

Engine Cooling - System Operation and Component Description

System Operation

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 head. Separate coolant circuits from the engine feeds the EGR cooler, oil cooler, transmission cooler, and turbocharger with coolant. The coolant pump, operated by engine rotation through the accessory drive belt, circulates the coolant. A dual thermostat system are separate control valves actuated by coolant temperature. When both thermostats are closed, coolant flow bypasses the radiator circuit and returns to the coolant pump. When one or both thermostats are open, coolant flows through the radiator circuit to transfer engine-generated heat to the outside air. The transmission cooler is equipped with an electronic coolant shut off valve that regulates coolant flow through the cooler.

This vehicle is equipped with a mechanical engine driven cooling fan.

The degas bottle holds surplus coolant and removes air from the cooling system. It also allows for coolant expansion and system pressurization, replenishes coolant to the cooling system and serves as the location for service fill.

The thermostat monitor is a function of the PCM and is designed to verify correct thermostat operation. The monitor executes once per drive cycle and has a monitor run duration of 300-800 seconds. If a malfunction occurs, DTC P0125 or P0128 sets, and the MIL illuminates.

Component Description

Engine Cooling Fan

The engine cooling fan is an electroviscous design. The engine cooling fan clutch is electronically controlled by the PCM, based on input information received from various engine sensors. The PCM provides a PWM signal to the fan clutch and monitors fan speed through the Fan Speed Sensor (FSS).

Thermostats

The engine thermostat is located in the coolant crossover at the front of the engine and contains two thermostatic devices in one assembly. The thermostat regulates the engine coolant temperature by controlling the flow of coolant through the radiator. The two thermostatic devices do not open at the same coolant temperature. The opening temperatures are staggered with the back one opening at 90°C (194°F), and the front one opening at 94°C (201°F). The transmission cooler is equipped with an electronic coolant shut off valve that regulates coolant flow through the cooler.