



Galvanic Isolator Safety and Liability Considerations

Safety Considerations

Galvanic isolators are installed on boats to prevent galvanic corrosion when the boat is connected to a shore power source; however, that is not their only important function. The fact that a galvanic isolator is installed in series with the safety grounding conductor of the shore power cable makes this product a critical link in safety grounding of the boat. If an electrical fault on the boat occurred and this safety grounding path was interrupted, personnel on the boat or bridging the boat and the dock and anyone in the water near the boat could be subject to serious electrical shock or potential electrocution. A number of electric shock drownings have been reported due to loss of grounding conductor continuity and some other marina drownings are highly suspected to also have been due to this cause.¹

Background Information

Products that perform the same functions as a marine galvanic isolator, though generally with much higher ratings, are also commonly used in the general corrosion protection industry, where it is often necessary to prevent the flow of dc current while providing ac continuity. In the corrosion industry, these products are generically called "decouplers." All such decouplers, when used in the grounding path of electrical equipment, must meet specific requirements of the U.S National Electrical Code (NFPA 70); namely Article 250.2, which defines an "effective ground fault current path," and Article 250.4(A)(5) which defines the requirements of an effective ground fault current path. The two key criteria are that the grounding conductor continuity must be permanent so safety grounding is always provided and it must be low impedance so circuit protective devices function properly. Nearly identical requirements exist in other international codes. The key point is that all of these codes require that the continuity of the safety grounding path can never be compromised.

Another item of interest is that monitoring of a decoupler is not a requirement in any segment of the corrosion industry, as corrosion monitoring is always treated as a separate issue. If a decoupler meets the safety codes and cannot fail open, then monitoring is only useful for detecting if corrosion is occurring, and present monitoring methods for marine galvanic isolators do not address corrosion detection – only failure of the device. Therefore, a fail-safe decoupler or isolator does not benefit from monitoring, as discussed below.



In the U.S., the electrical standards for most boats/yachts do not come under the U.S. National Electrical Code (NEC), but rather under the American Boat and Yacht Council (ABYC), and the standard for galvanic isolators is ABYC A-28. When A-28 was written it did not adopt the long-standing, previously established criteria for an effective ground fault current path from the code referenced above; hence, a marine galvanic isolator per the existing A-28 standard is not required to maintain continuity of the grounding conductor of the shore power cord - a potentially hazardous condition. To compensate for this concern, A-28 added a requirement for monitoring the galvanic isolator and to provide an alarm if the galvanic isolator failed open-circuit. DEI believes that this is a poor substitute for a galvanic isolator that meets the requirements of the previously referenced codes that assure safety grounding. The very event that would cause a galvanic isolator to fail open may well be the event that creates the potentially hazardous condition when grounding is lost, and which may also damage the monitor that is to provide the alarm. Even when the monitor alarm works properly, a potential hazard exists until the alarm is noted and the problem corrected. The most reliable galvanic isolator design is one that meets the code criteria referenced (i.e., assured grounding continuity at all times) and is not encumbered with the electronic components of a monitor that are much more subject to failure.

DEI Galvanic Isolators

DEI only manufactures fail-safe galvanic isolators that have been tested for compliance to all NEC requirements, to the Canadian Standards Association (CSA) 10-500 requirements (similar to the NEC requirements), to the European Union requirements, as well as tested to the anticipated ABYC A-28 requirements. "Fail-safe" means that an open circuit failure is not allowed even when the galvanic isolator is subject to a current and time duration that will raise the conductor associated with a given GI current rating to its melt temperature; hence, the primary reason for monitoring is eliminated. For this reason, and considering that the next revision to A-28 proposes to eliminate monitoring for fail-safe isolators, DEI galvanic isolators are not monitored but exceed every other requirement of the existing ABYC A-28 standard and the worst-case of all proposed revisions to A-28 presently under discussion by the ABYC galvanic isolator standards committee. With independent (third-party) testing to these higher level safety criteria, the DEI galvanic isolators offer greater safety and liability protection for boat builders, electrical installers, operators and owners.

Liability Implications

It is not clear as to when the revisions to ABYC A-28 will be finalized. However, consider which has the lesser liability implications: Using a galvanic isolator that just meets the existing version of A-28 and has a monitor, but can fail open circuit, or using a galvanic isolator that does not have a monitor, but is fail-safe and meets all worst case proposed revisions to A-28 as well as the higher level safety code requirements for decouplers used in all applications outside of the marine industry.



As a galvanic isolator manufacturer, we do not believe that a lawsuit resulting from an electric shock or electrocution that was the result of a galvanic isolator failing open circuit, even though it completely complied with the existing version of A-28, would be defensible given that this same category of product, when used outside of the marine industry, has long been required to comply with the considerably more stringent safety criteria in the other codes referenced. A boat builder or installer of galvanic isolators should have similar safety and liability concerns.

Product Availability

The next generation of trouble-free, fail-safe marine galvanic isolators made to this higher safety criteria are available now from DEI. The rating options and technical details are available on the DEI website www.dairyland.com.

References:

1. James D. Shafer and David E. Rifkin, Electric Shock Drowning Incidents – Marinas, paper, February, 2006.



