

Index

Engine code MC/NF

Antifreeze hydrometer

- checking 19.5

Coolant

- assembly 19.2
- checking 19.3
- draining/refilling 19.4
- expansion cap, checking 19.3
- level, checking 19.5
- mixture ratio 19.5
- thermostat, checking 19.3

Engine code 3B

Antifreeze hydrometer

- checking 19.5

Coolant

- checking 19.9
- component layout 19.6
- draining/refilling 19.10
- expansion tank cap, checking 19.9
- level, checking 19.11
- mixture ratio 19.11
- pump, checking 19.12
- thermostat, checking 19.9
- turbocharger thermostatic switch, checking

Engine – Cooling System

Note

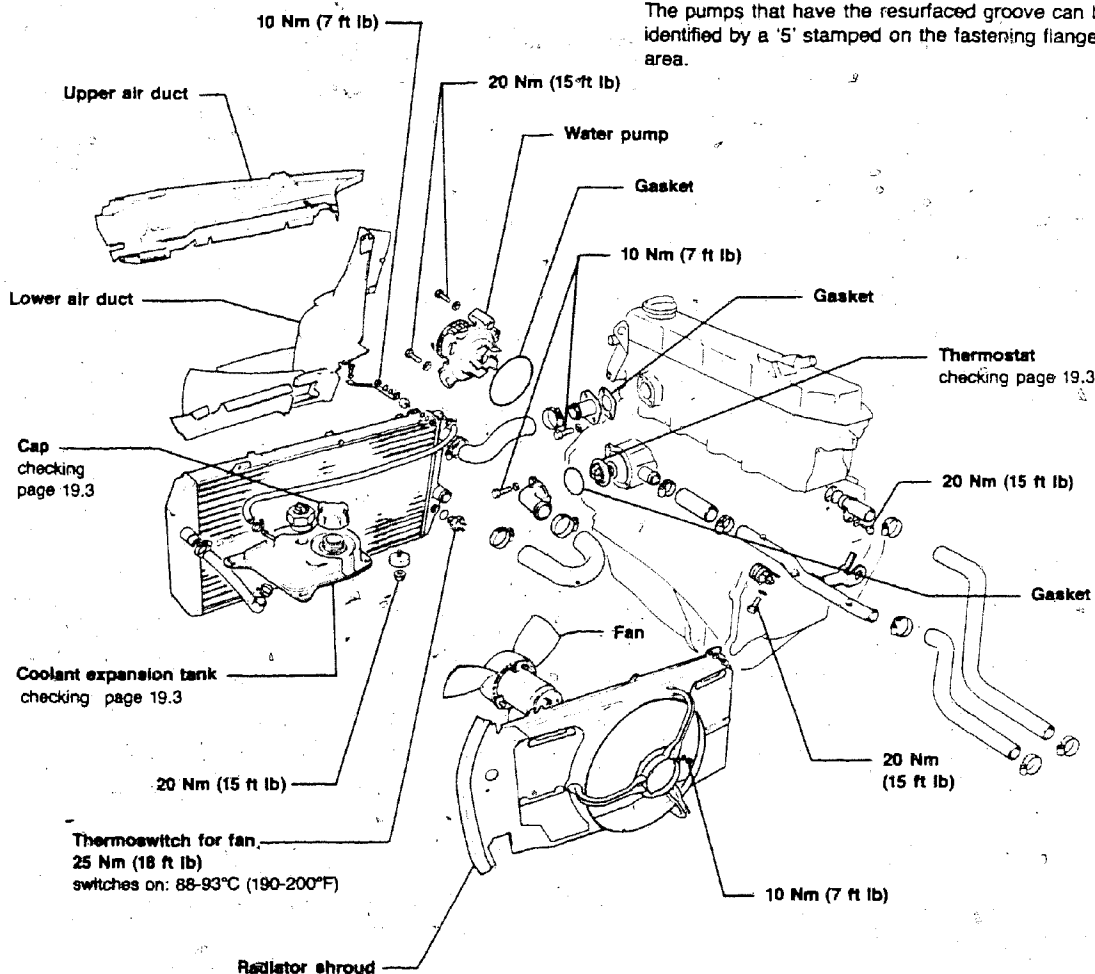
Always replace all gaskets and seals.

Note

During the remanufacture of water pumps, it may have been necessary to resurface and enlarge the o-ring groove in the pump housing.

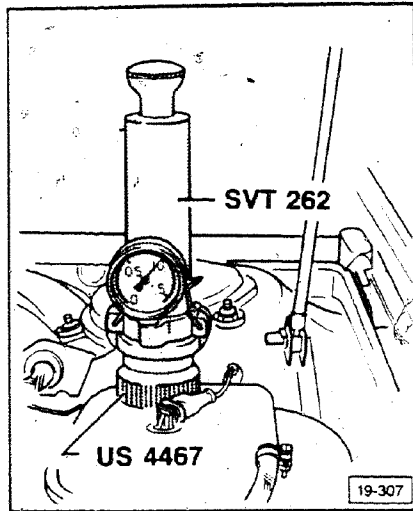
Since the standard production 4.0 mm (5/32 in) gasket ring cannot be used on these modified units, an oversized 5.0 mm (13/64 in) gasket ring must be installed.

The pumps that have the resurfaced groove can be identified by a '5' stamped on the fastening flange area.



19-309

Engine – Cooling System

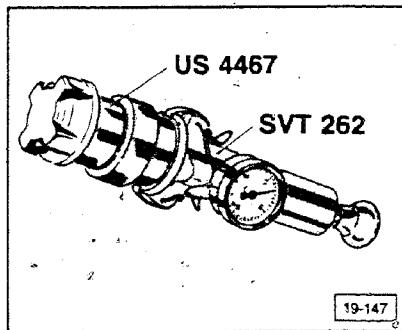


Cooling system, checking

Note

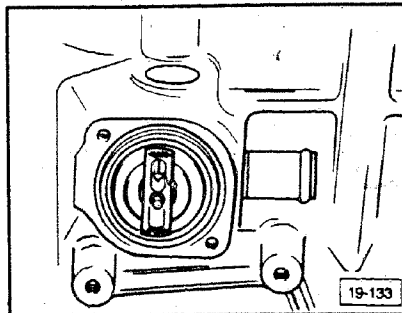
Perform this test only with the engine at operating temperature.

- attach tester in place of cap
- apply pressure of approximately 1 bar (14.5 psi)
 - if pressure remains constant system is OK



Coolant expansion tank cap, checking

- attach to cap
- apply pressure of 1.2 to 1.5 bar (17-22 psi)
 - if pressure relief valve opens within this range, cap is OK



Thermostat, checking

opens at: approximately 87°C (188°F)
ends: approximately 102°C (215°F)
travel: minimum 8.0 mm (5/16 in.)

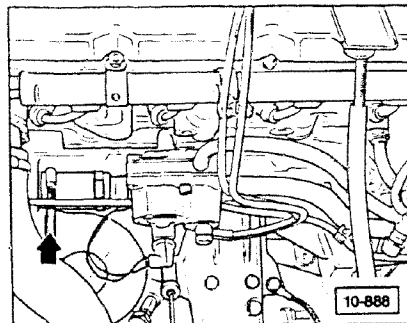
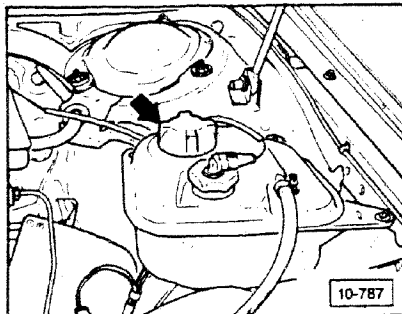
Engine – Cooling System

CAUTION

Coolant/antifreeze **must not** be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.

CAUTION

Part numbers are for reference only. Always check with your Parts Department for latest information.



Cooling system, draining/refilling

The cooling systems of **all** Audi vehicles are filled at the factory with a mixture of water and an antifreeze solution (**G 11**) with corrosion inhibitors. This coolant mixture should be used year-round.

Phosphate-free anti-freeze prevents frost and corrosion damage, the formation of chalk and in addition, it raises the boiling point of water. Due to the higher boiling point the coolant is an aid to operational efficiency, when the engine is operating under full load, particularly in tropical climates.

When replacing coolant/antifreeze solution in all Audi models, all model years, use phosphate-free coolant/antifreeze **ZVW 237 102**.

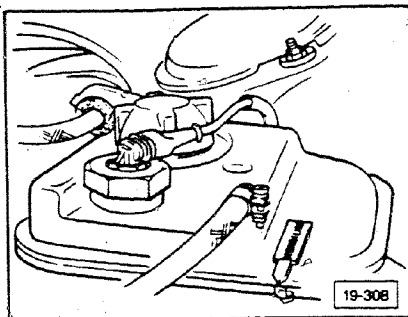
Cooling system, draining

- set heater control on dash to "warm"
- open overflow reservoir cap (**arrow**)
- disconnect coolant hose for heater at engine block
- remove coolant hose from radiator at lower connection to engine (**arrow**)
 - save coolant for reuse (see caution)

Cooling system, refilling

- set heater control on "warm"
- fill with coolant until the expansion tank is full
- run engine and continue to fill tank until level remains constant
- close tank with cap
- continue to run engine until cooling fan operates
- check coolant level and top up as necessary

Engine – Cooling System



Coolant level, checking

Note

The coolant level must be slightly above the "minimum" marking. When the engine is cold the level may be exactly at the mark.

Coolant mixture ratio

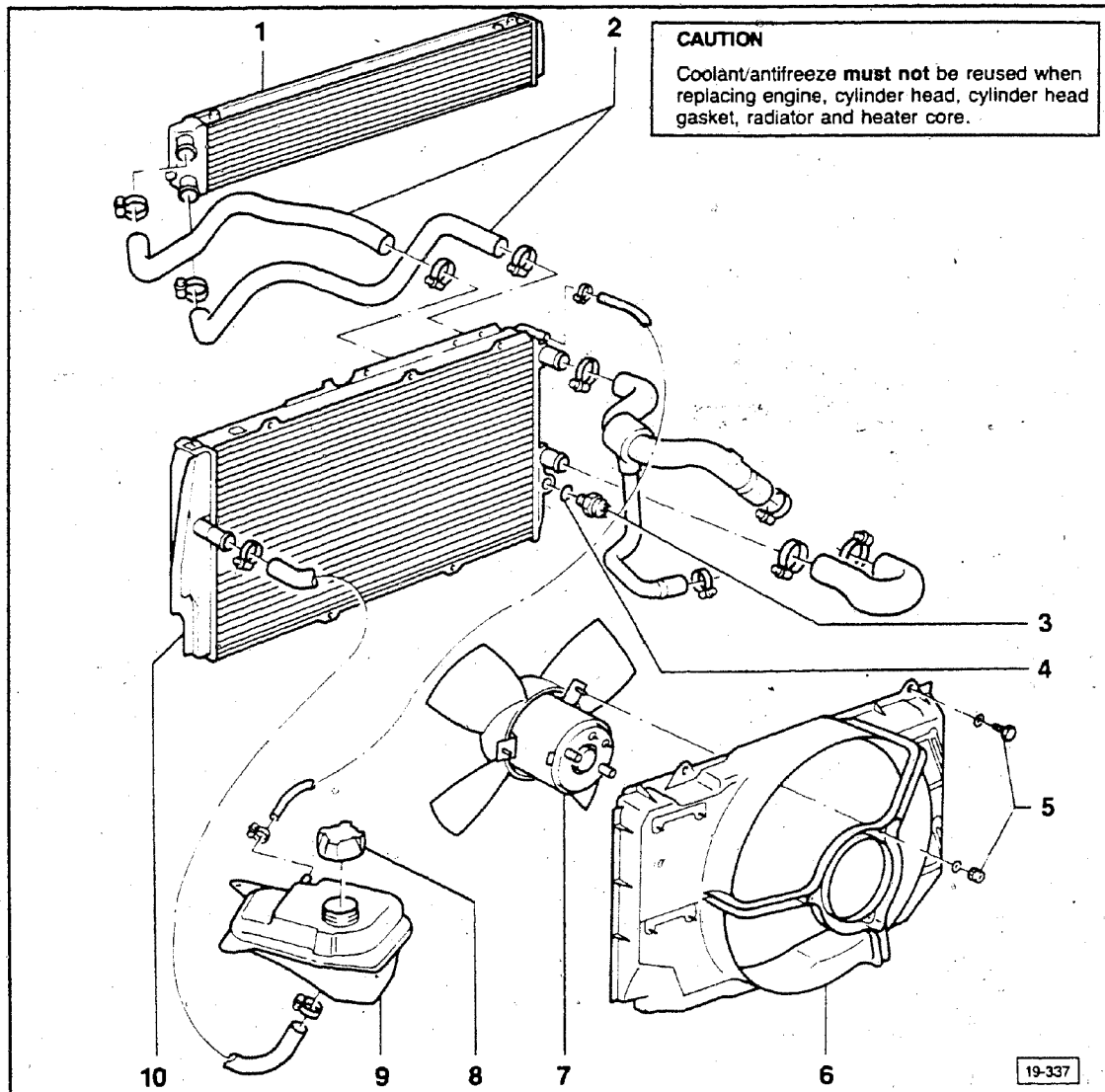
Outside temperature	Antifreeze	Water
-25°C (-13°F)	3.1L (3.3 qts)	4.7L (5.0 qts)
-30°C (-22°F)	3.6L (3.8 qts)	4.4L (4.7 qts)
-35°C (-30°F)	3.9L (4.1 qts)	3.9L (4.1 qts)

Antifreeze hydrometer, checking

Calibration of hydrometer must be checked frequently to ensure accuracy.

- mix a 50/50 mixture of antifreeze and water together in a small container
- hydrometer should read -35°C (-30°F)
 - if not, put a mark (paint dot) to indicate where -35°C (-30°F) should be.

Engine — Cooling System



CAUTION

Coolant/antifreeze **must not** be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.

Note

Always replace all gaskets and seals.

1 — Auxillary radiator

2 — Coolant hose
between radiator and auxillary radiator

3 — Thermostat, fan — 25 Nm (18 ft lb)

• 3-pin (+ = supply)

• switching temperature:

1st speed: ON 92° to 97°C (198°-207°F)

OFF approximately 84° (183°F)

2nd speed: ON 99°-105°C (210°-221°F)

OFF approximately 105°C (221°F)

4 — Gasket

5 — 10 Nm (7 ft lb)

6 — Fan shroud

7 — Radiator cooling fan

8 — Coolant expansion tank cap
testing, see page 19.9

9 — Coolant expansion tank
filling/checking, page 19.9

10 — Radiator
removing/installing, remove fasteners, coolant hoses,
and withdraw from top

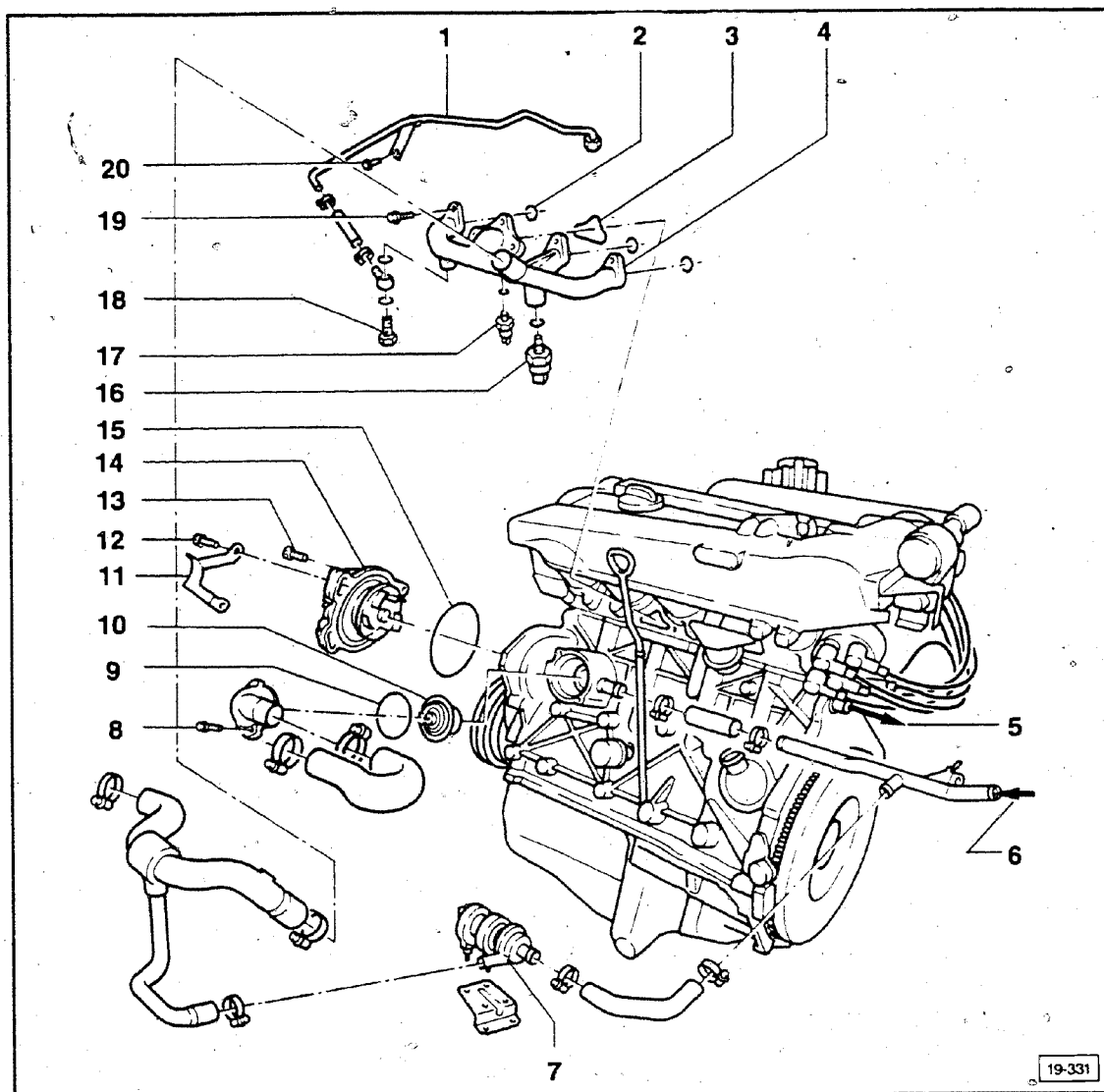


Engine code 3B — 20V Turbo

Cooling system, component layout

19.6

Engine — Cooling System



Note

Always replace gaskets and seals.

CAUTION

Coolant/antifreeze must not be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.

1 — Coolant pipe — to turbocharger

2 — O-ring

3 — Gasket
always replace

4 — Coolant manifold

5 — to heat exchanger

6 — from heat exchanger

7 — Coolant pump, turbocharger
checking, page 19.12

8 — 10 Nm (7 ft lb)

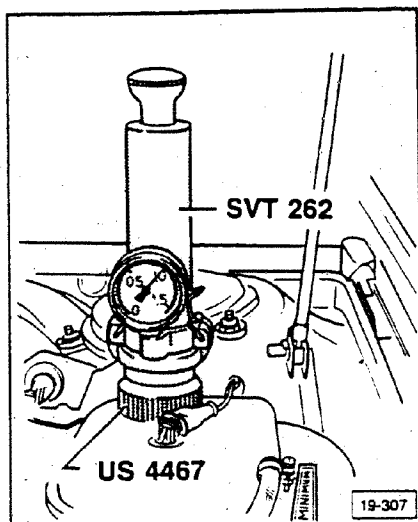
9 — O-ring
always replace

Engine — Cooling System

- 10 — Thermostat
checking, page 19.9
- 11 — V-belt deflection limiter, left
- 12 — 22 Nm (16 ft lb)
- 13 — 22 Nm (16 ft lb)
- 14 — Water pump
- 15 — Gasket
always replace
- 16 — Electronic thermostatic switch — 25 Nm (18 ft lb)
- 17 — Turbocharger coolant pump, thermostatic switch —
15 Nm (11 ft lb)
checking, page 19.12
- 18 — Bolt — 30 Nm (22 ft lb)
- 19 — 10 Nm (7 ft lb)
- 20 — 10 Nm (7 ft lb)

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Engine – Cooling System

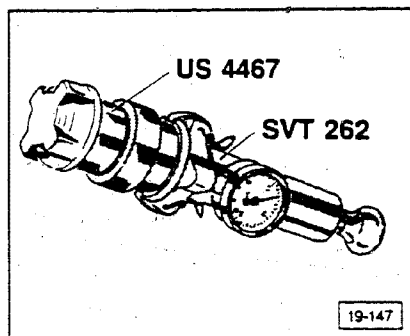


Cooling system, checking

Note

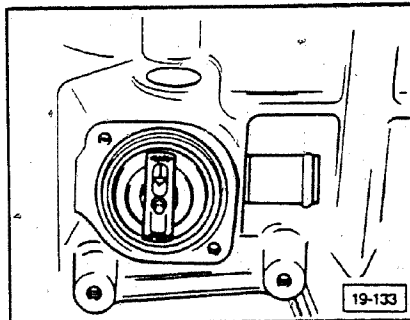
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- apply pressure of approximately 1 bar (14.5 psi)
 - if pressure remains constant system is OK



Coolant expansion tank cap, checking

- attach to cap
- apply pressure of 1.2 to 1.5 bar (17-22 psi)
 - if pressure relief valve opens within this range, cap is OK



Thermostat, checking

opens at: approximately 87°C (188°F)
ends: approximately 102°C (215°F)
travel: minimum 8.0 mm (5/16 in.)

Engine — Cooling System

Cooling system, draining/refilling

CAUTION

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Department for latest information.

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Phosphate-free anti-freeze prevents frost and corrosion damage, the formation of chalk and in addition, it raises the boiling point of water. Due to the higher boiling point the coolant is an aid to operational efficiency, when the engine is operating under full load, particularly in tropical climates.

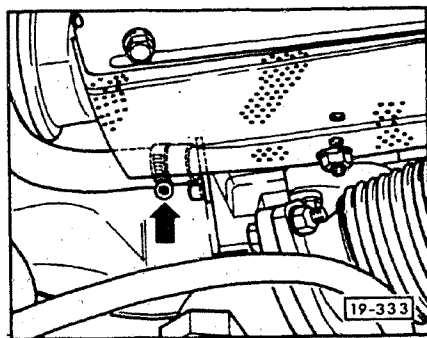
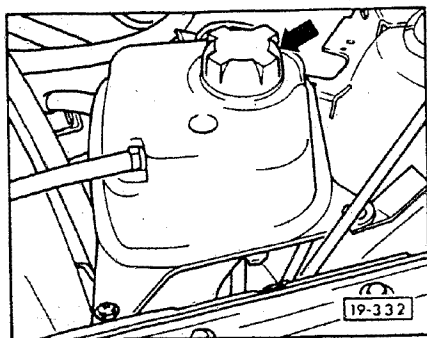
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Draining

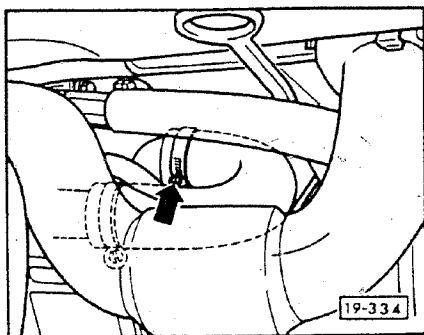
CAUTION

Coolant/antifreeze **must not** be reused when replacing engine, cylinder head, cylinder head gasket, radiator and heater core.

- set heater control on dash to "hot"
- open cap (**arrow**) coolant expansion tank
- disconnect coolant hose for heater at rear of engine block (**arrow**)
 - save coolant for reuse (see caution)



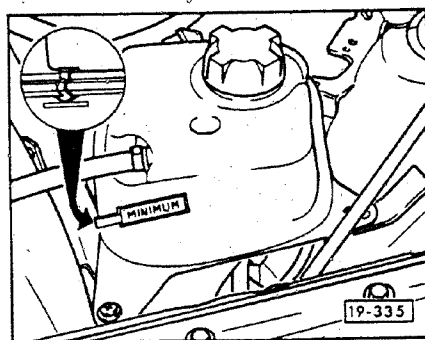
Engine — Cooling System



- remove coolant hose from radiator at lower connection to engine (arrow)

Refilling

- set heater control on "warm"
- fill with coolant until the expansion tank is full
- run engine and continue to fill tank until level remains constant
- close tank with cap
- continue to run engine until cooling fan operates
- check coolant level and top up as necessary



Coolant level, checking

Note

The coolant level must be slightly above the "minimum" marking. When the engine is cold the level may be exactly at the mark.

Coolant mixture ratio

Outside temperature	Coolant/ Antifreeze	Water
-25°C (-13°F)	3.4L (3.6 qt)	5.1L (5.4 qt)
-35°C (-30°F)	4.25L (4.5 qt)	4.25L (4.5 qt)

Engine — Cooling System

Turbocharger thermostwitch, coolant pump, checking

- start engine, let idle until cooling fan comes on
- turn off engine

After approximately 5 minutes, electric coolant pump and radiator fan must switch on.

if NO:

- disconnect wires to thermostwitch, and connect to each other

Electric coolant pump, radiator fan must come on.

if NO:

- repair break in wiring using appropriate wiring diagram

if YES:

- replace thermostwitch

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