

KENTFIELD FIRE PROTECTION DISTRICT



Developed by

Jim Galli, Battalion Chief

Approved by

Paul Smith, Fire Chief

Fire Protection Standard 515

Welding and Cutting Operations

Date: 1-1-04

Revision: _____

Page: 1 of 6

This standard has been developed pursuant to Article 49 of the Uniform Fire Code as adopted by ordinance by the Kentfield Fire Protection District. It is intended that this standard be used as a guide for establishing a reasonable degree of fire and life safety to welding and cutting operations.

I. Permits

- A. A Fire District permit is required to conduct welding or cutting operations in any occupancy or where conditions which may pose an unsafe situation or fire hazard to exist.
- B. Permits may be obtained by contacting the Fire Loss Management Division at 415-453-7464.
- C. The permit application and filing fee shall be submitted to the Fire Loss Management Division for processing.

II. General Requirements

- A. In performance of welding and cutting operations, only approved equipment such as blowpipes, torches, regulators and acetylene generators that have been examined and tested and found to be safeguarded as far as practicable shall be used.
- B. All cylinders or containers used for the storage of compressed gases shall be constructed, charged and marked in accordance with nationally recognized safe practices.
- C. No device or attachment facilitating or permitting mixture of air or oxygen with combustible gases prior to consumption, except at the burner or in a standard torch or blowpipe, shall be allowed unless approved for the purpose.
- D. The user shall not transfer gases from one cylinder to another or mix gases in a cylinder.
- E. Under no conditions shall acetylene gas be generated, piped (except in approved cylinder manifolds) or utilized at a pressure in excess of 15 pounds per square inch gage pressure, except when dissolved in a suitable solvent in cylinders manufactured according to Interstate Commerce Commission requirements.
- F. The use of liquid acetylene is prohibited.

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Page: 2 of 6

- G. Acetylene gas shall not be brought in contact with unalloyed copper except in a blowpipe or torch.
- H. Oxygen shall never be used from a cylinder or cylinder manifold unless a pressure-regulating device intended for use with oxygen, and so marked, is provided.
- I. Fuel gas shall never be used from cylinders through torches or other devices equipped with shutoff valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.
- J. Cylinders, valves, regulators, hose and other apparatus and fittings containing or using oxygen shall be kept free from oil or grease. Oxygen cylinders, apparatus and fitting shall not be handled with oily hands or gloves or greasy materials.
- K. When moving compressed gas cylinders by crane, suitable cradles shall be used in order to reduce the possibility of dropping. Ordinary rope slings or electromagnets shall not be used.
- L. Oxygen and fuel gas cylinders and acetylene generators shall be placed far enough away from the welding position that they will not be unduly heated by radiation from heated materials, by sparks or slag, or by misdirection of the torch flame.
- M. Gas welding or cutting shall not be done in or near brooms or locations where flammable liquids or vapors, lint, dust or loose combustible stocks are so located or arranged that sparks or hot metal from the welding or cutting operations may cause ignition or explosion of such materials.
- N. When such welding or cutting must be done above or within 10 feet of combustible construction or material or above a place where workers are employed, or where persons are likely to pass, noncombustible shields shall be interposed to protect such materials and persons from sparks and hot metal or oxide.
- O. One or more Fire Extinguishers of a suitable approved type shall be kept at the location where welding or cutting is being done.
- P. When welding or cutting is done above or within 10 feet of combustible construction or material, a fire watcher shall be on hand to make use of fire extinguishing equipment.
- Q. A fire watch shall be maintained for at least a half hour after completion of cutting or welding operations to detect and extinguish possible smoldering fires.

III. Piping of Oxygen and Fuel Gases

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Revision: _____

Page: 3 of 6

- A. Piping shall be of wrought iron, steel, brass or copper pipe, or approved seamless copper, brass or other approved gas tubing. All piping and fittings for conveying gas of liquid at pressures up to 150 pounds per square inch shall be suitable for a safe working pressure of not less than 150 pounds per square inch. For pressures in excess of 150 pounds per square inch, extra heavy-duty pipe and fittings shall be used as a minimum. Joints in steel or wrought iron pipe shall be welded or made up with threaded or flanged fittings. Joints in approved seamless copper, brass or other approved nonferrous gas tubing shall be made by means of approved fittings of, if other the socket type, with silver solder or similar high melting point material. Cast iron fittings shall be prohibited. Threaded connections in oxygen piping shall be tinned or made up with other suitable joint sealer applied to the male thread.
- B. Acetylene piping shall be steel or wrought iron pipe only.
- C. Oxygen piping shall be steel, wrought iron, brass or copper pipe or approved seamless nonferrous gas tubing. Tubing shall be used only for pressures of 150 pounds per square inch or less.
- D. Piping shall be protected against injury, and allowance made for contraction, expansion, jarring and vibration. If laid underground, it shall be below the frost line and protected against corrosion. Low points in piping shall be provided with drip pots and drain valves, the latter to be normally closed with screw caps or plugs. Oxygen piping shall not be placed in any location where it may be exposed to contact with oil.
- E. All piping shall be tested and proved tight at one and one-half times its maximum working pressure. Any medium used for testing oxygen lines shall be oil free. Flames shall not be used to detect leaks.
- F. All buried pipe and tubing and outdoor ferrous pipe and tubing shall be covered or painted with suitable corrosion resistant material.

IV. Manifolding of Cylinders

- A. Oxygen manifolds shall not be located in any acetylene generator room or in close proximity to cylinders of combustible gases. Oxygen manifolds shall be located away from high flammable material, especially oil, grease or any substance likely to cause or accelerate fire.
- B. The aggregate capacity of fuel-gas cylinders connected to one manifold inside a building shall not exceed 3000 cubic feet of gas, or 300 pounds in the case of liquefied petroleum gas. More than one such manifold, each supplying one blowpipe or one

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Revision: _____

Page: 4 of 6

machine, may be located in the same room if separated at least 50 feet.

- C. Where it is necessary to manifold fuel-gas cylinders having an aggregate gas capacity in excess of 3000 cubic feet, they shall be located outside or in a special building, or in a separate room constructed in accordance with the provisions of Section 49.109(b) Uniform Fire Code.

V. Storage of Cylinders

- A. Cylinders of fuel gases stored inside a building, except those in actual use or attached ready for use, shall be limited to a total capacity of 3000 cubic feet (250 pounds of liquefied petroleum gas). Storage exceeding the above amount shall be kept outside or in a special building. Buildings, rooms or compartments provided for such storage shall be well ventilated and be without open flame heating or lighting devices.
- B. Cylinders stored inside of buildings shall be away from highly combustible materials and in locations where they are not subject to excessive rise in temperature, mechanical injury or tampering. All cylinders, including empty ones, shall have their caps in place and all valves tightly closed.
- C. All compressed gas cylinders in service or in storage shall be adequately secured to prevent falling or being knocked over.

VI. Liquid Oxygen

- A. Where liquid oxygen in a quantity exceeding 100 gallons is to be used for welding and cutting, the container or containers shall be located outside or in a special building having no other occupancy except that related to the handling and gasification of the oxygen.

VII. Hose and Hose Connections

- A. Hose shall be capable of withstanding a hydrostatic pressure of 800 pounds per square inch.
- B. A single hose having more than one gas passage, a wall failure of which would permit the flow of one gas into the other gas passage, shall not be used. Where two hoses joined by a web so as to form integral lengths of double hose are used, the two hoses shall be identified as follows:
1. By exterior color, such as by employing green for oxygen and red for acetylene or,

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Revision: _____

Page: 5 of 6

2. If the entire exterior or both passages is of the same color, the two sides shall be distinguished by feel or touch (i.e., smooth versus rib or rough exterior surface).
- C. When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than four inches out of each eight shall be covered by tape.
- D. 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 a pressure of 300 pounds per square inch.
- E. Hose shall be inspected frequently for leaks, burns, torn places, loose connections or other defects that may render the hose unfit for service. Where hose shows excessive wear or has been subjected to flashback, it shall be inspected and tested at twice the normal pressure which it is subject to in service but in no case at less than 200 pounds per square inch before being returned to service. Defective lengths of hose shall be discarded.

VIII. Containers for Calcium Carbide

- A. Containers used for the storage of calcium carbide shall be of metal of sufficient strength to ensure handling without rupture and shall be provided with a screw top or its equivalent. They shall be of watertight construction. Solder shall not be used on joints in such a manner that fire would disrupt the package. Packages shall be marked "CALCIUM CARBIDE – DANGEROUS IF NOT KEPT DRY".

IX. Storage of Calcium Carbide in Buildings

- A. Storage of calcium carbide inside buildings shall be in a dry, waterproof and well-ventilated location.
- B. Calcium carbide in excess of 600 pounds shall not be stored in a building containing other occupancy unless in an acetylene generator room or separate room in a one-story building without basement underneath the carbide storage section. Such rooms shall be separated from the rest of the building by a one-hour occupancy separation constructed as specified in the building code. The room or compartments may also be used for storage of fuel-gas cylinders but not oxygen. Adequate ventilation shall be provided.
- C. Calcium carbide in excess of 5000 pounds shall be stored in one-story buildings without basement and used for either no other purpose except the storage of fuel-gas cylinders, or in outside acetylene generator houses. Locations of such storage buildings shall be approved by the Fire Marshal and shall comply with the requirements of the

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Revision: _____

Page: 6 of 6

Building Code for a Group H, Division 1 Occupancy.

X. Generators to be Approved

- A. Acetylene generators shall be of approved type and shall be plainly marked with the rate in cubic feet of acetylene per hour for which they are designed, the amount of weight of carbide necessary for a single charge, the manufacturer's name and address and the name or number of the type of generator.

XI. Generator Rooms

- A. Stationary generators shall be installed in a well-ventilated room located in one story buildings or on the top floor or roof of multistory buildings. Such rooms shall be separated from the rest of the building by one-hour occupancy separation constructed as specified in the building code. At least one wall of a generator room shall be an exterior wall.
- B. Approved explosion venting shall be provided in exterior walls or roofs. The venting area shall be not less than one square foot per 50 cubic feet of room volume.
- C. The storage of fuel-gas cylinders in such rooms shall not exceed a total capacity of 2000 cubic feet of gas, or a total water capacity of 735 pounds of LPG or methacetylene-propadiene stabilized.

XII. Portable Generators

- A. Portable generators shall not be used in rooms having a total volume less than 35 times the total gas-generating capacity per charge of all generators in the room. The gas-generating capacity in cubic feet per charge shall be assumed as 4.5 times the weight of carbide per charge in pounds. Generators shall not be used in rooms having a ceiling height less than 10 feet.
- B. An acetylene generator shall not be moved by derrick crane or hoist while charged.

XIII. Protection Against Freezing

- A. Generators shall be placed where water will not freeze. No common salt (sodium chloride) or other corrosive chemical shall be used as a protection against freezing.