

# Stray Current can kill a new radiator in just 3 weeks



Sometimes the most brutal cause of damage to vehicle components is unseen. This is an actual case involving an Aluminium radiator assembly which failed after only 3 weeks of service. Normally this component should last at least 3 years.

The complete aluminium radiator assembly was returned for inspection. It was reported to have failed after being in service for 3 weeks. No sample of coolant or service record was provided.

Inspection:

The external condition of the unit was generally good.

Visual inspection confirmed multiple tube leaks occurring in the core.

Cutting open a section of the tube where it leaked revealed pin holes to the surface of the tube wall as well as a build-up of foreign materials on the header plate.

A minor build-up of foreign materials was also noticed on the inside surface of the bottom tank.

The end tubes (revealed when the tank was removed) had become soft and distorted.

Conclusions: This radiator displays classic symptoms that make it easy to diagnose. It failed prematurely as a result of severe stray current corrosion (electrolysis) present in the cooling system. The give-away is the obvious build-up of aluminium hydroxide inside the tank. Aluminium is eroded away (sacrificial anode) during electrolysis, eventually wearing away enough material to cause a leak.



Tube cut open to show pinhole.



End tubes have become soft and distorted.



Header plate showing white deposits.



Tank coated with Aluminium Hydroxide.



## Possible causes are:-

- A. Failure to diagnose and correct a stray current problem prior to fitting a new radiator.
- B. Usually caused when a vehicle has been in an accident or has had an electrical aftermarket accessory fitted, leading to inadequate grounding of components.
- C. Damaged motor fan wires coming in contact with the radiator are known to have produced this problem.
- D. Damaged wiring insulation, faulty or incorrectly installed electric fans, faulty relays and earth straps that are either missing or covered in paint overspray after a panel repairs are all typical causes of stray current corrosion.

## Result:-

- A. Systematic removal of the corrosion protection layer on the inside of the radiator tube through electrolysis.
- B. Corrosion of the tube typically resulting in multiple holes.
- C. Build up aluminium hydroxide blocking passages.
- D. White aluminium hydroxide powder visible through the inlet and outlet pipes.

There was no evidence of manufacturing defect. The reason for the stray current was unseen or unnoticed by the installer. A simple check with a multimeter could have prevented this tragic loss of service life.

## How to check for stray current:-

- A. Use a stray current detector (shown) or an analogue multimeter with impedance of around 100k Ohms per Volt and lowest test scale of 0–0.5 Volts (many digital multimeters are unsuitable as they generate a small current down the probe).
- B. Connect the detector (or multimeter) and place the probe into the radiator filler neck until it touches the coolant.
- C. A flashing light/tone or reading greater than 50 mV (0.05 V) means stray current is present and remedial action is required.
- D. Usual causes of stray current are damaged wiring insulation, faulty or incorrectly installed fans, faulty relays or earth straps missing or covered in paint overspray following panel repairs.



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