

Changing Coolant

NOTICE

For information and procedures on draining the seawater cooling system of Seawater Cooled (Raw-water) Cooled Models, refer to SECTION 6A. For information and procedures on draining the Seawater Section of Closed Cooling (Coolant) Models refer to SECTION 1B. For cold weather or extended storage, refer to SECTION 1B.

Closed Cooling Section

Closed cooling section of closed cooling system should be kept filled year-round with recommended coolant solution. Do not drain closed cooling section for storage, as this will promote rusting of internal surfaces. If engine will be exposed to freezing temperatures, make sure that closed cooling section is filled with Extended Life 5/100 Coolant or an ethylene glycol antifreeze and water solution, mixed to manufacturer's recommended proportions, to protect engine to lowest temperature to which it will be exposed. If necessary, change coolant.

Coolant Recommendations

CAUTION

Alcohol or Methanol base antifreeze or plain water are not recommended for use in fresh water section of cooling system at any time.

NOTE: All factory installed closed cooling systems come filled with Extended Life 5/100 Coolant. This antifreeze requires draining and replacing every five years or 1000 hour of operation, whichever comes first. The color of this antifreeze is orange. For best results any "top-off" fluid used should be Extended Life 5/100 Coolant. If Extended Life 5/100 Coolant is unavailable, any type of ethylene glycol based antifreeze may be used, but it will require the draining and replacing of the coolant every two years or 400 hours of operation, whichever comes first.

In areas where the possibility of freezing DOES NOT exist, it is permissible to use a solution of rust inhibitor and water (mixed to manufacturer's recommendations).

Change Intervals

If the closed cooling system is factory installed, drain and flush coolant from the closed cooling system at least every five years or 1000 hours of operation, whichever comes first. It should also be changed whenever exhaust gases have entered the system.

If the system is not factory installed or has had anti-freeze other than Extended Life 5/100 Coolant added, it must be changed every two years or 400 hours of operation, whichever comes first.

Draining Instructions

WARNING

Allow engine to cool before removing pressure cap. Sudden loss of pressure could cause hot coolant to boil and discharge violently. After engine has cooled, turn cap 1/4 turn to allow any pressure to escape slowly, then push down and turn cap all the way off.

IMPORTANT: A wire should be inserted into drain holes to ensure that foreign material is not obstructing the drain holes. On some models with two piece petcock, removal of petcock may be required so that wire can be inserted completely into drain hole.

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IMPORTANT: Engine must be as level as possible to ensure complete draining of cooling system.

IMPORTANT: Closed cooling section must be kept filled year round with recommended

coolant. If engine will be exposed to freezing temperatures, make sure closed cooling section is filled with Extended Life 5/100 Coolant or an ethylene glycol antifreeze and water solution properly mixed to protect engine to lowest temperature to which it will be exposed.

The following draining instructions apply to all engines equipped with closed cooling. The location of petcocks that require opening and hoses that require removal are represented on the following pages for the individual engines.

IMPORTANT: Observe precautions previously outlined before proceeding.

1. Remove pressure cap from coolant tank.
2. Drain coolant from locations as shown in the "Draining Diagram."
3. After coolant has drained completely, reinstall petcocks and hoses. Tighten clamps and petcocks securely.
4. Remove coolant recovery bottle from mounting bracket and pour out coolant.
5. Clean system as outlined in "Cleaning System."
6. Fill system as outlined in "Filling Closed Cooling Section."

Cleaning System

Closed Cooling Section

Closed cooling section of closed cooling system should be cleaned at least once every two years or whenever decreased cooling efficiency is experienced.

A good grade automotive cooling system cleaning solution may be used to remove rust, scale or other foreign material. Always follow manufacturer's instructions for the cleaner. If closed cooling section is extremely dirty, a pressure flushing device may be used to flush out remaining deposits. Flushing should be done in direction opposite normal coolant flow to allow water to get behind deposits and force them out. Refer to instructions which accompany flushing device for proper hookup and flushing procedure.

NOTICE

For information and procedures for draining and flushing Seawater Section of Closed Cooling (Coolant) Models, refer to SECTION 1B. For cold weather or extended storage, refer to SECTION 1B.

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Seawater Section

Cooling efficiency of an engine with closed cooling is greatly dependent upon heat transfer through the tubes within the heat exchanger. During engine operation, contaminants within the seawater (such as salt, silt, lime, etc.) collect on the inside of the tubes, thus reducing heat transfer and greatly decreasing heat exchanger efficiency. It is, therefore, recommended that the seawater section of the heat exchanger be cleaned at least once every two years or whenever decreased cooling efficiency is suspected, as follows:

1. Remove bolts which secure end plates to each end of heat exchanger, then remove end plates, seal washers and gaskets. Discard seal washers and gaskets. Clean gasket material from end plates and heat exchanger.

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b

c

d

a - Heat Exchanger

b - Sealing Washer

c - End Cap

d - Gasket

2. Clean water passages in heat exchanger by inserting a suitable size wire brush into each passage. Use compressed air to blow loose particles out of water passages.
3. Apply Quicksilver Perfect Seal to both sides of new end plate gaskets, then reinstall end plates, using new gaskets and seal washers. (Be sure to install seal washers between end plates and gaskets.) Torque end plate bolts to specifications.

CAUTION

Avoid seawater pickup pump impeller damage. DO NOT operate engine without water being supplied to seawater pickup pump.

4. With boat in the water and/or cooling water properly supplied to seawater pickup pump, start engine and inspect for leaks.

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Filling Closed Cooling Section

CAUTION

Alcohol or Methanol base antifreeze or plain water are not recommended for use in coolant section of Closed Cooling System at any time.

It is recommended that coolant section of Closed Cooling System be filled with a 50/50 mixture of Extended Life 5/100 Coolant and pure, soft water. This coolant **MUST BE** used regardless of whether freezing temperatures are or are not expected to provide adequate corrosion protection. In areas where Extended Life 5/100 Coolant is not available and the possibility of freezing **DOES NOT** exist, it is permissible to use a solution of rust inhibitor and pure, soft water (mixed to manufacturer's recommendations).

NOTE: Coolant section capacity is approximately 18 U.S. Quarts (17 L).

1. Fill coolant section of Closed Cooling System with coolant mixture as follows:
 - a. Open bleeder valve on thermostat housing.

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a - Hex Head Bleeder Valve

- b. Fill with coolant mixture through heat exchanger fill neck until coolant appears at bleeder valve opening.
- c. Close bleeder valve securely.
- d. Continue filling until coolant level is into filler neck and begins to flow into coolant recovery bottle plastic tubing.

CAUTION

DO NOT operate engine without water flowing through seawater pickup pump, as pump impeller may be damaged and subsequent overheating damage to engine or sterndrive unit may result.

CAUTION

Front of engine should be higher than rear to purge trapped air out of the system during initial filling. This will minimize the possibility of air being trapped in the closed cooling section which can cause engine to overheat.

IMPORTANT: This closed cooling system flows coolant at a high rate. Higher idle speeds increase dispersion of trapped air into system making it more difficult to purge trapped air. Operate at idle during filling and air purging when specified.

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2. Start engine and run AT IDLE. Add coolant solution to heat exchanger, as required, to maintain coolant level at filler neck. After engine has reached normal operating temperature (thermostat is fully open), and coolant level remains constant, fill heat exchanger until coolant level is into filler neck and begins to flow into coolant recovery bottle plastic

tubing.

3. Remove cap from coolant recovery reservoir and fill to “Full” mark with coolant solution. Reinstall cap.

4. Lift recovery bottle and plastic tubing above heat exchanger filler neck. Allow coolant to flow down through tubing to purge air through filler neck fitting.

5. Install pressure cap on heat exchanger.

6. With engine still running, check hose connections, fittings and gaskets for leaks. Also observe engine temperature gauge to make sure that engine operating temperature is normal. If gauge indicates excessive temperature, stop engine immediately and examine for cause.

WARNING

Allow engine to cool down before removing pressure cap. Sudden loss of pressure could cause hot coolant to boil and discharge violently. After engine has cooled down, turn cap 1/4-turn to allow any pressure to escape slowly, then push down and turn cap all the way off.

7. Recheck coolant level after first boat test and add coolant, if necessary.

8. Maintain coolant level in coolant recovery reservoir between “Add” and “Full” marks with engine at normal operating temperature.

Coolant section of Closed Cooling System should be kept filled year around with recommended coolant solution. DO NOT drain coolant from fresh water section for storage, as this will promote rusting of internal surfaces. If engine will be exposed to freezing temperatures, make sure that coolant section is filled with Extended Life 5/100 Coolant and water solution, mixed to manufacturer’s recommended proportion, to protect engine to lowest temperature to which it will be exposed.