### NOTE

Applicable vehicles:
- 2007 Ford Fusion
- 2007 Ford Milan
- 2007 Ford MKZ

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DIAGNOSIS AND TESTING</td>
<td>Procedure revision date: 11/17/2006</td>
</tr>
</tbody>
</table>

Printable View (164 KB)

<table>
<thead>
<tr>
<th>Special Tool(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure Test Kit 014-R1072 or equivalent</td>
</tr>
<tr>
<td>Battery/Antifreeze Tester 014-R1060 or equivalent</td>
</tr>
</tbody>
</table>
**Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware or equivalent scan tool**

**73II Automotive Meter**
105-R0057 or equivalent

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### Material

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motorcraft Premium Gold Engine Coolant with Bittering Agent (US only)</td>
<td>WSS-M97B51-A1</td>
</tr>
<tr>
<td>VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)</td>
<td></td>
</tr>
</tbody>
</table>

### Principles of Operation

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. From the coolant pump, coolant is sent through the engine block and cylinder heads. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump is operated by engine rotation through a pulley which is driven by the accessory drive belt, a belt driven by a pulley attached to the camshaft, or a sprocket driven by the timing chain to circulate 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 is allowed to flow through the radiator circuit in order to transfer engine generated heat to the outside air.

**NOTE:** The vehicle is equipped with either a degas bottle or an expansion tank.
The degas bottle, if equipped, holds surplus coolant and removes air from the cooling system, which reduces hot spots. It also allows for coolant expansion and system pressurization, replenishes coolant to the cooling system and serves as the location for service fill.

The coolant expansion tank, if equipped, holds surplus coolant, allows for coolant expansion and replenishes coolant to the cooling system. It is equipped with a non-pressurized cap which allows coolant to be added to the tank to keep it filled to prescribed levels.

The cooling fan draws air through the radiator to help cool the system coolant as it passes through the radiator.

The thermostat monitor is a function of the powertrain control module (PCM) and is designed to verify correct thermostat operation. The monitor will be executed once per drive cycle and has a monitor run duration of 300-800 seconds. If a malfunction occurs, diagnostic trouble code (DTC) P0125 or P0128 is set, and the malfunction indicator lamp will be illuminated.

For vehicle/engine specific information, refer to Engine Cooling in the Description and Operation portion of this section.

**Inspection and Verification**

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**WARNING**

WARNING: Never remove the pressure relief cap under any conditions while the engine is operating or hot. Failure to follow these instructions could result in personal injury or damage to the cooling system or engine. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the pressure relief cap. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly. Step back while the pressure is released from the cooling system. When you are certain all the pressure has been released, (with a cloth) turn and remove the pressure relief cap. Failure to follow these instructions may result in serious personal injury.

---

**CAUTION**

CAUTION: The engine cooling system is filled with Motorcraft Premium Gold Engine Coolant. Mixing coolant types degrades the corrosion protection of Motorcraft Premium Gold Engine Coolant.

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**NOTE:** Vehicles equipped with a degas bottle system have the pressure relief cap on the degas bottle and no radiator cap. Vehicles equipped with a coolant expansion tank system have the pressure relief cap on the radiator.
1. Verify the customer concern.
2. Visually check the engine coolant level at the degas bottle or coolant expansion tank when the system is cold.
3. Make sure the pressure relief cap is installed correctly.
4. Record any cooling system diagnostic trouble codes (DTCs) retrieved. Refer to the DTC chart in this section for DTC descriptions.
5. **NOTE:** Take note of any coolant odor or steam coming from cooling system components.

If the system coolant is filled correctly and no DTCs associated with fail-safe cooling are retrieved, verify the customer's concern by operating the engine to duplicate the condition.

6. **NOTE:** Refer to the coolant flow diagram in the Description and Operation, Engine Cooling portion of this section.

Inspect to determine if any of the following mechanical or electrical concerns apply.

**Visual Inspection Chart**

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Leaks or weeps at:</td>
<td>▪ Inoperative or damaged:</td>
</tr>
<tr>
<td>▪ Hoses</td>
<td>▪ Electric cooling fan (if equipped)</td>
</tr>
<tr>
<td>▪ Tubes</td>
<td>▪ Electronically actuated fan clutch</td>
</tr>
<tr>
<td>▪ Clamp joints</td>
<td>▪ Electronically actuated fan clutch controller</td>
</tr>
<tr>
<td>▪ Quick connect couplings (if equipped)</td>
<td>▪ Wiring, connectors, relays or modules</td>
</tr>
<tr>
<td>▪ Gaskets</td>
<td>▪ Engine coolant temperature (ECT) sensor (if equipped)</td>
</tr>
<tr>
<td>▪ O-rings</td>
<td>▪ Cylinder head temperature (CHT) sensor (if equipped)</td>
</tr>
<tr>
<td>▪ Thermostat housing</td>
<td>▪ Intake air temperature (IAT) sensor (if equipped)</td>
</tr>
<tr>
<td>▪ Radiator</td>
<td>▪ Mass air flow (MAF) sensor</td>
</tr>
<tr>
<td>▪ Pressure relief cap</td>
<td>▪ Vehicle speed sensor (VSS)</td>
</tr>
<tr>
<td>▪ Coolant pump</td>
<td></td>
</tr>
<tr>
<td>▪ Heater core (wet floor or coolant odor in vehicle)</td>
<td></td>
</tr>
<tr>
<td>▪ Heater control valve</td>
<td></td>
</tr>
<tr>
<td>▪ Heated throttle body or heated throttle body adapter (if equipped)</td>
<td></td>
</tr>
<tr>
<td>▪ Coolant crossover manifold</td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td>Electrical</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>assembly (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Oil cooler (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Degas bottle (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Coolant expansion tank (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Heated positive crankcase ventilation (PCV)</td>
<td></td>
</tr>
<tr>
<td>(if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Fuel pressure regulator</td>
<td></td>
</tr>
<tr>
<td>• Clayton bowl (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Cylinder block core plugs (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Cylinder head core plugs (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Block heater (if equipped)</td>
<td></td>
</tr>
</tbody>
</table>

Visual Inspection Chart

<table>
<thead>
<tr>
<th>Mechanical</th>
<th>Electrical</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cracked or damaged:</td>
<td></td>
</tr>
<tr>
<td>• Hoses</td>
<td></td>
</tr>
<tr>
<td>• Tubes</td>
<td></td>
</tr>
<tr>
<td>• Hose clamps</td>
<td></td>
</tr>
<tr>
<td>• Heater control valve (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Thermostat housing</td>
<td></td>
</tr>
<tr>
<td>• Radiator</td>
<td></td>
</tr>
<tr>
<td>• Pressure relief cap</td>
<td></td>
</tr>
<tr>
<td>• Cooling fan</td>
<td></td>
</tr>
<tr>
<td>• Fan clutch (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Coolant pump</td>
<td></td>
</tr>
<tr>
<td>• Degas bottle (if equipped)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• Oil cooler (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Coolant crossover manifold assembly (if equipped)</td>
<td></td>
</tr>
<tr>
<td>• Cylinder block core plugs (if equipped)</td>
<td></td>
</tr>
</tbody>
</table>
### Mechanical

- Cylinder head core plugs (if equipped)
- Block heater (if equipped)
- Restricted airflow through the A/C condenser/radiator
- Drive belt loose, worn or installed incorrectly
- Broken or weak drive belt tensioner
- Excessive white or light gray exhaust smoke (may have burnt coolant odor)
- Coolant in engine oil
- Engine oil in coolant
- Coolant in automatic transmission fluid (if equipped)
- Automatic transmission fluid (if equipped) in coolant

### Electrical

7. If the inspection reveals an obvious concern that can be readily identified, repair it as necessary. Test the system for normal operation.

8. Inspect the coolant condition.

- If Motorcraft Premium Gold Engine Coolant has a clear or pale yellow color, this indicates higher water content than required. Test the engine coolant freezing point range with the Battery/Anti-Freeze Tester. The freezing point should be in the range -45°C to -23°C (-50°F to -10°F). If the vehicle is driven in cold climates less than -36°C (-34°F), it may be necessary to increase the coolant concentration to get adequate freeze protection. Recommended coolant concentration is 50/50 ethylene glycol to distilled water.

- A pale green color indicates incorrect coolant (green in color) may have been added to the system. Use of incorrect (green in color) coolant degrades the corrosion protection of Motorcraft Premium Gold Engine Coolant. Flush the system and refill with the correct mixture of distilled water and Motorcraft Premium Gold Engine Coolant.

**NOTE:** If Cooling System Stop Leak Pellets are used, darkening of the Motorcraft Premium Gold Engine Coolant from yellow to golden tan will occur.

Dark brown could indicate a commercially available stop leak may have been used. Flush the system and refill with the correct mixture of distilled water and Motorcraft Premium Gold Engine Coolant.
• 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 and Motorcraft Premium Gold Engine Coolant.

• An iridescent sheen on top of the coolant could indicate a trace of oil is entering the system. For information on engine diagnosis, refer to Engine System — General Information.

• 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. Refer to Engine System — General Information.

• A red, orange or light green colored sheen on top of the coolant may indicate that transmission fluid is entering the cooling system. The cause may be a leaky radiator. Pressure test the cooling system. Refer to the component tests in this section.

• If the engine coolant appearance is acceptable, test the engine coolant freezing point range with the Battery/Anti-Freeze Tester. The freezing point should be in the range -45°C to -23°C (-50°F to -10°F). If the vehicle is driven in cold climates less than -36°C (-34°F), it may be necessary to increase the coolant concentration to get adequate freeze protection. Recommended coolant concentration is 50/50 ethylene glycol to distilled water.

• Maximum coolant concentration is 60/40 for cold weather areas.

• Minimum coolant concentration is 40/60 for warm weather areas.

• 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 undiluted engine 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.

10. NOTE: Make sure to use the latest scan tool software release.
If the cause is not visually evident, connect the scan tool to the data link connector (DLC).

11. **NOTE:** The vehicle communication module (VCM) LED prove out confirms power and ground from the DLC are provided to the VCM.

   If the scan tool does not communicate with the VCM:
   
   - check the VCM connection to the vehicle.
   - check the scan tool connection to the VCM.
   - refer to Module Communications Network, No Power To The Scan Tool, to diagnose no communication with the scan tool.

12. If the scan tool does not communicate with the vehicle:

   - verify the ignition key is in the ON position.
   - verify the scan tool operation with a known good vehicle.
   - refer to Module Communications Network to diagnose no response from the powertrain control module (PCM).

13. Carry out the network test.

   - If the scan tool responds with no communication for one or more modules, refer to Module Communications Network.
   - If the network test passes, retrieve and record continuous memory diagnostic trouble codes (DTCs).

14. Clear the continuous DTCs and carry out the self-test diagnostics for the generic electronic module (GEM).

15. If the DTCs recovered are related to the concern, go to the Cooling System DTC Chart. For all other DTCs, refer to **Multifunction Electronic Modules**.

16. If no DTCs related to the concern are retrieved, GO to **Symptom Chart**.

**Powertrain Control Module (PCM) DTC Chart**

<table>
<thead>
<tr>
<th>DTC</th>
<th>Description</th>
<th>Go To Pinpoint Test C</th>
</tr>
</thead>
<tbody>
<tr>
<td>P0128</td>
<td>Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)</td>
<td></td>
</tr>
</tbody>
</table>

**Pinpoint Test C: The Engine Does Not Reach Normal Operating Temperature Normal Operation**

The engine cooling system functions to maintain engine temperatures during operation. Proper coolant flow through the engine, radiator and remainder of cooling system passages and components is essential to maintaining a proper engine temperature.

Engine coolant flows primarily from the engine to the radiator circuit and back to the coolant pump. From the coolant pump, coolant is sent through the engine block and
cylinder heads. A separate circuit from the engine also feeds the heater core with coolant. The coolant pump is operated by engine rotation through a pulley which is driven by the accessory drive belt, a belt driven by a pulley attached to the camshaft, or a sprocket driven by the timing chain to circulate 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 is allowed to flow 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, or when the cooling fans operate all the time (electric fans) or the fan clutch is always engaged (engine driven fans). 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.

For vehicle/engine specific information, refer to Engine Cooling in the Description and Operation portion of this section.

- DTC P0125 Insufficient Coolant Temperature (ECT) For Closed Loop Fuel Control
- DTC P0128 Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

This pinpoint test is intended to diagnose the following:

- Low coolant level
- Thermostat
- Engine coolant temperature (ECT) indicator system (gauge)
- Engine cooling fan

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

**WARNING**

WARNING: Never remove the pressure relief cap under any conditions while the engine is operating or hot. Failure to follow these instructions could result in personal injury or damage to the cooling system or engine. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the pressure relief cap. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly. Step back while the pressure is released from the cooling system. When you are certain all
the pressure has been released, (with a cloth) turn and remove the pressure relief cap. Failure to follow these instructions may result in serious personal injury.
<table>
<thead>
<tr>
<th>Test Step</th>
<th>Result / Action to Take</th>
</tr>
</thead>
<tbody>
<tr>
<td>all the time?</td>
<td>If the vehicle is also equipped with a mechanical cooling fan, GO to C4. Otherwise, GO to C5.</td>
</tr>
</tbody>
</table>

**C4 CHECK THE MECHANICAL COOLING FAN OPERATION**

- Carry out the cooling fan clutch component tests. For a mechanical cooling fan clutch, refer to Component Tests in this section. For an electronic cooling fan clutch, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.
- Is the cooling fan clutch OK?
  - Yes
    - GO to C5.
  - No
    - INSTALL a new cooling fan clutch. TEST the system for normal operation.

**C5 CHECK THE COOLANT LEVEL**

- **NOTE**: Allow the engine to cool before checking the coolant level.
- Visually check the engine coolant level in the degas bottle or coolant expansion tank.
- Is the engine coolant level within specification?
  - Yes
    - INSTALL a new thermostat. TEST the system for normal operation.
  - No
    - GO to Pinpoint test A to diagnose a coolant leak.

**Component Tests**

**Pressure Test — Degas Bottle Systems**

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**WARNING**

WARNING: Never remove the pressure relief cap under any conditions while the engine is operating or hot. Failure to follow these instructions could result in personal injury or damage to the cooling system or engine. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the pressure relief cap. Wait until the engine has cooled, then wran a thick cloth around the pressure relief cap and turn it slowly. Step back...
while the pressure is released from the cooling system. When you are certain all the pressure has been released, (with a cloth) turn and remove the pressure relief cap. Failure to follow these instructions may result in serious personal injury.

NOTE: Vehicles equipped with a degas bottle system have the pressure relief cap on the degas bottle and no radiator cap. Vehicles equipped with a coolant expansion tank system have the pressure relief cap on the radiator.

1. Turn the engine OFF.
2. Check the engine coolant level. Adjust the coolant level as necessary.
3. Attach the Radiator/Heater Core Pressure Tester to the degas bottle nipple and overflow hose. Install a pressure test pump to the quick-connect fitting of the test adapter.

CAUTION

CAUTION: 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.

5. NOTE: If the plunger of the pressure tester is depressed too fast, an erroneous pressure reading will result.
6. Slowly depress the plunger of the pressure test pump until the pressure gauge reading stops increasing and note the highest pressure reading obtained. If the pressure reading exceeds the maximum cap pressure listed in the specifications table, install a new pressure relief cap.
5. If the system does not hold pressure, remove the pressure relief cap and wash in clean water to dislodge all the foreign material from the gasket. Check the sealing surface in the filler neck of the degas bottle for nicks or cuts. Install the pressure relief cap.
6. Pressurize the engine cooling system as described in Step 4 above. 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 pressure relief cap may be leaking. Install a new pressure relief cap and retest the system.
8. If no leaks are found after a new pressure relief cap is installed, and the pressure drops, the leak may be internal to the radiator transmission cooler (if equipped). Inspect the coolant for transmission fluid and the transmission fluid for coolant. Repair as necessary.
9. If there is no contamination of the coolant or transmission fluid, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant. Refer to Engine System — General Information to diagnose the engine.

10. Release the system pressure by loosening the pressure relief cap. Check the coolant level and adjust as necessary.

**Pressure Test — Coolant Expansion Tank Systems**

**WARNING**

WARNING: Never remove the pressure relief cap under any conditions while the engine is operating or hot. Failure to follow these instructions could result in personal injury or damage to the cooling system or engine. To avoid having scalding hot coolant or steam blow out of the cooling system, use extreme care when removing the pressure relief cap. Wait until the engine has cooled, then wrap a thick cloth around the pressure relief cap and turn it slowly. Step back while the pressure is released from the cooling system. When you are certain all the pressure has been released, (with a cloth) turn and remove the pressure relief cap. Failure to follow these instructions may result in serious personal injury.

**NOTE:** Vehicles equipped with a degas bottle system have the pressure relief cap on the degas bottle and no radiator cap. Vehicles equipped with a coolant expansion tank system have the pressure relief cap on the radiator.

1. Turn the engine OFF.
2. Remove the pressure relief cap. Top off the radiator as needed. Fit the pressure tester to the radiator fill neck.

3. **CAUTION**

   CAUTION: Do not pressurize the cooling system beyond 138 kPa (20.0 psi) or cooling system components can be damaged.

4. **NOTE:** If the plunger of the pressure tester is depressed too fast, an incorrect pressure reading will result.
5. Pump the cooling system to a maximum of 138 kPa (20.0 psi) and hold for 2 minutes. If the pressure drops within this time, inspect for leaks and repair as necessary.

4. If no leaks are found and the pressure drops, the leak may be internal to the radiator transmission cooler (if equipped). Inspect the coolant for
transmission fluid and the transmission fluid for coolant. Repair as necessary.

5. If there is no contamination of the coolant or transmission fluid, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant. Refer to Engine System — General Information to diagnose the engine.

**Cap**

1. Inspect the pressure relief cap and seals for damage or deterioration. Install a new pressure relief cap if necessary.

2. Fit the pressure relief cap to the Radiator/Heater Core Pressure Tester Kit using the correct adapter.

3. **NOTE:** If the plunger of the pressure tester is depressed too fast, an incorrect pressure reading will result.

   Slowly pump the pressure tester until the pressure gauge stops increasing and note the highest pressure reading. Release the pressure and repeat the test. Install a new pressure relief cap if the pressure is not within specification. Refer to the General Specifications chart in this section.

**Thermostat**

A new thermostat should be installed only after the following tests and checks have been carried out:

- Pinpoint Test A, 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
   - Bent or broken valve or valve stem
   - 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.
4. If no damage is found during the inspection, continue troubleshooting the system concern. Go to the Symptom Chart for further instructions.

**Radiator Leak Test, Removed From Vehicle**

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
</table>

CAUTION: 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:** Always install plugs in the oil cooler fittings before leak testing or cleaning any radiator.

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

1. Leak test the radiator in clean water with 138 kPa (20 psi) air pressure.

**Fan Clutch Test**

1. Turn the engine OFF and wait until the fan comes to a complete stop.
2. Spin the fan blade by hand. A light resistance should be felt. If there is no resistance or very high resistance, the minimum and maximum fan speeds must be checked. For an electronically actuated fan clutch, refer to the Powertrain Control/Emissions Diagnosis (PC/ED) manual. For a viscous fan clutch, carry out the following:

**Fan Clutch Test — Minimum Speed Requirement**

1. Use a suitable marker to mark the coolant pump or fan pulley and one of the fan blades.
2. Make sure the A/C is OFF, if equipped.

3. WARNING

WARNING: To avoid the possibility of personal injury or damage to the vehicle, do not operate the engine until the fan blade has been first examined for possible cracks and separation. Failure to follow these instructions may result in serious personal injury.

4. Start the engine and run it at approximately 2,000 rpm for 5 minutes or until there is a noticeable reduction in fan noise to allow the fan clutch to go into disengaged mode.
4. Aim a laser photo tachometer at the coolant pump or fan pulley. Run the engine to achieve 3,000 rpm at the coolant pump or fan pulley.

5. With the coolant pump or fan pulley at 3,000 rpm, aim the laser photo tachometer at the fan blade. Monitor and record fan speed.

6. The fan blade speed must be less than the specified rpm at 3,000 rpm coolant pump or fan pulley rpm. Refer to the specification table in this section for correct fan speed.

7. Turn the engine off.

8. If the fan blade speed was greater than specified, install a new fan clutch.

**Fan Clutch Test — Maximum Speed Requirement**

1. Use a suitable marker to mark the coolant pump or fan pulley and one of the fan blades.

2. Block off areas on each side of the radiator in the engine compartment, the front of the radiator grille and the bumper. Close the hood. This will raise the temperature of the air striking the fan clutch and should cause the fan blade to operate at maximum speed.

3. Place the climate control function selector switch in the MAX A/C position and the blower motor switch in the HI position, if equipped.

4. **WARNING**

   WARNING: To avoid the possibility of personal injury or damage to the vehicle, do not operate the engine until the fan blade has been first examined for possible cracks and separation. Failure to follow these instructions may result in serious personal injury.

5. **NOTE:** Do not open the hood to check the coolant pump or fan pulley temperature. This will lower the temperature of the air reaching the fan clutch and void the test. Aim the infrared thermometer through the wheel well or from under the vehicle.

6. Start the engine and run it at approximately 2,000 rpm until normal operating temperature has been achieved. Using an infrared thermometer, monitor the coolant pump or fan pulley. Run the engine until the coolant pump or fan pulley is at least 96°C (205°F).

7. **NOTE:** Do not open the hood to check the coolant pump or fan pulley or fan blade speed. This will lower the temperature of the air reaching the fan clutch and void the test. Aim the laser photo tachometer through the wheel well or from under the vehicle.
Aim a laser photo tachometer at the coolant pump or fan pulley. Run the engine to achieve 3,000 rpm at the coolant pump or fan pulley.

6. With the coolant pump or fan pulley at 3,000 rpm, aim the laser photo tachometer at the fan blade. Monitor and record fan blade speed.

7. The fan blade speed must be greater than the specified rpm at 3,000 rpm coolant pump or fan pulley rpm. Refer to the specification table in this section for correct fan speed.

8. Open the hood and allow the engine to idle momentarily to lower engine temperature. Turn the engine off and remove the blocks from the radiator, grille and bumper.

9. If the fan blade speed is less than specified, install a new fan clutch.