ENVIRONMENTAL HEALTH & SAFETY
UNIVERSITY of WASHINGTON

HOT WORK: OTHER HAZARDS

Hot work operations, including welding, pose several physical hazards. Most welding at the University involves either a gas flame or an electrically generated arc. In addition to the general hazards listed below, each operation must be evaluated for specific hazards it may pose.

ELECTRICAL HAZARDS

Is there an electric shock hazard?

- Electric shock is a serious risk facing a welder.
- In arc welding operations, the primary voltage inside the welding equipment can be as high as 600 volts and the secondary (or welding) voltage is often 20-100 volts.
- A welder can be shocked by touching two different objects that have voltage between them.
- Depending on the conditions, a shock could **injure** or **kill**.

Electric shock can occur if you touch a hot lead inside the welder while you are touching the case or other grounded metal while the power to the welder is on.

How can I prevent electric shock?

- Turning the power switch off may not turn the power off to the welder.
- The welder **must be unplugged** or the circuit de-energized to fully cut power.
- A welder must be **installed by qualified personnel** to ensure it is compatible with intended uses and the input is the correct phase.

Fisher Scientific

FIRE HAZARDS

What are the fire hazards?

- The **intense heat** at the arc and flame from the torch present clear fire hazards.
- Another major fire hazard comes from the **sparks and slag** (molten metal) produced during the process.
- Sparks can spray up to 35 feet from the welding area and can cause a fire if they contact a flammable or combustible material.

How to reduce my risk of fire hazards?

- The **area must be inspected** before you start welding operations to identify potential fire hazards and take necessary actions.
- **Inspect** for any combustible or flammable materials in the area, as well as any other potential sources of ignition. Remove or relocate these materials as needed before starting the welding process.
- **Report** any identified hazards to the supervisor and follow their guidance on mitigation steps.
- A **fire watch** is generally required for all welding operations not in a dedicated welding booth.
- Fire watch must observe the process, watching where sparks and slag land, and look for signs of smoke or fire.
- Additional fire watch personnel may be required if the welding is in a location where these sparks or slag may penetrate a wall or floor, or on a raised platform.
- Fire watch should continue at least 30 minutes after welding is complete because a spark may encounter a combustible object and smolder.

These general fire safety rules should be followed during welding operations:

- Welders should be aware of the location of their nearest **exits** and **fire alarm** pull stations (if provided) and have a fully **charged fire extinguisher** ready.
- Those expected to use a fire extinguisher must be **trained**. Basic Fire Extinguisher training is available online, but hands-on training is required for those performing hot work or acting as fire watch for hot work operations. Both can be accessed on the EH&S website.
- Post the required signage: "Caution: Hot Work Area" to warn anyone entering the space.

COMPRESSED GAS HAZARDS

- Gas welding uses a fuel gas cylinder, often acetylene, as a torch to form a flame.
- In oxy-fuel welding, pure oxygen is used instead of air to increase the temperature of the flame, which differentiates welding from soldering or brazing.
- Gas cylinders pose several hazards and must be properly managed.
- Some types of welding, such as metal inert welding (MIG) and tungsten inert welding (TIG), use shielding gases to protect the weld area from oxygen or moisture.
- Shielding gases are often inert gases such as argon, helium, and carbon dioxide, which can reduce the amount of breathable oxygen in air.

How can I protect myself from compressed gas hazards?

- Ensure proper storage and handling of gas cylinders and adequate ventilation.
- Use the right equipment for the specific gas you are working with.
- Check for leaks before attaching a regulator.
- Know the emergency procedures for gas leaks, fires, or other hazardous situations.

THERMAL HAZARDS

How can I protect myself from high heat during welding operations?

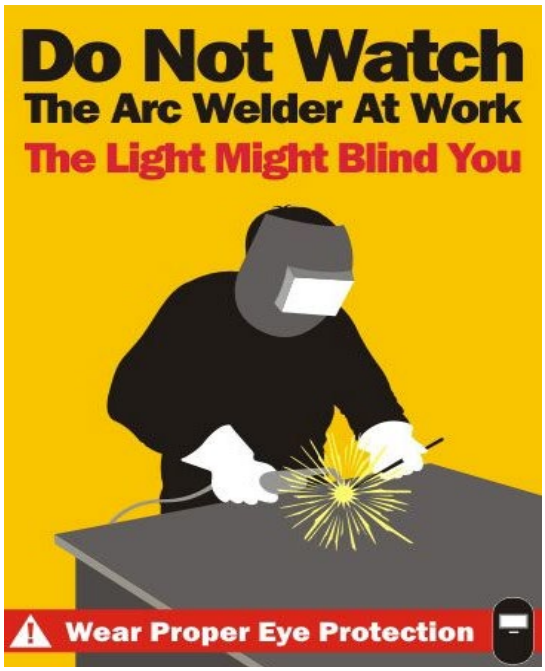
- Wearing appropriate personal protective equipment (**PPE**) can help prevent burns.
- Use welding **goggles** and **helmets** to protect the eyes from glare and flying sparks.
- Wear **heavy leather gloves**, protective **long-sleeve jackets**, **long pants**, and **closed-toe shoes**.

FLASHBACK

Flashback can occur in gas welding when the flame burns back up the hose lines. A resulting explosion in the hose could injure or kill the operator.

What can I do to prevent flashbacks?

- Make sure the system is equipped with a **flashback arrestor**.
- Operate the equipment at the recommended **pressure**.
- Equipment should be **inspected regularly** to ensure proper functioning.



Welding Safety Posters

PROHIBITED PRACTICES

Hot work must **not** be performed in areas:

- Requiring authorization before it has been granted.
- Where the fire suppression system is impaired
- With a reasonable potential to contain an atmosphere of explosive gases, vapors, or dusts prior to venting.
- Near the storage of large quantities of exposed and readily ignitable materials
- Where there are pipes that are in contact with combustible walls, ceilings, roofs, or partitions where heat conduction may cause ignition.

Contact EH&S at 206.543.7262 for more information.