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# 1.0 INTRODUCTION

## 1.1 Purpose

The purpose of this procedure is to provide safety requirements to be followed during Attended Energy Hot Work operations. Permitting requirements for all work, including high energy hot work operations, are found in R-11-005.

## 1.2 Scope

This procedure applies to Marathon Anacortes Refinery employees and contractors. All personnel working on Marathon Anacortes Refinery property must comply with this procedure.

# 2.0 REFERENCES

## 2.1 Marathon Standards, Policies & Procedures

- SAF-4004, Contractors
- RSP-1128-000, Safe Work Permitting
- RSP-1716-000, PPE
- RSP-1127-000, Confined Space Entry
- RSP-1715-000, Hot Work

## 2.2 Government Regulations

- OSHA 29 CFR 1910.252, Section A Welding, Cutting, and Brazing – General Requirements – Fire Prevention and Protection
- WAC 296-155-410, Fire Prevention
- OSHA 29 CFR 1910.14,6 Permit-Required Confined Spaces
- OSHA 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals
- EPA 40 CFR 68.130, List of Substances

# 3.0 DEFINITIONS

The following definitions are applicable to this procedure.

## Table 1 Definitions

| Term | Description |
| --- | --- |
| Changing Conditions that initiates stop work authority | Any change of condition to a piece of equipment or area that a permit to work has been issued that is different than the conditions that the permit was originally written under, such as (but not limited to):<br>• Crane lifting overhead<br>• Sudden Leak in nearby equipment<br>• Wind change of direction so contaminates are entering equipment<br>• New maintenance activity nearby that impacts your work<br>• Work that you are performing escaping containment<br>• Lightening in immediate area<br>• Atmospheric changes such as a large enough rise in temperature to release vapors from known and undetected debris or sludge<br>• Anything that could create a hazard that the permit to work hasn't identified and mitigated. Stop work, contact Operations and Safety if needed. |
| Highly Hazardous Chemicals | Substances possessing toxic, reactive, flammable, or explosive properties, and found at or above its threshold quantity listed in Appendix A of 29 CFR 1910.119 and Table 1 of 40 CFR 68.130. |
| Attended Hot Work | Any hot work that has an open flame or has potential to have an open flame and produces sparks. This may include cutting and welding, sparking of electrical equipment, grinding, buffing, drilling, chipping, sawing, or other similar operations that create hot metal sparks or hot surfaces from friction or impact. Attended Hot Work requires a Fire Watch. |
| Attended Hot Work Permit | A written record that authorizes specific work within an operating area for a specified time period. An agreement between the issuing department and the receiver that clearly documents the conditions, preparations, precautions, and limitations that must be understood before work begins. |
| Non-Attended Hot Work | Non-Attended Hot Work is work that may have an ignition source but does not create a spark. Some examples of Non-Attended Hot Work: concrete breaking, lights, and extension cords, non-explosion proof cordless tools, non-intrinsically safe equipment, gasoline or diesel-powered equipment (e.g., compressors, generators, pressure washers, etc.), opening of energized explosion proof enclosures, abrasive blasting, etc. Non-Attended Hot Work does not require a Fire Watch. |
| Shall/Must | Order, requirement, or obligation of the standard. Example: a strict regulatory requirement. |
| Should/May | Probability or expectation of the standard not enforced as an obligation. Example: A best practice. |
| Management of Change | Manages changes, except for "replacements in kind," to process chemicals, technology, equipment, and procedures; and changes to facilities that affect a covered process. |

# 4.0 ROLES AND RESPONSIBILITIES

## 4.1 Operations Supervisor

In conjunction with Management, the operations supervisor shall be responsible for the safe operation of hot work activities.

## 4.2 Operator

- Prepare the equipment for hot work (i.e. cleanout, drain, vapor free).
- Isolate equipment in compliance with established LO/TO requirements (see R-11-032 (SR-60)). Cover sewers within 35' of area and remove flammable materials.
- Notify the rest of the Operators in the unit to prevent inadvertent draining or sampling.
- Consider the safety of the Craft Employees and Fire Watch with respect to PPE for any special hazards beyond hot work (i.e. process hazards).
- Determine and inspect the combustible materials and hazardous areas present or likely to be present in the work location.
- Ensure fire prevention plans are adequate.
- Conduct atmospheric monitoring per Section 6.3.
- Inspect the area to ensure it is safe to authorize hot work.
- Monitor the area for any changing conditions that could affect the safety of the job.
- Suspend or stop work when conditions change or when appropriate to do so.
- Co-Authorize (with operations supervisor) the Attended hot work permit and conduct the Joint Jobsite Visit (JJSV).

**Note**: Attended Hot Work Permit must be specific to task and tools being used. If welding is to be done the type of welding must be identified (MIG, TIG, Stick, etc.), along with grinding or any other Attended Hot work activities.

## 4.3 Authorized Person in Charge (APIC)

- Supervise the craft performing the work and ensure compliance with this procedure.
- Ensure all surrounding persons are protected (i.e. visual) from the welding arc by arc guarding or ANSI certified PPE.
- Monitor the area for any changing conditions that could affect the safety of the job.
- Suspend or stop work when conditions change or when appropriate to do so.
- Responsible for the safe handling of the cutting or welding equipment within the covered process units, and ensuring this procedure is complied with.

## 4.4 Fire Watch

- Trained to understand the inherent hazards of the work site and of the hazards being performed.
- Trained on fire extinguishing equipment that is to be used at the site.

- Trained on responding to a fire or directing surrounding workers to evacuate in an orderly fashion.
- Ensures Safe Work Permit conditions are met before Attended Hot work begins and continues entire time permitted work is conducted.
- Not to perform any additional tasks that would distract them from their Fire Watch duties.
- Ensure 100% spark containment.
- Remain at the site of hot work for at least a half an hour after the hot work has been completed if there is the potential for smoldering fires.
- Ensure all surrounding persons are protected (i.e. visual) from the welding arc by arc guarding or ANSI certified PPE.
- Report all fires, including those that were easily extinguished, to the Area Supervisor and Health & Safety Department.
- Know how to shut-off the welding machine.
- Maintain communication with the Welder.
- Wear an orange vest.
- Monitor the area for any changing conditions that could affect the safety of the job.
- Perform continuous air monitoring while hot work is being performed and document the results on the Atmospheric Monitoring Log Sheet every hour. If the meter alarms, hot work shall be suspended until results are in normal range, and the cause for high readings is known and mitigated.
- Suspend or stop work when conditions change or when appropriate to do so.

### 4.5 Craft Person

- Verify understanding of all permit requirements by signing the Servicing Group Acknowledgement associated with the Safe Work Permit.
- Complies with all Safe Work Permit Conditions.
- Report any incidents immediately to Operations.
- Suspend or stop work when conditions change or when appropriate to do so.
- Ensure gasoline or diesel-powered equipment is shutdown in the event of an emergency.

## 5.0 HAZARD IDENTIFICATION AND EVALUATION - PERMITTING

### 5.1 Hot Work Permitting

For guidance on Permitting and JSA's please review R-11-005.

### 5.2 Hot Work in Designated Weld Areas & Zone E

Work outside the process units can be divided into two categories, routine tasks and non-routine tasks. Routine tasks have been evaluated using a Marathon Anacortes Refinery Process Hazard Assessment Tool, communicated and posted in the area where

those activities are performed. The Job Hazard Evaluation Tool shall be used for hot work in designated weld areas. See R-11-005 for non-routine work authorization.

### 5.3 Hot Work on the Wharf

- Turn-off or protect the fire eyes at the shore tanks when welding within their line of sight.
- Refer to R-11-028 whenever working at the Wharf.
- Keep a charged 1½" fire hose at the job site.
- Notify vessel Captains, Tanker men, and/or tug Captains prior to starting hot work.

5.3.1 Vessels at Wharf Loading Product

- No hot work is done on the Wharf while loading gasoline. This does not include the Causeway.
- Hot work is restricted to the areas east of the elevated turret nozzle control panels (Bent #258), and west of the furthest west turret nozzles (Bent #280).
- Other precautions may apply depending on the type of product being loaded.

5.3.2 Vessels at Wharf Discharging Product

- Hot work is restricted to the areas east of the elevated turret nozzle control panels and west of the western-most turret nozzle.

5.3.3 Vessels at Wharf - No Transfers

- If a vessel is at the Wharf and is not transferring product, hot work restrictions are the same as in a Tank Farm. Discuss with the Operator, Operation's Supervisor or Operation's Coordinator, the Health & Safety Department, and the Maintenance Supervisor in charge of the work. Refer to R-11-005 for more information.

## 6.0 ATTENDED HOT WORK REQUIREMENTS

### 6.1 Basic Precautions

- Be specific when completing an Attended Hot Work Permit. Identify the specific method of work (welding, grinding, etc.), along with the equipment that the work is performed on. If unsure whether an activity requires an Attended Hot Work Permit contact your Operations or Maintenance Supervisor.
- Hot work should be conducted outside of the covered process unit, when possible. If the object to be welded or cut cannot readily be moved, all movable fire hazards and combustibles shall be relocated at least 35 feet in all directions. If relocation is impractical, combustibles shall be protected by a listed or approved welding curtain, welding blanket, welding pad, shielding or guards (see Figure 1).
- If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag from coming into contact with the fire hazards.

- If fire hazards cannot be removed and guards cannot be established, then hot work shall not be performed.
- Make fire extinguishing equipment suitable to the situation available for immediate use.
- In areas where fixed fire protective systems are impaired, hot work shall be prohibited until fixed fire protective systems are operable or an adequate temporary fire system or equipment is in place.
- Where combustibles are present, the Fire Watch shall be maintained for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

6.1.1 Floors

Where combustible materials (such as paper clippings, wood shavings, or textile fibers) are on the floor, the floor shall be swept clean for a radius of 35 feet and the following criteria shall be met:

- Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields.
- Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

6.1.2 Ducts

Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

6.1.3 Combustible Walls

If hot work is done near walls, partitions, ceilings, or roofs of combustible construction, they shall be protected by a listed or approved welding curtain, welding blanket, welding pad, or equivalent.

6.1.4 Non-Combustible Walls

If welding is to be done on a metal wall, partition, ceiling, or roof, precautions shall be taken to prevent ignition of combustibles on the other side due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a Fire Watch on the opposite side from the work shall be provided.

6.1.5 Combustible Cover

Welding shall not be attempted on a metal partition, wall, ceiling, or roof having a combustible covering, or on walls or partitions of combustible sandwich-type panel construction.

6.1.6 Pipes

Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

6.1.7 Welding in Active Tank Yards

At Anacortes, a tank yard is considered "active" when any tank within the same yard is filling. A filling tank presents the highest potential for venting

vapors. No Attended Hot Work shall be conducted in an active tank yard while an adjacent tank is actively filling. Hazards are also present when a tank is drawing down. If Attended Hot Work is required within a tank yard, while tanks in the yard are drawing down only (i.e., none are filling), the following precautions must be met:

- Drawing down tank(s) is at least 50 feet away from Attended Hot Work.
- LEL meters (with pump & audible alarm) shall be placed at the top of the drawing down tank(s) as near a vent as possible. Additional meters should be placed downwind of the drawing down tank(s).
- If the Fire Watch is unable to see and or hear any of the meters, an additional Fire Watch is required to continuously monitor these meters. Any and all Fire Watch personnel must immediately shutdown all ignition sources within the tank yard if any meter alarms.

6.1.8 Welding on Lined Vessels

Welding on liners, cladding, re-pads, or nozzles can create additional hazards. This work must be checked for hydrocarbons behind the liners prior to beginning hot work. This work requires Health & Safety Department approval.

## 6.2 Authorization

As described in R-11-005, only Marathon Qualified Operators (i.e. Operations) may authorize hot work within the process units. Marathon Authorized Persons may authorize Hot Work in Zone E. The craft performing the work must have a Craft Authorized Person that is trained on Marathon's hot work practices to inspect the area prior to the authorization of cutting and welding.

Areas prohibited from hot work operations would include:

- Sprinklered buildings while such protection is impaired (i.e. if the hot work requires the presence of a properly functioning sprinkler system).
- The presence of explosive atmospheres.
- The presence of flammable liquids or other materials that could come into contact with ignition sources.
- The presence of un-cleaned or improperly prepared equipment, drums, tanks, or other containers that have previously contained materials that could develop explosive atmospheres.
- Areas with an accumulation of combustible dust that could develop explosive atmospheres.

## 6.3 Flammability Testing/Atmospheric Monitoring

Flammability testing is a critical component when authorizing hot work operations. Flammability testing shall include testing of the surrounding area, sewers, drains, equipment and containers that may contain flammable vapors. Flammability testing must be conducted in more than one location. In every instance, atmospheric monitoring must be conducted within two hours prior to the start of work and be documented on the work permit.

Continuous air monitoring of Attended Hot Work locations is always required while Attended Hot work is performed. Operations is also required to do a documented mid-shift gas test to ensure conditions have not changed. The results shall be documented at hourly intervals when Attended Hot Work begins. The results must be documented on the Atmospheric Monitoring Log Sheet. A passive type meter is not permissible for continuous air monitoring; the monitor must be equipped with a pump for sampling. Industrial Scientific MX-4's and MX-6's with pumps are supplied at Marathon Anacortes. All monitoring data stored (i.e. logged) on the Marathon Industrial Scientific Equipment will automatically be downloaded each time it is docked on a docking station. This data can be retrieved by request to the Health & Safety Department. Continuous air monitoring is not required for Non-Attended Hot Work.

Most hydrocarbons are heavier than air and collect in low points in the process, equipment and surrounding area. The heat generated by hot work may cause flammable liquids in the liquid phase to create hazardous or explosive atmospheres.

Authorized persons shall ensure that testing devices are properly maintained and calibrated prior to use. Welding or cutting shall not take place when LEL readings are above 0%. Attended Hot Work may be possible up to 10% LEL (i.e. where the source of the flammable vapors is known), if RSP 1715-000 Appendix B is completed. The Elevated LEL Hot Work Approval Form found in RSP-1715-000 is also in R-11-030 as Appendix A. For cutting or welding activities, local exhaust ventilation used for removing welding fumes (i.e. non-confined space) shall maintain an air velocity of at least 100 fpm at the source of the fumes or gases. When no ventilation is available nor does IH data exist for the work being performed, a minimum of a half mask respirator with HEPA filter must be used.

**Note**: If hot work is to be performed in a confined space, refer to R-11-017 for additional air monitoring requirements.

## 6.4 Special Precautions (Attended Energy Hot Work)

Working Surfaces (Ex: floors and walls) that are combustible must be covered with approved fire-retardant material. Openings or cracks in the flooring that cannot be closed, must also be covered/protected to prevent sparks that could drop down to the next level. Use caution when covering openings on work platforms, as this could create additional hazards to workers.

Sewers, vents, catch basins, contaminated ground, and drains must be properly covered or sealed (i.e. plugged, isolated or secured) within 35'. Process vents or drains shall not be opened into the hot work area. If sewer manholes, drains or catch basins are covered in preparation for hot work, the covers must be removed when the work has been completed or if work stops at the end of the day or shift. Sewer covers must be constructed of a material such as heavy-duty fire blanket or other industrial type material rated and designed for fire/spark prevention, and not contaminated with flammable or combustible products. Vehicles should not be parked or driven over unsealed sewer openings. Sewer covers shall be installed to seal the edges of the sewer or use other means (Ex: water seal) to positively seal sewer gases from the hot work if welding is absolutely necessary directly above a sewer opening.

Chlorinated or fluorinated solvents must be kept 200' from the hot work area.

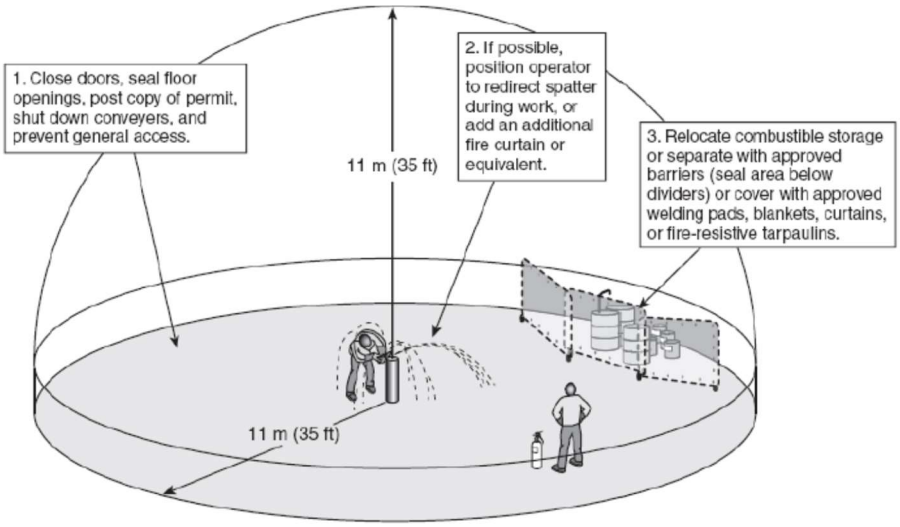


**Figure 1 35 ft Rule**

6.4.1 35 Foot Rule & Elevated Work

When performing hot work from an elevated location, the Elevated LEL Hot Work Approval Form must be completed (see Appendix A).

Figure 2 demonstrates how work must be managed when sparks or flame can reach a surface below. Additional Fire Watches would be needed to control any potential for fire.

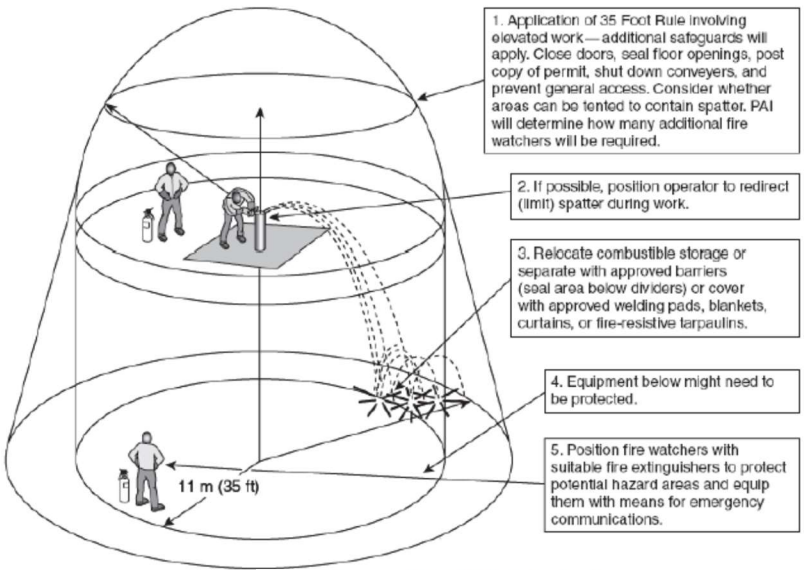


**Figure 2 35 ft Rule Elevated**

## 6.5 Equipment Preparation

Systems shall be blinded and spaced at the flange closest to the work. All of the piping/equipment within the blinds must be decontaminated. All work must be pre-approved by Safety, Operations, and Maintenance when installing a blind at a flange that is not closest to the weld site. When proper verification (atmospheric testing, visual inspection for cleanliness) of both sides of the entire system or equipment is not possible the following shall be done:

Contact Senior Safety Specialist to discuss and plan.

System must be isolated, blinded, and spaced. Atmospheric Monitoring shall be conducted at the air gap from the blind and space to verify zero LEL. In the unlikely case where the system is isolated and blinded with no spacers or vents: holes must be drilled to verify the equipment is hydrocarbon free. When cutting a line for future hot work, cold cutting of the lines shall be used. The line must be marked with a paint pen for verification and signed off by Operations & Maintenance. Once the line is cut, Vented Vapor Plugs or Pressure Plugs shall be used prior to hot work. The equipment/pipe shall be hydrocarbon free from the vapor plug to the weld area. The Vapor Plug must have a pressure relief system vented to a safe area outside of the welding enclosure (at least 35 feet from the weld site).

Exceptions will be noted and may include:

- Fire water
- Potable water
- Boiler feed water
- Steam and condensate (i.e. must be more than a single block valve away from process)

When isolation blinds are installed at locations other than the flange(s) closest to the work, additional control measures will be used to reduce risk to an acceptable level. Extreme caution must be taken to ensure that all hydrocarbons have been eliminated (i.e. steaming, purging, or water filling the equipment).

Determine whether the equipment is to be gas free or otherwise inert:

- Isolate equipment in accordance with R-11-032 (SR-60) Control of Hazardous Energy and MOP-28 Blinding Procedures.
- Vapor plugs are not isolation devices. Refer to R-30-008 for more information on how to use vapor plugs for hot work.
- Whenever possible, the vapor plug should be 12" away from the heat affected zone.
- When performing hot work or performing a hot tap on equipment in service, R-53-457 shall be followed.
- Before starting welding, cutting, or heating on any surface covered by a preservative coating whose flammability is not known, test the flammability by a competent person. Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity.
- Precautions shall be taken to prevent ignition of highly flammable hardened preservative coatings. When coatings are determined to be highly flammable, they shall be stripped from the area to be heated to prevent ignition.

- Protection against toxic preservative coatings:
  - In enclosed spaces, all surfaces covered with toxic preservatives shall be stripped of all toxic coatings for a distance of at least 4" from the area of heat application, or the employee shall be protected by airline respirators.
  - In the open air, employees shall be protected by a respirator suitable for the type of work being done.
  - The preservative coatings shall be removed a sufficient distance from the area to be heated to ensure that the temperature of the unstripped metal will not be significantly raised. Artificially cooling the metal surrounding the heating area may be used to limit the size of the area required to be cleaned.
  - No welding, cutting, or other hot work shall be performed on used drums, barrels, tanks, piping or any structural components, unless they have been cleaned so thoroughly as to make absolutely certain there are not flammable materials or any substances present (such as greases, tars, acids or other materials which when subjected to heat, might produce flammable or toxic vapors).
  - All hollow spaces, cavities or containers shall be vented to permit the escape of air or gases before preheating, cutting or welding. Purging with inert gas is recommended as long as specific controls for the inert purge are established.

## 6.6 Authorized Exceptions

See R-53-457 prior to welding on any in-service equipment.

## 6.7 Bolted Process Equipment and Hot Work

- Spark producing Hot Work (e.g., torch cutting, grinder with a cut-off wheel, reciprocating saw) is sometimes required to remove bolts/studs on bolted connections of process equipment. In order to prevent the ignition of flammable or combustible vapors and liquids inside process equipment, the seal on the gasket of the process equipment must be maintained. To ensure that the seal on the gasket is maintained during hot work removal of studs/nuts, at least four bolts must always be able to be removed via mechanical means (e.g., impact wrench, hand tools) for the final break on process equipment connections. Four bolt flanges require a new bolt be replaced as each bolt is cut. Refer to R-50-015 for guidance on removing studs/nuts from equipment.

  **Note**: On larger pieces of equipment with multiple bolts/studs more than four bolts may be required to maintain the gasket seal. The new bolts must be spaced adequately to maintain the gasket seal during Hot Work removal of the remaining bolts. Contact Engineering when unsure about the required gasket stress.

## 6.8 Welding in a Confined Space

- Each Welder shall be afforded 2000 CFM of ventilation within a confined space.
- In order to eliminate the possibility of gas escaping through leaks or improperly closed valves when gas welding or cutting, the torch valves shall be closed and the gas supply to the torch positively shut-off at some point outside the confined area whenever the torch is not to be used for a substantial period of time.

- Gas cylinders and welding machines shall be left outside the confined space.
- Blinds are to be installed at the flange closest to the vessel, if possible. If blinds are not installed at the closest flange, this change must be pre-approved by a Safety, Operations, and Maintenance Plan.
- Stand-by person required at entry to confined space.
- Inspection of inside of vessels prior to hot work:
    - When the vessel contains internal equipment, such as bubble-cap trays, weirs, and other internal pans, an inspection should be made to ensure that all oil, pyrophoric iron sulfide, and other flammable and combustible material has been removed. If any doubt exists about the cleanliness of internal equipment, the equipment should be removed or suitably covered.
- Strip lining, cladding, nozzle re-pads, hydrogen blisters, and any equipment where hydrocarbons could be trapped are to be drilled, purged, and verified per Section 6.3.
- When arc welding is suspended for any substantial period of time (i.e. lunch or end of the shift), all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur, and the machine disconnected from the power source or engine shut-off.
- When gas welding or cutting, the torch valves shall be closed and the fuel gas and oxygen supply to the torch positively shut-off at some point outside the confined area whenever the torch is not to be used for a substantial period of time. The torch and hose shall also be removed from the confined space. The hose need not be removed if it is disconnected from the fuel gas and oxygen supply system.
- R-11-017 shall be followed whenever working in a confined space.

# 7.0 SPECIAL HOT WORK REQUIREMENTS FOR ABOGEGROUND STORAGE TANKS

## 7.1 Floor Hazard Assessment

- Hydrocarbons of other previously stored flammable materials may be present under Aboveground Storage Tank (AST) floors which need repair. This is more probable if there has been a breach in the floor. Prior to cutting the floor with an open flame, the Servicing Group shall take appropriate precautions to ensure that flammables are not present under the AST floor. Refer to API RP 2207.
- The AST must be checked for the presence of a double bottom or sketch plates welded to the perimeter of the AST. Where this condition exists, refer to the precautions outlined in API RP 2207.
- The floor area must be inspected to ensure that patch plates were not used to cover old water draw or process sumps. Where these areas are suspected, holes should be drilled in the floor to verify there is no product under the patch plate.

## 7.2 Shell Hazard Assessment

- AST shell surface must be inspected for the presence of product residue, wax, ignitable rust or scale in the areas where hot work may be performed.

- Historically, equipment in contact with amines, hydrogen fluoride or "sour" (hydrogen sulfide containing) materials has been susceptible to hydrogen blistering. This occurs more often in areas which have been welded. If the AST contained one of these products or if hydrogen blistering is suspected for any other reason, an evaluation by a qualified person (e.g., metallurgist) must be included in the determination of whether it is safe to perform hot work.

## 7.3 AST Roof Structure Hazard Assessment

- Verify that product residue is not present on the upper surfaces of the roof rafter.
- Some ASTs were constructed using piping as structural support columns. Where this is the case, verify that mouse holes were cut at the base of the columns so they can be free draining.

## 7.4 AST Floating Roof Hazard Assessment

### 7.4.1 Deck

- The underside of the floating roof must be inspected for the presence of product residue, wax, ignitable rust or scale in the areas where hot work could be performed.
- The floating roof must be inspected to verify there are no pockets of hydrocarbon that could be trapped between the deck's plates due to the underside of the floating roof being seal welded.

### 7.4.2 Seals

- If the AST is equipped with either a primary or secondary resilient urethane foam log, it must be removed or protected from hot sparks prior to hot work being performed in the area. These seals can leak and trap hydrocarbon.
- Mechanical shoe-type seals need to be inspected for liquids and must be cleaned prior to hot work being performed in the area. The area between the top side of the primary fabric and the bottom side of the secondary seal fabric or underside of wiper must be clean. Outer rim plates, shoe seals, springs and other seal hardware must be clean and vapor free prior to any hot work activity.

## 7.5 Pontoon & Double Decks

- All deck and pontoon covers must be opened and each compartment free of hydrocarbon, ignitable rust, scale or wax, prior to any Attended Hot Work on or near the float roof.

## 7.6 Floating Roof Deck Penetrations

- All leg sleeves, vacuum breaker sleeves, gauge wells, column and ladder wells must be inspected for cleanliness and verified that they are hydrocarbon free.
- Floating roof and vacuum breaker legs can hold product. Prior to hot work, each leg must be cleaned and free draining.

- Gauge poles must be inspected to verify that they are free draining and clear of wax, product residue and scale.

### 7.7 Nozzle and Piping Hazard Assessment

- Verify that jet and internal distributors are clean and both vapor and liquid free.
- Foam lines must be checked for hydrocarbons. The frangible diaphragms often break allowing for product vapor to leak from the ASTs.
- Skimmer and drain piping must be drained, cleaned and gas free prior to performing hot work.

### 7.8 Hazard Assessment for Areas Adjacent to ASTs

- Tank dike must be free of combustible materials that could be affected by the Hot Work.
- Process valve bonnets and flanges located in the tank dike must be checked for leakage.
- All drain and vent valves located in the tank dike must be inspected to ensure there is a plug installed.
- The ground around the AST must be inspected to check for the possibility of an underground line leak.

## 8.0 PERSONAL PROTECTIVE EQUIPMENT/SAFETY DEVICES

- Face Shield: Required for all welding and grinding activities.
- Sealed Eye Protection: Required when grinding, chipping slag or buffing.
- Shaded Lenses: Required for all activities involving an arc. The Welder and crew are responsible for using shields (Ex: welding blanket) or other materials to block or eliminate arc exposure to other persons nearby.
- Safety Devices: Safety devices (such as grinder handles) shall not be removed unless a Marathon Maintenance Supervisor provides written authorization on the Job Safety Analysis.
- Do not use oxygen to ventilate, comfort cool, blow dust from clothing, or to clean the work area.
- Keep clothes free of grease and oil as these substances may ignite and burn uncontrollably in the presence of oxygen.
- Fire resistant clothing (FRC) shall follow R-11-023.
- For Respiratory Protection see SR-4 Hexavalent Chromium and Other Toxic Metals for guidelines.
- Welding leathers

**Note**: Welding hoods cannot be used for grinding unless they are approved for grinding operations.

# 9.0 PRE-WELDING EQUIPMENT INSPECTIONS

## 9.1 Welder

Before starting a welding operation, make a complete inspection of welding equipment:

- Read and understand the Instruction Manual.
- Read the Safety Data Sheets (SDS).
- Verify that all connections are tight, including the ground clamp.
- Verify the electrode holder and welding cable are in good condition.
- Verify that the machine settings are correct for the job.
- If using an engine-driven welder:
  - Verify the welder is running normally.
  - Verify the hoses are on tight.
  - Verify the fuel cap is on tight.
  - Inspect the engine for leaking gasoline and/or oil.
  - Verify the original enclosure and fan guard is in place.
  - Verify the mounted fire extinguisher is in working condition and accessible.
  - Verify the cables are the right size for the job.
  - Spread the cables out and run them neatly to prevent overheating.
  - Verify the cylinders are connected properly.
  - Verify the cylinders are secured.
  - Ensure the work is stable and easy to reach.
  - Verify that the work lead is connected securely.
  - Verify that there is adequate insulation between the craft person and the work.
  - Verify that there is adequate ventilation in the work area.

## 9.2 Inspection & Maintenance of Equipment & Work

Before starting any welding operation, make a complete inspection of your equipment.

To begin with:

- Have you read the Instruction Manual and do you understand the instructions?
- Have you read the warnings and instructions on the equipment, nameplates and decals, as well as the Safety Data Sheets (SDS)?

For the welder:

- Are all the connections tight, including the ground?
- Is the electrode holder and welding cable in good condition?
- Are the settings correct for the job you are about to begin?

For an engine-driven welder:

- Is it running alright?
- Are all the hoses on tight?
- Is the fuel cap on tight?
- Is the engine leaking gasoline or oil?
- Is the original enclosure and fan guard in place?
- Is the mounted fire extinguisher in working condition and accessible.

For the work in general:

- Are the work area conditions such that normal safety precautions can be observed or must special equipment (i.e. welding equipment, protective equipment, safety equipment) or procedures be used?
- Are the cables the right size for your job?
- Are they spread out and run neatly to prevent overheating?
- Are the cylinders connected properly?
- Are the cylinders secured?
- Is the work stable and easy to reach from where you are standing?
- Is the work lead connected securely?
- Is there enough insulation between your body and the work piece?
- Is there adequate ventilation in your work area?

## 10.0 ARC WELDING AND CUTTING


### 10.1 Electrode Holders

Use only electrode holders that are specifically designed for arc welding and cutting, and that are capable of safely handling the maximum rated current required by the electrodes. Any current-carrying parts passing through the portion of the holder which the Welder or Cutter grips in their hand, and the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

When arc welding, etc., is to be suspended for any substantial period of time, such as during lunch or at end of the shift, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur, and the machine be disconnected from the power source.

### 10.2 Welding Cables & Connectors

All arc welding and cutting cables shall be completely insulated, (this includes rubber boots over the attachment lugs on the machine), flexible, and capable of handling the

maximum current requirements of the work in progress, taking into account the duty cycle under which the Arc Welder or Cutter is working.

Use cables that do not have repairs or splices in them for a minimum of 10' from the cable end to which the electrode holder is connected. This does not apply to cables with standard insulated connectors or with splices that have an insulating quality equal to that of the cable. Welding cables shall be as short as possible while still allowing the Fire Watch to shut-off the machine quickly.

When it is necessary to connect or splice lengths of cable one to another, substantially insulated connectors with a current capacity at least equivalent to the cable shall be used. If connections are affected by cable lugs, they shall be securely fastened together to give sound electrical contact and the exposed metal parts of the lugs shall be completely insulated.

Do not use excessively worn cables. When bare conductors are exposed, the exposed portion shall be protected by rubber and friction tape or other equivalent insulation. Welding cables and the electrical supply cables shall be protected so they are not tripping hazards and not driven over to prevent damage. The electrical supply cord shall be painted yellow or identified with high visibility tape.

## 10.3 Ground Returns & Machine Grounding

Whenever possible, the ground is to be attached inside the welding enclosure. Otherwise, the area around the grounding location must be treated with the same precautions as the weld site (i.e. sewers are covered, area checked for LEL, made free of flammables and monitored by Operations).

Ground return cables shall have a current carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit that it services.

When a single ground return cable services more than one unit, its safe current-carrying capacity shall equal or exceed the total specified maximum output capacities of all the units that it services.

When a structure or pipeline is employed as a ground return circuit, verify that the required electrical contact exists at all joints. The generation of an arc, sparks, or heat at any point shall cause rejection of the structures as a ground circuit.

When a structure or pipeline is continuously employed as a ground return circuit, all joints shall be bonded and periodically inspected to ensure that no electrolysis condition or fire hazard exists.

All ground connections shall be inspected to ensure that they are mechanically strong and electrically adequate for the required current.

When the Welder stops work for an appreciable length of time, or when the welding machine is moved, the power supply to the equipment shall be turned-off.

Any faulty or defective equipment shall be taken out of service and reported to the Supervisor.

# 11.0 GAS WELDING AND CUTTING

## 11.1 Cylinders

- Unless cylinders are secured on a carrier designed to move uncovered regulators, regulators shall be removed, and valve protection caps put in place before cylinders are moved.
- Compressed gas cylinders shall be kept in an upright position unless it is necessary to hoist or carry them for short periods of time.
- Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20' from highly combustible materials.
- Cylinders should be stored away from elevators, stairs, and gangways. Storage sites shall be located where cylinders will not be knocked over or damaged by passing or falling objects.
- Cylinders shall not be kept in unventilated enclosures.
- Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag, or flame cannot reach them. When this is impractical, fire resistant shields shall be provided.
- The cylinder valve shall always be opened slowly to prevent damage to the regulator. For quick closing, valves on fuel gas cylinders shall not be opened more than 1 ½ turns.
- When a special wrench is required, it shall be left on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut-off quickly in case of an emergency.
- In the case of manifolded or coupled cylinders, at least one wrench shall always be available for immediate use.
- Nothing shall be placed on top of a fuel gas cylinder that may damage the safety device or interfere with the quick closing of the valve when the cylinder is in use.
- Fuel gas shall not be used from cylinders through torches or other devices that are equipped with shut-off valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.
- Always light the acetylene gas before opening the oxygen valve.
- Never use acetylene at a pressure in excess of 15 psi. Higher pressure can cause an explosion.
- For additional information on cylinder safety refer to R-50-004.

## 11.2 Hoses

- The fuel gas hose and oxygen hose shall be easily distinguishable from each other. The contrast may be made by different colors or by surface characteristics readily distinguishable by the sense of touch. Oxygen and fuel gas hoses shall not be interchangeable. A hose having more than one gas passage shall not be used.
- When parallel sections of oxygen and fuel gas hoses are taped together, not more than 4" out of 12" shall be covered by tape.

- All hoses that carry acetylene, oxygen, fuel gas, or any other gas that may ignite, burn, or pose harm to employees, shall be inspected prior to using them at the beginning of each working shift. Defective hoses shall be removed from service.
- Hose which has been subject to flashback or which shows evidence of severe wear or damage, shall be tested to twice the normal pressure to which it is subject, but in no case less than 300 psi. Defective hose, or hose in doubtful condition, shall not be used.
- Use hose couplings that cannot be unlocked or disconnected by means of a straight pull without rotary motion.
- Boxes used for the storage of gas hose(s) shall be ventilated.
- Hoses, cables, and other equipment shall be kept clear of passageways, ladders and stairs.
- Never wrap hose or hang torches around cylinder valves or regulators.
- All hoses must be equipped with flashback arrestors.
- When gas welding or cutting, the torch valves shall be closed and the fuel gas and oxygen supply to the torch positively shut-off whenever the torch is not to be used for a substantial period of time (Ex: breaks, lunches).
- To ensure gases cannot inadvertently accumulate while inside a confined space, all torches and hoses must be shut-off at the torch and the supply and removed from the confined space when not in use.

## 11.3 Torches

- Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills, or other devices designed for such purpose.
- Torches in use shall be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings, and tip connections. Defective torches shall not be used.
- Use a striker to light the torch. Do not use matches or lighters. Do not re-light the torch from hot metal.
- Use the proper tip or nozzle, and always operate it at the proper pressure for the work involved.

## 11.4 Regulators

- Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.
- Be sure the regulator tension screw is released before opening the cylinder valve. Always open the valve slowly to avoid strain on the regulator gauge.
- Release pressure on regulators when work is finished.
- Before a regulator is removed from a cylinder valve, the cylinder valve shall be closed, and the gas released from the regulator.
- Never exceed the design pressure of the regulator

## 12.0 FLASH SCREENS, WELDING BLANKETS, AND WELDING ENCLOSURES

- Arc protection and spark/slag containment are important factors in personal protection and fire prevention at Marathon Anacortes Refinery. Arc protection must be maintained to prevent flash burn to personnel, and in the area(s) where chlorinated or fluorinated solvents are used and stored (see R-11-016).
- Contain sparks and slag in process units and areas where flammables and combustibles are present. Areas where flammables and combustibles are not typically present (such as lay down yards, shops, roads and grounds) only require area containment. Area containment is defined as the area immediately surrounding the work site where the Authorized Person in Charge of the work has determined that no flammables or combustibles are present, and no danger of personnel injury is present due to sparks and slag.
- Hot work in Logistics Tank Yards must not be performed within 35’ of sewer drains or sample stations using area containment. The Operations Supervisor and Authorized Person in Charge will evaluate other areas where area containment may be used.
- For process units or other areas where containment structures (Ex: hooch) are built for spark and slag containment, the Operations Supervisor, along with the Authorized Person in Charge of the work, will make the initial evaluation of the effectiveness of the hooch.

### 12.1 Flash Screens

- Welding must be adequately screened to protect nearby workers or passers-by from the glare of welding. Arrange the screens so that they do not restrict ventilation. Mount screens as close to the floor as necessary to protect adjacent workers. Screen height is normally 6’ but may be higher depending upon the situation. Do not arc weld unless workers who may be exposed to radiation from the arc flash are protected by adequate screens, curtains, or partitions, or they wear suitable eye protection.
- A screen, curtain, or partition near an arc welding operation must be made of or be treated with a flame-resistant material or coating and must have a non-reflective surface finish.
- Screens or curtains can be either fixed permanently or mounted on portable frames where welding can take place at various locations within a shop. Flexible, translucent, plastic material is available which will filter out UV glare and the other harmful blue-white radiation.
- Portable frames must be secured/supported so that they cannot be accidentally knocked over or blown over by wind.

### 12.2 Welding Enclosures

- Inspect blankets prior to use. Remove them from service if excessive discoloration or degradation is found that would not allow the material to perform its primary function of containing sparks.
- Do not cover holes in decking, uneven surfaces, etc. with blanketing.
- Leave an adequate access/egress point in the enclosure.
- Construct the enclosure in a manner that will protect personnel working above from the arc rays.

- If a roof is to be installed on the enclosure, a minimum 1' gap must be maintained between the wall and roof on 2 opposing sides for ventilation.
- Do not leave wire points exposed.
- Do not tie blanket off to small piping or tubing.

### 12.3 Welding Blankets

Welding blankets used at Marathon Anacortes Refinery for spark and slag containment will meet or exceed MIL-C-24576 (SH) specifications. Other welding blankets may be used if they receive approval from the Marathon Health & Safety Department prior to use. Areas where spark and slag containment is required but no external heat sources are present (such as Logistics Tank Farms or during T/A activities) may not require blanket material meeting this specification. This will be determined during work task planning.

Avoid direct flame or hot slag from damaging welding blankets. No welding blanket can prevent heat transfer completely and will eventually degrade if it is subjected to the flame directly over a prolonged period. Preventative action could include placing a pail of water near the blanket, erecting a directed metal enclosure or plate, or other suitable methods (i.e. other than wood) to keep the molten product off of the blankets.

## 13.0 TEMPORARY PORTABLE PUMPS

The use of portable pumps to pump hydrocarbons must be managed to control potential ignition sources, releases, and fires.

The Proceduralized Management of Change (PMOC / MOC) must be completed prior to the start-up of any non-intrinsically safe portable pump used to pump hydrocarbons inside tank dikes or unit battery limits. Refer to RSP-1715-000 Sec 3.7 for further details.

The PMOC/MOC must contain, at a minimum, the following:

- PMOC/MOC duration,
- Product and pump specifications,
- Hazard review,
- Approvals,
- Implementation actions, and
- Pre-startup safety review (PSSR).

Temporary non-intrinsically safe pumps used to pump hydrocarbons that are located inside tank dikes or unit battery limits must be manned at all times while in operation and equipped with a remote shutdown device (e.g., lanyard, electronic shutoff, disconnect switch, fuel shutoff valve, etc.).

**Reference**: Refer to MPC Process Safety Advisory, PSA 16-02, which covers an event that resulted in a fire while utilizing a portable pump to transfer hydrocarbons from a tank.

## 14.0 REVIEW AND REVISION HISTORY

| Revision # | Preparer | Date | Description |
| --- | --- | --- | --- |
| 0 | Mark Willand | 1/16/2022 | Reformatted and Numbered per Document Control Policy, R-63-001. |
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## 15.0 APPENDIX A – ELEVATED LEL HOT WORK APPROVAL FORM SAMPLE (RSP-1715-000-FORM1)

### Elevated LEL Hot Work Approval Form

(RSP-1715-000-FORM1)

Company Performing Work: _____

Date: _____ Time: _____ Area/Unit: _____ Permit No.: _____

Hot Work to be Completed: _____

Describe the Source of the Flammable Vapors: _____

Justification to Complete the Hot Work at Increased LEL: _____



Additional Control Procedures Required to Complete the Hot Work Safely: _____

Conditions When the Hot Work Must be Stopped: _____

_____ Maintenance Manager

_____ Safety Supervisor