

Objective: To understand the hazards of welding, cutting, and brazing operations; to learn safety practices for those operations and the proper PPE.

Welding, cutting, and brazing are very common operations, which means their hazards are usually under appreciated. Everything can be highly hazardous, if precautions are not taken. Welding equipment must be chosen carefully for the application and installed properly. No employees should be permitted to use this equipment unless their training qualifies them to do so.



Types of Hazards:

Welding, cutting, and brazing use heat, electricity, flame, and potentially hazardous material. All represent serious hazards.

- Burns to the eye, face, and skin can occur through radiation, sparks, slag, and molten metal;
- Combustible or flammable materials in the welding areas, including welding gases, can ignite or explode;
- Electric shock can kill or seriously injure workers;
- Poisoning or long-term health effect can occur from inhaling toxic fumes. Toxic materials include fluxes, coverings and coatings, and alloys with fluorine compounds, zinc, lead, beryllium, cadmium, or mercury;
- Welding in confined spaces is especially hazardous due to oxygen deficiency, fire and explosion, toxic materials, and the problems of rescue in a confined space; and
- Asphyxiation from lack of oxygen.

OSHA Required Training:

- Fire watchers – must be trained in the use of fire extinguishing equipment, as well as know how to give alarms;
- Equipment operators – management must assure that cutters, welders, and their supervisors are suitably trained in the safe operation of their equipment;
- Oxygen and fuel gas supply equipment – workers in charge of this equipment must be trained and judged competent. Rules and instructions must be readily available;
- Arc welding and cutting – personnel who use arc welding equipment must be properly trained and qualified. Defects and safety hazards must be reported, and repaired by qualified personnel;
- Resistance welding – must be installed by a qualified electrician, and personnel operating it must be trained and judged competent; and
- Oxygen and acetylene – OSHA has specific regulations for the use, handling, and storage of these welding materials.

Safe Procedures:

Fire and explosion:

Welding sparks can travel as far as 35 feet; spatter can bounce on the floor or go through openings.

- Welding should be done in areas with fire resistant floors or shields;
- Check with a combustible gas indicator for flammable gases and vapors;
- Remove combustibles, trash, etc. (keep at least 35 feet away);
- Close ducts, use shields and guards;
- Don't work on containers unless you're sure there are no toxic or flammable vapors left inside;
- Have a fire watcher and fire extinguishers on hand; and
- For gas welders: check the MSDS, don't smoke, keep cylinders away, be careful with oxygen (don't blow dust with it, do not use grease or oil on compressed oxygen cylinder connections).

Electrical:

Arc welding uses electricity, so follow basic electrical safety procedures:

- Turn off power before touching parts;
- Check insulation;
- Ground what you are welding; and
- Avoid metal jewelry, don't weld in the rain.



Inhalation:

These operations create hazardous fumes and gases. In addition to respirators:

- Use adequate ventilation;
- Place fans to blow contaminants away from you; and
- Leave the area immediately and get medical assistance if you feel sick.



Gas Welding:

Follow compressed gas safety procedures outlined in the operator's manual, at all times.

Protective Clothing and Equipment:

PPE must be selected with great care considering the hazards. Supervisors are responsible for making sure it is worn, every day.

- Goggles, helmets, and shields for maximum eye protection. Eye protection comes with different lens shades for specific hazards. Goggles and spectacles should have side shields. A face shield is also often a good idea. Some form of eye protection is Always required when you weld;
- Gas welders to wear impact and heat resistant goggle or eye protection, and in many cases, nonflammable helmets;
- Flame and shock resistant gauntlet gloves and aprons;
- Fire resistant leggings or high boots;
- Safety shoes;
- Shoulder cover or cape (for overhead work);
- Safety hats or other head gear to protect against sharp or falling objects. Leather skull caps or other flame resistant head coverings may be worn under helmets;
- Earplugs or muffs (when using a high velocity plasma torch); and
- A respirator (when toxic gases, fumes, and dust may be released or created).

