

Corrosion In The Marina

Introduction

Here is a brief guide to how boat corrosion occurs and what you can do to minimise it. We guide you through how to test the condition of your anodes and identify the sources galvanic corrosion. Following these simple steps will help you prolong the life of your boats hull and metal components with the added benefit of you saving money.

Most corrosion happens in the Marina. This has always been the case but with the availability of electrical shore power connections the incidence, and severity, of corrosion has increased significantly.

Why do your anodes disappear?

Two boats in the water in close proximity to one another will have a variety of metal components under the water. Each type of metal will give up electrons at a different rate. This leads to a very small current flowing between the two vessels. The loss of electrons is called oxidation (or corrosion if you prefer).

The metal that loses the electrons depends on its position in the galvanic scale. Magnesium, Zinc and Aluminium for example are at the negative end of the scale and give up electrons quite readily while precious metals such as Gold, Silver and Platinum are relatively inert and are at the positive end of the scale.

Steel, Brass and Bronze are commonly used for shafts and skin fittings and these metals give up electrons less willingly than Zinc for example, but still suffer from galvanic corrosion. The metals corrode in order of their reactivity so an Aluminium propellor would disappear long before a Stainless steel shaft or a Brass skin fitting.

The current flow in these cases is very small and is not a significant issue. Unless of course you have a small fibre glass cruiser with a few small anodes moored next to a large metal hulled barge.



Connecting The Shore Power:

When we plug into the shore power (mains electricity) all boats are connected via the earth cable in the shore power lead. Obviously you need the earth connection so it cannot be disconnected for safety reasons. This means that you now have a very conductive link between all of the vessels and the metal components under the water. This is in essence a large battery and the rate of corrosion has just risen dramatically.

There are several factors that increase the number of electrons your boat loses. These include the type of metal; the surface area of that metal; the conductivity of the water; the proximity of the vessels and the temperature.

It is impossible to prevent some corrosion of your boat, but there are two very simple and sensible courses of action that will save thousands of pounds.



Testing your Anodes:

Most boats will have sacrificial anodes connected to the vital metal components. This helps protect them from losing electrons. Most anodes are made from Magnesium, Zinc or military grade Aluminium. Magnesium is only used for inland waters whereas Zinc is the most common anode for marine craft.

Owners will usually only know the condition of their anodes twice in their lifetimes. Once when they are new and once when they are being replaced.

How Do I Test Anodes?

If the anodes are gone (corroded completely) you have left it too late your boat will have suffered unnecessary corrosion. If they are still in good order you have spent good money taking your boat out of the water for no reason.

The Cathodic Protection Reference Electrode!

All you need to test your Hull Potential and the status of your metal components is to use a Cathodic Protection Reference Electrode and a cable with a multi-meter.

This will give you a mV meter reading that you should log when the anodes are new or just replaced. This is your best and most negative number and is likely to be around -750 to -1000mV.



This will become less negative over time as your anodes deplete. When they are replaced the reading will more than likely be around -750mV. These numbers vary from boat to boat, but once you have a note of the two numbers you will know when the anodes are healthy, and when something is causing the corrosion.

How Do I Check Where The Source Of Corrosion Is?

The first thing to do is to take a Hull potential reading with the shore power disconnected. This should be measured regularly so you can follow the downward trend caused by the depletion of the anodes.

Then you need to take a measurement with the shore power connected. In this instance you are now connected to the boats closest to you via the common earth.

If the new reading is less negative than the reading without shore power, you know you are being protected by the other boats near you. If your result is more negative the opposite is true. You might consider installing a Galvanic Isolator at this point.

Should I Install A Galvanic Isolator?

The Galvanic Isolator will break the link between you and the other boats in the Marina via the common earth in the shore power cables. This means that if you are protecting other boats anodes, by virtue of being better protected yourself, you can essentially disconnect and still have the safety of an independent earth.

To be clear, your boat is still connected to the other vessels as you are in the same body of water but any potential created currents would be small.

Checking The Water In The Marina:

It is possible to check for stray DC and other potential sources of catastrophic corrosion.

All you need is a Cathodic Protection Reference electrode together with a Platinum REDOX probe. Connect these to the Boat Meter or Multi-meter and place them in the Marina together.

Sea water would normally have a reading around +200mv. Fresh water is normally lower than this at say +150mV. The presence of electrons is detected by the Platinum electrode and will change the reading significantly. It will also make the reading less stable.

To see if there is any stray DC or oxidising characteristics you need to make a note of the result in the Marina and then extract a bucket of water from the Marina and repeat the test. If they are different you know you have a local issue.

Moving the electrodes around the pontoon may enable you to identify less problematic moorings or even the source of the issue.



Available Equipment:



BOAT METER



PLATINUM REDOX SENSOR



**CATHODIC PROTECTION
REFERENCE ELECTRODE**



5M CABLE W/ CROC CLIP



WEBSITE



YOUTUBE