Engine Cooling System Draining, Vacuum Filling and Bleeding

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.

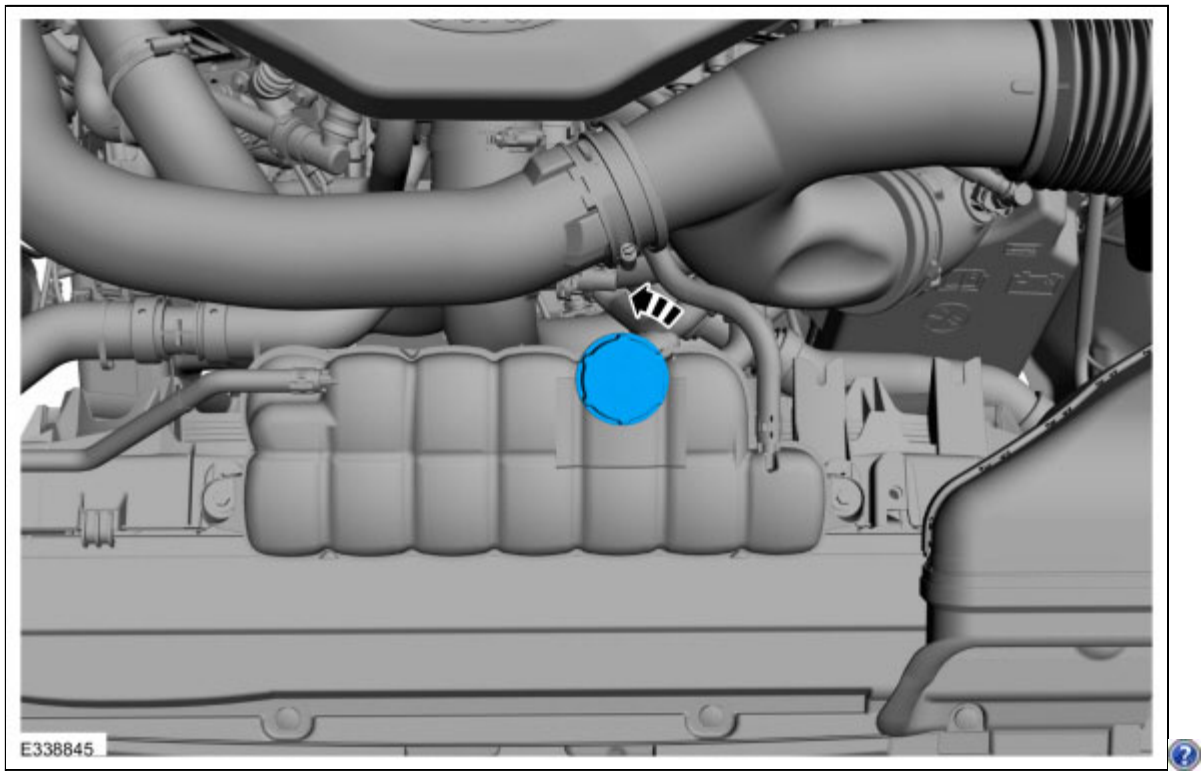
NOTE: *During normal vehicle operation, coolant can change color. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be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

   WARNING: When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

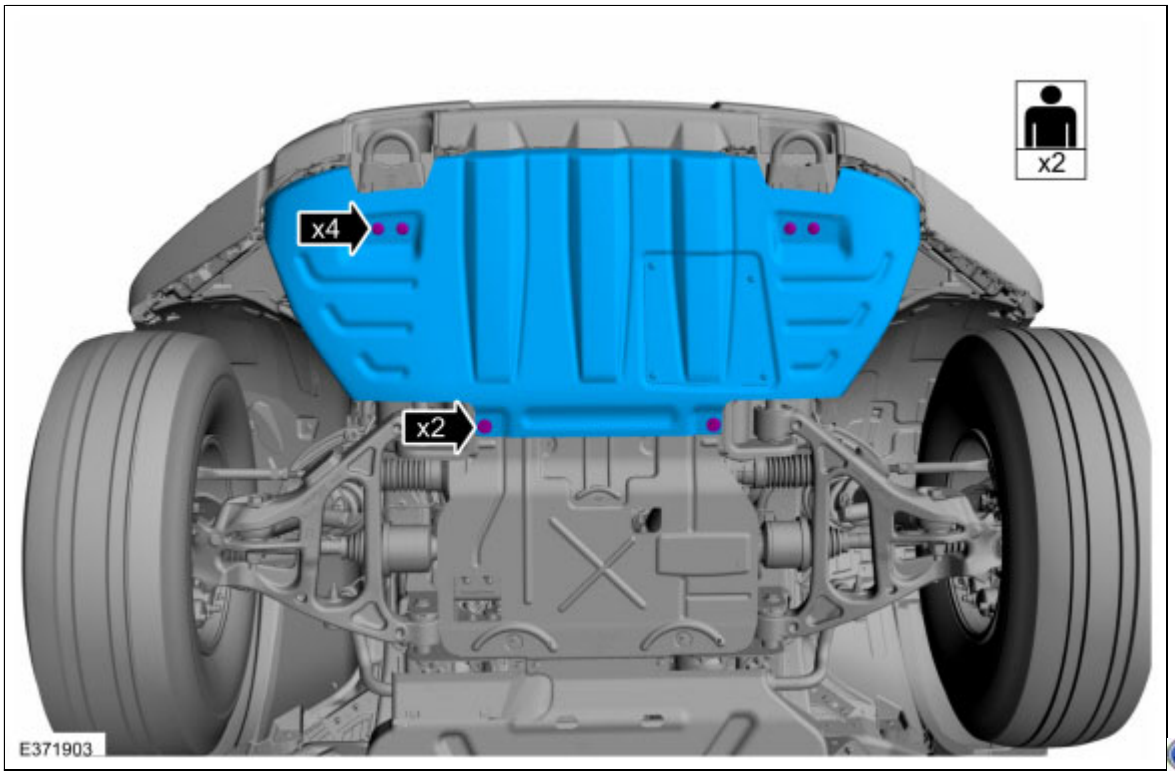
   Remove the pressure relief cap.



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

3. **NOTE:** *This step requires the aid of another technician.*

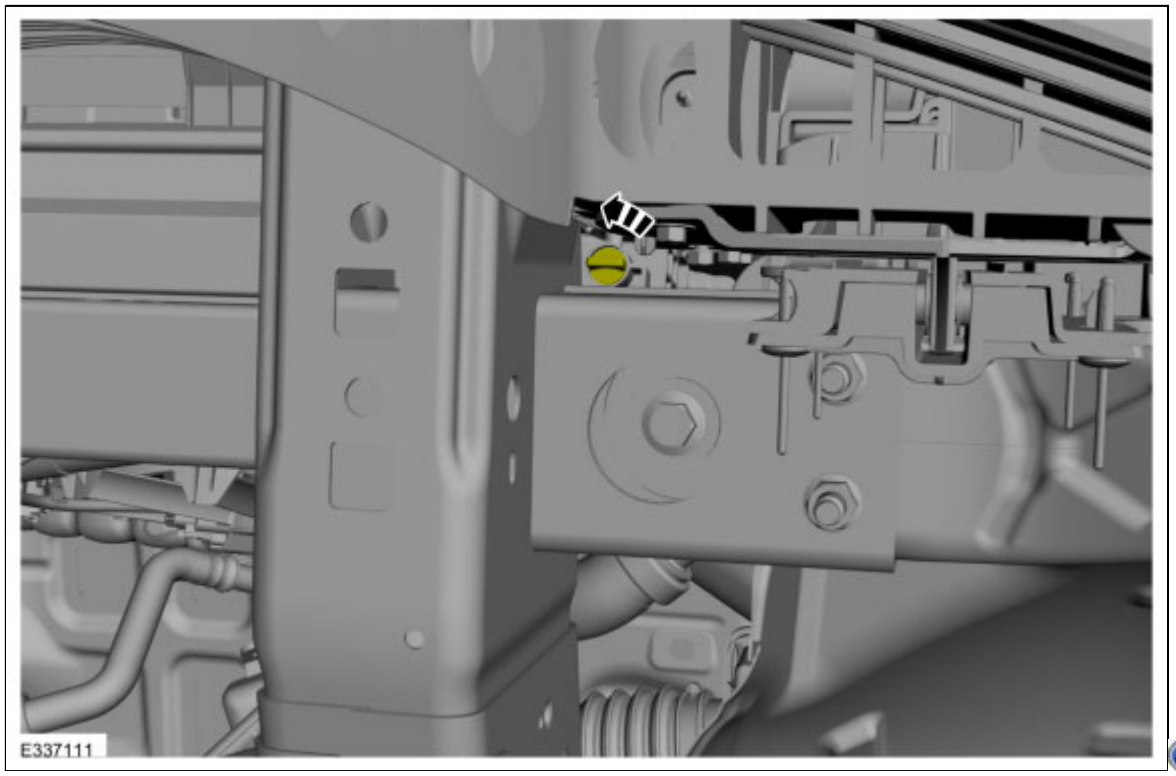
   If equipped.
   Remove the bolts and the engine front undershield.



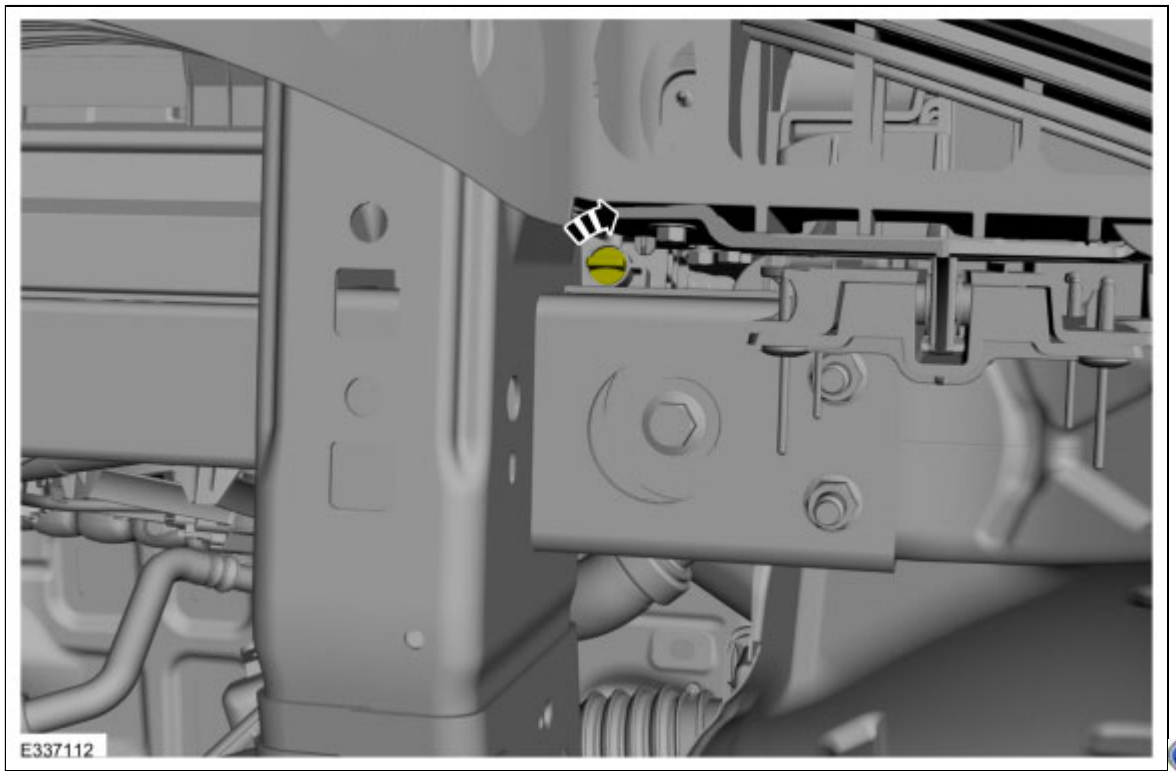
4. 

   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

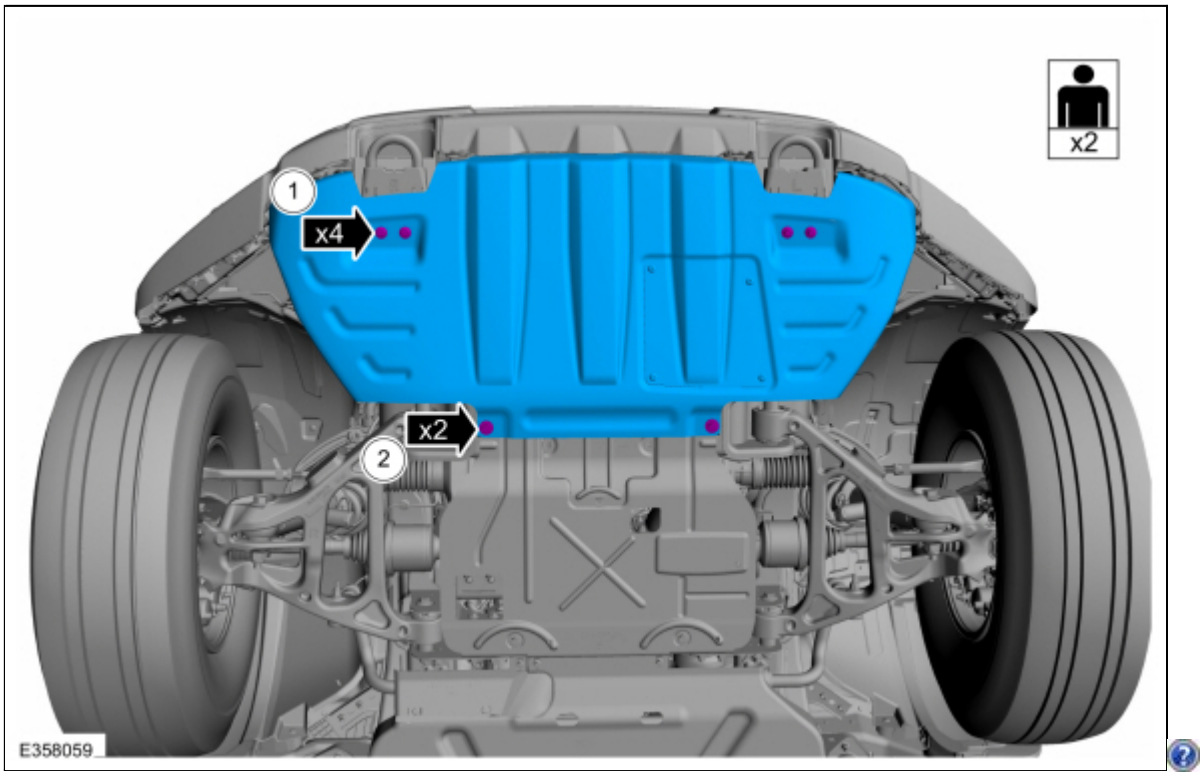


5. Close the radiator drain valve.



6. **NOTE:** *This step requires the aid of another technician.*

   If removed.
   Install the engine front undershield and the bolts.
   Torque :
   1:: 35 lb.ft (48 Nm)
   2:: 41 lb.ft (55 Nm)



Filling

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.
   - **NOTICE: Make sure that the concentration of antifreeze is not below 40% or above 60% as engine parts could become damaged.**

     Add, top-off or adjust the coolant to the correct concentration.
     Refer to: Specifications (303-03C Engine Cooling - 3.5L EcoBoost (BM), Specifications).

2. 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

3. Fill the degas bottle to the MAX FILL line.

4. Install the degas bottle cap until it contacts the hard stop.

5. Turn the climate control system off.

6. Start the engine and increase the engine speed to 3,500 rpm and hold for 30 seconds.

7. Turn the engine off and wait for 1 minute to purge any large air pockets from the cooling system.

8. **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 the degas bottle and if necessary fill to the top of the MAX FILL line on the degas bottle.

9. Start the engine and let it idle until the engine reaches normal operating temperature and the thermostat is fully open. A fully open thermostat is verified by the cooling fan cycling on at least once.

10. If necessary, start the engine. Increase the engine speed to 3,500 rpm and hold for 30 seconds.

11. Allow the engine to idle for 30 seconds.

12. Turn the engine off for 1 minute.

13. Repeat steps 10 through 12 a total of 5 times to remove any remaining air trapped in the system.

14. **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 the degas bottle and, if necessary, fill to the top of the MAX FILL line on the degas bottle.

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