

Safety and Health Policy and Procedure Manual

WELDING, CUTTING, and BRAZING PROGRAM Section 0140

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I. INTRODUCTION

This welding, cutting, and brazing program is designed to protect life and property from fire, atmospheric contaminants, and other associated hazards that may occur during these operations.

II. SCOPE

This policy applies to all of those employees who may perform welding, cutting, or brazing as part of their job function.

III. STANDARD

NCOSHA Part 1910.133, and 1926.350

[1910.133 Eye and Face Protection](#)

[1910.252 Welding, Cutting, and Brazing](#)

[1926.350 Gas, Welding, and Cutting](#)

IV. GENERAL REQUIREMENTS

A. Basic Precautions for Fire Prevention

1. The object to be welded should be moved to a safe place, when possible.
2. If the object cannot be readily moved, all movable fire hazards in the vicinity shall be moved to a safe location.
3. If the object cannot be readily moved and all fire hazards cannot be removed, guards shall be used to confine the heat, sparks, and slag, and protect immovable fire hazards. (i.e.curtains)

SPECIAL PRECAUTIONS WHENEVER

GUARDS ARE USED: Wherever floor cracks, or holes in walls, open doorways, open or broken windows, or openings that cannot be closed are present, take precautions to insure that readily combustible materials on the floor below will not be exposed to sparks which may drop through the cracks or openings. It is the welder's responsibility to notify their supervisor and take appropriate action whenever the welder feels that guards are required as they pertain to the rules of this standard, and must ensure that "special precautions" are observed.

4. A fire watch is required whenever there is a possibility of a fire developing. The fire watchers will have fire

extinguishing equipment immediately available and shall be trained in its use. They will also be familiar with the methods used to sound an alarm. Details on fire extinguisher and fire emergency procedures can be found in [Section 0170, Fire Emergency Procedures](#) , of this manual. The fire watch must be maintained for at least ½ hour after welding operations have stopped.

A Fire Watch is required whenever there is a possibility of a fire developing or any of the following conditions exist:

- a. Appreciable combustible material, in building construction or contents, are closer than 35 feet to the point of operation.
 - b. Appreciable combustibles are more than 35 feet away, but are easily ignited by sparks.
 - c. Wall or floor openings within 35 foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.
 - d. Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.
5. If requirements 1-4 above cannot be followed, welding and cutting shall not be performed.

B. Hot Work Permits

A written Hot Work Permit (See Appendix B) must be completed by supervisory personnel prior to any welding, cutting, or brazing operations. This permit must be kept at the worksite while work is being performed. The Hot Work Permit is a two part carbonless form. The supervisor issuing the permit should retain Part 1 and leave Part 2 at the worksite. Following completion of work and fire watch, if required, Part 2 of the permit shall be returned to the supervisor. The supervisor shall maintain copies of the completed permits in departmental files for a period of **one** year. The retention of these permits allows for audits by the Office of Safety and may be required during an OSHA inspection.

Special precautions which must be considered include:

1. Combustible Material: Remove or protect from sparks and hot slag.

2. Fire extinguishers: Maintain for instant use. **(Requires training for maintenance and use.)**

3. Prohibited areas: Welding, cutting, and brazing is not permitted in areas which have not been authorized.

Do not weld, cut or braze in:

- sprinklered buildings while the sprinkler system is impaired
- atmospheres where flammable gases, vapors, liquids, or dusts are present
- storage areas where there are large quantities of exposed, readily ignitable materials.

C. Supervisor or Designee Responsibilities

The supervisor or their designee will ensure the following before performing any welding, cutting and/or brazing:

1. Be responsible for the safe handling of the cutting or welding equipment and the safe use of this equipment during the cutting or welding process.
2. Determine the combustible materials and hazardous areas present or likely to be present in the work location.
3. Protect combustibles from ignition by the following:
 - Have the work moved to a location free from dangerous combustibles.
 - If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition.
 - See that cutting and welding are so scheduled that operations that might expose combustibles to ignition are not started during cutting or welding.
4. Secure authorization for the cutting or welding operations from the departmental supervisory representative.
5. Determine that the cutter or welder ensures that conditions are safe before proceeding.
6. Determine that fire protection and extinguishing equipment are functional and located in the immediate vicinity of the site.

7. Where fire watchers are required, see that they are present at the site.

8. Verify that hot work permits are completed as required and that copies are maintained in departmental files for a period of one year. The retention of these permits allows for audits by the Office of Safety and may be required during an OSHA inspection.

D. Training

The department head must assure that those performing welding, cutting and brazing operations and their supervisors are properly trained and competent concerning their assigned duties. A training roster has been provided as [Appendix A](#) . This roster should be completed and used to document training.

E. Welding or Cutting Containers

1. *Used containers.* No welding, cutting or other hot work shall be performed on used drums, barrels, tanks or other containers until they have been cleaned so thoroughly as to make absolutely certain that there are no flammable materials present or any substances such as greases, tars, acids, or other materials which when subjected to heat, might produce flammable or toxic vapors. Any pipe lines or connections to the drum or vessel shall be disconnected or blank/blind techniques shall be used.

2. *Venting and purging.* 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 highly recommended.*

F. Protective Equipment

1. When working on platforms, scaffolds, or runways, welders and their helpers shall be protected against falling by use of railings, safety belts, life lines, or other effective safeguards. Specifics on fall protection can be found under [Section 0160, Fall Protection](#) , of the *UNCG Safety & Health Policy and Procedure Manual*.

2. Helmets or hand shields shall be used during all arc welding/cutting operations, excluding submerged arc welding. All helpers & attendants shall be provided with proper eye protection. Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations. Spectacles with side shields and

suitable filter lenses are required during gas welding operations on light work, torch brazing, and for inspections. Operators and attendants of resistance welding or brazing shall use transparent face shields or goggles, depending on the particular job.

Specifications for eye protection:

Helmets and hand shields shall be made of material which is an insulator for heat and electricity. Helmets, shields and goggles shall not be readily flammable and shall be capable of withstanding sterilization. Helmets and hand shields shall be arranged to protect face, neck, and ears from direct radiant energy from the arc. Helmets shall be provided with filter plates designed for easy removal. Parts shall be constructed of material which will not readily corrode or discolor the skin. Goggles shall be ventilated to prevent fogging of lens as much as possible. All glass lenses shall be tempered and free from flaws. The front and rear surfaces of lenses shall be smooth and parallel, except prescription lenses for optical correction. Lenses shall bear permanent distinctive markings which denote source and shade for easy identification. All filter lenses and plates must meet the test for transmission of radiant energy set forth in ANSI Z87.1-1968, American National Standard Practice for Occupational & Educational Eye and Face Protection.

3. Special protection for arc welding rays shall be used. Where the work permits, the welder should be enclosed in an individual booth constructed of non-combustible, non-reflective material. All booths shall allow for either natural or mechanical ventilation to protect against the build-up of hazardous atmospheres.
4. Protective clothing shall be worn in accordance with 1910.132. The degree of protective clothing will vary with size, nature, and location of work to be performed.
5. Additional details on personal protective equipment can be found in [Section 0130](#) of this manual.

G. Confined Spaces

Confined space is defined as relatively small or restricted space such as a tank, boiler, pressure vessel, or manhole.

When performing welding or cutting in a confined space:

- Ventilation is a prerequisite to work in confined spaces.
- Gas cylinders and welding machines shall be left outside.
- Heavy portable equipment mounted on wheels shall be securely blocked.
- Whenever a welder must enter a confined space through a small opening or manhole, means shall be provided to quickly remove him in the event of an emergency. Safety belts and lifelines used for this purpose shall be attached to the welder's body so that his body cannot be jammed in a small exit opening.
- An attendant with knowledge of UNCG's preplanned rescue procedure shall be stationed outside to observe the welder at all times. He must be capable of putting rescue operations into effect.
- When arc welding is suspended for any substantial length of time, all electrodes shall be removed from the holders, and the holders located so that accidental contact cannot occur. The machine shall be disconnected from the power source.
- To prevent accidental gas leakage, torch valves shall be closed and the fuel-gas and oxygen supply to the torch shut off outside the confined area whenever the torch is not to be used for a substantial period of time. Where practicable, the torch and hose shall also be removed from the confined space.

Three factors in arc and gas welding govern the amount of contamination to which welders may be exposed. These factors are:

1. Dimensions of space where welding is to be done (ceiling height is especially important)
2. Number of welders
3. Possible evolution of hazardous fumes, gases, or dust according to metals involved.

All entry into UNCG confined spaces for **any purpose**, including welding and cutting, must be in compliance with [UNCG's Confined Space Entry Procedure, Section 0040](#) of this manual.

H. Ventilation

Mechanical ventilation shall be provided when welding or cutting is performed on metals not listed below. These metals have their own specific allowable concentration/ventilation requirements.

Fluorine compounds, Zinc, Lead, Beryllium, Cadmium, Mercury, Cleaning Compounds, Stainless Steels

GENERAL REQUIREMENTS - MECHANICAL VENTILATION is needed when:

1. Space is less than 10,000 cubic feet per welder
2. Ceiling height in room is less than sixteen feet
3. In confined spaces, or where welding space contains partitions or other structural barriers which may obstruct cross ventilation

Mechanical ventilation at a minimum rate of 2,000 cubic feet per minute per welder, except where local exhaust hoods, booths, or airline respirators are provided. Natural ventilation is considered sufficient for welding or cutting where restrictions 1-3 are not present.

Ventilation in Confined Spaces

Adequate ventilation must be provided to prevent accumulation of toxic fumes or possible oxygen deficiency. This includes not only the welder, but also helpers and other personnel in the immediate vicinity. All make-up air that is drawn into the area of operation, must be clean and respirable.

I. Cylinder Storage and Use

When gas cylinders are used during welding or cutting operations, employees shall follow all precautionary practices for transporting, storage, labeling, and use as set forth in [UNCG's Compressed Air and Gases Policy, Section 0020](#) of this manual.

