UNIVERSITY OF SOUTH CAROLINA LANCASTER
CUTTING AND WELDING (HOT WORK) OPERATIONS

Introduction

Cutting and welding operations (commonly referred to as hot work) are associated with machine shops, maintenance, and construction activities, as well as certain laboratory-related activities, such as glass blowing and torch soldering. Potential health, safety, and property hazards result from the fumes, gases, sparks, hot metal and radiant energy produced during hot work. Hot work equipment, which may produce high voltages or utilize compressed gases, also requires special awareness and training on the part of the worker to be used safely. The hazards associated with hot work can be reduced through the implementation of effective control programs.

Scope and Application

The Occupational Safety and Health Administration (OSHA) prohibits cutting and welding operations unless appropriate steps are taken to minimize fire hazards, such as removal or guarding of combustible materials and, when possible, restricting hot work to specially designated areas. Departments where hot work is performed are responsible for ensuring that adequate controls and procedures are in place before work begins.

Program Description

Cutting and welding operations often are found in maintenance, but can also occur in research settings. Adequate controls and procedures must be used to minimize the hazards associated with these activities.

General Cutting and Welding Controls

Areas where hot work is done should be properly designated and prepared. Combustible and flammable materials within the work area should be protected against fire hazards and the operation should not pose a hazard to others in nearby areas. To help achieve this, the following controls should be used:

- Cutting and welding operations restricted to authorized, properly trained individuals;
- If possible, hot work performed in a properly designed shop area equipped with all necessary controls and adequate ventilation;
- Move combustible materials at least 35 feet from the work site. If this is not possible, protect combustible materials with metal guards or by flameproof curtains or covers (other than ordinary tarpaulins);
- Cover floor and wall openings within 35 feet of the work site to prevent hot sparks from entering walls or falling beneath floors or to a lower level;
- Fire resistant curtains and /or tinted shields used to prevent fire, employee burns, and ultra-violet light exposure.

Ventilation and Atmospheric Testing

Hot work should not be conducted in the presence of explosive mixtures of flammable gases, vapors, liquids, or dusts or where explosive mixtures could develop inside improperly prepared tanks or equipment. Atmospheric testing and monitoring for combustible gases and vapors should be done before work begins and at regular, predetermined intervals thereafter. Ventilation of the work site, either through local or general exhaust ventilation, should be adequate for the work performed.

Fire Protection

A person other than the operator should perform fire watch duties and remain at the work site for at least 30 minutes after hot work operations have ended. Additionally, the following steps should be taken:

- A fire extinguisher rated at not less than 2-A:20-B:C must be available in shop areas where hot work is performed;
- A fire extinguisher rated at not less than 2-A:10-B:C must be attached to all portable cutting and welding carts;
- If a building or area is equipped with a sprinkler system, then that system must be operational when hot work is performed;

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Personal Protective Equipment

Personal protective equipment specifically designed for hot work should be provided to and used by workers. The potential for toxic fume emissions from the material being worked on or surface coatings should be considered, and appropriate steps should be taken to provide for respiratory protection.

Cutting and Welding in Confined Spaces

When cutting or welding is to be done in confined spaces, appropriate entry procedures should be followed (see USC Health and Safety Manual section VI, Confined Space).

Compressed Gas Cylinder Storage and Handling

Storage and handling of compressed gas cylinders are important parts of many cutting and welding operations. The following should be observed:

- Oxygen and fuel gas cylinders should be stored separately with the protective valve caps in place. Except when in use, oxygen and fuel gas cylinders should be stored at least 20 feet apart or separated by a noncombustible wall at least 5 feet high;
- Cylinder carts equipped with a cylinder restraint, such as a chain or strap, should be used for all transporting of compressed gas cylinders;
- Cylinders should be secured from tipping, in an upright position;
- Regulators must be compatible with the cylinder and its contents. Many regulators are similar in design and construction. Check the regulator's model number and compare that with the cylinder's requirements.

Hot Work Permits

Hot work permits should be developed by departments where cutting or welding is performed. Hot work permits can help minimize the risk of fire during cutting and welding activities by serving as a checklist for operators and those performing fire watch duties. The person responsible for issuing permits should be qualified to examine the work site and ensure that appropriate protective steps, such as those listed in this section, have been taken. A hot work permit should be issued at the beginning of each shift for each specific operation. Example: USC Hot Work Permit EHS-F-118

Training

All persons performing hot work should be trained in proper equipment operation, handling and storage of welding materials, compressed gas safety, chemical hazards, and in working procedures, including the written hot work permit. Additional training may also be necessary in the proper selection and use of personal protective equipment. Training in confined space entry is necessary before working in such areas.

Roles and Responsibilities

Department

- Develop a hot work permit.
- Provide workers with specific training on hot work procedures.

Supervisors

- Issue hot work permits.
- Ensure procedures are followed.

USC EHS

- Provide general training on hot work procedures.

- Provide a periodic audit of hot work procedures.

Individual

- Attend training.
- Follow hot work procedures.

For More Information

- Contact the USC Employee Safety Manager (Buddy Harley) at 777-5255.