

Welding, Cutting and Brazing

Standard 29 CFR Part 1910.251-254

Presented by: Barton Insurance Group LLC

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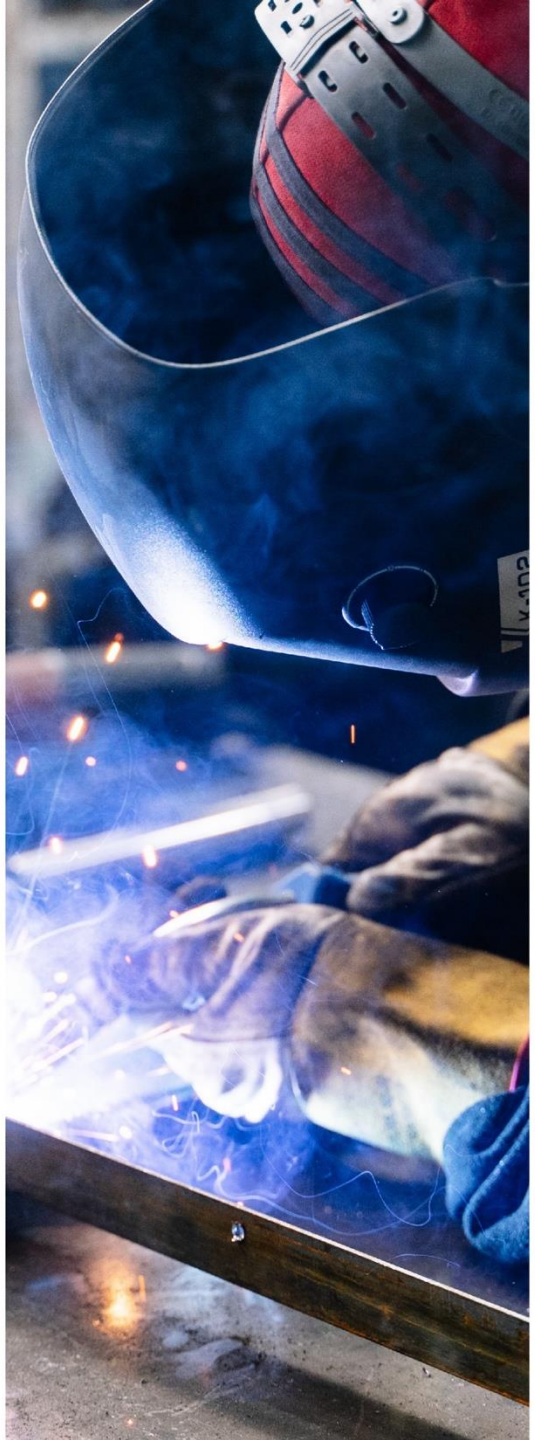
Learning Objectives

- During this training program, participants will learn about:
  - The hazards of welding, cutting and brazing
  - What personal protective equipment (PPE) is required when conducting hot work
  - Safety procedures related to welding, cutting and brazing
  - Instances where hot work permits are required
  - How to handle compressed gas cylinders



What Are Welding, Cutting and Brazing?

- **Welding** involves joining materials (e.g., metals or thermoplastics) using high heat to melt the parts together, causing fusion.
- **Cutting** involves separating metal using heat.
- **Brazing** involves joining two metals by heating and melting a filler metal.
- We will refer to these processes as “hot work” throughout this presentation.



Physical Hazards

- The heat involved in hot work processes can create serious hazards, including:
  - **Fire hazards**—Sparks, slag, flames and heat from hot work can cause accidental fires. What's more, heat from hot work can be conducted through pipes and ducts, which can start fires in different rooms or on other floors in a building.
  - **Explosion hazards**—Fuel gasses used in hot work can explode when ignited in a closed space. Additionally, oxygen can cause flammable and combustible liquids to burn with explosive force.



Personal Health Hazards

- Hot work can be hazardous to your health and safety in the following ways:
  - Contact with hot equipment or material can cause severe burns.
  - UV rays from hot work can cause serious eye damage, as well as burns if the skin is not protected.
  - High voltage welding leads, supply current leads or power tool cords can all cause electric shock.



Personal Health Hazards (Continued)

- Hot work can create a number of dangerous gasses and fumes, including:
  - **Welding gasses**—Inert gasses (e.g., argon) used in some types of hot work can be asphyxiants in high concentrations.
  - **Welding fumes**—Fumes created by hot work can be toxic:
    - **Metal fume fever**—Welding fumes can contribute to metal fume fever, which is caused by the inhalation of metal oxides. Symptoms of metal fume fever can include fevers, headaches and nausea.
    - **Hexavalent chromium**—Hexavalent chromium fumes can be produced by welding. Long-term exposure to these fumes can cause cancer.

Fire Prevention

- Hot work should only be done in one of two scenarios—in designated areas or under a hot work permit:
  - Designated areas are designated for hot work. These areas are often either production hot work or maintenance areas where hot work is done frequently.
  - The key to preventing fires is to ensure the work area is clear of flammable and combustible materials. If this can’t be accomplished, the work area can’t be used as a designated area.

Hot Work Permit

- Hot work permits are used for temporary hot work jobs. The following are some considerations related to hot work permits to keep in mind:
  - In order for a permit to be valid, conditions related to removing combustibles and selecting an individual as a fire watch must be met.
  - Fire watches must be trained individuals with a fire extinguisher who are capable of putting out a potential fire.
  - Once a hot work permit has expired, it must be turned in.



HOT WORK PERMIT

All temporary operations, outside of a designated fire safe area, involving open flames or producing heat and/or sparks require a Hot Work Permit. This includes, but is not limited to, brazing, cutting, grinding, soldering, thawing, and welding.

PART A

INSTRUCTIONS FOR PERMIT AUTHORIZED INDIVIDUAL (PAI)

A. Specify the precautions to take (or do not proceed with the work).
B. Fill out and keep Part A during the hot work process.
C. Issue Part B to the person doing the job.
D. Final signoff is on Part B.

DATE | JOB NO.

LOCATION/BUILDING & FLOOR (Be Specific)

DESCRIPTION OF WORK BEING PERFORMED

NAME OF PERSON DOING HOT WORK

The above location has been examined, the precautions checked on the Hot Work Checklist have been taken to prevent fire, and permission is authorized for this work.

SIGNED: (Permit Authorized Individual (PAI))

SIGNED: (Person doing Hot Work)

SIGNED: (Fire Watch)

TIME STARTED: Date: _____ Time: _____ AM/PM

PERMIT EXPIRES: Date: _____ Time: _____ AM/PM

FILL OUT EMERGENCY INFORMATION ON BACK OF PLY 2.

HOT WORK CHECKLIST

- ☐ Sprinklers and fire hoses in service/operable.
- ☐ Hot Work equipment in good condition (e.g., power source, welding leads, torches, etc.)
- ☐ Multi-purpose fire extinguisher and/or water pump can.

REQUIREMENTS WITHIN 35 FEET OF WORK

- ☐ Dust, lint, debris, flammable liquids and oily deposits removed.
- ☐ Explosive atmosphere in area eliminated.
- ☐ Combustible floors (e.g., wood, tile, carpeting) wet down, covered with damp sand or fire blankets.
- ☐ Flammable and combustible material remove where possible. Otherwise protected with fire blankets, guards, or metal shields.
- ☐ All wall and floor openings covered.
- ☐ Walkways protected beneath hot work.
- ☐ Protect or shut down ducts and conveyors that might carry sparks to distant combustibles.

WORK ON WALLS OR CEILINGS

- ☐ Combustibles moved away from other side of wall.

WORK IN CONFINED SPACES

- ☐ Confined space cleaned of all combustibles (example: grease, oil, flammable vapors).
- ☐ Containers purged of flammable liquids/vapors.
- ☐ Company confined space guidelines followed.

FIRE WATCH/HOT WORK AREA MONITORING

- ☐ Fire watch will be provided during and after work, including any coffee or lunch breaks: ☐ 30 minutes ☐ 60 minutes ☐ Other _____
- ☐ Fire watch is supplied with an extinguisher, and/or water pump can, also making use of other extinguishers located throughout work area.
- ☐ Fire watch is trained in use of this equipment and familiar with location of sounding alarm.
- ☐ Fire watch is required for opposite side of walls, above, and below floors and ceilings.

OTHER PRECAUTIONS TAKEN

- ☐ _____

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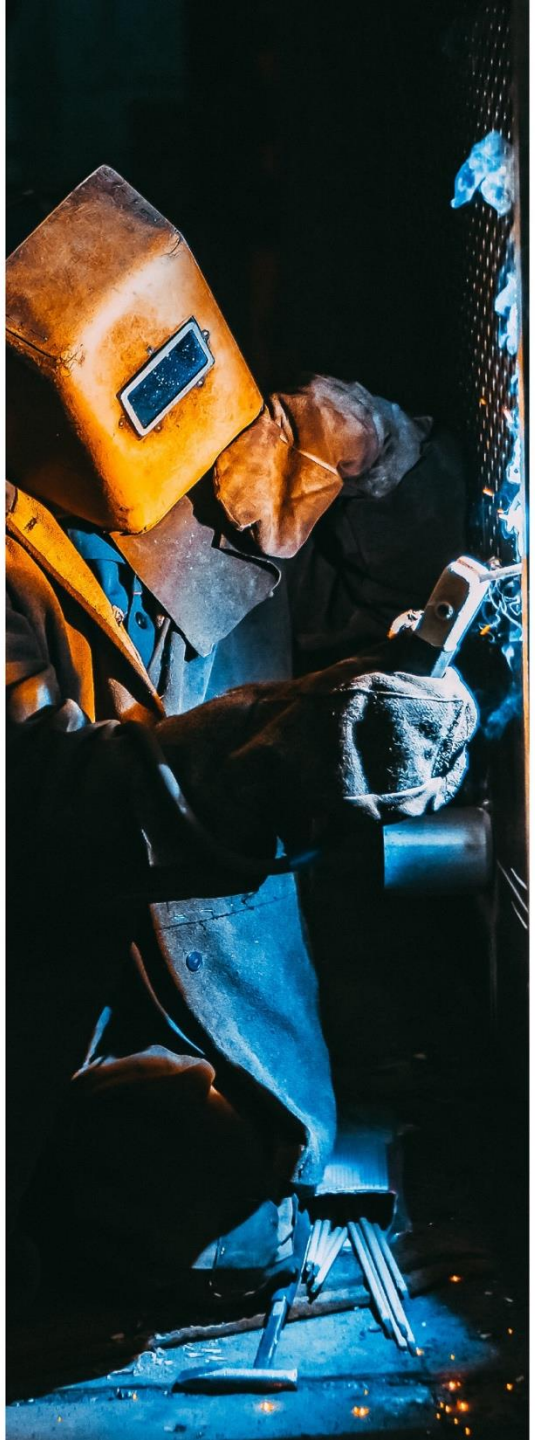


PPE – Eye and Face Protection

- During hot work, eye and face protection can protect you from flying particles and harmful rays
- Eye and face protection, like welding masks, must be selected to protect against the type of welding being performed.

PPE – Hand and Body Protection

- UV rays in hot work can damage your eyes and skin. To protect yourself:
  - Ensure your skin isn't exposed during hot work.
  - Use flame-retardant clothing, as slag can burn through normal clothes.
  - Wear the proper gloves to prevent cuts and burns.



Ventilation

- Ventilation is critical to controlling exposures related to hot work gases and fumes. The following are some considerations as it relates to ventilation:
  - The key to good ventilation is to draw fumes away from the breathing zone.
  - When welding on carbon steel, a naturally well-ventilated area allows for dispersion of fumes. When welding on stainless steel or galvanized steel, additional ventilation may be necessary.
  - A ventilation system, such as a hood or a smoke eater, can provide additional protection.

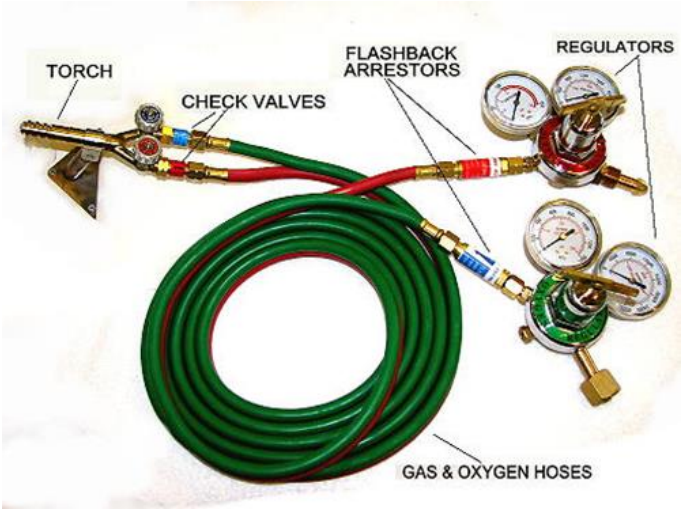


Compressed Gas Cylinders

- Compressed gas cylinders may be extremely pressurized. As such, dropping or striking a compressed gas can cause serious injuries.
- When moving a compressed gas cylinder, never roll it. Instead, use a cart or dolly.
- Whenever you transport a cylinder, the cap must be properly in place.

Compressed Gas Cylinders (Continued)

- Never let oxygen come into contact with flammable liquids, as this will accelerate burning.
- Inspect hoses for damage before hot work.
- Ensure valves and flash back preventers are in place to prevent mixing in the hose or cylinders.



Compressed Gas Cylinders (Continued)

- Open the fuel with the torch facing away from you.
- Use a flint striker to light torches—nothing else.
- Open oxygen slowly.
- Close oxygen at the torch first and the fuel second when shutting down.
- Bleed the lines after releasing pressure.

Electric Cords and Leads

- Inspect all power cords and leads for intact insulation and connectors.
- Check all connectors to ensure they are tight.
- Route cable out of wet areas, and be sure that workers are not standing in water. Keep cables out of walkways to prevent trips and falls.
- Never coil or loop a cable around your body. Uncoil cables and position them on the working surface.
- Be sure that ground is established with a true “earth” (e.g., the ground, structural steel or a water main).
- Attach the ground lead to the work piece or as close to it as possible.

Summary

- Welding, cutting and brazing are potentially hazardous undertakings.
- Persons who practice these crafts must remember that fires and injuries are always possible.
- Safe and skilled workers follow the rules and stay tuned into the work area to prevent accidents.

For More Information

For more information regarding welding, cutting, brazing or other safety issues, please contact:

Barton Insurance Group LLC

www.bartoninsurancegroupllc.com

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