



Grounding and Bonding

When transferring flammable liquids, it is important that the containers involved are bonded and grounded to prevent static electricity from igniting the vapors. Static electricity results from the interaction of dissimilar materials. This can occur when materials are rubbed together, such as walking across carpet while wearing wool socks. Static charges can develop when a liquid passes through a pipe or through an opening into a tank or drum. A static spark is a discharge of electricity across a gap between two points not in contact, resulting from the difference in electrical potential. The spark produced from this discharge usually contains enough energy to ignite flammable vapors if they are in concentrations that will sustain combustion. While static electricity cannot be eliminated, the potential for static charge buildup can be reduced through bonding and grounding.

Bonding is the process of eliminating electrical potential differences between two or more objects. This can be accomplished by attaching a conductive wire between the objects. The attachment point on both objects must be solid and secure and should be made on a bare metal surface. Using a pressure clamp (screw-on or spring-loaded) is a good way to ensure a positive connection. The connection must be made *prior* to beginning the transfer of material between containers. Bonding will not eliminate a potential charge difference between the objects and the earth.

Grounding is the process of eliminating potential difference between an object and the earth. To ensure a static spark is not created by the difference, a conductive path must be provided to the earth. An underground water main is a good grounding point, or a metal grounding rod can be driven into the earth.

Bonding and grounding are only effective on electrical charge-conducting materials, such as metal. Plastic drums and buckets cannot be grounded or bonded. When transferring flammable liquids to or from a plastic container, extreme caution should be exercised. When filling a plastic container, use a grounded discharge nozzle and hose, and fill the container from the bottom up. Decreasing the flow rate of the flammable liquid will decrease the potential for a static spark as will minimizing the sloshing of liquid in the container. Grounded flash guards through which the liquid must flow can also reduce static potential. Ideally, flammable liquids are not stored in plastic drums.

Static charges can be created anytime dissimilar materials interact, and the risk of creating a spark is always present. Several factors including the temperature of the liquid and the air, humidity, air pressure, and even the clothes worn by the worker can determine where and when an explosion takes place. Fortunately, these explosions are rare events. This rarity can cause workers and supervisors to disregard the danger and not take steps to properly bond and ground containers. It is important to avoid making assumptions about safeguards designed to contain static electrical buildup. Consistent and diligent bonding and grounding procedures can protect workers from danger.

