GROUNDING AND BONDING

HOW ARE YOU MANAGING STATIC ELECTRICITY?

SAFETY BULLETIN

ISSUE# 26-2018

Bonding and grounding remove stray currents and static electricity, which are potential ignition sources when a flammable atmosphere is present.

- **Bonding** is the equalizing of electric potential between two objects. It is achieved by joining metallic parts to form a path that ensures the safe conduction of any electrical current.
- **Grounding** is connecting a conductive object to ground (the earth or to some conducting body that serves in place of the earth), so the object is at zero electrical potential.

EXAMPLE OF A TRUCK BONDING CABLE REEL

ACTIVITIES WHERE STATIC ELECTRICITY MAY BE PRESENT

- Loading or unloading of flammable materials, such as crude oil or liquid petroleum gas
- Using vacuum trucks
- Using pressure washers and steamers during tank and vessel cleaning
- Abrasive blasting
- Using centrifuges on drilling rigs

EQUIPMENT USED TO MANAGE STATIC ELECTRICITY

- Grounding rods to dissipate charge
- Bonding cables and clamps to equalize charge
- Use of cable to dissipate charge on non-conductive materials such as plastic hose
- Multi-meter to measure electrical resistance
- Automatic bonding systems that warn when a bond is not present and interrupt the flow

UNDERSTAND THE RISKS

Static electricity is created by the transfer of charged electrons from one material to another as they move against another. The resulting static discharge can create a spark adequate to ignite petroleum hydrocarbon vapours and gases.

- Preventing fires and explosions requires strict adherence to quality controls (i.e. controls that work as designed every time)
- Paint, rust and residue on bonding and grounding contact points can significantly limit the ability to dissipate static electricity
- Clamps need a strong spring to bite down on the attachment point for a good bond and to remain securely in place (screw clamps are superior to alligator clamps)
- In an all-metal bonding system, the total resistance should typically be less than 10 Ohms* (units of electrical resistance)
  *Refer to “Additional Resources” on second page
- Under low humidity conditions, such as a cold winter day, static electricity builds faster
- Never modify the design of equipment without a formal review of the risks

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WHAT CAN SUPERVISORS DO?

- Ensure a fire and explosion hazard management plan is in place for your work site; it should identify potential flammable hydrocarbons and ignition sources, and controls such as bonding and grounding
- Consider using a multi-meter to take ohm measurements in areas such as:
  - Bonding clamp to the vehicle frame
  - Bonding clamp to the grounding rod when affixed
- Ensure the metal components that contact multi-meter pins are free of paint, rust and residue
- If a flammable atmosphere could exist, make measurements with an intrinsically safe meter or under a hot work permit and associated controls
- Designate an acceptable Ohm (Ω) criterion for your equipment and repair or remove from service any deficient equipment

WHAT CAN WORKERS DO?

- Understand the use and limitations of bonding and grounding equipment
- Ensure an adequate bond exists when materials are transferred or moved
- Never use or add unbonded components to equipment, such as adding a plastic extender (stinger) to the nozzle of pressure washers or using unbonded hose
- Before use, inspect the bonding cable and reel, especially the reel's attachment points to the vehicle frame and the cable's attachment point to the clamp
- Repair or remove from service any deficient equipment

ADDITIONAL RESOURCES

- NFPA 77: Recommended Practice on Static Electricity
- API 2219: Safe Operation of Vacuum Trucks Handling Flammable and Combustible Liquids in Petroleum Service
- Standata Electrical Safety Bulletin
- Fire and Explosion Management (FEHM) Guideline

PRESENT LIKE A PRO

Before you begin:

Understand the topic and how it applies to you and your team.

Research your own company's experience and provide examples that pertain to your work areas.

If you're not able to answer a question, find the information and make sure you follow up.

Consider the audience. Are they familiar with the topic and the terminology?

Involve the group:

Ask them to identify situations on your work site where bonding and grounding may be required.

Demonstrate how to make Ohm measurements of bonding equipment.

Review practices and procedures in relation to bonding and grounding.

Share past experiences of dealing with static electricity and the associated risks.

Ask the group for ways to improve the quality of this control on your work site.

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