

SAFETY ALERT



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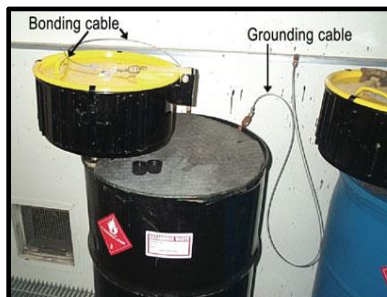
Preventing Static Discharge

In recent years, offshore operators on the Outer Continental Shelf have reported multiple flash-fire incidents that resulted in injuries and damage to facilities. Investigations found that static discharge was a contributing factor in each of the incidents. Flash-fire incidents occurred during multiple types of operations, including maintenance on a control panel when natural gas was being vented, or when flammable fluids were drained into a bucket or as flammable liquids were transferred between containers.

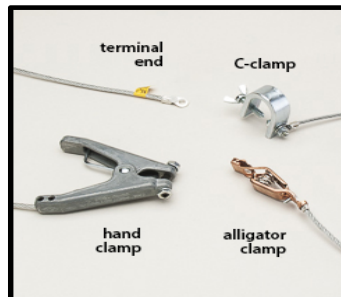
A static discharge can occur when an electrical charge accumulates on the surfaces of two materials, one with a positive charge and the other with a negative charge, that make contact and are separated. A static discharge can occur between two solids, a solid and a liquid, or between two non-mixable liquids. The heat generated from a static discharge is somewhere between 3,000°F and 6,000°F and can create enough energy to start a fire regardless of the flashpoint of hydrocarbon-based fluids.

Safely discharging the accumulation of static electricity requires bonding and grounding of any conductive equipment with the potential to produce electricity.

- **Bonding** involves connecting all components in a system using a conductive material, usually stranded copper wire or a conductive strap, with a minimum diameter of American Wire Gauge No. 6. This helps to keep the bonded objects at the same level of potential energy, which can reduce or eliminate the risk of static electricity or sparks.
- **Grounding** involves connecting the bonded system to earth. The conductive path to earth discharges the built-up static electricity to safely ground.



Bonding and grounding a metal container and drums.



Anti-static wires for use in bonding and grounding.



A metal container is incorrectly bonded to a plastic bucket.

Preparedness and extreme caution must be used wherever static discharge, static electricity or sparks may occur on an offshore facility. Examples include:

- Temporary tanks that contain or have previously contained flammable or combustible fluids
- Temporary vessels or process skids that have no electrical power associated
- Skid-mounted equipment with no electrical connection to a facility's power system
- Engine-driven skid-mounted equipment (not including generators) with no electrical connection to a facility's power system
- Non-conductive plastic buckets used for transferring flammable or combustible liquids
- Pressure washers and steamers used for tank and vessel cleaning
- Aircraft refueling operations
- Conductive equipment and operations including, but not limited to, tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, flow back tanks, pumping units, pits, and boilers
- Loading or unloading flammable materials, such as crude oil or liquid petroleum gas portable hand carried containers, such as sample bottles

Therefore, BSEE recommends that operators and contractors consider the following:

- Ensure that bonding and grounding is conducted to prevent the potential accumulation of electrostatic charge by using any of the following connection means: bolted, alligator clips, beam clamps and spring-type clamps;
- Clamps should have points or teeth to penetrate through paint and bolted, clamped, or spring-type clamps should not be stepped on, kicked or otherwise exposed to adverse conditions;
- Ensure that the mating surface for the grounding connection is cleaned of all non-conductive materials (e.g. grease, oil, and paint);
- Consider training offshore workers in grounding and bonding all equipment to understand how and why to bond and ground their equipment to ensure safe operation;
- Avoid bonding to a plastic bucket since there is greater difficulty in dissipating charges from a plastic container and a conductive bond wire attached to the outside of the container will not remove this charge;
- Follow the equipment manufacturer's instructions and operator's written safe work procedures for bonding and grounding and using the equipment;
- Conduct assessments to identify potential hazards such as lower flammable limits (LFLs);
- Identify all potential sources of LFLs on Safety Data Sheets for the products present in the atmosphere;

- Ensure that only metal buckets with metal handles are used for collecting hydrocarbons or other flammable/combustible liquids;
- Confirm that metal buckets have direct metal contact using a bonding cable to the nozzle or fill pipe from which a liquid is discharged. The nozzle and fill pipe should also be metal, and liquid should be discharged slowly to maintain a low velocity and minimize the amount of static electricity generated;
- Ensure that all metal storage tanks are grounded; and,
- Recommend that all personnel ground their bodies by touching a grounded metal surface, such as a steel walkway, before opening a gauge hatch on a tank.

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A **Safety Alert** is a tool used by BSEE to inform the offshore oil and gas industry of the circumstances surrounding a potential safety issue. It also contains recommendations that could assist avoiding potential incidents on the Outer Continental Shelf.