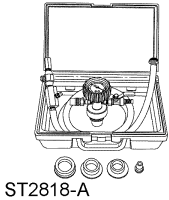


## SECTION 303-03A Engine Cooling

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**GENERAL PROCEDURES****Cooling System Draining, Filling and Bleeding****Special Tool(s)**

 <p>ST2818-A</p>	Air lift Cooling System Tester UVU550000 or equivalent
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**Material**

Item	Specification
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada); or equivalent	WSS-M97B44-D

**Draining**

**WARNING:**

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

**NOTICE:**

The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated, it must be recycled or disposed of correctly. Using contaminated coolant may result in damage to the engine or cooling system components.

**NOTE:**

Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant should be drained and the system filled with new coolant.

1. Release the pressure in the cooling system by slowly turning the pressure relief cap one half turn counterclockwise. When the pressure is released, remove the pressure relief cap.
2. Place a suitable container below the radiator draincock. Open the draincock and drain the engine coolant.
  - Close the radiator draincock when finished.

**Filling and Bleeding with a Vacuum Cooling System Filler****NOTICE:**

The engine cooling system is filled with Motorcraft® Specialty Orange Engine Coolant. Do not mix cooling types. Mixing coolant types degrades the corrosion protection of Motorcraft® Specialty Orange Engine Coolant.

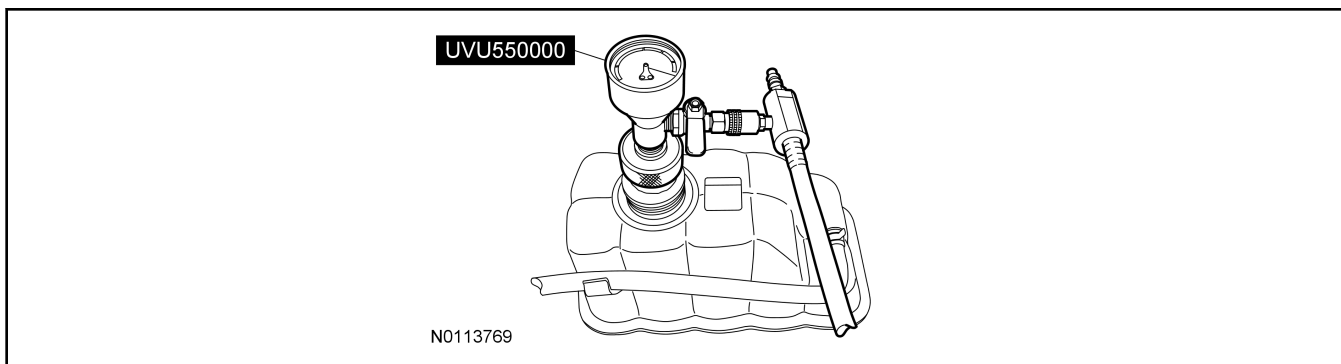
**NOTICE:**

Engine coolant provides boil protection, corrosion protection, freeze protection, and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle. To maintain the integrity of the coolant and the cooling system:

- Add Motorcraft® Specialty Orange Engine Coolant or equivalent meeting Ford specification WSS-M97B44-D (orange color). Use the same type of coolant that was drained from the cooling system. Do not mix coolant types.
  - Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.
  - Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
  - Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Specialty Orange Engine Coolant since a Ford-approved recycling process is not yet available.
1. Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the cooling system.
    - Recommended coolant concentration is 50/50 ethylene glycol to distilled water.
    - For extremely cold climates (less than -36°C [-34°F]):

**GENERAL PROCEDURES (Continued)**

- It may be necessary to increase the coolant concentration above 50%.
- NEVER increase the coolant concentration above 60%.
- Maximum coolant concentration is 60/40 for cold weather areas.
- A coolant concentration of 60% will provide freeze point protection down to -52°C (-62°F).
- Engine coolant concentration above 60% will decrease the overheat protection characteristics of the engine coolant and may damage the engine.
- For extremely hot climates:
  - It is still necessary to maintain the coolant concentration above 40%.
  - NEVER decrease the coolant concentration below 40%.
  - Minimum coolant concentration is 40/60 for warm weather areas.
  - A coolant concentration of 40% will provide freeze point protection down to -24°C (-12°F).
  - Engine coolant concentration below 40% will decrease the corrosion and freeze protection characteristics of the engine coolant and may damage the engine.
- Vehicles driven year-round in non-extreme climates should use a 50/50 mixture of engine coolant and distilled water for optimum cooling system and engine protection.

**Filling and Bleeding without a Vacuum Cooling System Filler****NOTICE:**

The engine cooling system is filled with Motorcraft® Specialty Orange Engine Coolant. Do not mix cooling types. Mixing coolant types degrades the corrosion protection of Motorcraft® Specialty Orange Engine Coolant.

**NOTICE:**

Engine coolant provides boil protection, corrosion protection, freeze protection and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

To maintain the integrity of the coolant and the cooling system:

- Add Motorcraft® Specialty Orange Engine Coolant or equivalent meeting Ford specification WSS-M97B44-D (orange color). Use the same type of coolant that was drained from the cooling system. Do not mix coolant types.
  - Do not add or mix with any other type of engine coolant. Mixing coolants may degrade the coolant's corrosion protection.
  - Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
  - Ford Motor Company does NOT recommend the use of recycled engine coolant in vehicles originally equipped with Motorcraft® Specialty Orange Engine Coolant since a Ford-approved recycling process is not yet available.
1. Fill the radiator through the degas bottle until the coolant level is between the COOLANT FILL LEVEL marks.
    - Recommended coolant concentration is 50/50 ethylene glycol to distilled water.
    - For extremely cold climates (less than -36°C [-34°F]):
      - It may be necessary to increase the coolant concentration above 50%.
      - NEVER increase the coolant concentration above 60%.
      - Maximum coolant concentration is 60/40 for cold weather areas.
      - A coolant concentration of 60% will provide freeze point protection down to -52°C (-62°F).
      - Engine coolant concentration above 60% will decrease the overheat protection characteristics of the engine coolant and may damage the engine.

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**GENERAL PROCEDURES (Continued)**

- For extremely hot climates:
    - It is still necessary to maintain the coolant concentration above 40%.
    - NEVER decrease the coolant concentration below 40%.
    - Minimum coolant concentration is 40/60 for warm weather areas.
    - A coolant concentration of 40% will provide freeze point protection down to -24°C (-12°F).
    - Engine coolant concentration below 40% will decrease the corrosion and freeze protection characteristics of the engine coolant and may damage the engine.
  - Vehicles driven year-round in non-extreme climates should use a 50/50 mixture of engine coolant and distilled water for optimum cooling system and engine protection.
2. Select the maximum heater temperature and blower motor speed settings. Position the control to discharge air at A/C vents in instrument panel.
  3. Start the engine and allow to idle. While engine is idling, feel for hot air at A/C vents.
  4. **NOTICE:**  
**If the air discharge remains cool and the Engine Coolant Temperature (ECT) gauge does not move, the engine coolant level is low and must be filled. Stop the engine, allow the engine to cool and fill cooling system. Failure to follow these instructions may result in damage to the engine.**  
  
Start the engine and allow it to idle until normal operating temperature is reached. Hot air should discharge from A/C vents. The Engine Coolant Temperature (ECT) gauge should maintain a stabilized reading in the middle of the NORMAL range. The upper radiator hose should feel hot to the touch.
  5. Shut the engine off and allow the engine to cool.
  6. Check the engine for coolant leaks.
  7. Check the engine coolant level in the degas bottle and fill as necessary.