
Chapter 20 : WELDING SAFETY

INTRODUCTION/OVERVIEW

This chapter presents the basic safety requirements found in 29 CFR 1926, Subpart J as well as capsule summaries of the major health hazards associated with the welding process.

CUNNINGHAM PAVING provides training in hazard identification and awareness. Be aware of these hazards and take the requisite precautions.

BASIC REQUIREMENTS - OSHA SUBPART J

ARC WELDING AND CUTTING

1. Do not use pipelines containing gases or flammable liquids, or conduits containing electrical circuits, as a ground return.
2. Ensure that the required electrical contact exists at all joints when a structure or pipeline is employed as a ground return circuit. The generation of an arc, sparks, or heat at any point shall cause rejection of the structures as a ground circuit.
3. Ground the frames of all arc welding and cutting machines either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current.
4. Open the power supply switch to the equipment when the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved.
5. Report any faulty or defective equipment to the supervisor.
6. Shield all arc welding and cutting operations, whenever practicable, by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

FIRE PREVENTION

1. Never permit welding, cutting or heating where the application of flammable paints or the presence of other flammable compounds creates a hazard.
2. Always maintain suitable fire extinguishing equipment in the work area. This equipment must be readily accessible and in a state of readiness for instant use.
3. Assign additional personnel to guard against fire whenever the welding, cutting or heating operation is such that normal fire prevention precautions are not sufficient. This additional personnel is to be present while the actual welding, cutting, or heating operation is being performed and for a sufficient period of time after completion of the work to ensure that no possibility of fire exists.
4. Any repairs done to a welding cable must be protected by means of rubber and friction tape or other equivalent insulation.
5. Whenever an object is to be welded, cut, or heated it must be moved to a designated safe location. If the item cannot be moved, all movable fire hazards in the vicinity must be taken to a safe place, or otherwise protected.
6. If the object cannot be moved and all fire hazards removed, positive means must be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.

VENTILATION

1. Provide adequate ventilation as necessary to maintain welding fumes and smoke within safe limits as defined in Subpart D (OSHA 1926.55). Generally, if you are welding in an open space of more than 10,000 square feet, or if the ceiling height is more than 16 feet, natural ventilation is adequate for general purpose welding. If in doubt, an environmental laboratory can run tests to determine the degree of hazard.
2. Mechanical ventilation, if required, should have sufficient capacity and be arranged to produce the number of air changes necessary to maintain safe limits. Local ventilation, if required, consists of freely movable hoods intended to be placed by the welder as close as possible to the work.
3. Provide suitable mechanical ventilation or respiratory protective equipment whenever unusual physical or atmospheric conditions create an unsafe accumulation of contaminants even if the process of welding, cutting, and heating, not involving the materials of toxic significance outlined below, does not normally require the use of such mechanical ventilation or personal protective systems.

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4. Provide either general mechanical or local exhaust ventilation when welding, cutting or heating in any enclosed spaces the metals of toxic significance listed below.
 - a. Zinc bearing base or filler metals or metals coated with zinc-bearing materials.
 - b. Cadmium bearing filler materials.
 - c. Chromium bearing metals or metals coated with chromium bearing materials.
 5. Provide either local exhaust ventilation in accordance with the requirements of 1926.353(a) or provide employees with air line respirators in accordance with the requirements of OSHA Subpart E when welding, cutting, or heating in any enclosed spaces the metals of toxic significance listed below.
 - a. Metals containing lead, other than as an impurity, or metals coated with lead bearing materials.
 - b. Cadmium bearing or cadmium coated base metals.
 6. No employee is to engage in or be exposed to the process of **inert-gas metal-arc welding** until the following **special precautions** have been taken. These precautions are required since the inert-gas metal-arc welding process involves the production of ultraviolet radiation of intensities of 5 to 30 times that produced during the shielded metal-arc welding as well as the liberation of toxic fumes and gases and the decomposition of chlorinated solvents by ultraviolet rays.
 - a. No chlorinated solvents are to be used within 200 feet of the exposed arc, unless shielded.
 - b. Ensure that all surfaces prepared with chlorinated solvents are thoroughly dry before welding is permitted on such surfaces.
 - c. Ensure that filter lenses meeting the requirements of OSHA Subpart E protect all employees in the area who are not protected from the arc by screening.
 - d. Ensure that all welders and other employees who are exposed to radiation are suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays.
 - e. Provide local exhaust ventilation or airline respirators to all employees who perform inert-gas metal-arc welding on stainless steel in any enclosed spaces. These ventilation and respiratory protection requirements must be met to protect against dangerous concentrations of nitrogen dioxide.

HEALTH HAZARDS - CHEMICAL AGENTS

ZINC

Zinc is used in large quantities in the manufacture of brass, galvanized metals, and various other alloys. Inhalation of zinc oxide fumes can occur when welding or cutting on zinc-coated metals. Exposure to these fumes is known to cause metal fume fever. Symptoms of metal fume fever are very similar to those of common influenza. They include fever (rarely exceeding 102°1=), chills, nausea, dryness of the throat, cough, fatigue, and general weakness and aching of the

