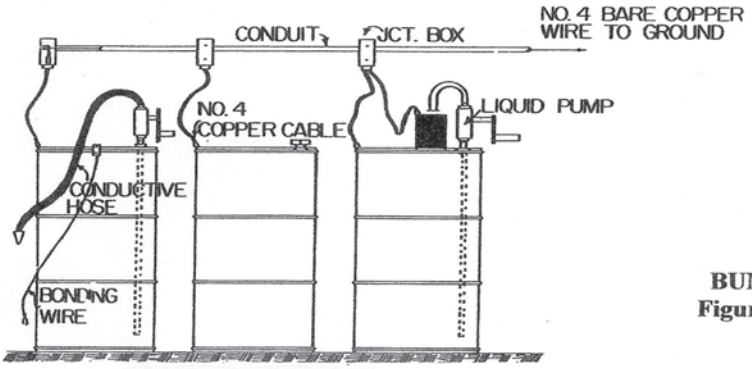
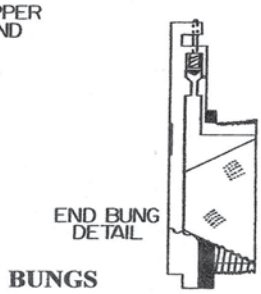
Bonding, Grounding and Pressure Relief

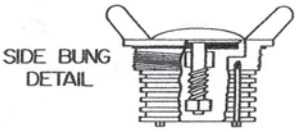
Risk Control Services

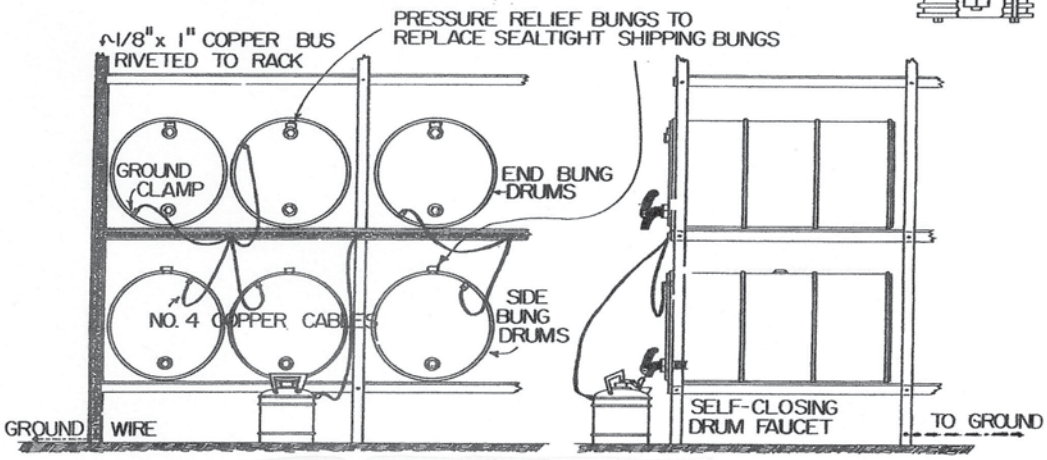


DRUM DISPENSIG
Figure No. 1



BUNGS
Figure No. 2





DRUM RACK STORAGE
Figure No. 3

THE HAZARD (SPARK IGNITES VAPOR)

Electrostatic charges can build up on the surface of flammable and combustible liquids or conductive equipment or containers. These static charges can be generated when liquids flow through a pipe or during the mixing, pouring, pumping, filtering, or agitating of liquids. The electrostatic charge may cause a spark that could ignite or explode flammable vapors which may be present within their flammable ranges. Under most circumstances, the accumulation of static electricity can be prevented by bonding and grounding.

Bonding: Where two or more conductive objects are connected by a conductor, often a copper wire. Bonding minimizes potential electrical differences between conducting objects.

Grounding: Where one or more conductive objects are connected to ground. Grounding eliminates or minimizes the potential electrical difference between conducting objects and ground. Some objects are inherently grounded (e.g., underground water pipes or large storage tanks that rest on the ground). A copper wire connected to ground can be used.

Continued on reverse

SPARK PREVENTION BY USE OF BONDING & GROUNDING

Grounding and bonding are among the most common methods of dissipating a static electric charge. In transferring liquids from drums to containers, static charges must be electrically grounded, in effect, "drained off", to prevent the a discharge of vapor-igniting sparks.

All metallic equipment such as tanks, machinery, piping or containers, where an ignitable mixture could be present should be bonded or grounded. Before dispensing flammable liquids, make sure the dispensing container is connected to a proper ground by use of grounding wires and clamps. Then make sure that a bonding wire with clamps is connected between the dispensing container and the receiving container. This technique will provide a common electrical charge between the containers or equipment and will dissipate potential static build up.

Non-metallic equipment, piping or containers, shall be designed to provide equivalent safeguards against static electricity (some non-metallic polyethylene safety containers have been laboratory tested to show that electrostatic charges that may build up on the container body is not of sufficient voltage to ignite a flammable liquid-air vapor mixture).

Figure No. 1 illustrates effective bonding and grounding techniques where flammable liquids are being dispensed. Note that all three drums are *bonded* to a No. 4 copper conductor which is connected to a *ground*. Examples of good grounds include cold water pipes that are upstream from the meter and driven grounding rods similar to those used to ground electrical systems. The grounding conductor is encased in conduit to reduce the possibility of a mechanical injury which could impair the ground's effectiveness. The container into which the liquid is being dispensed must be *bonded* to the drum even if the container is resting upon or in contact with the drum. Because paint and other coatings interfere with electrical conduction, mere contact between metal containers is not sufficient to form an effective low resistance ground. Bonding can be achieved by placing the conductive hose and nozzle in contact with the metal safety container or by using a bonding cable between the drum and the container.

When flammable liquids are gravity dispensed from drums in racks an individual connector must be used to bond each drum to the *grounding bus.* **Figure No. 3** shows a proper bus bar attached to the drum rack. If desired, the bar can be replaced with a cable and conduit arrangement as shown in **Figure No.1.** The containers into which the liquid is being dispensed are also *bonded* to the grounding bus. Strong clamps must be used to make good contact at the drum and container connections. Point-type clamps penetrate con-tainer coatings much better than either spring loaded alligator or battery-type clamps.

Either manual drum pumps or self-closing faucets can be used to safely dispense liquids from drums. If gravity dispensing, *self-closing faucets* should be used to help prevent hazardous leakage or spills. Self-closing faucets are constructed to automatically close and stop the liquid's flow when released. Faucets should be equipped with flame arresting screens to keep the vapors inside the drum from being ignited. Locate drip pans under the faucet to capture drippings.

VACUUM AND PRESSURE RELIEF

Drum vents, or safety bungs, provide both vacuum and pressure relief. This is important as it may reduce the amount of static electricity generated if a vacuum is created in the container during dispensing and will vent or release expanding vapors when the liquid's temperature rises, thereby reducing the potential of drum rupture in event of fire. **Figure No. 2** illustrates manufactured spring loaded, pressure relief safety bungs. Replace original drum bungs with safety bungs when drums are brought into the building.

REFERENCE: NFPA 30 -STANDARD FOR FLAMMABLE & COMBUSTIBLE LIQUIDS CODE