Welding, Cutting and Brazing Part 2: Physical Hazards

Physical hazards can cause physical damage to people and property and may even kill people. Before you begin welding, cutting or brazing, you need to look for hazards and determine if any special precautions are needed.

Many companies use **job hazard analyses** or other customized **risk assessments** that they update when conditions change. Check the analyses to learn about the hazards associated with the work and how to control hazards. The analyses include hazards and controls for the task you will perform, the tools and materials you will use, and the setting in which you will work. If there is not an analysis for your task, or if conditions change and the analysis requires an update, please notify your supervisor to determine if the analysis needs to be created or updated.

Typical **physical hazards** for welding, cutting and brazing work include:

- Fires and explosions related to hot work and compressed gas cylinders
- Hot torches and metals that can contribute to fires and cause burns to the body
- Electricity from arc welding that can cause electrical shocks
- Ultraviolet (UV) rays or light and, to a lesser extent, infrared (IR) radiation that can cause skin burns and damage to eyes
- Noise that can damage hearing

Before the Work

Many companies require a **written permit** system for hot work. Permitting systems help ensure everyone takes appropriate precautions prior to hot work. Precautions for **hot work** include inspecting and preparing the work area, moving or protecting combustible and flammable materials, and assigning a dedicated fire watcher with an extinguisher.

To prepare the **work area**:

- Inspect and control the hot work area BEFORE you start the work
- Do NOT weld, cut or braze in the presence of combustible or flammable fluids or atmospheres (gases, vapors or dusts)
- Inspect cracks and holes in the floor, walls and ceiling of the work area

Check the work area for **combustible materials**. Remove all objects that could catch fire (such as oily rags) or explode (such as flammable liquids and spare gas cylinders). Move all combustible material at least 11 meters (35 feet) horizontally from where the hot work will take place. If you cannot move remaining combustibles, protect them with appropriate guards and covers. If you cannot move or protect combustibles, do NOT weld, cut or braze in the area.

Welders are responsible for ensuring that the environment around them is free of hazards to protect the safety of all employees and property in the immediate area. It is EVERYONE'S responsibility to stop work immediately if they notice unsafe conditions.

Employers must train all hot work personnel about how to use portable fire extinguishers. Be familiar with escape routes and know how to sound alarms in case of fire.

Inspect and wear **personal protective equipment (PPE)** as prescribed in the job hazard analysis or other risk assessment. PPE can supplement other controls that protect you from hazards like heat, ultraviolet (UV) and infrared (IR) rays or light, electricity and noise. PPE may include:

- Welding goggles or a welding helmet with a cap underneath
- Thermal insulated welding gloves
- Fire-resistant (FR) sleeves
- Fire-resistant or leather cape or shoulder covers (for overhead work)
- Electrically rated leather shoes with safety toes
- A respirator with appropriate medical and fit testing (for some operations)
- Earplugs or earmuffs (for noisy operations and to repel sparks)

Follow your employer's procedures for removing defective PPE from service and replacing it.

During the Work

Follow your employer's safety protocols when using compressed gas cylinders for gas welding and electricity for arc welding.

Check for **explosion hazards**. Do NOT perform hot work operations on anything containing flammable or toxic material. Grease, tar, acid or other materials may produce flammable or toxic vapors. Sealed containers may burst when they are heated. Opening a hatch, flange or lid is a simple way to prevent pressure buildup.

Check **empty containers**. Treat any empty containers as flammable or toxic. Follow the instructions on the Safety Data Sheet (SDS) to clean containers and ensure that no flammable or toxic materials are present. Verify that containers are free of residue on the bottom or in crevices.

Small amounts of flammable liquid in a drum or other container may be enough to cause an explosion when you apply heat.

Electric arc in welding generates ultraviolet (UV) rays or light, which can cause severe skin burns, damage to eyes and skin cancer. For protection against UV rays or light, wear welding helmets and protective clothing. High-intensity UV light also reacts with the air around the welding arc to produce ozone, nitrogen oxides and carbon monoxide.

Electric arc and flame-based cutting equipment generate infrared (IR) radiation, which may cause thermal burns. For protection against IR radiation, wear welding helmets or goggles and protective clothing.

Arc welding generates intense light that can damage your eyes when you see it or its reflection. Because much of the energy of welding cannot be seen and because the onset of burns can be gradual, we should NOT rely on perceived brightness or pain as indicators of what’s safe when it comes to the UV rays or light and IR radiation associated with welding, cutting and brazing processes.

Wear appropriate welding helmets, safety glasses or goggles when you are welding. To protect people who will be around potentially damaging light, use welding curtains and post warning signs.

After the Work

Use your employer's fire watch procedures. A fire watcher should remain in the work area for at least 1 hour after finishing welding, cutting or brazing activities are finished to ensure that there are no smoldering fires.

Perform housekeeping to remove hazards created during the work.

If anyone is injured during welding, cutting and brazing activities, such as receiving burns or electrical shocks, IMMEDIATELY follow your employer's first aid and reporting procedures.