

Engine Cooling System Draining, Vacuum Filling and Bleeding

Special Tool(s) / General Equipment

 ST1720-A	ROB75240 Coolant/Battery Refractometer (Fahrenheit)
	Fluid Container
	Cooling System Vacuum Tester and Refiller

Draining

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.

NOTICE: Use the correct coolant. Do not mix coolant types. Mixing coolant types may degrade the coolant corrosion protection and may damage the engine or cooling system. For the correct coolant specified for this vehicle, refer to Specifications.

NOTICE: Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Refer to Cooling System Flushing. Failure to follow these instructions may damage the engine or cooling system.

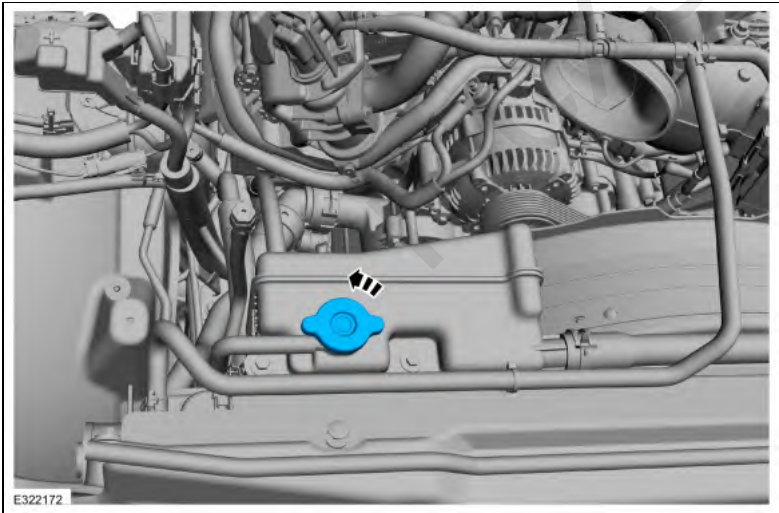
NOTE: During normal vehicle operation, coolant can change color. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

NOTE: Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

1. 
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WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth to prevent the possibility of scalding. Failure to follow this instruction may result in personal injury.

Remove the pressure relief cap.

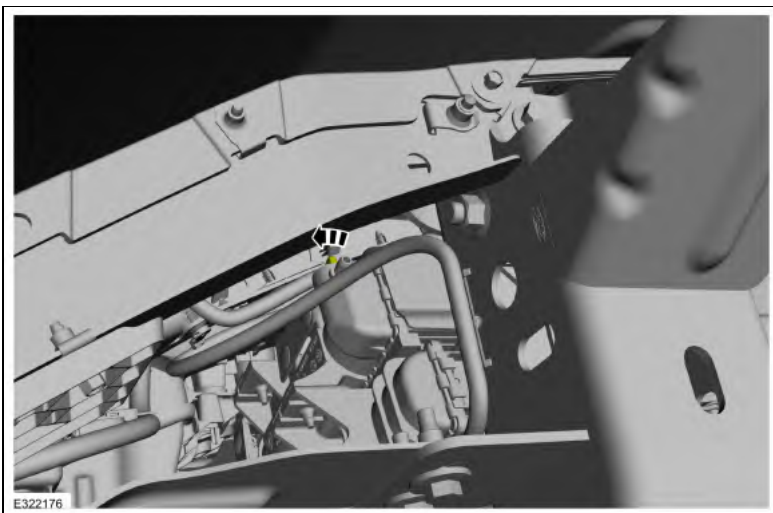


2. With the vehicle in NEUTRAL, position it on a hoist.
Refer to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).

3. 

NOTE: Be prepared to collect escaping fluid.

Connect a hose to drain the coolant. Open the radiator drain valve and drain the engine coolant in a suitable, clean container.
Use the General Equipment: Fluid Container



Filling

Filling and Bleeding with a Vacuum Cooling System Filler

1.

- **NOTICE:** Use the correct coolant. Do not mix coolant types. Mixing coolant types may degrade the coolant corrosion protection and may damage the engine or cooling system. For the correct coolant specified for this vehicle, refer to Specifications.

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.

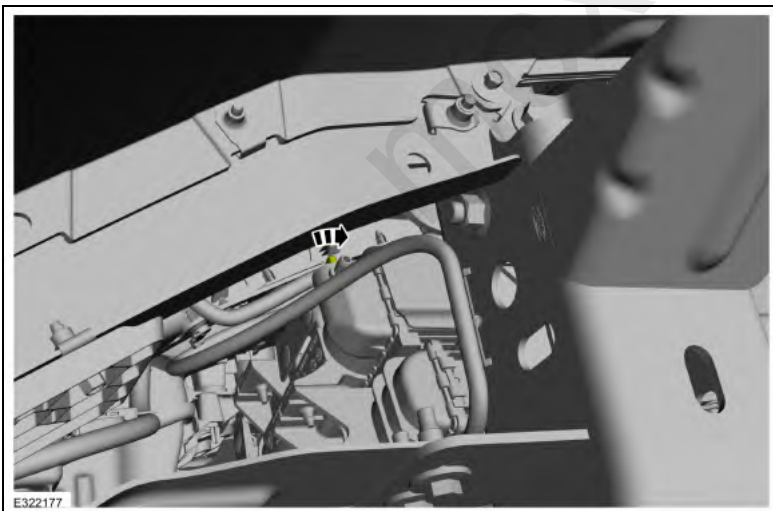
NOTICE: Do not add alcohol, methanol, or brine, or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.

NOTE: Ford Motor Company does NOT recommend the use of recycled engine coolant since a Ford- approved recycling process is not yet available.

When adding or topping off the engine coolant:

- Measure the coolant concentration in the vehicle.
Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).
- Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.
- Add, top-off or adjust the coolant as follows:
Refer to: Specifications (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Specifications).

2. Close the radiator drain valve.



3. Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the system. Use the General Equipment: Cooling System Vacuum Tester and Refiller

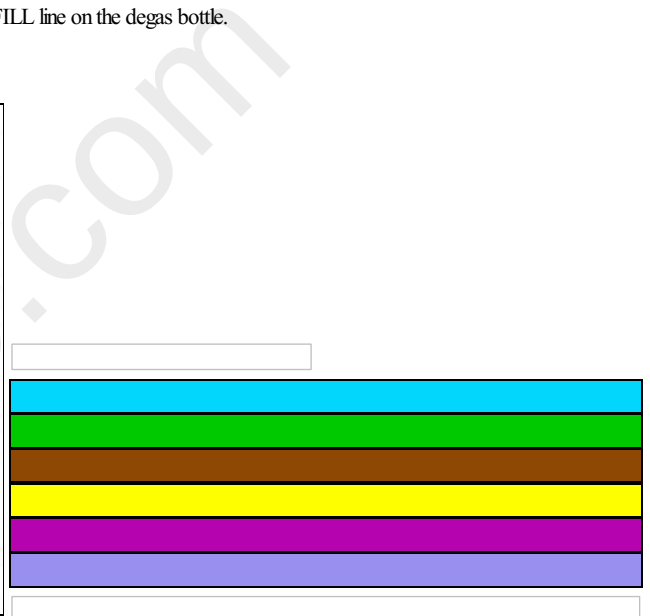
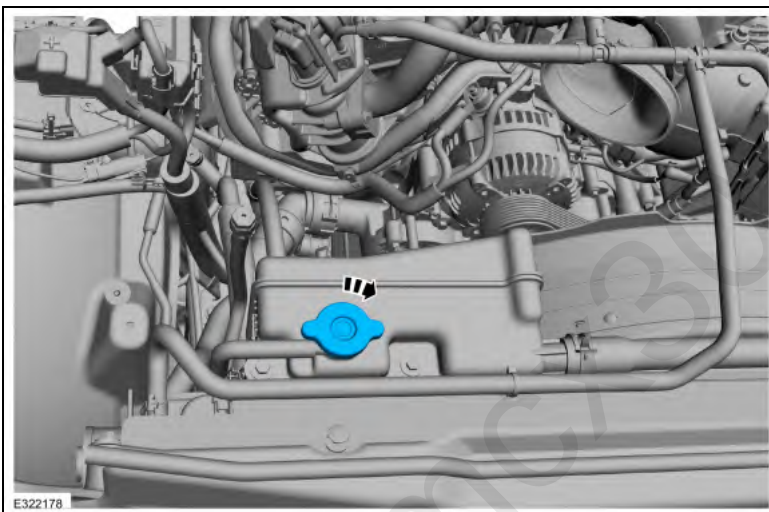
4. **NOTE:** The degas bottle cap must be loose so that the cooling system does not get pressurized.

Fill the degas bottle to the MAX FILL line.

5. Install the degas bottle cap to the first stop.
6. Start and idle the engine until the coolant level stabilizes.
7. Refill the degas bottle to the maximum fill line. Install the degas bottle cap to the first stop.
8. Run the engine at 2,000 RPM for 2 minutes.
9. Bring the engine to an idle.
10. Determine if the low temperature thermostat has opened by feeling the lower part of the LH side of the secondary radiator, under the high temperature thermostat housing. If the radiator is cool then the thermostat has not opened. If the radiator is warm then the low temperature thermostat has opened and coolant is flowing through the entire system.
11. If the coolant level has dropped below the minimum fill line then refill the degas bottle to the maximum fill line. Install the degas bottle cap to the first stop.
12. **NOTE:** *The coolant level will rise before the thermostat opens due to thermal expansion. The coolant level will drop after the thermostat opens due to air exiting the system.*
Repeat Steps 7 through 10 until the thermostat opens.
13. Restart and idle the engine for 5 minutes to stabilize the coolant temperature.
14. Fill the degas bottle to 5 mm (0.196 in) above the maximum fill line.
15. **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.

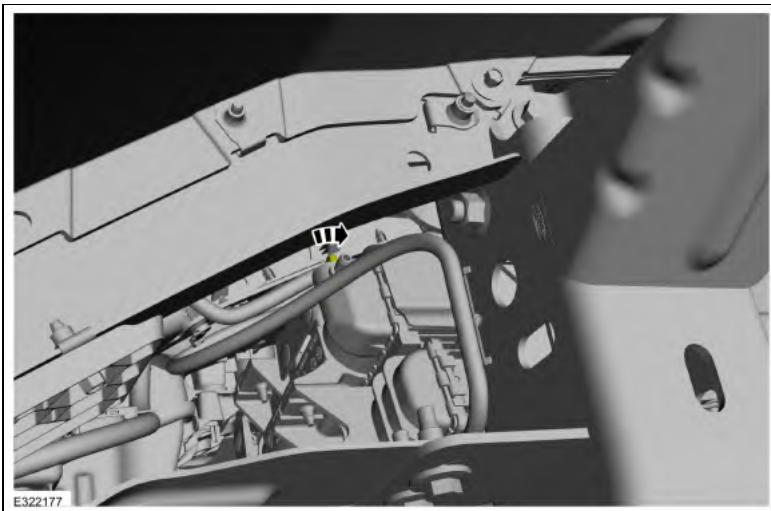
Check the engine coolant level in degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle.

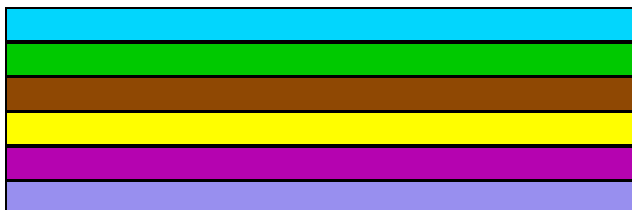
16. Install the pressure relief cap until it contacts the hard stop.



Filling and Bleeding without a Vacuum Cooling System Filler

17.
 - **NOTICE:** Use the correct coolant. Do not mix coolant types. Mixing coolant types may degrade the coolant corrosion protection and may damage the engine or cooling system. For the correct coolant specified for this vehicle, refer to Specifications.
 - 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.
 - NOTICE:** 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.
 - NOTE:** Ford Motor Company does NOT recommend the use of recycled engine coolant since a Ford- approved recycling process is not yet available.
 - When adding or topping off the engine coolant:
 - Measure the coolant concentration in the vehicle.
Use Special Service Tool: ROB75240 Coolant/Battery Refractometer (Fahrenheit).
 - Determine the concentration desired based on the vehicle duty cycle of extreme hot or cold operating conditions.
 - Add, top-off or adjust the coolant as follows:
Refer to: Specifications (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Specifications).
18. Close the radiator drain valve.





19. **NOTE:** Failure to block the radiator off will require more time before the thermostat will open.

Position a piece of cardboard on the driver side half of the radiator.

20. **NOTE:** The degas bottle cap must be loose so that the cooling system does not get pressurized.

Fill the degas bottle to the MAX FILL line.

21. Install the degas bottle cap to the first stop.

22. Start and idle the engine until the coolant level stabilizes.

23. Refill the degas bottle to the maximum fill line. Install the degas bottle cap to the first stop.

24. Run the engine at 2,000 RPM for 2 minutes.

25. Bring the engine to an idle.

26. Determine if the low temperature thermostat has opened by feeling the lower part of the LH side of the secondary radiator, under the high temperature thermostat housing. If the radiator is cool then the thermostat has not opened. If the radiator is warm then the low temperature thermostat has opened and coolant is flowing through the entire system.

27. If the coolant level has dropped below the minimum fill line then refill the degas bottle to the maximum fill line. Install the degas bottle cap to the first stop.

28. **NOTE:** The coolant level will rise before the thermostat opens due to thermal expansion. The coolant level will drop after the thermostat opens due to air exiting the system.

Repeat Steps 24 through 27 until the thermostat opens.

29. Stop the engine and remove the cardboard from the radiator.

30. Restart and idle the engine for 5 minutes to stabilize the coolant temperature.

31. Fill the degas bottle to 5 mm (0.196 in) above the maximum fill line.

32. Install the degas bottle cap.

