

Hot Work Permit Program and Training Materials



Effective Date:
Revision #:

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NOTE: Hot Work Permit Program Presentation accompanies this program.

Prepared by:

Date:

Approved by:

Date:

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Hot Work Permit Program

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Reference Standard

Occupational Safety and Health Administration, including Subpart Q, Welding, Cutting and Brazing: 29 CFR 1910.252, General Requirements.

Purpose

This procedure establishes minimum safety procedures to be followed for performing any hot work outside of a designated welding area. Hot work includes: flame cutting, welding, brazing, soldering, grinding and application of roofing material with a torch.

Scope

This procedure applies to all of our company members, contractors and vendors performing work on company property, and all other individuals who are visiting or have business with our company.

Responsibilities

- ✓ Management is responsible for development and review of this program. Management is also responsible for appropriate member training.
- ✓ Management and supervisors are responsible for enforcement of this program.
- ✓ Members must comply with all procedures outlined in this policy.
- ✓ Contractors and vendors must comply with all procedures outlined in this policy.

Definitions

Brazing: a technique used to join base metals with a filler metal. The base metals are not melted in brazing.

Cutting: use of a torch to melt metal and cut a unit part into multiple parts.

Fire Watcher: a worker who is assigned to stay in the hot-work area and look out for fires. A fire watcher must be capable of traveling above, below and to the sides of the hot work or additional personnel must be assigned to watch these exposures. Fire watch personnel must be equipped with and trained on how to use fire-suppression equipment and must know how to activate the fire alarm. A fire watcher is **not** a fire brigade.

Grinding: using a grinder to remove metal or another material. Grinding creates sparks capable of causing accidental fires.

Hot Work: welding, cutting and brazing.

Hot Work Permit: a permit issued after an area has been inspected and found not to contain fire hazards. After issuance of the permit, hot work can be undertaken for the duration of the permit but never longer than one shift.

Incipient Stage Fire: the beginning or initial stage of a fire. Generally, the heat and smoke production and fire growth are manageable. If an member believes that a fire is too big, too smoky or too hot the fire is **not** an incipient stage fire.

Resistance Welding: a technique that uses the resistance of pieces of metal to create heat and fuse the pieces together.

Vendor: a non-company member being paid to perform a service in our facility.

Welding: the technique of joining metal by melting the base metals with or without the use of filler metal with an electric current or a gas-fed flame.

Basic Precautions

Authorization: before cutting or welding is permitted, the area must be inspected by the individual responsible for authorizing cutting and welding operations. When granting the authorization, the inspector must designate the precautions to be followed if hot work is to proceed. Preferably, the permit will be in writing;

Fire hazards: if the object to be welded or cut cannot readily be relocated to a designated safe hot-work area, all movable fire hazards near the hot work must be taken to a safe place;

Relocation of combustibles: where practicable, all combustibles must be relocated at least 35 feet (10.7 m) from the work site. Where relocation is impracticable, combustibles must be protected with flame-proofed covers or otherwise shielded with metal or asbestos guards or curtains;

Floors: where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor must be swept clean for a radius of 35 feet (10.7 m). Combustible floors must be kept wet, covered with damp sand or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc-welding or arc-cutting equipment must be protected from shock;

Guards: guards must be used to confine the heat, sparks and slag, and to protect immovable fire hazards, if the object to be welded or cut cannot be moved;

Combustible material: wherever there are floor openings or cracks in the flooring that cannot be closed, precautions must be taken so that no readily combustible materials on the floor below will be exposed to sparks that may drop through the floor. The same precautions must be observed for cracks or holes in walls, open doorways and open or broken windows;

Ducts: ducts and conveyor systems that can carry sparks to distant combustibles must be suitably protected or shut down;

Combustible walls: fire-resistant shields or guards must be provided to prevent ignition where cutting or welding is done near walls, partitions, ceilings or roofs of combustible construction;

Noncombustible walls: if welding is to be done on a metal wall, partition, ceiling or roof, precautions must be taken to prevent ignition of combustibles on the other side, due to conduction or radiation. Preferably prevention will be achieved by relocating any combustibles. If relocating combustibles is not practicable, a fire watch on the opposite side of the hot work must be provided;

Pipes: cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs must not be undertaken if the work is close enough to cause ignition by conduction; and

Combustible cover: welding must not be attempted on a:

- ✓ Metal partition, wall, ceiling or roof having a combustible covering; or
- ✓ Wall or partition of combustible sandwich-type panel construction.

Procedure

A hot work permit must be completed whenever heat-, flame- or spark-producing work is performed outside of an area designated for containing such fire hazards;

Hot work will **not** be performed in the following situations:

- ✓ If the area is not approved by management;
- ✓ If cutting, welding or other equipment is not in safe condition;
- ✓ In sprinklered areas while the protection is impaired;

- ✓ In the presence of explosive atmospheres such as:
 - Flammable gasses, dust and vapor; or
 - Explosive atmospheres that may develop inside unclean or improperly prepared tanks or equipment which previously contained flammable material or combustible dust;
- ✓ In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper or cotton; and

The permit must be initiated by either the worker who is to perform the hot work or by the worker's supervisor.

Permit Procedure:

Permits must be authorized (signed) by the supervisor of the worker (or contract worker) performing the hot work (See Appendix A);

All personnel working in a hot-work area must be notified of the hot work before the hot work begins;

A trained fire watcher must be assigned to oversee the hot work before it begins. The fire watcher must be in constant attendance (including during lunch and breaks) until 30 minutes after the completion of the hot work;

The permit must be displayed at the job site for the duration of the hot work;

Permits are valid for a maximum of eight hours. New permits must be issued for continued work when a permit expires after the eight-hour period; and

Expired permits must be returned to the maintenance supervisor and be retained for examination by our fire insurance carrier. After review by the fire insurance carrier the expired permits can be discarded.

Permit Requirements:

- ✓ Area preparation:
 - Remove all flammable and combustible liquids within a 35-foot radius;
 - Seal all wall and floor openings within a 35-foot radius;
 - Wet down, protect with fire-proof tarps or other non-combustible shields all combustible flooring and any other combustible material that cannot be moved;
 - Move combustible materials away from walls, ducts and pipes that could transfer heat (preferably to remote areas);
 - Shield and protect others in the area from weld flash, sparks and slag;
 - Clean and purge enclosed equipment of all combustible materials and vapor; and
 - If necessary, issue a confined space entry permit in addition to the hot-work permit;
- ✓ The Supervisor:
 - Is responsible for the safe handling and use of the cutting or welding equipment;
 - Must determine the presence (or likely presence) of combustible materials and other hazards areas that are in the work site;
 - Must ensure that combustibles are protected from ignition by:
 - Moving the work moved to a location free of combustible materials;
 - Moving combustibles to a safe distance or properly shielding them from the hot work, if the work cannot be moved to a safe hot work area; and
 - Scheduling cutting and welding work so that it does not coincide with plant operations that might expose combustibles to ignition;

- Must secure authorization for cutting or welding operations from the designated management representative;
 - Must ensure that the cutter or welder secures approval for his or her work after certifying that conditions are safe before hot work begins;
 - Must determine that fire protection and extinguishing equipment are properly located at the site; and
 - Must see that fire watchers are available at the work site when their presence is required;
- ✓ Fire Protection:
- All fixed fire-protection systems in the area must be operational;
 - Have a trained fire watcher. A fire watcher must:
 - Be present whenever welding or cutting is performed in locations where a fire might develop (except for a minor fire) or if there are:
 - Appreciable combustible materials closer than 35 feet (10.7 m) to the point of operation;
 - Easily-ignited, appreciable combustibles more than 35 feet (10.7 m) away;
 - Combustible materials in adjacent areas (including concealed spaces) exposed by wall or floor openings within a 35-foot (10.7 m) radius; and
 - Conduction- or radiation-combustible materials adjacent to the opposite side of metal partitions, walls, ceilings or roofs where hot work will be performed;
 - Have fire extinguishing equipment readily available and be trained in its use. The fire watcher must:
 - Watch for fires in all exposed areas;
 - Try to extinguish fires only when doing so is obviously within the capacity of the fire-suppression equipment available to him or her; and
 - Alert others in the area in the case of a fire;
 - Be familiar with the facilities where the hot work takes place and know how to sound the alarm in the event of a fire; and
 - Keep watch for at least 30 minutes after completing welding or cutting operations to detect and extinguish possible smoldering fires.

Protection of Personnel

General:

- ✓ **Railing:** welders and their helpers must be protected against possible falls when working on platforms, scaffolds, or runways. This may be accomplished by the use of railings, safety belts, life lines, or some other equally effective safeguards; and
- ✓ **Welding cable:** welders must place welding cables and other equipment so that they are clear of passageways, ladders, and stairways.

Eye protection

- ✓ **Selection:**
 - Helmets or hand shields must be used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants must be provided with proper eye protection;

- Goggles or other suitable eye protection must be used during all gas welding or oxygen cutting operations. Spectacles without side shields, with suitable filter lenses are permitted for use during gas welding operations on light work, for torch brazing or for inspection;
- All operators and attendants of resistance welding or resistance brazing equipment must use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required; and
- Eye protection in the form of suitable goggles must be provided where needed for brazing operations not covered in the Code of Federal Regulations;

✓ **Specifications for protectors:**

- Helmets and hand shields must be made of heat and electrical insulation material. Helmets, shields and goggles must be not readily flammable and must be capable of withstanding sterilization;
- Helmets and hand shields must be arranged to protect the face, neck and ears from direct radiant arc energy;
- Helmets must be provided with filter and cover plates designed for easy removal;
- All parts must be constructed of a material which must not readily corrode or discolor the skin;
- Goggles must be ventilated to prevent fogging of the lenses as much as practicable;
- All glass for lenses must be tempered, substantially free from striae, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and windows must be smooth and parallel;
- Lenses must bear some permanent distinctive marking by which the source and shade may be readily identified; and
- The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit individual needs:

Welding operation	Shade No.
Shielded metal-arc welding— 1/16-, 3/32, 1/8-, 5/32-inch electrodes	10
Gas-shielded arc welding (nonferrous)— 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	11
Gas-shielded arc welding (ferrous)— 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	12
Shielded metal-arc welding: 3/16-, 7/32-, 1/4-inch electrodes	12
Shielded metal-arc welding: 5/16-, 3/8-inch electrodes	14
Atomic hydrogen welding	10-14
Carbon arc welding	14
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 inch to 6 inches	4 or 5
Heavy cutting, 6 inches and over	5 or 6
Gas welding (light) up to 1/8 inch	4 or 5
Gas welding (medium) 1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy) 1/2 inch and over	6 or 8

Health Protection and Ventilation

Contamination: health protection and ventilation requirements govern the amount of contamination to which welders may be exposed. These requirements have been established on the basis of three arc and gas welding factors. These factors are:

- ✓ Work space dimensions where welding is to be done (with special regard to height of ceiling);
- ✓ The number of welders; and
- ✓ The likelihood of hazardous fumes, gases or dust emission related to the metals used for the work;

Screens: when welding must be performed in a space entirely screened on all sides, the screens must be arranged so that they do not seriously restrict ventilation. If possible, mount the screens about 2 feet (0.61 m) above the floor, unless the work is performed so low that the screen must be extended closer to the floor to protect nearby workers from welding glare;

Maximum allowable concentration: local exhaust or general ventilating systems must be provided and arranged to keep the amount of toxic fume, gas or dust emissions below the maximum allowable concentration;

Precautionary labels: a number of potentially hazardous materials are employed in fluxes, coatings, coverings, and filler metals or are released to the atmosphere during welding and cutting. These include, but are not limited to, the materials itemized in the Code of Federal Regulations. Welding material suppliers must determine the hazard, if any, associated with the use of their materials in hot work. As a best practice, the following labels should be placed on the following hazardous materials if the labels are not provided by welding material suppliers;

- ✓ All filler metals and fusible granular materials must carry the following notice, as a minimum, on tags, boxes or other containers:

CAUTION

Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. Use adequate ventilation. See ANSI Z49.1 – 1967 Safety in Welding and Cutting published by the American Welding Society.

- ✓ Brazing (welding) filler metals containing cadmium in significant amounts must carry the following notice on tags, boxes or other containers:

WARNING

CONTAINS CADMIUM--POISONOUS FUMES MAY BE FORMED ON HEATING

Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1 - 1967. If chest pain, cough or fever develops after use call physician immediately.

- ✓ Brazing and gas welding fluxes containing fluorine compounds must have a warning to indicate that they contain fluorine compounds. The American Welding Society for brazing and gas welding fluxes offers this sample warning:

CAUTION
CONTAINS FLUORIDES

This flux when heated gives off fumes that may irritate eyes, nose and throat.

1. Avoid fumes--use only in well-ventilated spaces.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.

Training

- ✓ All personnel, including those performing hot work, fire watchers and hot work supervisors must be trained prior to their assignment to hot-work operations and fire-watch duties;
- ✓ Training must include:
 - How to prevent and protect equipment and personnel from fires;
 - How to operate the fire alarm system;
 - How to identify hazardous conditions during hot-work operations
 - How to evaluate the operational condition of fixed fire-protection systems (if applicable);
 - Instruction on hot work permit procedures;
 - How to operate fire extinguishers and other fire-suppression equipment; and
 - Instruction on personal protective equipment requirements;
- ✓ Retraining or additional training must be provided when:
 - Observations reveal that an individual or group of workers exhibits a need for training; or
 - Whenever equipment or procedures change.

Revision History Record:

Revision Number	Section	Revised By	Description
0	NA	NA	Original document.

Hot Work Permit

Date: _____

Time: _____ AM/PM

Floor/Location: _____

Fire Watch: _____

Permit Expiration: _____ AM/PM (not valid longer than one shift)

- WELDING/BRAZING**
- FLAME CUTTING/TORCHING**
- SOLDERING**
- GRINDING**
- OTHER** _____

PRECAUTIONS

- Cutting, welding and other equipment are in safe condition
- Trained fire watcher has been assigned
- Area personnel has been notified of the job
- Fire suppression and alarm systems are operational
- Fire extinguishers are on-site (minimum 10 lb. ABC dry chem.)
- Flammable and combustible liquids are at least 35 feet away
- Combustible materials are 35 feet away or shielded with fire-resistant covers
- Wall, floor and other openings within a 35-foot radius are covered
- Floor has been swept and is free of combustibles
- Combustible flooring has been wet down or covered
- Enclosed equipment has been cleaned and purged of flammable vapor and dust
- Confined Space Entry Permit has been issued (if required)
- Fire watcher has checked areas above, below and to the sides of the job site

Supervisor Approval: _____

Fire Watcher Final Inspection: _____

(30 minutes after conclusion of the job)

PLAYING IT SAFE



Hot Work Procedures

General Procedures

- The Hot Work Permit is initiated by the worker performing the work or the worker's supervisor;
- The permit must be signed by the worker's supervisor and displayed at the job site for the duration of the hot work;
- Permits are valid for a maximum of eight hours. A new permit must be issued for subsequent work;
- Return expired permits to the maintenance supervisor; they are kept on file for review by our insurance carrier; and
- Never perform hot work in the following situations:
 - If the area is not approved by management;
 - If cutting, welding or other equipment is not in safe condition;
 - In sprinklered areas while the protection is impaired; or
 - In the presence of explosive atmospheres (gasses, dust, vapor) or where explosive atmospheres may develop (inside improperly cleaned or prepared tanks or equipment that may have flammable material or combustible dust).

Area Preparation

- All flammable and combustible liquids within a 35-foot radius must be removed;
- All wall and floor openings within a 35-foot radius must be sealed;
- Combustible flooring and any other combustible material that can not be

- moved must be dampened or protected with fireproof tarps;
- Move combustibles away from walls, ducts and pipes that could transfer heat;
- Provide shielding to protect others in the area from weld flash, sparks and slag;
- Ensure enclosed equipment is cleaned of all flammable and combustible materials, and purged of flammable vapor; and
- If necessary, a confined space entry permit must be issued in addition to the hot-work permit.

Fire Protection

- All fixed fire protection systems in the area must be operational;
- A trained fire watcher must be available to:
 1. Remain in constant attendance (including during lunch and breaks) until 30 minutes after the completion of the hot work;
 2. Continuously check for accidental fires in the job area, the floors above and below (if applicable) and on the other side of walls and partitions;
 3. Keep all tarps and shields used for fire prevention and safety in place;
 4. Stop the hot work immediately if a hazardous situation develops;
 5. Activate the fire alarm system if a fire occurs; and
 6. Attempt to extinguish incipient stage fires



When to Use a Permit

A Hot Work Permit must be completed whenever heat-, flame-, or spark-producing work is performed outside of an area designated for containing such fire hazards.

Prior to beginning Hot Work, you must notify all personnel in the area.

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HOT WORK PROCEDURES QUIZ

The following provides a useful preparation outline for use by trainers presenting the Portable Fire Extinguisher Program training presentation to members.

Training Objectives

- ✓ Review the hazards of hot work for the worker and for others. Provide the students with the basic requirements of the hot work procedure. All personnel involved in hot work including supervisors, mechanics and fire watchers should receive this training.

Before Training

- ✓ Read the OSHA standards and the model Hot Work Procedure Program;
- ✓ Understand that a significant number of serious commercial and industrial fires are caused by hot work incidents;
- ✓ Understand that personnel who perform fire-watch duty must remember that "life is more important than property" and must receive training on how to:
 - Activate your facility's fire alarm;
 - Operate portable fire extinguishers and other fire-suppression equipment; and
 - Perform other emergency duties that they may be assigned to carry out;
- ✓ Know that the model program contains a hot work permit that can be copied and used by your personnel. Many facilities must produce their hot work permits on yellow or red heavy stock paper so that they stand out on the job site;
- ✓ Know that it's important to retain expired hot work permits for review by your property fire insurance carrier. One system used is to ask the inspector to sign and date the most current permit for file and discard all previous expired permits; and
- ✓ If there are flammable or combustible liquids present in areas where hot work will be performed a combustible gas meter should be used to check the atmosphere and verify that a flammable atmosphere does not exist. Students must be taught how to use your meter and how to respond to an alarm condition.

Introduction for Training

- ✓ Begin by stressing the overall importance of safety in your facility;
- ✓ Review with students that hot work can start accidental fires in the facility and that these fires could lead to severe injuries and serious property damage;
- ✓ Review the duties of a fire watcher in detail; and
- ✓ As a ground breaker, you can ask members what experience they have had performing hot-work duties in their past jobs.

General Guidelines

- ✓ Stress the importance of the bullet points on these slides;
- ✓ Stress the importance of the individual member being committed to his or her own safety;
- ✓ Be sure to be open to questions or comments;
- ✓ Explain the permit system and how to complete the permit itself; and
- ✓ Provide the opportunity to inspect and handle any special equipment that the student must be using (e.g. fire extinguisher, combustible gas meters, etc.);

Conclusion

- ✓ Review the potential hazards and facility requirements for flammable liquids (if applicable); and
- ✓ Review the handout for further training.

Student Exercise

- ✓ Have the students practice a mock permit completion;
- ✓ If the students will be using a combustible gas meter, provide an exercise to familiarize them with its operation;
- ✓ Allow the students to gain experience with any other specialized equipment that may be used; and
- ✓ Provide experience with fire extinguishers and other fire suppression equipment that will be used.

