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NFPA® 14

Standard for the Installation of Standpipe and Hose Systems

2013 Edition



NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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NFPA® 14

Standard for the

Installation of Standpipe and Hose Systems

2013 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 27, 2012, with an effective date of December 17, 2012, and supersedes all previous editions.

This edition of NFPA 14 was approved as an American National Standard on December 17, 2012.

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

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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 revises 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, has been defined. The term *horizontal standpipe* has been added to the requirement for pipe protection. Heat tracing requirements have been clarified, along with added requirements for the pitching of pipe used in a dry system. The valve and drain requirements have been extensively revised, providing greater guidance and clarification. New criteria and a new figure regarding horizontal exists have also 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.

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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 determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction 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 authority having jurisdiction, 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 authority having jurisdiction to demonstrate equivalency.

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

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.

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, *Standard for Use of the International System of Units (SI): The Modern Metric System.*

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.

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.

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

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2013 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies,* 2013 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection,* 2013 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection,* 2013 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* 2013 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* 2009 edition.

NFPA 72®, National Fire Alarm and Signaling Code, 2013 edition.

NFPA *101®, Life Safety Code®,* 2012 edition.

NFPA 170, *Standard for Fire Safety and Emergency Symbols,* 2012 edition.

NFPA 1963, *Standard for Fire Hose Connections,* 2009 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*, 2009.

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

Boiler and Pressure Vessel Code, 2010.

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*, 2006.

ASME B16.1, *Cast Iron Pipe Flanges and Flanged Fittings*, 2010.

ASME B16.3, *Malleable Iron Threaded Fittings*, 2006.

ANSI/ASME B16.4, *Gray Iron Threaded Fittings*, 2006.

ASME B16.5, *Pipe Flanges and Flanged Fittings*, 2009.

ANSI/ASME B16.9, *Factory-Made Wrought Steel Buttwelding Fittings*, 2007.

ASME B16.11, *Forged Fittings, Socket-Welding and Threaded*, 2009.

ASME B16.25, *Buttwelding Ends*, 1997.

ANSI/ASME B36.10M, *Welded and Seamless Wrought Steel Pipe*, 2004.

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*, 2010.

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

ASTM A234/A234M, *Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service*, 2011a.

ASTM A795/A795M, *Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use*, 2008.

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

ASTM B88, *Standard Specification for Seamless Copper Water Tube*, 2009.

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

2.3.4 AWS Publications. American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

AWS A5.8, *Specification for Filler Metals for Brazing and Braze Welding*, 2004.

AWS B2.1, *Specification for Welding Procedure and Performance Qualification*, 2009.

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

AWWA C104, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings*, 2008.

AWWA C110, *Ductile-Iron and Gray-Iron Fittings,* 2008.

AWWA C115, *Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges,* 2005.

AWWA C151, *Ductile-Iron Pipe, Centrifugally Cast, for Water,* 2009.

AWWA C153, *Ductile-Iron Compact Fittings for Water Service,* 2006.

2.3.6 IEEE Publications. Institute of Electrical and Electronics Engineers, Three Park Avenue, 17th Floor, New York, NY, 10016-5997.

IEEE/ASTM SI 10, *Standard for Use of the International System of Units (SI): The Modern Metric System*, 2010.

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,* 2013 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* 2013 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2011 edition.

NFPA *101®, Life Safety Code®,* 2012 edition.

NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications,* 2009 edition.

NFPA 5000®, Building Construction and Safety Code®, 2012 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.

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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. A document, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and which 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 *Manual of Style for NFPA Technical Committee Documents*.

3.3 General Definitions.

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

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

3.3.3 Connection.

3.3.3.1 *Fire Department Connection.*

3.3.3.1.1 *Fire Department Connection for Automatic Standpipe Systems.* A connection through which the fire department can pump the secondary water supply to an automatic standpipe 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.

3.3.3.1.2 *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.

3.3.3.2 *Hose Connection.* A combination of equipment provided for connection of a hose to the standpipe system that includes a hose valve with a threaded outlet.

3.3.4 Exit.

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

3.3.4.2* *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,*** 2012]

3.3.5 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,** 2009]

3.3.6 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,** 2012]

3.3.7 Hose Station. A combination of a hose rack, hose nozzle, hose, and hose connection.

3.3.8 Main.

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

3.3.8.1.1 *Express Main.* A type of feed main supplying the upper zone of a standpipe system. An express main does not supply any portion of a low zone standpipe system.

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

3.3.10 Pressure.

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

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

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

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

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

3.3.11.2 *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.

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

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

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

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

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

3.3.15* Standpipe System. An arrangement of piping, valves, hose connections, and allied 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

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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.

3.3.15.1 ***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.

3.3.15.2 ***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.

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

3.3.15.4 ***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.

3.3.15.5 ***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.

3.3.15.6 ***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.

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

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

3.3.17* System Classes.

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

3.3.17.2 ***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.

3.3.17.3 ***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.

3.3.18 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.

3.3.19 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 outlet, curving around any corners or obstructions with a 12 in. (300 mm) clearance.

3.3.20 Valve.

3.3.20.1 ***Control Valve.*** A valve controlling flow to water-based fire protection systems. Control valves do not include hose valves, inspector's test valves, drain valves, trim valves for dry pipe, preaction and deluge valves, check valves, or relief valves.

3.3.20.2 ***Hose Valve.*** The valve to an individual hose connection.

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, 4.2.1, and 4.3.1.

4.1.3 Components that do not affect system performance, such as drain piping, drain valves, and signs, 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, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.*

Table 4.2.1 Pipe or Tube Materials and Dimensions

Materials and Dimensions (Specifications)	Standard
Ferrous piping	
Ductile-Iron Pipe, Centrifugally Cast, for Water	AWWA C151
Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges	AWWA C115
Electric-resistance-welded steel pipe	
Standard Specification for Electric-Resistance–Welded Steel Pipe	ASTM A 135
Welded and seamless steel	
Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use	ASTM A 795
Welded and seamless steel pipe	
Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	ASTM A 53
Welded and Seamless Wrought Steel Pipe	ANSI B36.10M
Copper tube (drawn, seamless)	
Standard Specification for Seamless Copper Tube	ASTM B 75
Standard Specification for Seamless Copper Water Tube	ASTM B 88
Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	ASTM B 251
Brazing filler metal (classifications BCuP-3 or BCuP-4)	
Specification for Filler Metals for Brazing and Braze Welding	AWS A5.8

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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.

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	
Gray Iron Threaded Fittings	ANSI B16.4
Cast Iron Pipe Flanges and Flanged Fittings	ANSI B16.1
Malleable-iron	
Malleable Iron Threaded Fittings	ANSI B16.3
Ductile-iron	
Ductile-Iron and Gray-Iron Fittings	AWWA C110
Ductile-Iron Compact Fittings for Water Service	AWWA C153
Steel	
Factory-Made Wrought Steel Buttwelding Fittings	ANSI B16.9
Buttwelding Ends	ANSI B16.25
Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service	ASTM A 234
Pipe Flanges and Flanged Fittings	ANSI B16.5
Forged Fittings, Socket-Welding and Threaded	ANSI B16.11

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 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:**6.5.1.1]

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:**6.5.1.2]

4.4.1.3 Joint compound or tape shall be applied only to male threads. [**13:**6.5.1.3]

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, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work.*

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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, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*. [**13:**6.5.2.2.3]

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:**6.5.2.2.4]

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:**6.5.2.3.1]

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:**6.5.2.3.2]

4.4.2.3.3 Fittings shall not be required where pipe ends are buttwelded in accordance with the requirements of 4.4.2.4.2. [**13:**6.5.2.3.3]

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:**6.5.2.3.4]

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. The minimum throat thickness shall be not less than the thickness of the pipe, the thickness of the welding fitting, or 3⁄16 in. (4.8 mm), whichever is least. [**13:**6.5.2.4.1]

4.4.2.4.2* Circumferential butt joints shall be cut, beveled, and fit so that full penetration is achievable. Full penetration welding shall not be required. [**13:**6.5.2.4.2]

4.4.2.4.3 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:**6.5.2.4.3]

4.4.2.4.4 Face welds on the internal face of the flange shall be permitted as a water seal in addition to the hub weld required in 4.4.2.4.3. [**13:**6.5.2.4.4]

4.4.2.4.5 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:**6.5.2.4.5]

4.4.2.4.6 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 4.4.2.4.5.
(8) Completed welds shall be free from cracks, incomplete fusion, surface porosity greater than 1⁄16 in. (1.6 mm) diameter, and undercut deeper than 25 percent of the wall thickness or 1⁄32 in. (0.8 mm), whichever is less.
(9) Completed circumferential butt weld reinforcement shall not exceed 3⁄32 in. (2.4 mm).

[**13:**6.5.2.4.6]

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:**6.5.2.5.1]

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, *Specification for Welding Procedure and Performance Qualification*, ASME *Boiler and Pressure Vessel Code*, Section IX, *Welding and Brazing Qualifications*, or other applicable qualification standard as required by the authority having jurisdiction, except as permitted by 4.4.2.5.3. [**13:**6.5.2.5.2]

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:**6.5.2.5.3]

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:**6.5.2.5.4]

4.4.2.5.5 Contractors or fabricators shall be responsible for all welding they produce. [**13:**6.5.2.5.5]

4.4.2.5.6 Each contractor or fabricator shall have available to the authority having jurisdiction an established written quality assurance procedure ensuring compliance with the requirements of 4.4.2.4. [**13:**6.5.2.5.6]

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:**6.5.2.6.1]

4.4.2.6.2 Contractors or fabricators shall maintain certified records, which shall be available to the authority having jurisdiction, of the procedures used and the welders or welding machine operators employed by them, along with their welding identification. [**13:**6.5.2.6.2]

4.4.2.6.3 Records shall show the date and the results of procedure and performance qualifications. [**13:**6.5.2.6.3]

4.4.3 Groove Joining Methods.

4.4.3.1 Pipe joined with grooved fittings shall be joined by a listed combination of fittings, gaskets, and grooves. [**13:**6.5.3.1]

4.4.3.2 Grooves cut or rolled on pipe shall be dimensionally compatible with the fittings. [**13:**6.5.3.2]

4.4.3.3 Grooved fittings, including gaskets used on dry-pipe, preaction, and deluge systems, shall be listed for dry pipe service. [**13:**6.5.3.3]

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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:**6.5.4.6]

4.4.5 Other Joining Methods.

4.4.5.1 Other joining methods investigated for suitability in automatic sprinkler installations and listed for this service shall be permitted where installed in accordance with their listing limitations, including installation instructions. [**13:**6.5.5.1]

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:**6.5.5.2]

4.4.6 End Treatment.

4.4.6.1 After cutting, pipe ends shall have burrs and fins removed. [**13:**6.5.6.1]

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:**6.5.6.2]

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 Such valves shall not close in less than 5 seconds when operated at maximum possible speed from the fully open position.

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, *Standard for Fire Hose Connections.*

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

4.7.4 Where local fire department hose threads do not conform to NFPA 1963, *Standard for Fire Hose Connections*, 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 Each fire department connection shall have at least two 2½ in. (65 mm) internal threaded swivel fittings having NHS

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threads, as specified in NFPA 1963, *Standard for Fire Hose Connections. (See Sections 7.7 and 7.12 for design requirements.)*

4.8.2.1 Fire department connections shall be equipped with caps to protect the system from the entry of debris.

4.8.2.2 Where the local fire department uses fittings that differ from those specified, fittings compatible with local fire department equipment shall be used and their minimum size shall be 2½ in. (65 mm).

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.

5.1.4 Standpipe and hose systems not required by the AHJ and not meeting the requirements of this standard shall be marked with a sign that reads "FOR FIRE BRIGADE USE ONLY."

5.2 Automatic and Semiautomatic Dry Systems.

5.2.1* Automatic Dry.

5.2.1.1 Pressure Gauges. Listed pressure gauges conforming 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:**7.2.1]

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:**7.2.5]

5.2.1.3.1* General. The dry pipe valve and supply pipe shall be protected against freezing and mechanical injury. [**13:**7.2.5.1]

5.2.1.3.2 Valve Rooms. [**13:**7.2.5.2]

5.2.1.3.2.1 Valve rooms shall be lighted and heated. [**13:**7.2.5.2.1]

5.2.1.3.2.2 The source of heat shall be of a permanently installed type. [**13:**7.2.5.2.2]

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:**7.2.5.2.3]

5.2.1.3.3 High Water Level Protection.

5.2.1.3.3.1 Where it is possible to reseat 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:**7.2.5.4.1]

5.2.1.3.3.2 Low Differential Dry Pipe Valve. Protection against accumulation of water above the clapper shall be provided for a low differential dry pipe valve in accordance with 5.2.1.3.3.3. [**13:**7.2.5.4.2]

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:**7.2.5.4.3]

5.2.1.4 Air Pressure and Supply. [**13:**7.2.6]

5.2.1.4.1 Maintenance of Air Pressure. Air or nitrogen pressure shall be maintained on dry pipe systems throughout the year. [**13:**7.2.6.1]

5.2.1.4.2* Air Supply. [**13:**7.2.6.2]

5.2.1.4.2.1 The compressed air supply shall be from a source available at all times. [**13:**7.2.6.2.1]

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:**7.2.6.2.2]

5.2.1.4.3 Air Supply Connection. [**13:**7.2.6.3]

5.2.1.4.3.1 Connection pipe from the air supply 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:**7.2.6.3.1]

5.2.1.4.3.2 A check valve shall be installed in this air line, and a shutoff valve of the renewable disc type shall be installed on the supply side of this check valve and shall remain closed unless filling the system. [**13:**7.2.6.3.2]

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:**7.2.6.4]

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:**7.2.6.5.1]

5.2.1.4.6 Where the air compressor supplying the dry pipe system has a capacity less than 5.5 ft^3/min (156 L/min) at 10 psig (0.7 bar), no air receiver or air maintenance device shall be required. [**13:**7.2.6.5.2]

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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:**7.2.6.5.3]

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:**7.2.6.5.4]

5.2.1.4.9 System Air Pressure. [**13:**7.2.6.6]

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:**7.2.6.6.1]

5.2.1.4.11 The permitted rate of air leakage shall be as specified in 5.2.1.4.12. [**13:**7.2.6.6.2]

5.2.1.4.12 In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.8 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:**24.2.2.1]

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. [**13:**7.2.6.7]

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. [**13:**7.1.3]

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, National Fire Alarm and Signaling Code*.

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, National Fire Alarm and Signaling Code*.

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. Listed 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:**7.3.1.3]

5.2.3.5 Location and Protection of System Water Control Valves. [**13:**7.3.1.8]

5.2.3.5.1 System water control valves and supply pipes shall be protected against freezing and mechanical injury. [**13:**7.3.1.8.1]

5.2.3.5.2 Valve Rooms. [**13:**7.3.1.8.2]

5.2.3.5.2.1 Valve rooms shall be lighted and heated. [**13:**7.3.1.8.2.1]

5.2.3.5.2.2 The source of heat shall be of a permanently installed type. [**13:**7.3.1.8.2.2]

5.2.3.5.2.3 Heat tape shall not be used in lieu of heated valve enclosure rooms to protect preaction and deluge valves and supply pipe against freezing. [**13:**7.3.1.8.2.3]

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 authority having jurisdiction.

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 authority having jurisdiction.

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.

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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.

5.4.1.2.1 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 Section 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, *Standard for the Installation of Sprinkler Systems*.

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 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* The automatic portion of a Class III system shall be permitted to be only what is required for a Class II system unless the Class I portion requires an automatic water supply.

5.5* Gauges.

5.5.1 A listed pressure gauge having a minimum face diameter of 3½ in. (90 mm) shall be connected to 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 in a place so that water cannot freeze.

5.5.1.2 Each gauge connection shall be equipped with a shutoff 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 Pressure gauges shall be installed on the upstream and the 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 systems, listed waterflow and control valve supervision 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 test connection for testing the waterflow device shall be provided.

5.6.5 Alarm and supervisory devices shall be installed in accordance with *NFPA 72, National Fire Alarm and Signaling Code*.

Chapter 6 Installation Requirements

6.1* Location and Protection of Piping.

6.1.1 Location of Dry Standpipes. Dry standpipes shall not be concealed unless the piping integrity is monitored with supervisory air pressure, in accordance with *NFPA 72, National Fire Alarm and Signaling Code*.

6.1.2 Protection of Aboveground Piping.

6.1.2.1* Standpipe system piping shall be protected from mechanical damage.

6.1.2.2 Feed mains, standpipes, horizontal standpipes, and branch lines supplied by standpipes shall be located in enclosed exit stairways or shall be protected by a degree of fire resistance equal to that required for enclosed exit stairways in the building in which they are located.

6.1.2.2.1 In buildings equipped with an approved automatic sprinkler system, horizontal standpipes, feed mains, and branch lines shall not be required to be protected.

6.1.2.2.2 Piping connecting standpipes to 1½ in. (40 mm) hose connections shall not be required to be protected.

6.1.2.2.3 Where exit stairways are not required to be enclosed in fire-rated construction, standpipe systems shall be permitted to be installed without the fire resistance required by 6.1.2.2.

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 (4.4°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.

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

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.

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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, *Standard for the Installation of Sprinkler Systems*.

6.1.3 All piping for dry standpipes, manual dry standpipes, and semiautomatic 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, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

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.

6.3.1.2 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 check valve shall be provided in the water supply for a manual wet standpipe system.

6.3.1.6 Fire department connections shall not be provided with isolation valves.

6.3.2 Valves shall be provided on all standpipes, including manual-dry 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 for remote hose stations.

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 of the same size as the connection.

6.3.5.2 A listed pressure-regulating device that prevents backflow 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 Where the valve cannot be located at least 40 ft (12.2 m) from the building, it shall be installed in an approved location and 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 post-indicator valves cannot be used, underground valves shall be permitted.

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

6.3.6.2* Where the standpipes are supplied from a yard main or header in another building, the connection shall be provided with a listed indicating-type valve located outside at a safe distance from the building or at the header.

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 Section 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.

6.3.8.2 All control, drain, and test connection valves shall be provided with signs indicating their purpose.

6.3.8.3 Where sprinkler system piping supplied by a combined system is supplied by more than one standpipe ("loop" or "dual feed" design), a sign shall be located at each dual or multiple feed connection to the combination system standpipe to indicate that in order to isolate the sprinkler system served by the control valve, an additional control valve or valves at other standpipes shall be shut off.

6.3.8.3.1 The sign also shall identify the location of the additional control valves.

6.3.8.4 Where a main or sectional system control valve is located in a closed room or concealed space, the location of the valve

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shall be indicated by a sign in an approved location on the outside of the door or near the opening to the concealed space.

6.3.8.5* Where hose connections are not located in exit stairways, signs shall be provided in accordance with NFPA 170, *Standard for Fire Safety and Emergency Symbols*, to identify the location of the hose connection in an approved manner.

6.3.8.5.1 Valve cabinets, where provided, shall be marked to indicate the contents.

6.3.8.5.2 Letters shall be red with a white background and shall be 2½ in. (65 mm) in height.

6.4* Fire Department Connections.

6.4.1 Except for the valve required by 6.3.2, shutoff valves shall not be installed between the fire department connection and the system.

6.4.2 A listed check valve shall be installed in each fire department connection, including the connection in manual-dry systems, and located as near as practicable to the point where it joins the system.

6.4.3 The fire department connection shall be installed as follows:

(1) *Automatic Wet and Manual Wet Standpipe Systems.* On the system side of the system control valve, check valve, or any pump, but on the supply side of any isolating valves required in 6.3.2
(2) *Automatic Dry Standpipe Systems.* On the system side of the control valve and check valve and the supply side of the dry pipe valve
(3) *Semiautomatic Dry Standpipe Systems.* On the system side of the deluge valve
(4) *Manual Dry Standpipe Systems.* Directly connected to system piping with a check valve in the piping as required by 6.4.3(2)

6.4.3.1 Fire department connections shall not be connected on the suction side of fire pumps. [**13:**8.17.2.4.8]

6.4.4 In areas subject to freezing, a listed automatic drip valve that is arranged to allow drainage without causing water damage shall be installed in the piping between the check valve and the fire department connection.

6.4.5 Location and Identification.

6.4.5.1 Fire department connections shall be visible and recognizable from the street or nearest point of fire department apparatus accessibility or on the street side of buildings.

6.4.5.1.1 Fire department connections shall be located and arranged so that hose lines can be attached to the inlets without interference from nearby objects, including buildings, fences, posts, landscaping, vehicles, or other fire department connections.

6.4.5.2 Each fire department connection shall be designated by a sign, with letters at least 1 in. (25.4 mm) in height, that reads "STANDPIPE." For manual systems, the sign shall also indicate that the system is manual and that it is either wet or dry.

6.4.5.2.1 If automatic sprinklers are also supplied by the fire department connection, the sign or combination of signs shall indicate both designated services (e.g., "STANDPIPE AND AUTOSPKR" or "AUTOSPKR AND STANDPIPE").

6.4.5.2.2 A sign also shall indicate the pressure required at the inlets to deliver the system demand.

6.4.5.3 Where a fire department connection services multiple buildings, structures, or locations, a sign shall be provided indicating the buildings, structures, or locations served.

6.4.5.4* Fire department connections shall be located not more than 100 ft (30.5 m) from the nearest fire hydrant connected to an approved water supply.

6.4.5.4.1 The location of the fire department connection shall be permitted to exceed 100 ft (30.5 m) subject to the approval of the authority having jurisdiction.

6.4.6 Fire department connections shall be located not less than 18 in. (457 mm) nor more than 48 in. (1219 mm) above the level of the adjoining ground, sidewalk, or grade surface.

6.4.7 Fire department connection piping shall be supported in accordance with Section 6.5.

6.5 Support of Piping. Support of system piping shall be in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

6.6 Installation of Signs. Signs shall be secured to a device or the building wall with corrosion-resistant chains or fasteners.

6.7 Signs for Water Supply Pumps. Where a fire pump is provided, a sign shall be located in the vicinity of the pump indicating the minimum pressure and flow required at the pump discharge flange to meet the system demand.

6.8* Hydraulic Design Information Sign.

6.8.1 The installing contractor shall provide a sign identifying the basis of the system design.

6.8.2 The sign shall be located at the water supply control valve for automatic or semiautomatic standpipe systems and at an approved location for manual systems.

6.8.3 The sign shall indicate the following:

(1) Location of the two hydraulically most remote hose connections
(2) Design flow rate for the connections identified in 6.8.3(1)
(3) Design residual inlet and outlet pressures for the connections identified in 6.8.3(1)
(4) Design static pressure and the design system demand (i.e., flow and residual pressure) at the system control valve, or at the pump discharge flange where a pump is installed, and at each fire department connection

Chapter 7 Design

7.1* General. The design of the standpipe system is governed by building height, area per floor occupancy classification, egress system design, required flow rate and residual pressure, and the distance of the hose connection from the source(s) of the water supply.

7.1.1* When pressure-regulating devices are used, they shall be approved for installation within the maximum and minimum anticipated flow conditions.

7.2* Pressure Limitation.

7.2.1 The maximum pressure at any point in the system at any time shall not exceed 350 psi (24 bar).

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7.2.2 Express mains supplying higher standpipe zones shall be permitted to be designed with pressures in excess of 350 psi (24 bar) in accordance with their materials listings or as approved by the AHJ.

7.2.2.1 Where express mains supply higher standpipe zones, there shall be no hose outlets on any portion of the system where the pressure exceeds 350 psi (24 bar).

7.2.3* Maximum Pressure at Hose Connections.

7.2.3.1 Where the residual pressure at a 1½ in. (40 mm) outlet on a hose connection available for trained personnel use exceeds 100 psi (6.9 bar), an approved pressure-regulating device shall be provided to limit the residual pressure at the flow required by Section 7.10 to 100 psi (6.9 bar).

7.2.3.1.1 Paragraph 7.2.3.1 shall not apply to the 1½ in. (40 mm) outlet on a 2½ in. × 1½ in. (65 mm × 40 mm) reducer as allowed by 5.3.3.2 and 7.3.4.1.

7.2.3.2* Where the static pressure at a 2½ in. (65 mm) hose connection exceeds 175 psi (12.1 bar), an approved pressure-regulating device shall be provided to limit static and residual pressures at the outlet of the hose connection to 175 psi (12.1 bar).

7.2.3.3 The pressure on the inlet side of the pressure-regulating device shall not exceed the rated working pressure of the device.

7.2.4* Where more than two hose connections are used downstream of a pressure-regulating device, the following conditions shall apply:

(1) In systems with multiple zones, pressure-regulating device(s) shall be permitted to be used in lieu of providing separate pumps to control pressure in the lower zone(s) as long as the devices comply with all requirements in 7.2.4.
(2) A method to isolate the pressure-regulating device(s) shall be provided for maintenance and repair.
(3) Regulating devices shall be arranged so that the failure of any single device does not allow pressure in excess of 175 psi (12.1 bar) to any of the multiple hose connections downstream.
(4) An equally sized bypass around the pressure-regulating device(s), with a normally closed control valve, shall be installed.
(5) Pressure-regulating device(s) shall be installed not more than 7 ft 6 in. (2.31 m) above the floor.
(6) The pressure-regulating device shall be provided with inlet and outlet pressure gauges.
(7) The fire department connection(s) shall be connected to the system side of the outlet isolation valve.
(8) The pressure-regulating device shall be provided with a pressure relief valve in accordance with the manufacturer's recommendations.
(9) Remote monitoring and supervision for detecting high pressure failure of the pressure-regulating device shall be provided in accordance with *NFPA 72, National Fire Alarm and Signaling Code*.

7.3 Locations of Hose Connections.

7.3.1* General.

7.3.1.1 Hose connections and hose stations shall be unobstructed and shall be located not less than 3 ft (0.9 m) or more than 5 ft (1.5 m) above the floor.

7.3.1.1.1 This dimension shall be measured from the floor to the center of the hose valve.

7.3.1.2 The hose connection shall not be obstructed by any closed or open stairwell door(s) or other objects on the landing.

7.3.2* Class I Systems. Class I systems shall be provided with 2½ in. (65 mm) hose connections in the following locations:

(1) At the main floor landing in exit stairways
(2) On each side of the wall adjacent to the exit openings of horizontal exits
(3) In other than covered mall buildings, in each exit passageway at the entrance from the building areas into the passageway
(4) In covered mall buildings, at the entrance to each exit passageway or exit corridor, and at the interior side of public entrances from the exterior to the mall
(5)*At the highest landing of stairways with stairway access to a roof, or on roofs with a slope of less than 4 in 12 where stairways do not access the roof

7.3.2.1 Hose connections shall be permitted to be located at the highest intermediate landings between floor levels in exit stairways where required by the AHJ.

7.3.2.2* Where the most remote portion of a nonsprinklered floor or story is located in excess of 150 ft (45.7 m) of travel distance from a hose connection in or adjacent to a required exit or the most remote portion of a sprinklered floor or story is located in excess of 200 ft (61 m) of travel distance from a hose connection in or adjacent to a required exit, additional hose connections shall be provided, in approved locations, where required by the local fire department or the AHJ.

7.3.2.2.1 The distance requirements in 7.3.2.2 shall not apply to the roof if it is not intended for occupancy.

7.3.2.3* Hose connections on one side of a horizontal exit shall not be required where another outlet on that side of the horizontal exit can reach the portions of the building on the other side of the horizontal exit within the distances required by 7.3.2.3.1 that would have been protected by the outlet that was omitted.

7.3.2.3.1 This travel distance shall be 200 ft (61 m) for sprinklered buildings and 130 ft (39.7 m) for nonsprinklered buildings.

7.3.3* Class II Systems.

7.3.3.1 Class II systems shall be provided with 1½ in. (40 mm) hose stations so that all portions of each floor level of the building are within 130 ft (39.7 m) of a hose connection provided with 1½ in. (40 mm) hose or within 120 ft (36.6 m) of a hose connection provided with less than 1½ in. (40 mm) hose.

7.3.3.2 Distances shall be measured along a path of travel originating at the hose connection.

7.3.4 Class III Systems. Class III systems shall be provided with hose connections as required for both Class I and Class II systems.

7.3.4.1 Where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, Class II hose stations for use by trained personnel shall not be required, subject to the approval of the local fire department and 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.

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7.3.4.1.1 The travel distance limitation of 7.3.3.1 shall not apply to Class III systems.

7.3.4.1.2 For Class III systems installed without hose, the flow, pressure, and duration requirements shall be as specified for Class I systems.

7.4 Number of Standpipes. Separate standpipes shall be provided in each required exit stairway.

7.5* Interconnection of Standpipes.

7.5.1 Where two or more standpipes are installed in the same building or section of building, they shall be interconnected.

7.5.2 Where standpipes are supplied by tanks located at the top of the building or zone, the standpipes shall be interconnected at the top.

7.5.3 Where standpipes are interconnected at the top and bottom, check valves shall be installed at the base of each standpipe to prevent circulation.

7.6 Minimum Sizes for Standpipes and Branch Lines.

7.6.1 Class I and Class III standpipes shall be at least 4 in. (100 mm) in size.

7.6.2 Standpipes that are part of a combined system shall be at least 6 in. (150 mm) in size.

7.6.3 Where the building is protected throughout by an approved automatic sprinkler system in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, the minimum standpipe size shall be 4 in. (100 mm) for systems hydraulically designed in accordance with 7.8.1.

7.6.4 Branch lines shall be sized based on the hydraulic criteria established in Section 7.8 and Section 7.10 but not less than 2½ in. (65 mm).

7.7 System Design and Sizing of Pipe for Delivery of System Demand.

7.7.1 Class I and Class III standpipe systems shall be designed so that the system demand can be supplied by each fire department connection, which is provided in accordance with Section 7.12.

7.7.2* Where an automatic or semiautomatic water supply is required for a Class I, II, or III standpipe system by Section 5.4, the standpipe system shall be designed so that the system demand can be independently supplied by the attached water supply and each fire department connection provided on the system.

7.7.3 Where a manual system is permitted by Section 5.4 and an attached water supply is provided to supply an automatic sprinkler system or to maintain water in a wet system, the attached water supply shall not be required to satisfy the standpipe system demand.

7.7.4 When the system demand to be supplied by the fire department at the fire department connection is being determined, the local fire department shall be consulted regarding the water supply available from a fire department pumper.

7.8* Minimum and Maximum Pressure Limits.

7.8.1 Minimum Design Pressure for Hydraulically Designed Systems. Hydraulically designed standpipe systems shall be designed to provide the waterflow rate required by Section 7.10 at a minimum residual pressure of 100 psi (6.9 bar) at the outlet of the hydraulically most remote 2½ in. (65 mm) hose connection and 65 psi (4.5 bar) at the outlet of the hydraulically most remote 1½ in. (40 mm) hose station.

7.8.1.1 The pressure loss in the hose valve shall be calculated using Table 8.3.1.3.

7.8.1.1.1 The valve manufacturer's most up-to-date friction loss data shall be used when published.

7.8.1.2* Manual standpipe systems shall be designed to provide 100 psi (6.9 bar) at the topmost outlet with the calculations terminating at the fire department connection.

7.9* Standpipe System Zones.

7.9.1 Except as permitted by 7.2.4, each standpipe system zone shall be provided with a separate pump.

7.9.1.1 The use of pumps arranged in series to meet the requirements of 7.9.1 shall be permitted.

7.9.1.2 Pumps that are arranged in series shall be permitted to be, but are not required to be, located on the same level.

7.9.2* Each zone above the low zone shall have two or more separate and direct supply pipes sized to automatically and independently supply the flow and pressure requirements of Sections 7.8 and 7.10.

7.9.2.1 Standpipes from the lower zone shall be permitted to be used to meet the requirements of 7.9.2.

7.9.3* For systems with two or more zones in which any portion of the higher zones cannot be supplied by means of fire department pumpers through a fire department connection, an auxiliary means of supply in the form of high-level water storage with additional pumping equipment or other means acceptable to the AHJ shall be provided.

7.10 Flow Rates.

7.10.1 Class I and Class III Systems.

7.10.1.1* Flow Rate.

7.10.1.1.1 For Class I and Class III systems, the minimum flow rate for the hydraulically most remote standpipe shall be 500 gpm (1893 L/min), through the two most remote 2½ in. (65 mm) outlets, and the calculation procedure shall be in accordance with 7.10.1.2.

7.10.1.1.2* Where a horizontal standpipe on a Class I or Class III system supplies three or more hose connections on any floor, the minimum flow rate for the hydraulically most demanding horizontal standpipe shall be 750 gpm (2840 L/min), and the calculation procedure shall be in accordance with 7.10.1.2.2.

7.10.1.1.3 The minimum flow rate for additional standpipes shall be 250 gpm (946 L/min) per standpipe for buildings with floor areas that do not exceed 80,000 ft^2 (7432 m^2) per floor. For buildings that exceed 80,000 ft^2 (7432 m^2) per floor, the minimum flow rate for the additional standpipes shall be 500 gpm (1893 L/min) for the second standpipe and 250 gpm (946 L/min) for the third standpipe if the additional flow is required for an unsprinklered building.

7.10.1.1.4 Flow rates for combined systems shall be in accordance with 7.10.1.3.

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7.10.1.1.5 The maximum flow rate shall be 1000 gpm (3785 L/min) for buildings that are sprinklered throughout, in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, and 1250 gpm (4731 L/min) for buildings that are not sprinklered throughout, in accordance with NFPA 13.

7.10.1.1.6* Where lateral piping serves a single outlet, the minimum flow rate for the system shall be determined as if the outlet is being served from a separate standpipe.

7.10.1.2* Hydraulic Calculation Requirements.

7.10.1.2.1 Hydraulic calculations and pipe sizes for each standpipe shall be based on providing 250 gpm (946 L/min) at the two hydraulically most remote hose connections on the standpipe and at the topmost outlet of each of the other standpipes at the minimum residual pressure required by Section 7.8.

7.10.1.2.1.1* Where a standpipe system has risers that terminate at different floor levels, separate hydraulic calculations shall be performed for the standpipes that exist on each level. In each case, flow shall be added only for standpipes that exist on the floor level of the calculations.

7.10.1.2.2 Where a horizontal standpipe on a Class I and Class III system supplies three or more hose connections on any floor, hydraulic calculations and pipe sizes for each standpipe shall be based on providing 250 gpm (946 L/min) at the three hydraulically most remote hose connections on the standpipe and at the topmost outlet of each of the other standpipes at the minimum residual pressure required by Section 7.8.

7.10.1.2.3* Common supply piping shall be calculated and sized to provide the required flow rate for all standpipes connected to such supply piping, with the total not to exceed the maximum flow demand in 7.10.1.1.5.

7.10.1.2.4 Flows from additional standpipes as required by 7.10.1.1 shall not be required to be balanced to the higher pressure at the point of connection.

7.10.1.3 Combined Systems.

7.10.1.3.1 For a building protected throughout by an approved automatic sprinkler system, the system demand established by Section 7.7 and 7.10.1 also shall be permitted to serve the sprinkler system.

7.10.1.3.1.1 In a building protected in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, the water supply for the combined sprinkler and automatic standpipe system shall be based on the sprinkler system demand (including any hose stream demand) or the standpipe demand, whichever is greater.

7.10.1.3.1.2 A separate sprinkler demand shall not be required.

7.10.1.3.2 For a combined system in a building equipped with partial automatic sprinkler protection, the flow rate required by 7.10.1 shall be increased by an amount equal to the hydraulically calculated sprinkler demand or 150 gpm (568 L/min) for light hazard occupancies, or by 500 gpm (1893 L/min) for ordinary hazard occupancies, whichever is less.

7.10.2 Class II Systems.

7.10.2.1 Minimum Flow Rate.

7.10.2.1.1 For Class II systems, the minimum flow rate for the hydraulically most remote hose connection shall be 100 gpm (379 L/min).

7.10.2.1.2 Additional flow shall not be required where more than one hose connection is provided.

7.10.2.2 Hydraulic Calculation Requirements.

7.10.2.2.1 Hydraulic calculations and pipe sizes for each standpipe shall be based on providing 100 gpm (379 L/min) at the hydraulically most remote hose connection on the standpipe at the minimum residual pressure required by Section 7.8.

7.10.2.2.2 Common supply piping serving multiple standpipes shall be calculated and sized to provide 100 gpm (379 L/min).

7.10.3 Maximum Flow Rates for Individual Connections.

7.10.3.1 The maximum flow required from a 2½ in. (65 mm) hose connection shall be 250 gpm (946 L/min).

7.10.3.2 The maximum flow required from a 1½ in. (40 mm) hose connection shall be 100 gpm (379 L/min).

7.10.4 Sprinkler System Hose Demand. Sprinkler system hose demand in fully sprinklered buildings shall not be required to be added to standpipe calculations.

7.11* Drains and Test Riser.

7.11.1 A permanently installed drain riser shall be provided adjacent to each standpipe equipped with pressure-regulating devices to facilitate tests of each device. The drain shall be sized large enough to handle the full flow required from the largest pressure-regulating device but shall not be less than the following:

(1) The size of the discharge outlet of the pressure-regulating device for devices that are greater than 2½ in. (65 mm) in size
(2) 3 in. (80 mm) to facilitate testing of 2½ in. (65 mm) pressure-regulating devices
(3) 2 in. (50 mm) to facilitate testing of 1½ in. (40 mm) pressure-regulating devices

7.11.1.1 The drain riser shall be equipped with tees that are of the same size as the discharge outlets of the pressure-regulating devices to be tested with internal threaded swivel fittings having NHS threads, as specified in NFPA 1963, *Standard for Fire Hose Connections*, with plugs, and shall be located on at least every other floor.

7.11.1.2 Each drain riser shall terminate with a full-size elbow to grade or receptor that will receive the full flow from the drain riser.

7.11.1.3 Where drain risers are interconnected and run to a common discharge point, all piping shall be sized for the combined flow.

7.11.1.4 Where local fire department hose threads do not conform to NFPA 1963, *Standard for Fire Hose Connections*, the fire department shall designate the hose threads to be used.

7.11.2 Drains. All standpipe systems shall be equipped with drain connections in accordance with this section.

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7.11.2.1 A main drain shall be provided on the standpipe system side of the system control valve in accordance with Figure 7.11.2.1.

7.11.2.2 Where acceptable to the AHJ, the lowest hose connection shall be permitted to be used as the main drain.

7.11.2.3 The main drain connection shall be sized in accordance with Table 7.11.2.3.

7.11.2.4 The main drain connection shall be provided at a location that permits the valve to be opened wide without causing water damage.

7.11.2.5 Portions of the standpipe system that are trapped such that they cannot be drained through the main drain connection shall have an auxiliary method of draining in accordance with one of the following:

(1) An auxiliary drain in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*
(2) An auxiliary drain connection in accordance with Table 7.11.2.3
(3) A hose connection at a low point that has been approved for use with a hose to drain water out of the trapped portion of the system to a location that will not cause water damage

7.12* Fire Department Connections.

7.12.1 One or more fire department connections shall be provided for each zone of each Class I or Class III standpipe system.

7.12.1.1 The high zone fire department connection(s) shall not be required to be provided where 7.9.3 applies.

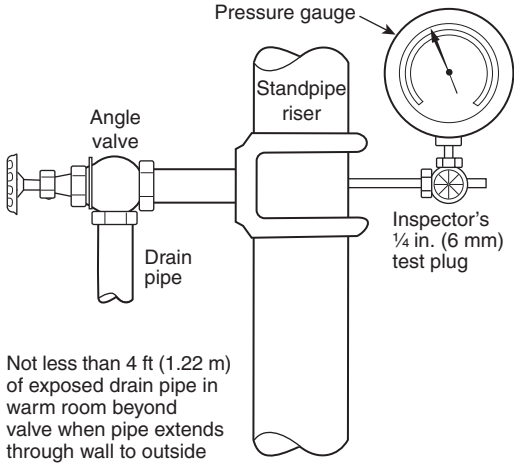


FIGURE 7.11.2.1 Drain Connection for System Riser.

Table 7.11.2.3 Sizing for Standpipe Drains

Standpipe Size	Size of Drain Connection
Up to 2 in. (50 mm)	¾ in. (20 mm) or larger
2½ in. (65 mm), 3 in. (80 mm), or 3½ in. (90 mm)	1¼ in. (32 mm) or larger
4 in. (100 mm) or larger	2 in. (50 mm) only

7.12.2 High-rise buildings shall have at least two remotely located fire department connections for each zone.

7.12.2.1 A single connection for each zone shall be permitted where acceptable to the fire department.

7.12.3 Fire department connection sizes shall be based on the standpipe system demand and shall include one 2½ in. (65 mm) inlet per every 250 gpm (946 L/min).

7.12.3.1 An approved large diameter hose connection of a size to accommodate the required flow shall be permitted.

7.12.3.2 The inlets required by 7.12.3 shall be permitted to be provided on multiple fire department connections.

7.12.3.3 The inlets required by 7.12.3 shall be permitted to be located in multiple locations as allowed by the AHJ.

Chapter 8 Plans and Calculations

8.1* Plans and Specifications.

8.1.1 Plans accurately showing the details and arrangement of the standpipe system shall be furnished to the authority having jurisdiction prior to the installation of the system.

8.1.2 Working plans shall be drawn to an indicated scale, on sheets of uniform size, and shall show those items from the following list that pertain to the design of the system:

(1) Name of owner(s) and occupant(s)
(2) Location, including street address
(3) Point of compass
(4) Name and address of installing contractor
(5) For automatic and semiautomatic standpipe systems, the following:
    (a) Size of city main in street and whether dead end or circulating; if dead end, direction and distance to nearest circulating main
    (b) City main test results and system elevation relative to test hydrant
(6) For automatic and semiautomatic standpipe systems, other sources of supply, with pressure and elevation
(7) Approximate capacity of each dry pipe system
(8) For automatic and semiautomatic standpipe systems, water supply capacity information, including the following:
    (a) Location and elevation of static and residual test gauge with relation to the riser reference point
    (b) Flow location
    (c) Static pressure [psi (bar)]
    (d) Residual pressure [psi (bar)]
    (e) Flow [gpm (L/min)]
    (f) Date
    (g) Time
    (h) Name of person who conducted the test or supplied the information
    (i) Other sources of water supply, with pressure or elevation
(9) Pipe type and schedule of wall thickness
(10) Nominal pipe size and cutting lengths of pipe (or center-to-center dimensions)
(11) Type of fittings and joints and locations of all welds and bends
(12) Type and location of hangers, sleeves, braces, and methods of securing piping
(13) All control valves, check valves, drain pipes, and test connections

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(14) Make, type, model and size of alarm, dry pipe, or deluge valve
(15) Type and location of alarms
(16) Size and location of standpipes, hose outlets, hand hose, nozzles, cabinets, and related equipment
(17) Information on the hydraulic data nameplate
(18) Hydraulic reference points shown on plan that correspond with comparable reference points on the hydraulic calculation sheets
(19) The setting for pressure-reducing and pressure-restricting valves
(20) For automatic and semiautomatic standpipe systems, size and location of hydrants, including static and residual hydrants used in flow tests
(21) Size, location, and piping arrangement of fire department connections
(22) Scale and graphical representation of the scale
(23) Hose valve manufacturer and model
(24) Pressure-reducing valve(s) manufacturer and model
(25) Required pressure at hose valve outlet
(26) Location of hose valves used in the hydraulic calculations
(27) Standpipe system demand (flow and pressure) at the following locations:
  (a) Fire department connection (FDC) inlet
  (b) Fire pump discharge flange
  (c) Water supply tank discharge
  (d) Water supply source if different from (a) through (c)

8.1.3 The drawings shall show the location, arrangement, water supply, equipment, and all other details necessary to establish compliance with this standard.

8.1.4 The plans shall include specifications covering the character of materials used and shall describe all system components.

8.1.5 The plans shall include an elevation diagram, and the vertical elevation of each floor shall be indicated.

8.2 Hydraulic Calculations.

8.2.1 Standpipe system piping shall be sized by hydraulic calculations.

8.2.2 A complete set of calculations shall be submitted with the plans.

8.2.3 Hydraulic calculations shall be prepared on form sheets that include a summary sheet, detailed worksheets, and a graph sheet. [**13:**14.3.1]

8.2.4 Summary Sheet. The summary sheet shall contain the following information, where applicable:

(1) Date
(2) Location
(3) Name of owner and occupant
(4) Building number or other identification
(5) Description of hazard
(6) Name and address of contractor or designer
(7) Name of approving agency
(8) System design requirements, as follows:
  (a) Number of standpipes flowing
  (b) Minimum rate of water application gpm (L/min)
(9) Total water requirements as calculated, including allowance for inside hose, outside hydrants, and sprinklers for buildings with partial sprinkler protection

[**13:**22.3.2]

8.2.5 Detailed Worksheets. Detailed worksheets or computer printout sheets shall contain the following information:

(1) Sheet number
(2) Hose connection description and discharge constant (K)
(3) Hydraulic reference points
(4) Flow in gpm (L/min)
(5) Pipe size
(6) Pipe lengths, center-to-center of fittings
(7) Equivalent pipe lengths for fittings and devices
(8) Friction loss in psi/ft (bar/m) of pipe
(9) Total friction loss between reference points
(10) Devices per 8.3.1.5
(11) Elevation head in psi (bar) between reference points
(12) Required pressure in psi (bar) at each reference point
(13) Velocity pressure and normal pressure if included in calculations
(14) Notes to indicate starting points or reference to other sheets or to clarify data shown

[**13:**22.3.3]

8.2.6 Graph Sheet. A graphic representation of the complete hydraulic calculation shall be plotted on semiexponential graph paper ($Q^{1.85}$) and shall include the following:

(1) Water supply curve
(2) Standpipe system demand
(3) Hose demand (where applicable)
(4) Partial sprinkler demand where applicable *(see 7.10.1.3.2)*

8.3 Hydraulic Calculation Procedures.

8.3.1 General.

8.3.1.1 For all systems, the hydraulic calculations shall be the most demanding based on the criteria of Chapter 7.

8.3.1.2 Calculations shall begin at the outlet of each hose connection and shall include the friction loss for the hose valve and any connecting piping from the hose valve to the standpipe.

8.3.1.3 Table 8.3.1.3 shall be used to determine the equivalent length of pipe for fittings and devices unless the manufacturer's test data indicate that other factors are more accurate.

8.3.1.4 For saddle-type fittings having friction loss greater than that shown in Table 8.3.1.3, the increased friction loss shall be included in the hydraulic calculations.

8.3.1.5 Valves. Specific friction loss values or equivalent pipe lengths for alarm valves, dry pipe valves, deluge valves, strainers, pressure-regulating device, backflow preventer, and other devices shall be made available to the authority having jurisdiction. [**13:**14.4.3.3]

8.3.1.6 Differing Values. Specific friction loss values or equivalent pipe lengths for listed fittings not in Table 4.3.1 shall be used in hydraulic calculations where these losses or equivalent pipe lengths are different from those shown in Table 8.3.1.3. [**13:**14.4.3.4]

8.3.2 Adjustments.

8.3.2.1 Table 8.3.1.3 shall be used only where the Hazen-Williams *C* factor is 120.

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Table 8.3.1.3 Equivalent Pipe Length Chart

Fittings and Valves	Fittings and Valves Expressed in Equivalent Feet of Pipe													
	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	5 in.	6 in.	8 in.	10 in.	12 in.
45 degree elbow	1	1	1	2	2	3	3	3	4	5	7	9	11	13
90 degree standard elbow	2	2	3	4	5	6	7	8	10	12	14	18	22	27
90 degree long-turn elbow	1	2	2	2	3	4	5	5	6	8	9	13	16	18
Tee or cross (flow turned 90 degrees)	3	5	6	8	10	12	15	17	20	25	30	35	50	60
Butterfly valve					6	7	10		12	9	10	12	19	21
Gate valve					1	1	1	1	2	2	3	4	5	6
Swing check*		5	7	9	11	14	16	19	22	27	32	45	55	65
Globe (straight) hose valve				46		70								
Angle or hose valve				20		31								

For SI units, 1 in. = 25.4 mm.
*Due to the variations in design of swing check valves, the pipe equivalents indicated in this table are considered to be average.

8.3.2.2 For other values of *C*, the values in Table 8.3.1.3 shall be multiplied by the factors indicated in Table 8.3.2.2.

Table 8.3.2.2 Adjustment Factors for *C* Values

Multiplying Factor	*C* Value
0.713	100
1.16	130
1.33	140
1.51	150

8.3.2.3 Table 8.3.2.3 indicates typical *C* factors that shall be used for commonly used piping materials.

Table 8.3.2.3 Hazen-Williams *C* Values

Pipe or Tube	*C* Value
Unlined cast or ductile iron	100
Black steel (dry systems, including preaction)	100
Black steel (wet systems, including deluge)	120
Galvanized (all)	120
Plastic (listed all)	150
Cement-lined cast or ductile iron	140
Copper tube or stainless steel	150

8.3.2.4 The AHJ shall be permitted to require other *C* values.

8.3.3 Formulas.

8.3.3.1 Friction Loss Formula.

8.3.3.1.1 Pipe friction losses shall be determined on the basis of the Hazen-Williams formula, as follows:

$$p = \frac{4.52Q^{1.85}}{C^{1.85}d^{4.87}}$$

where:
p = frictional resistance in psi per foot of pipe
Q = flow in gpm
C = friction loss coefficient
d = actual internal diameter of pipe in inches
[**13:**14.4.2.1.1]

8.3.3.1.2 For SI units, the following equation shall be used:

$$p_m = 6.05\left(\frac{Q_m^{1.85}}{C^{1.85}d_m^{4.87}}\right)10^5$$

where:
p_m = frictional resistance in bar per meter of pipe
Q_m = flow in L/min
C = friction loss coefficient
d_m = actual internal diameter in mm
[**13:**14.4.2.1.2]

Chapter 9 Water Supply

9.1* Required Water Supply.

9.1.1 Automatic and semiautomatic standpipe systems shall be attached to an approved water supply capable of supplying the system demand.

9.1.2 Manual standpipe systems shall have an approved water supply accessible to a fire department pumper.

9.1.3 A single automatic or semiautomatic water supply shall be permitted where it is capable of supplying the system demand for the required duration.

9.1.4 Where fire department pumpers cannot supply the required system demand through a fire department connection, an auxiliary water supply consisting of high-level water storage with additional pumping equipment or other means acceptable to the AHJ shall be provided.

9.1.4.1 The auxiliary water supply shall meet the 30-minute minimum water supply requirements of Sections 9.2 and 9.3.

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9.1.5 Water supplies from the following sources shall be permitted:

(1) A public waterworks system where pressure and flow rate are adequate
(2) Automatic fire pumps connected to an approved water source in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*
(3) Manually controlled fire pumps in combination with pressure tanks
(4) Pressure tanks installed in accordance with NFPA 22, *Standard for Water Tanks for Private Fire Protection*
(5) Manually controlled fire pumps operated by remote control devices at each hose station, supervised in accordance with *NFPA 72, National Fire Alarm and Signaling Code*, at each hose station
(6) Gravity tanks installed in accordance with NFPA 22, *Standard for Water Tanks for Private Fire Protection*

9.2 Minimum Supply for Class I and Class III Systems. The water supply shall be capable of providing the system demand established by Sections 7.8 and 7.10 for at least 30 minutes.

9.3 Minimum Supply for Class II Systems. The minimum supply for Class II systems shall be capable of providing the system demand established by Sections 7.8 and 7.10 for at least 30 minutes.

Chapter 10 Water Supply Testing

10.1* Water Supply Evaluation. A waterflow test shall be conducted on the water distribution system to determine the rate of flow and pressures available for system design and for fire-fighting purposes.

10.2* Procedure. Where a waterflow test is used for the purposes of system design, the test shall be conducted no more than 12 months prior to working plan submittal unless otherwise approved by the authority having jurisdiction. [**13:**23.2.1.1]

Chapter 11 System Acceptance

11.1* General.

11.1.1 All new systems shall be tested prior to the occupancy of the building.

11.1.2 Existing standpipe systems that are to be utilized as standpipes for a combination system in the retrofit of a new sprinkler system shall be tested in accordance with Section 11.4.

11.1.3 The installing contractor shall complete and sign the appropriate contractor's material and test certificate(s) as shown in Figure 11.1.3(a) and Figure 11.1.3(b).

11.2 Flushing of Piping.

11.2.1 Underground piping supplying the system shall be flushed in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*

11.2.2 Piping between the fire department connection and the check valve in the inlet pipe shall be flushed with a sufficient volume of water in order to remove any construction debris and trash accumulated in the piping prior to the completion of the system and prior to the installation of the fire department connection.

11.3 Hose Threads.

11.3.1 All hose connection and fire department connection threads shall be tested to verify their compatibility with threads used by the local fire department.

11.3.2 The test shall consist of threading coupling samples, caps, or plugs onto the installed devices.

11.4 Hydrostatic Tests.

11.4.1* General. All new systems, including yard piping and fire department connections, shall be tested hydrostatically at not less than 200 psi (13.8 bar) of pressure for 2 hours, or at 50 psi (3.5 bar) in excess of the maximum pressure where the maximum pressure is in excess of 150 psi (10.3 bar).

11.4.2 The hydrostatic test pressure shall be measured at the low elevation point of the individual system or zone being tested.

11.4.3 The standpipe system piping shall show no leakage other than as permitted by NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*

11.4.4 Underground pipe shall be tested in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*

11.4.5 Where cold weather prevents testing with water, an interim air test shall be permitted to be conducted prior to the standard hydrostatic test.

11.4.5.1 An air pressure leakage test at 40 psi (2.8 bar) shall be conducted for 24 hours.

11.4.5.2 Any leakage that results in a loss of pressure in excess of 1½ psi (0.1 bar) during a continuous 24-hour period shall be corrected.

11.4.6 Fire Department Connection. Piping between the fire department connection and the check valve in the inlet pipe shall be tested hydrostatically in the same manner as the balance of the system.

11.4.7 Existing Systems.

11.4.7.1 Where an existing standpipe system, including yard piping and fire department connection, is modified, the new piping shall be independently tested in accordance with 11.4.1.

11.4.7.2 Modifications that cannot be isolated, such as new valves or the point of connection for new piping, shall not require testing in excess of system static pressure.

11.4.8 Protection from Freezing. During testing, care shall be taken to ensure that no portion of the piping is subject to freezing during cold weather.

11.4.9 Gauges. During the hydrostatic test, the pressure gauge at the top of each standpipe shall be observed and the pressure recorded.

11.4.10 Water Additives. Additives, corrosive chemicals such as sodium silicate or derivatives of sodium silicate, brine, or other chemicals shall not be used while hydrostatically testing systems or for stopping leaks.

11.5 Flow Tests.

11.5.1* The standpipe system shall be tested to verify system demand.

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CONTRACTOR'S MATERIAL AND TEST CERTIFICATE FOR ABOVEGROUND PIPING

Standpipe System NFPA 14

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and the system left in service before the contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood that the owner's representative's signature in no way prejudices any claim against the contractor for faulty material, poor workmanship, or failure to comply with the approving authority's requirements or local ordinances.

Property name	Date
Property address	

Plans	Accepted by approving authorities (names) Address Installation conforms to accepted plans? ❑ Yes ❑ No Equipment used is approved or listed? ❑ Yes ❑ No If no, explain deviations. _____
Type of System	❑ Automatic dry ❑ Automatic wet ❑ Semiautomatic dry ❑ Manual dry ❑ Manual wet ❑ Combination standpipe/sprinkler If other, explain. _____
Water Supply Data Used for Design and As Shown on Plans	Fire pump data Manufacturer _____ Model _____ Type: ❑ Electric ❑ Diesel ❑ Other (explain) _____ Rated, gpm _____ Rated, psi _____ Shutoff, psi _____
Water Supply Source Capacity, Gallons	❑ Public waterworks system _____ (gal) ❑ Storage tank _____ (gal) ❑ Gravity tank _____ (gal) ❑ Open reservoir _____ (gal) ❑ Other (explain) _____
If Public Waterworks System:	Static, psi _____ Residual, psi _____ Flow, gpm _____
Have Copies of the Following Been Left on the Premises?	❑ System components instructions ❑ Care and maintenance of system ❑ NFPA 25 ❑ Copy of accepted plans ❑ Hydraulic data/calculations
Supplies Building(s)	Main waterflow shutoff location _____ Number of standpipe risers _____ Do all standpipe risers have base of riser shutoff valves? ❑ Yes ❑ No
Valve Supervision	❑ Locked open ❑ Sealed and tagged ❑ Tamperproof switch ❑ Other If other, explain. _____
Pipe and Fittings	Type of pipe _____ Type of fittings _____
Hose Threads	Hose threads have been verfied for compliance with local fire department ❑ Yes ❑ No
Backflow Preventor	❑ Double check assembly ❑ Reduced-pressure device Size _____ Make and model _____

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FIGURE 11.1.3(a) Sample Contractor's Material and Test Certificate for Aboveground Piping.

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CONTROL VALVE DEVICE

Type	Size	Make	Model

Time to trip through remote hose valve _____ Min _____ Sec Water pressure _____ Air pressure _____
Time water reached remote hose valve outlet _____ Min _____ Sec Trip point air pressure _____ psi
Alarm operated properly? ❑ Yes ❑ No If no, explain. _____

Time water reached remote hose valve outlet _____ Min _____ Sec
Hydraulic activation ❑ Yes
Electric activation ❑ Yes
Pneumatic activation ❑ Yes
Make and model of activation device _____
Each activation device tested? ❑ Yes ❑ No If no, explain. _____

Each activation device operated properly? ❑ Yes ❑ No If no, explain. _____

PRESSURE-REGULATING DEVICE

Location & Floor	Model	Nonflowing (psi)		Flowing (psi)		gpm
		Inlet	Outlet	Inlet	Outlet	

All hose valves on system operated properly? ❑ Yes ❑ No If no, explain. _____

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FIGURE 11.1.3(a) ***Continued***

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Test Description	*Hydrostatic:* Hydrostatic tests shall be made at not less than 200 psi (13.6 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.2 bar) for 2 hours. Differential dry pipe valve clappers shall be left open during test to prevent damage. All aboveground piping leakage shall be stopped. *Pneumatic:* Establish 40 psi (2.7 bar) air pressure and measure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours.
Tests	All piping hydrostatically tested at _____ psi (____ bar) for _____ hrs Dry piping pneumatically tested? ❑ Yes ❑ No Equipment operates properly? ❑ Yes ❑ No If no, state reason. Do you certify as the standpipe contractor that additives and corrosive chemicals, sodium silicate, or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks? ❑ Yes ❑ No Drain test: Reading of gauge located near water supply test connection _____ psi (____ bar); Residual pressure with valve in test connection open wide _____ psi (____ bar) Underground mains and lead-in connections to system risers flushed before connection made to standpipe piping. Verified by copy of the underground test form? ❑ Yes ❑ No ❑ Other (explain) _____ Flushed by installer of underground standpipe piping? ❑ Yes ❑ No _____
Flow Test	Flow water from the hydraulically most remote standpipe outlet(s). Record: Static pressure: _____ psi (____ bar) Residual pressure: _____ psi (____ bar) Nozzle diameter: _____ in. (____ cm) Pitot pressure: _____ psi (____ bar) Total flow: _____ gpm (____ L/min)
Blank Testing	Number used _____ Locations _____ Number removed _____
Welding	Welded piping ❑ Yes ❑ No **If yes . . .** Do you certify as the standpipe contractor that welding procedures comply with the requirements of at least AWS D10.9, Level AR-3? ❑ Yes ❑ No Do you certify that the welding was performed by welders qualified in compliance with the requirements of at least AWS D10.9, Level AR-3? ❑ Yes ❑ No Do you certify that welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slag and other welding residue are removed, and that the internal diameters of piping are not penetrated? ❑ Yes ❑ No
Cutouts (Discs)	Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved? ❑ Yes ❑ No
Hydraulic Data Nameplate	Nameplate provided? ❑ Yes ❑ No ❑ If no, explain. _____
Remarks	Date left in service with all control valves open: _____
Name of Sprinkler/ Standpipe Contractor	Name of contractor _____ Address _____ State license number (if applicable) _____
System Operating Test Witnessed by	Property owner _____ Title _____ Date _____ Sprinkler/standpipe contractor _____ Title _____ Date _____ Approving authorities _____ Title _____ Date _____
Additional Explanation and Notes	

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FIGURE 11.1.3(a) ***Continued***

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Contractor's Material and Test Certificate for Underground Piping

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property name		Date
Property address		
Plans	Accepted by approving authorities (names)	
	Address	
	Installation conforms to accepted plans	❑ Yes ❑ No
	Equipment used is approved If no, state deviations	❑ Yes ❑ No
Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	❑ Yes ❑ No
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain	❑ Yes ❑ No
Location	Supplies buildings	
Underground pipes and joints	Pipe types and class	Type joint
	Pipe conforms to _____ standard Fittings conform to _____ standard If no, explain	❑ Yes ❑ No ❑ Yes ❑ No
	Joints needing anchorage clamped, strapped, or blocked in accordance with _____ standard If no, explain	❑ Yes ❑ No
Test description	Flushing: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at one of the flow rates as specified in 10.10.2.1.3 of NFPA 24. Hydrostatic: All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.5 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure ±5 psi (0.35 bar) for 2 hours. Hydrostatic Testing Allowance: Where additional water is added to the system to maintain the test pressures required by 10.10.2.2.1 of NFPA 24, the amount of water shall be measured and shall not exceed the limits of the following equation (for metric equation, see 10.10.2.2.6 of NFPA 24): $L = \frac{SD\sqrt{P}}{148{,}000}$ L = testing allowance (makeup water), in gallons per hour S = length of pipe tested, in feet D = nominal diameter of the pipe, in inches P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)	
Flushing tests	New underground piping flushed according to _____ standard by (company) If no, explain	❑ Yes ❑ No
	How flushing flow was obtained ❑ Public water ❑ Tank or reservoir ❑ Fire pump	Through what type opening ❑ Hydrant butt ❑ Open pipe
	Lead-ins flushed according to _____ standard by (company) If no, explain	❑ Yes ❑ No
	How flushing flow was obtained ❑ Public water ❑ Tank or reservoir ❑ Fire pump	Through what type opening ❑ Y connection to flange and spigot ❑ Open pipe

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FIGURE 11.1.3(b) Sample of Contractor's Material and Test Certificate for Underground Piping. [24:Figure 10.10.1]

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Hydrostatic test	All new underground piping hydrostatically tested at _____ psi for _____ hours	Joints covered ❑ Yes ❑ No
Leakage test	Total amount of leakage measured _____ gallons _____ hours	
	Allowable leakage _____ gallons _____ hours	
Forward flow test of backflow preventer	Foward flow test performed in accordance with 10.10.2.5.2 of NFPA 24: ❑ Yes ❑ No	
Hydrants	Number installed / Type and make	All operate satisfactorily ❑ Yes ❑ No
Control valves	Water control valves left wide open If no, state reason	❑ Yes ❑ No
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm	❑ Yes ❑ No
Remarks	Date left in service	
Signatures	Name of installing contractor	
	Tests witnessed by	
	For property owner (signed) / Title / Date	
	For installing contractor (signed) / Title / Date	

Additional explanation and notes

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FIGURE 11.1.3(b) ***Continued***

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11.5.1.1 This test shall be conducted by flowing water simultaneously from the outlet(s) indicated in the approved hydraulic calculations of each standpipe as required by Sections 7.8 and 7.10.

11.5.2 For a manual standpipe, a fire department pumper or portable pump of a capacity to provide required flow and pressure shall be used to verify the system design by pumping into the fire department connection.

11.5.3 Backflow Prevention Assemblies.

11.5.3.1 The backflow prevention assembly shall be forward flow tested to ensure proper operation. [**13:**24.2.5.1]

11.5.3.2 The minimum flow rate shall be the system demand. [**13:**24.2.5.2]

11.5.4 The filling arrangement for suction tanks shall be verified by shutting down all supplies to the tank, draining the tank to below the designated low water level, and then opening the supply valve to ensure operation of its automatic features.

11.5.5 Pressure-Regulating Devices.

11.5.5.1* Each pressure-regulating device shall be tested to verify that the installation is correct, that the device is operating, and that the inlet and outlet pressures and flow at the device are in accordance with the design.

11.5.5.2 Static and residual inlet pressure and static and residual outlet pressure and flow shall be recorded on the contractor's test certificate.

11.5.6 Main Drain Flow Test.

11.5.6.1 The main drain valve shall be opened and shall remain open until the system pressure stabilizes.

11.5.6.2 The static and residual pressure shall be recorded on the contractor's test certificate.

11.5.6.3 Main drain flow tests are not required for manual systems that do not have a permanently attached water supply.

11.5.7 Testing of Automatic Dry and Semiautomatic Systems.

11.5.7.1 Automatic dry and semiautomatic systems shall be tested by initiating a flow of water from the hydraulically most remote hose connection.

11.5.7.2 The system shall deliver a minimum of 250 gpm (946 L/min) at the hose connection within 3 minutes of opening the hose valve if the system capacity exceeds 750 gal (2480 L).

11.5.7.3 Each remote control activation device for operating a semiautomatic system shall be tested in accordance with the manufacturer's specifications and instructions.

11.5.7.4 In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.8 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:**24.2.2]

11.5.7.5 These tests shall be conducted in addition to all the tests required for automatic and manual systems.

11.5.8 Where pumps are part of the water supply for a standpipe system, testing shall be conducted while the pumps are operating.

11.6 Manual Valve Test.

11.6.1 Each valve intended to be manually opened or closed shall be operated by turning the handwheel crank or wrench for its full range and returning it to its normal position.

11.6.2 Hose valve caps shall be tightened sufficiently to avoid leaking during the test and removed after the test to drain water and relieve pressure.

11.7 Alarm and Supervision Tests. Each alarm and supervisory device provided shall be tested in accordance with *NFPA 72, National Fire Alarm and Signaling Code*.

11.8* Record Drawings, Test Reports, and Manuals.

11.8.1 One set of record drawings shall be provided to the building owner.

11.8.2 One copy of the completed test report shall be provided to the building owner.

11.8.3 One set of instruction manuals for all major components of the standpipe system shall be provided to the building owner. The manual shall contain the following:

(1) An explanation of the operation of the component
(2) Instructions for routine maintenance
(3) Instructions concerning repairs
(4) Parts list and identification for serviceable components
(5) A copy of the current edition of NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*

11.9 Instructions. The installing contractor shall provide the owner with the following:

(1) All literature and instructions provided by the manufacturer describing the operation and maintenance of equipment and devices installed
(2) A copy of the current edition of NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*

11.10 Signs. The installation of signs required by this standard shall be verified.

Chapter 12 Buildings Under Construction

12.1 General. Where required by the authority having jurisdiction, a standpipe system, either temporary or permanent, shall be provided in accordance with this chapter in buildings under construction.

12.2 Fire Department Connections. The standpipes shall be provided with conspicuously marked and readily accessible fire department connections on the outside of the building at the street level, at a location approved by the local fire department.

12.3 Other System Features. Pipe sizes, hose connections, hose, water supply, and other details for new construction shall be in accordance with this standard.

12.4 Support of Piping. Standpipes shall be supported and restrained at each alternate floor.

12.5* Hose Connections.

12.5.1 At least one hose connection shall be provided at each floor level, at a location approved by the local fire department.

12.5.2 Hose valves shall be kept closed at all times and guarded against mechanical injury.

12.6* Extension of System Piping. Standpipes shall be extended upward for each story and capped at the top.

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12.7 Temporary Installations.

12.7.1 Temporary standpipes shall remain in service until the permanent standpipe is complete.

12.7.2 Where temporary standpipes normally contain water, the piping shall be protected against freezing.

12.8 Timing of Water Supply Installation.

12.8.1 Where construction reaches a height at which public waterworks system pressure can no longer provide the required flow and pressure, temporary or permanent fire pumps shall be installed to provide protection to the uppermost level or to the height required by the AHJ.

12.8.2 Where local fire department pumping apparatus is permitted by the AHJ for the standpipe pressure required, temporary or permanent fire pumps shall not be required.

12.9 Protection of Hose Connections and Fire Department Connections.

12.9.1 Threaded caps and plugs shall be installed on fire department connections and hose connections.

12.9.2 Fire department connections and hose connections shall be protected against physical damage.

Chapter 13 System Testing, Inspection, and Maintenance

13.1 General. A standpipe system installed in accordance with this standard shall be properly inspected, tested, and maintained by the property owner or an authorized representative in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, to provide at least the same level of performance and protection as designed.

Annex A Explanatory Material

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

A.1.1.2 See NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.*

A.3.2.1 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.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, 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.3.2.3 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.3.3.1 Auxiliary Drain Connection. An auxiliary drain connection is not a main drain connection and is not intended to be used for testing the attached water supply. An auxiliary drain is also not intended to be operated under pressure.

A.3.3.4.2 Horizontal Exit. The doorway from a rated corridor or area into a rated exit stairwell is not considered a horizontal exit. Sometimes an area of refuge can also be found in the stairwell. A valve is required only in the stairwell, not on both sides of the door.

A.3.3.11 Pressure-Regulating Device. Examples include pressure-reducing valves, pressure control valves, and pressure-restricting devices.

A.3.3.11.3 Pressure-Reducing Valve. A pressure relief valve is not a pressure-reducing valve and should not be used as such.

A.3.3.15 Standpipe System. This arrangement is accomplished by means of connections to water supply systems or by means of pumps, tanks, and other equipment necessary to provide an adequate supply of water to the hose connections.

A.3.3.17 System Classes. NFPA 600, *Standard on Industrial Fire Brigades*, and the Fire Equipment Manufacturers Association (FEMA) are resources for training of personnel.

A.4.1 The use of standard-weight valves and fittings ordinarily should be confined to the upper stories of very high buildings and to equipment in which the highest available pressures are less than 175 psi (12.1 bar).

A.4.3.5.1 There are many cases in which various sizes of fittings are referenced in a manufacturer's catalog but are not normally maintained in stock. Waiting for the manufacturer to produce fittings on special order can take several weeks. It is not the intent of this standard to force contractors to use fittings that are not available at the time of fabrication or installation, causing unnecessary delays in the project.

A.4.4.1.2 Some steel piping material having lesser wall thickness than specified in 4.4.1.2 has been listed for use in sprinkler systems where joined with threaded connections. The service life of such products can be significantly less than that of Schedule 40 steel pipe, and it should be determined if this service life will be sufficient for the application intended. [**13:** A.6.5.1.2]

All such threads should be checked by the installer using working ring gauges conforming to the "Basic Dimensions of Ring Gauges for USA (American) Standard Taper Pipe Threads,

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NPT," as per Table 8 of ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*. [**13:** A.6.5.1.2]

A.4.4.2.2 Cutting and welding operations account for 4 percent of fires each year in nonresidential properties and 8 percent in industrial and manufacturing properties. In-place welding of standpipe piping introduces a significant hazard that can normally be avoided by shop-welding the piping and installing the welded sections with mechanical fittings. As a result, the standard requires that all piping be shop-welded. When such situations cannot be avoided, the exceptions outline procedures and practices that minimize the increase in hazard. *(See Figure A.4.4.2.2.)*

A.4.4.2.3.1 Listed, shaped, and contoured nipples meet the definition of fabricated fittings. [**13:** A.6.5.2.3.1]

A.4.4.2.4.1 Partial penetration welds on outlet fitting connections are considered adequate, since there is no significant load on the joint other than that caused by pressure internal to the pipe *(see Figure A.4.4.2.4.1)*. [**13:** A.6.5.2.4.1]

The load due to the internal pressure can be accommodated with a weld that has a conservative weld throat thickness that can be calculated as follows:

$$\text{Weld throat thickness (in.)} = PD \times 0.000035$$

where:
P = rated system pressure (psig)
D = outside diameter of the fitting (in.)
[**13:** A.6.5.2.4.2]

For example: If you assume a pressure of 300 psig and the OD [outside diameter] of the outlet fitting of 3 in., the result of the thickness calculation is 0.0315 in. When compared to the minimum throat thickness of 3⁄16 in. (0.18 in.), there is a factor of more than 5 times the calculated thickness value. [**13:** A.6.5.2.4.2]

A.4.4.2.4.2 The preparation of mating surfaces is important to the proper fabrication of a weld joint. To accomplish this, the mating surfaces for a circumferential butt weld joint should be prepared and configured so that a full penetration weld is achievable, but a partial penetration weld is acceptable. [**13:** A.6.5.2.4.3]

A.4.4.4 The fire hazard of the brazing process should be suitably safeguarded.

A.4.6.2.1 One method of determining adequately trained personnel is described in NFPA 600, *Standard on Industrial Fire Brigades*.

A.4.6.5 One method of determining adequately trained personnel is described in NFPA 600, *Standard on Industrial Fire Brigades*.

A.4.7.5 It is important to provide adequate clearance for the valve handle so that a fire fighter using a gloved hand can quickly open and close a hose valve. Subsection 4.7.5 does not pertain to hose valves located in closets and cabinets.

A.5.1.2 Design of standpipe systems should include consideration of local fire department suppression tactics, hose size, hose length, and types of nozzles used.

A.5.2.1 A dry pipe system should be installed only where heat is not adequate to prevent freezing of water in all parts of, or in sections of, the system. [**13:** A.7.2]

A.5.2.1.2.1 The capacities of the various sizes of pipe given in Table A.5.2.1.2.1 are for convenience in calculating the capacity of a system. [**13:** A.7.2.3]

A.5.2.1.3 The dry pipe valve should be located in an accessible place near the system it controls. Where exposed to cold, the dry pipe valve should be located in a valve room or enclosure of adequate size to properly service equipment. [**13:** A.7.2.5]

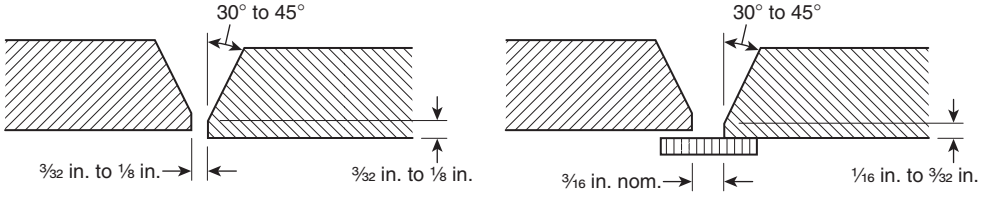


FIGURE A.4.4.2.2 Weld Diagram.

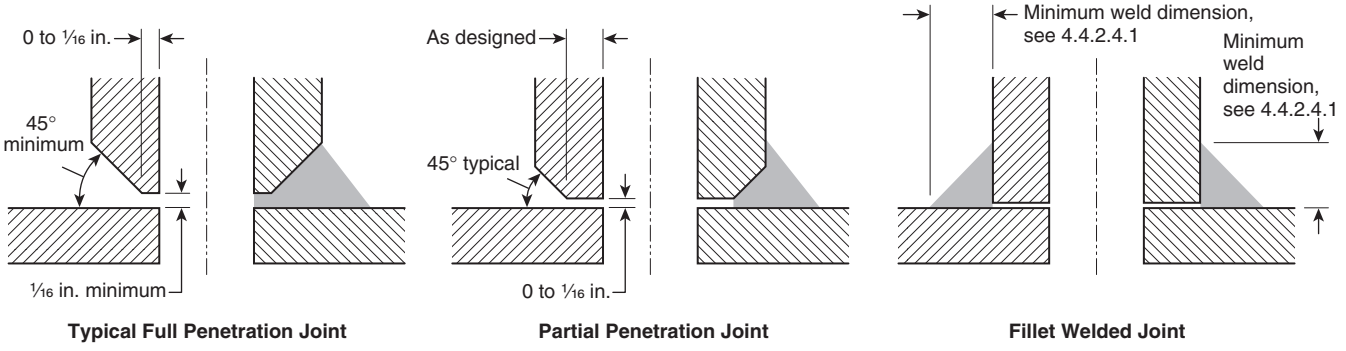


FIGURE A.4.4.2.4.1 Weld Descriptions.

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Table A.5.2.1.2.1 Capacity of 1 Foot of Pipe (Based on Actual Internal Pipe Diameter)

Nominal Pipe Diameter (in.)	Pipe	
	Schedule 40 (gal)	Schedule 10 (gal)
¾	0.028	
1	0.045	0.049
1¼	0.078	0.085
1½	0.106	0.115
2	0.174	0.190
2½	0.248	0.283
3	0.383	0.433
3½	0.513	0.576
4	0.660	0.740
5	1.040	1.144
6	1.501	1.649[b]
8	2.66[a]	2.776[c]

For SI units, 1 in. = 25.4 mm; 1 ft = 0.3048 m; 1 gal = 3.785 L.
[a]Schedule 30.
[b]0.134 wall pipe.
[c]0.188 wall pipe.
[**13:** Table A.7.2.3]

A.5.2.1.3.1 The dry pipe valve and supply piping should be in an area maintained at or above 40°F (4°C). It is the intent of the committee to protect the valves from freezing. The occasional exposure of valves to short exposures of air temperatures below 40°F (4°C) that would not cause the valves to freeze does not justify the construction of a valve room. [**13:** A.7.2.5.1]

A.5.2.1.4.2 The compressor should draw its air supply from within the operating criteria allowed by the manufacturer of the compressor. Air piping should not be attached to the intake of the compressor unless acceptable to the compressor manufacturer. Damage, air reduction, or reduced life expectancy can result if guidelines are not followed. [**13:** A.7.2.6.2]

A.5.2.1.4.2.2 When a single compressor serves multiple dry pipe systems, the 30-minute fill time is based on the single largest system. [**13:** A.7.2.6.2.2]

A.5.2.3 A dry pipe system should be installed only where heat is not adequate to prevent freezing of water in all parts of, or in sections of, the system.

A.5.2.3.1.3 Remote control activation circuits should not be placed in unsprinklered areas of combustible construction.

A.5.4 The committee's intent is to permit the omission of a fire pump as part of the standpipe system in non-high-rise buildings where the automatic sprinkler system can be designed and installed with the available water supply and the flow and pressure demands of the standpipe system can be provided by the fire department apparatus through the fire department connection.

A.5.4.1.1 A fire pump can be installed to supply the sprinkler demand and inside hose requirements only. The fire pump is not required to supply the manual wet standpipe system demand at the most remote hose outlets.

A.5.4.2.1 A manual wet standpipe system can be used to satisfy the demand for a Class III system as long as the water supply can provide 100 gpm at 65 psi (379 L/min at 4.5 bar) to the most remote 1½ in. (40 mm) hose outlet. The fire department can provide the rest of the demand through the fire department connection.

A.5.5 Additional pressure gauges located at the base of the standpipes might be desirable in some equipment, particularly in large plants and high-rise buildings.

A.5.5.2 It is the intent of the standard that pressures can be read on each floor where pressure-regulating devices are installed and that a valved outlet be provided for a pressure gauge. A permanently installed pressure gauge is not required.

A.5.6 Audible alarms are normally located on the outside of the building. Approved electric gong bells, horns, or sirens located inside the building or both inside and outside are sometimes advisable.

A.5.6.4 It is acceptable to utilize a hose valve on the standpipe to test the waterflow device as long as the water is dispersed to an acceptable location. This could be done with a hose valve on the roof or by using a hose connected to a hose valve discharging to a suitable location.

A.6.1 Connections from fire pumps and sources outside the building should be made at the base of the standpipes.

A.6.1.2.1 Standpipes should not be placed in unsprinklered areas of combustible construction.

A.6.1.2.3.2.2 The standards for the listing of heat tracing should include supervision of the following items:

(1) Ground fault
(2) Low system temperature
(3) High system temperature
(4) Temperature sensor failure
(5) Primary controller failure
(6) Electrical continuity
(7) Loss of incoming supply voltage
(8) Engagement of secondary controller

A.6.3.5 See Figure A.6.3.5(a) and Figure A.6.3.5(b).

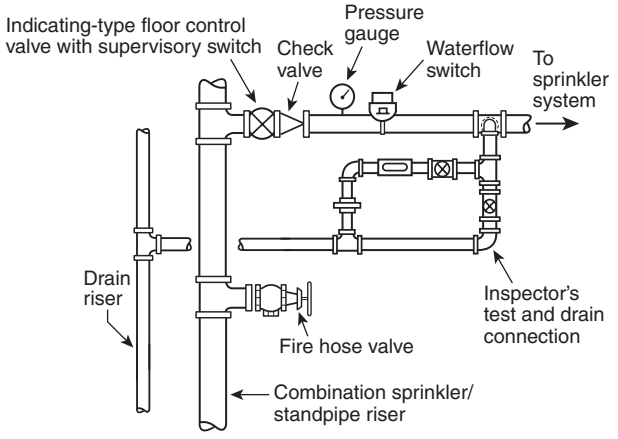


FIGURE A.6.3.5(a) Acceptable Piping Arrangement for Combined Sprinkler/Standpipe System.

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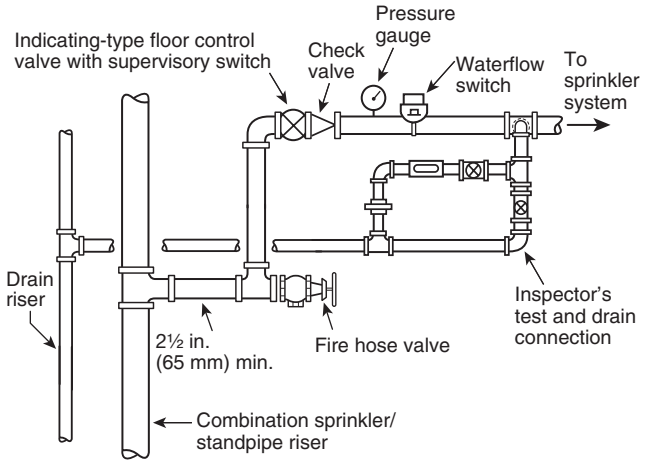


FIGURE A.6.3.5(b) Combined Sprinkler/Standpipe System.

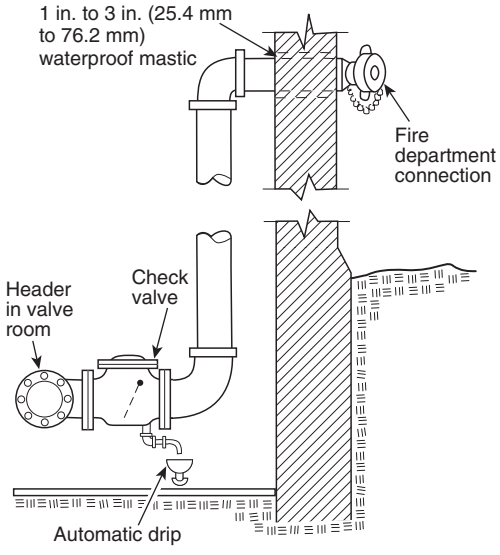


FIGURE A.6.4 Typical Fire Department Connection for Wet Standpipes.

Location of the two hydraulically most remote hose connections: _____

Design flow rate for the connections identified above: _____

Design residual inlet and outlet pressures for the connections identified above: _____

Design static pressure and design system demand (i.e., flow and residual pressure) at the system control valve, or at the pump discharge flange where a pump is installed, and at each fire department connection: _____

FIGURE A.6.8 System Hydraulic Design Information Sign.

A.6.3.6.1.1 A water supply connection should not extend into a building or through a building wall unless such connection is under the control of an outside listed indicating valve or an inside listed indicating valve located near the outside wall of the building.

All valves controlling water supplies for standpipe systems or portions thereof, including floor control valves to sprinkler systems and standpipe isolation valves, should be accessible to authorized persons during emergencies. Permanent ladders, clamped treads on risers, chain-operated hand wheels, or other accepted means should be provided where necessary.

Outside control valves are suggested in the following order of preference:

(1) Listed indicating valves at each connection into the building at least 40 ft (12.2 m) from buildings if space permits
(2) Control valves installed in a cutoff stair tower or valve room accessible from outside
(3) Valves located in risers with indicating posts arranged for outside operation
(4) Key-operated valves in each connection into the building

A.6.3.6.2 See NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

A.6.3.8.5 Depending on the arrangement of the hose connection in a corridor or large area, it can be preferable to mount hose connection identification signs parallel, perpendicular, or at an angle to the plane of the mounting surface on which the sign is located.

A.6.4 See Figure A.6.4 for general arrangement.

A.6.4.5.4 The system designer should contact the AHJ prior to establishing the location of the fire department connection. The location should be based on the requirements of the fire department.

A.6.8 See Figure A.6.8 for a sample hydraulic design information sign.

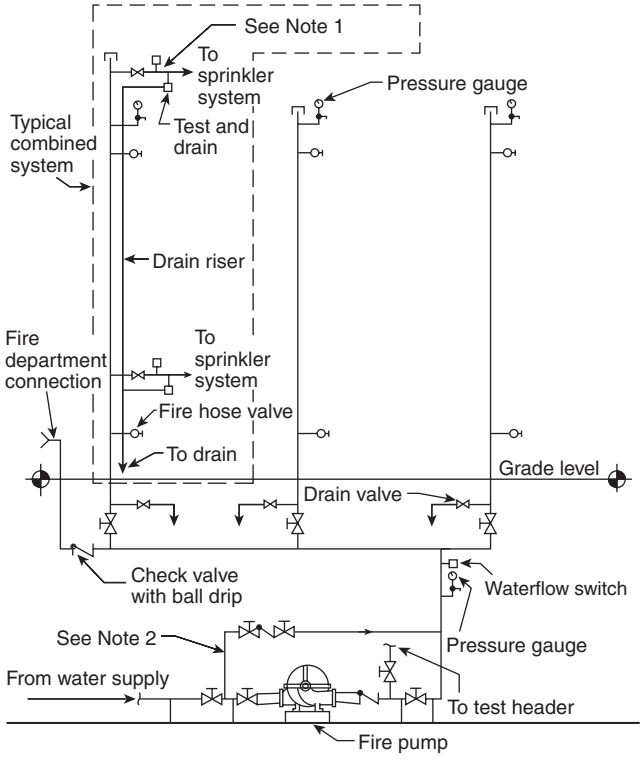
A.7.1 The building height determines the number of vertical zones. The area of a floor or fire area and exit locations, as well as the occupancy classification, determines the number and locations of hose connections. Local building codes influence types of systems, classes of systems, and locations of hose connections. Pipe sizing is dependent on the number of hose connections flowing, the quantity of water flowed, the required residual pressure, and the vertical distance and horizontal distance of those hose connections from the water supplies.

For typical elevation drawings, see Figure A.7.1(a), Figure A.7.1(b), Figure A.7.1(c), and Figure A.7.1(d). See Chapter 7 for general system requirements.

A.7.1.1 It is important to determine the exact operating range to ensure that pressure-regulating devices function in accordance with the manufacturer's instructions for both maximum and minimum anticipated flow rates. Minimum flow can be from a single sprinkler for combined systems or flow from a 1½ in. (40 mm) hose connection on standpipe systems that do not supply sprinklers. This could require the use of two devices installed in parallel.

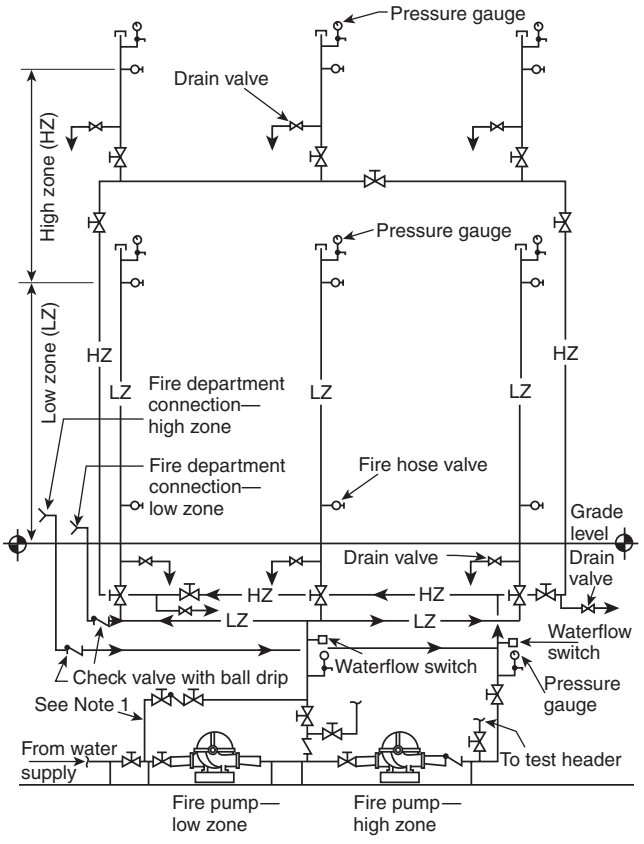
A.7.2 The system pressure limits have been implemented to replace the former height units. Because the issue addressed by the height limits has always been maximum pressure, pressure limitations are a more direct method of regulation and allow flexibility in height units where pumps are used, because a pump curve with less excess pressure at churn yields lower maximum system pressures while achieving the required system demand.

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Notes:
1. Sprinkler floor assembly in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*
2. Bypass in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.*

FIGURE A.7.1(a) Typical Single-Zone System.



Notes:
1. Bypass in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.*
2. High zone pump can be arranged to take suction directly from source of supply.

FIGURE A.7.1(b) Typical Two-Zone System.

The maximum system pressure normally is at pump churn. The measurement should include both the pump boost and city static pressures. The 350 psi (24 bar) limit was selected because it is the maximum pressure at which most system components are available, and it recognizes the need for a reasonable pressure unit.

A.7.2.3 Due to the different pressure limitations established in Section 7.2, it might be necessary to arrange piping so that separate pressure-regulating devices can be provided on the Class I and Class II hose connections.

For Class I standpipes, a pressure-regulating device should not be required where the static pressure of a hose connection exceeds 175 psi (12.1 bar), provided that downstream components, including fire hose and fire nozzles of the responding fire suppression company, are rated for the anticipated static and residual pressures, subject to approval by the AHJ. Due to the inherent safety issues of higher pressure, the AHJ should determine that the fire department is trained in the use of higher pressure hose and nozzles.

A.7.2.3.2 Where the building fire department connections are inaccessible or inoperable, many fire departments lay a hoseline from the pumper into the building and connect to an accessible valve outlet using a double female swivel. To pressurize the standpipe, the hose valve is opened and the engine pumps into the system.

If the standpipe is equipped with pressure-reducing hose valves, the valve acts as a check valve, prohibiting pumping into the system when the valve is open.

A supplementary single-inlet fire department connection or hose valve with female threads at an accessible location on the standpipe allows pumping into that system.

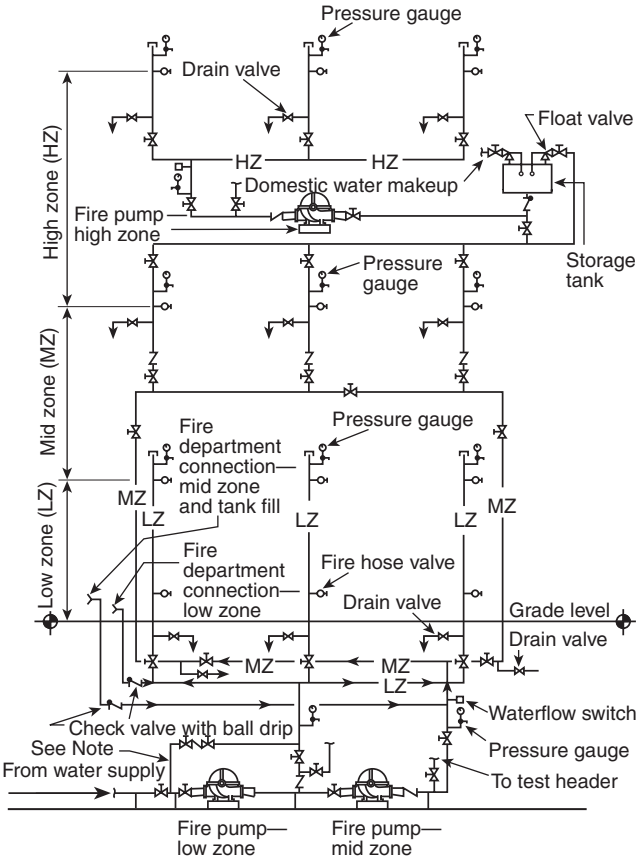
A.7.2.4 A small diameter pressure-reducing device can be required due to the minimum listed flow for large diameter pressure-reducing devices typically exceeding low flow conditions, to accommodate low flow conditions such as those created by the flow of a 1½ in. (40 mm) hose connection or a single sprinkler on a combined system. These should also be arranged such that the failure of a single device does not allow pressure in excess of 175 psi (12.1 bar) to more than two hose connections.

See Figure A.7.2.4 for methods to comply with 7.2.4.

A.7.3.1 Hose can be permitted to be located at one side of the standpipe and supplied by short lateral connections to the standpipe where necessary to avoid obstructions.

Hose connections for Class I systems should be located in a stairway enclosure, and connections for Class II systems should be located in the corridor or space adjacent to the stairway enclosure and connected through the wall to the standpipe. For Class III systems, the connections for 2½ in. (65 mm) hose should be located in a stairway enclosure, and Class II connections should be located in the corridor or space adjacent to the stairway enclosure. These arrangements make it possible to use

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Note: Bypass in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.*

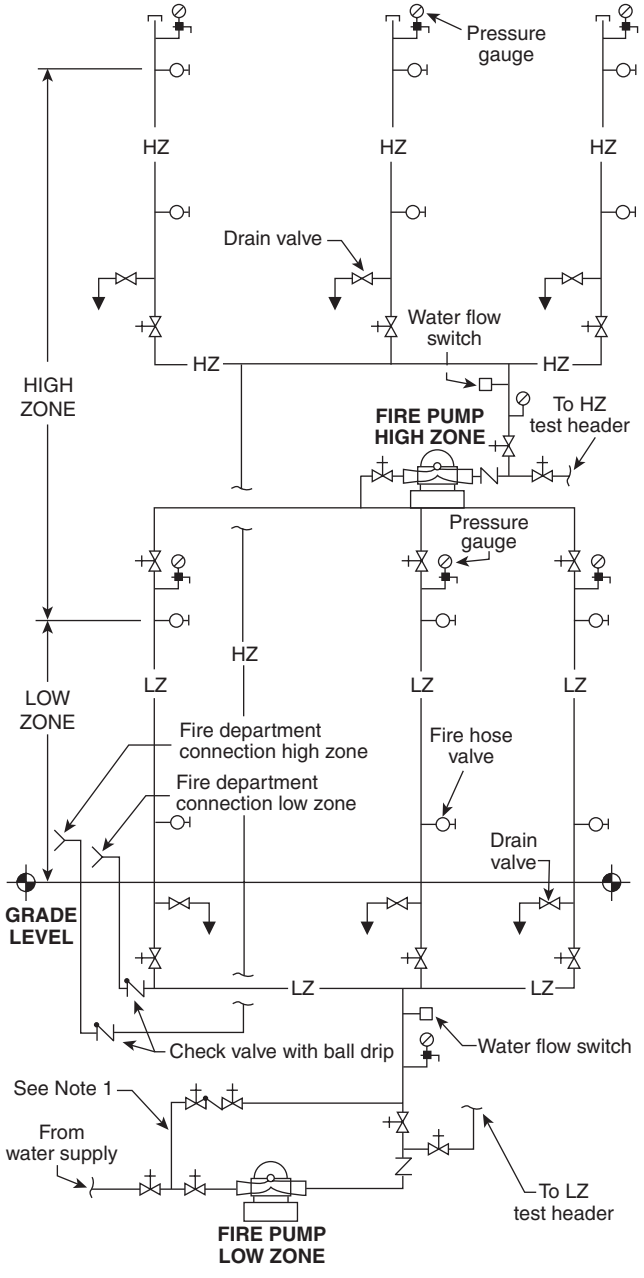
FIGURE A.7.1(c) Typical Multizone System.

Class II system hose streams promptly in case the stairway is filled with people who are escaping at the time of fire. In buildings having large areas, connections for Class I and Class III systems can be located at interior columns.

A.7.3.2 Hose connections are now specified to be located at the main floor landing in exit stairways. Paragraph 7.3.2.1 permits hose connections to be located at intermediate landings where local fire-fighting tactics require this location. Only one standpipe is necessary to serve the roof regardless of the travel distances in 7.3.2.2; it is not the intent to extend each standpipe to the roof level.

The approach to locating hose connections with respect to exits is shown in Figure A.7.3.2(a), Figure A.7.3.2(b), and Figure A.7.3.2(c).

A.7.3.2.2 Paragraph 7.3.2.2 is intended to provide local fire departments with the authority to require additional hose connections outside of or away from a 2-hour fire-resistive separation. These additional hose connections could be needed to allow fire fighters to attach a fire hose in a reasonable time frame, based on the lengths of hose available on fire department standpipe packs or in carry bags. While it is recognized that outlet spacing limitations provide controls to limit the maximum hose length needed to fight a fire, thereby minimizing the physical demands on fire fighters, it is also recognized that, in some cases, based on architectural layout, additional outlets could be needed in open floor areas in order to

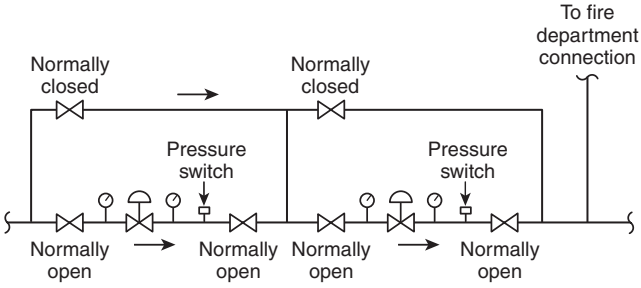


Note: Bypass in accordance with NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.*

FIGURE A.7.1(d) Vertically Staged Pumps for Two-Zone System.

meet spacing requirements. In such cases, such outlets are unlikely to be utilized, since there would not be a staging area for fire fighters to use when accessing the hose connection. Therefore, additional hose connections, where provided to meet distance requirements, would be located in 1-hour fire-resistive exit corridors wherever possible, to provide a degree of protection for fire fighters accessing the connection. Such connections also should be located as uniformly as possible from floor to floor so that fire fighters can find them easily during a fire.

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Note: FDC required downstream of pressure-regulating device but not required immediately adjacent thereto.

FIGURE A.7.2.4 Dual Pressure-Regulating Device Arrangement.

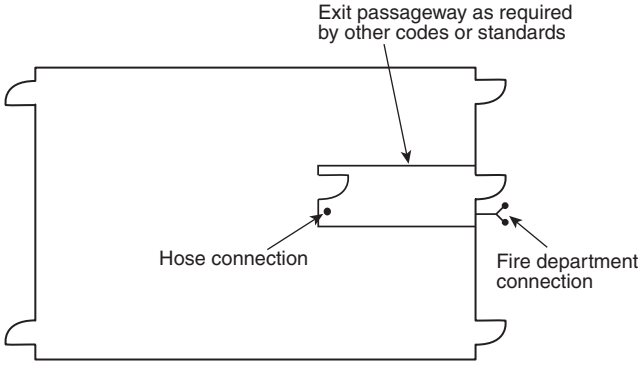


FIGURE A.7.3.2(c) Location of Hose Connections in Exit Passageways.

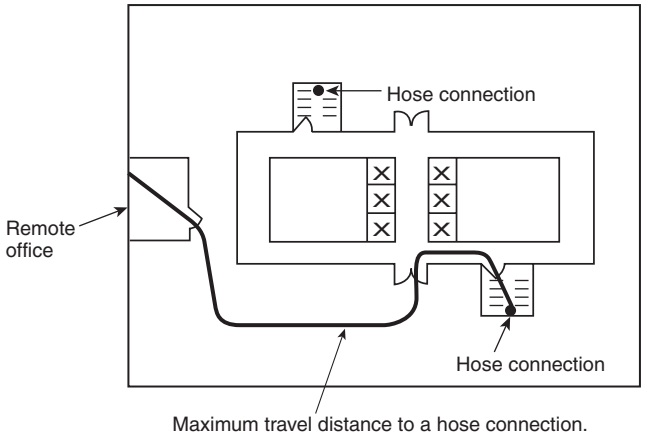


FIGURE A.7.3.2(a) Location of Hose Connections in Stairwells.

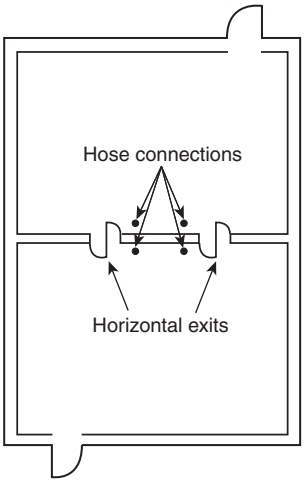


FIGURE A.7.3.2(b) Location of Hose Connections at Horizontal Exits.

The 200 ft (61 m) distance allowed for sprinklered buildings could necessitate additional hose lengths in order to reach the most remote portion of a floor; however, automatic sprinklers should provide adequate control to allow time for fire fighters to extend hoses in those cases where a fire is located in the most remote area.

A.7.3.2.3 See Figure A.7.3.2.3.

A.7.3.2(5) Access to the roof can be via a stairwell that terminates at the roof level. Access could also be a permanent ladder, permanent ladder rungs, or a pull-down stair with a roof hatch. See Figure A.7.3.2(5) for an example of roof outlets.

A.7.3.3 Hose stations should be so arranged as to allow discharge to be directed from the nozzle into all portions of important enclosures such as closets and similar enclosures.

A.7.5 Fire department connections feeding interconnected standpipes, including combined systems, should be arranged to supply all interconnected standpipes in a building or section of a building. See Figure A.7.1(a), Figure A.7.1(b), and Figure A.7.1(c). Interconnection should occur as close to the source of supply(ies) as possible.

Standpipe systems in separate buildings or structures fed by the same water supply are not required to be interconnected. For example, a building might have an automatic-wet standpipe system while an adjacent parking garage has an automatic-dry standpipe system fed by the same fire pump and water main. These two standpipe systems are not required to be interconnected since they protect different structures.

A.7.7.2 Hydraulic calculations should be provided to show that each fire department connection can adequately supply the standpipe demand.

A.7.8 Where determining the pressure at the outlet of the remote hose connection, the pressure loss in the hose valve should be considered.

It is very important that fire departments choose an appropriate nozzle type for their standpipe fire-fighting operations. Constant pressure- (automatic-) type spray nozzles *(see* NFPA 1964, *Standard for Spray Nozzles)* should not be used for standpipe operations because many of these types require a minimum of 100 psi (6.9 bar) of pressure at the nozzle inlet to produce a reasonably effective fire stream. In standpipe operations, hose friction loss could prevent the delivery of 100 psi (6.9 bar) to the nozzle.

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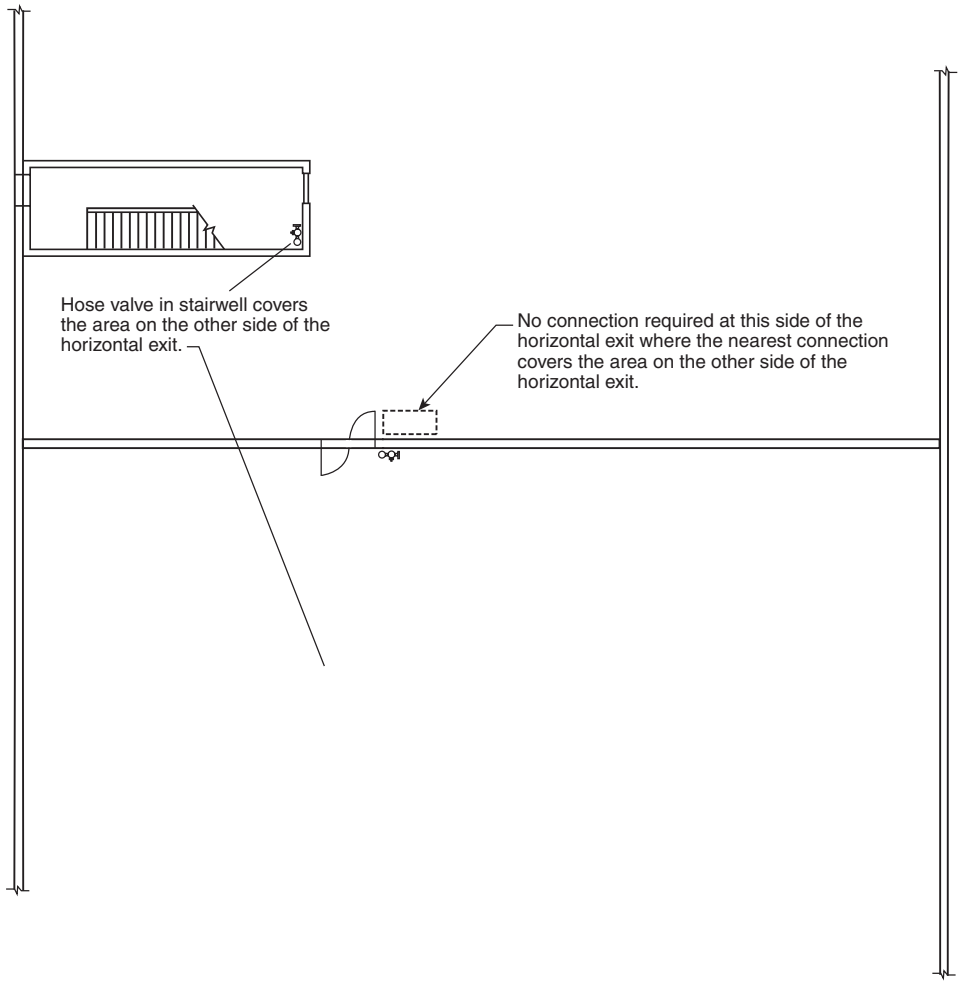


FIGURE A.7.3.2.3 Location of Hose Connections at Horizontal Exits and Stairwells.

In high-rise standpipe systems with pressure-reducing hose valves, the fire department has little or no control over hose valve outlet pressure.

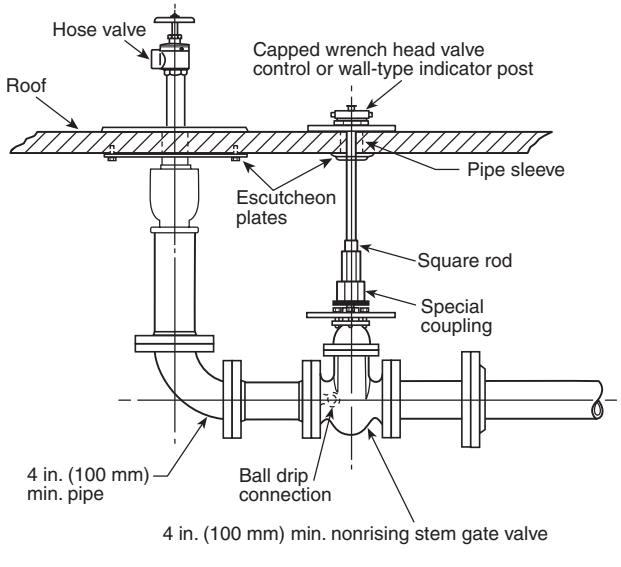
Many fire departments use combination (fog and straight stream) nozzles requiring 100 psi (6.9 bar) residual pressure at the nozzle inlet with 1½ in., 1¾ in., or 2 in. (40 mm, 44 mm, or 50 mm) hose in lengths of up to 150 ft (45.7 m). Some use 2½ in. (65 mm) hose with a smooth bore nozzle or a combination nozzle.

Some departments use 50 ft (15.2 m) of 2½ in. (65 mm) hose to a gated wye, supplying two 100 ft (30.5 m) lengths of 1½–2 in. (40–50 mm) hose with combination nozzles, requiring 120–149 psi (8.3–0.3 bar) at the valve outlet. *(See Table A.7.8.)*

Also see NFPA 1901, *Standard for Automotive Fire Apparatus*.

A.7.8.1.2 It is not the intent of this standard to provide an automatic water supply for manual standpipe systems. Manual standpipe systems are designed (sized) to provide 100 psi (6.9 bar) at the topmost outlet using a fire department pumper as the source of flow and pressure.

A.7.9 Standpipe system zones are intended to limit system design pressures to not more than 350 psi (24 bar) or within the system component pressure ratings as required by Section 7.2. It is the intent of Section 7.9 to provide for this pressure



ELEVATION VIEW

FIGURE A.7.3.2(5) Roof Outlet Piping Arrangement.

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Table A.7.8 Hose Stream Friction Losses Summary

Calculation No.	Nozzle/Hose	Valve Outlet		Flow	
		gpm	L/min	psi	bar
1	2½ in. (65 mm) combination nozzle, with 150 ft (45.7 m) of 2½ in. (65 mm) hose	250	946	123	8.5
2	Two 1½ in. (40 mm) combination nozzles with 100 ft (30.5 m) of 1½ in. (40 mm) hose per nozzle, 2½ in. (65 mm) gated wye, and 50 ft (15.2 m) of 2½ in. (65 mm) hose	250	946	149	10.3
3	Same as calculation no. 2 with two 100 ft (30.5 m) lengths of 1½ in. (40 mm) hose	250	946	139	9.6
4	Same as calculation no. 3 with two 100 ft (30.5 m) lengths of 2 in. (50 mm) hose	250	946	120	8.3
5	1½ in. (40 mm) combination nozzle with 150 ft (45.7 m) of 2 in. (50 mm) hose	200	757	136	9.4
6	Same as calculation no. 5 with 1½ in. (40 mm) hose	200	757	168	11.6

Note: For a discussion of use by the fire department of fire department connections, see NFPA 13E, *Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.*

limitation and to provide redundancy in the design of supply pipes and pumps to the upper zones of a standpipe system. When standpipe systems are subdivided to eliminate or avoid the use of pressure-reducing valves, such subdivisions should not constitute a standpipe system zone. *[See Figure A.7.1(d) for vertically staged pumps for two-zone systems.]*

A.7.9.2 It is the intent of 7.9.2 to require that each supply pipe have the ability to independently supply the entire flow and pressure required by Sections 7.8 and 7.10.

A.7.9.3 An auxiliary means can also be in the form of pumping through the fire department connection in series with the low- or mid-zone fire pump, as approved by the AHJ.

A.7.10.1.1 If a water supply system supplies more than one building or more than one fire area, the total supply can be calculated based on the single building or fire area requiring the greatest number of standpipes.

For a discussion of use by the fire department of fire department connections, see NFPA 13E, *Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.*

A.7.10.1.1.2 The intent of this section is to provide a different flow requirement for large area low-rise buildings and other structures protected by horizontal standpipes.

A.7.10.1.1.6 The situation in which a single outlet is served by a lateral pipe is not considered a "horizontal standpipe," because the definition of *horizontal standpipe* includes the idea that the pipe feeds two or more outlets. Lateral runs of pipe, like those shown in Figure A.7.10.1.1.6, exist for convenience, but essentially they form additional standpipes that need to be taken into account in the hydraulics. For the system shown in Figure A.7.10.1.1.6 (outlets in the stairwells with the standpipe as well as outlets fed by lateral pipes on each floor), the hydraulic calculations should include 250 gpm (946 L/min) from outlets A, B, C, D, and H if the building is not sprinklered or B, C, D, and H if the building is sprinklered in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.* This means that the standpipe serving the stairwell on the far right side will need to be capable of handling the flow of 750 gpm (2839 L/min) below node H because of the 250 gpm (946 L/m) flow at node C, the 250 gpm flow at node D, and the 250 gpm (946 L/min) flow at node H.

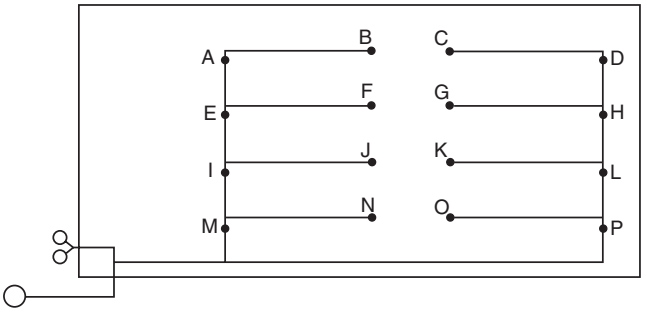


FIGURE A.7.10.1.1.6 Standpipe System with Single Outlets Served by a Lateral Pipe.

A.7.10.1.2 See Section 14.4 of NFPA 13, *Standard for the Installation of Sprinkler Systems.*

When performing a hydraulic design, the hydraulic characteristics of each water supply need to be known. The procedure for determining the hydraulic characteristics of permanent water supplies, such as pumps, is fairly straightforward and is described in NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection.* The procedure for determining the hydraulic characteristics of fire apparatus supplying a standpipe system are similar. Lacking better information about local fire apparatus, a conservative design would accommodate a 1000 gpm (3785 L/min) fire department pumper performing at the level of design specifications set forth in NFPA 1901, *Standard for Automotive Fire Apparatus.* NFPA 1901 specifies that fire department pumpers must be able to achieve three pressure/flow combinations. These are 100 percent of rated capacity at 150 psi (1034 kPa) net pump pressure, 70 percent of rated capacity at 200 psi (1379 kPa) net pump pressure, and 50 percent of rated capacity at 250 psi (1724 kPa) net pump pressure. Therefore, a 1000 gpm (3785 L/min) pumper can be expected to deliver no less than 1000 gpm (3785 L/min) at

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150 psi (1034 kPa), 700 gpm (2650 L/min) at 200 psi (1379 kPa), and 500 gpm (1893 L/min) at 250 psi (1724 kPa). Residual supply pressure on the suction side of a pump from a municipal or other pressurized water supply can also be added.

To perform a hydraulic design, one should determine the minimum required pressure and flow at the hydraulically most remote hose connection and calculate this demand back through system piping to each water supply, accumulating losses for friction and elevation changes and adding flows for additional standpipes and sprinklers at each point where such standpipes or sprinklers connect to the hydraulic design path. When considering fire apparatus as a water supply, flows are calculated from system piping through the fire department connection and back through connecting hoses to the pump. If the pressure available at each supply source exceeds a standpipe system's pressure demand at the designated flow, the design is acceptable. Otherwise, the piping design or the water supply needs to be adjusted.

The intent of the standard is to require that each vertical standpipe serving two or more hose connections be capable of individually flowing 500 gpm (1893 L/min) and 250 gpm (946 L/min) at each of the two hydraulically most demanding connections at the required residual pressure. Given the requirement in 7.10.1.1.3 for the hydraulically most remote standpipe to supply this pressure and flow rate and given the minimum standpipe sizes in Section 7.6, the ability of standpipes that are not hydraulically most remote to satisfy this requirement is implicit and should not require additional hydraulic calculations.

A.7.10.1.2.1.1 For example, consider the standpipe system shown in Figure A.7.10.1.2.1.1 with two risers that terminate at the 15th floor and two risers that terminate at the 10th floor of this fully sprinklered high-rise building. In this case, two separate hydraulic calculations need to be performed. The first would verify that the system can deliver 100 psi (6.9 bar) to the top of the risers on the 15th floor with a total of 750 gpm (2840 L/min) flowing [250 gpm (946 L/min) each at points A, B, and C]. The second would need to prove that the system can deliver 100 psi (6.9 bar) to the 10th floor with a total of 1000 gpm (3785 L/min) flowing [250 gpm (946 L/min) each at points D, E, F, and G]. Note that since the building is sprinklered, there is no flow required from the fourth riser in this second calculation.

A.7.10.1.2.3 Flow is added at nodes in a standpipe system in 250 gpm (946 L/min) increments without requiring additional flow, which might occur from higher pressures at that node (balancing the system). The common supply piping should be hydraulically calculated based on the required flow rate [500, 750, 1000, or 1250 gpm (1893, 2840, 3785, or 4732 L/min)] for the standpipe system. The calculated pressure for the standpipe system does not have to be balanced at the point of connection to the common supply piping.

A.7.11 During flow testing of pressure-reducing valves, care should be taken in making connections to drain risers. An air gap should be maintained in order to prevent cross-connection to nonpotable water sources.

A.7.12 See NFPA 13E, *Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.*

The number of 2½ in. (65 mm) inlets to supply the required water volume and pressure at the fire department connection is dependent on several variables, such as the performance of the water supply at the source, the distance from the source to the location of the inlets, the diameter of the hose used, the size of the fire department pumper, and the required water volume and pressure at the base of the standpipe riser(s).

A.8.1 Plans should indicate the type of fire department equipment that the system is designed to serve, including the hose size, hose length, and hose nozzle. Such equipment is the basis for the pressure selected in accordance with Section 7.8.

A.9.1 The selection of water supplies for each installation should be determined in cooperation with the AHJ.

A.10.1 Additional benefit is derived from waterflow tests by the indication of possible deficiencies, such as tuberculation of piping, closed valves, or other obstructions, which should be corrected to provide adequate waterflows.

A.10.2 Tests should be conducted in accordance with NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants.*

A.11.1 Where standpipe connections are built into the walls or partitions, the hydrostatic tests should be made before they are covered or permanently sealed.

Example of Required Hydrostatic Test Pressure. The water supply for a standpipe system is the connection to a public water service main. A 100 psi (6.9 bar) rated pump is installed in the connection. With a maximum normal public water supply pressure of 70 psi (4.9 bar) at the low elevation point of the system or zone being tested and an 120 psi (8.3 bar) pump (churn) pressure, the hydrostatic test pressure is 70 psi + 120 psi + 50 psi, or 240 psi (4.8 bar + 8.3 bar + 3.4 bar, or 16.5 bar). *(See* NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances, for permitted leakage in underground piping.)*

A.11.4.1 The testing and flushing of the underground pipe should be in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*

A.11.5.1 The hydraulically most remote hose connections in a building are generally at a roof manifold, if provided, or at the top of a stair leading to the roof. In a multizone system, the testing means is generally at a test header at grade or at a suction tank on higher floors.

Where a flow test at the hydraulically most remote hose connection is not practicable, the AHJ should be consulted for the appropriate location of the test.

A.11.5.5.1 It is important to test pressure-regulating devices at the maximum and minimum anticipated flow rates. Minimum flow can be from a single sprinkler for combined systems or flow from a 1½ in. (40 mm) hose connection on standpipe systems that do not supply sprinklers. This can require a sustained flow to demonstrate the continued performance of the pressure-regulating device at the minimum flow rate.

A.11.8 It is the intent that the building owner retain the record drawings, equipment manual, and completed test report for the life of the standpipe system.

A.12.5 A substantial box, preferably of metal, should be located at the highest hose connection, in which a quantity of hose sufficient to reach all parts of the floor, a 1⅛ in. (29 mm) nozzle, spanner wrenches, and hose straps should be kept.

A.12.6 Top hose connections should not be located more than one floor below the highest forms, staging, and similar combustibles at any time.

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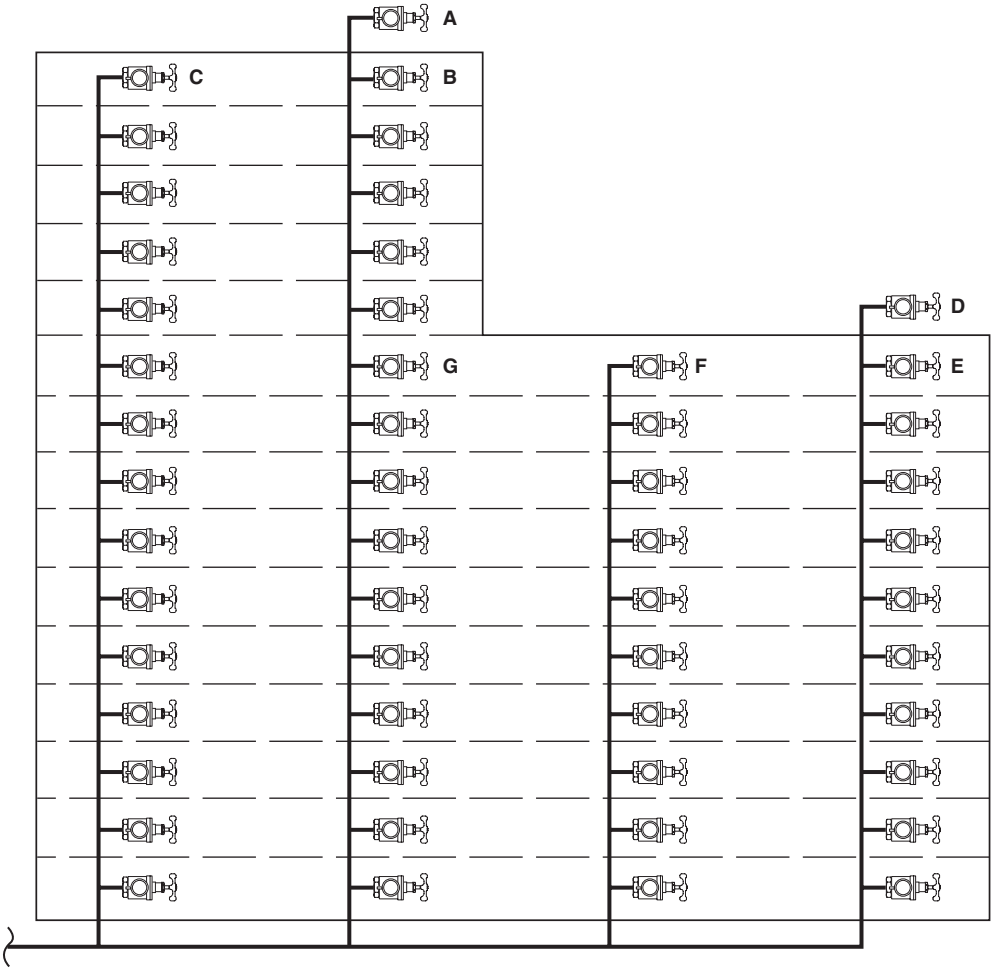


FIGURE A.7.10.1.2.1.1 Standpipe System with Risers Terminating at Different Floor Levels.

Annex B Informational References

B.1 Referenced Publications. The documents or portions thereof listed in this annex are referenced within the informational sections of this standard and are not part of the requirements of this document unless also listed in Chapter 2 for other reasons.

B.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2013 edition.

NFPA 13E, *Recommended Practice for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems*, 2010 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2013 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 2013 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2011 edition.

NFPA 291, *Recommended Practice for Fire Flow Testing and Marking of Hydrants*, 2013 edition.

NFPA 600, *Standard on Industrial Fire Brigades*, 2010 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus*, 2009 edition.

NFPA 1964, *Standard for Spray Nozzles*, 2013 edition.

B.1.2 Other Publications.

B.1.2.1 ASME Publications. American Society for Mechanical Engineers, Three Park Avenue, New York, NY 10016-5990.

ASME B1.20.1, *Pipe Threads, General Purpose (Inch)*, 1983.

B.2 Informational References. The following documents or portions thereof are listed here as informational resources only. They are not a part of the requirements of this document.

AWWA C116, *Protective Fusion Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Services*, 2003.

B.3 References for Extracts in Informational Sections.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2013 edition.

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Step 1: Call for Proposals

- Proposed new Document or new edition of an existing Document is entered into one of two yearly revision cycles, and a Call for Proposals is published.

Step 2: Report on Proposals (ROP)

- Committee meets to act on Proposals, to develop its own Proposals, and to prepare its Report.
- Committee votes by written ballot on Proposals. If two-thirds approve, Report goes forward. Lacking two-thirds approval, Report returns to Committee.
- Report on Proposals (ROP) is published for public review and comment.

Step 3: Report on Comments (ROC)

- Committee meets to act on Public Comments to develop its own Comments, and to prepare its report.
- Committee votes by written ballot on Comments. If two-thirds approve, Report goes forward. Lacking two-thirds approval, Report returns to Committee.
- Report on Comments (ROC) is published for public review.

Step 4: Technical Report Session

- "*Notices of intent to make a motion*" are filed, are reviewed, and valid motions are certified for presentation at the Technical Report Session. ("Consent Documents" that have no certified motions bypass the Technical Report Session and proceed to the Standards Council for issuance.)
- NFPA membership meets each June at the Annual Meeting Technical Report Session and acts on Technical Committee Reports (ROP and ROC) for Documents with "certified amending motions."
- Committee(s) vote on any amendments to Report approved at NFPA Annual Membership Meeting.

Step 5: Standards Council Issuance

- Notification of intent to file an appeal to the Standards Council on Association action must be filed within 20 days of the NFPA Annual Membership Meeting.
- Standards Council decides, based on all evidence, whether or not to issue Document or to take other action, including hearing any appeals.

Committee Membership Classifications

The following classifications apply to Technical Committee members and represent their principal interest in the activity of the committee.

M *Manufacturer:* A representative of a maker or marketer of a product, assembly, or system, or portion thereof, that is affected by the standard.

U *User:* A representative of an entity that is subject to the provisions of the standard or that voluntarily uses the standard.

I/M *Installer/Maintainer:* A representative of an entity that is in the business of installing or maintaining a product, assembly, or system affected by the standard.

L *Labor:* A labor representative or employee concerned with safety in the workplace.

R/T *Applied Research/Testing Laboratory:* A representative of an independent testing laboratory or independent applied research organization that promulgates and/or enforces standards.

E *Enforcing Authority:* A representative of an agency or an organization that promulgates and/or enforces standards.

I *Insurance:* A representative of an insurance company, broker, agent, bureau, or inspection agency.

C *Consumer:* A person who is, or represents, the ultimate purchaser of a product, system, or service affected by the standard, but who is not included in the *User* classification.

SE *Special Expert:* A person not representing any of the previous classifications, but who has a special expertise in the scope of the standard or portion thereof.

NOTES:
1. "Standard" connotes code, standard, recommended practice, or guide.
2. A representative includes an employee.
3. While these classifications will be used by the Standards Council to achieve a balance for Technical Committees, the Standards Council may determine that new classifications of members or unique interests need representation in order to foster the best possible committee deliberations on any project. In this connection, the Standards Council may make appointments as it deems appropriate in the public interest, such as the classification of "Utilities" in the National Electrical Code Committee.
4. Representatives of subsidiaries of any group are generally considered to have the same classification as the parent organization.

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Submitting Public Input / Public Comment through the Electronic Submission System (e-Submission):

As soon as the current edition is published, a Standard is open for Public Input.

Before accessing the e-Submission System, you must first sign-in at www.NFPA.org. *Note: You will be asked to sign-in or create a free online account with NFPA before using this system*:

a. Click in the gray Sign In box on the upper left side of the page. Once signed-in, you will see a red "Welcome" message in the top right corner.
b. Under the Codes and Standards heading, Click on the Document Information pages (List of Codes & Standards), and then select your document from the list or use one of the search features in the upper right gray box.

OR

a. Go directly to your specific document page by typing the convenient short link of www.nfpa.org/document#, (Example: NFPA 921 would be www.nfpa.org/921) Click in the gray Sign In box on the upper left side of the page. Once signed in, you will see a red "Welcome" message in the top right corner.

To begin your Public Input, select the link The next edition of this standard is now open for Public Input (formally "proposals") located on the Document Information tab, the Next Edition tab, or the right-hand Navigation bar. Alternatively, the Next Edition tab includes a link to Submit Public Input online

At this point, the NFPA Standards Development Site will open showing details for the document you have selected. This "Document Home" page site includes an explanatory introduction, information on the current document phase and closing date, a left-hand navigation panel that includes useful links, a document Table of Contents, and icons at the top you can click for Help when using the site. The Help icons and navigation panel will be visible except when you are actually in the process of creating a Public Input.

Once the First Draft Report becomes available there is a Public comment period during which anyone may submit a Public Comment on the First Draft. Any objections or further related changes to the content of the First Draft must be submitted at the Comment stage.

To submit a Public Comment you may access the e-Submission System utilizing the same steps as previous explained for the submission of Public Input.

For further information on submitting public input and public comments, go to: http://www.nfpa.org/publicinput

Other Resources available on the Doc Info Pages

Document information tab: Research current and previous edition information on a Standard

Next edition tab: Follow the committee's progress in the processing of a Standard in its next revision cycle.

Technical committee tab: View current committee member rosters or apply to a committee

Technical questions tab: For members and Public Sector Officials/AHJs to submit questions about codes and standards to NFPA staff. Our Technical Questions Service provides a convenient way to receive timely and consistent technical assistance when you need to know more about NFPA codes and standards relevant to your work. Responses are provided by NFPA staff on an informal basis.

Products/training tab: List of NFPA's publications and training available for purchase.

Community tab: Information and discussions about a Standard

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Information on the NFPA Standards Development Process

I. Applicable Regulations. The primary rules governing the processing of NFPA standards (codes, standards, recommended practices, and guides) are the NFPA *Regulations Governing the Development of NFPA Standards (Regs)*. Other applicable rules include NFPA *Bylaws*, NFPA *Technical Meeting Convention Rules*, NFPA *Guide for the Conduct of Participants in the NFPA Standards Development Process*, and the NFPA *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council*. Most of these rules and regulations are contained in the *NFPA Standards Directory*. For copies of the *Directory*, contact Codes and Standards Administration at NFPA Headquarters; all these documents are also available on the NFPA website at "www.nfpa.org."

The following is general information on the NFPA process. All participants, however, should refer to the actual rules and regulations for a full understanding of this process and for the criteria that govern participation.

II. Technical Committee Report. The Technical Committee Report is defined as "the Report of the responsible Committee(s), in accordance with the Regulations, in preparation of a new or revised NFPA Standard." The Technical Committee Report is in two parts and consists of the First Draft Report and the Second Draft Report. (See *Regs* at 1.4)

III. Step 1: First Draft Report. The First Draft Report is defined as "Part one of the Technical Committee Report, which documents the Input Stage." The First Draft Report consists of the First Draft, Public Input, Committee Input, Committee and Correlating Committee Statements, Correlating Input, Correlating Notes, and Ballot Statements. (See *Regs* at 4.2.5.2 and Section 4.3) Any objection to an action in the First Draft Report must be raised through the filing of an appropriate Comment for consideration in the Second Draft Report or the objection will be considered resolved. [See *Regs* at 4.3.1(b)]

IV. Step 2: Second Draft Report. The Second Draft Report is defined as "Part two of the Technical Committee Report, which documents the Comment Stage." The Second Draft Report consists of the Second Draft, Public Comments with corresponding Committee Actions and Committee Statements, Correlating Notes and their respective Committee Statements, Committee Comments, Correlating Revisions, and Ballot Statements. (See *Regs* at Section 4.2.5.2 and 4.4) The First Draft Report and the Second Draft Report together constitute the Technical Committee Report. Any outstanding objection following the Second Draft Report must be raised through an appropriate Amending Motion at the Association Technical Meeting or the objection will be considered resolved. [See *Regs* at 4.4.1(b)]

V. Step 3a: Action at Association Technical Meeting. Following the publication of the Second Draft Report, there is a period during which those wishing to make proper Amending Motions on the Technical Committee Reports must signal their intention by submitting a Notice of Intent to Make a Motion. (See *Regs* at 4.5.2) Standards that receive notice of proper Amending Motions (Certified Amending Motions) will be presented for action at the annual June Association Technical Meeting. At the meeting, the NFPA membership can consider and act on these Certified Amending Motions as well as Follow-up Amending Motions, that is, motions that become necessary as a result of a previous successful Amending Motion. (See 4.5.3.2 through 4.5.3.6 and Table1, Columns 1-3 of *Regs* for a summary of the available Amending Motions and who may make them.) Any outstanding objection following action at an Association Technical Meeting (and any further Technical Committee consideration following successful Amending Motions, see *Regs* at 4.5.3.7 through 4.6.5.3) must be raised through an appeal to the Standards Council or it will be considered to be resolved.

VI. Step 3b: Documents Forwarded Directly to the Council. Where no Notice of Intent to Make a Motion (NITMAM) is received and certified in accordance with the Technical Meeting Convention Rules, the standard is forwarded directly to the Standards Council for action on issuance. Objections are deemed to be resolved for these documents. (See *Regs* at 4.5.2.5)

VII. Step 4a: Council Appeals. Anyone can appeal to the Standards Council concerning procedural or substantive matters related to the development, content, or issuance of any document of the Association or on matters within the purview of the authority of the Council, as established by the *Bylaws* and as determined by the Board of Directors. Such appeals must be in written form and filed with the Secretary of the Standards Council (See *Regs* at 1.6). Time constraints for filing an appeal must be in accordance with 1.6.2 of the *Regs*. Objections are deemed to be resolved if not pursued at this level.

VIII. Step 4b: Document Issuance. The Standards Council is the issuer of all documents (see Article 8 of *Bylaws*). The Council acts on the issuance of a document presented for action at an Association Technical Meeting within 75 days from the date of the recommendation from the Association Technical Meeting, unless this period is extended by the Council (See *Regs at* 4.7.2). For documents forwarded directly to the Standards Council, the Council acts on the issuance of the document at its next scheduled meeting, or at such other meeting as the Council may determine (See *Regs* at 4.5.2.5 and 4.7.4).

IX. Petitions to the Board of Directors. The Standards Council has been delegated the responsibility for the administration of the codes and standards development process and the issuance of documents. However, where extraordinary circumstances requiring the intervention of the Board of Directors exist, the Board of Directors may take any action necessary to fulfill its obligations to preserve the integrity of the codes and standards development process and to protect the interests of the Association. The rules for petitioning the Board of Directors can be found in the *Regulations Governing Petitions to the Board of Directors from Decisions of the Standards Council* and in 1.7 of the *Regs*.

X. For More Information. The program for the Association Technical Meeting (as well as the NFPA website as information becomes available) should be consulted for the date on which each report scheduled for consideration at the meeting will be presented. For copies of the First Draft Report and Second Draft Report as well as more information on NFPA rules and for up-to-date information on schedules and deadlines for processing NFPA documents, check the NFPA website (www.nfpa.org/aboutthecodes) or contact NFPA Codes & Standards Administration at (617) 984-7246.

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