



Welding, Cutting and Brazing Safety Guidelines

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Welding, Cutting and Brazing Safety Guidelines

I. Purpose

The purpose of the University of Northern Colorado's Welding, Cutting and Brazing (WC&B) program is to protect

III. Hazard Identification and Prevention

Welding, cutting, and similar processes produce molten metal, sparks, slag, and hot work surfaces that 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.

A. Fire Prevention and Protection:

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. Welding and cutting can cause explosions in spaces containing flammable gases, vapors, liquids, or dusts.

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 and Controlled. Refer to the UNC Hot Work program for further details regarding requirements and restrictions.

C. Eye and Face Protection:

Welding, cutting, and brazing processes present 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. Personal Protective Equipment 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.

Helmets with filter lenses and cover lenses shall be used by operators and nearby personnel when viewing the arc. A darker shade is necessary because the presence of the gas increases the reflective intensity of the arc.

Appendix A is a guide for the selection of the proper shade number 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 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 is required for protection against these hazards.

V. Health Protection / Ventilation Requirements

The heat caused by welding, cutting or brazing creates fumes and gases (fume plume). Fumes contain respiratory particles. Gases include the shielding gas, and combustion products. The heat from the arc or flame causes the fume plume to rise. Over exposure 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.

Ventilation is used to control overexposures to the fumes and gases during welding and cutting will keep the fumes and gases from the welder's breathing zone. Adequate ventilation shall be provided for all welding and cutting and related operations and shall be enough ventilation such that personnel exposures to hazardous concentrations of airborne contaminants are maintained below the allowable limits. There are two forms of ventilation that are utilized with these types of work to mitigate health problems.

A. Natural Ventilation

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.

Natural ventilation is considered sufficient for welding or cutting operations where the following restrictions are not present.

- < In a space of less than 10,000 cubic feet (284 m³) per welder.
- < In a room having a ceiling height of less than 16 feet (5 m).
- < In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation.

B. Mechanical Ventilation

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 that includes

per minute in the zone of welding when the hood is at its most remote distance from the point of welding. The rates of ventilation required to accomplish this control velocity using a 3 inch (7.6 cm) wide flanged suction opening are shown in the following table:

Minimum air Duct - Welding zone flow		
Distance from arc	Cubic feet/Minute	Duct Size
4 to 6 inches from arc or torch	150	3
6 to 8 inches from arc or torch	275	3 1/2
8 to 10 inches from arc or torch	425	4 1/2
10 to 12 inches from arc or torch	600	5 1/2

2. Fixed enclosure (Booths). A fixed enclosure with a top and not less than two sides which surround the welding or cutting operations and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

Ventilation in confined spaces

All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. All replacement air shall be clean and reparable. Because of its flammable properties, Oxygen shall never be used for ventilation.

VI. Operational Safety

The following sections are general safety precautions for the most commonly used welding

- ⟨ 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.
- ⟨ Torches shall be lit by a friction lighter or other approved device, not by any form of flame.
- ⟨ Whenever work is suspended, Torch valves shall be closed, and the gas supply shut off.
- ⟨ Hose connections shall be clamped or otherwise securely fastened in a manner that will
- ⟨ With stand, without leakage, twice the pressure to which they are normally subjected in service, but in no case less than a

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