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2008 JEEP Cherokee/Liberty OEM Service and Repair Workshop Manual

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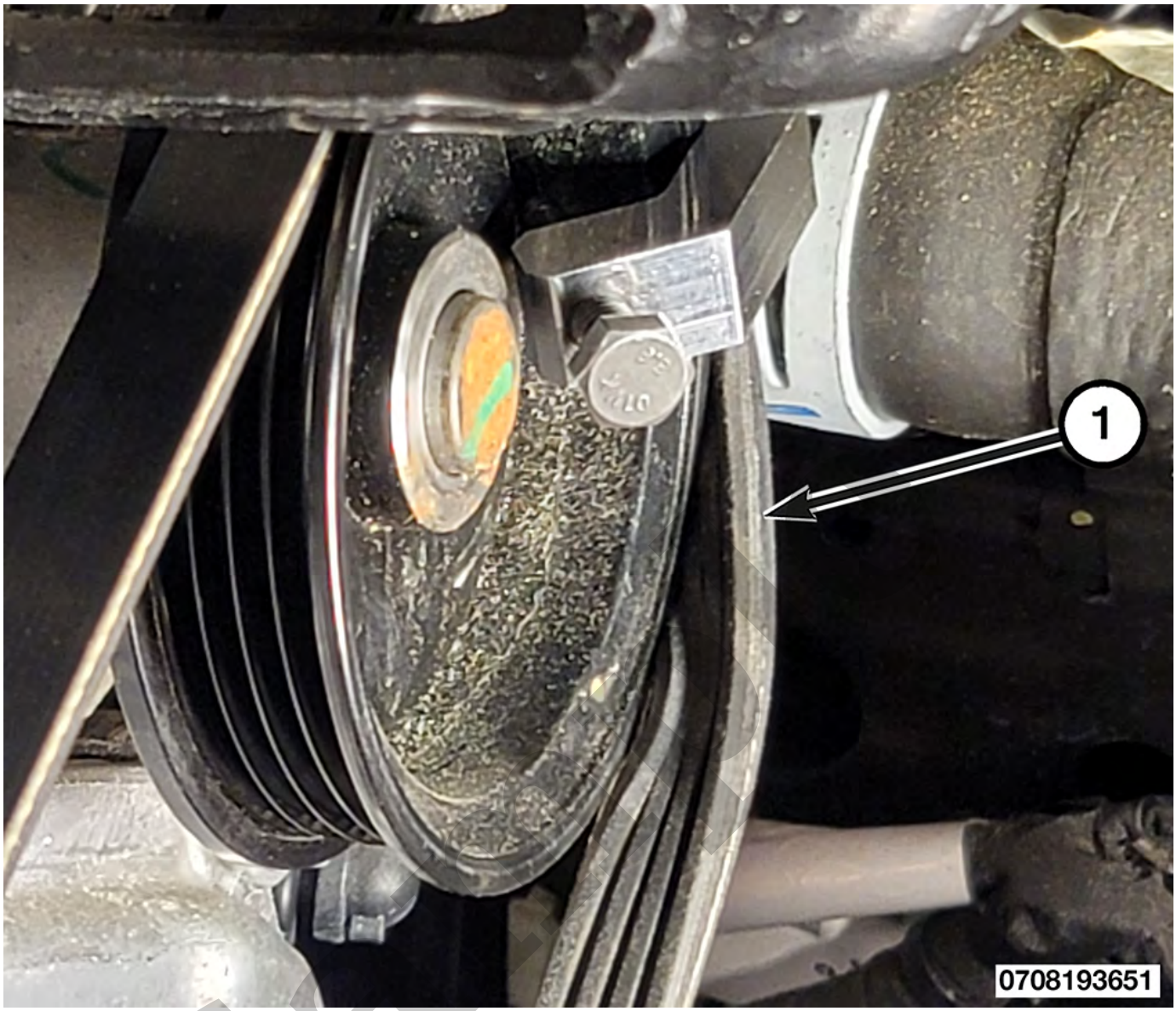
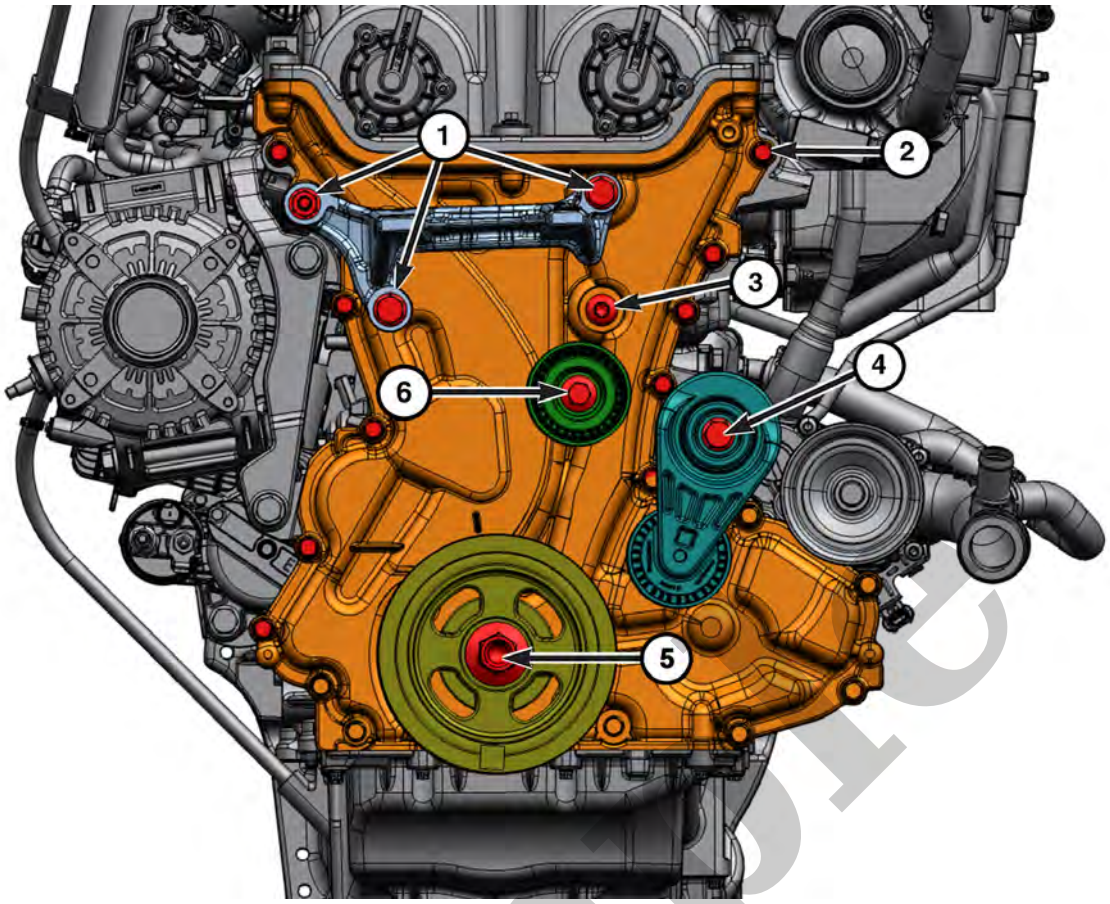
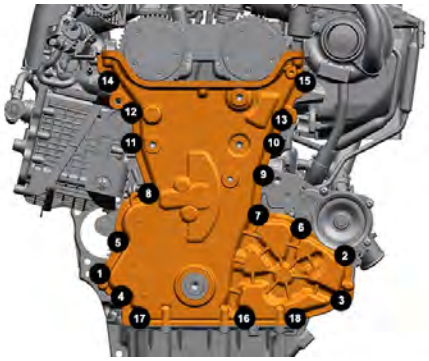
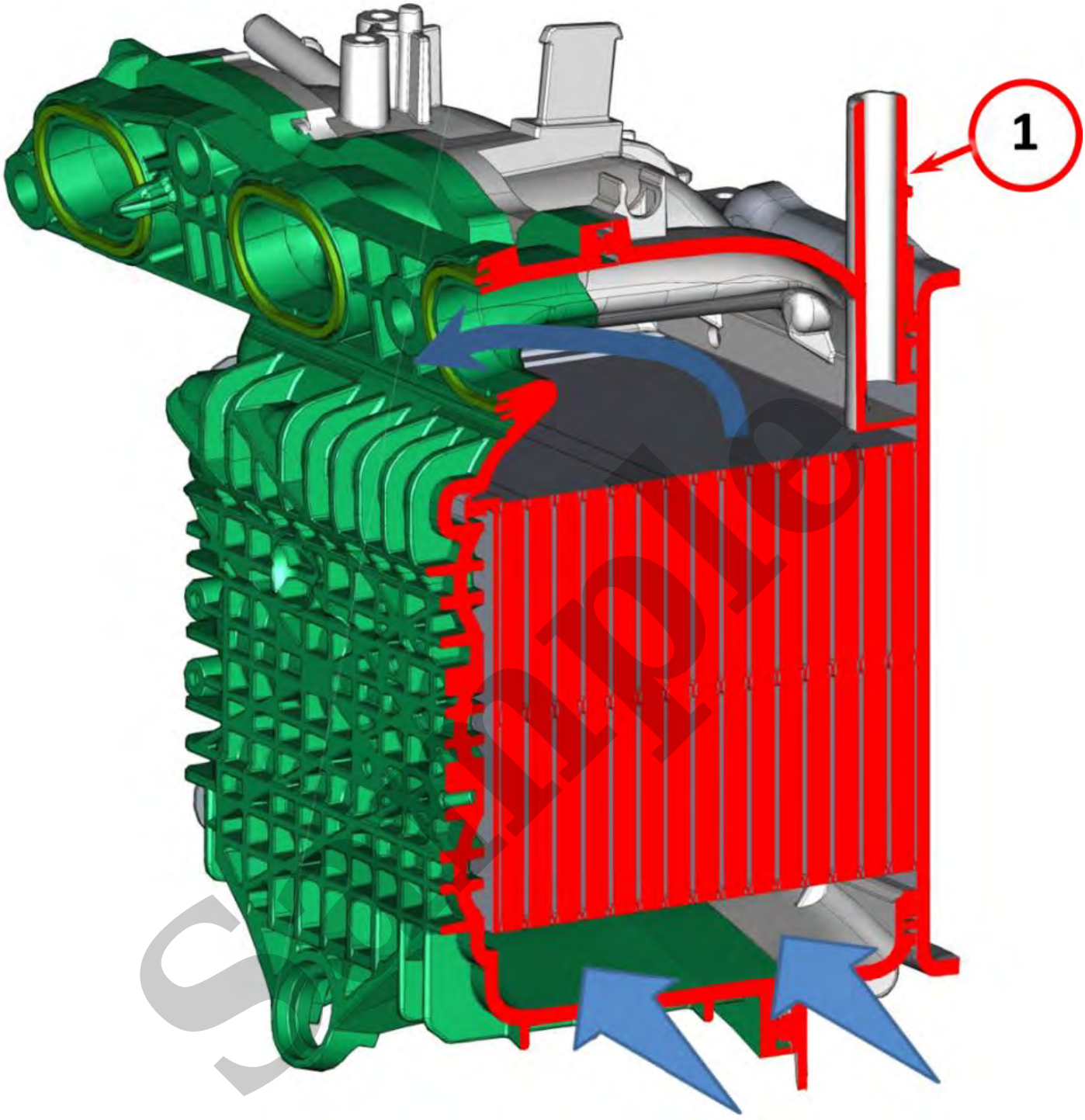


1 - Water Pump Belt

3. Turn the vibration damper **clockwise** to install the water belt on the pulley.



CALLOUT	DESCRIPTION	SPECIFICATION	COMMENTS
1	Front Cover to Block Stud Bolts Front Cover to Block Bolt	**50 N·m (37 Ft. Lbs.)** **55 N·m (41 Ft. Lbs.)**	–
2	Timing Chain Cover to Block and Cylinder Head M6 Bolts	**5 N·m (44 In. Lbs.) + 40°**	Tightening sequence 



1 - Vapor Inlet

The airflow from the turbocharger is controlled by the throttle body and enters the bottom of the intake manifold. Once inside the manifold, the air gives off heat as it passes through the intercooler plates, which are maintained at a lower temperature by the coolant circulating within. This lower temperature air mixes with the idling engine oil vapor inlet and exits from the manifold to enter the cylinder head intake ports.

cabin. The coolant bottle and cap regulate the cooling system pressure. The centrifugal water pump is used to circulate coolant throughout the system when the engine is running. The thermostat is closed when the engine is cold to block the flow through the radiator allowing the engine to reach operating temperature quickly. The thermostat opens when the engine is near operating temperature to allow flow through the radiator maintaining the proper engine temperature.

When the engine is not running, the Power Inverter Module will operate the electric coolant heater to warm the coolant in the engine cooling system that is circulating through the heater core. The electric coolant heater is connected to a HV cable from the BPCM. The electric coolant heater is provided battery power from a relay and a chassis ground. The PIM controls the operation of the electric coolant heater using a common LIN bus communication line shared with the chiller valve and electric A/C compressor used in the battery cooling system. The coolant control valve and check valve can restrict the flow of coolant pulled from the engine. The coolant in the heater core portion of the system is circulated through the high temperature auxiliary coolant pump and through the heater to the heater core. This allows the coolant to be heated quickly and maintain temperature easier. There is a temperature sensor mounted in the system before the high temperature auxiliary coolant pump and another mounted at the inlet of the heater core used to monitor the cooling system temperature and regulate heating.

FUNCTIONAL DESCRIPTION - AUXILIARY COOLANT PUMPS

The auxiliary coolant pumps are a smart device used to circulate coolant through the cooling system. The pumps are provided either a direct fused battery feed or fused ignition feed (refer to the wiring information) and a chassis ground. The smart pumps are controlled using a LIN bus communication line. The controlling Electronic Control Unit (ECU) will send a command with an rpm request to the pump electronics. The auxiliary coolant pump will operate the pump motor and monitor the internal motor operation and circuitry for faults. The auxiliary coolant pump communicates feedback to the ECU regarding the following operating parameters and failure modes:

- Motor rpm target
- Motor rpm actual
- Motor temperature
- Motor current
- Dry run operation error
- Blocked pump error
- Overtemp condition error
- Over current condition error
- Voltage error
- Fail Safe activated

DIAGNOSTICS:

FUNCTIONAL DESCRIPTION - 3 WAY COOLANT CONTROL VALVE

The Three Way Coolant Valve is a 12V DC powered valve and control coolant flow through the Electric Coolant Heater (ECH). The valve directs coolant flow through the ECH when commanded. The valve is normally open. The middle port of the shut-off valve is the inbound flow of coolant coming in and the top port has outbound flow. When the shut-off valve energized, the lower port now has outbound flow to the Electric Heater Core.

FUNCTIONAL DESCRIPTION - PRESSURIZED COOLANT BOTTLE

A multi-chambered liquid coolant receiving bottle unitized from upper and lower plastic parts forming part of the closed coolant system of an internal combustion engine. When unitized the bottle comprises a pressurized coolant deaeration chamber separated by a convexly curved stationary pressure wall from the overflow chamber. The chambers are arranged laterally side-by-side and are hydraulically connected to one another by a hose external to the bottle. The upper plastic part forming an upper portion of the coolant chamber supports a coolant filler neck that operatively mounts a pressure cap thereon. The pressure cap has a lower primary seal, an upper secondary seal and a vacuum breaker valve and cooperates with the filler neck so that coolant is transmitted to the overflow chamber from the deaeration chamber when the coolant of the system expands and from the overflow chamber to the de-aeration chamber when the system coolant contacts and creates a vacuum.

FUNCTIONAL DESCRIPTION - RADIATOR

A heavy duty cross-flow aluminum/plastic radiator is used. The radiator consists of an aluminum core and plastic end tanks, which are fastened to the core with clinch tabs and sealed with a high temperature rubber gasket. Vehicles equipped with automatic transmissions use a separate A/C condenser and transmission oil cooler located on the front of the radiator. If the plastic tank has been damaged, individual parts are not available, and the radiator must be replaced. As air passes through the radiator core, the heat within the coolant is dissipated into the ambient air.

FUNCTIONAL DESCRIPTION - THERMOSTAT

A diaphragm-type thermostat controls the operating temperature of the engine by controlling the amount of coolant flow to the radiator. The thermostat is located inside of the thermostat housing and is serviced with the housing as one unit. On all engines the thermostat begins to open at 88°C (190°F) to allow flow to the radiator. The thermostat is fully open by 100ºC (212ºF). This provides quick engine warm up and overall temperature control. The same thermostat is used for winter and summer seasons. An engine should not be operated without a thermostat, except for servicing or testing. Operating without a thermostat causes other problems such as longer engine warm-up time, unreliable warm-up performance, increased exhaust emissions and crankcase condensation. This condensation can result in sludge formation. The wax motor is located in a sealed container at the spring end of the thermostat. When heated, the internal wax expands, overcoming closing spring tension and water pump pressure to force the valve to open.

FUNCTIONAL DESCRIPTION - WATER PUMP

The cooling system is pressurized and uses a centrifugal water pump to circulate coolant throughout the system. A separate and remotely mounted, pressurized coolant bottle is used. When the engine is cold the thermostat is closed and the cooling system has no flow through the radiator. The coolant flows through the engine, engine oil cooler, water pump, EGR Cooler, and passenger compartment heater core while the thermostat is closed. When the engine is at operating temperature the thermostat is fully open and coolant will then flow through the radiator.

FUNCTIONAL DESCRIPTION - COOLANT

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air. The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, or the equivalent ethylene-glycol base coolant with organic corrosion inhibitors (called OAT, for Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% ethylene-glycol and 50% distilled water to obtain a freeze point of -37°C (-35°F). If it becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

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FUNCTIONAL DESCRIPTION - COOLING SYSTEM PRESSURE CAP

Aeration

AERATION

If coolant level drops below a certain point, aeration will occur drawing air into the water pump resulting in the following:

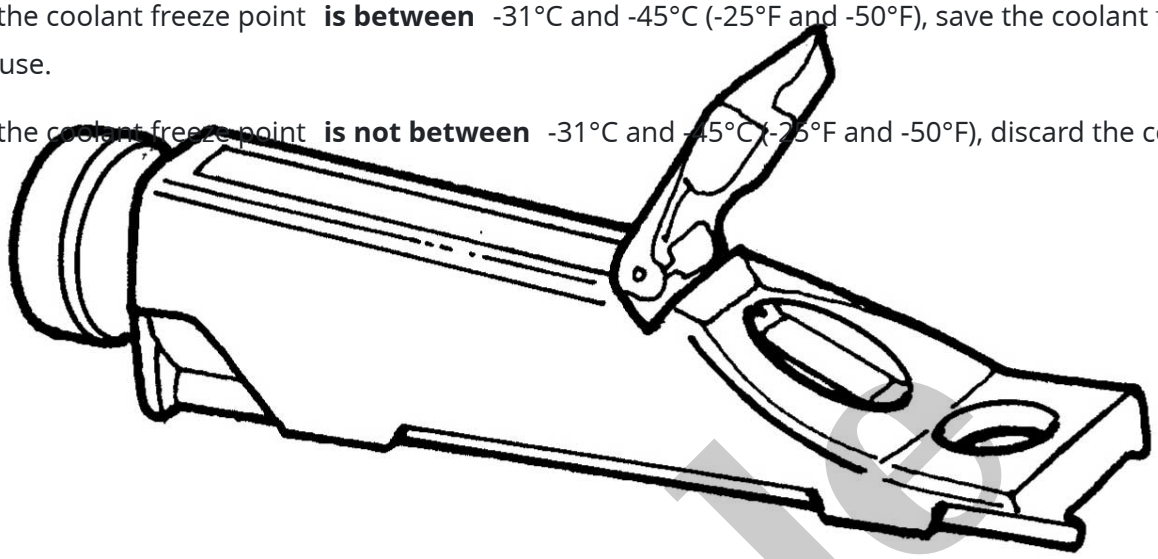
- High reading shown on the temperature gauge.
- Loss of coolant flow through the heater core.
- Corrosion in the cooling system.
- Water pump seal may run dry, increasing the risk of premature seal failure.

NOTE

Combustion gases leaking into the coolant can also cause the above problems.

or equivalent, following the manufacturer's instructions, test the coolant freeze point:

- If the coolant freeze point **is between** -31°C and -45°C (-25°F and -50°F), save the coolant for reuse.
- If the coolant freeze point **is not between** -31°C and -45°C (-25°F and -50°F), discard the coolant.



Radiator pressure testing tools are very sensitive to small air leaks which will not cause cooling system problems. A pressure cap that does not have a history of coolant loss should not be replaced just because it leaks slowly when tested with this tool. Add water to tool. Turn tool upside down and recheck pressure cap to confirm that cap needs replacement.

Remove the cap. Be sure that the sealing surfaces are clean. Moisten the rubber gasket with water and install the cap on a commercially available pressure tester.

Using the cooling system tester, bring the pressure up to the pressure inscribed on cap. For example if the radiator cap shows 21 psi and the applied pressure to the radiator cap fails to hold up to 21 psi, replace the cap.

NOTE

If the cap is designed to hold up to 21 psi (inscribed on the cap) and during the test, the pressure rapidly bleeds off prior to 21 psi, the radiator cap has failed.

The pressure cap may test properly while positioned on the pressure test tool. It may not hold pressure or vacuum when installed on the pressurized coolant bottle. If the test passes on the tool but there is sufficient evidence that the cap fails on the bottle, inspect the coolant bottle neck for damage or debris that may prevent the cap from sealing properly.