

Mechanical	Electrical
• Leaks or weeps at: • Hoses • Tubes • Hose clamps • Engine gaskets (may leak internally or externally) • O-rings • Thermostat housing (part of coolant pump) • Radiator • Pressure relief cap • Coolant pump • Heater core (wet floor or coolant odor in vehicle) • Coolant outlet connector • Engine oil cooler (may leak internally or externally) (if equipped) • Degas bottle • Cylinder block core plugs • Cylinder head core plugs • Block heater (if equipped) • Turbochargers • Transmission fluid heater coolant control valve • Transmission fluid warmer (may leak internally or externally) • Cracked or damaged: • Hoses • Tubes • Hose clamps • Thermostat housing (part of coolant pump) • Coolant outlet connector • Engine oil cooler (if equipped) • Radiator • Pressure relief cap • Electric cooling fan • Coolant pump • Degas bottle • Cylinder block core plugs • Cylinder head core plugs • Block heater (if equipped) • Turbochargers • Transmission fluid heater coolant control valve • Transmission fluid warmer • Restricted airflow through the A/C condenser/radiator • Excessive white or light gray exhaust smoke (may have burnt coolant odor) • Coolant in engine oil • Engine oil in coolant • Coolant in transmission fluid • Transmission fluid in coolant	• Inoperative or damaged: • Active grill shutter • Electric cooling fan • Wiring, connectors, relays or modules • ECT sensor • CHT sensor

7. If the inspection reveals an obvious concern that can be readily identified, repair it as necessary.

8. Inspect the coolant condition.

1. Inspect the coolant color.

- A darker orange with the presence of debris could indicate a commercially available stop leak may have been used and could result in loss of coolant flow to critical parts of the engine. If sediment is present, flush the system and refill with the correct mixture of distilled water and the relevant Motorcraft® Concentrated Antifreeze/Coolant.

REFER to: Engine Cooling System Flushing (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).

REFER to: Specifications (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Specifications).

- A light or reddish brown color indicates that rust may be present in the cooling system. Flush the system and refill with the correct mixture of distilled water the relevant Motorcraft® Concentrated Antifreeze/Coolant.

REFER to: Engine Cooling System Flushing (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).

REFER to: Specifications (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Specifications).

- An iridescent sheen on top of the coolant could indicate a trace of oil is entering the system. For engine diagnosis, REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
Flush the system and refill with the correct mixture of distilled water and the relevant Motorcraft® Concentrated Antifreeze/Coolant. REFER to: Engine Cooling System Flushing (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).
REFER to: Specifications (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Specifications).
- A milky brown color may indicate that engine oil is entering the cooling system. Pressure test the cooling system. Refer to component tests in this section. If engine oil is suspected, the cause of the leak may be internal to the engine. For engine diagnosis,
REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
Flush the system and refill with the correct mixture of distilled water and the relevant Motorcraft® Concentrated Antifreeze/Coolant. REFER to: Engine Cooling System Flushing (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).
REFER to: Specifications (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Specifications).

2. **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.**

If the engine coolant appearance is acceptable, test the engine coolant freezing point range with the Coolant/Battery Refractometer. Maintain the coolant concentration.

REFER to: Specifications (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Specifications).

3. Adjust coolant range and level if necessary:
- If coolant is low, add specified coolant mixture only.
 - If the engine coolant tests too weak, remove some of the engine coolant and add the relevant Motorcraft® Concentrated Antifreeze/Coolant until the readings are within acceptable levels.
 - If the engine coolant tests strong, remove some of the engine coolant and add distilled water until the readings are within acceptable levels.

9. If an obvious cause for an observed or reported concern is found, correct the cause and test the system for normal operation before proceeding to the next step.

Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods (100-00 General Information, Description and Operation).

Symptom Chart

Condition	Possible Sources	Actions
Loss of coolant	Refer to the Pinpoint Test	GO to Pinpoint Test A
The engine overheats.	Refer to the Pinpoint Test	GO to Pinpoint Test B
The engine does not reach normal operating temperature.	Refer to the Pinpoint Test	GO to Pinpoint Test C
The block heater does not operate correctly.	• Block heater power cable • Block heater	• CHECK continuity in all 3 power cable circuits. If any circuit measures more than 5 ohms, INSTALL a new power cable. • CHECK the resistance of the block heater. If the resistance does not measure between 30 and 40 ohms, INSTALL a new block heater. REFER to: Block Heater (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).

The electric cooling fan is inoperative in one or more speeds or does not operate correctly.	• Wiring • Relays • Fuses • Cooling fan motor	Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual.
The electric cooling fan stays on all the time.	• Wiring • Relays	Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual.
Noisy electric cooling fan operation.	• Foreign material contamination • Fan motor	• REMOVE the foreign material from the cooling fan and shroud. TEST the system for normal operation. If still noisy, INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
	• Fan blade detached from fan motor	• INSTALL a new cooling fan assembly. REFER to: Cooling Fan Motor and Shroud (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).

Pinpoint Tests

Loss of Coolant

Normal Operation and Fault Conditions

The engine cooling system is a closed system providing for coolant expansion and contraction as well as changes in pressure as coolant warms and cools with engine operation. Various gaskets, seals, hoses and clamps contain coolant within the cooling system and keep other fluids and contaminants from entering the cooling system.

Possible Sources

- Coolant hoses or tubes
- Hose clamps
- Thermostat O-ring seal or gasket
- Coolant pump O-ring seal or gasket
- Thermostat housing (part of coolant pump)
- Oil cooler (may leak internally or externally)
- Radiator
- Pressure relief cap
- Coolant pump (leaking from weep hole)
- Heater core
- Coolant outlet connector
- Engine gaskets (may leak internally or externally)
- Degas bottle
- Cylinder block core plugs
- Cylinder head core plugs
- Block heater (if equipped)
- Turbochargers
- Transmission fluid heater coolant control valve
- Transmission fluid warmer (may leak internally or externally)

PINPOINT TEST A : LOSS OF COOLANT

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.

A1 CARRY OUT INSPECTION AND VERIFICATION

- Carry out Inspection and Verification.

Are any concerns present?

Yes	REPAIR as needed.
No	GO to A2

A2 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE ENGINE COOLING SYSTEM

NOTE: Allow the engine to cool before checking the engine coolant level.

- Ignition OFF
- Visually inspect the engine coolant level at the degas bottle and adjust as necessary. Pressure test the engine cooling system. Refer to Component Tests, Cooling System Pressure Test in this section.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.
No	GO to A3

A3 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

- Inspect the engine coolant in the degas bottle for signs of engine oil.

Is engine oil evident in the engine coolant?

Yes	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
No	GO to A4

A4 CHECK THE ENGINE OIL FOR COOLANT

- Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
No	Vehicles equipped with a Transmission Fluid Warmer, GO to A5 . Vehicles NOT equipped with a Transmission Fluid Warmer, GO to A7

A5 CHECK THE ENGINE COOLANT FOR TRANSMISSION FLUID

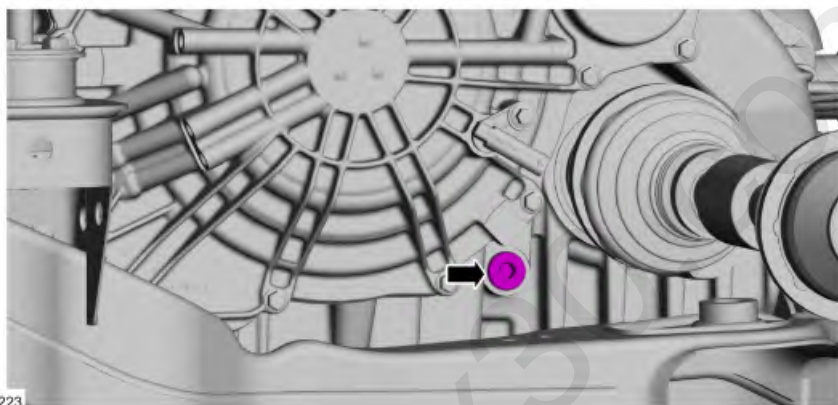
- Check the engine coolant in the degas bottle for signs of transmission fluid.

Is transmission fluid evident in the engine coolant?

Yes	INSTALL a new Transmission Fluid Warmer. REFER to: Transmission Fluid Warmer (307-02B Transmission Cooling - 8-Speed Automatic Transmission â€“ 8F57, Removal and Installation). . REPAIR the transmission as necessary. REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests (307-01B Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F57, Diagnosis and Testing). . TEST the system for normal operation.
No	GO to A6

A6 CHECK THE TRANSMISSION FLUID FOR ENGINE COOLANT

- Remove the transmission oil leveling plug.



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- Check the transmission fluid for engine coolant.

Is engine coolant evident in the transmission fluid?

Yes	INSTALL a new Transmission Fluid Warmer. REFER to: Transmission Fluid Warmer (307-02B Transmission Cooling - 8-Speed Automatic Transmission â€“ 8F57, Removal and Installation). . REPAIR the transmission as necessary. REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests (307-01B Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F57, Diagnosis and Testing). . TEST the system for normal operation.
No	GO to A7

A7 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

NOTE: Use UView[®] Combustion Leak Tester part number UVU560000-R or equivalent.

- Using a cooling system combustion gas leak tester, following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
No	The cooling system is operational.

The Engine Overheats

Normal Operation and Fault Conditions

The engine cooling system maintains the engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder heads. A separate circuit from the engine also feeds the heater core and turbochargers with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air.

Engine overheating generally occurs when there is a disruption in the ability to control either coolant flow at the correct rate, the inability to transfer heat from the engine through the coolant (including low coolant) or an inability to transfer engine-generated heat to the outside air through the radiator.

Possible Sources

- Low coolant level
- External engine coolant leak
- Airlock in system
- Pressure relief cap
- Restricted airflow through A/C condenser/radiator
- Internal engine coolant leak
- Transmission fluid warmer (if equipped)
- Turbochargers
- Coolant condition/concentration
- Non-OEM engine enhancement components
- Electric cooling fan
- CHT sensor
- ECT sensor
- Radiator
- Thermostat
- Temperature gauge
- Coolant pump
- Coolant flow restriction
- Active grill shutter

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0217	Engine Coolant Overtemperature Condition	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor or the ECT sensor.

P1285	Cylinder Head Overtemperature Condition	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor or the ECT sensor.
P1299	Cylinder Head Overtemperature Protection Active	Sets in the PCM when an engine overheat condition was sensed by the CHT sensor or the ECT sensor. A failure mode effects strategy called fail-safe cooling was activated to cool the engine.

PINPOINT TEST B : THE ENGINE OVERHEATS

B1 CARRY OUT INSPECTION AND VERIFICATION

- Carry out the Inspection and Verification procedure in this section.

Are any concerns present?

Yes	REPAIR as needed.
No	GO to B2

B2 CHECK FOR PCM (POWERTRAIN CONTROL MODULE) DTCS

- Ignition ON.
- Using a scan tool, perform PCM self-test.

Is DTC P0217, P1285 and/or P1299 present?

Yes	GO to B3
No	Actual engine overheating has not been verified. CHECK the engine coolant temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing). If any other PCM DTCs are retrieved, REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing).

B3 CHECK THE ACTIVE GRILL SHUTTER OPERATION

- Start the engine and let it idle for at least 30 seconds to allow the grille shutter calibration to complete.
- Using a scan tool, view PCM PIDs.
- Select the GRILL_A_CMD PID and active command the grille shutter from 100% (open) to 0% (close) while visually inspecting the grille shutter operation from the front of the vehicle.

Does the shutter fully open and close?

Yes	GO to B4
No	Diagnose the active grill shutter is inoperative or does not operate correctly, REFER to: Active Grille Shutter (501-02 Front End Body Panels, Diagnosis and Testing).

B4 CHECK FOR AN AIRFLOW OBSTRUCTION AND MISSING AIR DEFLECTORS

NOTE: *Verify no vehicle front end damage is present.*

- Check the radiator or A/C condenser for an external obstruction such as leaves or cardboard and verify all air deflectors are present.

Is an airflow obstruction present or air deflectors missing?

Yes	REPAIR as necessary.
No	GO to B5

B5 CHECK THE ELECTRIC COOLING FAN OPERATION

- Start the engine.
- Place the climate control function selector in the MAX A/C position and the blower motor switch in the HI position.

Did the electric cooling fan operate?

Yes	GO to B6
No	DIAGNOSE the electric cooling fan operation. Refer to Powertrain Control/Emissions Diagnosis (PC/ED) manual. Section 3 Symptom Charts.

B6 CHECK THE ENGINE COOLANT LEVEL AND PRESSURE TEST THE COOLING SYSTEM

- Ignition OFF.
- Visually check the engine coolant level in the coolant expansion tank and adjust as necessary. Pressure test the cooling system.

Does the engine cooling system leak externally?

Yes	REPAIR or INSTALL new components.
No	GO to B7

B7 CHECK THE ENGINE COOLANT FOR AN INTERNAL LEAK

- Inspect the engine coolant in the coolant expansion tank for signs of engine oil.

Is engine oil evident in the coolant?

Yes	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
No	GO to B8

B8 CHECK THE ENGINE OIL FOR COOLANT

- Remove the oil level indicator from the engine.

Is coolant evident in the oil?

Yes	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
No	For vehicles equipped with a Transmission Fluid Warmer, GO to B9 Vehicles NOT equipped with a Transmission Fluid Warmer, GO to B11

B9 CHECK THE ENGINE COOLANT FOR TRANSMISSION FLUID

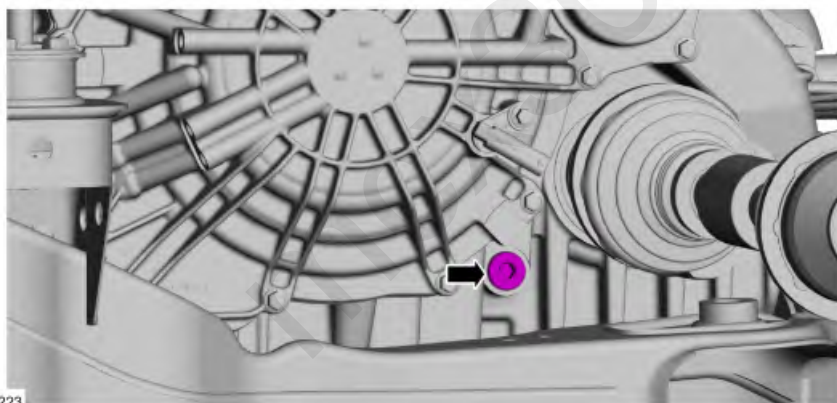
- Check the engine coolant in the degas bottle for signs of transmission fluid.

Is transmission fluid evident in the engine coolant?

Yes	INSTALL a new Transmission Fluid Warmer. REFER to: Transmission Fluid Warmer (307-02B Transmission Cooling - 8-Speed Automatic Transmission â€“ 8F57, Removal and Installation). . REPAIR the transmission as necessary. REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests (307-01B Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F57, Diagnosis and Testing). . TEST the system for normal operation.
No	GO to B10

B10 CHECK THE TRANSMISSION FLUID FOR ENGINE COOLANT

- Remove the transmission oil leveling plug.



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- Check the transmission fluid for engine coolant.

Is engine coolant evident in the transmission fluid?

Yes	INSTALL a new Transmission Fluid Warmer. REFER to: Transmission Fluid Warmer (307-02B Transmission Cooling - 8-Speed Automatic Transmission â€“ 8F57, Removal and Installation). . REPAIR the transmission as necessary. REFER to: Diagnostic Trouble Code (DTC) Charts and Pinpoint Tests (307-01B Automatic Transmission - 8-Speed Automatic Transmission â€“ 8F57, Diagnosis and Testing). . TEST the system for normal operation.
No	GO to B11

B11 CHECK THE COOLING SYSTEM FOR COMBUSTION GASES

NOTE: Use UView^Â® Combustion Leak Tester part number UVU560000-R or equivalent.

- Using a cooling system combustion gas leak tester, and following the instructions supplied with the tester, check the coolant for combustion gases.

Are combustion gases present?

Yes	REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
No	GO to B12

B12 CHECK COOLANT CONDITION

- Check the coolant for dirt, rust or contamination and check the coolant concentration.

Is the coolant condition OK?

Yes	GO to B13
No	FLUSH the engine cooling system. REFER to: Engine Cooling System Flushing (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), General Procedures).

B13 CHECK THE COOLANT PUMP OPERATION

- Start the engine.
- Allow the engine to run for 30 minutes. Place the climate control function selector in the MAX HEAT position. Feel the heater outlet hose.

Is the heater outlet hose hot?

Yes	GO to B14
No	INSTALL a new coolant pump. REFER to: Coolant Pump (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).

B14 VISUALLY INSPECT THE THERMOSTAT

- Carry out the Thermostat Visual Inspection in the Component Tests portion of this section.

Is the thermostat damaged?

Yes	INSTALL a new thermostat. REFER to: Thermostat (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).
No	INSTALL a new thermostat. REFER to: Thermostat (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation). If the engine still overheats, INSTALL a new radiator. REFER to: Radiator (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation).

Normal Operation and Fault Conditions

The engine cooling system maintains engine temperature during operation. Correct coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a correct engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. Coolant is sent from the coolant pump through the engine block and cylinder heads. A separate circuit from the engine also feeds the heater core and turbochargers with coolant. The coolant pump circulates the coolant. The coolant thermostat is a control valve actuated by coolant temperature. When the thermostat is closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When the thermostat is opened, coolant flows through the radiator circuit in order to transfer engine generated heat to the outside air.

Concerns of engine inability to reach normal operating temperature typically occur when the rate of coolant flow through some coolant circuits (radiator, heater core) is more than expected given the conditions. Heat is not allowed to build in the engine because a heat exchanger is removing too much heat, including the radiator, heater core and oil cooler. In addition, perceived concerns that the engine does not reach normal operating temperature can be related to a low coolant level or trapped air which does not allow for hot coolant to be available at the heater core, an inoperative climate control system, or for concerns perceived or related to an incorrect engine temperature gauge indication.

Possible Sources

- Low coolant level
- Thermostat
- Temperature gauge
- CHT sensor
- ECT sensor

Diagnostic Trouble Code (DTC) Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P0125	Insufficient Coolant Temp for Closed Loop Fuel Control	Sets in the PCM when the CHT sensor has not achieved the required temperature level to enter closed loop operating conditions within a specified amount of time after starting the engine.
P0128	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature)	Sets in the PCM when the thermostat monitor has not achieved the required engine operating temperature within a specified amount of time after starting the engine.

PINPOINT TEST C : THE ENGINE DOES NOT REACH NORMAL OPERATING TEMPERATURE

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.

C1 CARRY OUT INSPECTION AND VERIFICATION

- Carry out the Inspection and Verification procedure in this section.

Were any concerns found?

Yes	REPAIR as needed.
No	GO to C2

C2 CHECK FOR DTC P0125 OR P0128

- Using a scan tool, perform the PCM self-test.

Is DTC P0125 or P0128 present?

Yes	GO to C3
No	The cooling system is operational. If an inoperative temperature gauge is suspected, CHECK the temperature gauge operation. REFER to: Instrumentation, Message Center and Warning Chimes (413-01 Instrumentation, Message Center and Warning Chimes, Diagnosis and Testing). If an inoperative climate control system is suspected, CHECK the climate control system operation. For Dual Automatic Temperature Control (DATC), REFER to: Climate Control System - Vehicles With: Dual Automatic Temperature Control (DATC) (412-00 Climate Control System - General Information, Diagnosis and Testing). For Electronic Manual Temperature control (EMTC), REFER to: Climate Control System - Vehicles With: Electronic Manual Temperature Control (EMTC) (412-00 Climate Control System - General Information, Diagnosis and Testing). If any other Diagnostic Trouble Codes (DTCs) are retrieved, REFER to: Electronic Engine Controls (303-14B Electronic Engine Controls - 2.7L EcoBoost (238kW/324PS), Diagnosis and Testing).

C3 CHECK THE COOLANT LEVEL

NOTE: Allow the engine to cool before checking the coolant expansion tank.

- Visually check the engine coolant level in the coolant expansion tank

Is the engine coolant level within specification?

Yes	INSTALL a new thermostat. REFER to: Thermostat (303-03B Engine Cooling - 2.7L EcoBoost (238kW/324PS), Removal and Installation). CLEAR Diagnostic Trouble Codes (DTCs). If the DTC returns check for correct CHT sensor and ECT operation.
No	GO to Pinpoint Test A

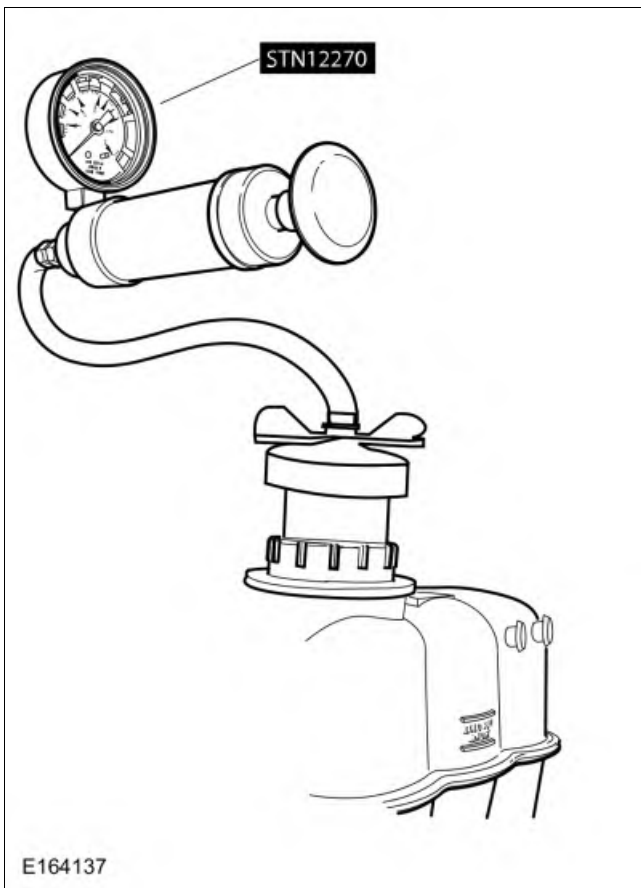
Component Tests

Cooling System Pressure Test

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.

NOTE: Vehicles have a pressure relief cap on the degas bottle and no radiator cap.

1. Turn the engine OFF.
2. Check the engine coolant level and adjust as necessary.
3. Remove the degas bottle cap. Inspect the degas bottle cap and degas bottle for any issues that would cause improper sealing, such as for cross-threading, burrs, damaged o-ring, etc. If any issues are found, INSTALL a new cap and/or degas bottle.
4. Attach the Pressure Tester (Stant 12270 or equivalent) and adaptor (Snap-On TA53 or equivalent), to the degas bottle cap. The cap must hold pressure of 145 kPa +/- 21 kPa (21 PSI +/- 3 PSI). If any issues are found, INSTALL a new cap.
5. Attach the Pressure Tester (Stant 12270 or equivalent) and adaptor (Snap-On TA52, AST ASSFZ-47, Redline RDL95-0750 or equivalent) to the degas bottle.



NOTICE: Do not pressurize the cooling system beyond the maximum pressure listed in the specifications table in this section, or cooling system components can be damaged.

NOTE: If the plunger of the pressure tester is pressed too fast, an erroneous pressure reading will result.

6. To pressurize the engine cooling system, slowly press the plunger of the pressure test pump and increase the pressure to between 124 - 138 kPa (18 - 20 PSI). Observe the gauge reading for approximately 2 minutes. Pressure should not drop during this time. If the pressure drops within this time, inspect for leaks and repair as necessary.
7. If no leaks are found and the pressure drops, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant.
REFER to: Engine (303-00 Engine System - General Information, Diagnosis and Testing).
8. If the pressure does not drop remove the cooling system Pressure Tester and adaptor from degas bottle.
9. Install the degas bottle cap until it contacts the hard stop.

Thermostat

Install a new thermostat only after at least one of the following tests and checks have been carried out:

- Pinpoint Test B or C
- Thermostat Visual Inspection

Thermostat Visual Inspection

1. Remove the thermostat.
2. Examine the thermostat for signs of damage including:
 - Valve not fully seated (light visible through the valve)
 - Foreign material lodged in the main valve
 - Bent or broken frame or flange
 - Bent or broken spring
 - Wax leaking from wax reservoir or a bulge in the reservoir
 - Any other damage or distortion
3. **NOTE:** If no damage is found during the inspection, do not attempt to open the thermostat using hot water or other heat sources.

This method is not an accurate means to test the function of the thermostat and may damage the thermostat.

If damage is found during the inspection, remove any foreign material or broken pieces and install a new thermostat.

Radiator Leak Test, Removed From Vehicle

NOTICE: Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners may be present in the cleaning tank and they will damage aluminum radiators.

NOTE: Clean the radiator before leak testing to avoid contamination of tank.

1. Leak test the radiator in clean water with air pressurized to the maximum pressure listed in the Specifications table.
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General Procedures

Engine Cooling System Draining, Vacuum Filling and Bleeding

Special Tool(s) / General Equipment

	ROB75240 Coolant/Battery Refractometer (Fahrenheit)
ST1720-A	
Fluid Container	

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.

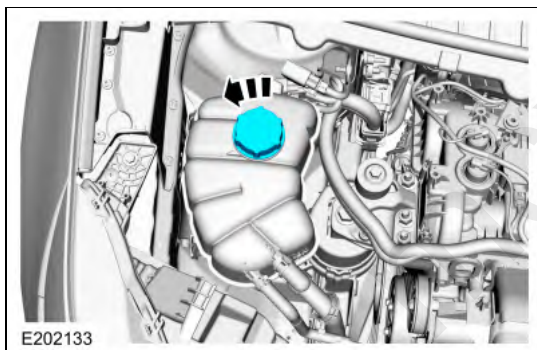
NOTE: During normal vehicle operation, coolant can change color. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

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



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

Remove the pressure relief cap.



2. Refer to: Jacking and Lifting - Overview (100-02 Jacking and Lifting, Description and Operation).
3. If equipped.
Remove the retainers and the under body shield.