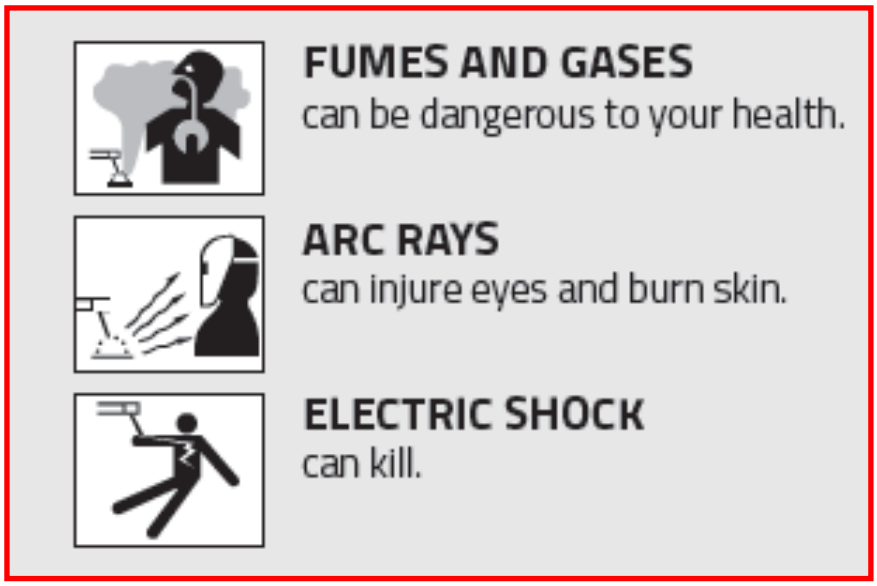
WELDING SAFETY



There are a variety of welding methods available today, all of which have inherent safety and health hazards associated with them. **EHS must evaluate all welding processes to ensure welders, bystanders and property are properly protected.** The information below provides a basic overview of the hazards of welding and some of the precautionary measures that should be taken to weld safely.

Potential Hazards

Health effects: Metal fumes are formed when a metal is heated above its boiling point and its vapors condense into very fine particles. Health effects from inhalation of these fumes depend on the specific metals present in the fume, as well as their concentration. Health effects can range from short-term illnesses such as metal fume fever with flu-like symptoms to longer-term issues such as lung damage or neurological disorders.

The factors affecting exposure to welding fume are:

- Type of welding process
  - SMAW/Stick, GMAW/MIG/, or GTAW/TIG
  - Oxyacetylene Welding and Cutting
- Composition of welding rod
- Filler metals and base metal used
- Type of coatings present
- Location, i.e., open area or confined space
- Ventilation controls
- Work practices of welder

Burns may be caused by contact with hot surfaces or hot flying particles.

Eye injuries can result from exposure to ultraviolet and infrared radiation created from the arc or from particulates or spattering.

Electric shock may occur due to improper grounding and/or contact with current through damp clothing, wet floors and other humid conditions. Even if the shock itself is not fatal, the jolt may still cause welders to fall from their work positions. In addition, stray welding current may cause extensive damage to equipment, buildings and electrical circuits.

Fire caused by heat, sparks, slag or flames contacting combustible or flammable materials in the welding area. Improper use and storage of oxygen and acetylene may result in fire or explosion

Strains, neck and lower back injuries resulting from repetitive motions and work orientation.

Lacerations resulting from accidental contact with sharp edges and burrs.

Safe Work Practices

Respiratory Health:

- Use local exhaust ventilation, such as an exhaust trunk, while performing welding activities whenever possible to minimize exposures to welding fume. For optimal capture of fumes, position the face of the exhaust no more than 1.5x the diameter of the duct from the welding point and in such a way that it pulls the fume away from the welder.
- If local exhaust ventilation is not available, feasible, or is unable to consistently control exposures below all recommended levels, respiratory protection may be needed. Please contact Yale EHS to discuss the need for respiratory protection.

Protective Clothing:

- **Eye Protection –** To protect eyes from exposures to UV and infrared radiation, a properly fitted welding helmet, with proper grade of filter plate, must be worn. An auto-darkening welding helmet is highly recommended as these helmets do not need to be raised to check welds and can be kept in the lowered position all the time, reducing fume exposure. These helmets also reduce the urge to use the neck muscle to flip the helmet to the "up" position, which can cause significant neck discomfort and possible injury. Safety glasses should also be worn under the welding helmet to provide impact protection and to protect eyes from particulates when hoods are lifted.
- **Body Protection –** Protect your body from spatter and arc flash with flame-resistant gloves and apron or jacket, flame-resistant natural fiber clothing (such as wool or cotton) and leather boots. Pant cuffs and rolled up sleeves should be avoided.

Additional Precautions:

- Remove any combustible or flammable materials away from the welding area to prevent fires.
- Maintain a clear egress path out of the welding area as well as to the nearest emergency equipment such as fire extinguisher, emergency eyewash and emergency shower.
- Check welding equipment and personal protective equipment (PPE) for defects and damage before beginning work. Ensure PPE is properly stored and maintained when not in use.
- Position welding curtains as needed to protect others in the area from splatter, flash and glare.
- Inform occupants in the area of your intent to start welding and set up any signs or safety cones as needed.
- Prevent lacerations by identifying sharp edges and burrs, wearing appropriate gloves, deburring, and proper storage methods.
- Ensure good insulation from work surfaces, the electrode, the electrode holder and grounding surfaces is obtained and maintained.
- Practice good lifting techniques and consider ergonomics when setting up the work. Position work to minimize awkward postures.
- Obtain training on the safe use, transportation and storage of compressed gases prior to use. Never use adapters to connect regulators to cylinders and never use compressed gases or compressed air to blow dust off.

Please contact EHS at 203-785-3550 or ehs@yale.edu if an assessment of the welding occurring in your area has not been performed or if there are any questions.