



HOT WORK POLICY

1.0 INTRODUCTION

This policy is to ensure Simmons College (Simmons) employee and student safety during Hot Work operations along with the protection of property (including equipment) from Hot Work operations. The National Fire Protection Association (NFPA) defines Hot Work as “work involving burning, welding, or a similar operation that is capable of initiating fires or explosions.” Below are some examples of Hot Work operations:

- Welding and allied processes
- Heat treating
- Grinding
- Thawing pipe
- Power-driven fasteners
- Hot riveting
- Torch-applied roofing

This policy does not apply to candles, pyrotechnics or special effects, cooking operations, electric soldering irons, Hot Work requirements in confined spaces, and lockout/tag out procedures during Hot Work.

This policy is to meet the requirements outlined in the following regulations and standards of care. These documents were used to develop this policy.

- Boston Fire Department (BFD) Hot Work requirements as defined in 527 Code of Massachusetts Regulations (CMR) 1.00
- NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2014 Edition
- American National Standards Institute (ANSI) Z49.1:2012, *Safety in Welding, Cutting, and Allied Processes* (also prepared by the American Welding Society®)

For specific safety requirements for the use of compressed gas cylinders, refer to Simmons’ Compressed Gas Handout.



2.0 ROLES AND RESPONSIBILITIES

Everyone described in this section will recognize their mutual responsibility for safety in Hot Work operations.

2.1 Director Environment, Health and Safety (EH&S)

The Director of EH&S is responsible for reviewing hazards and incidents associated with Hot Work operations conducted on campus along with developing training programs for Hot Work operations, performing hazard evaluations, and performing safety inspections of Hot Work areas and equipment.

2.2 Department Heads or Directors

Department heads and directors are responsible in making sure employees and students and students who will be performing Hot Work operations are properly trained on the SIMMONS procedures before performing Hot Work on campus and for ensuring all safety procedures associated with Hot Work operations are implemented and followed by the department's employees and students and students. In addition, they are responsible for implementing any areas for improvement identified through audits, inspections, and/or incident investigation.

2.3 Professors, Laboratory Technicians, Studio Technicians, and Supervisors

Professors, Laboratory Technicians, Studio Technicians, and supervisors overseeing Hot Work operations **MUST** perform and develop a Job Safety Analysis (JSA). It provides specifies written rules and instructions covering when Hot Work Permit is required, the safe operation of equipment, incorporating information from Safety Data Sheets (SDS) materials used, appropriate personal protective equipment (PPE), evaluation of combustible materials and hazardous areas present or likely to be present in the Hot Work location. In addition, they shall advise all contractors about the specific flammable materials, hazardous processes or conditions, or other potential fire hazards.

Whenever a Hot Work Permit is required, the Professor or Supervisor is responsible for designating the following:

- Permissible Area: Is the established area for Hot Work operations.
- Hot Work Operator: Is the Departmental employee who is qualified and authorized by management to perform Hot Work such as welding, brazing, soldering, and other associated work tasks.
- Permit Authorizing Individual: is the Departmental employee who trained and is authorized to issue a Hot Work Permit. This person must have completed the BFD/NFPA Hot Work training program and received a NFPA training certificate.
- Fire Watch: is the Department employee who is trained in Hot Work safety and monitors the



Hot Work area for changing conditions and watches for fires and extinguishes them if possible.

2.4 Permit Authorized Individual

The Permit Authorized Individual (PAI) is responsible for safe operation of Hot Work activities for her/his department. The PAI will:

- Consider the safety of the Hot Work operator and fire watch with respect to PPE for other special hazards beyond Hot Work.
- Determine the site-specific flammable materials, hazardous processes, or other potential fire hazards that are present or likely to be present in the work location.
- Ensure the protection of combustibles from ignition by the following means:
 1. Considering alternative methods to Hot Work
 2. Moving the work to a location that is free from combustibles
 3. If the work cannot be moved, moving the combustibles to a safe distance or having the combustibles properly shielded against ignition
 4. Scheduling Hot Work so that operations that could expose combustibles to ignition are not begun during Hot Work operations.
- If the criteria outlined in Numbers 2 through 4 cannot be met, Hot Work **SHALL NOT** be performed.
- Determine the fire protection and extinguishing equipment are properly located at the site.
- Be responsible for ensuring that a fire watch is at the site, when required.
- Where a fire watch is not required, make a final check ½ hour after the completion of Hot Work operations to detect and extinguish smothering fires.
- Review Designated Areas for Hot Work operations at least on an annual basis.

2.5 Employees and students and Students

Employees and students and students performing Hot Work (a.k.a. Hot Work Operator) MUST:

- Before use of Hot Work equipment, read and understand all safety practices outlined in the manufacture instruction manual for the specific type(s) of Hot Work equipment used for the process. Read and understand SDSs, and Laboratory, Studio, or Department Specific Work Practices (e.g. Standard Operating Procedures [SOPs], JSA) and safety requirements of this Policy.
- Complete annual Fire Extinguisher Training (“hands-on”) and complete the Hot Work safety training.
- Be trained in the safe operation of the Hot Work equipment and in the safe use of the process. This training must be documented by the department.
- Inspect all Hot Work equipment daily prior to use.
- Shall perform an inspection of all equipment before work or during any unusual Hot Work

operations are planned.

- Have PAI's approval before starting Hot Work operations.
- Shall follow all the safety requirements outlined in the issued Hot Work Permit.
- Ensure fire extinguishers are in working condition and readily available (e.g., within reach).
- Verify that the ventilation is working properly.
- Use all required PPE for the specific job.
- Verify that the Designated Area is fire resistant.
- Cease Hot Work operations if unsafe conditions develop.
- Report any unsafe condition immediately to the professor, Laboratory Technician, Studio Technician or supervisor overseeing the Hot Work operation.

2.5 Fire Watch

The fire watch will:

- Be trained to understand the inherent hazards of the work site and of the Hot Work.
- Ensure that safe conditions are maintained during Hot Work operations.
- Have the authority to stop the Hot Work operations if unsafe conditions develop.
- Have fire-extinguishing equipment readily available and trained in its use.
- Be familiar with the facilities and procedure for activating the fire alarm system in an event of a fire.
- Watch for fires in all exposed areas and try to extinguish them only when the fires are obviously within the capacity of the equipment available. If the fire watch determines that this fire is not within the capacity of the equipment, the fire watch will activate the fire alarm system immediately.
- Be permitted to perform additional task, but those tasks shall not distract her or him from her or his fire watch responsibilities.

2.6 Contractors

Before starting Hot Work, contractors and their clients will discussed the planned project completely, including the type of Hot Work to be conducted and the hazards in the area.

3.0 HAZARD IDENTIFICATION AND PREVENTION

3.1 Fire Prevention and Protection for Welding and Cutting

Welding, cutting, and allied processes produce molten metal, sparks, slag, and Hot Work surfaces can cause fire or explosion if precautionary measures are not followed.



Flying sparks are the main cause of fires and explosions in welding and cutting. Sparks can travel up to 35 feet from the work area. Sparks and molten metal can travel greater distances when falling. Sparks can pass through or become lodged in cracks, clothing, pipe holes, and other small openings in floors, walls, or partitions. Typical combustible materials found inside buildings include: wood, paper, rags, clothing, chemicals, flammable liquids and gases, and dusts. Parts of buildings such as floors, partitions, and roofs may also be combustible. Welding and cutting can cause explosions in spaces containing flammable gases, vapors, liquids, or dusts.

Fire Hazard Prevention Tips:

- Whenever possible, relocate the work from the work site to the welding/maintenance shop area. Welding and cutting operations shall ideally be conducted in a separate, well-ventilated room with a fire-retardant floor.
- When not possible to relocate work to the welding shop: remove combustible materials for a minimum radius of 35 feet (10.7 meters) around the work area in all directions or move the work to a location well away from combustible materials.
- Protect combustibles with covers made of fire-resistant materials (see below for a description of approved fire-resistant materials for Hot Work).
- If possible, enclose the work area with portable, fire-resistant screens.
- Cover or block all openings, such as doorways, windows, cracks, or other openings with fire resistant material.
- When needed, have a qualified firewatcher in the work area during and for at least 30 minutes after Hot Work is finished.
- Do not dispose of hot slag in containers holding combustible material.
- Fire extinguishers shall be maintained in a state of readiness for instant use.
- Welding or cutting is not permitted in or near rooms containing flammable or combustible liquids, vapors, or combustible dusts. Do not weld or cut in atmospheres containing reactive, toxic, or flammable gases, vapors, liquids, or dust.
- Do not apply heat to a work piece covered by an unknown substance or coating that can produce flammable, toxic, or reactive vapors when heated.
- Provide safety supervision for outside contractors conducting Hot Work. Inform contractors about site-specific hazards including the presence of flammable materials.

3.2 Hot Work Permit Requirements

Employees, students, or contractors that perform Hot Work outside of designated Welding Shop and Maintenance Shop areas must complete a SIMMONS Hot Work Permit (see Appendix A) prior to conducting Hot Work operations and post original at job site and provide EH&S with a copy of the initial (before work) and the final sign-off (after work is completed). The Supervisor, Departmental PAI, and Hot Work Operator are responsible for ensuring compliance with the permit requirements. The



information contained on the SIMMONS Hot Work Permit is based from NFPA 51B. Appendix B provides the Hot Work Permit Decision Tree. This decision tree can be used to determine if a Hot Work permit is necessary.

The PAI must document the following on the Hot Work Permit:

1. Date the Permit is being issued. A Permit is only valid for one day of work.
2. Building/Location/Floor Level where Hot Work will be taking place.
3. Document type of work to be performed (i.e. Overhead MIG Welding)
4. The PAI then shall inspect the work area and confirm that precautions have been taken to prevent a fire. The PAI must complete the checklist outlined on the Hot Work Permit which includes observing special precautions needed during work such as posting a fire watch, and ensuring the Hot Work location is free from hazards within 35 feet of the work area where Hot Work is planned.
5. Document any special precautions for the work to be performed such as the use of supplemental fire extinguishers, welding blankets, welding curtains, and ensuring combustible materials are not present and guarding materials that cannot be relocated as a last line of defense where Hot Work is planned.
6. The PAI must inspect if Hot Work is planned near or on walls, ceilings, and roofs. These areas must be inspected for fire hazards.
7. Hot Work is prohibited on enclosed equipment, such as in, on, near tanks, vessels, or containers that contain or have contained flammable substances.
8. Hot Work is prohibited in areas with the accumulation of dusts.
9. The PAI must ensure that the Fire Watch is provided during Hot Work and for 30 minutes after the completion of Hot Work.
10. The PAI must ensure the Fire Watch is supplied with appropriate fire extinguishers and/or fire suppression equipment (e.g. water hose).
11. The Fire Watch must be able to activate the fire alarm and be able to contact the Fire Department in the event of an emergency.
12. The PAI must determine if more than one fire watch is required in adjoining areas, above level and below areas.
13. The Fire Watch must perform a final check of the work area and adjacent areas to which sparks and heat might spread (including floors above and below, and on opposite side of wall(s)). 30 minutes after the Hot Work was completed and verify with the PAI that the area was found safe.
14. After completion of the Hot Work Permit, a copy of the completed Permit must be submitted to the Director of EH&S at the Physical Plant building or hand delivered to the Physical Plant.

3.3 Hot Work Locations

Hot Work is never permitted in certain types of locations where safe conditions do not exist and cannot



be created. Hot Work is allowed in two types of locations:

Designated Area

A permanent location approved for routine Hot Work operations made safe by removal of all possible sources of ignition that could be ignited by the Hot Work tool. An example is the Welding Shop or Maintenance Shop where all combustibles have been removed. A Hot Work Permit **IS NOT** required in a Designated Hot Work Area.

Controlled Area

A controlled area is an area in which safe conditions for Hot Work exist or where safe conditions can be created by moving or protecting combustibles. An example of a controlled area is in a campus building construction area where welding must take place and the work area has been made safe by removing all combustibles and implementing the requirements of the Hot Work permit in order to make it safe.

- In a Controlled Area, a Hot Work Permit must be obtained by the Hot Work operator.
- The permit must be obtained from the Supervisor or Departmental designated PAI before the Hot Work can proceed in a controlled area.
- Refer to Appendix A for the SIMMONS Hot Work Permit that is to be used before commencing Hot Work activities.
- A Hot Work Permit is good for only one day of work. A copy of the Permit must be forwarded to the Director of EH&S.

Non-Permissible Locations

Hot Work **IS NOT** permitted in the following areas:

- In areas not authorized by the Director of EH&S
- In sprinklered buildings where sprinklers are impaired, unless the requirements of NFPA 25, *Standards for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, are met.
- In the presence of explosive atmospheres (i.e., mixtures of flammable gases, vapors, liquids, or dust exist in the air)
- In the presence of uncleaned or improperly prepared equipment, drums, tanks, or other containers that have previously contained materials that could develop explosive atmospheres.

An example is near closed tanks that contain or have contained flammable liquids such as a fuel tank.

3.4 Welding and Hot Work In and Around Tanks

SIMMONS adheres to U.S. Chemical Safety Board recommendations for welding or cutting operations in or near tanks. Whenever possible, avoid Hot Work and consider alternative methods. Analyze the



hazards; prior to initiation of Hot Work perform a hazard assessment that identifies the scope of work, potential hazards, and methods of hazard control.

Work is not allowed and shall not be performed in or near closed tanks that contain or have contained flammable liquids. The tanks must be thoroughly drained, purged, and atmospherically tested with a combustible gas meter (indicator). This will ensure the tank is free from the accumulation of flammable gases or vapors.

Once approved safe for Hot Work, atmospheric monitoring must be performed using a portable combustible gas analyzer before and during the work by only trained personnel (PAIs or EH&S). Assistance can be obtained with atmospheric monitoring by contacting the Director of EH&S.

If any detectable readings are obtained, then work cannot begin or continue until the source of vapor is found and suitably mitigated such that the concentration is maintained below 10% of the Lower Flammable/Explosive Limit. For technical assistance regarding combustible gas meters, contact the Director of EH&S.

3.5 Electric Shock Hazards and Safety Precautions

Electric shock from electrical welding and cutting equipment can result in death or severe burns. Additionally, serious injury can occur if the welder falls as a result of the shock. This safety hazard is associated with operations that use electricity to generate heat, such as arc and resistance welding and cutting.

Employees and students are to use proper precautionary measures and recommended safe practices at all times to avoid electrical shocks. Personnel using electrical welding and cutting equipment must be trained on safe work practices and procedures before use of this equipment. Some measures to prevent electrical shock include:

- Never use a bare hand or wet glove to change electrodes.
- Do not touch an energized electrode while you are in contact with the work circuit.
- Never stand on a wet or grounded surface when changing electrodes.
- Do not allow the electrode holder or electrode to come in contact with any other person or any grounded object.
- Ground the frames of welding units.
- Insulate yourself from the workpiece and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground, or wear properly designed and approved rubber-soled boots in good condition.
- If utilizing long lengths of cable, suspend them overhead whenever possible. If run along the floor, be sure they do not create a tripping hazard, become damaged, or tangled.
- Additional safety precautions are required when welding is performed under any of the



following electrical hazardous conditions: in damp locations or while wearing wet clothing, on metal floors, gratings, scaffolds, or other metal structures; in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece and ground. Where these conditions are present, use one of the following types of equipment presented in order of preference:

1. Semiautomatic DC constant voltage metal electrode (wire) welder,
2. DC manual covered electrode (stick) welder,
3. AC welder with reduced open-circuit voltage. In most situations, use of a DC constant voltage wire welder is recommended. And do not work alone!

3.6 Ventilation Requirements for Welding

Adequate ventilation shall be provided for all welding and cutting and related operations. Adequate ventilation shall be enough ventilation such that personnel exposures to hazardous concentrations of airborne contaminants are maintained below the allowable limits.

Ventilation is used to control overexposures to the fumes and gases during welding and cutting. Adequate ventilation will keep the fumes and gases from the welder's breathing zone. The heat of the arc or flame creates fumes and gases (fume plume). Fumes contain respirable particles. Gases include the shielding gas, and combustion products. The heat from the arc or flame causes the fume plume to rise. Overexposure to welding fumes and gases can cause dizziness, illness, and even unconsciousness and death. The following measures and precautions are to be instituted to protect employee health:

- General Welder Safety Precautions: Keep your head out of the fume plume. Reposition the work, your head, or both to keep from breathing smoke and fumes. Do not breathe the fumes. Use ventilation to control the fumes and gases produced from cutting and welding.
- Adequate ventilation: All welding, cutting, and heating operations shall be ventilated (natural or mechanical) such that personnel exposures to hazardous concentrations of airborne contaminants are within acceptable limits. Adequate ventilation can be obtained through natural or mechanical means or both.
 - Natural ventilation is the movement of air through a workplace by natural forces. Roof vents, open doors and windows provide natural ventilation. The size and layout of the area/building can affect the amount of airflow in the welding area. Natural ventilation can be acceptable for welding operations if the contaminants are kept below the allowable limits.
 - Mechanical ventilation is the movement of air through a workplace by a mechanical device such as a fan. Mechanical ventilation is reliable. It can be more effective than natural ventilation. An example is a local exhaust ventilation system. These systems include a capture device, ducting, hood, and a fan. The capture devices remove fumes and gases at their source. Some systems filter the airflow before exhausting it. Fixed or



moveable capture devices are placed near or around the work. They can keep contaminants below allowable limits. When using mechanical ventilation remember to:

- Locate the hood as close as possible to the work.
 - Position the hood to draw the plume away from the breathing zone.
 - Curtains may be used to direct airflow. Curtains must meet the BFD requirements.
- Cutting of Stainless Steel: Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Employees and students and students exposed to the hazards created by Hot Work operations shall be protected by PPE in accordance with the requirements of the U.S. Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) 1910.132 – *Personal Protective Equipment*.

Appropriate protective clothing required for any Hot Work operation will vary with the size, nature and location of the work to be performed. PPE must protect against hazards such as burns, sparks, spatter, electric shock, and optical radiation.

4.1 Body Protection

Clothing shall provide sufficient coverage, and be made of suitable materials, to minimize skin burns caused by sparks, spatter, or radiation. Wear oil-free protective clothing made of wool or heavy cotton. Heavier materials work best. Choose clothing that allows freedom of movement and covers all areas of exposed skin. Wear long sleeved shirts (no t-shirts), and button the cuffs, pockets, and collar. They will protect your arms and neck from exposure and skin burns. Wear leather aprons (leather or other material that protects against radiated heat and sparks), leggings, capes, and sleeves as needed for the application. Keep clothing dry. Change it when needed (this reduces the possibility of electric shock). Keep clothing clean (free of oil, grease, or solvents which may catch fire and burn easily). Keep it in good repair (no holes, tears, or frayed edges). Always follow the manufacturer's direction for their use, care, and maintenance. Remove all flammables and matches and cigarette lighters from your pockets. Do not wear synthetic (man-made) fabrics because they may burn easily, melt, stick to your skin, and cause serious burns.

4.2 Foot and Leg Protection

Wear leather, steel-toed, high-topped boots in good condition. They will help protect your feet and ankles from injury. In heavy spark and slag areas, use fire-resistant boot protectors or leather spats strapped round your pant legs and boot tops to prevent injury and burns. Do not wear pants with cuffs. Wear the bottoms of your pants over the tops of your boots to keep out sparks and flying metal. Do not



tuck pant legs into your boots.

4.3 Hand Protection

Wear flame-resistant gloves, such as leather welder's gloves. Always wear dry, hole-free, insulated welding gloves in good condition. They will help protect your hands from burns, sparks, heat, cuts, scratches, and electric shock.

4.4 Hearing Protection

If loud noise is present, wear approved ear plugs or ear muffs to protect your hearing and prevent hearing loss. When working out of position, such as overhead, wear approved earplugs or muffs. They prevent sparks, spatter, and hot metal from entering your ears and causing burns.

4.5 Respiratory Protective Equipment

When controls such as ventilation fail to control airborne contaminants to allowable levels or when the implementation of such controls is not feasible, respiratory protective equipment shall be used to protect employees and students from hazardous concentrations of air contaminants. Only approved respiratory protection (NIOSH approved respirators) shall be used and employee use of respirators must meet SIMMONS' Respiratory Protection Program Requirements.

4.6 Eye and Face Protection

Welding, cutting, and allied Hot Work processes presents various hazards to the welder's eyes and face: the intense heat from arc rays and welding sparks can cause burns to the skin and eyes, during electric welding and welding processes. PPE for the eyes and face is very important for both the welder and other personnel working near welding operations. Filter lens shall be in accordance with ANSI Z87.1.

For Electric Arc Welding and Arc Cutting: Helmets with filter lenses and cover lenses shall be used by operators and nearby personnel when viewing the arc. For electric welding, the minimum lens shade should be at least #10. If the electrodes are larger than 5/32" a darker lens compensates for the additional amperage required for the electrode. If the process uses a shielding gas, the lens shade should increase to at least #11 or #12. A darker shade is necessary because the presence of the gas increases the reflective intensity of the arc. See the below OSHA welding and cutting lens selector guide for the selection of welding lens for this process.

For Oxyfuel Gas Welding and Cutting: Welding helmets with a filter lens of #5 is the minimum protection for gas welding and cutting; however the protection required may increase to shade #8 dependent on the operation. Goggles or other approved eye protection shall be worn by persons in the work area during oxyfuel gas welding and cutting operations. See the below OSHA welding and cutting lens selector guide for the selection of welding lens for this process.



For Other Work Associated with Welding (Such as Grinding): Welding helmets with filter lenses are intended to protect users from arc rays and from weld sparks and spatter which impinge directly against the helmet. They are not intended to protect against slag chips, grinding fragments, wire wheel bristles, and similar hazards. Spectacles with side shields or impact safety goggles, combined with the use of a face shield approved at the ANSI Z87+ level is required for protection against these hazards. The PPE should be stamped ANSI Z87+. The spectacles or goggles may have either clear or filtered lenses, depending upon the amount of exposure to adjacent welding or cutting radiation. Others in the immediate welding area should wear similar eye protection.

4.7 OSHA Welding Lens Selector Guide

The following is a guide for the selection of the proper shade numbers for welding and cutting eye protection. These recommendations may be varied to suit the individual's needs to protect against infrared and ultraviolet light.

Welding Operation	Suggested 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
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

NOTE: In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation.

5.0 APPROVED FIRE RESISTANT MATERIALS FOR HOT WORK AREAS

5.1 Welding Blanket

A heat-resistant fabric designed to be placed in the vicinity of a Hot Work operation. They are intended for use in horizontal applications with light to moderate exposures such as that resulting from chipping,



grinding, heat treating, sand blasting, and light horizontal welding. In addition, they are designed to protect machinery and prevent ignition of combustibles such as wood that are located adjacent to the underside of the blanket. They are made from different materials such as fiberglass, Silica, and other fire resistant materials.

5.2 Welding Pads

A heat-resistant fabric designed to be placed directly under a Hot Work operation such as welding or cutting. Welding pads are intended for use horizontal applications with severe exposures such as that resulting from molten substances of heavy horizontal welding. These pads are designed to prevent the ignition of combustibles that are located adjacent to the underside of the pad.

5.3 Welding Curtain

A heat-resistant fabric designed to be placed in the vicinity of a Hot Work operation. They are intended for use in vertical application with light to moderate exposures such as that resulting from chipping, grinding, heat treating, and light horizontal welding. In addition, they are designed to prevent sparks from escaping a confined area.

*Welding blankets and curtains are required to be listed, approved, or the equivalent for such use. One such approval includes ANSI/FM 4950, *American National Standard for Evaluating Welding Pads, Welding Blankets and Welding Curtains for Hot Work Operations*, and the BFD requirements for curtains.

6.0 MOST COMMON TYPES OF WELDING AND CUTTING OPERATIONS

6.1 Oxyfuel Gas Welding and Cutting Operations

This section covers safety practices for users of oxyfuel gas welding. For additional specific safety requirements for Oxygen-fuel gas welding and cutting operations, refer to OSHA Standard 29 CFR 1910.253 - *Oxygen-fuel gas welding and cutting*.

6.2 Oxygen Cylinders and Apparatus

Oxygen cylinders and apparatus shall be kept free from oil, grease, and other flammable or explosive substances. Oxygen cylinders or apparatus shall not be handled with oily hands or gloves.

Oxygen cylinders and apparatus shall not be used interchangeable with any other gas. Oxygen shall not be used as a substitute for compressed air. Oxygen shall not be used for any other work purpose other than welding and cutting (e.g. do not use to blow out pipelines, to dust clothing, do not strike against an oily surface, greasy clothing, or enter fuel oil other storage tanks, etc.). Inside of buildings, cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 (6.1 m) feet from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places



away from elevators, stairs, or gangways. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons.

Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards. Empty cylinders shall have their valves closed. Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.

Oxygen cylinders shall not be stored near highly combustible material, especially oil and grease; or near reserve stocks of other fuel-gas cylinders, or near any other substance likely to cause or accelerate fire; or in an acetylene generator compartment.

Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire-resistance rating of at least one-half hour.

6.3 Torches

Connections shall be checked for leaks after assembly and before lighting the torch. Flames shall not be used. Before lighting the torch for the first time each day, hoses shall be purged individually. Hoses shall not be purged into confined spaces or near ignition sources. Hoses shall be purged after a cylinder change.

Torch Lighting

Torches shall be lighted by a friction lighter or other approved device, not by matches, cigarette lighters, or welding arcs. Point the torch away from persons or combustible materials. Whenever work is suspended, Torch valves shall be closed and the gas supply shut off.

Hose and Hose Connections

Hose connections shall be clamped or otherwise securely fastened in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected in service, but in no case less than a pressure of 300 psi (2.04 MPa). Oil-free air or an oil-free inert gas shall be used for the test. Hose showing leaks, burns, worn places, or other defects rendering it unfit for service shall be repaired or replaced.

NOTE: Oxygen and acetylene hoses should be different colors. Red is generally used for fuel and green for oxygen. Black is generally used for inert gas and air hoses.

6.4 Precautionary Information for Oxyfuel Gas Process and Equipment

The information provided below shall be placed on stock containers of materials such as rods and fluxes, and on major equipment used in oxyfuel gas welding, cutting, and allied processes. The information shall



be readily visible and may be on a label, tag, or other printed form which is generally provided by the welding equipment company.

WARNING:

PROTECT yourself and others. Read and understand this information.

FUMES AND GASES can be hazardous to your health.

HEAT RAYS (INFRARED RADIATION) from flame or hot metal can injure eyes.

- Before use, read and understand the manufacturer's instructions, SDSs, and the safety practices.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the flame, or both, to keep fumes and gasses from your breathing zone and the general area.
- Wear correct eye, ear, and body protection.

See American National Standard ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, for details.

6.5 Electric Arc Welding and Cutting Operations

This section contains safety precautions specific to the operations of arc welding and cutting equipment. For additional specific safety requirements for Electric Arc Welding and Cutting operations, refer to OSHA standard 29 CFR 1910.254 – *Arc welding and cutting*.

Standard Machines for Arc Welding

Arc Welding Machines shall be designed and constructed to carry their rated load with rated temperature rises where the temperature of the cooling air does not exceed 40 deg. C. (104 deg. F.) and where the altitude does not exceed 3,300 feet (1,005.8 m), and shall be suitable for operation in atmospheres containing gases, dust, and light rays produced by the welding arc.

Manual Electrode Holders

Only manual electrode holders specifically designed for arc welding and cutting of a capacity capable of safely handling the maximum rated current required by the electrodes may be used. All current carrying parts of the holder that are gripped by the welder or cutter, and the outer jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

Welding Cables and Connectors

Cables shall be completely insulated, flexible, capable of handling the maximum current requirements of the work in progress, and in good repair.



Voltage

The following limits shall not be exceeded:

- Alternating-current (A.C.) machines: Manual arc welding and cutting – 80 volts.
- Automatic (machine or mechanized) arc welding and cutting – 100 volts.
- Direct-current machines: Manual arc welding and cutting – 100 volts.
- Automatic (machine or mechanized) arc welding and cutting – 100 volts.

When special welding and cutting processes require values of open circuit voltages higher than the above, means shall be provided to prevent the operator from making accidental contact with the high voltage by adequate insulation or other means.

For ac welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard.

Grounding

The frames of arc welding and cutting machines shall be adequately grounded in accordance with the manufacture, OSHA electrical standards, and ANSI standards.

Equipment Loading

Care shall be taken in applying arc welding equipment to ensure that the ampere rating chosen is adequate to handle the job. Welding machines shall not be operated above the ampere ratings and corresponding rated duty cycles as specified by the manufacturer and shall not be used for applications other than those specified by the manufacturer.

Environmental Conditions

When using alternating current (ac) or direct current (dc) arc welding machines, the welding operator shall take special care to prevent electrical shock. The manufacturer shall be consulted and a hazard assessment shall be performed before unusual service conditions are encountered. Unusual service conditions may exist, and in such circumstances machines shall be especially designed to safely meet the requirements of the service. Chief among these conditions are:

- Exposure to unusually corrosive fumes.
- Exposure to steam or excessive humidity.
- Exposure to excessive oil vapor.
- Exposure to flammable gases.
- Exposure to abnormal vibration or shock.
- Exposure to excessive dust.
- Exposure to weather.

NOTE: Water or perspiration may cause electrically hazardous conditions. Electrical shock may be prevented by performing a hazard assessment before work, relocating work to a safe location, avoiding



contact with live electrical parts, and lastly by use of personal protective equipment the use of nonconductive gloves, clothing, and shoes. Other examples of electrically hazardous conditions are locations in which the freedom of movement is restricted so that the operator is forced to perform the work in a cramped (kneeling, sitting, lying) position with physical contact with conductive parts, and locations that are fully or partially limited by conductive elements and in which there is a high risk of unavoidable or accidental contact by the operator. These hazards can be minimized by performing a hazard assessment before work is performed and by insulating conductive parts near the vicinity of the operator.

Precautionary Information for Arc Welding and Related Processes and Equipment

The information provided below shall be placed on stock containers of materials such as wires, fluxes, and electrodes and on major equipment such as power supplies, wire feeders, and controls used in arc welding, arc cutting, and allied processes. The information shall be readily visible and may be on a label, tag, or other printed form.

WARNING:

PROTECT yourself and others. Read and understand this information.

FUMES AND GASES can be hazardous to your health.

ARC RAYS can injure eyes and burn skin.

ELECTRIC SHOCK can KILL.

- Before use, read and understand the manufacturer's instructions, SDSs, and your employer's safety practices.
- Keep your head out of the fumes.
- Use enough ventilation, exhaust at the flame, or both, to keep fumes and gasses from your breathing zone and the general area.
- Wear correct eye, ear, and body protection.
- Do not touch live electrical parts.

7.0 REFERENCES

The following references were used to develop this program:

- NFPA 51B — Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
- 29 CFR 1910 Subpart Q — Welding, Cutting, and Brazing
- 29 CFR 1926.352 — Welding and Cutting Fire Prevention
- ANSI Z49.1:2012 — Safety in Welding, Cutting and Allied Processes
- American Welding Society, Safety and Health Fact Sheets





APPENDIX A – HOT WORK PERMIT

<p>HOT WORK PERMIT</p> <p>Seek an alternative/safer method, if possible.</p> <p>Before initiating Hot Work, ensure precautions are in place as required by BFD, OSHA, NFPA 51B, and ANSI Z49.1. Make sure an appropriate fire extinguisher is readily available.</p> <p>This Hot Work Permit is required for any operation involving open flame or producing heat and/or sparks. This work includes, but is not limited to, welding, brazing, cutting, grinding, soldering, thawing pipe, torch-applied roofing, or chemical welding.</p>	
<p>Date:</p>	<p>Hot Work being performed by:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Employee <input type="checkbox"/> Student <input type="checkbox"/> Contractor
<p>Location (Building, Floor, Room):</p>	
<p>Printed Name and Signature of Person Doing Hot Work:</p>	
<p>Time Started:</p>	<p>Time Completed:</p>
<p>THIS PERMIT IS ONLY GOOD FOR ONE DAY (24 HOURS)</p>	
<p>I verify that the above location has been examined, the precautions marked on the checklist below have been taken, and permission is granted for this work.</p>	<p>Printed Name and Signature of Permit-Authorizing Individual (PAI):</p>
<ul style="list-style-type: none"> <input type="checkbox"/> Available sprinklers, hose streams, and extinguishers are in service and operable. 	
<ul style="list-style-type: none"> <input type="checkbox"/> Hot work equipment is in good working condition in accordance with manufacturer’s specifications. 	
<ul style="list-style-type: none"> <input type="checkbox"/> Special permissions obtained to conduct hot work on metal vessels or piping lined with rubber or plastic. 	
<p>Requirements within 35 feet of Hot Work:</p> <p style="text-align: center;">NOTE: If conducting Hot Work in an elevated area, these requirements apply to all areas below.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Flammable liquid, dust, lint, and oily deposits removed. <input type="checkbox"/> Explosive atmosphere in area eliminated. <input type="checkbox"/> Floors swept clean and trash removed. <input type="checkbox"/> Combustible floors wet down or covered with a damp sand or fire-resistive/non-combustible materials or equivalent. <input type="checkbox"/> Personnel protected from electrical shock when floors are wet. <input type="checkbox"/> Other combustible storage material removed or covered with listed or approved materials (welding pads, blankets, or curtains; fire-resistive tarpaulins), metal shields, or non-combustible materials <input type="checkbox"/> All wall and floor openings are covered. <input type="checkbox"/> Ducts and conveyors that might carry sparks to distant combustible material are covered, protected, and/or shut down. 	
<p>Requirements for Hot Work on walls, ceilings, or roofs (If not applicable, write N/A)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Construction is non-combustible and without combustible coverings or insulation. 	



- Combustible material on other side of walls, ceilings, or roofs is moved away or removed.

Requirements for Hot Work on enclosed equipment

- Enclosed equipment is cleaned of all combustibles.
- Containers are purged of flammable liquid/vapor.
- Pressurized vessels, piping, and equipment removed from service, isolated, and vented.

Requirements for Hot Work Fire Watch and Fire Monitoring

- Fire watch is provided during and for a minimum of 30 minutes after Hot Work, including any break activity.
- Fire watch is provided with suitable fire extinguishers and, where practical, a charged small hose.
- Fire watch is trained on how to use fire extinguishing equipment and in activating fire alarm.
- Fire watch can be required for adjoining areas, above, and below.
- Per the PAI/Fire watch, monitoring of Hot Work area has been extended beyond the 30 minutes.
 - Yes, how long in minutes: _____
 - No

APPENDIX B – HOT WORK PERMIT DECISION TREE

