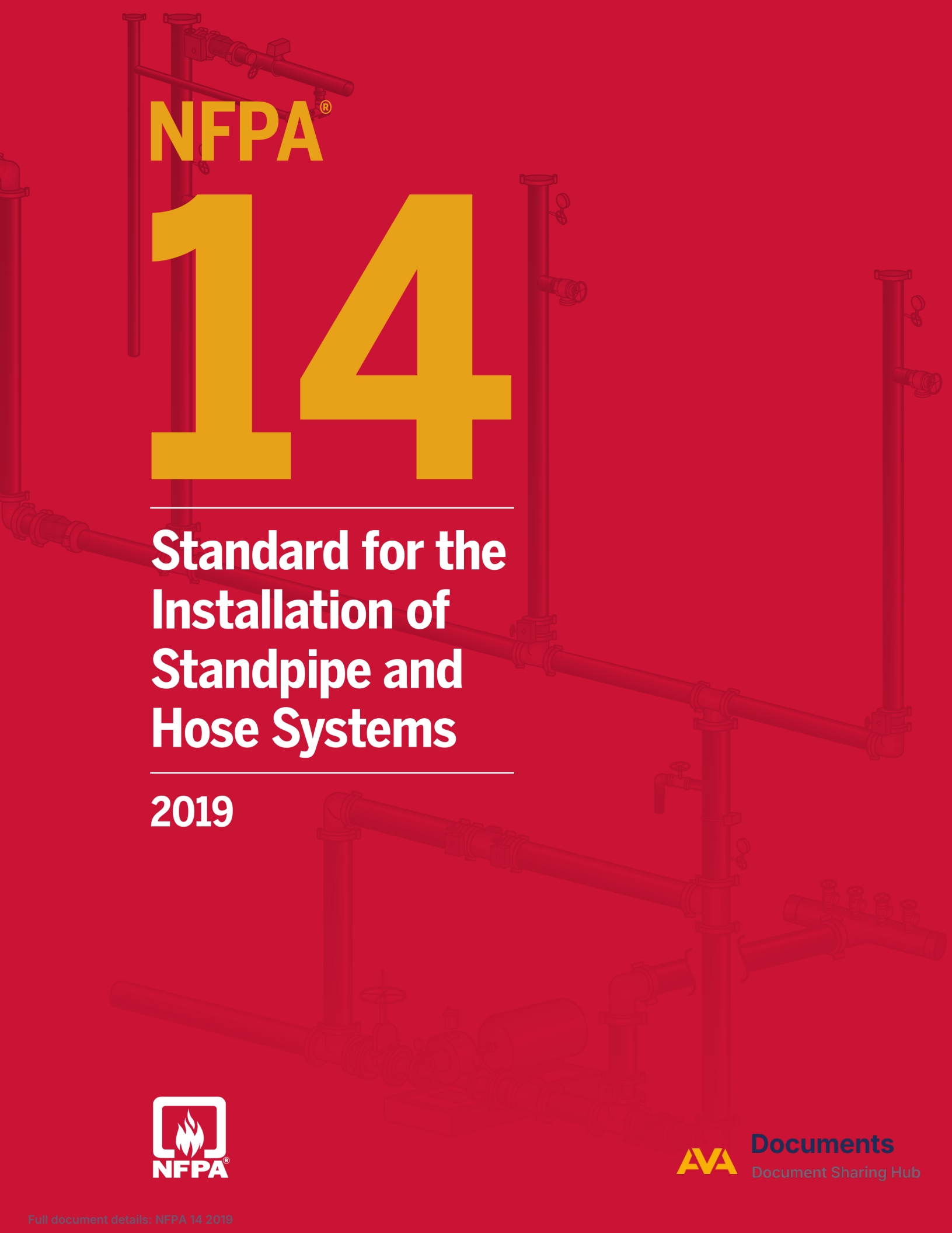




NFPA[®]

14

Standard for the Installation of Standpipe and Hose Systems

2019



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NFPA® 14

Standard for the

Installation of Standpipe and Hose Systems

2019 Edition

This edition of NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, was prepared by the Technical Committee on Standpipes. It was issued by the Standards Council on November 5, 2018, with an effective date of November 25, 2018, and supersedes all previous editions.

This document has been amended by one or more Tentative Interim Amendments (TIAs) and/or Errata. See “Codes & Standards” at www.nfpa.org for more information.

This edition of NFPA 14 was approved as an American National Standard on November 25, 2018.

Origin and Development of NFPA 14

This standard dates from 1912, when an initial report was made by the Committee on Standpipe and Hose Systems. The report was amended in 1914 and adopted by the Association in 1915. Revisions were adopted in 1917. Additional revisions were submitted by the Committee on Field Practice and adopted in 1926, 1927, 1931, 1938 (included action by the NFPA Board of Directors), 1941, and 1945. The Committee on Standpipes recommended revisions adopted in 1949, 1952, 1963, 1968, 1969, 1970, 1971, 1973, 1974, 1976, 1978, 1980, 1982, 1985, and 1990.

The 1993 edition of NFPA 14 was a complete reorganization of the document. The “user friendliness” of NFPA 14 was evaluated, and numerous changes followed. The standard was arranged to provide for a logical system approach for the design and installation of a standpipe system.

Substantive changes to the 1993 edition were the result of experience with standpipe systems under fire conditions. Flow rates, pressures, and the specific location of the hose connections were studied to determine optimum combinations for each factor.

The 1996 edition of NFPA 14 was a continuation of the changes that had been initiated for the 1993 edition. Some definitions were expanded, and certain requirements for piping materials, pipe support, waterflow alarms, valves, fire department connections, system testing, and water supplies were revised. In addition, a number of editorial changes were made to improve the user friendliness of the document.

The 2000 edition of NFPA 14 incorporated requirements for hydrants, hose houses, and master streams previously contained in NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*. Also included in this revision were test procedures for fire flow testing and marking of hydrants previously contained in NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*.

The 2003 edition was reformatted to conform to the *Manual of Style for NFPA Technical Committee Documents*, 2000 edition. Hydraulic calculation requirements were rewritten for clarification, and requirements for horizontal standpipes were added. Guidance for hydrants, hose houses, and master streams were deleted as this information was retained by NFPA 13, *Standard for the Installation of Sprinkler Systems*, and NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*. Similarly, test procedures for fire flow testing and marking of hydrants were returned to NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*; for that reason, “private hydrant” was removed from the title of NFPA 14.

The 2007 edition included guidance on the use of pressure-regulating devices and roof outlets for standpipe systems. Related information was extracted from NFPA 13, *Standard for the Installation of Sprinkler Systems*, to assist the user in applications involving combined sprinkler/standpipe systems.

The 2010 edition permitted express mains supplying higher zone standpipes to be designed with pressures in excess of 350 psi (24 bar). The requirements for standpipe system zones were extensively

revised for clarification. The requirements for pipe schedule design were deleted, and all standpipe systems were required to be hydraulically calculated. The requirements to balance hydraulic junction points were deleted. New requirements were added to address standpipe systems risers that terminate at different floor levels. A new definition for *horizontal standpipe* was added.

The 2013 edition revised clearance requirements around hose valve handles where hose valves are located within cabinets and where adjacent to objects. Travel distance, as it applies to this standard, was defined. The term *horizontal standpipe* was added to the requirement for pipe protection. Heat tracing requirements were clarified, along with added requirements for the pitching of pipe used in a dry system. The valve and drain requirements were extensively revised, providing greater guidance and clarification. New criteria and a new figure regarding horizontal exists also were added.

In the 2016 edition, in Chapter 6, protection of aboveground pipe was revised to clarify the building construction and building types under which standpipe system piping needs to be protected. As a result of that revision, new definitions of construction types were added to Chapter 3. The horizontal exit requirements in Chapter 7 were revised in an effort to align with building code requirements, and new annex figures were added. Subsection 7.3.2 was revised and reorganized in its entirety. Revisions also were made to Section 7.6 clarifying that only partially sprinklered buildings require 6 in. standpipes, while all others, if in a fully sprinklered building, whether combined or not, require only 4 in. standpipes, where supported by hydraulic calculations. The requirement for pressure gauges was revised to no longer require that gauges be listed, only approved.

In the 2019 edition, the terminology has been made consistent throughout the document by changing the terms *outlet(s)* and *hose outlet(s)* to *hose connection(s)*, as this is the more appropriate term. The definitions for the terms *hose connection* and *hose valve* also have been revised to clarify what is meant by each term as used in the document. Definitions and requirements for *distance monitoring* and *automated inspection and testing* have been added because technology now allows for monitoring of certain conditions as well as inspecting and testing standpipe systems from a remote location. A definition for *open parking garage* has been added along with a requirement that permits manual standpipes in open parking garages under a certain height. The signage for pressure requirements is no longer required when the pressure is 150 psi or less, as NFPA 13E requires a standard pressure of 150 psi unless a sign indicates more pressure is required. The maximum pressure permitted at any point in the system has been increased from 350 psi to 400 psi. Subsection 7.8.1 has been revised to clarify that the required pressure is to be calculated at the outlet of the hose valve. The hydraulic calculation procedures have been revised to clarify that additional standpipes should be calculated at the point of connection rather than at the topmost outlet. Subsection 7.11.2 has been revised to delineate between a standpipe system main drain and individual standpipe drains. Revisions have been made to the required number of fire department connections due to the ease with which a single connection can be compromised. A new Chapter 13 on maritime standpipe and hose systems has been added.

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Committee Scope: This Committee shall have primary responsibility for documents on the installation of standpipes and hose systems in buildings and structures.

Contents

Chapter 1 Administration	14- 6	7.11 Drains and Test Riser.	14- 23
1.1 Scope.	14- 6	7.12 Fire Department Connections.	14- 24
1.2 Purpose.	14- 6	Chapter 8 Plans and Calculations	14- 24
1.3 Retroactivity.	14- 6	8.1 Plans and Specifications.	14- 24
1.4 Equivalency.	14- 6	8.2 Hydraulic Calculations.	14- 25
1.5 Units.	14- 6	8.3 Hydraulic Calculation Procedures.	14- 25
Chapter 2 Referenced Publications	14- 7	Chapter 9 Water Supply	14- 27
2.1 General.	14- 7	9.1 Required Water Supply.	14- 27
2.2 NFPA Publications.	14- 7	9.2 Minimum Supply for Class I, Class II, and Class III Systems.	14- 27
2.3 Other Publications.	14- 7	Chapter 10 Water Supply Testing	14- 27
2.4 References for Extracts in Mandatory Sections. ...	14- 8	10.1 Water Supply Evaluation.	14- 27
Chapter 3 Definitions	14- 8	10.2 Procedure.	14- 27
3.1 General.	14- 8	Chapter 11 System Acceptance	14- 27
3.2 NFPA Official Definitions.	14- 8	11.1 General.	14- 27
3.3 General Definitions.	14- 8	11.2 Flushing of Piping.	14- 27
Chapter 4 System Components and Hardware	14- 10	11.3 Hose Threads.	14- 27
4.1 General.	14- 10	11.4 Hydrostatic Tests.	14- 27
4.2 Pipe and Tube.	14- 10	11.5 Flow Tests.	14- 33
4.3 Fittings.	14- 11	11.6 Manual Valve Test.	14- 34
4.4 Joining of Pipe and Fittings.	14- 12	11.7 Automated Inspection and Testing Devices and Equipment.	14- 34
4.5 Valves.	14- 13	11.8 Alarm and Supervision Tests.	14- 34
4.6 Hose Stations.	14- 13	11.9 Record Drawings, Test Reports, and Manuals.	14- 34
4.7 Hose Connections.	14- 14	11.10 Signs.	14- 34
4.8 Fire Department Connections.	14- 14	Chapter 12 Buildings Under Construction	14- 34
4.9 Pressure-Regulating Devices.	14- 14	12.1 General.	14- 34
4.10 Signs.	14- 14	12.2 Fire Department Connections.	14- 34
Chapter 5 System Requirements	14- 14	12.3 Other System Features.	14- 34
5.1 General.	14- 14	12.4 Support of Piping.	14- 34
5.2 Automatic and Semiautomatic Dry Systems.	14- 14	12.5 Hose Connections.	14- 34
5.3 Classes of Standpipe Systems.	14- 16	12.6 Extension of System Piping.	14- 34
5.4 Required Type of System.	14- 16	12.7 Temporary Installations.	14- 34
5.5 Gauges.	14- 16	12.8 Timing of Water Supply Installation.	14- 34
5.6 Waterflow and Supervisory Alarms.	14- 17	12.9 Protection of Hose Connections and Fire Department Connections.	14- 34
Chapter 6 Installation Requirements	14- 17	Chapter 13 Maritime Standpipes and Hose Systems	14- 35
6.1 Location and Protection of Piping.	14- 17	13.1 Application.	14- 35
6.2 Underground Piping.	14- 18	13.2 Components and Hardware.	14- 35
6.3 Gate Valves and Check Valves.	14- 18	13.3 System Requirements.	14- 36
6.4 Fire Department Connections.	14- 19	13.4 Installation.	14- 36
6.5 Support of Piping.	14- 19	13.5 Design.	14- 37
6.6 Installation of Signs.	14- 19	13.6 Plans and Calculations.	14- 38
6.7 Signs for Water Supply Pumps.	14- 19	13.7 Water Supply.	14- 38
6.8 Hydraulic Design Information Sign.	14- 19	13.8 Water Supply Testing.	14- 38
Chapter 7 Design	14- 20	13.9 System Acceptance.	14- 38
7.1 General.	14- 20	Chapter 14 System Inspection, Testing, and Maintenance	14- 38
7.2 Pressure Limitation.	14- 20	14.1 General.	14- 38
7.3 Locations of Hose Connections.	14- 20	Annex A Explanatory Material	14- 38
7.4 Number of Standpipes.	14- 21	Annex B Informational References	14- 56
7.5 Interconnection of Standpipes.	14- 21	Index	14- 57
7.6 Minimum Sizes for Standpipes and Branch Lines, Class I and Class III Standpipes.	14- 21		
7.7 System Design and Sizing of Pipe for Delivery of System Demand.	14- 22		
7.8 Minimum and Maximum Pressure Limits.	14- 22		
7.9 Standpipe System Zones.	14- 22		
7.10 Flow Rates.	14- 22		

NFPA 14

Standard for the

Installation of Standpipe and Hose Systems

2019 Edition

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

A reference in brackets [] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex B. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard covers the minimum requirements for the installation of standpipes and hose systems.

1.1.2* This standard does not cover requirements for periodic inspection, testing, and maintenance of these systems.

1.2 Purpose.

1.2.1 The purpose of this standard is to provide a reasonable degree of protection for life and property from fire through installation requirements for standpipes and hose systems based on sound engineering principles, test data, and field experience.

1.2.2 Nothing in this standard is intended to restrict new technologies or alternate arrangements, provided that the level of safety prescribed by the standard is not lowered.

1.3 Retroactivity. The provisions of this standard reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this standard at the time the standard was issued.

1.3.1 Unless otherwise specified, the provisions of this standard shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the standard. Where specified, the provisions of this standard shall be retroactive.

1.3.2 In those cases where the authority having jurisdiction (AHJ) determines that the existing situation presents an unacceptable degree of risk, the AHJ shall be permitted to apply retroactively any portions of this standard deemed appropriate.

1.3.3 The retroactive requirements of this standard shall be permitted to be modified if their application clearly would be impractical in the judgment of the AHJ, and only where it is clearly evident that a reasonable degree of safety is provided.

1.4* Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this standard.

1.4.1 Technical documentation shall be submitted to the AHJ to demonstrate equivalency.

1.4.2 The system, method, or device shall be approved for the intended purpose by the AHJ.

1.5 Units.

1.5.1 Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). Liter and bar units, which are outside of but recognized by SI, are commonly used in international fire protection. These units and their conversion factors are provided in Table 1.5.1.

1.5.2 If a value for measurement provided in this standard is followed by an equivalent value in other units, the first value stated shall be regarded as the requirement. An equivalent value could be approximate.

1.5.3 Where sizes for pipe, sheet and plate steel, and wire gauges are indicated, they are noted in trade sizes and not by hard conversions.

Table 1.5.1 Metric Units of Measure

Name of Unit	Unit Symbol	Conversion Factor
meter	m	1 ft = 0.3048 m
millimeter	mm	1 in. = 25.4 mm
liter	L	1 gal = 3.785 L
cubic decimeter	dm ³	1 gal = 3.785 dm ³
Pascal	Pa	1 psi = 6894.757 Pa
bar	bar	1 psi = 0.0689 bar
bar	bar	1 bar = 10 ⁵ Pa

Note: For additional conversion and information, see IEEE/ASTM SI 10, *American National Standard for Metric Practice*.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2019 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, 2019 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2019 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2018 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2019 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2017 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2019 edition.

NFPA 72®, *National Fire Alarm and Signaling Code*®, 2019 edition.

NFPA 101®, *Life Safety Code*®, 2018 edition.

NFPA 170, *Standard for Fire Safety and Emergency Symbols*, 2018 edition.

NFPA 1963, *Standard for Fire Hose Connections*, 2019 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ANSI Z97.1, *Safety Glazing Materials Used in Buildings — Safety Performance Specifications and Methods of Test*, 2015.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*, 2013.

ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250*, 2015.

ASME B16.3, *Malleable Iron Threaded Fittings: Classes 150 and 300*, 2016.

ANSI/ASME B16.4, *Gray Iron Threaded Fittings: Classes 125 and 250*, 2016.

ASME B16.5, *Pipe Flanges and Flanged Fittings, NPS ½ Through NPS 24 Metric/Inch Standard*, 2013.

ANSI/ASME B16.9, *Factory-Made Wrought Butt Welding Fittings*, 2012.

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*, 2016.

ASME B16.15, *Cast Copper Alloy Threaded Fittings: Classes 125 and 250*, 2013.

ASME B16.18, *Cast Copper Alloy Solder Joint Pressure Fittings*, 2012.

ASME B16.22, *Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings*, 2013.

ASME B16.25, *Butt Welding Ends*, 2012.

ANSI/ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*, 2015.

Boiler and Pressure Vessel Code, 2017.

2.3.3 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A53/A53M, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*, 2012.

ASTM A135/A135M, *Standard Specification for Electric-Resistance-Welded Steel Pipe*, 2009, reapproved 2014.

ASTM A234/A234M, *Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*, 2016.

ASTM A795/A795M, *Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use*, 2013.

ASTM B32, *Standard Specifications for Solder Metal*, 2008 (2014).

ASTM B43, *Standard Specification for Seamless Red Brass Pipe, Standard Sizes*, 2015.

ASTM B75/B75M, *Standard Specification for Seamless Copper Tube*, 2011.

ASTM B88, *Standard Specification for Seamless Copper Water Tube*, 2016.

ASTM B251, *Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube*, 2010.

ASTM B446, *Standard Specification for Nickel-Chromium-Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum-Silicon Alloy (UNS N06219), and Nickel-Chromium-Molybdenum-Tungsten Alloy (UNS N06650) Rod and Bar*, 2003 (2014).

ASTM F437, *Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 2015.

ASTM F438, *Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40*, 2015.

ASTM F439, *Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80*, 2013.

ASTM F442/F442M, *Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)*, 2013e1.

ASTM F2164, *Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure*, 2013.

ASTM F2620, *Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings*, 2013.

2.3.4 AWS Publications. American Welding Society, 8669 NW 36 Street, #130, Miami, FL 33166-6672.

AWS A5.8M/A5.8, *Specification for Filler Metals for Brazing and Braze Welding*, 2011, Amendment 1, 2012.

AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*, 2014, Amendment 1, 2015.

AWS D10.9, *Specification for Qualification of Welding Procedures and Welders for Piping and Tubing*, 1980.

- ▲ **2.3.5 AWWA Publications.** American Water Works Association, 6666 West Quincy Avenue, Denver, CO 80235.

AWWA C104/A21.4, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings*, 2016.

AWWA C105/A21.5, *Polyethylene Encasement for Ductile-Iron Pipe Systems*, 2010.

AWWA C110, *Ductile-Iron and Gray-Iron Fittings*, 2012.

AWWA C111/A21.11, *Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings*, 2017.

AWWA C115, *Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges*, 2011.

AWWA C116, *Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings*, 2015.

AWWA C150, *Thickness Design of Ductile-Iron Pipe*, 2014.

AWWA C151/A21.51, *Ductile-Iron Pipe, Centrifugally Cast, for Water*, 2017.

AWWA C153, *Ductile-Iron Compact Fittings*, 2011.

AWWA C600, *Installation of Ductile-Iron Water Mains and Their Appurtenances*, 2010.

AWWA C900, *Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 60 in. (100 mm Through 1,500 mm)*, 2016.

AWWA C905, *Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 in. Through 48 in. (350 mm Through 1,200 mm), for Water Transmission and Distribution*, 2010.

AWWA C906, *Polyethylene (PE) Pressure Pipe and Fittings, 4 in. Through 65 in. (100 mm Through 1,650 mm), for Waterworks*, 2015.

- ▲ **2.3.6 IEEE Publications.** IEEE, Three Park Avenue, 17th Floor, New York, NY, 10016-5997.

IEEE/ASTM SI 10, *American National Standard for Metric Practice*, 2016.

2.3.7 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2019 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2019 edition.

NFPA 101®, *Life Safety Code*®, 2018 edition.

NFPA 241, *Standard for Safeguarding Construction, Alteration, and Demolition Operations*, 2018 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, 2017 edition.

NFPA 5000®, *Building Construction and Safety Code*®, 2018 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this standard. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* 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.

3.2.4 Shall. Indicates a mandatory requirement.

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

3.2.6 Standard. An NFPA Standard, the main text of which contains only mandatory provisions using the word “shall” to indicate requirements and that is in a form generally suitable for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA Manuals of Style. When used in a generic sense, such as in the phrase “standards development process” or “standards development activities,” the term “standards” includes all NFPA Standards, including Codes, Standards, Recommended Practices, and Guides.

3.3 General Definitions.

- **3.3.1 Automated Inspection and Testing.** The performance of inspections and tests at a distant location from the system or component being inspected or tested through the use of electronic devices or equipment installed for that purpose.

3.3.2* Auxiliary Drain Connection. A drain connection installed to permit draining water from a trapped section of pipe.

3.3.3 Branch Line. A piping system, generally in a horizontal plane, connecting not more than one hose connection with a standpipe.

3.3.4 Connection.

3.3.4.1 Fire Department Connection.

3.3.4.1.1 Fire Department Connection for Automatic Standpipe Systems. A connection through which the fire department can pump the secondary water supply to an automatic stand-

pipe system at the required system demand. Supplemental water can also be provided into the sprinkler system or other system furnishing water for fire extinguishment to supplement existing water supplies.

3.3.4.1.2 Fire Department Connection for Manual Standpipe Systems. A connection through which the fire department can pump the primary water supply to a manual standpipe system at the required system demand.

3.3.4.2 Hose Connection. The outlet of a hose valve installed on a standpipe system for the connection of fire hose.

3.3.5* Construction Types.

3.3.5.1 Type I and Type II Construction. Those types in which the fire walls, structural elements, walls, arches, floors, and roofs are of approved noncombustible or limited-combustible materials.

3.3.5.2 Type III Construction. That type in which exterior walls and structural elements that are portions of exterior walls are of approved noncombustible or limited-combustible materials and in which fire walls, interior structural elements, walls, arches, floors, and roofs are entirely or partially of wood of smaller dimensions than required for Type IV construction or are of approved noncombustible, limited-combustible, or other approved combustible materials.

3.3.5.3 Type IV Construction. That type in which fire walls, exterior walls, and interior bearing walls and structural elements that are portions of such walls are of approved noncombustible or limited-combustible materials. Other interior structural elements, arches, floors, and roofs are constructed of solid or laminated wood or cross-laminated timber without concealed spaces within allowable dimensions of the building code.

3.3.5.4 Type V Construction. That type in which structural elements walls, arches, floors, and roofs are entirely or partially of wood or other approved material.

3.3.6 Distance Monitoring. The monitoring of various conditions of a system or component from a location distant from the system or component through the use of electronic devices, meters, or equipment installed for that purpose.

3.3.7 Exit.

3.3.7.1 Exit Passageway. Hallways, corridors, passages, or tunnels used as exit components and separated from other parts of the building in accordance with NFPA 101.

3.3.7.2* Horizontal Exit. A way of passage from one building to an area of refuge in another building on approximately the same level, or a way of passage through or around a fire barrier to an area of refuge on approximately the same level in the same building that affords safety from fire and smoke originating from the area of incidence and areas communicating therewith. [101, 2018]

3.3.8 Fire Department. An organization providing rescue, fire suppression, and related activities, including any public, governmental, private, industrial, or military organization engaging in this type of activity. [1002, 2017]

3.3.9 High-Rise Building. A building where the floor of an occupiable story is greater than 75 ft (23 m) above the lowest level of fire department vehicle access. [5000, 2018]

3.3.10 Hose Station. A combination of a hose rack or reel, hose nozzle, hose, and hose connection.

3.3.11 Main.

3.3.11.1 Feed Main. The portion of a standpipe system that supplies water to one or more standpipes.

3.3.11.1.1 Express Main. A type of feed main supplying only the upper zone(s) of a standpipe system.

3.3.12 Main Drain. The primary drain connection located on the system riser and also utilized as a test connection.

3.3.13 Open Parking Garage. A structure or portion of a structure with openings as prescribed by the adopted building code that is used for the parking or storage of private motor vehicles.

3.3.14 Pressure.

3.3.14.1 Nozzle Pressure. Pressure required at the inlet of a nozzle to produce the desired water discharge characteristics.

3.3.14.2 Residual Pressure. For standpipe systems, pressure acting on a point in the system with a flow being delivered.

3.3.14.3 Static Pressure. For standpipe systems, pressure acting on a point in the system with no flow from the system.

3.3.15 Pressure Control Valve. A pilot-operated pressure-reducing valve designed for the purpose of reducing the downstream water pressure to a specific value under both flowing (residual) and nonflowing (static) conditions.

3.3.16* Pressure-Regulating Device. A device designed for the purpose of reducing, regulating, controlling, or restricting water pressure.

3.3.16.1* Pressure-Reducing Valve. A valve designed for the purpose of reducing the downstream water pressure under both flowing (residual) and nonflowing (static) conditions.

3.3.16.2 Pressure-Restricting Device. A valve or device designed for the purpose of reducing the downstream water pressure under flowing (residual) conditions only.

3.3.17 Rated Capacity. The flow available from a device, at the designated residual pressure either measured or calculated.

3.3.18 Record Drawing. A design, working drawing, or as-built drawing that is submitted as the final record of documentation for the project.

3.3.19 Standpipe. The system piping that delivers the water supply for hose connections, and for sprinklers on combined systems, vertically from floor to floor.

3.3.19.1 Horizontal Standpipe. The system piping that delivers the water supply for two or more hose connections, and for sprinklers on combined systems, on a single level.

3.3.20* Standpipe System. An arrangement of piping, valves, hose connections, and associated equipment installed in a building or structure, with the hose connections located in such a manner that water can be discharged in streams or spray patterns through attached hose and nozzles, for the purpose of extinguishing a fire, thereby protecting a building or structure and its contents in addition to protecting the occupants.

3.3.20.1 Automatic Dry Standpipe System. A standpipe system permanently attached to a water supply capable of supplying the system demand at all times, containing air or nitrogen under pressure, the release of which (as from opening a hose valve) opens a dry pipe valve to allow water to flow into the piping system and out of the opened hose valve.

3.3.20.2 Automatic Wet Standpipe System. A standpipe system containing water at all times that is attached to a water supply capable of supplying the system demand at all times and that requires no action other than opening a hose valve to provide water at hose connections.

3.3.20.3 Combined System. A standpipe system that supplies both hose connections and automatic sprinklers.

3.3.20.4 Manual Dry Standpipe System. A standpipe system with no permanently attached water supply that relies exclusively on the fire department connection to supply the system demand.

3.3.20.5 Manual Wet Standpipe System. A standpipe system containing water at all times that relies exclusively on the fire department connection to supply the system demand.

3.3.20.6 Semiautomatic Dry Standpipe System. A standpipe system permanently attached to a water supply that is capable of supplying the system demand at all times arranged through the use of a device such as a deluge valve and that requires activation of a remote control device to provide water at hose connections.

3.3.20.7 Wet Standpipe System. A standpipe system having piping containing water at all times.

3.3.21 Standpipe System Zone. A vertical subdivision of a standpipe system limited or determined by the pressure limitations of the system components.

3.3.22* System Classes.

3.3.22.1 Class I System. A system that provides 2½ in. (65 mm) hose connections to supply water for use by fire departments.

3.3.22.2 Class II System. A system that provides 1½ in. (40 mm) hose stations to supply water for use primarily by trained personnel or by the fire department during initial response.

3.3.22.3 Class III System. A system that provides 1½ in. (40 mm) hose stations to supply water for use by trained personnel and 2½ in. (65 mm) hose connections to supply a larger volume of water for use by fire departments.

3.3.23 System Demand. The flow rate and residual pressure required from a water supply, measured at the point of connection of a water supply to a standpipe system, to deliver the total waterflow rate and the minimum residual pressures required for a standpipe system at the hydraulically most remote hose connection, and the minimum waterflow rate and residual pressure for sprinkler connections on combined systems.

3.3.24 System Working Pressure. The maximum anticipated static (nonflowing) or flowing pressure applied to standpipe system components exclusive of surge pressures.

3.3.25 Travel Distance. The length measured on the floor or other walking surface along the centerline of the natural path

of travel, starting from the hose connection, curving around any corners or obstructions with a 12 in. (300 mm) clearance.

3.3.26 Valve.

3.3.26.1* Control Valve. A valve controlling flow to water-based fire protection systems.

3.3.26.2 Hose Valve. The valve to an individual hose connection with an outlet for attaching a fire hose.

Chapter 4 System Components and Hardware

4.1* General.

4.1.1 Standpipe system components and hardware shall be in accordance with this chapter.

4.1.2 All devices and materials used in standpipe systems shall be listed, except as permitted in 4.1.3, 4.1.4, 4.2.1, and 4.3.1.

4.1.3* Components that do not affect system performance shall not be required to be listed.

4.1.4 Automated Inspection, Testing, and Distance Monitoring Devices, Meters, and Equipment.

4.1.4.1* Where provided, devices, meters, and equipment utilized to perform automated inspection and testing procedures that are not subjected to system pressure shall not be required to be listed.

4.1.4.2* Where provided, devices, meters, and equipment utilized to perform distance monitoring of system or component status that are not subjected to system pressure shall not be required to be listed.

4.2 Pipe and Tube.

4.2.1 Pipe or tube used in standpipe systems shall meet or exceed one of the standards in Table 4.2.1 or shall be in accordance with 4.2.2 through 4.2.6.

4.2.2 Where ductile-iron pipe is installed in accordance with Table 4.2.1, it shall be lined in accordance with AWWA C104/A21.4, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings*.

4.2.3 Where steel pipe specified in Table 4.2.1 is used and joined by welding as specified in Section 4.4 or by roll-grooved pipe and fittings as specified in Section 4.4, the minimum nominal wall thickness for pressures up to 300 psi (20.7 bar) shall be in accordance with Schedule 10 for pipe sizes up to 5 in. (127 mm), 0.134 in. (3.40 mm) for 6 in. (150 mm) pipe, and 0.188 in. (4.78 mm) for 8 in. and 10 in. (203 mm and 254 mm) pipe.

4.2.3.1 Pressure limitations and wall thickness for steel pipe listed in accordance with 4.2.6 shall be in accordance with the listing requirements.

4.2.4 Where steel pipe specified in Table 4.2.1 is joined by threaded fittings as specified in Section 4.4 or by fittings used with pipe having cut grooves, the minimum wall thickness shall be in accordance with Schedule 30 [sizes 8 in. (203 mm) and larger] or Schedule 40 [sizes less than 8 in. (203 mm)] pipe for pressures up to 300 psi (20.7 bar).

4.2.4.1 Pressure limitations and wall thicknesses for steel pipe specially listed in accordance with 4.2.6 shall be in accordance with the listing requirements.

Table 4.2.1 Pipe or Tube Materials and Dimensions

Materials and Dimensions (Specifications)	Standard
Ferrous piping	
<i>Ductile-Iron Pipe, Centrifugally Cast, for Water</i>	AWWA C151/ A21.51
<i>Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges</i>	AWWA C115
Electric-resistance-welded steel pipe	
<i>Standard Specification for Electric-Resistance- Welded Steel Pipe</i>	ASTM A135/ A135M
Welded and seamless steel	
<i>Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use</i>	ASTM A795/ A795M
Welded and seamless steel pipe	
<i>Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless Welded and Seamless Wrought Steel Pipe</i>	ASTM A53/ A53M ANSI/ASME B36.10M
Copper tube (drawn, seamless)	
<i>Standard Specification for Seamless Copper Tube</i>	ASTM B75/ B75M
<i>Standard Specification for Seamless Copper Water Tube</i>	ASTM B88
<i>Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube</i>	ASTM B251
Brazing filler metal	
<i>Specification for Filler Metals for Brazing and Braze Welding (classifications BCuP-3 or BCuP-4)</i>	AWS A5.8M/ A5.8
<i>Standard Specification for Solder Metal</i>	ASTM B32
<i>Standard Specification for Nickel-Chromium- Molybdenum-Columbium Alloy (UNS N06625), Nickel-Chromium-Molybdenum- Silicon Alloy (UNS N06219), and Nickel- Chromium-Molybdenum-Tungsten Alloy (UNS N06650) Rod and Bar</i>	ASTM B446
Brass Pipe	
<i>Standard Specification for Seamless Red Brass Pipe, Standard Sizes</i>	ASTM B43

4.2.5 Copper tube as specified in the standards referenced in Table 4.2.1 shall have a wall thickness of Type K, L, or M where used in standpipe systems.

4.2.6 Other types of pipe or tube investigated for use in standpipe installations and listed for this service, including, but not limited to, steel differing from that provided in Table 4.2.1, shall be permitted where installed in accordance with their listing limitations, including installation instructions.

4.2.6.1 Pipe or tube shall not be listed for portions of an occupancy classification.

4.2.7 Bending of Pipe and Tube.

4.2.7.1 Bending of Schedule 40 steel pipe and Types K and L copper tube shall be permitted where bends are made with no kinks, ripples, distortions, reductions in diameter, or any noticeable deviations from a round shape.

4.2.7.2 The minimum radius of a bend shall be six pipe diameters for pipe sizes 2 in. (50 mm) and smaller, and five pipe diameters for pipe sizes 2½ in. (65 mm) and larger.

4.3 Fittings.

4.3.1 Fittings used in standpipe systems shall meet or exceed the standards in Table 4.3.1 or shall be in accordance with 4.3.2.

4.3.2 Other types of fittings investigated for suitability in standpipe installations and listed for this service, including, but not limited to, steel differing from that provided in Table 4.3.1, shall be permitted where installed in accordance with their listing limitations, including installation instructions.

4.3.3 Fittings shall be extra-heavy pattern where pressures exceed 175 psi (12.1 bar).

4.3.3.1 Standard weight pattern cast-iron fittings 2 in. (50 mm) in size and smaller shall be permitted where pressures do not exceed 300 psi (20.7 bar).

4.3.3.2 Standard weight pattern malleable-iron fittings 6 in. (150 mm) in size and smaller shall be permitted where pressures do not exceed 300 psi (20.7 bar).

4.3.3.3 Fittings shall be permitted for system pressures up to the limits specified in their listings.

Table 4.3.1 Fittings Materials and Dimensions

Materials and Dimensions	Standard
Cast Iron	
<i>Gray Iron Threaded Fittings: Classes 125 and 250</i>	ANSI/ASME B16.4
<i>Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250</i>	ASME B16.1
Malleable Iron	
<i>Malleable Iron Threaded Fittings: Classes 150 and 300</i>	ASME B16.3
Ductile Iron	
<i>Ductile-Iron and Gray-Iron Fittings</i>	AWWA C110
<i>Ductile-Iron Compact Fittings</i>	AWWA C153
Steel	
<i>Factory-Made Wrought Butt-Welding Fittings</i>	ANSI/ASME B16.9
<i>Butt-Welding Ends</i>	ASME B16.25
<i>Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service</i>	ASTM A234/A234M
<i>Pipe Flanges and Flanged Fittings, NPS ½ through NPS 24 Metric/Inch Standard</i>	ASME B16.5
<i>Forged Fittings, Socket-Welding and Threaded</i>	ASME B16.11
Copper	
<i>Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings</i>	ASME B16.22
<i>Cast Copper Alloy Solder Joint Pressure Fittings</i>	ASME B16.18
Bronze	
<i>Cast Copper Alloy Threaded Fittings: Classes 125 and 250</i>	ASME B16.15

Shaded text = Revisions. **Δ** = Text deletions and figure/table revisions.

• = Section deletions.

N = New material



4.3.4 Screwed unions shall not be used on pipe larger than 2 in. (50 mm).

4.3.4.1 Couplings and unions of other than the screwed type shall be of the types listed specifically for use in standpipe systems.

4.3.5 A one-piece reducing fitting or coupling shall be used wherever a change is made in the size of the pipe.

4.3.5.1* Hexagonal or face bushings shall be permitted for reducing the size of openings of fittings where standard fittings of the required size are not available.

4.4 Joining of Pipe and Fittings.

4.4.1 Threaded Pipe and Fittings.

4.4.1.1 All threaded pipe and fittings shall have threads cut to ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*. [13:7.5.1.1]

4.4.1.2* Steel pipe with wall thicknesses less than Schedule 30 [in sizes 8 in. (200 mm) and larger] or Schedule 40 [in sizes less than 8 in. (200 mm)] shall only be permitted to be joined by threaded fittings where the threaded assembly is investigated for suitability in automatic sprinkler installations and listed for this service. [13:7.5.1.2]

▲ **4.4.1.3** Joint compound or tape shall be applied only to male threads.

4.4.2 Welded Pipe and Fittings.

4.4.2.1 General.

4.4.2.1.1 Welding shall be permitted as a means of joining standpipe piping in accordance with 4.4.2.2 through 4.4.2.6.

4.4.2.2* Fabrication.

4.4.2.2.1 When standpipe piping is welded, the pipe shall be shop-welded unless the requirements of 4.4.2.2 are met.

4.4.2.2.2 Where the design specifications require any part of the piping system to be welded in place, welding of standpipe piping shall be permitted where the welding process is performed in accordance with NFPA 51B.

4.4.2.2.3 Tabs for longitudinal earthquake bracing shall be permitted to be welded to in-place piping where the welding process is performed in accordance with NFPA 51B. [13:7.5.2.2.3]

4.4.2.2.4 Welding shall not be performed where there is impingement of rain, snow, sleet, or high wind on the weld area of the pipe product. [13:7.5.2.2.4]

4.4.2.2.5 Torch cutting and welding shall not be permitted as a means of modifying or repairing standpipe systems.

4.4.2.3 Fittings.

4.4.2.3.1* Welded fittings used to join pipe shall be listed fabricated fittings or manufactured in accordance with Table 4.3.1. [13:7.5.2.3.1]

4.4.2.3.2 Fittings referenced in 4.4.2.3.1 shall be joined in conformance with a qualified welding procedure as set forth in this section and shall be an acceptable product under this standard, provided that materials and wall thickness are compatible with other sections of this standard. [13:7.5.2.3.2]

4.4.2.3.3 Fittings shall not be required where pipe ends are butt-welded in accordance with the requirements of 4.4.2.4.3. [13:7.5.2.3.3]

4.4.2.3.4 When the pipe size in a run of piping is reduced, a reducing fitting designed for that purpose shall be used in accordance with the requirements of 4.4.2.3.1. [13:7.5.2.3.4]

4.4.2.4 Welding Requirements.

4.4.2.4.1* Welds between pipe and welding outlet fittings shall be permitted to be attached by full penetration welds, partial penetration groove welds, or fillet welds. [13:7.5.2.4.1]

4.4.2.4.2 The minimum throat thickness shall be not less than the thickness of the pipe, the thickness of the welding fitting, or $\frac{3}{16}$ in. (4.5 mm), whichever is least. [13:7.5.2.4.2]

4.4.2.4.3* Circumferential butt joints shall be cut, beveled, and fit so that full penetration is achievable. [13:7.5.2.4.3]

4.4.2.4.4 Full penetration welding shall not be required. [13:7.5.2.4.4]

4.4.2.4.5 Where slip-on flanges are welded to pipe with a single fillet weld, the weld shall be on the hub side of the flange and the minimum throat weld thickness shall not be less than 1.25 times the pipe wall thickness or the hub thickness, whichever is less. [13:7.5.2.4.5]

4.4.2.4.6 Face welds on the internal face of the flange shall be permitted as a water seal in addition to the hub weld required in 4.4.2.4.5. [13:7.5.2.4.6]

4.4.2.4.7 Tabs for longitudinal earthquake bracing shall have minimum throat weld thickness not less than 1.25 times the pipe wall thickness and welded on both sides of the longest dimension. [13:7.5.2.4.7]

4.4.2.4.8 When welding is performed, the following shall apply:

- (1) Holes in piping for outlets shall be cut to the full inside diameter of fittings prior to welding in place of the fittings.
- (2) Discs shall be retrieved.
- (3) Openings cut into piping shall be smooth bore, and all internal slag and welding residue shall be removed.
- (4) Fittings shall not penetrate the internal diameter of the piping.
- (5) Steel plates shall not be welded to the ends of piping or fittings.
- (6) Fittings shall not be modified.
- (7) Nuts, clips, eye rods, angle brackets, or other fasteners shall not be welded to pipe or fittings, except as permitted in 4.4.2.2.3 and 4.4.2.4.7.
- (8) Completed welds shall be free from cracks, incomplete fusion, surface porosity greater than $\frac{1}{16}$ in. (1.6 mm) diameter, and undercut deeper than 25 percent of the wall thickness or $\frac{1}{32}$ in. (0.8 mm), whichever is less.
- (9) Completed circumferential butt weld reinforcement shall not exceed $\frac{3}{32}$ in. (2 mm).

[13:7.5.2.4.8]

4.4.2.5 Qualifications.

4.4.2.5.1 A welding procedure shall be prepared and qualified by the contractor or fabricator before any welding is done. [13:7.5.2.5.1]

4.4.2.5.2 Qualification of the welding procedure to be used and the performance of all welders and welding operators shall be required and shall meet or exceed the requirements of AWS B2.1/B2.1M, *Specification for Welding Procedure and Performance Qualification*; ASME *Boiler and Pressure Vessel Code*, Section IX, "Welding, Brazing, and Fusing Qualifications"; or other applicable qualification standard as required by the AHJ, except as permitted by 4.4.2.5.3. [13:7.5.2.5.2]

4.4.2.5.3 Successful procedure qualification of complete joint penetration groove welds shall qualify partial joint penetration (groove/fillet) welds and fillet welds in accordance with the provisions of this standard. [13:7.5.2.5.3]

4.4.2.5.4 Welding procedures qualified under standards recognized by previous editions of this standard shall be permitted to be continued in use. [13:7.5.2.5.4]

4.4.2.5.5 Contractors or fabricators shall be responsible for all welding they produce. [13:7.5.2.5.5]

4.4.2.5.6 Each contractor or fabricator shall have available to the AHJ an established written quality assurance procedure ensuring compliance with the requirements of 4.4.2.4. [13:7.5.2.5.6]

4.4.2.6 Records.

4.4.2.6.1 Welders or welding machine operators shall, upon completion of each welded pipe, place their identifiable mark or label onto each piece adjacent to a weld. [13:7.5.2.6.1]

4.4.2.6.2 Contractors or fabricators shall maintain certified records, which shall be available to the AHJ, of the procedures used and the welders or welding machine operators employed by them, along with their welding identification. [13:7.5.2.6.2]

4.4.2.6.3 Records shall show the date and the results of procedure and performance qualifications. [13:7.5.2.6.3]

4.4.3 Groove Joining Methods.

4.4.3.1 Pipe, fittings, valves, and devices to be joined with grooved couplings shall contain cut, rolled, or cast grooves that are dimensionally compatible with the couplings. [13:7.5.3.1]

4.4.3.1.1 Pipe, fittings, valves, devices, and couplings that conform with or are listed in compliance with standardized groove specifications shall be considered compatible. [13:7.5.3.1.1]

4.4.3.1.2 Other groove dimensions and grooving methods shall be acceptable in accordance with 4.4.5.1. [13:7.5.3.1.2]

4.4.3.2 Grooved couplings, including gaskets used on dry pipe, preaction, and deluge systems, shall be listed for dry service. [13:7.5.3.2]

4.4.4* Brazed Joints.

4.4.4.1 Joints for the connection of copper tube shall be brazed.

4.4.4.2 Brazing fluxes, if used, shall not be of a highly corrosive type. [13:7.5.4.6]

4.4.5 Other Joining Methods.

- Δ **4.4.5.1** Other joining methods investigated for suitability in sprinkler installations and listed for this service shall be permitted where installed in accordance with their listing limitations, including installation instructions. [13:7.5.5.1]

4.4.5.2 Outlet Fittings. Rubber-gasketed outlet fittings that are used on standpipe systems shall meet the following requirements:

- (1) Be installed in accordance with the listing and manufacturer's installation instructions
- (2) Have all disks retrieved
- (3) Have smooth bores cut into the pipe, with all cutting residue removed
- (4) Not be modified [13:7.5.5.2]

4.4.6 End Treatment.

4.4.6.1 After cutting, pipe ends shall have burrs and fins removed. [13:7.5.6.1]

4.4.6.2 Pipe used with listed fittings and its end treatment shall be in accordance with the fitting manufacturer's installation instructions and the fitting's listing. [13:7.5.6.2]

4.5 Valves.

4.5.1 All valves controlling connections to water supplies and standpipes shall be listed indicating valves.

4.5.1.1 A listed underground gate valve equipped with a listed indicator post shall be permitted.

4.5.1.2 A listed water control valve assembly with a position indicator connected to a remote supervisory station shall be permitted.

4.5.1.3 A nonindicating valve, such as an underground gate valve with approved roadway box complete with T-wrench, acceptable to AHJ, shall be permitted.

4.5.2 All valves controlling connection to water supplies and standpipes shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position.

N 4.5.3 Automated Valves. A listed indicating valve with an automatic means to operate the valve shall be permitted.

N 4.5.3.1 A listed water control valve assembly with an automatic means to operate the valve shall be connected to a remote supervisory station.

N 4.5.3.2 A listed water control valve assembly with an automatic means to operate the valve shall include a visual position indicator.

N 4.5.3.3 A listed water control valve assembly with an automatic means to operate the valve shall be able to be operated manually as well as automatically.

4.6 Hose Stations.

4.6.1 Closets and Cabinets.

4.6.1.1 Closets and cabinets used to contain fire hose shall be of a size to allow the installation of the necessary equipment at hose stations and designed so they do not interfere with the prompt use of the hose connection, the hose, and other equipment at the time of fire.

4.6.1.1.1 Within the cabinet, the hose connections shall be located so that there are at least 2 in. (50 mm) between any part of the cabinet, other than the door and the handle of the valve when the valve is in any position ranging from fully open to fully closed.

4.6.1.1.2 The cabinet shall be used for fire equipment only, and each cabinet shall be conspicuously identified.

4.6.1.2 Where a “break glass”-type protective cover for a latching device is provided, the device provided to break the glass panel shall be attached in the immediate area of the break glass panel and shall be arranged so that the device cannot be used to break other glass panels in the cabinet door.

4.6.1.2.1 All glazing shall be either tempered safety glass or plastic glazing in accordance with ANSI Z97.1, *Safety Glazing Materials Used in Buildings — Safety Performance Specifications and Methods of Test*.

4.6.1.3 Where a fire-resistive assembly is penetrated by a cabinet, the fire resistance of the assembly shall be maintained as required by the local building code.

4.6.1.4 Hose cabinets shall be marked to indicate the contents.

4.6.2 Hose.

4.6.2.1* Each hose connection provided for use by trained personnel (Class II and Class III systems) shall be equipped with not more than 100 ft (30.5 m) of listed, 1½ in. (40 mm), lined, collapsible or noncollapsible fire hose attached and ready for use.

4.6.2.2 Where hose less than 1½ in. (40 mm) is used for 1½ in. (40 mm) hose stations in accordance with 5.3.2 and 5.3.3, listed noncollapsible hose shall be used.

4.6.3 Hose Racks.

4.6.3.1 Each 1½ in. (40 mm) hose station provided with 1½ in. (40 mm) hose shall be equipped with a listed rack or approved storage method.

4.6.3.2 Each 1½ in. (40 mm) hose station provided with hose less than 1½ in. (40 mm) in accordance with 5.3.2 and 5.3.3 shall be equipped with a listed continuous flow reel.

4.6.4 Nozzles. Nozzles provided for Class II service shall be listed.

4.6.5* Label. Each rack or storage facility for 1½ in. (40 mm) or smaller hose shall be provided with a label that includes the wording “FIRE HOSE FOR USE BY TRAINED PERSONNEL” and operating instructions.

4.7 Hose Connections.

4.7.1 Hose valves shall be listed.

4.7.2 Hose connections shall have external National Hose Standard (NHS) threads, for the valve size specified, in accordance with NFPA 1963.

4.7.3 Hose connections shall be equipped with threaded caps to protect the hose threads.

4.7.4 Where local fire department hose threads do not conform to NFPA 1963, the AHJ shall designate the hose threads that shall be used.

4.7.5* Hose connections shall be located so that there is at least 3 in. (76.2 mm) clearance between any adjacent object and the handle of the valve when the valve is in any position ranging from fully open to fully closed.

4.8 Fire Department Connections. (See Figure A.6.4.)

4.8.1 Fire department connections shall be listed for a working pressure equal to or greater than the pressure requirement of the system demand.

4.8.2 Unless the requirements of 4.8.2.1 or 4.8.2.2 are met, the fire department connection(s) shall have at least two 2½ in. (65 mm) connections using NH internal threaded swivel fitting(s) with 2.5–7.5 NH standard thread, as specified in NFPA 1963. (See Sections 7.7 and 7.12 for design requirements.)

4.8.2.1 Where local fire department connections do not conform to NFPA 1963, the AHJ shall be permitted to designate the connection to be used.

4.8.2.2 The use of threadless couplings shall be permitted where required by the AHJ and where listed for such use.

4.8.3 Fire department connections shall be equipped with approved plugs or caps, properly secured, and arranged for easy removal by fire departments.

4.8.4 Fire department connections shall be of an approved type.

4.9 Pressure-Regulating Devices. Pressure-regulating devices shall be listed.

4.10 Signs. Signs shall be permanently marked and shall be constructed of weather-resistant metal or rigid plastic materials.

Chapter 5 System Requirements

5.1 General.

5.1.1 The number and arrangement of standpipe equipment necessary for protection shall be governed by local conditions such as the occupancy, character, and construction of the building and its accessibility.

5.1.2* The AHJ shall be consulted regarding the required type of system, class of system, and special requirements.

5.1.3 The spacing and location of standpipes and hose connections shall be in accordance with Chapter 7.

5.2 Automatic and Semiautomatic Dry Systems.

5.2.1* Automatic Dry.

5.2.1.1 Pressure Gauges. Approved pressure gauges in accordance with Section 5.5 shall be connected as follows:

- (1) On the water side and air side of the dry pipe valve
- (2) At the air pump supplying the air receiver where one is provided
- (3) At the air receiver where one is provided
- (4) In each independent pipe from air supply to dry pipe system
- (5) At quick-opening devices

[13:8.2.1]

5.2.1.2 Size of Systems Volume Limitations.

5.2.1.2.1* Not more than 750 gal (2839 L) system capacity shall be controlled by one dry pipe valve.

5.2.1.2.2 Piping volume shall be permitted to exceed the requirements of 5.2.1.2.1 where the system design is such that water is delivered to the system at the most remote hose connection in not more than 3 minutes, starting at the normal air pressure on the system and at the time of fully opened hose connection.

5.2.1.2.3 The use of a listed quick opening device shall be permitted in order to meet the requirements of 5.2.1.2.2.

5.2.1.3* Location and Protection of Dry Pipe Valve. [13:8.2.5]

5.2.1.3.1* General. The dry pipe valve and supply pipe shall be protected against freezing and mechanical injury. [13:8.2.5.1]

5.2.1.3.2 Valve Rooms. [13:8.2.5.2]

5.2.1.3.2.1 Valve rooms shall be lighted and heated. [13:8.2.5.2.1]

5.2.1.3.2.2 The source of heat shall be of a permanently installed type. [13:8.2.5.2.2]

5.2.1.3.2.3 Heat tape shall not be used in lieu of heated valve enclosures to protect the dry pipe valve and supply pipe against freezing. [13:8.2.5.2.3]

5.2.1.3.3 High Water Level Protection.

5.2.1.3.3.1 Where it is possible to reseal the dry valve after actuation without first draining the system, protection against occurrence of water above the clapper shall be permitted in accordance with 5.2.1.3.3.3. [13:8.2.5.4.1]

Δ 5.2.1.3.3.2 Differential Dry Pipe Valve. Protection against accumulation of water above the clapper shall be provided for differential dry pipe valves in accordance with 5.2.1.3.3.3. [13:8.2.5.4.2]

5.2.1.3.3.3 High Water Level Device. An automatic high water level signaling device or an automatic drain device shall be permitted. [13:8.2.5.4.3]

5.2.1.4 Air Pressure and Supply. [13:8.2.6]

5.2.1.4.1 Maintenance of Air Pressure. Air or nitrogen or other approved gas pressure shall be maintained on dry pipe systems throughout the year. [13:8.2.6.2]

5.2.1.4.2* Air Supply. [13:8.2.6.3]

5.2.1.4.2.1 The compressed air supply shall be from a source available at all times. [13:8.2.6.3.1]

5.2.1.4.2.2* The air supply shall have a capacity capable of restoring normal air pressure in the system within 30 minutes. [13:8.2.6.3.2]

5.2.1.4.3 Air Supply Connection. [13:8.2.6.4]

5.2.1.4.3.1 The connection from the air supply to the dry pipe valve shall not be less than ½ in. (15 mm) in diameter and shall enter the system above the priming water level of the dry pipe valve. [13:8.2.6.4.1]

Δ 5.2.1.4.3.2 A check valve shall be installed in the air filling connection. [13:8.2.6.4.2]

N 5.2.1.4.3.3 A listed or approved shutoff valve of either the renewable disc type or ball valve type shall be installed on the supply side of this check valve. [13:8.2.6.4.2.1]

5.2.1.4.4 Relief Valve. An approved relief valve shall be provided between the air supply and the shutoff valve and shall be set to relieve pressure no less than 10 psi (0.7 bar) in excess of system air pressure provided in 5.2.1.4.10 and shall not exceed the manufacturer's limitations. [13:8.2.6.5]

5.2.1.4.5 Automatic Air Maintenance. Unless the requirements of 5.2.1.4.6 are met, where the air supply to a dry pipe system is maintained automatically, the air supply shall be from a dependable plant system or an air compressor with an air receiver, and shall utilize an air maintenance device specifically listed for such service and capable of controlling the required air pressure on, and maximum airflow to, the dry system. [13:8.2.6.6.1]

5.2.1.4.6 Where the air compressor supplying the dry pipe system has a capacity less than 5.5 ft³/min (160 L/min) at 10 psi (0.7 bar), an air receiver or air maintenance device shall not be required. [13:8.2.6.6.2]

5.2.1.4.7 The automatic air supply to more than one dry pipe system shall be connected to enable individual maintenance of air pressure in each system. [13:8.2.6.6.3]

5.2.1.4.8 A check valve or other positive backflow prevention device shall be installed in the air supply to each system to prevent airflow or waterflow from one system to another. [13:8.2.6.6.4]

5.2.1.4.9 System Air Pressure.

5.2.1.4.10 The system air pressure shall be maintained in accordance with the instruction sheet furnished with the dry pipe valve, or shall be 20 psi (1.4 bar) in excess of the calculated trip pressure of the dry pipe valve, based on the highest normal water pressure of the system supply. [13:8.2.6.7.1]

5.2.1.4.11 The permitted rate of air leakage shall be as specified in 5.2.1.4.12. [13:8.2.6.7.2]

5.2.1.4.12 In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.7 bar) shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1½ psi (0.1 bar) for the 24 hours shall be corrected. [13:8.2.6.7.3]

5.2.1.4.13 Nitrogen. Where used, nitrogen shall be introduced through a pressure regulator set to maintain system pressure in accordance with 5.2.1.4.5.

5.2.2 Auxiliary Systems. A wet standpipe system shall be permitted to supply an auxiliary dry standpipe system, provided the water supply is capable of supplying the system demand.

5.2.3* Semiautomatic Dry.

5.2.3.1 A listed remote control activation device shall be provided at each hose connection within 3 ft (1 m) and shall be visible and identified as to its intended use and in accordance with the manufacturer's specifications.

5.2.3.1.1 The remote control activation device shall be permitted to be secured in an approved manner to prevent unauthorized system activation.

5.2.3.1.2 The remote control activation system shall be installed in accordance with NFPA 72.

5.2.3.1.3* The remote control activation circuits shall be protected from mechanical damage.

5.2.3.1.4 All wiring for actuation of semiautomatic systems shall be supervised in accordance with *NFPA 72*.

5.2.3.2 All remote control activation devices of the semiautomatic dry standpipe system shall be compatible and listed for the intended use.

5.2.3.3 The automatic water control valve shall be provided with hydraulic means or mechanical manual means for operation that is independent of the remote control activation device.

5.2.3.4 Pressure Gauges. Approved pressure gauges conforming with Section 5.5 shall be installed as follows:

- (1) Above and below preaction valve and below deluge valve
- (2) On air supply to preaction and deluge valves [13:8.3.1.3]

5.2.3.5 Location and Protection of System Water Control Valves. [13:8.3.1.8]

5.2.3.5.1 System water control valves and supply pipes shall be protected against freezing and mechanical injury. [13:8.3.1.8.1]

5.2.3.5.2 Valve Rooms. [13:8.3.1.8.2]

5.2.3.5.2.1 Valve rooms shall be lighted and heated. [13:8.3.1.8.2.1]

5.2.3.5.2.2 The source of heat shall be of a permanently installed type. [13:8.3.1.8.2.2]

5.2.3.5.2.3 Heat tracing shall not be used in lieu of heated valve enclosure rooms to protect preaction and deluge valves and supply pipe against freezing. [13:8.3.1.8.2.3]

5.2.3.6 Semiautomatic dry systems shall be one of the following types:

- (1) A single interlock system, which admits water to piping upon operation of the remote control activation device
- (2) A non-interlock system, which admits water to piping upon operation of remote control activation device or hose valve
- (3) A double interlock system, which admits water to piping upon operation of both remote control activation devices and hose valves

5.3 Classes of Standpipe Systems.

5.3.1 Class I Systems. A Class I standpipe system shall provide 2½ in. (65 mm) hose connections to supply water for use by fire departments and those trained in handling heavy fire streams.

5.3.2 Class II Systems.

5.3.2.1 A Class II standpipe system shall provide either 1½ in. (40 mm) hose stations to supply water for use by trained personnel or a hose connection for the fire department during initial response.

5.3.2.2 A minimum 1 in. (25.4 mm) hose shall be permitted to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the AHJ.

5.3.3 Class III Systems. A Class III standpipe system shall provide 1½ in. (40 mm) hose stations to supply water for use by trained personnel and 2½ in. (65 mm) hose connections to

supply a larger volume of water for use by fire departments and those trained in handling heavy fire streams.

5.3.3.1 A minimum 1 in. (25.4 mm) hose shall be permitted to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the AHJ.

5.3.3.2 Where the building is protected throughout by an approved automatic sprinkler system, Class II hose stations for use by trained personnel shall not be required, subject to the approval of the AHJ, provided that each Class I hose connection is 2½ in. (65 mm) and is equipped with a 2½ in. × 1½ in. (65 mm × 40 mm) reducer and a cap attached with a chain.

5.3.3.2.1 Class III standpipes meeting the provisions of 5.3.3.2 shall not be required to meet the pressure requirements of 7.2.3.1 or the travel requirements of 7.3.3.

5.4* Required Type of System.

5.4.1 Class I Standpipe Systems.

5.4.1.1* Class I standpipe systems shall be permitted to be automatic dry, automatic wet, semiautomatic dry, manual dry, or manual wet in buildings not classified as high-rise buildings.

5.4.1.2 Class I standpipe systems in buildings classified as high-rise buildings shall be automatic or semiautomatic.

N 5.4.1.2.1 Manual standpipes shall be permitted in open parking garages where the highest floor is located not more than 150 ft (45,720 mm) above the lowest level of fire department vehicle access.

5.4.1.2.2 In buildings classified as high-rise, all required standpipes shall be automatic or semiautomatic, including partial height and horizontal standpipes that serve only a portion or limited number of floors within the building.

5.4.1.3 Where an existing standpipe system having standpipes with a minimum diameter of 4 in. (100 mm) is to be utilized to supply a new retrofit sprinkler system, the water supply required by Sections 7.8 and 7.10 shall not be required to be provided by automatic or semiautomatic means, provided that the water supply is adequate to supply the hydraulic demand of the sprinkler system in accordance with NFPA 13.

5.4.1.4 Class I standpipe systems shall be wet systems except where piping is subject to freezing.

5.4.2 Class II and Class III Standpipe Systems. Class II and Class III standpipe systems with 1½ in. (40 mm) hose stations shall be automatic wet systems unless located in a facility where piping is subject to freezing and where a fire brigade is trained to operate the system without fire department intervention, in which case an automatic dry or semiautomatic dry system shall be permitted.

5.4.2.1* In a non-high-rise building, the Class I portion of a Class III system shall be permitted to be manual. The Class II portion of a Class III system shall be automatic.

5.5* Gauges.

5.5.1 An approved pressure gauge with a connection not smaller than ¼ in. (6 mm) shall be installed at each discharge pipe from the fire pump and the public waterworks, at the pressure tank, at each main drain connection, at the air pump supplying the pressure tank, and at the top of each standpipe.

5.5.1.1 Gauges shall be located to permit removal and shall be located where they will not be subject to freezing.

5.5.1.2 Each gauge connection shall be equipped with a shut-off valve and provisions for draining.

5.5.1.3 Where several standpipes are interconnected at the top, a single gauge shall be permitted to be substituted for a gauge at the top of each standpipe.

5.5.1.4 Pressure gauges shall be installed above and below each alarm check valve, dry pipe valve, deluge valve, backflow preventer, or system riser check valve where such devices are present.

5.5.2* Pressure-Regulating Device.

5.5.2.1 A valved outlet for a pressure gauge shall be installed on the upstream side of every pressure-regulating device.

5.5.2.2 Approved pressure gauges shall be installed on both upstream and downstream sides of every pressure-regulating device installed in accordance with 7.2.4(6).

5.6* Waterflow and Supervisory Alarms.

5.6.1 Except for manual dry and manual wet standpipe systems, listed waterflow devices shall be provided for each standpipe system.

5.6.2 Waterflow alarms shall utilize a sensing mechanism appropriate to the type of standpipe.

5.6.3 Paddle-type waterflow alarms shall be used on wet standpipe systems only.

5.6.4* A means for testing the waterflow device shall be provided.

5.6.5 Alarm and supervisory devices shall be installed in accordance with NFPA 72.

Chapter 6 Installation Requirements

6.1* Location and Protection of Piping.

6.1.1 Location of Dry Standpipes. Dry standpipes shall be monitored in accordance with NFPA 72 with supervisory air pressure.

6.1.2 Protection of Aboveground Piping.

6.1.2.1* Standpipe system piping shall be protected from mechanical damage and fire damage in accordance with this section.

6.1.2.2* Standpipe systems shall be protected in accordance with Table 6.1.2.2.

6.1.2.2.1 Protection shall consist of one of the following methods:

- (1) Enclosure in a fire-rated exit stairway
- (2) Enclosure in fire-rated construction with such rating equal to that of the enclosed fire rated exit stairway
- (3) Listed fire wrap or other insulating material applied directly to the pipe with such rating equal to that of the enclosed fire-rated exit stairway

6.1.2.2.2 Where exit stairways are not required to be enclosed in fire-rated construction, standpipe systems shall not be required to be protected.

6.1.2.2.3 Class II standpipe systems are not required to be protected.

6.1.2.2.4 Where additional standpipes are needed to meet travel distance requirements in non-high-rise buildings, protection of piping is not required.

6.1.2.2.5 Piping subject to mechanical damage shall be protected by steel posts, concrete barriers, or other approved means.

6.1.2.3 Where standpipe system piping that is normally filled with water passes through an area subject to freezing temperatures, it shall be protected to maintain the temperature of the water in the piping between 40°F and 120°F (4°C and 48.9°C).

6.1.2.3.1 Antifreeze solutions shall not be used to protect standpipe system piping from freezing.

6.1.2.3.2 Listed heat tracing shall be permitted to be used for protection from freezing.

6.1.2.3.2.1 Heat tracing shall be installed and insulated in accordance with the manufacturer's specifications.

6.1.2.3.2.2* Where heat tracing is utilized, it shall be specifically listed for use on fire suppression systems.

Table 6.1.2.2 Protection of Aboveground Piping

Construction Type	Sprinkler Protection	High-Rise Buildings			Non-High-Rise Buildings		
		Standpipe	Horizontal ^a	Branchline	Standpipe	Horizontal ^a	Branchline
I	AS ^b	✓	N/A	N/A	✓	N/A	N/A
I	NS ^c	✓	✓	✓	✓	N/A	N/A
II	AS	✓	N/A	N/A	✓	N/A	N/A
II	NS	✓	✓	✓	✓	N/A	N/A
III, IV, & V	AS/NS	✓	✓	✓	✓	N/A	N/A

Notes:

^aRefers to either a horizontal standpipe or the horizontal portion of any standpipe such as a feed main.

^bAS = fully sprinklered building in accordance with NFPA 13

^cNS = nonsprinklered or partially sprinklered building

Shaded text = Revisions.  = Text deletions and figure/table revisions. • = Section deletions.  = New material



6.1.2.3.2.3 Where heat tracing systems are used, they shall be supervised by one of the following methods:

- (1) Central station, proprietary, or remote station signaling service
- (2) Local signaling service that will cause a signal at a constantly attended location

N 6.1.2.3.3 Water-filled piping shall be permitted to be installed in areas where the temperature is less than 40°F (4°C) when heat loss calculations performed by a professional engineer verify that the system will not freeze.

6.1.2.4 Where corrosive conditions exist or piping is exposed to the weather, corrosion-resistant types of pipe, tube, fittings, and hangers or protective corrosion-resistive coatings shall be used.

6.1.2.5 Where standpipe systems are required to be protected against damage from earthquakes, standpipe systems shall be protected in accordance with NFPA 13.

6.1.3 Horizontal piping for all dry standpipe systems and semi-automatic standpipes shall be pitched to drain at least ¼ in. per 10 ft (2 mm/m).

6.1.4 In refrigerated areas, the pipe shall be pitched to drain at least ½ in. per 10 ft (4 mm/m).

6.2 Underground Piping. Underground piping shall be in accordance with NFPA 24.

6.3 Gate Valves and Check Valves.

6.3.1 Connection to Water Supply.

6.3.1.1 Connections to each automatic water supply shall be provided with an approved indicating-type valve and check valve located close to the supply.

6.3.1.1.1 The approved indicating-type valve and check valve shall be permitted to be located within the building.

6.3.1.2 Valves in 6.3.1.1 shall not be required for automatic and semiautomatic standpipe systems supplied by fire pumps.

6.3.1.3 Backflow preventers shall be acceptable devices to meet the requirements of 6.3.1.1.

6.3.1.4 Valves in 6.3.1.1 shall not be required on manual dry standpipe systems.

6.3.1.4.1 The valves required by 6.3.2 shall be provided where there is more than one standpipe on a system.

6.3.1.5* An approved indicating-type valve and approved check valve shall be provided in the water supply for a manual wet standpipe system.

6.3.2 Valves shall be provided on all standpipes, including manual dry standpipes and horizontal standpipes, to allow isolation of a standpipe without interrupting the supply to other standpipes from the same source of supply.

6.3.3 Listed indicating-type valves shall be provided at the standpipe for controlling branch lines where the distance to the remote hose connection exceeds 40 ft (12 m) measured along the pipe.

6.3.4 Where wafer-type valve discs are used, they shall be installed so that they do not interfere with the operation of other system components.

6.3.5* Control Valves and Check Valves on Combined (Standpipe/Sprinkler) Systems.

6.3.5.1 Each connection from a standpipe that is part of a combined system to a sprinkler system shall have an individual control valve and check valve.

6.3.5.2 A listed pressure-regulating device that prevents back-flow shall be considered a check valve, and an additional check valve shall not be required.

6.3.6 Valves on Connections to Water Supplies.

6.3.6.1 General.

6.3.6.1.1* Each water supply, other than the fire department connection, shall be provided with a listed indicating valve in an approved location.

6.3.6.1.2 Valves on fire department connections shall be in accordance with Sections 6.3 and 6.4.

6.3.6.1.2.1 All valves shall be plainly marked to indicate the service that they control.

6.3.6.1.2.2 The indicating valve shall be installed where it is readily accessible in case of fire and not subject to damage.

6.3.6.1.2.3 Wall post indicator valves shall be permitted where approved by the AHJ.

6.3.6.1.3 Where a post-indicator valve cannot be used, an underground valve with an approved roadway box, complete with T-wrench, shall be permitted.

6.3.6.1.3.1 The location of the T-wrench shall be acceptable to the AHJ.

6.3.6.1.3.2 The valve locations, directions for their opening, and services that they control shall be plainly marked on the buildings served.

6.3.7 Valve Supervision.

6.3.7.1 System water supply valves, isolation control valves, and other valves in feed mains shall be supervised in an approved manner in the open position by one of the following methods:

- (1) A central station, proprietary, or remote station signaling service
- (2) A local signaling service that initiates an audible signal at a constantly attended location
- (3) Locking of valves in the open position
- (4) Sealing of valves and an approved weekly recorded inspection where valves are located within fenced enclosures under the control of the owner

6.3.7.2 Underground gate valves with roadway boxes shall not be required to be supervised.

6.3.7.3 The bypass valves required in 7.2.4(4) shall be supervised in the closed position.

6.3.7.3.1 Supervision of these valves shall be in accordance with 6.3.7.1(1) or 6.3.7.1(2).

6.3.8 Signs for Room Identification, Valves, and Hose Connections.

6.3.8.1 All main and sectional system control valves, including water supply control valves, shall have a sign indicating the portion of the system that is controlled by the valve.