



## **Appendix A**

# **Maintenance & Repair**

## **Hot Work Policy**

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## Definitions

**Confined Space** WAC 2296-809-099: A small compartment with limited access such as a double bottom tank, or other small, confined space that can readily create or aggravate a hazardous exposure

**Designated Repair Facility (Seattle Fire Department):** Those piers, designated by the fire code official, and by virtue of their construction, location, fire protection and fire hydrant availability, are suitable to permit certain repairs to marine vessels.

**Enclosed Space** (29 CFR 1915.4 (q)): Any space, other than a confined space, which is enclosed by a bulkhead and overhead. The term includes cargo holds, tanks, quarters, and machinery spaces.

**Fire Watch** (29 CFR 1915.509): The activity of observing and responding to the fire hazards associated with hot work in shipyard employment and the employees designated to do so.

**Gangway** (29 CFR 1915.4(e)): A ramp-like or stair-like means of access, provided to enable personnel to board or leave a vessel including accommodation ladders, gangplanks, and brows.

- Gangways shall be in accordance with 29 CFR 1915 and shall have a walking surface not less than 20 inches wide, be of adequate strength, maintained in safe repair and be safely secured. Each side of a gangway, and the turntable if used, shall have a railing with a minimum height of 33 inches measured perpendicularly from rail to walking surface at the stanchion, with a mid-rail. Rails shall be of wood, pipe, chain, wire or rope and shall be kept taut at all times.

**Hot Work** (29 CFR 1915.4(r) and 1915.11(b)): Hot work means any activity involving riveting, welding, burning, brazing, soldering, heating, use of powder-actuated tools or similar or fire-producing activity.

- Grinding, drilling, abrasive blasting, or similar spark-producing operations are also considered hot work except when such operations are isolated physically from any atmosphere containing more than 10 percent of the lower explosive limit of a flammable or combustible substance.

**Marine Chemist** (29 CFR 1915.11(b)): An individual who possesses a current Marine Chemist Certificate issued by the National Fire Protection Association.

**Vessel** (29 CFR 1915.4(f)): Includes every description of watercraft or other artificial contrivance used as a means of transportation on water, including special purpose floating structures not primarily designed for or used as a means of transportation on water.

**Powder Actuated Fastening Tool** (29 CFR 1915.4(u)): Means a tool or machine that drives a stud, pin, bolt, or other type of fastener by means of an explosive charge

**Shipyard/Maintenance Repair Facility** (Seattle Fire Department) A pier, wharf, or series of piers and related onshore facilities, designated by the fire code official, which by virtue of the pier construction, location, emergency vehicle access, fire protection, hydrant availability and onsite safety personnel, is suitable to permit repairs, including major conversions, on marine vessels of any length.

**Shipyard Competent Person (SCP):** A person who is designated in writing by their employer in accordance with OSHA 29 CFR 1915.7 and able to evaluate employee exposure to hazardous substances, fire hazards or to other unsafe conditions and is able to specify the necessary precautions to be taken.

## **Regulatory References**

### **OSHA**

#### **29 CFR 1915.14 Maritime**

**Subpart D:** Welding, Cutting, and Heating

**Subpart P:** Fire Protection in Shipyard Employment

#### **29 CFR 1910 General Industry**

**Subpart Q:** Welding, Cutting and Brazing

**Title 33 CFR Part 154** – Facilities Transferring Oil or Hazardous Material In Bulk

**Subpart D** – Facility Operations

**WAC 296-24-Part (I):** Welding, Cutting and Brazing

**WAC 296-304-02007, WAC 296-304-02013**

**NFPA 51B:** Standard for Fire Prevention in Use of Cutting and Welding Processes

**NFPA 306:** Standard for the Control of Gas Hazards on Vessels

**NFPA 312:** Standard for Fire Protection of Vessels during Construction, Conversion, Repair & Lay-Up

**International Fire Code:** Chapter 26 “Welding and Other Hot Work”

**Seattle Fire Department Administrative Rule 26.01.14**

**Tacoma Fire Department** – Annual Hot Work Permit Requirements

# Hot Work Policy

## RESPONSIBILITY

The Facility Safety Manager, the Shipyard Competent Person (SCP), the Engineering Manager, Port Engineers, Weld Foreman, and Lead men are responsible for all facets of this program, having the authority to make necessary decisions to ensure its success. All employees, vendors, temporary workers have the authority to stop work where there is a danger of serious injury or property damage.

## PERMITTING

### A. FACILITY HOT WORK PERMIT

Dockside maintenance facilities **must** be approved and have a **current** Hot Work Permit issued by the governing Fire Department for their location. It may be temporary or annual. Tacoma and the Old Yard have an annual permit. The originals are either posted or in the Permit Notebook at our facilities.

### B. MARINE CHEMIST & SHIPYARD COMPETENT PERSON PERMITS

A Marine Chemist (initial inspection) or SCP must examine a hot work job site and issue a daily “hot work” permit before any hot work is conducted onboard a vessel or outside of a designated hot work area (R&M shop, slab).

- A SCP **must** maintain safe conditions set by the Marine Chemist.

## PRECAUTIONS BEFORE HOTWORK

A. **A Marine Chemist Certificate** must be obtained prior to work in any machinery space (engine room, refrigeration (refr) room, generator room, etc.)

B. **HOT WORK SITE:** The following conditions **must** exist before hot work commences.

1. All combustible material (e.g., hydraulic fluid, diesel fuel, cardboard, rope, plastic, wood or other combustible surfaces) within **35 feet** of the hot work including the adjacent to the hot work surface must be removed or **must** be sufficiently covered with flame retardant material (fire blanket, baffles, Fire & Ice, no char); (WAC 296-304-01011(2)(c), 29 CFR 1915.504(b)(3))

**EXCEPTION:** When a Marine Chemist certifies the space “Safe for Hot Work”. Space **must** be maintained to the original Marine Chemist certification.

2. Hot work **must** be separated from any flammable liquids or solids (e.g., gasoline, acetone, MEK) by **100 feet**. (SFD Administrative Rule 26.01.09 Section 5.10.1, 33 CFR 154.735(I)(1))

**EXCEPTION:** When a Marine Chemist certifies the space “Safe for Hot Work” Space **must** be maintained to the original Marine Chemist certification.

3. Decks will be clean from debris and wooden decks will be watered down. Heavy dust will be cleaned from the area.
4. Tanks or pipes subject to hot work shall have volatile material **emptied and shall be gas free**. And then a **marine chemist must certify** the worksite and hot work surface safe for hot work and entry is required, safe for entry. (.OSHA 29 CFR 1915.14)
5. A charged hose must be in the vicinity of the hot work that meets the minimum sizes listed below:

- a. **OLD YARD SEATTLE:** 5/8 –inch diameter capable of delivering not less than 12 gallons per minute
- b. **TACOMA YARD:** 1 ½ -inch fire hose (TFD Permit)

### C. HOT WORK SURFACES

Whenever hot work is to be conducted upon a surface with a preservative coating whose flammability is not known, the SCP must determine if it is flammable or hazardous. Such coatings must be stripped from the area to be heated before hot work begins.(29 CFR 1915.53(b) (c)) In enclosed spaces toxic coatings must either be scraped off a **minimum of 4 inches**, in all directions, away from the heat application or employees shall be protected by airline respirators.(29 CFR1915.53 (d) (1))

### D. TESTS, INSPECTIONS & APPROVAL

1. **Marine Chemist** – Certifies hot work in hazardous areas or compartments that contain or have contained flammable or combustible vapors, coatings, fuel oils, hydraulic oil, lube oil, waste oil or other petroleum products and if polyurethane foam cannot be removed according to Part D of this document.
2. **Shipyard Competent Person (SCP)** – Certifies hot work in areas or compartments that do not contain or have not contained flammable or combustible vapors, coatings, fuel oils, hydraulic oil, lube oil, waste oil or other petroleum products.
3. **Atmospheric Testing** – Shall be performed with an approved gas monitor that has been calibrated and passed its current bump tests. If a space cannot be ventilated to within the PELs or is IDLH a Marine Chemist, Shipyard Competent Person or Certified Industrial Hygienist must retest until the space can be certified **“Enter with Restrictions” or “Safe for Workers.”**

### E. POLY-URETHANE FOAM

Precautions that must be taken for hot work near foam insulation under the guidance of the SCP or Marine Chemist:

#### 1. Tacoma

- a. *When hot work is to be performed on a surface with foam, a Marine Chemist will be called in for instructions on welding techniques and to mitigate the area, unless the foam can be removed 12” on all sides from the adjacent hot work operation and No-char painted on the exposed edges of the cut foam.*
- b. *When hot work is to be performed on a surface with foam on the adjacent side, a Marine Chemist will be called in for instructions on welding techniques and to mitigate the area, unless the foam can be removed 12” on all sides from the adjacent hot work operation*
- c. *In all cases, exposed foam will be wet down and covered with wet fire-retardant blankets, welding cloths or other suitable “fire-retardant” substances within 36 inches of all hot work operations.*
- d. *All foam dust, small solid bits and pieces will be swept, vacuumed and removed from the vessel prior to commencing hot work.*

#### 2. Old Yard

- a. *A Marine Chemist certificate is required prior to performing any hot work on or adjacent to any area that has polyurethane insulation. SFD Administrative Rule 26.01.09 Section 6.1*

- b. *Remove foam 36” in all directions unless authorized otherwise by a Marine Chemist. SFD Administrative Rule 26.01.09 Section 6.22*
- c. *The Fire watch must be a trained SCP and will pay particular attention to areas with exposed foam and be immediately available to extinguish incipient stage fires. SFD Administrative Rules 26.01.09 Section 6.2.4*
- d. *A fire watch shall be maintained at least **1 hour** past completion or interruption of the hot work. SFD Administrative Rule 26.01.09 Section 6.2.4*
- e. *All foam dust, small solid bits and pieces will be swept, vacuumed and removed from the vessel prior to commencing hot work.*
- f. *In all cases, exposed foam will be wet down and covered with wet fire-retardant blankets, welding cloths or other suitable “fire-retardant” substances of all hot work operations.*

#### **F. FIRE WATCH (29 CFR 1915.504)**

A trained fire watch person shall be maintained in the immediate location of the following hot work conditions:

1. Slag, weld splatter, or sparks might pass through an opening and cause a fire;
2. Where there is combustible material closer than 35 ft. (10.7m) in either the horizontal or vertical direction to the hot work that cannot be removed, shielded or protected with flame-retardant covers, guards or curtains; WAC 296-304-01011(2)(c)
3. The hot work is carried out on or near insulation, combustible coatings, spaces that cannot be shielded, cut back, or removed, or a space that cannot be inerted;
4. Combustible materials adjacent to the opposite sides of bulkheads, decks, overheads, metal partitions, or sandwich-type construction may be ignited by conduction, convection or radiation;
5. The hot work is close enough to cause ignition through heat radiation or conduction on the following:
  - Insulated pipes, bulkheads, decks, partitions, or overheads; or
  - Combustible materials and/or coatings;
6. Post a Fire Watch whenever the employer, Repair Supervisor, Fire Department Inspector, Marine Chemist or a SCP requires it.
7. When several workers are performing hot work at any one site, the Fire Watch shall have a clear view of up to 4 welders, and immediate access to, each worker.

#### **Duties of a Fire Watch:**

Fire watch personnel shall have no other duties than to watch for fire or any other hazardous conditions and sound an alarm and attempt to extinguish incipient stage fires. They shall be maintained at the hot work site for at least **30 minutes** after hot work has stopped. SFD Administrative Rule 26.01.09 Section 5.5.4, 5.8.2 and 29 CFR 1915.504 (c) (2) (IV)

#### **G. VENTILATION**

Adequate ventilation will be provided to ensure that the welding fumes and particles are exhausted away from the workers breathing zone and working area.

Mechanical ventilation must meet the following requirements:

1. Mechanical systems may consist of either area or localized ventilation
2. Area ventilation must create sufficient air exchange to maintain safe limits of breathing air.
3. Local exhaust ventilation systems **must** have freely moveable hoods that allow the operator to place them at least 1 – 1 ½ times the duct diameter from the work area. The system shall provide a rate of air-flow sufficient to maintain a velocity in the direction of the hood of 100 linear feet per minute at its most remote distance from the point of welding. (see chart) (29 CFR 1910.252(c)(3)(i))

<b>WELDING ZONE</b>	Minimum Air Flow ft <sup>3</sup> /min	Duct Diameter inches
4 to 6 inches from arc or torch	150	3
6 to 8 inches from arc or torch	275	3 ½
8 to 10 inches from arc or torch	425	4 ½
10 to 12 inches from arc or torch	600	5 ½

4. All air replacing that withdrawn **shall be** clean and respirable.
5. Oxygen **shall not** be used for ventilation purposes, comfort cooling, blowing dust or dirt from clothing, or for cleaning the work area.
6. Exhausted air **shall be** discharged away from the breathing zone and away from the intake for the supply system.
7. Ventilation **shall be** set up in a way that does not impede entry or egress from confined or enclosed spaces.
8. When sufficient ventilation cannot be attained, workers shall use respirators with filters.

## **H. PERSONAL PROTECTION EQUIPMENT**

1. **Respirators** Appropriate respirators equipped with NIOSH approved P-100 particle cartridges will be provided for use during hot work operations in accordance with Trident’s Respiratory Protection program. (Medical Clearance and Fit Test are required before use of a respirator)
2. **Eye and Face Protection** The employer will ensure that each affected employee uses appropriate eye, or face protection with eye protection, where there are exposures to eye or face hazards caused by flying particles, molten metal, liquid chemicals, acid or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. (29 CFR 1915.153)
3. **Hearing Protection** Hearing protection will be worn during welding operations and in any area where welding or cutting exceeds the 85decibel level for an 8 hour time weighted average. (29 CFR 1910.95 and WAC 296-817) Wearing hearing protection has the added benefit of keeping flying debris from entering the ear canal.
4. **Protection from Flash Burn** Although most work does not permit the welder to be in individual workstations, workers and other persons adjacent to the welding areas are protected from the rays by noncombustible or flameproof screens or shields. Screens will be so mounted as to permit circulation of air at floor level. (29 CFR 1915.153)
5. **PROTECTIVE CLOTHING**
  - a. In order to provide protection from sparks and slag, leather or other fire-retardant garments must be worn. These should be free from oil, grease or solvent stains. In

- addition, protection from UV and IR light can be attained by wearing long sleeve cotton or wool shirts and pants
- b. When necessary long-cuffed leather gloves will be worn while carbon arcing and regular leather gloves will be worn while welding, cutting, or burning.
  - c. Boots or safety shoes will be worn with the legs of the protective clothing over them to prevent slag from entering.

## EQUIPMENT OPERATION

- A. COMPRESSED GAS CYLINDER** If welding or cutting must be performed in a confined space, the gas cylinders and welding machines will remain outside the confined space
- B. MANIFOLDS** All fuel gas and oxygen hose lines will be disconnected at the supply manifold at the end of each day. Manifolds shall be placed in a safe and accessible location in the open air.
- C. TORCHES & HOSES**
1. Do not leave fuel gas and oxygen hose lines or torches in **confined spaces** unattended. If they are to be left unattended for more than **15 minutes**, roll the hoses back to the manifold or to a space in the open air and disconnect. (WAC 296-304-01009 (2)(b)(ii), 29 CFR 1915.503(b)(2)(ii))
  2. At the **end of the day** all disconnected fuel gas and oxygen hose lines:(WAC 296-304-01009 (2)(b)(iii), 29 CFR 1915.503(b)(2)(iii))
    - a. **Old Yard:** roll back to open air, disconnect from cylinder, remove gauges, and replace cylinder cap.
    - b. **Tacoma:** Welders will use trackers to delineate hoses. At the end of the day each welder will roll back to open air, disconnect from cylinder, remove gauges, and replace cylinder cap.
  3. All disconnected fuel gas and oxygen hose lines are rolled back to the supply manifold or to open air to disconnect the torch; or extended fuel gas and oxygen hose lines are not reconnected at the supply manifold unless the lines are given a positive means of identification when they were first connected and the lines are tested using a drop test or other positive means to ensure the integrity of fuel gas and oxygen burning system. WAC 296-304-01009 (2)(b)(iv), 29 CFR 1915.503(b)(2)(iv)
  4. Soap testing is required for acetylene tanks when initially hooking up regulators and hoses. (WAC 296-24-68209 (5))
- D. ELECTRODE REMOVAL** When arc welding is to be suspended for any length of time, such as during meal breaks, all electrodes shall be removed from the holders and be carefully located so accidental contact cannot occur, with the machined disconnected from the power source.
- E. WELDING OR CUTTING OF HOLLOW METAL CONTAINERS AND STRUCTURES** When welding or cutting on containers on board vessels, the following guidelines are mandatory:
1. **Containers** No welding, cutting or other hot work shall be performed on drums, barrels, tanks or other containers that have contained flammable substances until a SCP or Marine Chemist approves the work.
  2. **Hollow Structures** Structural voids such as masts, booms, stanchions or railings, shall be inspected by a SCP or Marine Chemist and if necessary made safe before preheating, cutting or welding.