Aluminium Corrosion in Water Spaces

efr215

Joined: 06 Nov 2004
Posts: 121

Posted: Thu Jun 07, 2007 1:28 pm Post subject: Aluminium corrosion in water spaces

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From time to time the subject of corrosion in the waterworks crops up for one reason or another. Principally it is the aluminium castings that suffer because it is the least noble metal in the mixture that is the Scott cooling system.

Effectively what we have is a primary cell, (a battery), and the aluminium is the bit that acts as the sacrificial anode. What we need then is something that is more electropositive, more anodic, than the aluminium. If you don't want to get poisoned or irradiated the choices are a bit limited because aluminium is so reactive but there is one metal in common use that fits the bill, Magnesium.

Where then to get some? Well, if you live near a canal go and find a boatyard and scrounge a discarded anode off a narrowboat. A seventy footer might have four or more fitted so there should be plenty to be had.

Once a piece of Magnesium is obtained the remaining problem will be finding somewhere to attach it inside the cooling system. I haven't the numbers handy but about two square inches of surface area should serve. Remember it has to be attached electrically to work, not obstruct the flow and that it will dissolve over time so will need checking.

Worth a try surely, it works in other situations and if it stops your castings turning into a sponge . . .

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Graham

Joined: 28 Aug 2006
Posts: 5
Location: Arkansas

Posted: Thu Jun 07, 2007 5:02 pm Post subject:

Interesting. Could you please expand this topic to cover effects on the brass and solder used in radiators? This really means, will the magnesium prevent the gradual disintegration of the zinc alloyed in?

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efr215

Joined: 06 Nov 2004
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Posted: Thu Jun 07, 2007 6:21 pm Post subject:

Magnesium is about as far down the anodic end of the galvanic scale as we can go

in any practical terms. That is to say almost all other metals and alloys are less liable to corrosion.

The scale goes something like the list below with the noblest first:

Palladium : Platinum : Gold : Silver : Titanium : Stainless steel (316 passive) : Stainless Steel (304 passive) : Silicon bronze : Phosphor bronze : Admiralty brass : Cupronickel : Molybdenum : Red brass : Yellow brass : Naval brass : Chromium plating : Nickel (passive) : Copper : Cast iron : Steel : Lead : Tin : Aluminium : Uranium (pure) : Cadmium : Beryllium : Zinc plating (galvanizing) : Magnesium

The "posh" end of the market will be of no surprise to anyone and are just included to make the point. It will be seen that all the materials from 316 stainless steel down could quite possibly be found in the Scott cooling system and all are above Magnesium in the nobility stakes and should therefore be unaffected by corrosion or certainly less so.

By introducing Magnesium into the equation it renders aluminium no longer the most anodic and so that should also be protected at the expense of the magnesium anode.

You can now see what I was meaning about poisoned or irradiated; Uranium at best makes you glow in the dark and behave like Homer Simpson, cadmium & beryllium are both poisonously nasty. Zinc is no more a problem than magnesium but magnesium is just that bit more effective.

Finally Chlorines are to be avoided at any cost and it is everywhere just to make things complicated, I’m no chemist but I think it is a part of a group called “Halides”. These chemicals it would seem are pretty invasive, will promote stress cracking and it would seem are even able to have a delirious effect on such apparently stable materials as Viton rubber and Teflon so distilled water would certainly seem to be the order of the day.

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efr215

Joined: 06 Nov 2004
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Posted: Thu Jun 07, 2007 7:50 pm Post subject:

"delirious"?!!! Oh! Very droll! Must start taking more water with it! Perishing spellcheckers! Obviously it should have been "deleterious"

That'll teach me to ter try an' talk posh!

Yer can take the boy art ov Essex but yer can't take the Essex art ov the boy!

Like -- Yer know wot I mean? -- Like?