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A Little Static Can Spark a Big Fire

Static electric discharge is capable of igniting a fire or triggering an explosion. In 2007, the U.S. Chemical Safety Board (CSB) investigated incidents related to static discharge at a chemical distribution facility in Des Moines, IA (CSB Report No. 2008-02-I-IA) and at a facility in Valley Center, KS (2007-06-I-KS).

The incident in Iowa (Figure 1) occurred during filling of a stainless steel portable tote with flammable solvent. The flowing liquid generated static electricity, and because the steel parts of the fill nozzle and hose assembly were not bonded and grounded, the electricity was able to accumulate and spark the stainless steel tote body, igniting the vapor that had gathered around the opening during filling.

An explosion and fire occurred in Kansas (Figure 2) during filling of a storage tank with flammable liquid from a tanker truck. The level float inside the storage tank was poorly grounded, allowing static electricity to accumulate and create a spark inside the tank.


1

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Did you know?

- Contact and separation of two different materials generates static electricity. The charge remains on the materials until it can discharge to a point of lower electrical potential, which can create a spark that can have enough energy to ignite flammable vapors, gases, or a combustible dust cloud.
- Fluids flowing through pipes, solids flowing through ducts, and even air flowing through ductwork or pneumatic conveyors can generate static electricity.
- Rollers and belts of mechanical conveying systems can generate static on contact, especially if the implements slide over each other.
- Static sparks may be felt as a sharp zap, seen as a small bluish arc, or heard as a snapping sound.
- Nonconductive liquids, such as benzene, toluene, and naphtha, generate static much more easily and dissipate charge more slowly than conductive fluids, such as water, alcohols, and acetone.
- Poorly grounded and bonded hoses are often responsible for creating static.

What can you do?

- Follow your plant's grounding and bonding procedures before any material transfer operation.
- Ensure that grounding/bonding equipment in your plant is regularly inspected and tested.
- Inspect grounding/bonding equipment before each use to ensure it is in proper working order and that it attaches firmly (metal to metal) to the container. If it is frayed or has a poor connection to ground, notify your supervisor.
- Inspect hoses prior to use. A damaged hose may have a broken grounding wire inside. Hoses should be checked regularly for electrical continuity.
- Nonmetallic containers (*e.g.,* plastic or glass) are difficult to ground and bond. When using these containers, exercise additional caution and follow procedures. If there is no grounding specified, ask why.
- If you are handling solids packaged in plastic bags or in plastic liners inside paper bags, ask a more-experienced engineer for advice on proper procedures to prevent static sparks.

Managing static is a key step in reducing ignition sources.