

Effective Grounding and Bonding for Flammable Liquid Containers

The process of transferring flammable liquids from one container to another can pose a serious hazard because it builds up static electricity. If this static charge is not controlled and is allowed to build up, a spark can occur. That spark, if discharged under the right conditions of air-to-fuel mix and humidity may be sufficient enough to ignite flammable vapor. This could potentially cause a fire or explosion.

Static Electricity

Electric charges can build up on an object or in a liquid when certain liquids (e.g., petroleum solvents, fuels) come into contact with other materials. This can occur when liquids are poured, pumped, filtered, agitated, stirred or flow through pipes. This buildup of electrical charge is called static electricity. Even when liquids are transported or handled in non-conductive containers (e.g., plastic, glass), something rubbing the outside surface of the container may cause a static charge to build up in the liquid. The amount of charge that develops depends, in part, on how much liquid is involved and how fast it is flowing or is being agitated or stirred. Even transferring liquids into non-conductive containers may build up a charge because the plastic or glass containers decrease the rate at which the charge in the solvent dissipates. Though static electricity cannot be completely eliminated, it can be controlled with the use of grounding and bonding devices.



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Bonding and Grounding

The process of bonding and grounding creates a path for the charge to travel to the ground. This path eliminates the buildup of static electricity and allows it to safely dissipate into the ground. When properly done, charges will dissipate as fast as they are generated.

- Grounding is a technique that “bleeds off” the charges and directs them harmlessly to the earth. A ground wire and clamp are attached from the container that the liquid is being transferred from (e.g., 55-gallon metal drum) to a ground. This can be a metal grounding rod driven several feet into the earth, the cold water pipe running through the room, or even a part of the building structure itself. It is important to be sure the wire connects cleanly and firmly to both the ground and the container.
- Bonding is the process of connecting two or more conductive containers together. This ensures there is no difference in the electrical potential between the two containers. Therefore, static electricity will not build up and create a spark. Some liquid transfer pumps have self-bonding hoses that contain conductive wire or fibers that bond the nozzle to the pump and prevent static from accumulating as liquid flows. When properly bonded, the electrons will flow harmlessly from the liquid, through the wire, and to the ground. The drum and container have the same electrical potential and a spark will not jump from the dispensing nozzle to the can.

References

National Fire Protection Association (NFPA) Standard 30:
Flammable and Combustible Liquids Code



Department	Yes	No	Recommended Action
Bonding cables: <ul style="list-style-type: none">In good conditionGood contact points			
Bonding clamps: <ul style="list-style-type: none">In good conditionGood metal connection			
Grounding conductors: <ul style="list-style-type: none">In good conditionLead to earth			
Static electricity ground: <ul style="list-style-type: none">Direct to earth			
The following are free of static grounds: <ul style="list-style-type: none">Electrical conduit unitPlastic pipesGas or steam pipesDry pipe sprinkler systemsLightening rods			
<ul style="list-style-type: none">Continuity checked			
<ul style="list-style-type: none">Conductivity measured			
Safety cans: <ul style="list-style-type: none">bonded and grounded			

Initials of person doing inspection:

Date of:

Inspection:

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