September 2017 Newsletter

Text and photos by Steve D’Antonio

Photo Essay: (Not) Painting Aluminum

It’s a phenomenon I encounter on a near-weekly basis; virtually every vessel I’m aboard suffers, to one degree or another, from a failure of painted aluminum surfaces. This includes cranes, window frames, doors, hatches, arches and masts.

To a degree, aluminum, left to its own devices, is naturally corrosion resistant, (see this article for more on the subject); as soon as it’s exposed to oxygen it develops a tough, clear oxide film, negating the need for paint. Unlike steel and iron, it is, therefore, not harmful to leave aluminum in its natural, unpainted state, and many commercial and military vessel operators take advantage of this attribute.

With some notable exceptions, such as the Dashew FPB series, most will agree that for pleasure vessel use, unpainted aluminum can be unattractive. Make no mistake about it, with the exception of anti-fouling paint; the only reason to paint aluminum is to improve its cosmetic appearance.

Not only is paint an unnecessary addition to aluminum, applying it can be detrimental; it can actually promote corrosion (unless appearances dictate otherwise, this includes aluminum fuel tanks, I began specifying unpainted tanks more than 20 years ago). Achieving reliable adhesion between aluminum and any coating is challenging. The smallest breach in the coating nearly always leads to poultice corrosion, a phenomenon which can only occur when aluminum is both exposed

to moisture and robbed of oxygen; an environment that often exists at the base of a nick or scratch on a painted surface. This forms the toe-hold for poultice corrosion, which progresses to unsightly aluminum hydroxide-filled blisters and eventually coating failure.

The best defense against this scenario is to avoid painting aluminum weather deck hardware, along with cabins, decks and hulls (and tanks). The next best option is to ensure coatings over aluminum remain intact; thoroughly bed all fasteners and hardware assemblies using polyurethane or polysulfide sealant, to seal paint which inevitably fractures in these locations during hardware installation, and make sure all surfaces that are to be painted are free of sharp ridges where paint is naturally thin, and all holes and edges should be radiused or beveled.

Ask Steve

Hi Steve,

I own Nordhavn 46/82. Thank you so much for your article on Electric Shock drowning. I have a few questions I hope you can answer.

1. Our boat has an Olson isolation transformer. Is it needed to install an ELCI if the shore source of current is already isolated from the boat? Wouldn’t an ELCI just be an unnecessary redundancy?
2. I know that even if our boat has an ELCI or isolation transformer that it is still not safe to be in the water in a marina because of other un-isolated or unprotected vessels. The question I have is how far away from the marina is a safe distance to swim? If the current is going back to its source then where is the source? At

the location of the fault, the boat, the dock pedestal? If I am not in between the docks of a typical marina and am let's say 100 feet outside the general perimeter of the dockage am I safe?
3. Is it possible for the marina to provide this protection at their equipment rather than the boater?
4. Finally, if I am not in a marina but instead at anchor running the genset is there any risk of electrocution?

Thank you so much for your time and efforts with our owners' group. Your expertise helps make my wife and me, with our 7 year old daughter, feel much safer.

Kal Blumberg

Kal:

With one exception, ABYC Standards do call for the use of an ELCI in transformer installations, saying the following…

"E-11.11 GROUND FAULT PROTECTION – AC

11.11.1 An Equipment Leakage Circuit Interrupter (ELCI) or Type A Residual Current Device (RCD) shall be installed with or in addition to the main shore power disconnect circuit breaker(s) or at the additional overcurrent protection as required by E-11.10.2.8.3 whichever is closer to the shore power connection.

EXCEPTION: Installations where an isolation transformer is installed within 10 feet (3 m) of the shore power inlet or the electrical attachment point of a permanently installed shore power cord and supported according to 11.14.4.1.3"

I would argue that an ELCI is more than just desirable in an isolation transformer installation, it's necessary because the transformer's case is not, and cannot be in order for it to provide isolation, grounded to both the vessel's and shore side ground. Typically, the case is connected to the vessel's

ground. Therefore, in the unlikely event the case becomes energized with the shore side current, there is no path back to the source, and the breaker will not trip, and the case remains energized; in which case a person could complete the path by touching it and something that is referenced to the shore, such as a seacock, rudder stock etc. An ELCI would present a defense against such a scenario.

The above-noted exception, by the way, is one with which I strongly disagree. With very few exceptions, I believe shore power inlet wiring should be protected as close to the inlet as possible almost regardless of its length, as the up to 10 foot allowed unprotected run between the inlet and the transformer, or main panel if no transformer is used, is essentially only protected by the dock pedestal circuit breaker; these are notorious for being faulty.

How far away from energized docks one can swim is a difficult question to answer, among other things it’s a function of the salinity of the water and the current available to the fault, variables that are impossible to quantify at the time you intend to swim. While there are no guarantees, generally speaking, the consensus among my marine electrical colleagues is to stay at least 150 feet from energized docks and ground stakes ashore.

The “source of power” is the transformer, which is typically located at the head of the dock or in the parking lot area. It’s essentially wherever that transformer is grounded to earth. Fault current will travel through the water, and to the land to which that transformer is grounded.

More and more marinas are installing ground fault protection at the point of power, the dock pedestals. Unfortunately this has been problematic as the trip current ranges from 5 to 30 mA, and as such, for those in the lower threshold range, nuisance trips are very common. The good news for you is, vessels equipped with transformers, isolation or polarization,

are unlikely to suffer from nuisance tripping even at the lower range.

While I can’t guarantee it couldn’t happen, I am not aware of any ESD’s occurring with generator use (electrocutions on the other hand have occurred, it’s no different than shore power aboard, along with inverters). If a fault occurs, the current will attempt to return to the genset, and it is unlikely this return path will be through the water, and even if it is, it’s likely to be direct, from a strut to a through hull, or through hull to a ground plate for instance, rather than spreading outward away from and around the vessel. If you swam into that path it’s possible you could become a victim, however, again I am not familiar with any such cases.

Hi Steve,

I’ve been following your column and articles for many years for your valuable tips.

My question concerns bilge pumps, particularly for use in deep bilges where a separate float switch isn’t feasible to install. I’ve been using various pumps with built-in sensors which senses the depth of water, turns on, then supposed to shut off when the level drops…often it doesn’t, and runs and runs.

Another type of sensing pump run momentarily every 2 minutes, if no water is found it will wait for another 2 minute cycle.

On my pump the interval is every 12 seconds!

I seem to have to replace my bilge pump every year or so. Is this technology still evolving? Even float switch have become less dependable since mercury was banned.

By the way, I have a high-capacity bilge pump mounted below the floor boards with a separate float switch for when the day the deep bilge pump doesn’t answer the call.

There’s no oil or contaminates in the bilge to give false readings and no persistent leaks, a dry bilge.

Thanks,

Ron Bruno

Ron:

Two solutions come to mind. The first is Ultra Safety Systems Ultimate Pump Switch Mini. It’s pretty small and will likely fit in the space you have. Unlike the paddle type switches it’s a cylinder and thus has a smaller foot print.

Alternatively, you can use one of the pressure-actuated switches such as Jabsco’s Hydro Air. The “sensor” or pressure bell can be located as much as 10 feet below the switch mechanism, making it suitable for deep, narrow bilges.

I’ve only resorted to the automatic pumps in very rare cases, I find them to be problematic as well.

Do you have a high water alarm? If not I’d strongly recommend one. While a stand-alone system is preferred, if you have no room for another switch, and if your bilge is typically dry you could attach an audible alarm to your bilge pump, which would sound an alert whenever the pump was triggered.

Hi Steve,

I have had a 1985 Ericson 38 in the Deltaville area for several years. Recently, the dock master at Fishing Bay Yacht Club plugged in a Galvanalert cord to all the boats on our

dock, and mine apparently popped a yellow “accelerated” corrosion indicator.

I have not had any unusual zinc activity, but sometimes if I run multiple AC appliances onboard the main outlet gets pretty warm. Could that be related?

I am not clear about what to do next.

Do you have any suggestions?

Thanks,

John Cabell

John:

The Marinco Galvanalert is a tool that measures DC voltage (DC voltage causes corrosion, AC, with rare exceptions, does not) on the shore cord’s green safety grounding wire. While it can be somewhat useful, it can also be misleading. Without a more thorough analysis, it’s difficult to determine the potential level of corrosion, as the Galvanalert’s literature provides no voltage thresholds or levels.

Having said this, if your vessel is not equipped with a galvanic isolator, it should be. Doing so will almost certainly extinguish the “Medium Activity” indicator. Galvanalert or not, every vessel that plugs into shore power should be equipped with a galvanic isolator, it’s cheap insurance against galvanic corrosion induced by other nearby vessels.

If your vessel is already equipped with a galvanic isolator, there’s a good chance it’s either not wired properly or it’s no longer operating; it should be tested and the problem corrected or unit replaced with one that meets the current ABYC A-28 standard.

The “warm outlet” should be investigated, removed, inspected

and replaced of necessary. If the outlet is sound it may be a wiring issue, don’t ignore this clue, it could be the precursor to a fire.

Hi Steve,

For producing a LOT of electricity, why wouldn’t a pto-powered hydraulic pump linked to a hydraulic motor directly attached to the alternator shaft work more reliably than any belt?

Regards,

Bob Frenier

Bob:

On the face of it that seems like a great approach, and it was used by some builders for a period of time, including Nordhavn. I haven’t seen a new installation in years. In fact it’s pretty darn inefficient, turning mechanical energy from the engine into hydraulic fluid pressure, which is then converted back into mechanical energy to turn an alternator, induces significant loss and inefficiency, on the order of 10% to 15%. Additionally, it’s often difficult to turn an alternator fast enough using a hydraulic pump; that speed is needed not only to produce adequate energy, it’s also used to operate the alternator’s fan for cooling purposes. In their heyday it was not unheard of for hydraulic alternators to overheat and even catch fire.