TIB #09

Repair of Bolt on Radiator Cores

AIR RADIATORS
45 Heales Road, Lara VIC, Australia 3212
Phone +61 3 5275 6644 Facsimile +61 3 5275 3333

Pierced and extruded header plates should not be repaired by solder puddling etc.

In order to repair the radiator core correctly, you must identify the cause of the fault.

Failures of radiator cores can be identified as follows: -
Core failure is usually caused by either,
(a) Corrosion and erosion of solder joints, OR
(b) Mechanical failure.

A properly soldered joint will not deteriorate or fail under normal operation, - deterioration can only be caused by an outside influence.

Corrosion - Failure from corrosion can be traced to lack of maintenance of coolant inhibitor, the addition of poor water, or a combination of both.

The quality of coolant used is often less than desirable - high salt content and/or high PH are direct contributors to solder joint failure.

Inhibitors - Both Alflox and Fleetguard D.C.A. are nitrite based inhibitors. If the inhibitor is not maintained at the correct level and is either over or under concentrated, the nitrite will attack the lead in the solder. This creates porosity with weepage at the joints, and finally complete failure of the joint.

This can be recognised (by visual inspection) as a whitish light brown deposit forming around the joint both inside (water side) and outside (air side) of the core. Low treatment and low velocity areas will encourage accelerated corrosion and induce early failure. Test kits for both D.C.A. and Alfloc are available at nominal cost.

It is recommended R.S.D. purchase these kits and obtain coolant samples for testing at the time of repair.

Inhibitor levels must be maintained.
PH levels should be between 7.0 and 8.0 (slightly alkaline).

Erosion - Can occur as a result of turbulent flow, entrained air in coolant, very high (or low) coolant velocity passing a rough or sharp edge in the flow path. This can cause eddy flows or air bubbles, which are subjected to widely fluctuating pressures. The pressure impedes the air bubbles causing high frequency vibration, and erodes the material in contact with the bubble.

Low flow, air bubbles, low inhibitor level, high velocity and cross turbulence cause the corrosion and erosion to work simultaneously.

Low flow on side of tube retained air on side or tube - implosions. Low water treatment - lack of protection to solder high flow from turbulent cross flow. Due to the inlet pipes being too low in the tank (too close to header plate).

All combined to induce the failure.

Mechanical failure can be identified by visual inspection of fractured header plate joints.

Cause of this failure is a result of the bottom tank flexing 8mm, forcing the core block into the top tank, distorting the top header plate, and finally cracking.

The core or solder joint cannot be held responsible for poor installation or design.

Corner failures can usually be traced to two basic reasons:

(a) Insufficient side overhang between tank and tube.

(b) Radiator pushed out of square during operating life (or twisting). This can usually be traced to incorrect mounting.

We suggest you read our TIB on mounting checks.

Other items that can affect corner failures are:-
- Hoses too short or too hard
- Isolating mounts too hard
- Tie rods set incorrectly.

External environmental and operating conditions will cause early failure of fin surface.

(a) Salt air corrodes a copper fin. The solution is a core made from solder coated fins.

(b) Close location to sand blasting causes the core to erode away.

(c) Other outside influences include:
- Hoses too short.
- Mounting too hard.
- Tie bars incorrectly set.

Corner core failures can be directly related to inadequate mounting or inadequate side overhang of core. See our TIB #7.

For further information, contact Air Radiators.
Ph: +61 3 5275 6644 Fax: +61 3 5275 3333 Email: mail@airrads.com.au

Issue : 1 Date : 31/05/01

ECN : Approval :

Uncontrolled Document - This copy will not be automatically updated.