

6.3 Cooling System

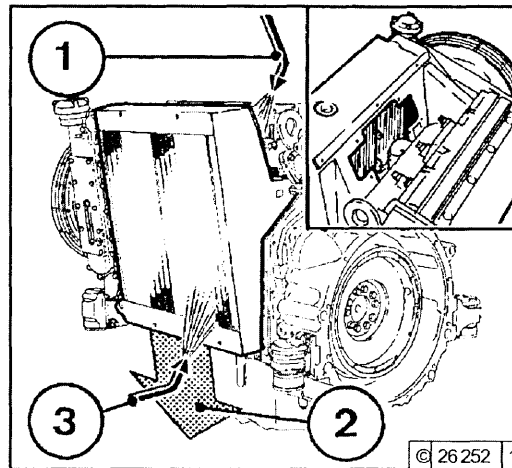
Service and Maintenance

6.3.1 Cleaning Intervals

- The amount of contamination in the cooling system depends on the engine application.
- Spilled oil or fuel on the engine increases the risk of contamination. Be especially careful if the engine is used in dusty environments.
- Serious contamination can occur, for example:
 - on construction sites where there is a high level of air-borne dust.
 - in harvesting application where there are high concentrations of chaff and chopped straw in the vicinity of the machine.
- Because applications vary, cleaning intervals have to be determined from case to case. The cleaning intervals given in the table below can be used as a guide.

| Checking / Cleaning Intervals | |
|-------------------------------|---|
| Suggested OH | Application |
| 2000 | Ships, gensets in enclosed spaces, pumps |
| 1000 | Vehicles on paved roads |
| 500 | Tractors, forklift trucks, mobile gensets |
| 250 | Vehicles on construction sites and unpaved roads, construction equipment, compressors, underground mining equipment |
| 125 | Agricultural machiner, harvester tractors |

6.3.2 Cleaning Cooling System



Series 1012/1013

- Place a cleaning bath under the heat exchanger (it. 2).
- Remove the service flap on the heat exchanger (see insert).

Compressed Air

- Blow out heat exchanger with compressed air (first from it. 3, then from it. 1).
- Be careful not to damage the cooling fins.
- Wash out loosened dirt with a hose.

Cold Cleansing Agent

- Spray the heat exchanger with a commercial cold cleansing agent and let stand for about 10 minutes.
- First spray clean with a water jet from position 3 then from position 1 (do not spray sensitive engine components directly with a water jet, eg generator, cables, electronic components, fan drive).

Cleaning with steam or with hot water

- Remove oil and grease residues with the jet set at a gentle setting.

- Refit service flap.
- Run the engine up to normal operating temperature to evaporate any remaining water.

Series 1012E/1013E

- If an external cooling system is fitted, follow the manufacturer's instructions.

Unit engine

- Clean as described under series 1012/1013. The cleaning jet must be positioned parallel to the cooling-air ducts.

Hose pressure: max. 100 bar

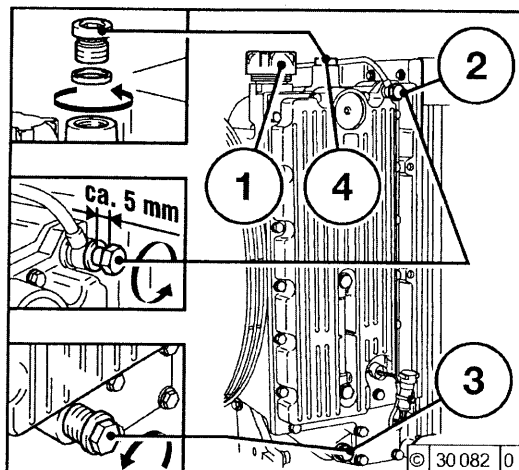
Service and Maintenance

6.3 Cooling System

6

6.3.3 Draining Cooling System

1012/1013



- Place container under drain plug 3.
- Unscrew cap 1.
- Unscrew drain plug 3 fully.
- Drain coolant.
- Drain the remaining fluid from the engine oil cooler (coolant duct).
- Screw in the sealing plug 3 up to the first notch and screw in the sealing plug on the oil cooler (arrow).



Be careful when draining hot coolant – danger of scalds! Collect drained coolant and dispose of according to environmental regulations.

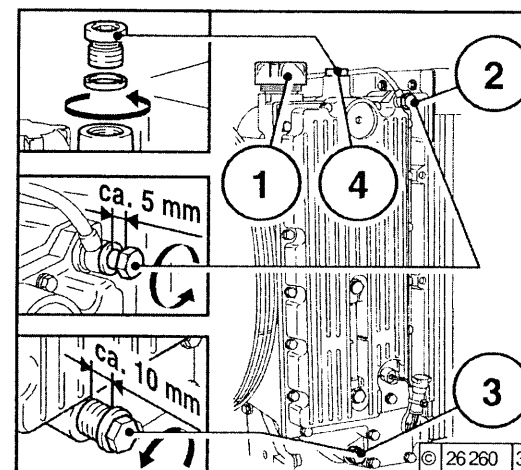
Fill/vent the cooling system: see section 6.3.4



If a heater is connected to the cooling system, all heater valves must be opened during filling. Depending on the water content and the installation position of the heater, it may be required to repeat the last point several times to vent the heater system.

6.3.4 Filling / Venting Cooling System

1012/1013



- Unscrew cap 1.
- Loosen sealing plug 2.
- Unscrew vent plug 4.
- Unscrew sealing plug 3 (10 mm) up to the first notch.
- Add coolant up to the max. marking or fill-up limit (heater valve – if fitted – of the unit must be opened).
- Tighten sealing plug 2 (tightening torque 18 Nm)
- Tighten vent plug 4 (tightening torque 40 Nm)
- Tighten sealing plug 3.
- Close cap 1.
- Start engine and warm up until thermostat opens.
- Switch off engine.
- Check coolant level (see section 3.3.3) and top up as required.

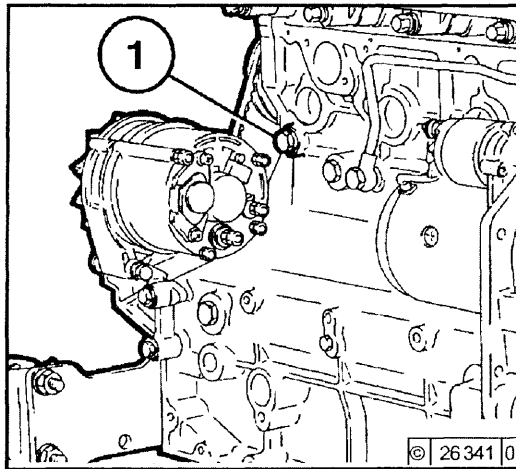
6.3 Cooling System

Service and Maintenance

6

6.3.5 Draining the Cooling System

1012 E / 1013 E



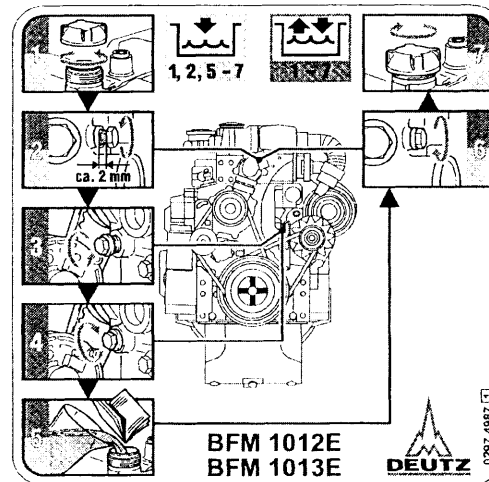
- Place a container under sealing plug 1.
- Remove sealing plug 1 from the crankcase.
- Drain off the coolant.
- Tighten sealing plug 1 again.
- If sealing plug 1 is not accessible, the system can be drained at the engine oil cooler (coolant duct).

Filling/venting the cooling system:
See section 6.3.6.



Be careful when draining hot coolant – danger of scalds! Collect drained coolant and dispose of according to environmental regulations.

6.3.6 Filling/Venting the Cooling System 1012 E/1013 E Standard engine



- Open radiator cap position 1.
- Loosen vent plug position 2.
- Add coolant up to the maximum marking or filler limit (heater valve of the system must be opened – if fitted).
- Tighten vent plug position 2 + sealing plug position 3.
- Close radiator cap position 1.
- Start engine and warm up until thermostat opens.
- Switch off engine.
- Check coolant level when the engine is cold and top up as required.
- Close the radiator sealing plug position 1.

Venting

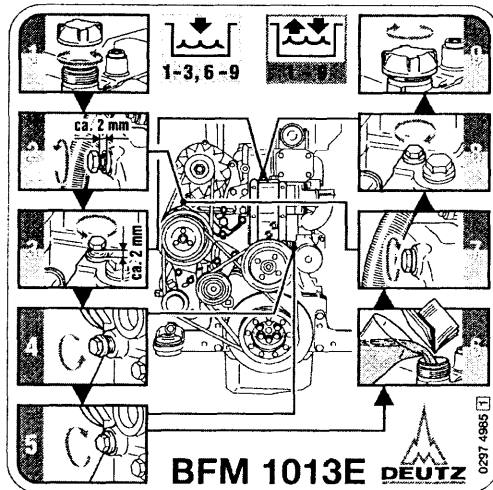
- The cooling systems, which are built in line with our installation guidelines, are vented automatically after they have been filled.
- With external cooling systems in accordance with the specifications of the manufacturer.

Service and Maintenance

6.3 Cooling System

6

1013E Short engine



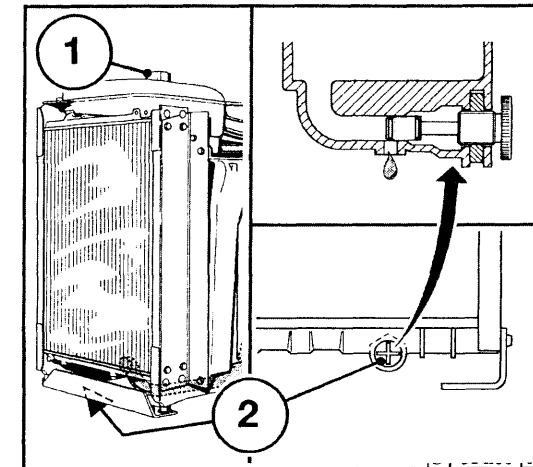
- Loosen vent plug position 2 and sealing plug position 3.
- Add coolant up to the maximum marking or filler limit (heater valve of the system must be opened – if fitted).
- Tighten vent plug position 2 + sealing plug position 3.
- Close radiator cap position 1.
- Start engine and warm up until thermostat opens.
- Switch off engine.
- Check coolant level when the engine is cold and top up as required.
- Close the radiator sealing plug position 1.

Venting

- The cooling systems, which are built in line with our installation guidelines, are vented automatically after they have been filled.
- With external cooling systems in accordance with the specifications of the manufacturer.
- Start the engine and warm up until the thermostat opens.

6.3.7 Draining the Cooling System

Unit Engine (4 Cylinders)



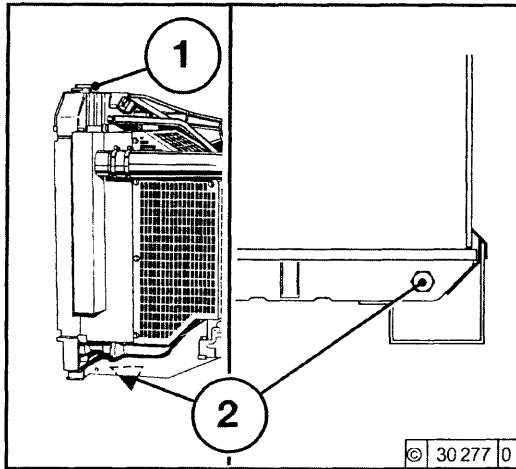
- Open the cap 1 of the expansion tank.
 - Place a container beneath knurled screw 2.
 - Unscrew the knurled screw 2 in an anti-clockwise direction until coolant is emitted.
 - Drain off coolant.
 - In case of clogging, rinse the radiator through with clear water.
 - Tighten knurled screw 2.
- Filling/venting the cooling system:
see section 6.3.8

6.3 Cooling System

Service and Maintenance

6

Unit engine (6 cylinders)

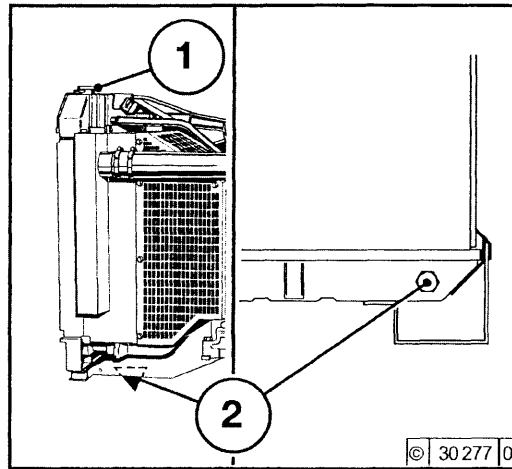


- Open the cap 1 of the expansion tank.
 - Place a container beneath sealing plug 2.
 - Unscrew the sealing plug 2.
 - Drain off coolant.
 - In case of clogging, rinse the radiator through with clear water.
 - Tighten sealing plug 2.
- Filling/venting the cooling system:
see section 6.3.8



Be careful when draining hot coolant - danger of scalds! Collect drained coolant and dispose of according to environmental regulations.

6.3.8 Filling/Venting the Cooling System Unit Engine

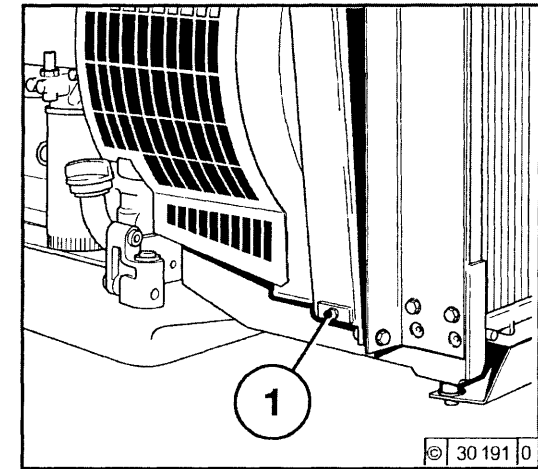


- Open the cap 1 of the expansion tank.
- Slowly add coolant up to the max. marking or filler limit.
- Close the cap.
- Start the engine and warm up until the thermostat opens, the upper coolant line warms up tangibly.
- Briefly run the engine at nominal output (fixed setting), this rinses out any pockets.
- Switch off the engine and leave to cool down.
- Open cap 1, add coolant up to the max. marking or filler limit and close the cap 1.
- Once the engine has been run once, check the coolant level when the engine is cold.



If a heater is connected to the cooling system, the heater valves must be opened when coolant is added. Depending on the coolant contents and the installation location of the heater, it may be necessary to repeat the procedure several times.

6.3.9 Draining the Charge-Air Cooler



- Loosen the drain plug 1 on the end of the charge-air cooler.
- Drain off any oil residues that may be remaining.
- Close the drain plug 1.