May 2025 Newsletter – Lifeline Corrosion

Photo Essay: Lifeline Corrosion

While plastic coated wire lifelines are a ubiquitous aspect of small boat safety, they aren't without their shortcomings. Long ago, while a student aboard a sail training vessel, an experienced crew member gave me advice about lifelines that has stayed with me for 40 years, "The lifeline isn't there to save you, and you should never rely on it to do so. No, instead it's a reminder, a borderline that you should never cross".

Wire lifelines, particularly those used aboard sailing vessels, are often coated in white plastic in order to reduce chafe damage to sails. However, as is so often the case, the law of unintended consequences rears its head; water can migrate between the plastic coating and the wire, where it becomes trapped, which in turn sets up an ideal environment for crevice corrosion. Eventually the wire will part, typically at the swage connection. I have personally seen this happen on several occasions, frequently when someone places their full weight on the lifeline, while boarding a vessel from the dock or a tender. For this reason, I cringe whenever I see folks grabbing and hanging on lifelines.

Ideally, stainless steel wire lifelines are best left uncoated; certainly, this should be the case on power vessels. While it may hasten sail chafe, it virtually guarantees the wire will remain corrosion-free, eliminating the possibility of corrosion-induced failure.

The lifeline shown here has the brown 'tea staining' earmarks of ongoing crevice corrosion. It should be replaced without

hesitation.

Ask Steve

Steve,

I read your article on installing prop nuts… install the big one first and tighten then remove and install the little one and then the big nut. A yacht tech had mine on just the opposite… big one first then the small one.

My question is, are there any torque specs for the nuts? For example, when I install the big one first do I torque it to a certain spec before I remove it? When I remove it and install the small one is there a torque for that? Lastly, once the small one is installed and I install the bigger in its final location, is there a torque for that?

Nick DeRaimo

Dear Nick:

You've posed some very good questions.

This Spreadsheet offers guidance for propeller nut torque; it is the result of collaboration with another reader. While I did not include it in the propeller installation column, yes, the initial large nut installation should be torqued to the torque specification, as it is being relied upon to drive the prop fully into the shaft taper. The half-height nut does not need to be torqued per se, while the second installation of the full-height nut should be torqued to the torque specification.

You might also find this of interest.

Steve,

I have read a few of your articles on bonding wires in boats… a lot of great information. I've seen only one mention of the proper wire size to be used; it was for using an 8ga wire for a shaft bonding system. Looking at my boat, there are various sized bonding wires going everywhere. Similar sized sea cocks have 8 and 10 ga wires daisy chained together and running throughout the boat. I've read your suggested bonding strap dimensions and discussion on placement of terminal blocks on existing boats.

What size should the bonding wires should be used?

I'm thinking of installing a terminal block in each head for the multiple sea cocks under the sink cabinets, then adding a terminal block on each side of the engine room.

Also thinking of using 8ga tinned copper strand from each item being bonded to the terminal strip and then 10ga tinned copper strand from the terminal blocks to the bonding strap of the boat…. when I find it.

Plan also to use KORP-SHEILD CP8-TB, a copper anti-seize compound, on the wires before crimping and then waterproof heat shrinking. As well as using it in the threads and around the connections to the items being bonded. This how the product is designed to be used per the manufacturer. Then over spraying the attachment bolts with a corrosion coating. Sound acceptable?

Boat: 1994 Nordhavn 46

Sincerely,

Harold Carrison

Harold:

Relevant sections from ABYC Standard E-2 Cathodic Bonding are worth sharing…

- 2.5.8.1 Cathodic bonding conductors shall be oil resistant, insulated, tinned, stranded copper wire, or uninsulated copper strip. Copper braid or copper tubing shall not be used for this purpose.
- 2.5.8.2 Wire, where used as a cathodic bonding conductor, shall be at least #8 AWG.
- 2.5.8.3 Cathodic bonding conductors fabricated from a copper strip shall have a minimum thickness of 1/32 in (0.8 mm) if connections are thru-bolted and a minimum width of 0.5 in (13 mm), or
- 2.5.8.3.1 connections using machine screws shall have a minimum thickness sufficient to allow for the engagement of four threads at connections if drilled and tapped, and a minimum width of 0.5 in (13 mm).
- 2.5.8.4 Self tapping fasteners shall not be used at connections.
- 2.5.8.5 Insulated conductors shall be selected from ABYC E-11, *AC and DC Electrical Systems on Boats*.
- 2.5.8.6 Insulated conductors shall be identified by the color green or green with yellow stripe(s).
- 2.5.10.2 if a lightning protection system is installed on the boat, this conductor shall not be less than the equivalent of #6 AWG (see ABYC TE-4*, Lightning Protection*).

The strategically placed terminal strip approach makes good sense. If you use tinned wires, and tinned high quality (more on that subject here), heat shrink terminals, there's no need to use a conductant paste on the wire strands before inserting them into crimp terminal. However, it does make good sense to use conductant, or dielectric, grease between all ring terminals and the surface they are installed over (while there are copper-based anti-seize compounds, Koper Shield is a conductant paste, and not an anti-seize). Once complete, all bonding connections should be sprayed with a "drying" corrosion inhibitor, one that cannot be easily wiped off.

Dear Steve,

I have a Poly-“something” fuel tank never before filled that will get diesel. I know the tank will expand 1-3% when first filled, and then not change size again. I am writing to ask over what period of time this expansion takes place; a day, a week, or a month? I have tried to research this but to no avail.

Would appreciate any thoughts.

Rick Schuch

Rick:

Cross linked polyethylene, or XLPE, the variety of polyethylene that must be used for diesel fuel, is subject to hydrocarbon expansion of between 2% and 6% or ¼” per foot. This can take as long as a month of full emersion exposure to occur, more on the subject in this article, part II of a two part fuel tank series.