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## Safely Performing Hot Work on Hollow or Enclosed Structures in Marine Terminals

OSHA requires employers to provide workplaces that are free of recognized hazards. Hot work performed on hollow or enclosed structures in marine terminals can present hazards to marine terminal workers. OSHA defines hot work to include riveting, welding, flame cutting, or similar fire- or spark-producing operations. Requirements for hot work are in 29 CFR 1917.152.

### Hollow or Enclosed Structures

Hollow or enclosed structures are objects on which marine terminal employees work, but that are not large enough for them to enter. These structures are not vented to the atmosphere and may be filled with foam or preservatives to prevent corrosion. Hollow or enclosed structures in marine terminals come in a variety of sizes and shapes. Examples include, but are not limited to, drums, inaccessible voids, pipe stanchions, booms, lampposts, crane pedestals, crane-portal beams, doubler plates, railings, mooring bitts and bollards, vents, and container frames. Requirements for performing hot work on or in tanks or confined spaces, including testing the atmosphere in confined spaces, are in [29 CFR 1917.152](#).

### Explosion and Fire Hazards

During hot work on hollow or enclosed structures, employers must take precautions to protect workers from exposure to a range of hazards such as flammable or toxic gases, liquids, or residues; combustible preservatives; saltwater; fuel oils; solvents, degreasers or cleaning chemicals; and high-pressure or vacuum effects due to fluctuating temperatures. However, employers must pay particular attention to these known hazards:

- **Explosive atmosphere** – This hazard can be created when there is a presence of flammable gases or dust in the air and an ignition source such as hot work is introduced.
- **Flammable material** – This hazard can be created when insulating foam or other commonly used materials catch fire and release noxious gases when exposed to an ignition source such as hot work.

### Sources of Flammable or Explosive Atmospheres

Flammable or explosive atmospheres in hollow or enclosed structures can result from many sources, including:

- Cargo containers may contain various types of chemicals. The structure of the container or the container coating can absorb chemicals and emit toxic gases.
- As a result, when a worker removes a stored product from, or cleans the container, the toxic gases in the container may create a flammable or explosive atmosphere.
- Rusting metals caused by oxidation can create an explosive atmosphere due to the release of hydrogen gas.
- Carbon monoxide gas released when welding on a hollow or enclosed structure can accumulate to a high enough concentration to become explosive.
- Flammable liquefied gas may leak from cargo containers, such as reefer units. If the flammable liquefied gas enters a hollow or enclosed structure, an explosion can occur when an ignition source such as welding is present.

### Control Measures Required for Hot Work on Hollow or Enclosed Structures

Prior to starting hot work operations, employers must:

- Have a designated person test the atmosphere in a hollow or enclosed structure to determine that the atmosphere is not hazardous, [29 CFR 1917.152\(c\)\(8\)\(i\)](#).<sup>1</sup>

<sup>1</sup> An NFPA-certified Marine Chemist may perform the tasks assigned to a designated person.

- Ensure that suitable fire-extinguishing equipment is immediately available and ready for use at all times, [29 CFR 1917.152\(c\)\(3\)](#).
- Train workers involved in hot work operations on the fire hazards of hot work and the use of firefighting equipment, [29 CFR 1917.152\(c\)\(4\)](#).
- Ensure that workers wear proper personal protective equipment (PPE), clothing, gloves, and eye protection during hot work operations, [29 CFR 1917, Subpart E](#).
- If normal fire-prevention precautions are not sufficient, assign additional personnel to guard against fire during hot work and for a sufficient time after completing the work, [29 CFR 1917.152\(c\)\(4\)](#).
- Make safe any hollow structure that previously contained flammable or combustible substances by cleaning the structure or filling it with water and then ventilating the structure, [29 CFR 1917.152\(c\)\(8\)\(i\)](#).
- Open the hollow structure to release pressure that builds up during heat application, [29 CFR 1917.152\(c\)\(8\)\(i\)](#).

Employers are responsible for providing training and a safe and healthful workplace for their workers.

Note: States with OSHA-approved state plans may have different requirements. See [www.osha.gov](http://www.osha.gov).

**This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.**

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