

# NFPA 51A

## Standard for Acetylene Cylinder Charging Plants

### 2001 Edition



NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101  
An International Codes and Standards Organization

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## **NFPA 51A**

### **Standard for**

## **Acetylene Cylinder Charging Plants**

### **2001 Edition**

This edition of NFPA 51A, *Standard for Acetylene Cylinder Charging Plants*, was prepared by the Technical Committee on Industrial and Medical Gases and acted on by the National Fire Protection Association, Inc., at its November Meeting held November 12–15, 2000, in Orlando, FL. It was issued by the Standards Council on January 13, 2001, with an effective date of February 9, 2001, and supersedes all previous editions.

This edition of NFPA 51A was approved as an American National Standard on February 9, 2001.

### **Origin and Development of NFPA 51A**

Although acetylene cylinder charging plants have been built and operated for several decades, a limited number of concerns were involved and these possessed a high degree of design and operating capability. As a result, fire experience was good and there was no need for national standard guidance.

In recent years, a number of other firms have entered this industry and the need for a national standard became evident. Work on this standard was initiated and its subsequent promulgation materially assisted by a Committee of the Compressed Gas Association, Inc., which submitted a text to the NFPA Technical Committee on Industrial and Medical Gases.

This standard was adopted as a tentative standard in 1970. Amended editions were adopted in 1971, 1973, 1974, 1979, 1984, 1989, and 1996.

The 2001 edition contains editorial changes made to conform to the NFPA *Manual of Style*.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

**Committee Scope:** This Committee shall have primary responsibility for documents on the storage, transfer, and use of industrial gases. Included are the storage and handling of such gases in their gaseous or liquid phases; the installation of associated storage, piping, and distribution equipment; and operating practices. The Committee also has a technical responsibility for contributions in the same areas for medical gases and clean rooms.

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## NFPA 51A

## Standard for

## Acetylene Cylinder Charging Plants

## 2001 Edition

NOTICE: An asterisk (\*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Changes other than editorial are indicated by a vertical rule in the margin of the pages on which they appear. These lines are included as an aid to the user in identifying changes from the previous edition.

Information on referenced publications can be found in Chapter 11 and Appendix B.

## Chapter 1 Introduction

**1.1 Purpose.** This standard provides safety requirements for the design, construction, and installation of acetylene cylinder charging plants in order to provide safeguards for the protection of the plant, its employees, and the public.

**1.2 Scope.**

**1.2.1** This standard shall apply to plants that are engaged in the generation and compression of acetylene and in the charging of acetylene cylinders, either as their sole operation or in conjunction with facilities for charging other compressed gas cylinders.

**1.2.2** An existing plant that is not in strict compliance with the provisions of this standard shall be permitted to continue operations where such use does not constitute a distinct hazard to life or adjoining property.

**1.2.3** This standard shall not apply to plants that only produce and compress acetylene for chemical operations or to plants that only produce and compress acetylene below a gauge pressure of 15 psi (103 kPa). (Refer to NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, for acetylene generating plants where the acetylene is used with oxygen for welding, cutting, heating, and heat-treating operations.)

**1.3 Definitions.** For the purposes of this standard the following definitions shall apply.

**1.3.1 Acetylene.**

**1.3.1.1 High Pressure Acetylene.** Acetylene at pressures exceeding gauge pressure of 15 psi (103 kPa), but not exceeding 400 psi (2760 kPa).

**1.3.1.2 Low Pressure Acetylene.** Acetylene at a pressure not exceeding gauge pressure of 1 psi (6.9 kPa).

**1.3.1.3 Medium Pressure Acetylene.** Acetylene at pressures exceeding gauge pressure of 1 psi (6.9 kPa) but not exceeding 15 psi (103 kPa).

**1.3.1.4 Acetylene Operations.** Includes acetylene generation, storage, purification, compression, cylinder filling, cylinder storage, and calcium carbide storage.

**1.3.2\* Approved.** Acceptable to the authority having jurisdiction.

**1.3.3\* Authority Having Jurisdiction.** The organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

**1.3.4 Limited-Combustible Material.** A type of building construction material as defined in NFPA 220, *Standard on Types of Building Construction*.

**1.3.5\* Listed.** Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

**1.3.6\* Mobile Acetylene Trailer System.** A manifolded group of cylinders held together as a unit on a transport vehicle for the purpose of containing and transporting large quantities of acetylene.

**1.3.7 Noncombustible Material.** A material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion, or release flammable vapors when subjected to fire or heat. Materials that are reported as passing ASTM E 136, *Standard Method of Test for Behavior of Materials in a Vertical Tube Furnace at 750°C*, shall be considered noncombustible materials. (220:Chapter 2)

**1.3.8 Plant.** A facility engaged in the generation and compression of acetylene and in the filling of acetylene cylinders either as its sole operation or in conjunction with facilities for filling other compressed gas cylinders.

**1.3.9 psi.** Gauge pressure in pounds per square inch.

**1.3.10 Shall.** Indicates a mandatory requirement.

**1.3.11 Should.** Indicates a recommendation or that which is advised but not required.

**1.3.12 Unpierced Wall.** A wall that can have pipes or conduits passing through it, or windows, glazed with safety glass or wired glass, set in it; but such openings must be sealed to prevent the flow of air between adjacent rooms.

## Chapter 2 Plant Location, Arrangement, Construction, and Utilities

**2.1 Location.**

**2.1.1** Portions of plants housing acetylene charging and acetylene cylinder storage operations shall be located at least 50 ft (15 m) from public right-of-way and from lines of adjoining property that can be built upon. A lesser distance shall be permitted if suitable fire barriers are provided.

**2.1.2** If plants are located in heavily populated or congested areas, the authority having jurisdiction shall determine appropriate distance requirements, barriers, or other protective measures.

**2.2 Arrangement.**

**2.2.1\*** Portions of plants housing acetylene operations shall be permitted to be used for charging of other gases provided that oxidizing gas operations are located at least 20 ft (6 m) from flammable gas operations. The 20-ft separation distance shall not be required to be met if charging of oxidizing

gas cylinders or storage of such filled cylinders can be separated from charging or storage of flammable gas cylinders by a masonry wall at least 5 ft (1.5 m) high having a fire resistance rating of at least 1 hour.

**2.2.2** Portions of plants housing acetylene operations shall be separated by unpierced walls from other portions of the plant that do not meet the provisions of this standard applicable to acetylene operations. In existing plants only, walls of rooms housing activities associated with the acetylene operations, such as locker rooms, offices, and maintenance rooms, shall be permitted to be pierced with doorways if these are provided with self-closing doors. If either the construction or the occupancy of the non-acetylene operation portions of the plant is combustible, the common wall shall be constructed of non-combustible or limited-combustible materials and have a fire resistance rating of at least 1 hour.

**2.2.3** Acetylene cylinder charging plants shall not have floors above or basements beneath the cylinder charging area.

**2.2.4** The property where the plant and carbide-residue pond are located shall be posted, fenced, or guarded to discourage the entrance of unauthorized persons.

### 2.3 Construction.

**2.3.1** Walls, partitions, and roofs of buildings where acetylene operations are conducted shall be constructed of noncombustible or limited-combustible materials.

**2.3.2\*** Buildings or rooms housing acetylene operations, excluding calcium carbide storage rooms, shall be constructed of lightweight materials or panels designed to relieve at a maximum internal pressure of 25 lb/ft<sup>2</sup> (122 kg/m<sup>2</sup>).

**2.3.3** Exits shall be provided in accordance with NFPA 101®, *Life Safety Code*®. Areas housing acetylene operations shall be considered as “high hazard industrial occupancies” in the application of NFPA 101.

**2.4 Ventilation.** Rooms housing acetylene operations, excluding calcium carbide storage rooms (*see* 3.2.7), shall be ventilated at a rate of not less than 1 ft<sup>3</sup>/min · ft<sup>2</sup> (0.03 m<sup>3</sup>/min · 0.09 m<sup>2</sup>) of ceiling area. This shall be accomplished by natural or mechanical ventilation with discharge or exhaust to a safe location outside of the building. Inlet openings shall be located near the floor. Outlet openings shall be located at the high point of the room. Provision shall be made for introduction of make-up air in such a manner as not to short-circuit the ventilation. If operations involving heavier-than-air flammable gases are conducted in a room housing acetylene operations, special consideration shall be given to ventilation at the operation involving heavier-than-air gases.

Ventilation shall be permitted to be reduced below 1 ft<sup>3</sup>/min · ft<sup>2</sup> (0.03 m<sup>3</sup>/min · 0.09 m<sup>2</sup>), provided the full ventilation is automatically restored when the acetylene concentration exceeds 20 percent of the lower flammable limit of acetylene.

### 2.5 Heating.

**2.5.1** Heating equipment shall be of the steam or hot water types.

**2.5.2** Boilers, water heaters, and other heating equipment employing flames or capable of creating sparks shall be located in a separate building or room not directly communicating with areas devoted to acetylene operations.

**2.5.3** Buildings or rooms devoted to acetylene operations, excluding calcium carbide storage rooms and cylinder storage areas, shall be maintained at a temperature above 40°F (4.4°C) during time of operation.

### 2.6 Electrical Equipment.

**2.6.1** Rooms containing electrical equipment and wiring not conforming with 2.6.2 shall be separated from acetylene operations by an unpierced wall. In existing plants only, walls of rooms housing activities associated with the acetylene operations, such as locker rooms, offices, and maintenance rooms, shall be permitted to be pierced with doorways if these are provided with self-closing doors.

**2.6.2** Electrical equipment and wiring in rooms housing acetylene operations, except rooms used exclusively for calcium carbide storage, shall conform to NFPA 70, *National Electrical Code*®, Article 501, for Class I, Division 2 locations.

**2.6.3** A readily accessible emergency electrical shutdown switch shall be provided to shut down compressors and generators at the building exits.

## Chapter 3 Calcium Carbide

### 3.1 Drums and Containers.

**3.1.1** Calcium carbide shall be stored in packages meeting Department of Transportation or Transport Canada regulations.

**3.1.2** Containers for calcium carbide shall be marked using:

CALCIUM CARBIDE — DANGEROUS IF NOT  
KEPT DRY

or equivalent wording.

### 3.2 Storage Areas.

**3.2.1** Calcium carbide storage areas shall not be used for the storage of flammable materials or flammable compressed gases.

**3.2.2** Each area of the plant where calcium carbide is handled, stored, or used shall be posted with notices reading

CALCIUM CARBIDE — DANGEROUS IF NOT  
KEPT DRY — KEEP WATER AND FLAMES AWAY

or using equivalent wording.

**3.2.3** Calcium carbide storage areas shall be arranged so that any defective container can be removed within a reasonable period of time.

**3.2.4** Calcium carbide containers shall be supported in a manner so that the containers will not come in contact with the ground or with ground water.

**3.2.5** Calcium carbide storage shall be located at least 10 ft (3 m) from any line of adjoining property that can be built upon.

**3.2.6** Exposed water, steam, or condensate lines shall not be permitted in rooms or buildings devoted exclusively to calcium carbide storage in drums. Unopened bulk carbide containers that have accumulations of ice and snow shall be permitted to be stored in such rooms or buildings.

**3.2.7** Storage of calcium carbide inside buildings shall be in a dry, waterproof, and well-ventilated location.



**3.3 Handling.** Locations where calcium carbide is transferred from transport containers to generator hopper loading carts or systems shall be protected from rain.

## Chapter 4 Acetylene Generators and Calcium Carbide Residue

**4.1 Design.** This section shall not govern the design of acetylene generators, because of the many variable and complex design features of different types of generators. Generators shall be designed by competent experienced persons familiar with the chemical and physical properties of acetylene and calcium carbide and with the fundamentals of pressure-vessel design.

### 4.2 Installation.

**4.2.1** Acetylene generators shall be installed within a room or building not exceeding a height of one story, except that a two-story building shall be permitted provided that the second story is used only for charging the generators with calcium carbide. Outdoor installations shall be permitted where protected from rain and freezing.

**4.2.2** The foundation under a generator shall be so arranged that the generator will be level and no excessive strain will be placed on the generator or its connections.

**4.2.3** If water is supplied to the generator through a continuous connection, means shall be provided on the generator to prevent overfilling. Such a connection shall also be equipped with means to prevent the backflow of acetylene from the generator into the water supply.

### 4.3 Venting of Generator.

**4.3.1** Each generator shall be provided with pressure relief devices to prevent pressures in excess of the allowable pressure rating of the generator. The relief vent piping shall be installed without traps and in such a manner that condensation will not accumulate in the vent piping.

**4.3.2** The maximum permissible generating pressure shall be a gauge pressure of 15 psi (103 kPa). The maximum pressure setting of the generator pressure relief devices shall be 18 psi (124 kPa).

**4.3.3** The vent pipes shall be full size to the termination point outside of the building and shall terminate in a hood or bend directed to a safe location. The hoods or bends shall be located at least 12 ft (3.6 m) above the ground, at least 3 ft (0.9 m) from combustible construction, and as far as practical from building openings and sources of ignition. The hood or bend shall be constructed so that it will not be obstructed by rain, snow, ice, insects, or birds.

**4.3.4** Generator chamber relief pipes shall not be interconnected but shall be led separately to the outdoors. This requirement shall not prohibit connecting two pressure relief device vents protecting the same section of a generator from connecting to a common vent pipe of cross-sectional area equal to the sum of the cross-sectional areas of the individual vents.

**4.4 Operating Instructions.** Generator operating instructions shall be displayed in a conspicuous place near the gener-

ator or otherwise be kept convenient for ready reference by the operator.

### 4.5 Calcium Carbide Residue Disposal.

**4.5.1** Acetylene generators shall not be fitted with continuous drain connections leading to sewers. Calcium carbide residue shall be discharged into outdoor open sump pits or other ventilated receptacles. Such receptacles shall be permitted to have a clear-water connection to public sewers if such disposal means is approved by the authority having jurisdiction.

**4.5.2** The point of discharge of calcium carbide residue from acetylene generators into sump pits and other receptacles shall be located outdoors or in well-ventilated areas and at least 15 ft (4.5 m) from sources of ignition and the line of adjoining property that can be built upon.

**4.5.3** All calcium carbide residue pits and ponds shall be within an area fenced or posted around their perimeters with signs reading

NO TRESPASSING — NO SMOKING — NO OPEN  
FLAMES

or using equivalent wording.

## Chapter 5 Acetylene Gasholders, Purifiers, and Low Pressure Driers

### 5.1 Location of Gasholder.

**5.1.1** Gasholders shall be permitted to be located outdoors or inside of buildings.

**5.1.2** The gasholder shall be located at least 50 ft (15 m) from places of public assembly and any flammable liquid or flammable gas storage and at least 25 ft (7.6 m) from any source of ignition, line of adjoining property that can be built upon, or public way.

**5.1.3** Indoor gasholders shall be located in a room that complies with the requirements of Chapter 2 of this standard. This room shall be permitted to house other acetylene equipment.

### 5.2 Installation of Gasholder.

**5.2.1** The gasholder shall be equipped with inlet and outlet shutoff valves located so that they can be closed readily in an emergency.

**5.2.2\*** The gasholder shall not be located beneath, or in a location where it could be exposed to failure in electric power lines, piping containing all classes of flammable or combustible liquids or piping containing other flammable gases.

**5.2.3** Weeds and grass within 25 ft (7.6 m) of the gasholder shall be kept cut, and the cuttings shall be removed. Combustible material shall not be permitted within 25 ft (7.6 m) of the gasholder.

**5.2.4** The gasholder shall be marked as follows:

ACETYLENE — FLAMMABLE GAS — DANGER —  
KEEP FIRE AND OPEN FLAMES AWAY

**5.3\* Low Pressure Purifiers and Driers.** Purifiers and driers shall have inlet and outlet shutoff valves located so that they can be closed in an emergency.

## Chapter 6 Acetylene Compressors and High Pressure Driers

### 6.1 Installation.

**6.1.1** The inlet and outlet piping of each compressor shall be provided with readily accessible shutoff valves that can be closed in an emergency.

**6.1.2** Drain lines from high pressure [gauge pressure above 15 psi (103 kPa)] oil separators, condensate traps, and driers shall be piped outdoors to a safe location away from any source of ignition and combustible material. Drain lines from medium pressure [15 psi (103 kPa) and lower] systems, where the effluent water is visible to the operator from the drain valve location, shall be permitted to be piped to an indoor drain.

**6.1.3** The pressure relief valve vent pipes shall be full size to the termination point outside of the building and shall terminate in a hood or bend directed to a safe location. The hoods or bends shall be located at least 12 ft (3.6 m) above the ground, at least 3 ft (0.9 m) from combustible construction, and as far as practical from building openings and sources of ignition. The hood or bend shall be constructed so that it will not be obstructed by rain, snow, ice, or birds.

**6.1.4** The suction line to the compressor shall be provided with a pressure switch or equivalent device capable of shutting down the compressor when the suction pressure falls below a pressure not less than 1 in. of water column (0.25 kPa) above atmospheric pressure. A shutoff valve shall not be installed between the compressor and the pressure switch or equivalent device.

**6.1.5** The discharge line from the compressor shall be provided with a pressure switch to shut down the compressor when the discharge pressure reaches the maximum permissible operating pressure of the system, but in no case more than gauge pressure of 400 psi (2800 kPa). Any valve installed between the compressor and the pressure switch shall be provided with a positive lock-open device.

### 6.2 Design.

**6.2.1** Compressors shall be specifically designed and constructed for acetylene service.

**6.2.2** Compressors shall be constructed so that the acetylene is cooled during and after each stage of compression. Where water is used, the flow of water from the cooling jackets and intercoolers shall be visible to the operator.

**6.2.3** A pressure gauge shall be provided on the discharge piping following each stage of compression, and a temperature indicator shall be provided on the final discharge piping.

**6.2.4** A pressure relief device shall be provided on the discharge piping following each stage of compression. There shall be no shutoff valve between the relief device and the compressor piping. The pressure relief device in the final stage shall be set no higher than a gauge pressure of 450 psi (3100 kPa).

**6.2.5** Transmission belts, where used in compressor rooms, shall be provided with static eliminators or be of the static-conducting type.

## Chapter 7 Acetylene Piping

### 7.1 General.

**7.1.1** Acetylene piping shall be identified in accordance with ANSI A13.1, *Scheme for Identification of Piping Systems*.

**7.1.2** Acetylene piping shall be braced and supported to avoid excessive strains and vibrations.

**7.1.3** Pipe fittings shall conform to the requirements of 10.1.1 through 10.1.3.

### 7.2 Piping for Pressure Not Exceeding Gauge Pressure of 15 psi (103 kPa).

**7.2.1** Piping and fittings shall be steel, wrought iron, malleable iron, or copper alloys meeting the requirements of 10.1.2.

**7.2.2** For nominal pipe size 6 in. and less ( $\leq 152$  mm), all pipe shall be a minimum of Schedule 40, and all pipe fittings shall have a minimum rating of gauge pressure of 125 psi (861 kPa).

**7.2.3** Piping shall be gas-leak tested to at least 150 percent of the maximum operating pressure using inert gas or air as the test medium.

### 7.3 Piping for Pressure Exceeding Gauge Pressure of 15 psi (103 kPa).

**7.3.1** Piping shall be steel or wrought iron, and fittings shall be steel, malleable iron, ductile iron, or copper alloys meeting the requirements of 10.1.2.

**7.3.2** All pipe of nominal size 1 in. and less ( $\leq 25$  mm) shall be at least Schedule 80.

**7.3.3** All pipe of nominal sizes  $1\frac{1}{4}$  in. (32 mm) and  $1\frac{1}{2}$  in. (38 mm) shall be at least Schedule 160.

**7.3.4** All pipe fittings shall have a minimum working pressure of gauge pressure of 3000 psi (20.7 MPa).

**7.3.5** Pressure gauge Bourdon tubes shall be steel or copper alloys meeting the requirements of 10.1.2.

**7.3.6** Each pressure gauge shall be protected by a device that will stop a detonation flame and limit the rise in pressure on the pressure gauge side to prevent Bourdon tube deformation.

**7.3.7** Piping shall be hydrostatically tested at a gauge pressure of 4500 psi (31 MPa). Pressure relief valves, pressure gauges, diaphragm valves, regulators, and flash arresters shall be exempted from this provision.

**7.4 Cylinder Charging Leads.** Cylinder charging leads shall have a minimum burst rating of gauge pressure 10,000 psi (69 MPa) and shall be constructed of metallic or nonmetallic materials suitable for use in acetylene service.

## Chapter 8 Acetylene Cylinder Charging Manifolds, Acetoning Equipment, and Mobile Acetylene Trailer Systems

### 8.1 General.

**8.1.1** Each cylinder charging manifold shall be provided with a shutoff valve and a blow-down valve vented to the outdoors or to the low pressure system.

**8.1.2** A check valve shall be installed in the pipeline at each cylinder charging manifold or in each cylinder charging lead.

8.1.3 Each pressure gauge shall be protected by a device that will stop a detonation flame and limit the rise in pressure on the pressure gauge side to prevent Bourdon tube deformation.

8.1.4 Each cylinder charging manifold outlet shall be provided with a shutoff valve.

8.1.5 Cylinder charging manifolds shall be arranged so that stress in the cylinder charging leads is limited to prevent failure.

8.1.6 Acetylene cylinders that have provision for caps shall not be required to have caps in place when in the acetylene cylinder charging plant.

**8.2 Acetoning Equipment.** Acetone storage containers shall be constructed and installed in accordance with NFPA 30, *Flammable and Combustible Liquids Code*. Aboveground acetone storage containers in excess of one 55-gal (208-L) drum shall be located at least 25 ft (7.6 m) from the storage of acetylene cylinders and other flammable gas cylinders.

**8.3 Charging Procedures.**

8.3.1 To prevent liquefaction (condensation) of acetylene, its pressure shall not exceed the values for the corresponding acetylene temperatures shown in Table 8.3.1.

**Table 8.3.1 Maximum Acetylene Pressure According to Acetylene Temperature**

Temperature		Pressure	
°F	°C	psi (gauge)	kPa
-5	-20.5	200	1400
0	-17.8	220	1500
10	-12.2	260	1800
20	-6.7	305	2100
30	-1.1	360	2500
≥37	≥2.8	400	2800

8.3.2 Valves for charging cylinders shall be operated in such a sequence that the cylinder valves are opened first at the start of charging operations and closed last at the end of charging operations.

**8.4 Cylinder Cooling Systems.** Acetylene cylinders connected to charging manifolds shall have provisions for cooling by water spray applied from a manually activated spray nozzle system, where needed for removing heat of solution of acetylene, as determined by ambient temperature and cylinder charging rate.

**8.5 Cylinder Storage.** Charged cylinders shall be stored outside the charging room. In the charging room, they shall be located as far as practical from the charging manifolds.

**8.6\* Mobile Acetylene Trailer Systems.**

**Chapter 9 Fire Prevention and Protection**

**9.1\* Fire Prevention.**

9.1.1 Acetylene cylinder shipping and receiving docks and plant entrances shall be posted with a readily visible sign reading

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or using equivalent wording.

9.1.2 Self-closing metal waste receptacles shall be provided for greasy, oily rags and similar waste materials.

9.1.3 Exits and fire protection equipment shall not be blocked or obstructed.

**9.2 Fire Protection.**

9.2.1 Plant areas devoted to acetylene compression, purification, acetylene cylinder charging, acetylene cylinder storage, and other areas housing acetylene operations (but where calcium carbide is not stored) shall be protected by one or more 1<sup>1</sup>/<sub>2</sub>-in. (38-mm) hose stations. Hoses shall be equipped with combination spray and solid stream nozzles.

9.2.2 The need for automatic water spray system protection for acetylene cylinder charging manifolds and cylinder storage areas shall be determined by an analysis of local conditions of hazard within the plant, exposure to other properties, water supplies, the probable effectiveness of plant fire brigades, and the time of response and probable effectiveness of fire departments. Where automatic water spray systems are installed, they shall be in accordance with NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*. Automatic actuation shall be permitted to be by means of fusible links. Water coverage shall be not less than 0.25 gpm/ft<sup>2</sup> (0.02 L/sec · m<sup>2</sup>) of process equipment wetted by the system. As an acceptable alternative, an extra hazard (Group 1) open or closed head sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, shall be permitted.

9.2.3 The plant areas devoted to calcium carbide storage, handling, and acetylene generation shall not be equipped with fire protection sprinkler systems.

9.2.4 Fire protection equipment shall be conspicuously identified and located so that it is readily visible and accessible in an emergency. Fire hoses and sprinkler actuation valves shall be located so that they can be operated from outdoors or at an exit.

9.2.5 Each plant shall have a written emergency procedure and shall conduct periodic fire drills. Where plant buildings are widely separated, consideration shall be given to providing an audible alarm for summoning plant personnel in an emergency.

**Chapter 10 General Provisions**

**10.1 General Provisions.**

10.1.1 Unalloyed copper, silver, or mercury shall not be used where they can be exposed to acetylene or to liquids containing acetylene in solution.

10.1.2 Copper alloys containing more than 65 percent copper shall not be used where they can be exposed to acetylene, unless such alloys have been found to be safe in the specific application by experience or by test.

**10.1.3** All major equipment and piping (generators, compressors, and manifolds) employed in acetylene operations shall be electrically continuous and bonded to any grounding electrode, in accordance with NFPA 70, *National Electrical Code*.

**10.1.4** Generators, compressors, and pressure relief devices shall be marked with their capacities, pressure ratings, the manufacturer's name and address, and the model or serial numbers. The capacity and operating pressure of this equipment shall not exceed the rating for which it is designed.

## Chapter 11 Referenced Publications

**11.1** The following documents or portions thereof are referenced within this standard as mandatory requirements and shall be considered part of the requirements of this standard. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this standard. Some of these mandatory documents might also be referenced in this standard for specific informational purposes and, therefore, are also listed in Appendix B.

**11.1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1999 edition.

NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*, 1996 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2000 edition.

NFPA 51, *Standard for the Design and Installation of Oxygen Fuel-Gas Systems for Welding, Cutting, and Allied Processes*, 1997 edition.

NFPA 68, *Guide for Venting of Deflagrations*, 1998 edition.

NFPA 70, *National Electrical Code*®, 1999 edition.

NFPA 101®, *Life Safety Code*®, 2000 edition.

NFPA 220, *Standard on Types of Building Construction*, 1999 edition.

### 11.1.2 Other Publications.

**11.1.2.1 ANSI Publication.** American National Standards Institute, Inc., 11 West 42nd Street 13th floor, New York, NY 10036.

ANSI A13.1, *Scheme for Identification of Piping Systems*, 1981.

**11.1.2.2 ASTM Publication.** American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM E 136, *Standard Method of Test for Behavior of Materials in a Vertical Tube Furnace at 750°C*, 2000.

## Appendix A Explanatory Material

*Appendix A is not a part of the requirements of this NFPA document but is included for informational purposes only. This appendix contains explanatory material, numbered to correspond with the applicable text paragraphs.*

**A.1.3.2 Approved.** The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance

with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

**A.1.3.3 Authority Having Jurisdiction.** The phrase “authority having jurisdiction” is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

**A.1.3.5 Listed.** The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

**A.1.3.6 Mobile Acetylene Trailer System.** This system includes the mobile acetylene trailer, pressure regulator(s), flash arrestors, protective devices, meter (optional), and interconnecting piping. The system terminates at the point where acetylene at service pressure enters the user's piping system.

**A.2.2.1** For purposes of this standard, air is not considered an oxidizing gas.

**A.2.3.2** See NFPA 68, *Guide for Venting of Deflagrations*, for guidance in the construction techniques.

**A.5.2.2** See NFPA 30, *Flammable and Combustible Liquids Code*.

**A.5.3** See CGA G-1.7, *Standard for Storage and Handling of Calcium Carbide in Containers*, and CGA Safety Bulletin SB-4-1997, *Handling Acetylene Cylinders in Fires*.

**A.8.6** For information on mobile acetylene trailer systems, see CGA Pamphlet G-1.6, *Recommended Practices for Mobile Acetylene Trailer Systems*.

**A.9.1** The major fire hazard in an acetylene plant is that of acetylene gas escaping from equipment, piping, or cylinder fittings. The gas might or might not ignite. In either case, every attempt consistent with personnel safety is normally made to shut off or remove the source of escaping gas. Fire is not normally extinguished in any other way, but some fires due to leaking acetylene or acetone have been extinguished with hose water or hand extinguishers when the source of escaping fuel was small enough so that it did not present a reignition hazard, or the source was removed safely and promptly to a safe location. When a fire has exposed acetylene cylinders, the cylinders have been kept cool by application of water to protect them and prevent undue release of acetylene through the cylinder safety devices.

## Appendix B Referenced Publications

**B.1** The following documents or portions thereof are referenced within this standard for informational purposes only and are thus not considered part of the requirements of this standard unless also listed in Chapter 11. The edition indicated here for each reference is the current edition as of the date of the NFPA issuance of this standard.

**B.1.1 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 30, *Flammable and Combustible Liquids Code*, 2000 edition.

NFPA 51, *Standard for the Design and Installation of Oxygen–Fuel Gas Systems for Welding, Cutting, and Allied Processes*, 1997 edition.

NFPA 68, *Guide for Venting of Deflagrations*, 1998 edition.

**B.1.2 CGA Publications.** The following publications are available from the Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4100.

CGA Pamphlet G-1, *Acetylene*, 1990.

CGA Pamphlet G-1.6, *Recommended Practices for Mobile Acetylene Trailer Systems*, 1991.

CGA Pamphlet G-1.7, *Standard for Storage and Handling of Calcium Carbide in Containers*, 1995.

CGA Safety Bulletin SB-4-1997, *Handling Acetylene Cylinders in Fires*.