



MARINE INDUSTRY & SHIPYARD HOT WORK

What Is Hot Work?

According to NFPA 306, hot work is any activity that involves any of the following:

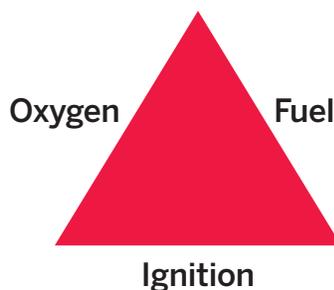
- Riveting, welding, burning, the use of powder-actuated tools or similar fire-producing operations
- Any operation that raises the temperature of the work piece equal to or greater than 204°C (400°F)
- Grinding, drilling, abrasive blasting, or similar operations in the presence of or against the accumulations of readily combustible materials or flammable or combustible liquids or vapors when the atmosphere exceeds 10% of the Lower Explosive Limit (LEL)



Grinding, drilling, abrasive blasting, or similar spark-producing operations should always be considered hot work when conducted in the presence of accumulations of flammable gases, flammable or combustible liquids, their vapors, or accumulations of other common combustible materials.

Understanding the Fire Triangle.

The fire triangle has three parts: oxygen, fuel, and an ignition source.



Oxygen is present in the ambient air. Unsafe practices involving pure oxygen cause an increase in the levels of oxygen present in the workplace. Examples of unsafe practices in the marine industry and in shipyards include leaving a leaking oxygen-fuel gas (e.g., acetylene) cutting torch in a space or using 100% oxygen to cool a worker or ventilate a confined space. Oxygen enrichment occurs whenever the level of oxygen reaches 22% by volume.

Fuel includes anything that can be ignited. Common fuels include the following:

- Flammable and combustible liquids or gases — engine fuel, cargo, paint, cleaning solvents
- Simple combustibles — rags, paper, cardboard, dunnage, insulation material, furnishings

Ignition results when any heat source sufficient to ignite a fuel does so. It can occur through the direct or indirect application of heat. Direct application of heat includes welding, cutting, and burning. Indirect application includes heat conducted through metal surfaces to fuel sources on the other side (e.g., through to the other side of a bulkhead) and sparks traveling to a distant fuel source (e.g., to a pool of liquid or other combustible material).

Recognize, Evaluate, and Control Hot Work Hazards.

- **Recognize** — Determine if fire risks exist before hot work is started.
- **Evaluate** — Determine if hazards are present, especially hazards that could fuel a fire (e.g., flammable and combustible liquids or gases, simple combustibles).
- **Control** — Take appropriate steps to eliminate or minimize the hazards.

Before hot work can be performed, the space or area where the hot work is to be done — and all the spaces adjacent to it — must be tested and visually inspected by a competent person (as defined by OSHA and NFPA 306), an NFPA Certified Marine Chemist, or a U.S. Coast Guard Authorized Person as per the applicable OSHA and U.S. Coast Guard regulations. Hot work can only be done in or on those spaces that are designated “Safe for Hot Work.”



MARINE INDUSTRY & SHIPYARD HOT WORK CONTINUED

FAQs

What is meant by the “Safe for Hot Work” designation?

According to the OSHA *Shipyard Employment Standard* (29 CFR 1915) and NFPA 306, *Standard for the Control of Gas Hazards on Vessels*, all of the following conditions must be met for a space or area to be designated “Safe for Hot Work:”

- The oxygen content is not greater than 22% by volume. (If the space must be entered, 20.8% is ideal.)
- The concentration of flammable materials is less than 10% of the Lower Explosive Limit (LEL). (0% LEL is ideal.)
- The residues, scale, or soft, greasy preservative coatings in the entire space are cleaned sufficiently to prevent the spread of fire and are not capable of producing an oxygen concentration greater than 22% by volume or a flammable gas concentration greater than 10% LEL. Combustible materials are removed or sufficiently shielded with barriers.
- All adjacent spaces must have combustible gas readings less than 10% LEL and have been sufficiently cleaned to prevent the spread of fire, or have been inerted.

Spaces that fail to meet these criteria must be designated and labeled “Not Safe for Hot Work” in accordance with OSHA 29 CFR 1915 and NFPA 306.



What are the qualifications of the marine chemist?

A marine chemist is the holder of a valid certificate issued by NFPA in accordance with the “Rules for the Certification and Recertification of Marine Chemists.” This establishes the person’s qualifications to determine whether construction, alteration, repair, or shipbreaking of vessels can be safely undertaken.

When is an NFPA Certificated Marine Chemist needed for hot work?

According to OSHA and the U.S. Coast Guard, an NFPA Certificated Marine Chemist is needed to authorize hot work in, on, or adjacent to any space that contains, or previously contained, combustible or flammable liquids or gases, and on pipelines, heating coils, pump fittings or other accessories connected to spaces that contain or have last contained combustible or flammable liquids or gases. [29 CFR 1915.14(a); regulations pertaining to hot work in 46 CFR]

For More Information

For more information about marine industry and shipyard hot work safety, NFPA Certificated Marine Chemists, and confined space/competent person training, visit NFPA’s Certificated Marine Chemist (CMC) page at www.nfpa.org/MarineChemists or contact NFPA’s Marine Field Service.

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This Fact Sheet contains some basic information about confined space entry and work in accordance with NFPA 306 and OSHA 29 CFR 1915. It identifies some of the requirements found in those publications as of the date of publication of this Fact Sheet. This material is not the complete and official position of the NFPA on the referenced topics which is represented solely by the NFPA documents in their entirety. For free access to the complete and most current version of these and all NFPA documents, please go to www.nfpa.org/docinfo. References to “Related Regulations” is not intended to be a comprehensive list. The NFPA makes no warranty or guaranty of the completeness of the information in this Fact Sheet. In using this information, you should rely on your independent judgment and, when appropriate, consult a competent professional.