

EXCERPT FROM HEALTH AND SAFETY CODE HANDBOOK – WELDING AND CUTTING

27.23 - Welding and Cutting. Principal hazards are shock and burns from the electric current, eye and skin injury from ultraviolet and infrared radiation, and internal injury from fumes. Hot metals or sparks can also burn skin.

27.23a - Standards. The standards for welding requirements are in 29 CFR 1910.251, 1910.252 and 1926.350 - 1926.354; 42 CFR Part 84; American Welding Society, American Standard Safety in Electric and Gas Welding and Cutting Operations (sec. 27.01); American National Standards Institute (ANSI), Z49.1: Safety in Welding and Cutting; and NFPA 51 and 51B.

27.23b - Qualifications. In addition to ensuring that employees have the applicable training listed in section 22.07, use only accomplished welders. Determine competency by:

1. Standards of the American Welding Society, State and local vocational training courses, and trade unions.
2. Practical work experience.

Prior to beginning welding projects, supervisors shall assess employee competency.

27.23c - Personal Protective Equipment. The JHA shall specify the type of PPE required for the work project or activity. Normally this PPE includes:

1. Welder's face shield or goggles with a proper shade for eye protection. Exhibit 01 is a guide for the selection of proper shade number. These recommendations may be varied to suit the individual's needs.

27.23c - Exhibit 01

2. Head protection such as a leather skull cap and/or hardhat.
3. Flameproof gauntlet welding gloves, vest, apron, cape, shoulder covers, and flame-resistant clothing.
4. Steel-toed boots.
5. Hearing protection (85 dB and above).
6. Respiratory protection as identified by the JHA or MSDS.

27.23d - Procedures. Prepare a JHA for each type of material to be welded and cut. Specify the welding and cutting procedures to be used (sec. 22.08).

27.23e - Safety Practices. Follow these basic safety and health practices for welding.

1. Ventilation. Provide adequate ventilation when welding and cutting in confined places. When adequate ventilation is not possible, provide welders with air-line respirators. Refer to exhibit 01 and section 38.2 for further direction.

27.23e - Exhibit 01

2. Toxicity. The JHA and MSDS shall identify the toxicity of materials used. Common materials that may give off hazardous substances include:

- a. Fluoride compounds: often found in cleaning materials.
- b. Zinc: found in culverts and other galvanized materials.
- c. Lead: found in lead-based metals, plumbing lead, and lead-based paints.
- d. Cadmium: found in certain alloys used in making bolts and other fasteners and present in silver solder and other fluxes.
- e. Stainless steel: found in stainless steel rod and materials

3. Equipment. Inspect hose lines, connections, and welding cables.

- a. Test for gas leaks with soapy water only; never use an open flame.
- b. Use acetylene at 15 psi (103 kilopascals) pressure or less.
- c. Never directly inhale the gas from either acetylene or oxygen cylinders.
- d. Do not connect cylinders to pipes or manifolds.
- e. Do not transfer gases from one cylinder to another.

4. General Welding. Never weld near wood scraps, shavings, sawdust, paper, grease-soaked rags, or volatile materials such as gasoline or solvents, and other combustibles.

b. Provide appropriate eye protection, shades, shields, or barriers during welding operations for employees and other bystanders in area.

5. Arc Welding. Provide sufficient electrical circuiting for the welding machine. Check electrical connections before starting work. Do not use cables needing repair.

a. ***Do NOT arc weld within 200 feet (60 m) of flammable solvents unless you are shielded. Poisonous gas or explosion can result from heated solvents.***

b. Ensure that insulation, protective coverings, and electrode holders are in good condition and safe. Only rubber-covered cable, without splices, is permitted within 10 feet (3 m) of the electrode holder.

c. Insulate exposed cables on metal lead connection lugs. Keep cable out of the way and off the floor, especially across aisles or crosswalks. Make sure equipment never passes over cables. Protect leads so workers do not trip over them.

d. Keep welding leads clear of the primary leads of electric motor-operated welders. Electric motors may blow toxic materials into employee work area.

(1) Ground material being welded as close as possible to the weld.

(2) Use insulated platforms in wet places.

(3) Do not weld near batteries.

(4) Turn off a welding machine whenever work is stopped.

6. Storage.

a. Store equipment and supplies in dry, protected areas.

b. Do not leave rods and stingers out when not in use.

c. Ensure labels and operating instructions are legible.

7. Oxygen-Fuel Cutting and Welding.

- a. Always read the manufacturer's operating instructions prior to using equipment. Follow the manufacturer's operating instructions at all times.
- b. Inspect the torch before use. Connections must be tight to avoid ignition inside the tip and possible explosion. Inspect the filter in the inlet nipple of oxygen regulators to ensure that the filter is in place and is clean. If the filter is missing, have the regulator inspected and cleaned, and have the filter replaced by a qualified repair shop.
- c. Keep oxygen cylinders, cylinder valves, couplings, regulators, hoses, and apparatus free from oil, grease, and other flammables or explosive substances. Do not handle oxygen cylinders or apparatus with oily hands or gloves.
- d. Have at least one special cylinder wrench available for immediate use. Cylinders not having fixed hand wheels shall have keys, handles, or nonadjustable wrenched-on valve stems while in service so that the gas flow can be turned off quickly in case of emergency.
- e. Always close the cylinder valves whenever the equipment is unattended.
- f. Always drain the regulator. Before a regulator is removed from a cylinder, close and release the cylinder valve and release the gas from the regulator.
- g. Always slightly open the cylinder valve. Before removing a regulator from a cylinder, close the cylinder valve and release the gas from the regulator.
- h. Perform these steps after the regulator is attached to oxygen cylinders:
 - (1) Engage the adjusting screw and open the downstream line to drain the regulator of gas.
 - (2) Disengage the adjusting screw and open the cylinder valve slightly so that the regulator cylinder pressure gauge moves up slowly before opening the valve all the way.
 - (3) Stand to one side of the regulator and not in front of the gauge face when opening the cylinder valve.

- i. Always leak-test the connection after assembly and before lighting the torch. Do not use flames
 - j. Follow the manufacturer's instructions for lighting, adjusting, and extinguishing torch flames. Use a friction lighter, stationary pilot flame, or other suitable source of ignition. Never use matches, cigarette lighters, or welding arcs.
 - k. Use pressure reducing regulators only for the gas and pressure for which they are labeled.
 - l. Always ascertain that gauges used for oxygen service are marked "USE NO OIL."
 - m. Have repair maintenance for regulators or parts of regulators (including gauges) performed by qualified technicians.
 - n. Do not use acetylene pressure above 15 pounds per square inch gauged (psig) or 103 kPa.
 - o. Do not leave pressure on a regulator when not in use.

8. Cylinder Handling. Handle cylinders carefully to avoid damage and prevent leaks.

- a. Before moving cylinders, close valves and secure the valve protection cap. Do not lift cylinders by valves or caps.
- b. Move cylinders by tilting and rolling them on the bottom edge. Never drag or slide them.
- c. If a gas cylinder was temporarily placed in a horizontal position when being transported, make sure it is positioned upright for at least 2 hours before use.

9. Cylinder Storage. Place acetylene and oxygen cylinders upright for storage and use.

- a. Provide a cylinder truck or rack to prevent cylinders from being upset. Chain or otherwise secure them to prevent tipping.
- b. Store oxygen cylinders in a dry location away from heat sources and flammable/combustible materials and at least 20 feet (6 m) from acetylene.

END