

# GROUNDING AND BONDING

## PURPOSE AND SCOPE

Use and dispensing of flammable liquids presents fire and explosion hazards to facilities and occupants. Proper grounding and bonding limits the potential of static electrical spark during dispensing. These concepts can be applied to any shop, research and/or lab location where open use and dispensing of flammable liquids may occur.

## STATIC HAZARDS ASSOCIATED WITH FLAMMABLE LIQUID DISPENSING

Static electricity can be generated when dispensing flammable liquids that have a flash point < 100 °F or ignitable liquids > 100 °F when heated above their flashpoint, from one container to another. An accumulation of static electricity can discharge with enough energy to lead to a “spark” which can ignite the flammable vapors likely to be present during dispensing operations.

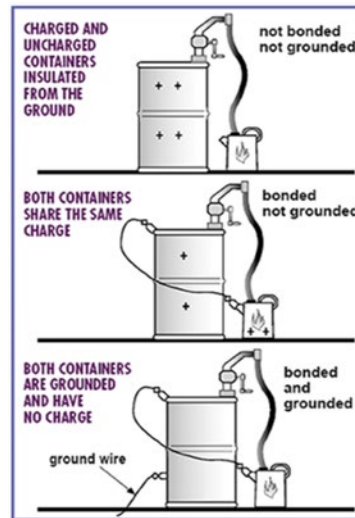
To prevent sparking when dispensing flammable liquids, all dispensing components (containers, piping, funnels, pumps) must be electrically connected to a static grounding system using bond wires, conductive materials and ground cables and attachments.

[University policy](#) requires grounding and bonding when dispensing flammable liquids greater than 1.3 gallon (5 liters).

## BONDING AND GROUNDING

**Bonding** refers to ensuring all components (containers, piping, pumps, funnels) in the dispensing process carry the same electrical potential.

**Grounding** is the process of carrying the electric charge to “earth” or “ground.” Indoor dispensing locations can tap into grounded building systems, such as the electrical distribution system, to carry the charge to ground.



Static electricity generated in a flammable liquid container

**Bonding** eliminates the electrical potential between 2 containers

**Grounding** eliminates the difference in static potential charge between the conductive object and the ground

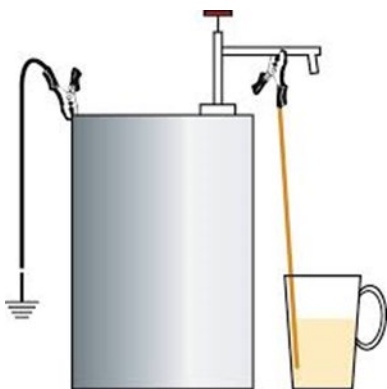
## QUALITY OF GROUND SOURCE

Grounding is accomplished by attaching a ground cable to a ground rod or grounding system designed to provide a continuous ground path to less than 5 ohms (*NFPA 77 states 10 but to be conservative 5 is recommended*). The ground attachment must be metal-to-metal and must not be painted, and kept clean, free of debris or dirt to ensure a good connection. Grounding systems should be checked annually by an electrician to verify the ground resistance.



## DISPENSING INTO PLASTIC OR GLASS CONTAINERS

Plastic and glass containers larger than 1.3 gallons should *not* be used for flammable liquid dispensing operations as these materials are non-conductive. Where there is a chemical compatibility issue and metal containers cannot be used, a metal funnel and fill pipe that extends to the bottom of the container or a metal rod inserted into the container can be used for bonding and grounding the operation.



## SELECT A PROPER LOCATION FOR DISPENSING

Carefully assess and identify a safe location for flammable liquids transfer.

- Dispense flammable liquids (< 20 liters) inside a chemical fume hood or in a well-ventilated location.
- Flammable liquids in quantities > 20 liters must be dispensed inside a room/area specifically designed for dispensing flammable liquids with explosion-proof electrical wiring and equipment, and special ventilation systems. Contact EH&S if you have questions. Ensure exit door and egress pathways are not obstructed in the dispensing location.
- Ensure all ignition sources (e.g., flames, electrical outlets, etc.) are located at least 3 feet away from dispensing operations.

## SAFETY CANS

Safety cans have a self-closing air tight lid, flexible metal dispensing nozzle and a flame arrestor that protects the contents from an external ignition source, making them safer for storage and dispensing of flammable liquids. However, bonding and grounding is still required when transferring flammable liquids because static electricity generation and accumulation is possible during the transfer.

Polyethylene safety cans are equipped with a grounding lug designed to attach to ground wires.



*This image shows dispensing into a glass container. Note the ground rod inserted into the funnel.*

**Please contact EH&S at 206.685.0341 for more information.**