Isolating the electronic equipment from all other power equipment by disconnecting it from the power equipment ground is not the correct solution, nor is removing the equipment grounding means or adding nonmetallic spacers in the metallic raceway system. Those solutions are contrary to fundamental safety grounding principles covered in the requirements of Article 250. Furthermore, if the electronic equipment is grounded to an earth ground that is isolated from the common power system ground, a potential difference can be created, which is a shock hazard. The error is compounded because such isolation does not establish a low-impedance ground-fault return path to the power source, which is necessary to actuate the OCPD. Section 250.6(B) does not permit disconnecting all safety grounding and bonding connections to the electronic equipment in order to reduce an electromagnetic interference (EMI) problem.

See also

250.6(D) and its commentary for limitations to alterations

Δ **(C) Currents Not Classified as Objectionable Currents.** Currents resulting from abnormal conditions such as ground faults, and from currents resulting from required grounding and bonding connections shall not be classified as objectionable current for the purposes specified in 250.6(A) and (B).

(D) Limitations to Permissible Alterations. This section shall not be considered as permitting electronic equipment to be operated on ac systems or branch circuits that are not connected to an equipment grounding conductor as required by this article. Currents that introduce electromagnetic interference or data errors in electronic equipment shall not be considered the objectionable currents addressed in this section.

Section 250.6(D) indicates that currents that result in noise or data errors in electronic equipment are not considered to be the objectionable currents referred to in 250.6, which limits the alterations permitted by 250.6(B).

See also

250.96(B) and **250.146(D)** for requirements that provide safe bonding and grounding methods to minimize noise and data errors

(E) Isolation of Objectionable Direct-Current from Cathodic Protection Systems. If isolation of objectionable direct currents from a cathodic protection system is required, a listed isolator device shall be permitted in the equipment grounding conductor path to provide an effective return path for ac ground-fault current while blocking the flow of direct currents.

The listed ac coupling/dc isolating device allowed by this section blocks the dc current on grounding and bonding conductors and allows the ground-fault return path to function properly. These devices are evaluated by a recognized qualified electrical testing laboratory for proper performance under ground-fault conditions.

Where cathodic protection for the piping system is provided, the required grounding and bonding connections associated with metal piping systems allow dc current to be imposed on grounding and bonding conductors.

250.8 Connection of Grounding and Bonding Equipment.

(A) Permitted Methods. Equipment grounding conductors, grounding electrode conductors, and bonding jumpers shall be connected by one or more of the following means:

(1) Listed pressure connectors
(2) Terminal bars
(3) Pressure connectors listed as grounding and bonding equipment
(4) Exothermic welding process
(5) Machine screw-type fasteners that engage not less than two threads or are secured with a nut
(6) Thread-forming machine screws that engage not less than two threads in the enclosure
(7) Connections that are part of a listed assembly
(8) Other listed means

By specifically identifying machine screws and thread-forming machine screws as acceptable connection methods, this section does not permit other types of screws, such as sheet metal screws or drywall screws, to be used for the connection of grounding and bonding conductors or terminals. Coarse-threaded screws do not satisfy product certification standard requirements for grounding and bonding connections to engage two full threads of the screw into a metal box or other metal enclosure.

Listed pressure connectors, such as twist-on wire connectors, do not have to be specifically listed for grounding and bonding. The use of listed pressure connectors other than those that are green in color is permitted for the connection of grounding and bonding conductors. Exhibits 250.2 and 250.3 illustrate two acceptable methods of attaching an equipment bonding jumper to a grounded metal box.

(B) Methods Not Permitted. Connection devices or fittings that depend solely on solder shall not be used.

250.10 Protection of Ground Clamps and Fittings. Ground clamps or other fittings exposed to physical damage shall be enclosed in metal, wood, or equivalent protective covering.

Δ **250.12 Clean Surfaces.** Nonconductive coatings (such as paint, lacquer, and enamel) on equipment to be grounded or bonded shall be removed from threads and other contact surfaces to ensure electrical continuity or shall be connected by means of fittings designed to make such removal unnecessary.

Certain fittings, such as locknuts and star washers, can be designed to ensure good electrical continuity to the contact surface through nonconductive coatings. The key is for the installer to make the connection up tight to ensure that the locknut provides that good electrical connection.

Part II. System Grounding

Δ **250.20 Alternating-Current Systems to Be Grounded.** Alternating-current systems shall be grounded in accordance