

U.S. Fire Administration / National Fire Academy

*Coffee Break Training***Topic: Electrical Bonding**

Learning objective: The student shall be able to explain the need and method for bonding flammable liquid vessels.

When volatile Class I flammable liquids are poured or dispensed through air, they accumulate a static charge that—under certain conditions—can ignite the liquid with catastrophic results. This static accumulation is the result of differences in electrical potential between the dispensing and the receiving vessels.

To equalize the electrical potential and remove the risk of static discharge, the two vessels should be bonded together when the liquid is transferred. Generally, this is done with a bonding cable similar to the one in the photograph.

Bonding cables must be durable and of low electrical resistance. Bonding conductor connections must be direct and positive. For portable equipment, uninsulated copper or stainless steel aviation-type flexible cable and single-point clamps like the one pictured 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.

Permanent connections can be made by using solid or braided wires, and must incorporate screw-type clamps, welded connections, or other similar means. Temporary connections should use only braided wires in conjunction with spring clamps, magnetic clamps or other similar methods of maintaining metal-to-metal contact.



Single conductor solid wires should be used only for permanent connections, or those that will not be handled often, because solid wire is not known for its durability. Braided wires consist of several strands of wire wrapped together to provide greater strength and flexibility. Braided wires are recommended for use with temporary connections because of their flexibility and strength.

Some common examples of Class I liquids include alcohol, toluene, acetone, and benzene. Their flashpoints can be found on the product Material Safety Data Sheet (MSDS) from the manufacturer or distributor.

For additional information, refer to *International Fire Code*, Chapter 34; *NFPA 1, Uniform Fire Code™*, Chapter 60; *NFPA 30, Flammable and Combustible Liquids Code*; or *NFPA 77, Recommended Practice on Static Electricity*.