG 1274 cooling system tester with VAG 1274/9 adapter
- ◆ Test pressure: 1.4 to 1.6 bar

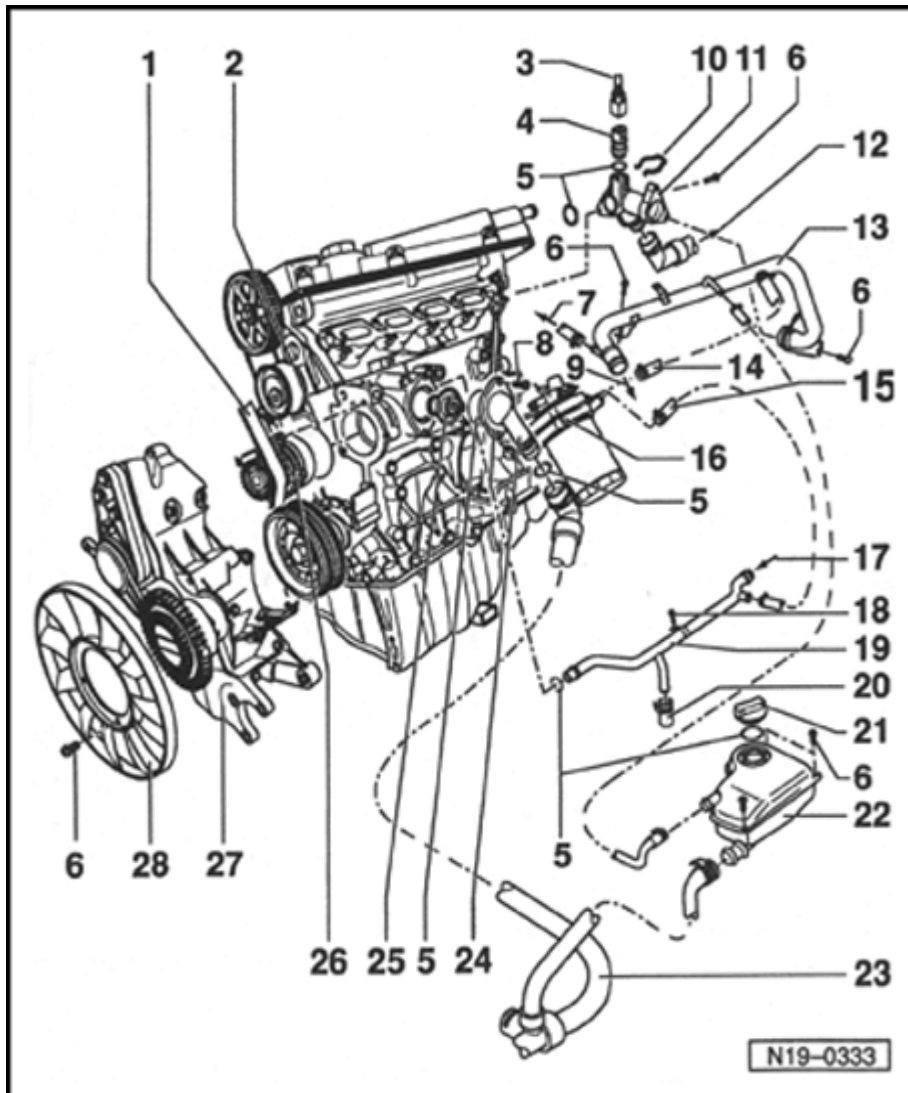
22 - Expansion tank

- ◆ Perform cooling system leakage test using VAG 1274 cooling system tester with VAG 1274/8 adapter

23 - Lower coolant hose

- ◆ From bottom of radiator
- ◆ Connection diagram for coolant hoses ⇒ [Page 19-15](#)
- ◆ secured with retaining clip at radiator and connecting piece
- ◆ Check for secure fitting

24 - Connecting piece



25 - Coolant thermostat

- ◆ Installation position: Bracket must be vertical
- ◆ Checking: Warm thermostat in hot water bath.
- ◆ Starts opening at approx. 86 ° C
- ◆ Opens at least 7 mm

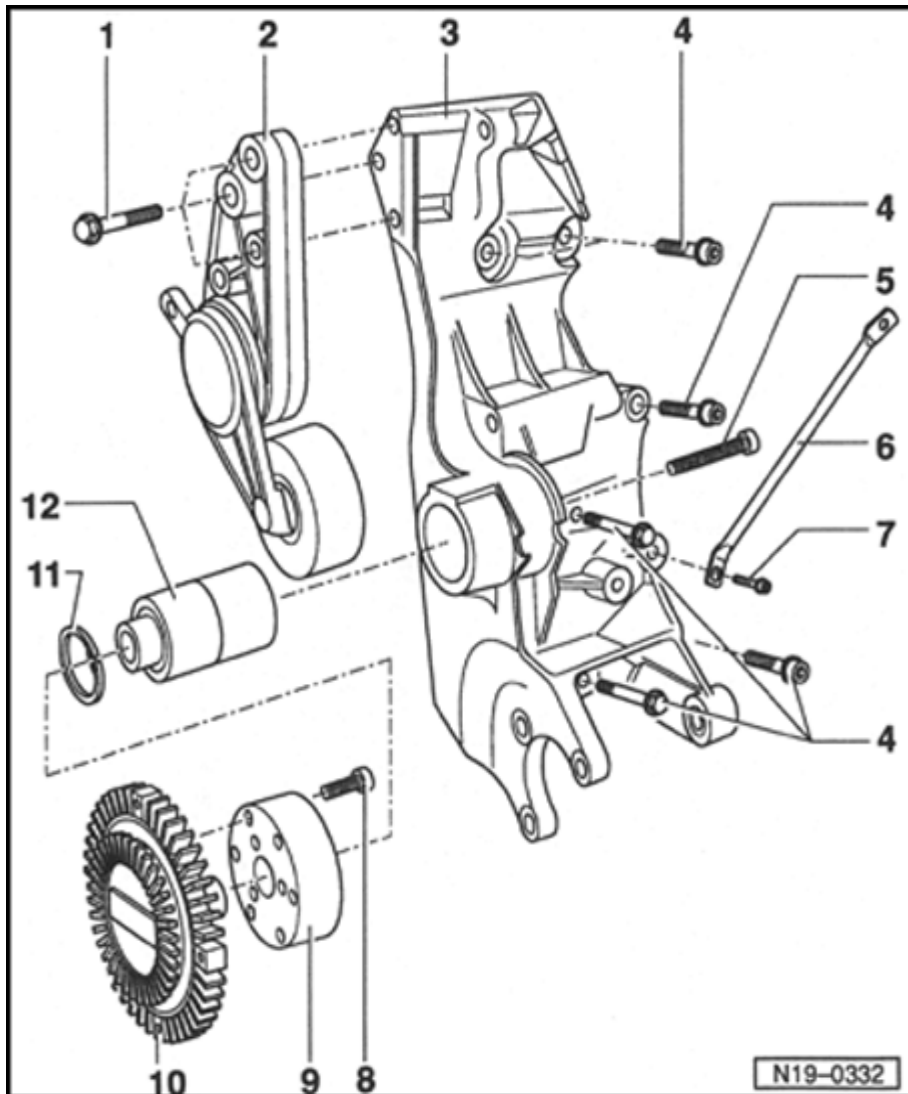
26 - Coolant pump

- ◆ Check for ease of movement
- ◆ Completely replace if damaged or leaking
- ◆ Removing and installing ⇒ [Page 19-26](#)

27 - Bracket

- ◆ For tensioner, viscous-fan clutch, generator and power steering vane pump
- ◆ Removing and installing ⇒ [Page 19-12](#)

28 - Blower wheel



Bracket, removing and installing

1 - 25 Nm

2 - Ribbed belt tensioner

- ◆ Ribbed belt, removing and installing ⇒ [Page 13-14](#)

3 - Bracket

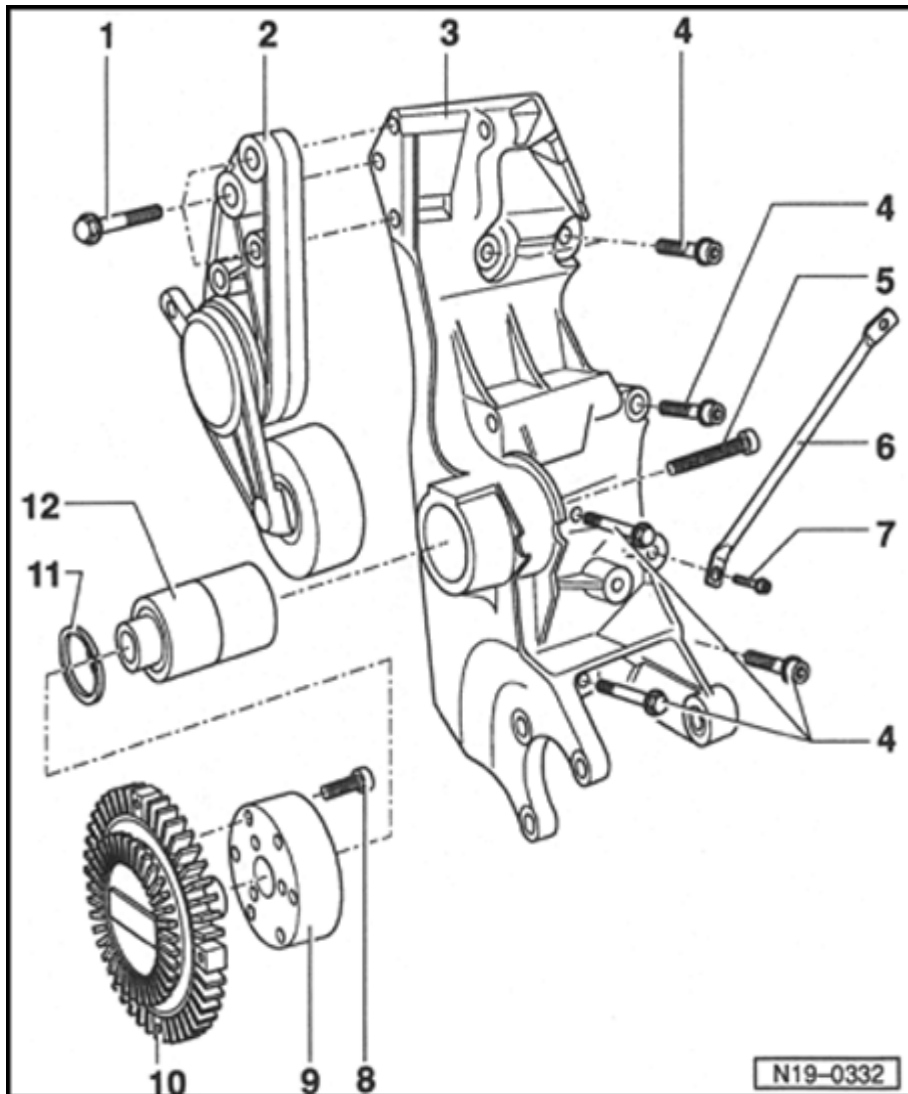
- ◆ For tensioner, viscous-fan clutch, generator and power steering vane pump

4 - 50 Nm

- ◆ Observe tightening sequence ⇒ Fig. ⇒ [1](#)

5 - 45 Nm

- ◆ For viscous fan clutch



6 - Brace

- ◆ Between bracket and intake manifold

7 - 20 Nm

8 - 30 Nm

9 - Belt pulley

- ◆ For viscous fan clutch
- ◆ Removing and installing ⇒ [Page 19-29](#), viscous fan clutch, removing and installing

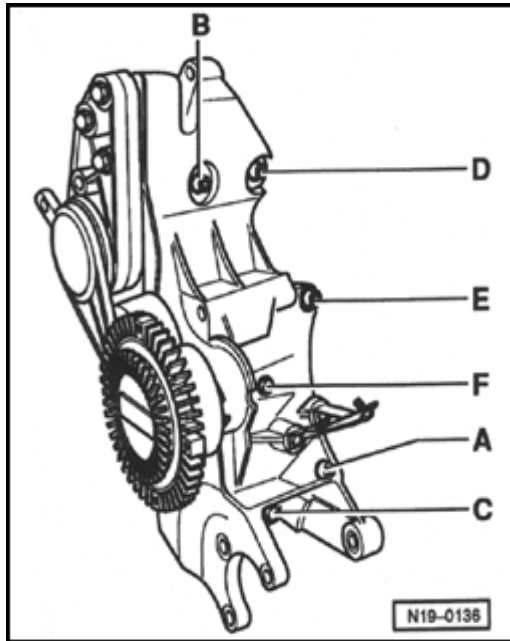
10 - Viscous fan clutch

- ◆ Removing and installing ⇒ [Page 19-29](#)

11 - Snap ring

12 - Bearing bushing

- ◆ For viscous fan clutch
- ◆ Removing and installing ⇒ [Page 19-31](#)



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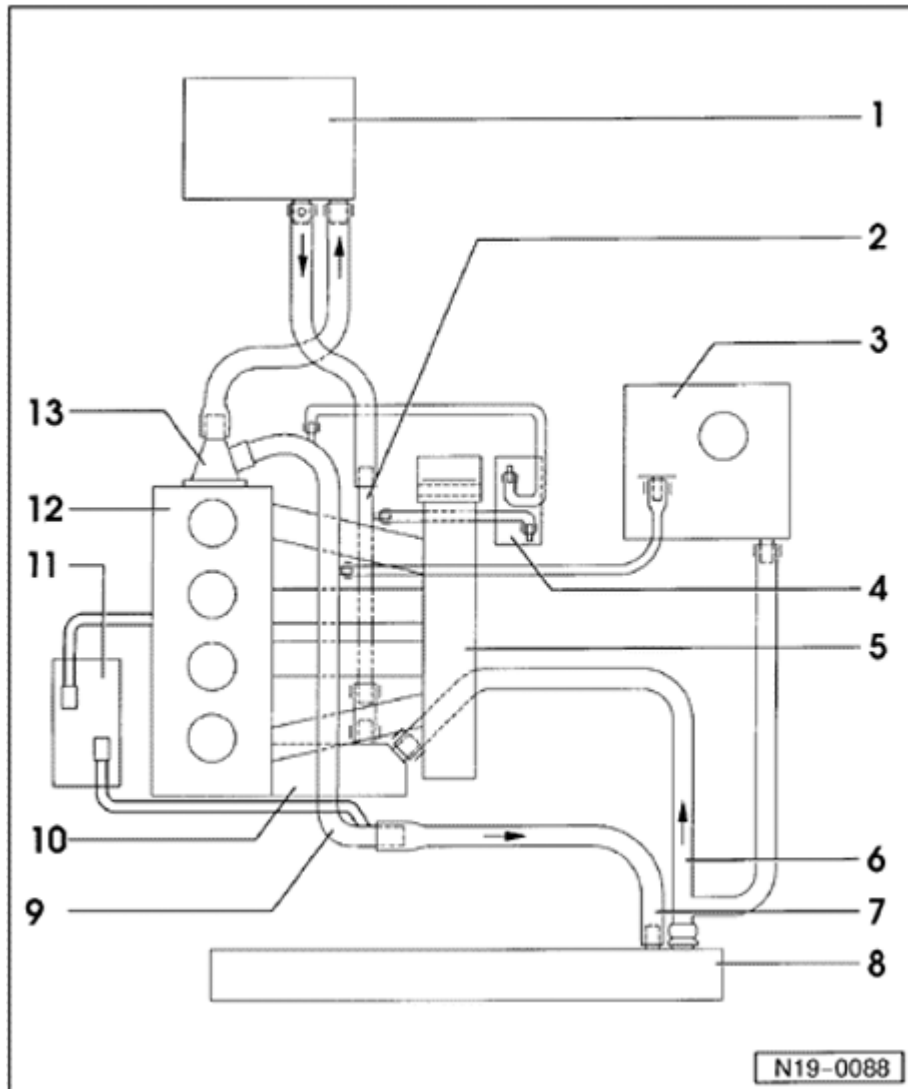
Fig. 1 Tightening sequence, bracket to cylinder block

Special tools and equipment

- ◆ VAG 1331 torque wrench (5 to 50 Nm)

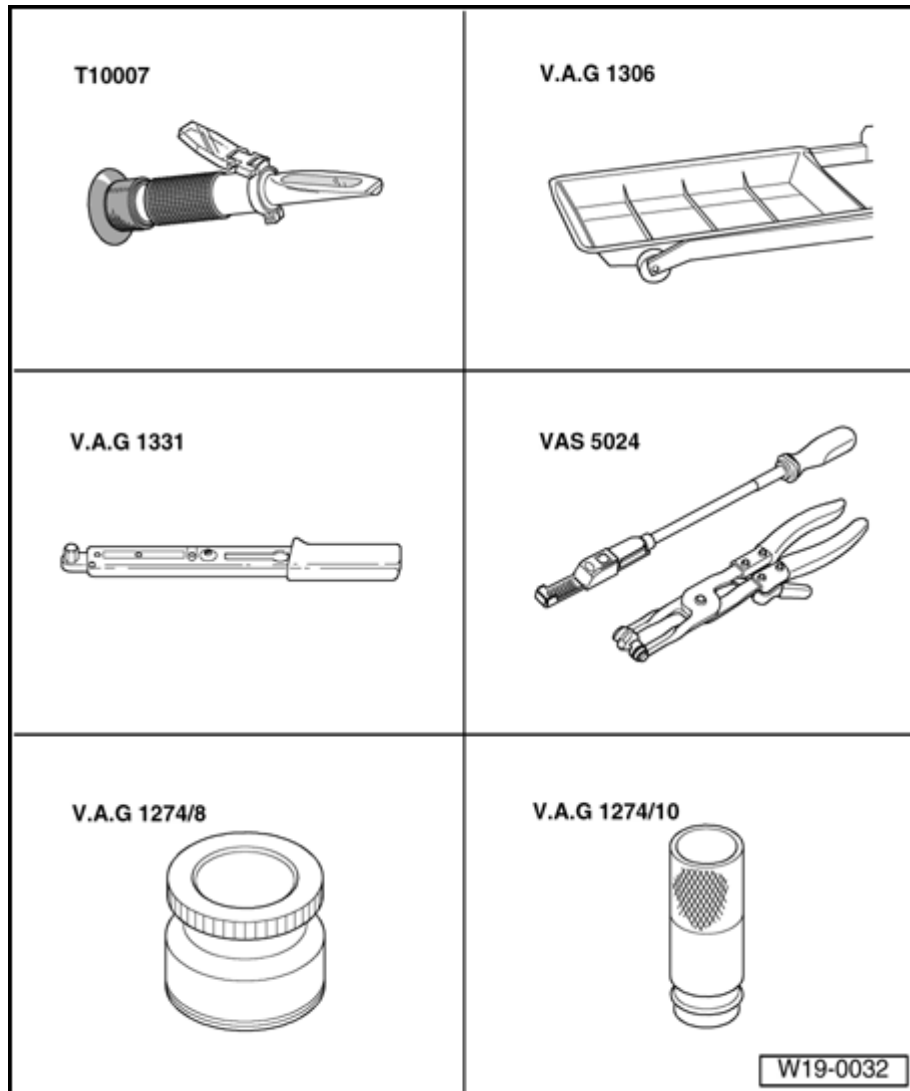
Procedure

- Place bracket on cylinder block.
- Tighten bracket in shown tightening sequence to 50 Nm as follows:
 - 1 - Tighten bolt -A-
 - 2 - Tighten bolt -B-
 - 3 - Tighten bolt -C-
 - 4 - Tighten bolt -D-
 - 5 - Tighten bolt -E-
 - 6 - Tighten bolt -F-



Coolant hose connection diagram

- 1 - Heater core
- 2 - Lower coolant pipe
- 3 - Expansion tank
- 4 - Oil cooler
- 5 - Intake manifold
- 6 - Lower coolant hose
- 7 - Upper coolant hose
- 8 - Radiator
- 9 - Upper coolant line
- 10 - Coolant pump/coolant regulator
- 11 - Turbocharger
- 12 - Cylinder head/Cylinder block
- 13 - Connecting piece



Coolant, draining and refilling

Special tools and equipment

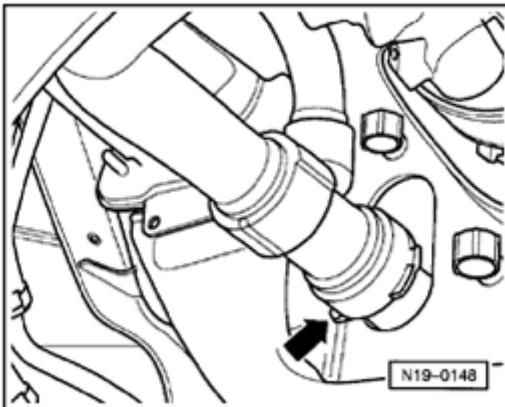
- ◆ T10007 Refractometer
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5 to 50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clamps
- ◆ VAG 1274/8 Adapter
- ◆ VAG 1274/10 Adapter



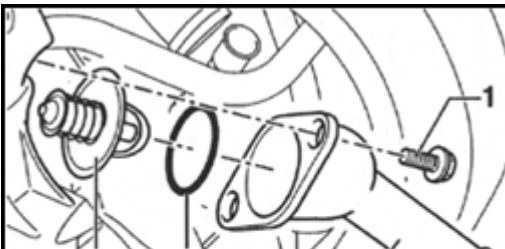
Draining

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

⇒ [Repair Manual, Body Exterior, Repair Group 50; Body, front; Noise insulation - Assembly overview](#)

**A**

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

**A**

- Disconnect coolant hose from connecting piece -2-.
- Remove bolts -1-, connecting piece -2-, O-ring -3- and coolant thermostat -4-.

Note:

Follow coolant disposal regulations!



Filling

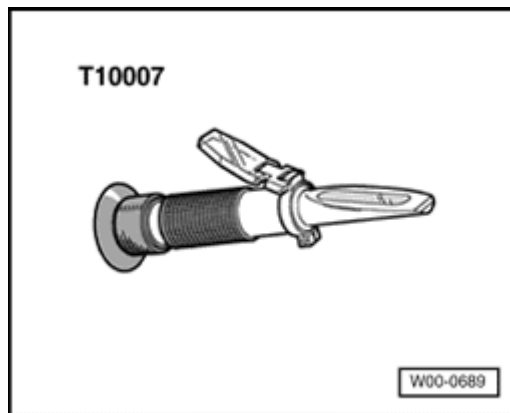
Notes:

- ◆ *Only use coolant additive G12 (according to TL VW 774 D). Characteristic: red color*
- ◆ *Do not mix G12 with any other coolant additive!*
- ◆ *If the fluid in expansion tank is brown, G12 has been mixed with other coolant. In this is the case, coolant must be replaced.*
- ◆ *"G12" and coolant additives marked "In accordance with TL VW 774 D" prevent frost and corrosion damage, scaling and also raise the boiling point of the coolant. 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 protect against frost to about -25 C (about -35 C 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 12 can be increased, but only up to 60% (frost protection to about -40 ° C), 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.*



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- ◆ *The T10007 refractometer is recommended for determining frost protection density.*

Recommended mixture ratios:

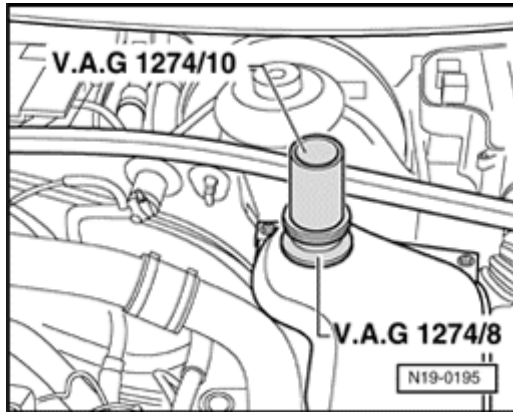
Frost protection to	Anti-freeze amount	-G12- ¹⁾	Water ¹⁾
-25 ° C	40 %	3.0 l	4.0 l
-35 ° C	50 %	3.5 l	3.5 l

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

Procedure

- Install lower radiator hose and secure.
- Replace O-ring and remove coolant thermostat and connecting piece. Bracket of coolant thermostat must be vertical. Tightening torque: 15

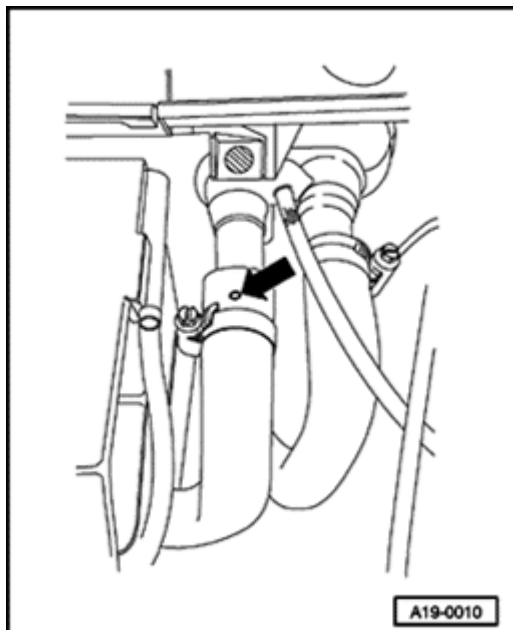
Nm



- Attach coolant hose to connecting piece.

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- Thread VAG 1274/8 onto coolant reservoir and lengthen using 1274/10 tube
- Move back protective cover for coolant hose at connection of heater core.



A

- Loosen coolant hose on heater core and pull back hose sufficiently so that the bleed hole in coolant hose (arrow) is no longer covered by the connecting piece.
- Fill up coolant until it flows out of the coolant hose bleed hole.
- Slide coolant hose onto connecting piece and secure it again.
- 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 lower coolant hose at radiator is hot.

- Check coolant level and top off if necessary. With engine at operating temperature, coolant level must be at max. marking, with engine cold, it must be between min. and max. marking.

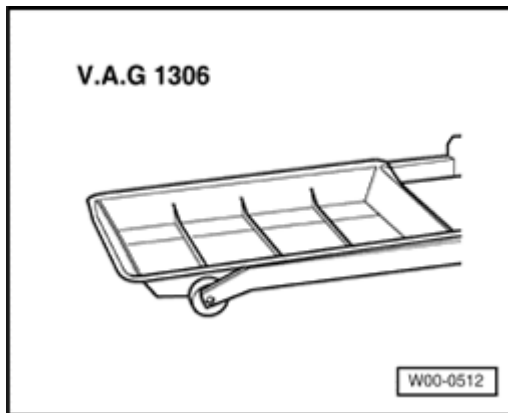


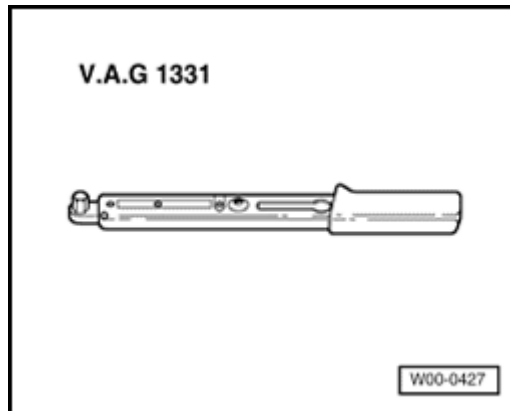
Radiator, removing and installing

Special tools and equipment



- ◆ VAG 1306 drip tray





A

- ◆ VAG 1331 torque wrench (5 to 50 Nm)

Removing

- Drain coolant ⇒ [Page 19-16](#) .
- Remove front bumper:

⇒ [Repair Manual, Body Exterior, Repair Group 63; Bumper, front; Assembly overview](#)

- Remove coolant hoses from radiator.

Vehicles with automatic transmission

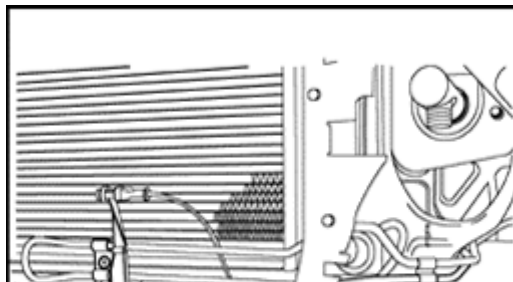
- Remove ATF lines from radiator:

⇒ Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37, Transmission disassembling and assembling; ATF lines, removing and installing.

Continuation for all vehicles

A

- Unbolt cooling coil for power steering fluid (arrows) and let hang free; Do not open hydraulic fluid circuit.
- Remove upper radiator securing pins and remove radiator toward front.



Vehicles with A/C system

- Observe additional notes and repair work ⇒ [Page 19-25](#) .



Installing

Installation is reverse of removal, noting the following:

Vehicles with automatic transmission

- Attach ATF lines to radiator:

⇒ Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37, Transmission disassembling and assembling; ATF lines, removing and installing.

- Check ATF level.

⇒ Repair Manual, 5 Spd. Automatic Transmission 01V, Repair Group 37; ATF level, checking and topping up

Continuation for all vehicles

- Top up coolant ⇒ [Page 19-16](#) .
- For harness connectors and routing:

⇒ *Electrical Wiring Diagrams, Troubleshooting & Component Locations*

- Install front bumper

⇒ *Repair Manual, Body Exterior, Repair Group 63; Bumper, front; Assembly overview*

- Check headlight adjustment, correct if necessary:

⇒ *Repair Manual, Maintenance*



Additional notes and assembly steps for vehicles with A/C system

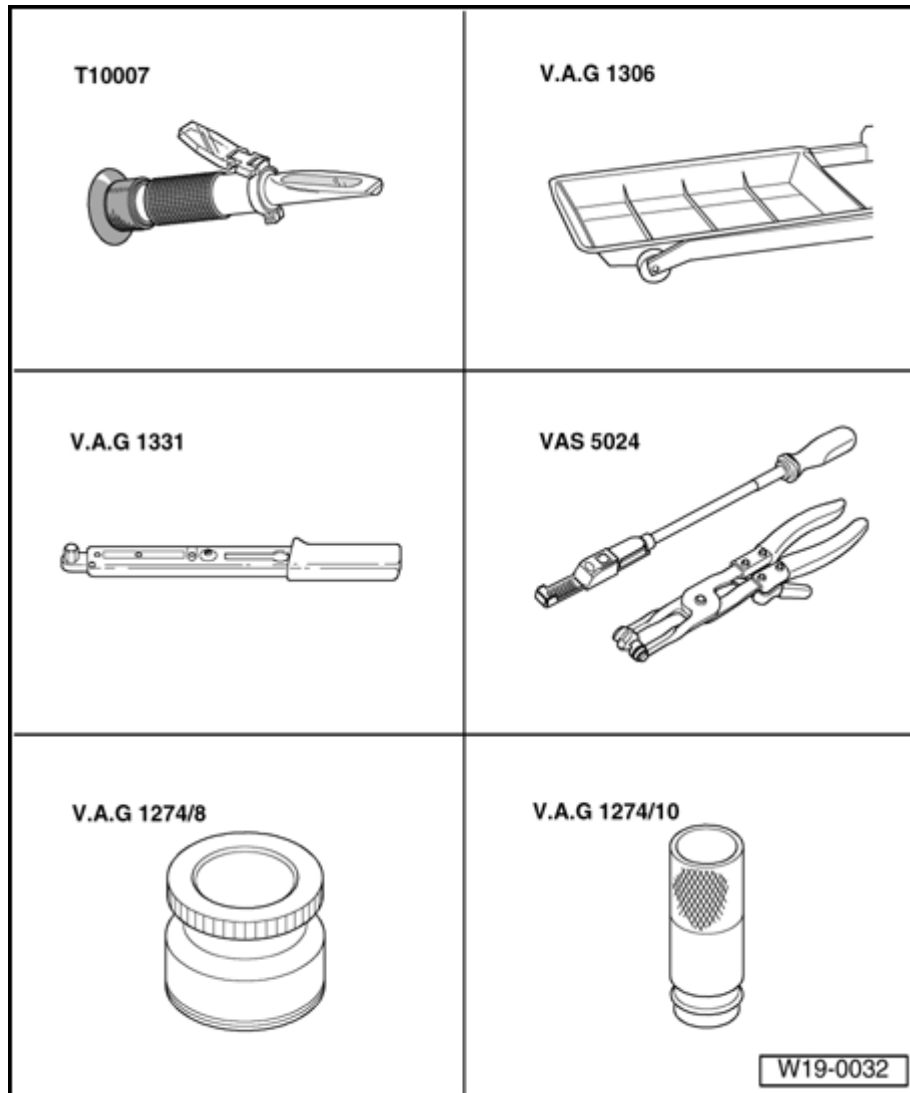
WARNING!

Do not open refrigerant circuit for A/C system.

Note:

Do not bend or stretch lines or hoses as condenser and/or refrigerant lines/hoses may be damaged.

- Remove retaining clamp(s) for refrigerant lines.
- Remove condenser from radiator and pull forward as far as possible.
- Secure condenser to body so that the refrigerant lines/hoses are not burdened.
- Remove radiator between condenser and bumper.



Coolant pump, removing and installing

Special tools and equipment

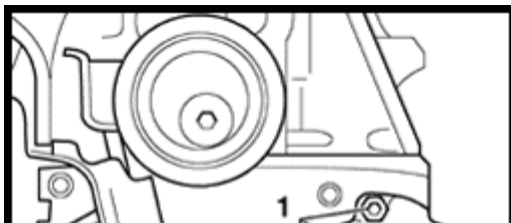
- ◆ T10007 Refractometer
- ◆ VAG 1306 Drip tray
- ◆ VAG 1331 Torque wrench (5 to 50 Nm)
- ◆ VAS 5024 Assembly tool for spring-type clamps
- ◆ VAG 1274/8 Adapter
- ◆ VAG 1274/10 Adapter

**Notes:**

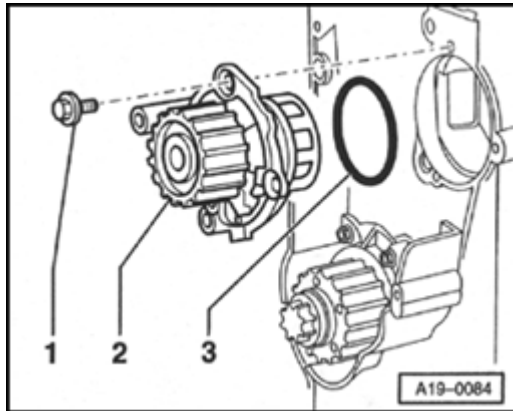
- ◆ *Always replace seals and gaskets.*
- ◆ *Lower portion of toothed belt guard can remain installed.*
- ◆ *Toothed belt stays attached to crankshaft toothed belt gear.*
- ◆ *Cover the toothed belt with a cloth to protect it from coolant before removing the coolant pump.*

Removing

- Drain coolant ⇒ [Page 19-16](#) .
- Remove ribbed belt ⇒ [Page 13-14](#) .
- Remove toothed belt from toothed belt gear of coolant pump ⇒ [Page 15-6](#) .
- Remove coolant pump mounting bolts -1- and remove coolant pump -2- .

**A****Installing**

Installation is reverse of removal, noting the following:



A

- Moisten new O-Ring -3- with coolant.
- Insert coolant pump -2-. Installation position: Sealing plug in housing points downward.
- Tighten mounting bolts -1-. Tightening torque: 15 Nm

How to install toothed belt and adjust valve timing ⇒ [Page 15-6](#)

- Install ribbed belt ⇒ [Page 13-14](#) .
- Top up coolant ⇒ [Page 19-16](#) .

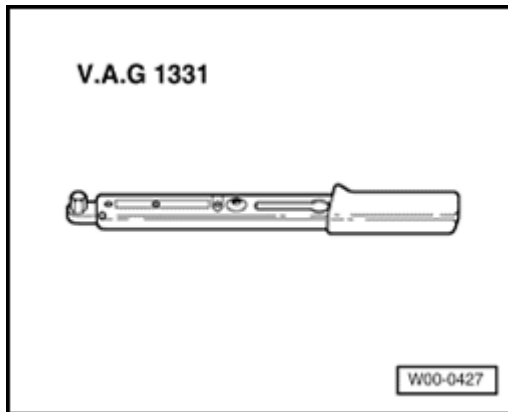


Viscous fan clutch, removing and installing

Special tools and equipment

A

- ◆ VAG 1331 torque wrench (5 to 50 Nm)
- ◆ 5 mm drift



Removing

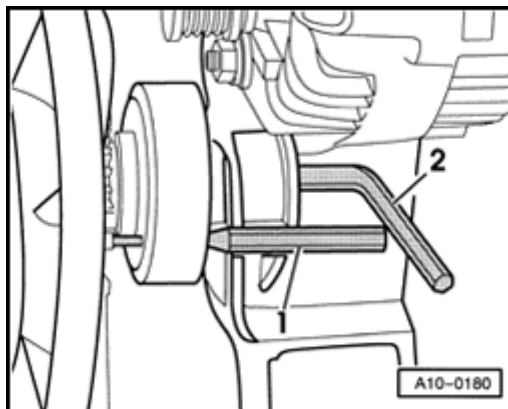
- Bring the lock carrier into service position:

⇒ [Repair Manual, Body Exterior, Repair Group 50, Front chassis; Lock carrier service position](#)

- Remove ribbed belt ⇒ [Page 13-14](#) .
- Remove fan wheel from viscous fan clutch.

A

- Secure belt pulley of viscous-fan clutch using a drift ($\leq 5\text{ mm}$) -1-.
- Unbolt securing bolt for viscous fan clutch (with 8 mm wrench insert hex socket -2-) and remove viscous fan clutch with belt pulley.
- Disconnect belt pulley from viscous fan clutch.





Installing

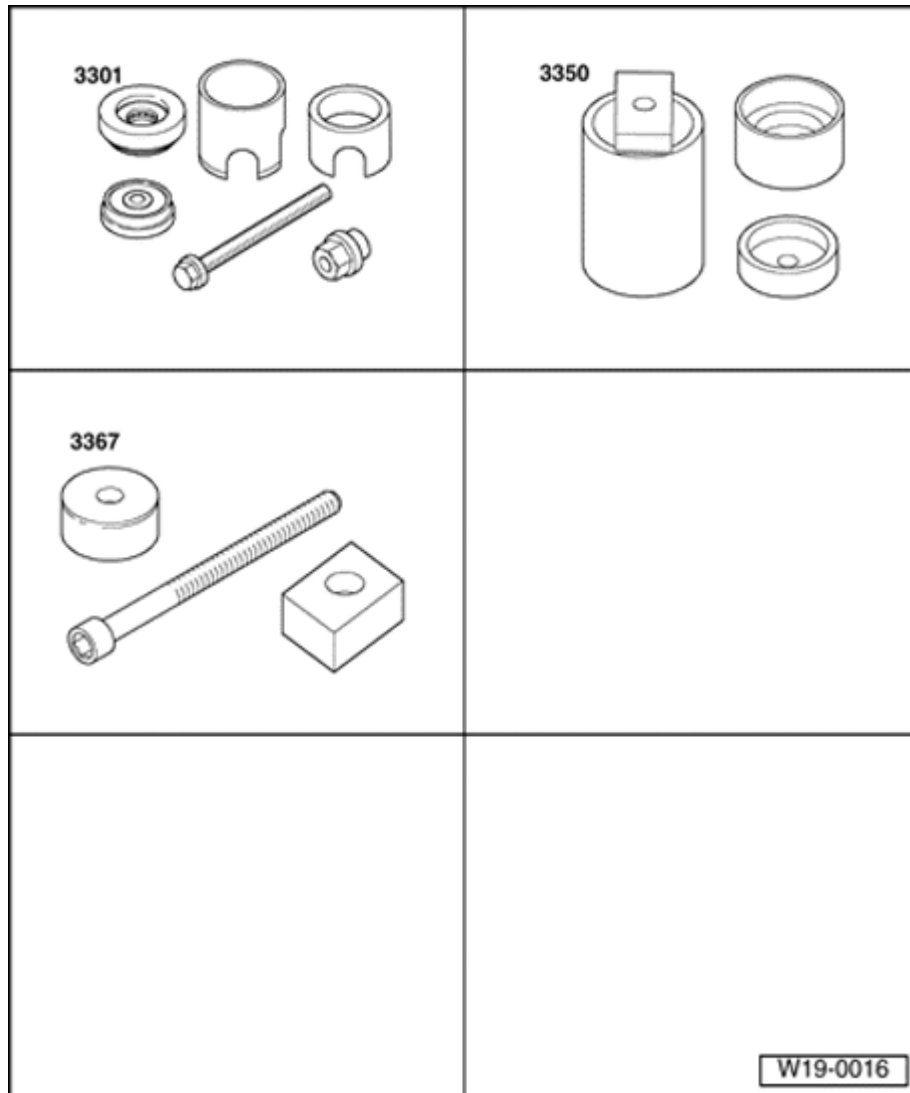
Installation is reverse of removal, noting the following:

- Tighten belt pulley at viscous fan clutch to 30 Nm.

- Tighten viscous fan clutch at bracket to 45 Nm.

- Tighten fan wheel at viscous fan clutch to 10 Nm.

- Install ribbed belt ⇒ [Page 13-14](#) .



Viscous fan clutch bushing, removing and installing

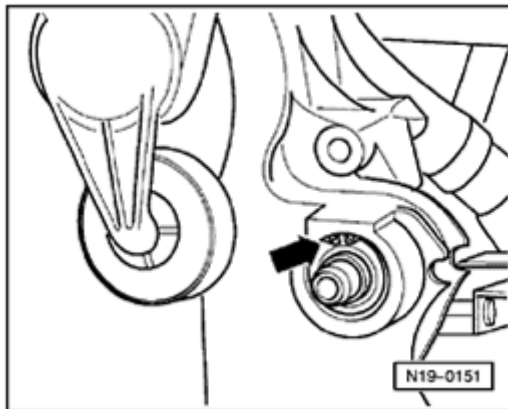
Special tools and equipment

- ◆ Hex nut from 3301 Assembly Tool
- ◆ Extractor line from 3350 Installation Device
- ◆ 3367 Press tool for viscous fan

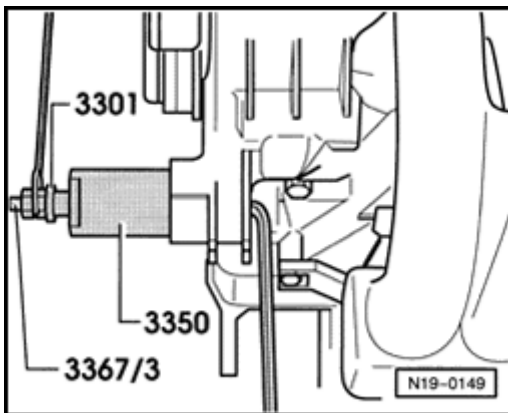


Removing

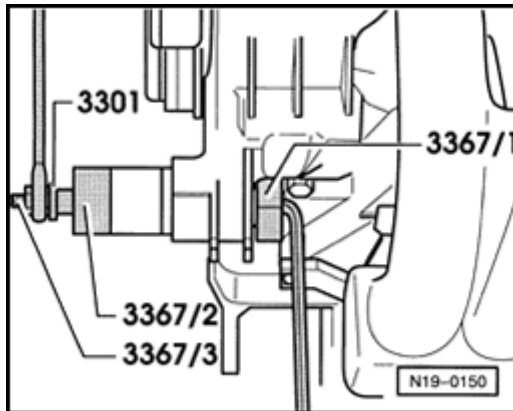
- Remove viscous fan clutch (with belt pulley) ⇒ [Page 19-29](#) .

**A**

- Remove circlip -arrow- from bearing bushing.

**A**

- Press out bushing from bracket using 3367/3 socket head bolt, tube from 3350 carrier bearing inst. Tool and hex nut from 3301 assembly tool.



Installing

A

- Press bushing into bearing up to stop using 3367/1 compensation piece, 3367/2 pressure piece, 3367/3 socket head bolt and hex bolt from 3301 assembly tool.
- After installation, secure bearing with securing ring.
- Install viscous fan clutch ⇒ [Page 19-29](#) .