

Welding, Cutting, and Brazing Safety

The Risk

Welding is the most common way of permanently joining metal parts. In this process, heat is applied to metal pieces, melting and fusing them to form a permanent bond. **Cutting** is any process, including grinding, which produces a spark or sparks capable of igniting combustible or flammable materials and transmits heat to the work material from a hot gas. **Brazing** uses molten metal to join two pieces of metal where metal is added during the process and has a melting point lower than that of the metal so only the added metal is melted, not the workpiece.

All are considered “hot work” as they have the potential of creating heat or a spark which can start a fire. The following information will outline some of the best practices to assist in managing the risk associated with welding, cutting, and brazing.

The Controls

Processes and Equipment

Oxygen-Fuel Gas Welding is the act of joining metal by generating extremely high heat during combustion.

Resistance Welding is the act of joining or cutting metals by generating heat through resistance created by the flow of an electric current.

Arc Welding is the act of joining or cutting metals by generating heat from an electric arc that extends between the welding electrode and the electrode placed on the equipment being welded.

Gas Tungsten Arc (TIG) welding is often used with stainless steel or aluminum. TIG uses welding rods, where the welder holds the welding rod in one hand and an electric torch in the other hand. The torch is used to simultaneously melt the rod and the workpiece.

Gas Metal Arc (MIG) welding uses a spool of continuously fed wire, which allows the welder to join longer stretches of metal without stopping to replace the rod. The welder holds the wire feeder which functions like the alligator clip in arc welding. Instead of using gas flux surrounding the rod, TIG and MIG protect the initial weld from the environment by blowing inert gas onto the weld.

Cutting or brazing equipment could be a torch, grinder, etc. The heat from the torch can cut through the metal or the wheel of a grinder can be used to cut the material. In both operations, sparks and heat are created.

Operator Training and Qualification

The person conducting hot work operations needs to be trained, qualified, and knowledgeable of the equipment, materials, and hazards associated with the process. The person needs to be knowledgeable in selecting the correct protective equipment to be used during the welding, cutting, and/or brazing process.

General and Pre-work Preparation

Inspecting the area where the “hot work” is to take place is critical as it determines if the conditions are safe to conduct the hot work.

The area where the hot work is to take place should be free or cleared of combustibles, flammables, etc. (approximately 35’ around the hot work area). If this is not feasible, other protective measures should be used such as hot work curtains or barricades.

If there are openings in walls or floors in the hot work area, these should be covered to keep hot slag or flame falling through onto co-workers or equipment.

If area contains combustible residues such as chips, lubricants and wood waste that cannot be completely removed for the hot work area, the area should be wet down liberally and repeated as necessary to ensure fire safety in the area.

Do not start hot work in areas or on equipment which contains or has contained hydrocarbons or other combustible liquids until all provisions are made to prevent fire or explosion have been made. Caution should be exercised around conveyors or other such devices that could cause the spread of fire.

Hot Work Permits – Issuance

Once it has been determined that the “hot work” can be conducted, the hot work permit needs to be completed, authorized, issued, and hung as the site where the hot work is to take place.

The person issuing the permit must complete an inspection before issuing the permit. All precautions and fire preventions measures should be written and explained on the permit.

Where flammable gas or hydrocarbon vapor may be present the person issuing the permit will perform or arrange for atmospheric testing before issuing the permit.

When the person issuing the permit is satisfied that the necessary safety checks of the hot work area have been made, and that it is safe for the work to proceed, the person will sign the permit to authorize the work to begin.

The signed permit is to remain at the job site until the work has been completed.

Hot Work – Cancellation

The hot work permit can be canceled at any time where conditions have changed, making continuation of the work hazardous.

All hot work permits are automatically void when a fire or emergency condition has been signaled. In that event, the permit holder must cease operation and secure his equipment in a safe manner without delay.

Hot Work Permits - Completion

Upon completion of work and after the hot work equipment has been removed from the area, the employee doing the work will return the hot work permit to the Supervisor.

Hot Work Permits – Retention

A copy of all completed permits will be delivered to the Safety Manager to keep on file for six months from the date of issue.

OSHA Regulations for Welding, Cutting, Brazing

- 1910 – Subpart Q
- 1910.251
- 1910.252
- 1910.253
- 1910.254
- 1910.255

Disclaimer

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