Global Parts Distributors, LLC

TECH TIP

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Electrolysis in Heat Exchange Products

Have you ever installed a new radiator or heater core and had the vehicle come back with the same leaking issue in a short period of time? Or, have you ever installed multiple radiators or heater cores on the same vehicle to find them with unexplainable core leaks? If so, you may be experiencing cooling system electrolysis.

Electrolysis is a common problem on late model vehicles with aluminum components in the cooling system. Electrolysis is a chemical reaction between the coolant and the metal surfaces in the cooling system. Since aluminum is the softest metal in the cooling system, it is more prone to damage. There are two types of electrolysis in the automotive cooling system. The first type of electrolysis is from worn coolant. Over a period of time the corrosion inhibitors become worn and the coolant becomes acidic. A chemical reaction will then take place between the coolant and metals. Once this happens the cooling system will start to leak. The second type of electrolysis is caused by stray electrical currents flowing in the coolant as a result of loose, missing, or corroded grounds. This stray current will eat away at all aluminum components in the cooling system, including water pumps and water passages in the cylinder heads. Since the radiator and heater core have the thinnest materials, they are the most prone to failure.

Now that we know what causes electrolysis, how do we diagnose it and fix it?

To diagnose which type of electrolysis you have, you will need to test the voltage in the coolant. With the vehicle at operating temperature and running, place one probe from your volt meter directly into the coolant. Ground your other probe to the battery ground post. If your reading 0.3 volts or higher, you have an electrolysis issue. Now with the vehicle off and the battery disconnected, perform this same test. If you have 0.00 voltage, then you have a bad ground somewhere in the electrical system. If you still have 0.3 volts or higher then it is from contaminated, worn coolant.

If you find that the electrolysis issue is caused from a bad or missing ground, one helpful tip is to run vehicle with all accessories off while checking voltage. Turn each accessory on one at a time to see a change in the voltage reading until you isolate the cause or find the missing or bad ground. This bad ground can be from aftermarket accessories such as, stereos, C B Radio, fog / driving lights, etc. If you find it is a chemical electrolysis, then you must thoroughly flush the entire cooling system with flushing chemicals and distilled water possibly multiple times to get all the contaminates and residue out of the cooling system. Then refill the system with a 50/50 mix of antifreeze and distilled water. Checking the voltage after completion of each flush.

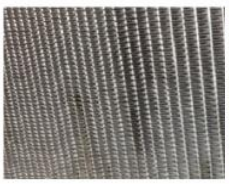

Figure 1

Figure 2

Figure 1: Electrolysis is typically noticeable by dark spots on the radiator core

Figure 2: Pressurized air leaking through the damaged core