

Ground Fault Circuit Interrupters at Anchorage 47

History:

On January 1, 2013, a new version of the California Electrical Code, based on the 2011 version of the National Electrical Code¹, went into effect. This updated code included a new provision affecting the electrical power distribution systems to docks and marinas². This new provision is intended to protect the boating public from the hazards of electric shock by requiring the use of Ground Fault Circuit Interrupter (GFCI) protection of all marina shore power connections.

While GFCI protection has been required by both the National and California Electrical Codes in most wet locations for more than 20 years (most of you have these devices installed on the outlets in your kitchens and bathrooms at home) it had not been required at shore power connections in California before January of 2013. For this reason, many of you may experience difficulties with the shore power distribution system for the first time when moving to Anchorage 47. While this is currently the only anchorage in Marina del Rey to be affected by these issues, as more of the anchorage operators perform upgrades and improvements to their docks in the coming years, such problems will become far more common.

How it Works:

A Ground Fault Circuit Interrupter works by detecting current leakage along a circuit and acting to shut down power to that circuit before it can cause significant injury or death. This is achieved by measuring the load on the neutral conductor and comparing it to the load on the line or “hot” conductor. Under normal circumstances, these two loads will equal each other. If the two loads are not equal, this indicates that there is current leaking to ground somewhere along the circuit. In a wet environment, this can easily mean that someone can be shocked or that there is current being discharged to the water. When the GFCI detects such an imbalance between the two measured loads, it will trip the device and shut off the power.

In order to provide protection against electric shock, the threshold for an acceptable current imbalance must be kept very low. Most GFCI devices are set to trip once a 5 mA imbalance is detected between the line and neutral conductors. In order to avoid nuisance tripping of the GFCI devices, marinas are allowed to use GFCI protection that is set to trip at a much higher load imbalance than the typical GFCI device. For instance, the devices installed at Anchorage 47 are set to trip once a load imbalance of 30 mA is detected. While this is 6 times as much leakage as would be normally acceptable in a typical restroom or kitchen, given the special conditions and rigors of the marine environment, nuisance tripping is still a possibility.

Troubleshooting Procedures:

In order to avoid nuisance tripping, you will be asked to meet with a Department of Beaches and Harbors (DBH) representative at the Burton Chace Park Transient Docks to test the current leakage on your vessel prior to moving into your assigned slip. The Burton Chace Park Transient Docks were built before the requirement for GFCI protection at marinas was put into effect and should not trip even if leakage above the 30 mA threshold is detected. This will allow the representative to measure the amount of current

¹ NFPA 70

² Cal. Electrical Code, Sec. 555.3

leakage that will be detected by the GFCI device and verify that your boat is ready to use the new shore power distribution system at your slip.

In order to test the vessel, you will be asked to connect to shore power with all of your on board electrical devices powered off. The representative from DBH will then measure the amount of leakage using a meter at the shore power cord. You will then be asked to turn on each of your on board electrical devices one at a time. As each device is turned on, the leakage will be measured at the shore power cord. The representative will inform you of any devices that show a high level of current leakage upon startup. The source of any objectionable leakage can usually be determined in this fashion. If unacceptable levels of current leakage are detected, a qualified electrician should be able to determine the cause and repair the issue.

If the total current leakage measured is less than the 30 mA threshold with all electrical devices operating normally, your vessel should be able to use the new shore power distribution system without nuisance tripping. If the total current leakage exceeds 30 mA at any time during the testing, you will need to determine the cause of the leakage and repair it prior to moving into the new slips. All boats must be tested and show less than 30 mA of total leakage before being allowed to move to the new docks.

{Note to Electricians: There are devices aboard many vessels that bond the neutral and grounding conductors at the device. This condition will almost always result in nuisance tripping, as current from the vessel's grounding system may flow back to the shore power neutral, or current from the shore power system may leak to the vessel's grounding system. Either of these situations will result in an imbalance in the current reading between the shore power neutral and line conductors, and cause the GFCI device to trip. All onboard devices, including inverters, battery chargers, water heaters, refrigerators and generators, should have the neutral and grounding conductors isolated from each other when under shore power to avoid this issue. Alterations, upgrades, changes, or repairs to the wiring of a vessel, or any of its components, should only be performed by a fully qualified and licensed electrician.}

The purpose of GFCI protection is to reduce the risk of serious injury and death by electric shock in a wet environment. Overriding these devices is a violation of the terms of the slip rental agreement, as well as of State and County law. For your own safety, as well as the safety of your fellow boaters, do not tamper with the shore power distribution system.