

ANODES, ELECTROLYSIS

As a Guide in brief

- 1) Shallow berth more concentrated anodes will wear more quickly
- 2) Deep water is better as anodes will last longer
- 3) Batteries should be isolated, but if you are in a Marina and the boat next to your boat has left the batteries on this will also cause a problem
- 4) The flexible gearbox coupling must always have a earth strap
R & D Marine supply earth straps / silver impregnated strip
Earthing Connectors

More info in detail below

CORROSION AND ELECTROLYSIS

EQUAL CONFUSION TO MOST

(As applied to fiberglass vessels)

It has been said by many electrical (gurus) that the term electrolysis is the most confusing and misused term around the boatyard. Electrolysis is a term that is loosely applied to the corrosion processes. The term refers to "solution phenomena" and not to corrosion.

There is a type of corrosion called electrolytic corrosion but it is not electrolysis. Electrolysis refers to the degradation of an electrolyte that occurs as a result of passing electrical current through it. Electrolytic corrosion is caused by a current from an external source, often the boat's battery or shore supply. The current that causes electrolytic action is called "stray current" and usually emanates from a poorly installed electrical circuit or a bad earthing (ground) arrangement, like a poorly installed electrical circuit or bad ground arrangement on a radio or power tool or a current leak due to damp connections.

The confusion is usually between the terms galvanic corrosion and electrolytic corrosion. Galvanic corrosion is caused by an electric current generated by two different metals in a conducting medium such as seawater. When we talk about galvanic corrosion we're talking about an electric exchange. The results of each type of corrosion can be similar and can occur at an alarming rate. The bottom line however is that you can have a properly wired boat moored at a properly wired dock and still be at risk of corrosion.

Where is the safest place to store my boat to repel these enemies of corrosion. It helps if you keep your vessel out of the conducting medium, like seawater, or well away from other vessel's feasting on shore supplied alternating current that may be leaking to or from God knows where. When your vessel is anchored out half the problem is eliminated (this makes a good case for cruising). Now some of you can dry store your vessel and that prevents a host of problems, but many of us are stuck in the wet stuff.

Galvanic Isolators

Our first line of defense against galvanic corrosion is sacrificial anodes, you know those dissolving jewels your diver friend frequently invoices you for and calls them zincs. Anode according to American Boat and Yacht Council is the electrode of an electrochemical cell with more negative potential, the least noble metal of an electrolytic cell that tends to corrode. For these things to work we must have a galvanic couple. A galvanic couple is a pair of dissimilar conductors (common) metals in electrical contact in an electrolyte such as seawater. I look at it this way, its sort of like the taxpayers are the anode, and the federal government is the cathode. The anodes waste away while protecting the cathodes. I must be least noble because by the end of the year I feel pretty eaten up. If a zinc does not contain Cadmium, it is not U.S. Navy Mil Spec Zinc and will not properly protect your underwater jewels. The navy has undergone extensive research and have stated that the presence or absence of certain other metals greatly affects the ability of the zinc anode to perform. In particular, Lead, iron, and Copper tend to poison the anode and small amounts of Aluminum and Cadmium tends to enhance the performance.

Thus "Mil.Spec. A - 1800 - J" became the specific military specification (.005% Iron, .005% Copper, .006% Lead, .025 - .070% Cadmium, 1 - 5% Aluminum and the remainder Zinc) elements in a proper anode to protect the ship. When you haul your vessel and find your anode (zinc) coated with an insulating film, it was useless. The non mil spec zinc anodes provide reduced protection levels and form an insulating crust that prevents access of water to the surface. This is like the taxpayer that doesn't pay their taxes, they aren't wasting away and are no good to anyone. There needs to be a balance here and you can be under or over zinced. There is much to know about anodes, but lets move on to another weapon that has been developing for some time, Galvanic Isolators.

According to American Boat and Yacht Council, a galvanic isolator is a device installed in series with the (AC) grounding (green) conductor of the shore power cable to block low voltage DC galvanic current flow, but permit the passage of alternating current (AC) normally associated with the (AC) grounding (green) conductor. This device helps combat galvanic / stray current corrosion. American Boat and Yacht Council have written a standard for construction, installing and testing this equipment that more and more manufacturers are providing and many boaters like myself are installing as an after market upgrade in an effort to protect our vessels. The National Fire Protection Association also diagrams and issues standards in a properly constructed and installed galvanic isolator. This is an important corrosion tool which is effective and necessary, as long as the vessel is connected to shore based power. Its function is to block the flow of galvanic current between dockside and the vessel via the green safety grounding conductor.

In our preliminary investigation of Galvanic Isolators, I discovered that there are some major concerns by electrical gurus as to the safety of some isolators due to components and construction and lack of Underwriting Laboratories testing. In order to confirm this discovery, I had a telephone conference with Underwriter Laboratories and discovered that there is only one Isolator that has gone through their rigorous testing procedure and bears the UL seal and that one is manufactured by Mercury Marine. The major difference is that some isolators have only diodes which can be "biased"

becoming conductive by small AC current leakage through the ground circuit allowing galvanic current to pass along with the AC. This current leakage renders isolators with only diodes useless. The Mercury manufactured unit has a capacitor that solves this problem.

If you intend to install a galvanic isolator, do your homework and be sure to follow American Boat and Yacht Council's suggestions to installing this equipment to insure safety. The current ABYC Standard A-28 lists the testing sequence of a Galvanic Isolator which includes AC Conductivity test, Vibration Test, Shock Test, Temperature Test, Short Circuit Test and Strain Relief Test. The requirements in general state that isolators be tested by an independent laboratory to establish the isolators compliance with this standard and that isolators be provided with instructions covering installation requirements including a complete set of electrical instructions with diagrams. Faulty ground paths are contributing factors in every marine related electrocution / drowning. A properly installed Galvanic Isolator is a device available to equip a vessel to a higher standard. Our vessels are resting in harsh environments. A neighbors boat with stray current problems can cause accelerated corrosion to other boats plugged into the same shore line if they provide a better ground. Stray current would be transmitted to other boats through the common ground wire but can and should be blocked by installing a Galvanic Isolator.