

Powertrain Secondary Cooling System Flushing - With Fuel Contamination

Special Tool(s) / General Equipment

Fluid Suction Gun
Hose Clamp Remover/Installer

Materials

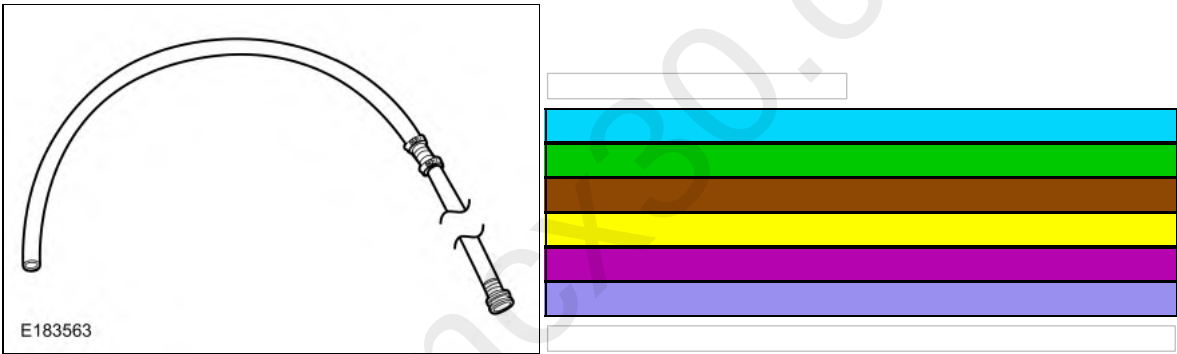
Name	Specification
Motorcraft® Premium Cooling System Flush VC-1	ESR-M14P7-A

Flushing

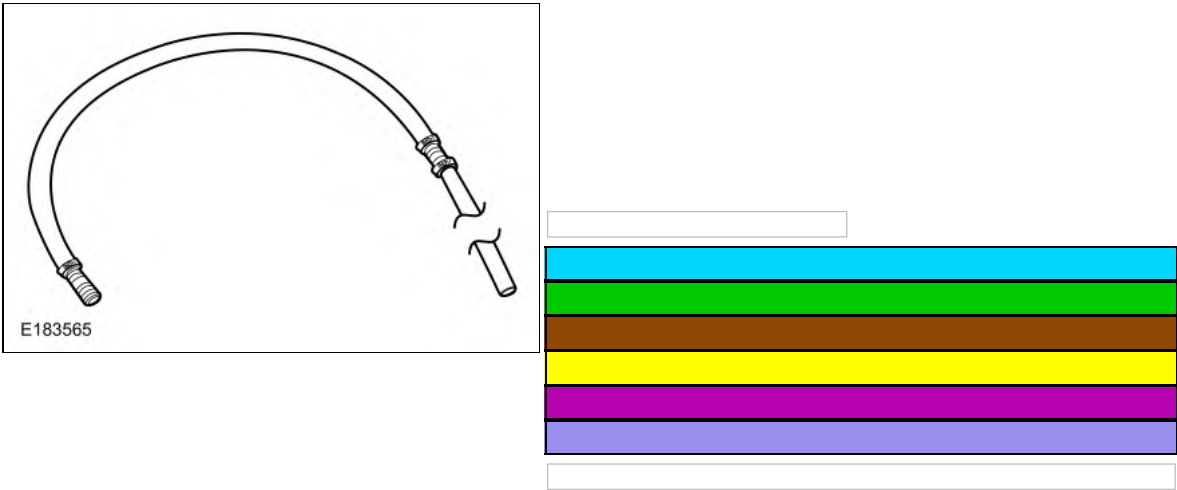
NOTICE: Use this procedure only if the cooling system is contaminated with fuel or transmission fluid. If the cooling system is contaminated with any material other than fuel or transmission fluid, carry out the Cooling System Flushing - Without Fuel or Transmission Fluid Contamination procedure.

NOTE: For the coolant flow diagram, refer to Description and Operation portion of this section.

1. With the vehicle in NEUTRAL, position it on a hoist.
Refer to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
2.
 - Fabricate a fresh water supply hose:
 - NOTE:** The heater hose will prevent kinking in tight areas of the engine compartment.
 - Cut the garden hose to length. The hose must reach from a fresh water supply faucet to the vehicle.
 - Using a coupling adapter and 2 hose clamps, attach a 61 cm (2 ft) length of heater hose to the garden hose.



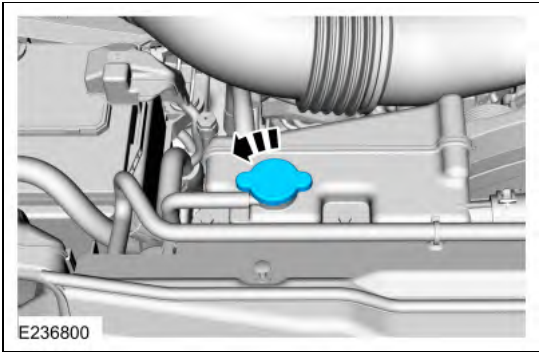
3.
 - Fabricate a drain hose.
 - NOTE:** The heater hose will prevent kinking in tight areas of the engine compartment.
- Using a coupling adapter and 2 hose clamps, attach a 61 cm (2 ft) length of heater hose to the remaining section of the garden hose to be used as a drain hose.



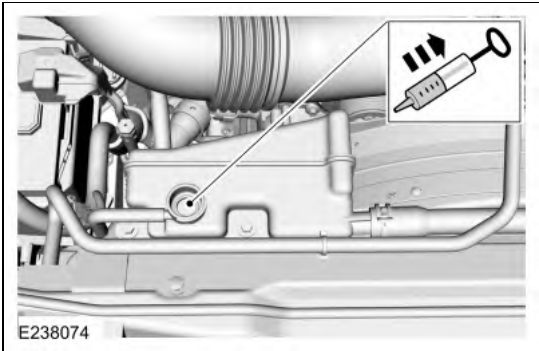
4. **WARNING:** Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened

slightly. Failure to follow these instructions may result in serious personal injury.

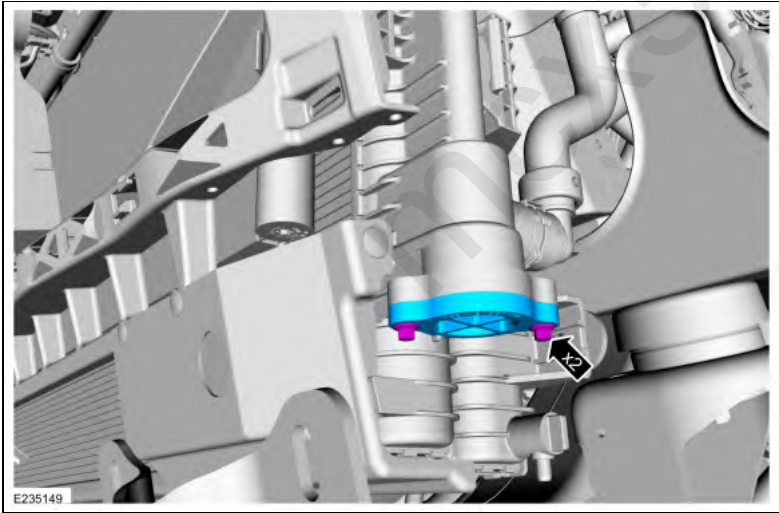
Release the pressure in the cooling system by slowly turning the pressure relief cap one-half turn counterclockwise. When the pressure is released, remove the pressure relief cap.



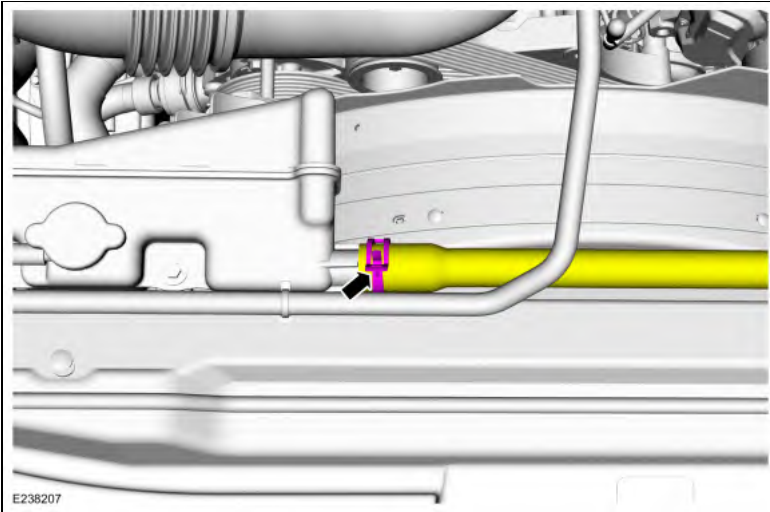
5. Using a suitable suction devise, siphon all contents and contaminants from the degas bottle.
Use the General Equipment: Fluid Suction Gun



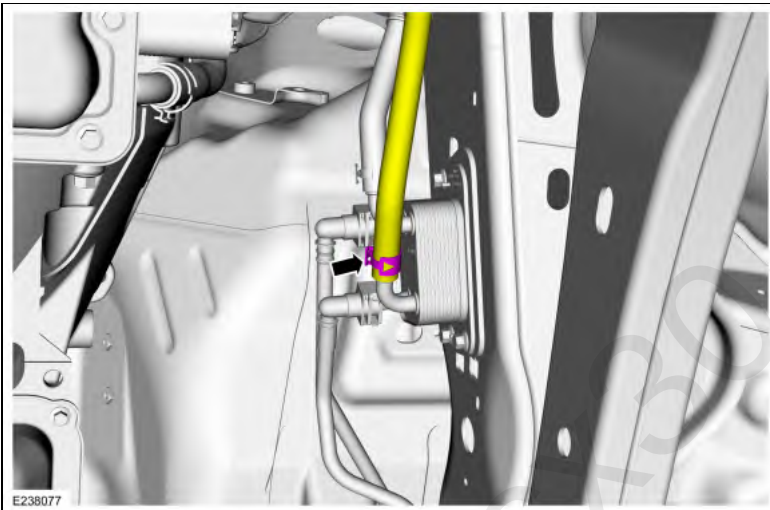
6. Remove the thermostat.
Refer to: Thermostat (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Removal and Installation).
7. Install the thermostat cover and the bolts.
Torque: 53 lb.in (6 Nm)



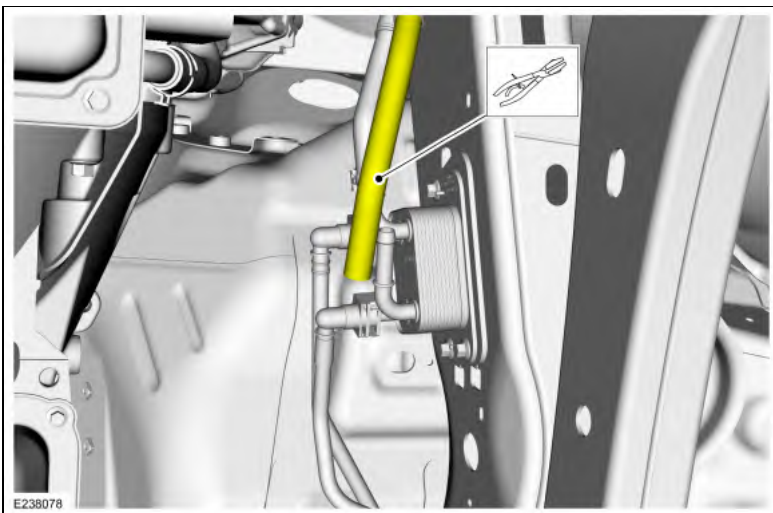
8. Release the clamp and disconnect the degas bottle-to-CAC hose from the degas bottle.
Use the General Equipment: Hose Clamp Remover/Installer



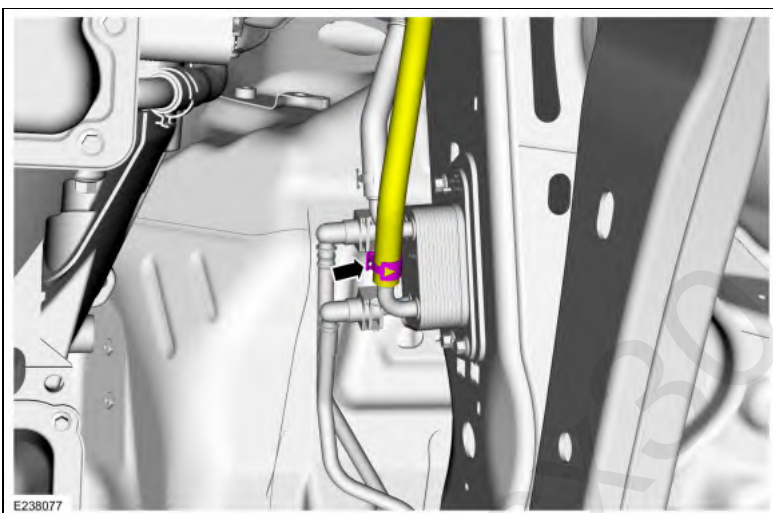
9. Using a coupling adapter and 2 hose clamps, connect the fabricated fresh water supply hose to the degas bottle-to-CAC hose.
10. Using a hose clamp, connect the fabricated drain hose to the fitting on the degas bottle.
11. Disconnect the fuel cooler-to-degas bottle hose from the fuel cooler.
Use the General Equipment: Hose Clamp Remover/Installer



12. **NOTE:** Use of hot water during this procedure will improve removal of cooling system contaminants.
Turn on the fresh water supply and allow the water to flush the Charge Air Cooler (CAC) .
13. Turn off the fresh water supply.
14. Using hose pinch pliers, clamp the disconnected fuel cooler-to-degas bottle hose.



15. Turn on the fresh water supply and allow the water to flush the fuel cooler.
16. Turn off the fresh water supply.
17. Remove the hose pinch pliers, connect the fuel cooler-to-degas bottle hose to the fuel cooler and position the clamp.
Use the General Equipment: Hose Clamp Remover/Installer



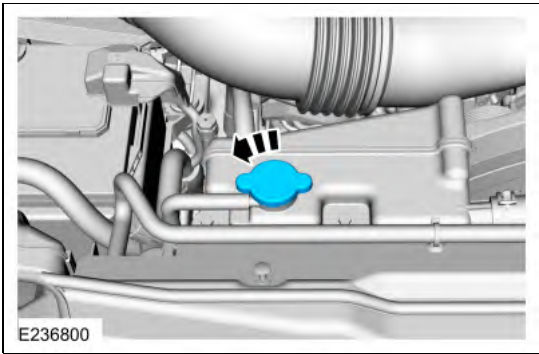
18. Disconnect the fabricated fresh water supply hose from the degas bottle-to-CAC hose and the fabricated drain hose from the degas bottle fitting.
19. Close the radiator draincock.
20. Remove the degas bottle.
Refer to: Degas Bottle (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Removal and Installation).
21. Clean the degas bottle in a solvent tank.
22. Install the degas bottle.
Refer to: Degas Bottle (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Removal and Installation).
23.
 1. Fill the secondary cooling system with 3.79 L (1 gal) of Simple Green[®] and water:
 2. Fill the degas bottle to the maximum fill line.
 3. **NOTE:** The degas bottle cap must be loose so that the cooling system does not get pressurized.

Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.

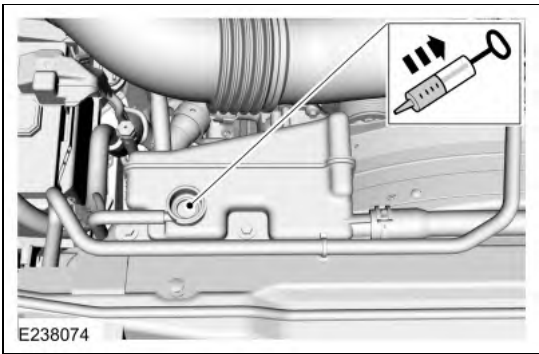
 4. Start and idle the engine until the coolant level stabilizes.
 5. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
 6. Run the engine at 2,000 rpm for 2 minutes.
 7. Bring the engine to an idle.
 8. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
 9. Repeat Steps 6 through 8 until the coolant level stabilizes. Shut the engine off.
 10. Fill the degas bottle to 20 mm (0.787 in) above the maximum fill line. Install the degas bottle cap.
24. Start the engine.
25. **NOTE:** Failure to run the engine at 2,000 rpm for 1 hour will result in insufficient cleaning of the cooling system.

Using a scan tool, select active command and set the engine rpm to 2,000 and run the engine for 1 hour.

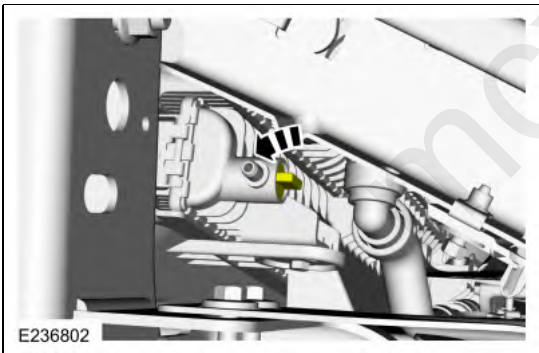
26. Return the engine to idle speed, shut the engine off and allow the engine to cool.
27. **WARNING: Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under 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.**
- Release the pressure in the cooling system by slowly turning the pressure relief cap 1/2 turn counterclockwise. When the pressure is released, remove the pressure relief cap.



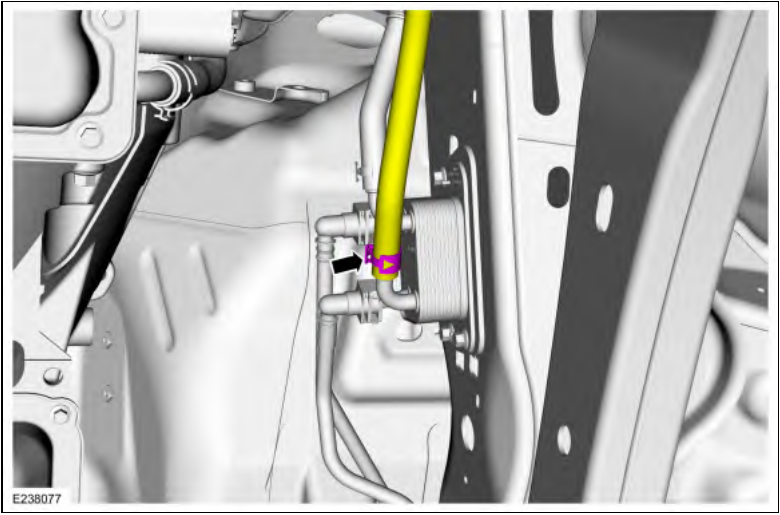
28. Using a suitable suction device, siphon all contents and contaminants from the degas bottle.



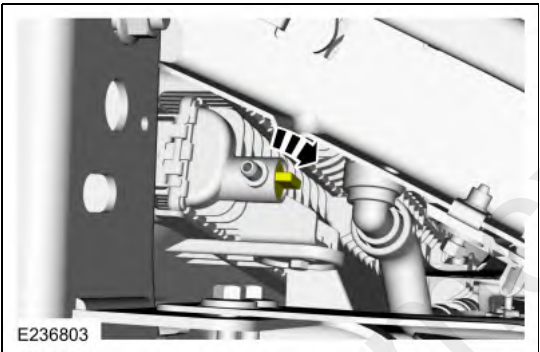
29. Open the secondary radiator draincock and drain the cooling system.



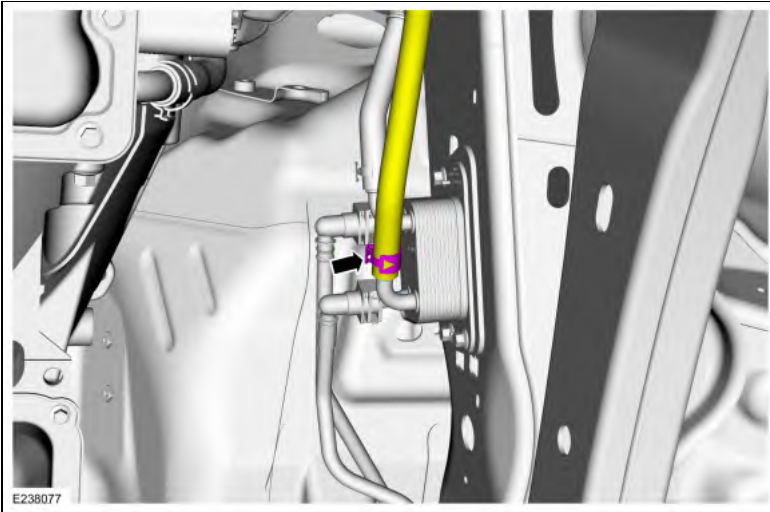
30. Release the clamp, disconnect the fuel cooler-to-degas bottle hose and drain secondary cooling system.
Use the General Equipment: Hose Clamp Remover/Installer



31. Close the radiator draincock.



32. Connect the fuel cooler-to-degas bottle hose and position the clamp.
Use the General Equipment: Hose Clamp Remover/Installer



33. Repeat steps 23 through 32 once.

34.

1. Fill the secondary cooling system with 3.79 L (1 gal) of Simple Green® and water:
2. Fill the degas bottle to the maximum fill line.

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

Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.

4. Start and idle the engine until the coolant level stabilizes.
5. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
6. Run the engine at 2,000 rpm for 2 minutes.
7. Bring the engine to an idle.
8. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
9. Repeat Steps 6 through 8 until the coolant level stabilizes. Shut the engine off.
10. Fill the degas bottle to 20 mm (0.787 in) above the maximum fill line. Install the degas bottle cap.

35. Repeat steps 24 through 32 once.

36. **NOTICE:** After adding Motorcraft® Premium Cooling System Flush to the secondary cooling system, carry out the remaining steps of this procedure within 24 hours. Failure to follow these instructions may damage the cooling system.

1. Fill the secondary cooling system with 950 mL (32 fl oz) of Motorcraft® Premium Cooling System Flush and water:
- Material: Motorcraft® Premium Cooling System Flush / VC-1 (ESR-M14P7-A)

2. Fill the degas bottle to the maximum fill line.

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

Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.

4. Start and idle the engine until the coolant level stabilizes.
5. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
6. Run the engine at 2,000 rpm for 2 minutes.
7. Bring the engine to an idle.
8. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
9. Repeat Steps 6 through 8 until the coolant level stabilizes. Shut the engine off.
10. Fill the degas bottle to 20 mm (0.787 in) above the maximum fill line. Install the degas bottle cap.

37. **NOTICE:** Failure to run the engine at 2,000 rpm for 1 hour will result in insufficient cleaning of the cooling system.

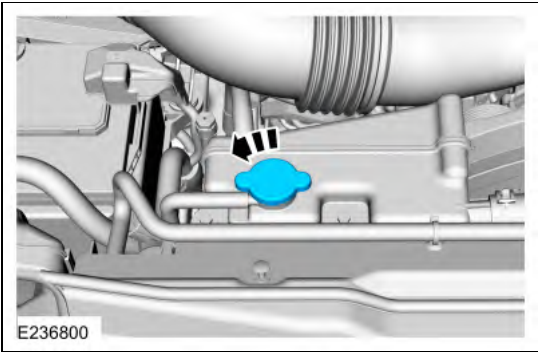
Using a scan tool, select active command and set the engine rpm to 2,000 and run the engine for 1 hour.

38. Return the engine to idle speed, shut the engine off and allow the engine to cool.

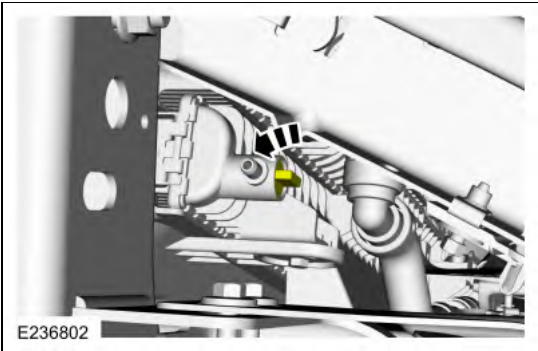
39. **WARNING:** Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened

slightly. Failure to follow these instructions may result in serious personal injury.

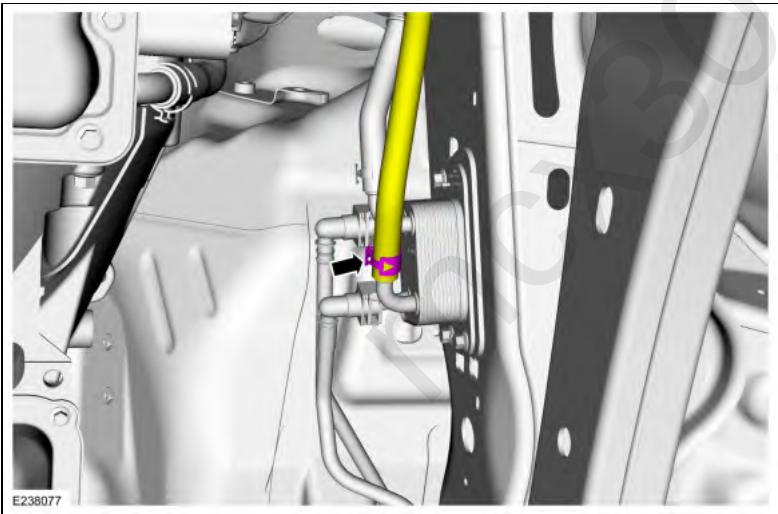
Release the pressure in the cooling system by slowly turning the pressure relief cap 1/2 turn counterclockwise. When the pressure is released, remove the pressure relief cap.



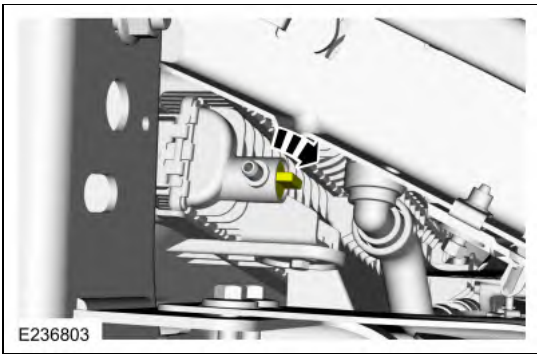
40. Open the secondary radiator draincock and drain the cooling system. Leave the draincock open.



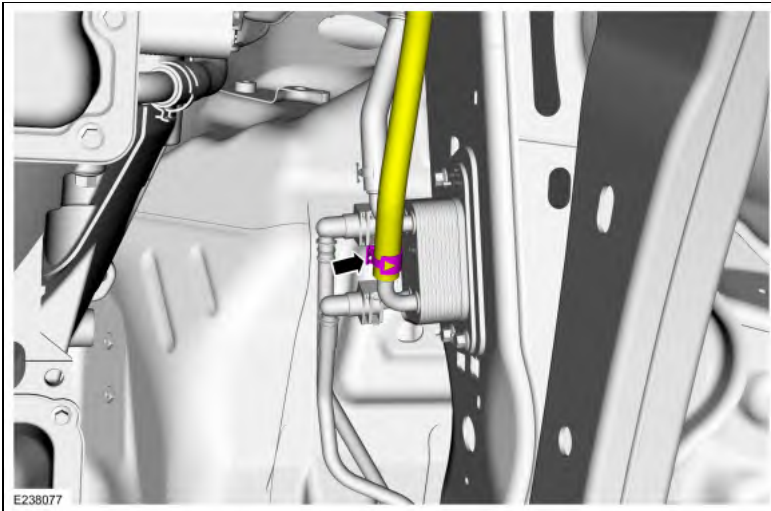
41. Release the clamp, disconnect the fuel cooler-to-degas bottle hose from the fuel cooler and drain secondary cooling system.
Use the General Equipment: Hose Clamp Remover/Installer



42. Close the radiator draincock.



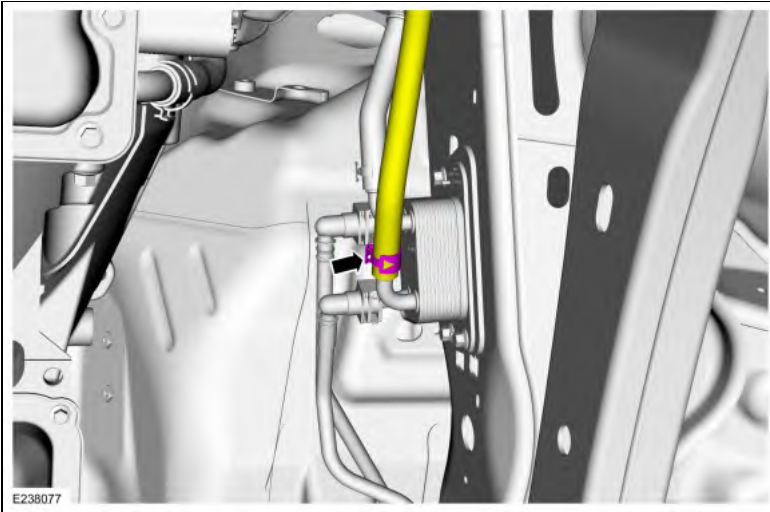
43. Connect the fuel cooler-to-degas bottle hose and position the clamp.
Use the General Equipment: Hose Clamp Remover/Installer



44. **NOTICE: Failure to flush all the Motorcraft® Premium Cooling System Flush from the cooling system will result in shortened coolant protection against corrosion of the cooling system.**

Turn on the fresh water supply to flush the secondary cooling system until the water is free of foam, bubbles or discoloration. Use a clear, clean approximately 1 L (1 qt) container to verify the drain water is clear.

45. Turn off the fresh water supply.
46. Open the secondary radiator draincock and drain the cooling system. Use a clear, clean approximately 1 L (1 qt) container to verify the drain water is clear of foam, bubbles or discoloration. Close the radiator draincock when finished.
47. Release the clamp, disconnect the fuel cooler-to-degas bottle hose and drain the secondary cooling system. Use a clear, clean approximately 1 L (1 qt) container to verify the drain water is clear of foam, bubbles or discoloration. Connect the fuel cooler-to-degas bottle hose and position the clamp when finished.
Use the General Equipment: Hose Clamp Remover/Installer



48. If any of the drain water in steps 46 through 47 shows signs of foam, bubbles or discoloration, repeat steps 44 through 47.
49. Disconnect the fabricated fresh water supply hose from the degas bottle-to-CAC hose and the fabricated drain hose from the degas bottle fitting.
50. Remove the degas bottle.
Refer to: Degas Bottle (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Removal and Installation).
51. Clean the degas bottle in a solvent tank.
52. Install the degas bottle.
Refer to: Degas Bottle (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Removal and Installation).
- 53.

1. **NOTE:** Use of hot water during this procedure will improve removal of cooling system contaminants.

Fill the secondary cooling system with low hardness, low chloride water. Tap water which is verified with Rotunda Water Test Strip 5 pack 328-00007 or equivalent is acceptable. Alternatively, use water treated by reverse osmosis, or water that is de-ionized or distilled.

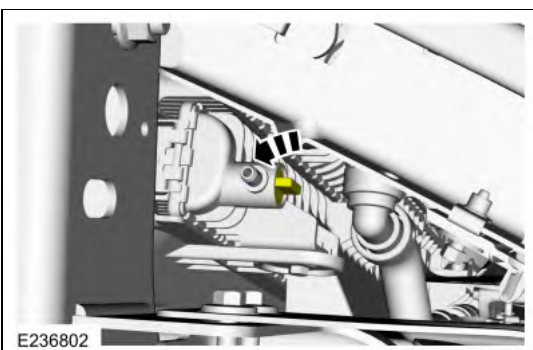
2. Fill the degas bottle to the maximum fill line.

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

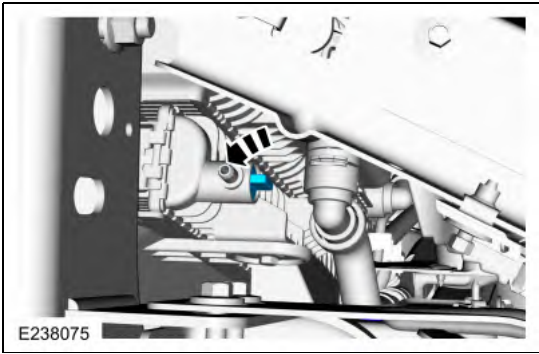
Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.

4. Start and idle the engine until the coolant level stabilizes.
5. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
6. Run the engine at 2,000 rpm for 2 minutes.
7. Bring the engine to an idle.
8. If the coolant level drops below the minimum fill line refill the degas bottle to the maximum fill line. Install the degas bottle cap until it starts to ratchet. Back the degas bottle cap off one-half turn.
9. Repeat Steps 6 through 8 until the coolant level stabilizes. Shut the engine off.
10. Fill the degas bottle to 20 mm (0.787 in) above the maximum fill line. Install the degas bottle cap.

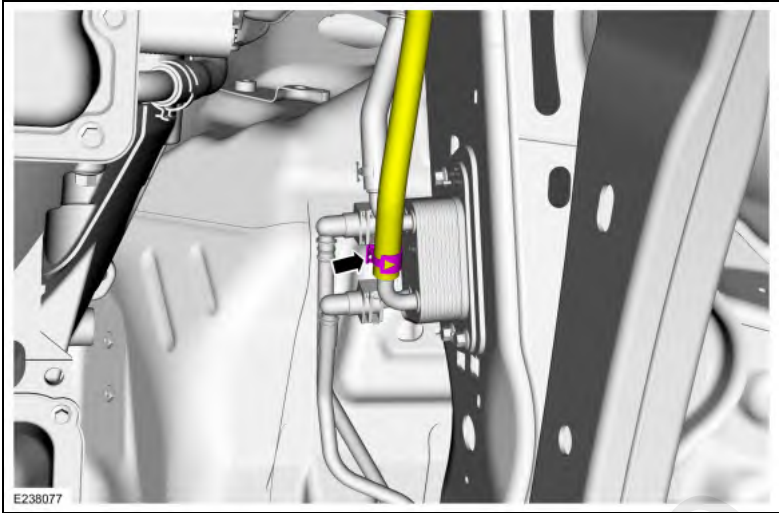
54. Open the secondary radiator draincock and drain the cooling system.



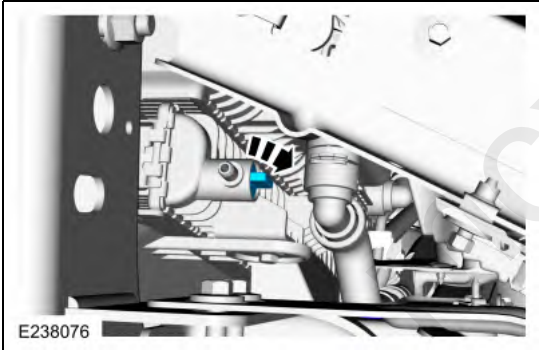
55. Remove and discard the radiator draincock.



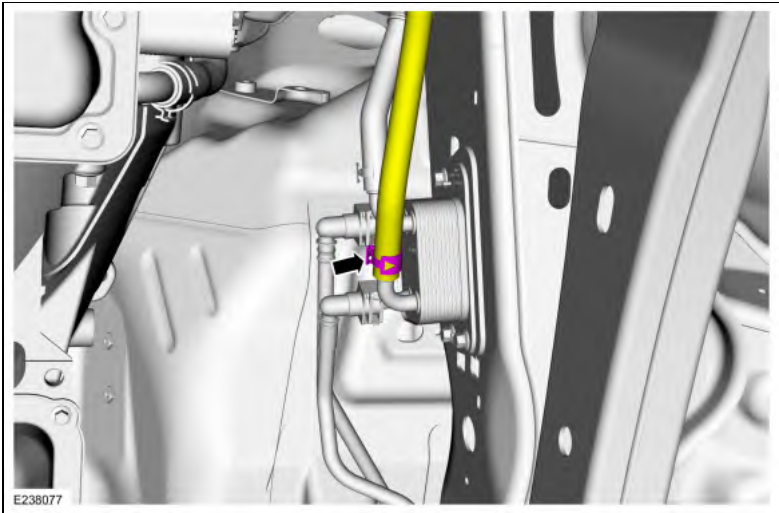
56. Release the clamp, disconnect the fuel cooler-to-degas bottle hose from the fuel cooler and drain the secondary cooling system.
Use the General Equipment: Hose Clamp Remover/Installer



57. Install a new secondary radiator draincock, making sure the draincock is closed.



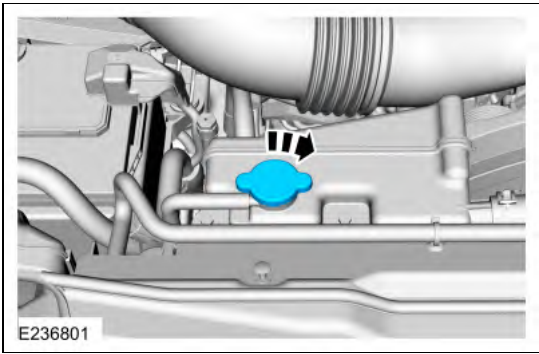
58. Connect the fuel cooler-to-degas bottle hose to the fuel cooler and position the clamp.
Use the General Equipment: Hose Clamp Remover/Installer



59. Install the thermostat and a new O-ring seal.

Refer to: Thermostat (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, Removal and Installation).

60. Fill and bleed the cooling system with the correct mixture of engine coolant and distilled water.
Refer to: Engine Cooling System Draining, Vacuum Filling and Bleeding (303-03C Powertrain Secondary Cooling - 6.7L Power Stroke Diesel, General Procedures).
61. Install a new pressure relief cap.



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