

Effective grounding and bonding for fire prevention



The formation of static electricity is due to the action of contact and separation of dissimilar substances. Liquids produce static when they flow through pipes or hose; when they fall through the air in drops or as a spray; when they are splashed around in tanks; and when air or other gases are bubbled through them.

How charge builds up

If static electricity is not properly eliminated as it is formed, the charge builds up gradually. It may eventually develop a sufficient voltage to cause a spark to jump a gap to some nearby grounded or less highly charged object.

Ground all containers for extra safety

In the handling of containers of flammable liquids, possible loss of life, loss of property and interruption to business can be greatly minimized by effective grounding and bonding of the containers.

The illustration on the following page shows an effective method of preventing static accumulation by grounding drums to a water pipe or other low resistance ground and bonding the drums to small containers during filling operations

Suitable ground

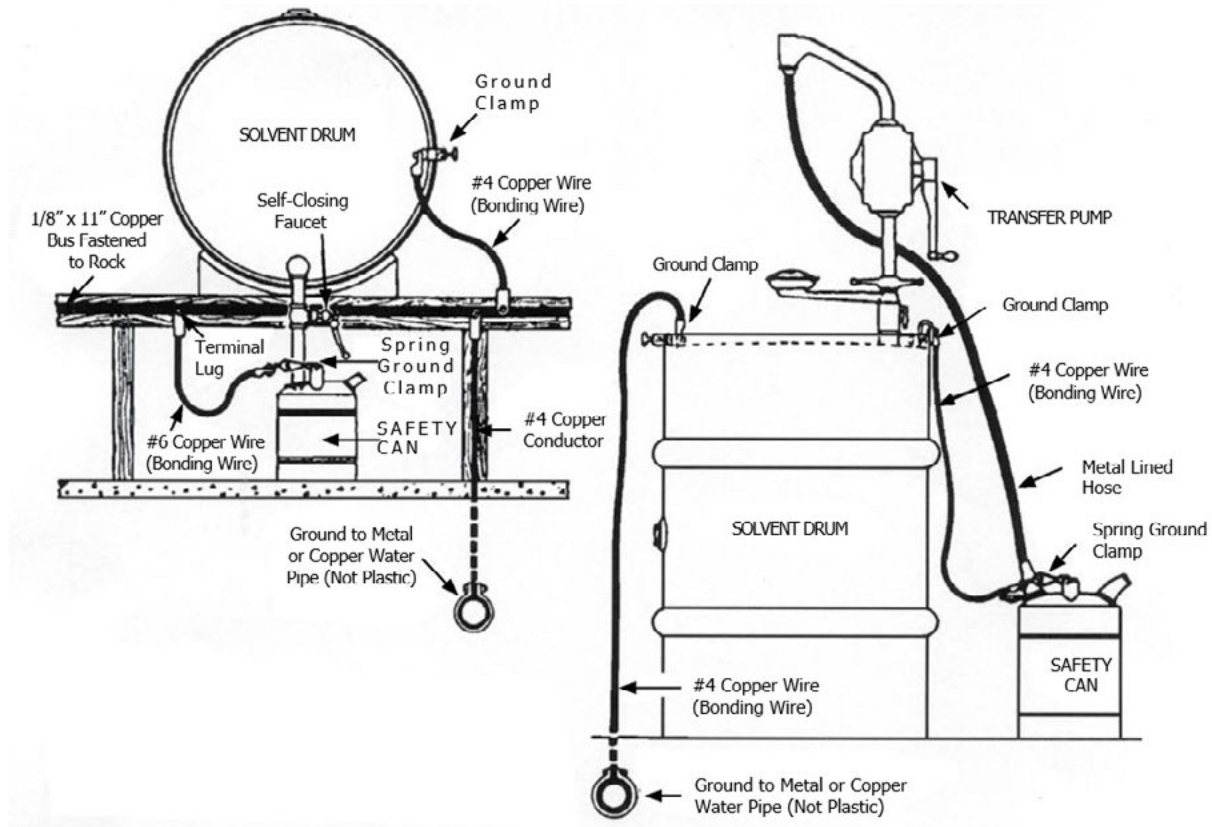
Grounding connections may be made to metal frame of a building, metal or copper water pipes, metal rods or metal plates, so long as the following provisions are met:

- Frame of building or metal/copper water pipes are in contact with the ground for at least 10 feet.
- Connections to water pipes should be made within 5 feet of entrance of building.
- Grounding rods are 8 feet in length, or metal plate measures 2 sq. feet in area.



Suitable drum pump

If a drum pump is the desired method of flammable liquid transfer, the correct type of pump should be used. The type of drum pump can vary depending on the pump design and delivery method required. Flammable liquid transfer pumps should be approved by a nationally recognized testing laboratory (Underwriters Laboratories, Factory Mutual, etc.) and should be approved/developed to transfer the flammable liquids used in your facility.



The NFPA illustrations above show grounding of solvent drums and methods of bonding drums to small containers being filled. If a good electrical connection is known to exist from the drum to the can through a metal lining and nozzle of the hose, the bonding cable between the drum and the container is not required.

Plastic containers

Handling of flammable liquids in plastic containers does not eliminate the possibility of fires caused by static sparks. Electrical charges can build up on the surfaces of liquids in plastic containers, or on the surface of the plastic container. This voltage can cause a spark to jump a gap to a nearby grounded, or less highly charged object.

Because there is greater difficulty in dissipating charges from the surface of plastic containers (a conductive bond wire attached to the outside of the container will not remove this charge) metal safety cans are preferable.

If a nonconductive container such as plastic must be used, it should be UL listed. It is prudent to limit the size of plastic containers to one gallon capacity.

When filling plastic containers, grounding and bonding procedures should be followed. A grounded conductor (fill tube or separate ground wire) should be present in the container being filled throughout the filling process. All conductive elements on the container, such as metal handles, and all nearby metal such as funnels, should be grounded.

Both the National Fire Protection Association (NFPA) and the Occupational Safety and Health Administration (OSHA) have bonding and grounding requirements. NFPA addresses the need for bonding and grounding in [NFPA 30, the Flammable and Combustible Liquids Code](#). OSHA's requirements for bonding and grounding in general industry are referenced in the [Flammable Liquids Standard, 29 Code of Federal Regulation \(CFR\) 1910.106\(e\)\(6\)\(ii\)](#).



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