

Engine Coolant Leaks

Corrosion...Electrolysis...or Excessive Thermocycles?

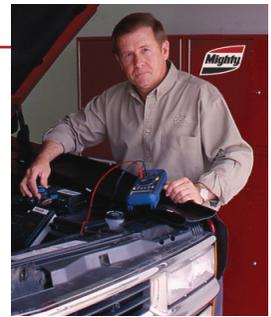
When most think of engine coolant (anti-freeze) it is in relation to its freeze-point protection with little consideration of its ability to provide lubrication and protection from system corrosion.

Unfortunately, engine coolant normally does not receive any attention until one of the following scenarios occurs: 1) The engine overheats. 2) Freeze-point protection for winter is not sufficient. 3) Coolant is spilling, weeping or seeping from the engine or cooling system components. 4) A water pump or hose is replaced. While these are reasons for attention to the coolant, other conditions must be considered before these symptoms occur. For example, once the corrosion inhibitors in the coolant break down, the system can encounter corrosion, promoting holes forming in the cooling system components, resulting in leaks, rust deposits or scale forming in the radiator tubes, thereby restricting coolant flow, resulting in engine overheating. Cooling system maintenance is imperative. It can save the customer much frustration and unnecessary expense.

ELECTROLYSIS

Deteriorated coolant is usually our first consideration when diagnosing leaking radiator tubes; however electrolysis must also be considered. Electrolysis is a condition that occurs when electrical current flows through the engine coolant, promoting a deterioration of the system much like that of extreme corrosion resulting from worn out or contaminated coolant. Electrolysis is becoming a common occurrence with the new vehicle designs due to the use of lightweight metals, ungrounded plastic radiator tanks and a myriad of electrical accessories and systems. Many of the accessories are consumer add-ons and are not properly grounded. Electrolysis occurs when current takes the path of least resistance and seeks a ground through the coolant. The coolant becomes electrically charged and becomes an electrolyte, thus consuming soft metals such as aluminum radiators and heater cores. Testing for electrolysis can be performed with a digital voltmeter set on the 12

Volt DC scale. Attach the negative lead of the voltmeter to the negative post of the battery and the positive lead should be placed in the coolant, but not allowed to make contact with the filler neck or radiator core. Two readings should be taken, one with the engine off and the other with the engine running at 2,000 rpm, with all electrical accessories on. A voltage reading in excess of 0.3 volts confirms electrical leakage into the cooling system. If the condition is present, perform a complete coolant exchange and re-test. If the condition is still present, a thorough ground inspection must be performed. For additional information concerning pinpointing the source of the electrical leakage refer to Mighty Tech Tip #137 *Cooling Systems*.



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LET ME PUT IT THIS WAY, BUDDY...
KNOW WHAT'S NO LONGER "COOL" ABOUT YOUR CAR?
IT'S YOUR ENTIRE COOLING SYSTEM.

EXCESSIVE THERMOCYCLES

Here's a different twist in cooling system troubleshooting. GM advises that the presence of a coolant smell or leakage may occur at the radiator on 2014-2016 Trucks and SUVs equipped with a 4.3L, 5.3L or 6.2L engine. Specific applications and Production Plant Codes are reflected in GM TSB PI1513D. The radiator should be inspected where the tubes attach to the headers. The presence of leakage may be the result of excessive thermocycles in the cooling system due to excessive cycling of the thermostat. This condition prompts fatigue in the tubes resulting in cracks and leakage where the tubes attach to the radiator headers. GM offers a revised thermostat and housing to eliminate the excessive cycling. If you identify the described leakage condition, do not replace the radiator without installing the revised thermostat or the condition will repeat itself.

Summary: In addition to the coolant, the radiator cap, water pump, thermostat, hoses and belts, and cooling fans should all be a part of the cooling system maintenance checks. A thorough system check may prevent the customer from becoming stranded or engine damage due to overheating.