

Grounding & Bonding – The Basics

The first step toward safe and stable operation of AC powered electrical and electronic devices are a properly designed and installed grounding system. The importance proper & appropriate grounding and bonding can not be overstated. Grounding, equal potential bonding, lightning protection, and surge protection are interdependent technologies.

Today, proper and appropriate grounding far exceed the NEC requirements for life safety grounding. Due to the wide range of soil and installation conditions most often selection of materials and grounding system design is complicated at the very least. In addition to the basic design provisions must be made for future testing of the system installed. Long gone are the days when a ground rod(s) is driven and forgotten until a problem is experienced. The design of a proper and appropriate grounding and bonding system should be completed by a competent licensed professional electrical engineer (PE).

Equal potential bonding is required for structures, equipment and systems with more than one ground reference. Not only is bonding required for life safety, it is also critical to for networked equipment. The most sophisticated surge protection devices and systems protection equipment can not protect networked equipment from damage without proper and appropriate equal potential bonding.

The reliable protection of a facility from lightning can not be achieved without low-impedance grounding and bonding. An air terminal can not capture lightning energy without a low impedance path to ground. Any such system should be designed to meet NFPA-78 and UL (Underwriters Laboratories) master label standards.

The most expensive AC power surge protection device (SPD) will provide poor performance without a low impedance path to ground. Low voltage surge protection devices can induce ground surges to protected networked equipment if ground loops are present. Many such devices do not function without a low impedance path to a single point grounding system.

The sophisticated noise (EMI & RFI) shielding can not dissipate unwanted noise without a low impedance path to ground.

- ◆ Eliminate shock hazards of all conductive enclosures that may be touched by personnel.
- ◆ Provide protection from large electrical disturbances (such as lightning) by creating a low resistance path to earth.
- ◆ Reduce Static Electricity that may be generated within facilities.

- ◆ **Limit voltage in an electrical distribution to definite fixed values.**
- ◆ **Limit voltage to within insulation ratings.**
- ◆ **Provide a more stable system with a minimum of transient over voltage and electrical noise.**
- ◆ **Provide the proper conditions for power quality devices to operate to their design specifications. (SPDs, UPS, Power Conditioners, etc.)**
- ◆ **Provide a path to ground in fault conditions for quick isolation of equipment with ground fault protection.**
- ◆ **Improve the operation of equipment sensitive to electrical noise.**
- ◆ **Provide a stable platform for the operation of sensitive networked equipment.**
- ◆ **Increase the life of electrical and electronic devices.**
- ◆ **Eliminate ground loops (difference in ground potential).**
- ◆ **Improve the effectiveness of network, control and loop SPD's.**
- ◆ **Increase the effectiveness of EMI & RFI shielding.**