Bonding & Grounding of Flammable Liquids

Toolbox Talk Lesson Plan

ASK THE STUDENTS: ***"Who can explain what static electricity is?"***

Answer: When objects are rubbed or flow against each other, electrons from one object transfer from one object to the other. Remember that electrons are negative-charged particles. This means one object now has extra negative-charged particles and has a negative charge, while the other item has less negative-charged particles and now has a positive charge. This is an unstable state and the two items are looking for a way to get back to a neutral state by transferring electrons. You have no doubt experienced this when you walked across a carpet to turn on a light switch and seen the spark and felt the jolt.

Now image if that spark occurred in the presence of gasoline or other flammable liquid or vapors. That is the importance of discussing bonding and grounding when transferring flammable or combustible liquids. Transferring flammable liquids includes pumping gasoline or diesel fuel, pouring or pumping from a drum to a secondary container, of from the secondary container to a piece of equipment.

ASK THE STUDENTS: *"**What is bonding?**"*

Bonding creates a path for the extra electrons to flow back to the object that gave them up so that neither article accumulates fewer or extra electrons, and therefore stay in a neutral charge state between them. There are two principle methods to achieve this.

Method #1 is to keep the two objects in direct metal-to-metal contact with each other. An example of this is the metal nozzle of the gas pump staying in contact with the metal fill tube of a vehicle. Safety professionals consider this less reliable because it is difficult to keep a good connection during the entire transfer process.

The preferred method is to attach a bonding strap or cable between the two items. Bonding straps must be attached to clean metal surfaces to be most effective.

Hold up a bonding strap from the facility and describe how and where it should be used in your operations.

ASK THE STUDENTS: *"**What is grounding?**"*

Grounding provides a means for any accumulated static charge to be dissipated to the earth, usually from one of the containers to a metal water pipe or buried rod.

Bonding and grounding are needed to keep each container, and the system as a whole in a neutral-charge state.

CHECK YOUR UNDERSTANDING – True or False

1. When filling a gasoline safety can in the bed of a truck, the metal of the truck grounds the can and is therefore safe to do? FALSE. Go to YouTube to see videos of what happens when this is not done.
2. When filling a polyethylene plastic secondary container, you must use a bonding strap to prevent the accumulation of static electricity? FALSE – polyethylene does not conduct electricity so bonding and grounding are not necessary. However, the splashing and turbulence of the liquid in the container can create a static charge. To reduce this hazard, the NFPA recommends filling the container slowly and using a grounded wire in the liquid.
3. If using a metal funnel to fill a plastic secondary container, you must ground the funnel also? TRUE

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