

## **4123:1-5-16 Cutting and welding.**

(A) Reserved.

(B) Reserved.

(C) Responsibility.

(1) The employer shall verbally and through demonstration instruct the employee in the safe operation and maintenance of cutting and welding equipment.

(2) It shall be the duty of the employee to operate such equipment in accordance with such instructions.

(D) Maximum pressure.

Under no condition shall acetylene be generated, piped (except in approved cylinder manifolds), or utilized at a pressure in excess of fifteen pounds per square inch gauge pressure.

(E) Gas welding and cutting.

(1) Equipment.

Only approved equipment, such as torches, regulators, or pressure-reducing valves, acetylene generators, manifolds, cylinders, and containers shall be used.

(2) Cylinders and containers.

(a) Marking.

Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling and shall not be readily removed.

(b) Storage.

(i) Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of twenty feet or by a noncombustible barrier at least five feet high, having a fire resistance rating of at least one-half hour.

(ii) Cylinders, when not in use, shall be protected from any heat-radiating objects or open flame which could cause the cylinders to rupture or could cause the fusible plug to melt.

(c) Valve protection caps.

(i) All cylinders with a water weight capacity of over thirty pounds shall be equipped with means of connecting a valve protection cap or with a collar or recess to protect the valve.

(ii) Employees shall be responsible for using valve protection caps when cylinders are moved from place to place or put in storage.

(iii) Where carriers are provided for moving cylinders which are connected for use, capping shall not be required but employees shall be responsible for seeing that cylinder valves are closed and pressure is released from regulators, hoses and torches.

(d) Regulator protection.

Welders and cutters shall be instructed to close valves on oxygen and acetylene cylinders and bleed off hose pressure at the end of each workshift, to prevent malfunction of the regulators.

(e) Transporting cylinders by crane or derrick.

When cylinders are hoisted, they shall be secured on a cradle, slingboard, or pallet. They shall not be hoisted or transported by means of magnets or choker slings.

(f) Facilities for securely fastening cylinders; responsibility.

The employer shall provide facilities for securely fastening cylinders of compressed gas in an upright position.

(3) Hose and hose connections.

(a) Hose.

(i) Identification.

The color red shall be used for acetylene and other fuel gas hose. The color green shall be used for oxygen hose. The color black shall be used inert gas and air hose.

(ii) Hose in which flashback has occurred.

Any length of hose in which a flashback has occurred and burned in the hose shall be taken out of service.

(iii) Single hose with more than one gas passage.

The use of a single hose having more than one gas passage, in which a wall failure would permit the flow of one gas into the other gas passage, shall not be permitted.

(iv) Hoses taped together – limitation.

When parallel lengths of oxygen and acetylene hoses are taped together for convenience and to prevent tangling, not more than four inches out of twelve inches shall be covered by tape.

(v) Damaged or defective hose.

Hose showing leaks, burns, worn places, or other defects rendering it unfit for service shall have the damaged portion removed.

(b) Hose connections and couplings.

(i) Hose connections for oxygen and fuel gas shall be distinguished from each other. Hose connections shall be clamped or otherwise securely fastened in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected in service, but in no case less than three hundred pounds per square inch.

(ii) Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.

(c) Pressure reducing regulators.

Oxygen and fuel gas pressure regulators, including their related gauges, shall be in proper working order while in use.

(F) Electric welding.

(1) Approved equipment.

Only approved electric welding equipment shall be used.

(2) Design.

No connections for portable control devices such as push buttons to be carried by the operator shall be connected to an alternating current circuit of higher than one hundred twenty volts. Exposed metal parts of portable control devices operating on circuits above fifty volts shall be grounded by a grounding conductor in the control cable.

(3) Installation of arc welding equipment.

Installation, including power supply, shall be in accordance with the manufacturer's specifications.

(a) The frame or case of the welding machine (except engine-driven machines) shall be grounded under the conditions and according to the manufacturer's specifications.

(b) Supply.

(i) All direct current machines shall be connected with the same polarity.

(ii) All alternating current machines shall be connected to the same phase of the supply circuit and with the same instantaneous polarity.

(c) Switches.

Proper switching equipment for shutting down the machine shall be provided.

(4) Electrode holders.

(a) Insulation.

Electrode holders shall be insulated to protect the operator against shock.

(b) When not in use.

Electrode holders when not in use shall be so placed that they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks.

(c) Cables with splices.

Cables with splices within ten feet of the holder shall not be used.

(5) Maintenance.

(a) Defective equipment.

The operator shall report any equipment or defect or safety hazard to his supervisor and the use of the equipment shall be discontinued until its safety has been assured. Repairs shall be made only by authorized personnel.

(b) Cables.

Cables with damaged insulation or exposed bare conductors shall be replaced. Joining lengths of work and electrode cables shall be done by the use of connecting means specifically intended for the purpose. The connecting means shall have insulation adequate for the service conditions.

(6) Installation and operation of resistance welding equipment.

(a) Thermal protection.

Ignitron tubes used in resistance welding equipment shall be equipped with a thermal protection switch.

(b) Guarding.

Controls of all automatic or air and hydraulic clamps shall be arranged or guarded to prevent the operator from accidentally activating them.

(c) Spot and seam welding machines (nonportable).

(i) Voltage.

All external weld initiating control circuits shall operate on low voltage, not over one hundred twenty volts.

(ii) Capacitor welding.

Stored energy or capacitor discharge type of resistance welding equipment and control panels involving high voltage (over five hundred fifty volts) shall be insulated and protected by complete enclosures, all doors of which shall be provided with interlocks and contacts wired into the control circuit (similar to elevator interlocks). Such interlocks or contacts shall be so designed as to interrupt power and short circuit all capacitors when the door or panel is open. A manually operated switch or positive device shall be installed, in addition to the mechanical interlocks or contacts, as an added safety measure assuring absolute discharge of all capacitors.

(iii) Interlocks.

All doors and access panels of all resistance welding machines and control panels shall be kept locked and interlocked to prevent access by unauthorized employees, to live portions of the equipment.

(iv) Guarding.

All press welding machine operations, where there is a possibility of the operator's fingers being under the point of operation, shall be guarded by the use of a device such as an electronic eye safety circuit, two-hand controls or protection similar to that prescribed for power press operations (see rule 4123:1-5-10 of the Administrative Code).

(v) Disengaging from power supply.

Means shall be provided at each machine, within easy reach of the operator, for disengaging it from its power supply. This shall not apply to rolling departments of iron and steel mills nor to electrical power generation or conversion equipment.

(vi) Safety blocks.

The employer shall provide and enforce the use of safety blocks or pins so that whenever safety blocks or pins are inserted in the platen or ram, the press becomes inoperative.

(vii) Grounding.

The secondary of all welding transformers used in multi-spot, projection, and seam welding machines shall be grounded. This may be done by permanently grounding one side of the welding secondary current circuit, or a center tapped grounding reactor connected across the secondary or the use of a safety disconnect switch in conjunction with the welding control are acceptable alternatives. Safety disconnect shall be arranged to open both sides of the line when welding current is not present.

(d) Portable welding machines.

(i) Counterbalance.

All portable welding guns shall have counterbalancing devices for supporting the gun unless the design of the gun makes counterbalancing unnecessary.

(ii) Safety chains.

All portable welding guns, transformers and related equipment that is suspended from overhead structures, I-beams, trolleys, etc., shall be equipped with safety chains or cables. Safety chains or cables shall be capable of supporting the total shock load in the event of failure of any component of the supporting system.

(iii) Clevis.

When trolleys are used to support portable welding equipment, with a forged steel clevis for the attachment of safety chains, each clevis shall be capable of supporting the total shock load of the suspended equipment in the event of trolley failure.

(iv) Switch guards.

All initiating switches located on the portable welding gun shall be equipped with guards capable of preventing accidental initiation through contact with fixturing, operator's clothing, etc. Initiating switch voltage shall not exceed twenty-four volts.

(v) Grounding.

The secondary and the case of all portable welding transformers shall be grounded. Secondary grounding shall be by:

(a) Center tapped secondary, or

(b) A center tapped grounding reactor connected across the secondary.

(vi) Butt (flash) welding equipment.

Butt welding machines shall be equipped with a hood to control flying flash. In cases of high production, where materials may contain a film of oil and where toxic elements and metal fumes are given off, ventilation shall be provided in accordance with rule 4123:1-5-18 of the Administrative Code.

(7) Welding or cutting of containers.

No welding, cutting, or work utilizing a torch shall be performed on used drums, barrels, tanks, or other containers until they have been cleaned and purged of materials which when subjected to heat might produce flammable or toxic vapors.

(8) Eye and ear protection.

See rule 4123:1-5-17 of the Administrative Code, "Personal protective equipment."

(G) Protection from sparks or falling objects.

(1) Cutting or welding shall be permitted only in areas that are or have been made fire safe.

(2) Screens or shields shall be provided for the protection of employees or combustible materials exposed to sparks or falling objects.

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