



WESTERN
KENTUCKY
UNIVERSITY

Environmental Health & Safety

**WELDING, CUTTING, & BRAZING
PROGRAM
2006**

Purpose

It is our goal at Western Kentucky University to provide a safe and healthy work environment. To that end, this Welding, Cutting, and Brazing program has been written (and will be implemented) to comply with the Occupational Safety and Health Administration (OSHA) Standard 29 CFR 1910.251-255. This program pertains to all WKU employees and/or students who will be welding, cutting, or brazing.

In addition, this program must be utilized in tandem with WKU's Hot Work Permit program. The Hot Work Permit program is designed to establish written procedures for preventing fires that may occur as a result of a temporary operation that involves either open flames or produces heat and/or sparks. The program is required by OSHA 29 CFR 1910.252, 29 CFR 1926.352 and NFPA Standard 51B. It includes, but is not limited to, brazing, cutting, grinding, soldering, thawing pipes, torch applied roofing and welding.

The Welding, Cutting, and Brazing program focuses on safe work practices, proper personal protective equipment, and proper ventilation, while the Hot Work Permit program establishes procedures that must be followed in order to obtain permission to conduct hot work activities.

Responsibility

Management and/or faculty shall recognize the responsibility for the safe usage of cutting and welding equipment on Western Kentucky University property. Cutting or welding shall be permitted only in areas that are or have been made fire-safe. Fire extinguishing equipment must be located at the work site. Proper ventilation shall be adequate to prevent the accumulation of toxic materials or possible oxygen deficiency. Students must be under the supervision of a faculty member at all times when welding, cutting, or brazing.

Definitions

A *Welder* is any operator of electric or gas welding and cutting equipment. All other welding terms are used in accordance with American Welding Society – Terms and Definitions—A3.0-1969, which is incorporated by reference as specified in CFR 1910.6

General Safety Precautions

To prevent injury to personnel, extreme caution should be exercised when using any types of welding equipment. Injury can result from fire, explosions, electric shock, or harmful agents. The following safety precautions should be used:

- Conduct welding and cutting operations in a designated area free from flammable materials.
- Remove from the area anything that is flammable.
- Periodically check welding and cutting areas for combustible atmospheres.
- Take care to prevent sparks from starting a fire.

- Remove unused gas cylinders from the welding and cutting area.
- Keep hoses out of doorways and away from other people. A flattened hose can cause a flashback.
- Ensure that adequate ventilation and exhaust are available.
- Be aware of electrocution hazards, particularly in damp conditions. Be sure that cords are properly grounded.
- Do not use worn, damaged, undersized, or poorly spliced cables, welding gun cables, or torch cables.
- Make sure all connections are tight, clean, and dry.
- Do not touch holders connected to two welding machines at the same time.
- Avoid breathing the fumes from welding.
- Use enough ventilation, exhaust at the arc (or both) to keep fumes and gases away from your breathing zone and general area.

Personal Protective Equipment

Proper selection of personal protective equipment is very important when welding. Of all injuries to welders, burns are the most common due to flying sparks that land on bare skin.

Some welding arcs are so intense that the high amperages that could cause injury with just a few minutes of exposure. Some arcs are as mild as a single birthday candle (around 30 amps). To be safe, an arc should never be viewed with the naked eye within a distance of 50.0 feet. Because of this, operators of all oxyacetylene welding and cutting processes must use safety goggles to protect the eyes from heat, glare, and flying fragments of hot metals. In addition, during all electric welding processes, operators must use safety goggles and a hand shield or a helmet equipped with a suitable filter glass to protect against the intense ultraviolet and infrared rays. Filter glasses (plates) are available in a number of optical densities, and should be chosen based on the welding process, type of base metal, and the welding current being used.

Make sure to protect your hearing with earplugs, canal caps, or earmuffs. Exposure to hazardous noise can lead to fatigue, irritability, and eventually total hearing loss. In addition, wearing hearing protection will also prevent sparks and metals from entering the ear.

Avoid rolling up sleeves and trouser legs, since sparks or hot metal could get stuck in the folds. Trousers should be worn *over* work boots. Flame resistant suits, aprons, leggings, and leather sleeves are highly recommended to protect your body and hands from sparks or metals. Wear high top shoes that are fire-resistant.

In addition, take care to protect other people from the hazards of welding. For example, use a welding curtain to block UV radiation. If the job requires more than one person, each worker must wear proper protective gear and follow required procedures.

Welding Operations

Electrical Arcs

There are two major types of welding. One uses electrical arcs and the other type utilizes a combination of “fuel gas” and oxygen. Arc welding encompasses several forms of electrical welding. Each type uses large amounts of electricity to generate the heat that is necessary for welding. In electrical welding, the first step is to make sure that the work lead and the electrode are properly connected. These leads conduct electricity from the power source to the electrode holder. A poor connection could produce a severe shock. Do not operate arc welding equipment if there is moisture present on the machine, your hands or the floor. If moisture is present, completely dry off any equipment or work areas.

Welding leads must be completely insulated and in good condition. Look for damaged insulation or bare conductors. Sometimes it is necessary to splice a welding cable to repair or lengthen it. To reduce the risk of an accidental shock from a splice, make sure to leave at least ten feet of cable between the splice and the electrode holder. Partially used electrodes should be removed from the holders when not in use.

Finally, locate welding machines where there is adequate ventilation. When not in use, disconnect the machine from power supply.

Fuel Gas Welding/Cutting

Gas welding and cutting tools are often powered by oxygen or acetylene gas cylinders. These tanks require special safety precautions to prevent explosions and serious injuries. For more information, refer to the compressed gas cylinder policy. The following safety procedures should be used when performing gas welding:

- Ensure that acetylene/oxygen systems are equipped with flame or flashback arrestors.
- Always turn the acetylene cylinders so the valve outlet will point away from the oxygen cylinder
- Oxygen and acetylene tanks must be secured in a safe place.
- Keep cylinder fittings and hoses free from oil and grease.
- Repair or replace defective hoses by splicing. Do not use tape.
- Do not tamper or attempt to repair cylinders, valves, or regulators.
- Do not interchange regulators or pressure gauges with other gas cylinders.
- Carefully purge hoses and torches before connecting a cylinder.
- Never use acetylene at a pressure in excess of 15 psi. Higher pressure can cause an explosion.
- Acetylene is nontoxic; however, it is an anesthetic and if present in great enough concentrations, could asphyxiate and produce suffocation.
- Never use a match to light a torch.
- Always use oxygen regulators to reduce the cylinder pressure to a low working pressure. High cylinder pressure will burst the hose.

Ventilation

To maintain a healthy breathing zone, make sure that plenty of air flows around the welding operation. Intense heat required for welding can cause metals to release hazardous fumes. The dangers of these fumes are based on the dimension of the work space, how many welders are in the room, the height of the ceilings, and the location of a welder's breathing zone.

To maintain a healthy breathing zone, make sure that plenty of air flows around the welding operation. Add mechanical ventilation when a room has less than 10,000 cubic feet per welder, or where ceilings are less than 16 feet high. All welding and thermal cutting operations carried on in confined spaces must be adequately ventilated to prevent the accumulation of toxic materials, combustible gases, or possible oxygen deficiency. Monitoring instruments should be used to detect harmful atmospheres.

Short-term exposure can lead to irritation of the eyes, nose, and throat. Long-term exposure can cause severe damage to the nervous system, and even lung cancer.

As with any EH&S policy, please contact our office for clarification and interpretation of this or any other OSHA program.

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