



Inspection Techniques: Primer on Bonding and Grounding

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Learning Objective: The student shall be able to explain the difference between electrical bonding and grounding.

There are numerous references in the fire codes to electrical bonding and grounding for hazardous materials containers, especially low flashpoint flammable liquids. Bonding and grounding are effective techniques for reducing the likelihood of ignition from static electricity.

Electrical **bonding** is the practice of intentionally electrically connecting all metallic non-current-carrying items so they have the same electrical potential. When liquids pass through air, such as when flammable liquids are poured or dispensed, they collect static electricity. Static sparking cannot take place between objects that are the same potential.



This bonding clip connects to another container to remove the electrical potential.

Grounding is a form of bonding in which conductive equipment is connected to an electrode driven into the soil or to the building grounding system to prevent sparking between conductive equipment and grounded structures.

In potentially flammable locations, all conductive objects that are electrically isolated from ground by nonconductive items—such as piping or hoses, flexible hoses, flexible connections, equipment supports, or gaskets—should be bonded. An isolated, conductive object can become charged sufficiently to cause static spark. Objects which may become isolated include screens, rims of nonconductive drums, probes, thermometers, spray nozzles, and high pressure cleaning equipment.

Bonding and grounding cables must be durable and of low resistance (ohms or Ω). Connections of bonding conductors to process equipment must be direct and positive for portable equipment; uninsulated copper or stainless steel, aviation-type flexible cable, and single-point clamps should be used. These clamps will make contact with metal surfaces through most paint, rust, and surface contaminants. The single-point clamps are superior to the battery-type and “alligator” type clamps for making direct contact. The large diameter of bonding and grounding cables is intended to minimize mechanical damage rather than for current-carrying capacity.

Caution must be exercised in the installation of static grounding systems not to use as a ground any part of the electrical current-carrying system. Fires have occurred by electrical arcing from current feedback through the grounding system where static-control grounds were tied into the electrical system’s neutral legs.

For additional information, refer to National Fire Protection Association 70, National Electrical Code®.

