

NFPA® 24

Standard for the Installation of Private Fire Service Mains and Their Appurtenances

2025 Edition



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NFPA® 24

Standard for the

Installation of Private Fire Service Mains and Their Appurtenances

2025 Edition

This edition of NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, was prepared by the Technical Committee on Private Water Supply Piping Systems and released by the Correlating Committee on Automatic Sprinkler Systems. It was issued by the Standards Council on April 22, 2024, with an effective date of May 12, 2024, and supersedes all previous editions.

This edition of NFPA 24 was approved as an American National Standard on May 12, 2024.

Origin and Development of NFPA 24

In 1903, the NFPA Committee on Hose and Hydrants first presented *Specifications for Mill Yard Hose Houses*, taken substantially from a standard published by the Eastern Factory Insurance Association. This text was revised and adopted in 1904. The NFPA Committee on Field Practice amended the Specifications in 1926, published as NFPA 25.

In 1925, the Committee on Field Practice prepared a *Standard on Outside Protection, Private Underground Piping Systems Supplying Water for Fire Extinguishment*, which was adopted by NFPA. It was largely taken from the 1920 edition of the *NFPA Automatic Sprinkler Standard*, Section M on Underground Pipes and Fittings. In September 1931, a revision was made, with the resulting standard designated as NFPA 24. In the 1981 edition, the title was changed from *Standard for Outside Protection to Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

In 1953, on recommendation of the Committee on Standpipes and Outside Protection, the two standards (NFPA 24 and NFPA 25) were completely revised and adopted as NFPA 24. Amendments were made leading to separate editions in 1955, 1959, 1962, 1963, 1965, 1966, 1968, 1969, 1970, 1973, 1977, 1981, 1983, and 1987.

The 1992 edition included amendments to further delineate the point at which the water supply stops and the fixed fire protection system begins. Minor changes were made concerning special topics such as thrust restraint and equipment provisions in valve pits.

The 1995 edition clarified requirements for aboveground and buried piping. Revisions were made to provide additional information regarding listing requirements, signage, valves, valve supervision, hydrant outlets, system attachments, piping materials, and thrust blocks. User friendliness of the document was also addressed.

The 2002 edition represented a complete revision of NFPA 24. Changes included reorganization and editorial modifications to comply with the *Manual of Style for NFPA Technical Committee Documents*. Additionally, all of the underground piping requirements were relocated into a new Chapter 10.

The 2007 edition was revised in five major areas: Chapter 10 was updated editorially, and minor technical changes were made. Newly established leakage test criteria, as well as updated requirements for thrust blocks and restrained joints, were added to Chapter 10. Two annexes were new to this edition: Annex C, *Recommended Practice for Fire Flow Testing*, and Annex D, *Recommended Practice for Marking of Hydrants*. These two annexes were developed based on the 2002 edition of NFPA 291.

The 2010 edition was revised in three major areas: the provisions for location and identification of fire department connections, valves controlling water supply, and protection of fire service mains entering the building.

The 2013 edition of NFPA 24 included clarifications on the requirements for running piping under buildings, including annex figures depicting clearances. The Contractors Material and Test

Certificate for Underground Piping (Figure 10.10.1) was modified to include confirmation that the forward flow test of the backflow preventer had been conducted. A provision was also added that required the automatic drip valve to be in an accessible location that permits inspections in accordance with NFPA 25.

NFPA 24 underwent a structural rewrite for the 2016 edition. The hydrant definitions were clarified to describe the type of hydrant in question, as opposed to describing when and where they would be used. The valve arrangement requirements were rewritten for clarity, and annex figures added to provide figures that are consistent with NFPA 13. The title of Chapter 6 was changed from Valves to Water Supply Connections to better describe the material in the chapter. Revisions to Section 6.1 more clearly call out the permitted exceptions to indicating valves and permit nonlisted tapping sleeve and valve assemblies in connections to municipal water supplies. The center of hose outlet measurements was updated to include clear minimum and maximum values for the location of the outlet, along with the appropriate measurement for a hose house installation. The steel underground piping references have been removed from the table in Chapter 10 because steel pipe is required to be listed other than in the FDC line. A statement also was added to allow underground fittings to be used above the ground to transition to aboveground piping.

The 2019 edition included minor changes related to trenching and backfill. Acceptance testing requirements for aboveground piping were included. The standard was also revised to clarify the unacceptable use of steel piping for underground service.

The 2022 edition explained that NFPA 24 does not apply to dry fire hydrants used for drafting. Chapter 5 clarified that a single fire department connection can supply multiple buildings where approved by the AHJ. Alternate distance criteria were added to Chapter 6 for post indicator valves and backflow preventors. A new section was added to Chapter 10 to clarify that the flush rates of NFPA 20 need to be used where a fire pump is connected to the water supply. Also, a new section was added that provides an alternate cleaning procedure in place of traditional flushing. New annex material was added to help determine ice thickness where taking water from a source exposed to freezing conditions.

For the 2025 edition, a revision in Chapter 1 makes it clear that new technologies and alternate methods are permitted if the level of safety prescribed by the standard is not lowered. In Chapter 7, clarification is provided for the orientation of hydrant outlets. Chapter 10 addresses the requirements for the joining of plain end pipe, adds that bituminous coating is an acceptable corrosion retarding material, and clarifies that, since the maximum force that a thrust block will face is from hydrostatic testing, that the requirement of sizing thrust blocks shall be based on test pressure. Chapter 12 provides annex language on what is considered a hazardous area.

Correlating Committee on Automatic Sprinkler Systems

William E. Koffel, *Chair*
Koffel Associates, Inc., MD [SE]

Roland A. Asp, National Fire Sprinkler Association, Inc., MD [M]
Rep. National Fire Sprinkler Association

Jose R. Baz, JRB Associates Group Inc., FL [M]
Rep. NFPA Latin American Section

Kerry M. Bell, UL LLC, IL [RT]

Tracey D. Bellamy, Telgian Corporation, GA [U]
Rep. The Home Depot

Chase A. Browning, Medford Fire Department, OR [E]

Steven W. Dellasanta, JENSEN HUGHES, RI [SE]

John August Denhardt, American Fire Sprinkler Association (AFSA), TX [IM]
Rep. American Fire Sprinkler Association

Russell P. Fleming, Northeast Fire Suppression Associates, LLC, NH [SE]

Alex Hoffman, Viking Fire Protection Inc., Canada [IM]
Rep. Canadian Automatic Sprinkler Association

Sultan M. Javeri, SC Engineering, France [IM]

Charles W. Ketner, National Automatic Sprinkler Fitters LU 669, MD [L]

Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry

James D. Lake, Viking Corporation, MI [I]

John A. LeBlanc, FM Global, MA [I]

Kenneth W. Linder, Swiss Re, FL [I]

David O. Lowrey, City of Boulder Fire Rescue, CO [E]

Bryan Edwin Matthews, Liberty Mutual Group, NY [I]

Garner A. Palenske, Wiss, Janney, Elstner Associates, Inc., CA [SE]

Lawrence Richard Phillips, US Department of the Navy, VA [E]

Adam Seghi, Coda Risk Analysis, TX [I]

Joseph Su, National Research Council of Canada, Canada [RT]

J. Michael Thompson, GHD/The Protection Engineering Group, PC, VA [SE]

Alternates

Ralph E. Bless, Jr., Telgian Corporation, GA [U]
(Alt. to Tracey D. Bellamy)

Bruce H. Clarke, American International Group, Inc. (AIG), SC [I]
(Alt. to Adam Seghi)

David B. Fuller, FM Approvals, RI [I]
(Alt. to John A. LeBlanc)

Kevin Ryan Hall, American Fire Sprinkler Association (AFSA), MD [IM]
(Alt. to John August Denhardt)

Jeffrey E. Harper, JENSEN HUGHES, IL [SE]
(Alt. to Steven W. Dellasanta)

Jeff Hebenstreit, UL LLC, IL [RT]
(Alt. to Kerry M. Bell)

Jeffrey M. Hugo, National Fire Sprinkler Association, Inc., MI [M]
(Alt. to Roland A. Asp)

Matthew Osburn, Canadian Automatic Sprinkler Association (CASA), Canada [IM]
(Alt. to Alex Hoffman)

Donato A. Pirro, Electro Sistemas De Panama, S.A., Panama [M]
(Alt. to Jose R. Baz)

Matthew T. Smith, GHD, Inc., MD [SE]
(Alt. to J. Michael Thompson)

Jeffrey J. Van Rhyn, Jr., Local 669 JATC, NV [L]
(Alt. to Charles W. Ketner)

Nonvoting

Robert G. Caputo, American Fire Sprinkler Association (AFSA), TX [IM]
Rep. TC on Private Water Supply Piping Systems

Raymond A. Grill, Ray Grill Consulting PLLC, VA [SE]
Rep. TC on Sprinkler System Installation Criteria

Kenneth E. Isman, University of Maryland, MD [SE]
Rep. TC on Residential Sprinkler Systems

Thomas Goss, NFPA Staff Liaison

William B. Smith, Code Consultants, Inc., MO [SE]
Rep. TC on Sprinkler System Discharge Criteria

John J. Walsh, UA Joint Apprenticeship Committee Local 669, MD [O]
Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry
(Member Emeritus)

Chad Duffy, NFPA Co-Staff Liaison

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Committee Scope: This Committee shall have overall responsibility for documents that pertain to the criteria for the design and installation of automatic, open and foam-water sprinkler systems including the character and adequacy of water supplies, and the selection of sprinklers, piping, valves, and all materials and accessories. This Committee does not cover the installation of tanks and towers, nor the installation, maintenance, and use of central station, proprietary, auxiliary, and local signaling systems for watchmen, fire alarm, supervisory service, nor the design of fire department hose connections.

Technical Committee on Private Water Supply Piping Systems

Robert G. Caputo, *Chair*

American Fire Sprinkler Association (AFSA), TX [IM]

Alhassan Kamel Taha Ahmed, WSP Middle East, Saudi Arabia [SE]

Roland A. Asp, National Fire Sprinkler Association, Inc., MD [M]
Rep. National Fire Sprinkler Association

James B. Biggins, CAC Specialty - Natural Resources, IL [I]

Dominic Bosco, Shambaugh & Son, NV [IM]
Rep. Illinois Fire Prevention Association

Flora F. Chen, Hayward Fire Department, California, CA [E]

Stephen A. Clark, Jr., Allianz, GA [I]

Steven W. Dellasanta, JENSEN HUGHES, RI [SE]

Jeffrey T. Dudley, National Aeronautics & Space Administration, Kennedy Space Center (NASA), FL [U]

Byron E. Ellis, Entergy Corporation, LA [U]
Rep. Edison Electric Institute

Brandon W. Frakes, AXA XL/Global Asset Protection Services, LLC, NC [I]

Robert M. Gagnon, Gagnon Engineering, MD [SE]

Fred Grenning, The House Monster Company, IL [M]

LaMar Hayward, All-In FPC, LLC, ID [SE]

Jeff Hebenstreit, UL LLC, IL [RT]

Conor J. Kauffman, Kauffman Company, TX [IM]
Rep. National Fire Sprinkler Association

Larry Keeping, PLC Fire Safety Engineering, Canada [SE]

Kevin J. Kelly, Victaulic, PA [M]

Rep. National Fire Sprinkler Association

Alan R. Laguna, Merit Sprinkler Company, Inc., LA [IM]

Leslie “Chip” L. Lindley, II, Lindley Fire Protection Company Inc., CA [IM]

Cody Blake Melton, Wichita Falls Fire Department, TX [E]

Bob D. Morgan, Fort Worth Fire Department, TX [E]

Mohamed Mustafa, Norman Disney and Young (NDY)/TetraTek, Inc., Australia [SE]

Jason R. Olliges, Sprinkler Fitters Local 268, MO [L]

Rep. United Assn. of Journeymen & Apprentices of the Plumbing & Pipe Fitting Industry

John H. Pecot, Johnson Controls, TX [M]
Rep. Johnson Controls

Dion Powell, Liberty Mutual, IL [I]

James R. Richardson, Lisle Woodridge Fire District, IL [E]

Peter T. Schwab, Wayne Automatic Fire Sprinklers, Inc., FL [IM]

David A. Shindle, US Department of the Navy, VA [U]

Austin L. Smith, Consolidated Nuclear Security, LLC, Y-12, TN [U]

Dustin Stokes, Battelle Energy Alliance, ID [U]

Chen-Hsiang Su, US Consumer Product Safety Commission (CPSC), MD [C]

Kenneth W. Wagoner, Parsley Consulting, MO [SE]

Alternates

Zainul Abedeen, WSP Middle East, United Arab Emirates [SE]
(Alt. to Alhassan Kamel Taha Ahmed)

Mark A. Bowman, Global Asset Protection Services, LLC, OH [I]
(Alt. to Brandon W. Frakes)

Johnathan C. Carl, Victaulic Company of America, PA [M]
(Alt. to Kevin J. Kelly)

Christopher D. Fulkerson, Local 669 Jatc, IN [L]
(Alt. to Jason R. Olliges)

Andrew C. Higgins, Allianz, NC [I]
(Alt. to Stephen A. Clark, Jr.)

John L. Hulett, APi National Service Group, CO [IM]
(Alt. to Conor J. Kauffman)

Bryan Edwin Matthews, Liberty Mutual Group, NY [I]
(Alt. to Dion Powell)

Thomas Goss, NFPA Staff Liaison

Joshua P. McDonald, American Fire Sprinkler Association (AFSA), TX [IM]

(Alt. to Robert G. Caputo)

William Overton, Consolidated Nuclear Security, LLC, Y-12, TN [U]
(Alt. to Austin L. Smith)

Ryan Lee Peterson, Wayne Automatic Fire Sprinklers, Inc., FL [IM]
(Alt. to Peter T. Schwab)

William Scott Roberts, Quick Response Fire Protection, NJ [M]
(Alt. to Roland A. Asp)

Joseph W. Spokis, JENSEN HUGHES, RI [SE]
(Alt. to Steven W. Dellasanta)

Craig M. Vesely, Alliant Energy, WI [U]
(Alt. to Byron E. Ellis)

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Committee Scope: This Committee shall have the primary responsibility for documents on private piping systems supplying water for fire protection and for hydrants, hose houses, and valves. The Committee is also responsible for documents on fire flow testing and marking of hydrants.

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NFPA 24

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

Chapter 1 Administration

1.1 Scope.

1.1.1 This standard shall provide the minimum requirements for the installation of private fire service mains and their appurtenances, which include supplying the following:

- (1) Automatic sprinkler systems
- (2) Open sprinkler systems
- (3) Water spray fixed systems
- (4) Foam systems
- (5) Private hydrants
- (6) Monitor nozzles or standpipe systems with reference to water supplies
- (7) Hose houses

1.1.2 This standard shall apply to combined service mains intended to carry water for fire service and other uses.

Δ 1.1.3 This standard shall not apply to the following situations:

- (1) Mains under the control of a water utility

- (2) Mains providing fire protection and/or domestic water that are privately owned but are operated as a water utility
- (3)* Dry fire hydrants utilized for drafting or mains connected to dry hydrants utilized for drafting

1.1.4 This standard shall not apply to underground mains serving sprinkler systems designed and installed in accordance with NFPA 13R that are less than 4 in. (100 mm) in nominal diameter.

1.1.5 This standard shall not apply to underground mains serving sprinkler systems designed and installed in accordance with NFPA 13D.

1.2 Purpose. The purpose of this standard shall be to provide a reasonable degree of protection for life and property from fire through installation requirements for private fire service main systems based on sound engineering principles, test data, and field experience.

N 1.2.1 Private fire service mains are specialized fire protection systems and shall require design and installation by knowledgeable and trained personnel.

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

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

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

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

Δ 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.

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

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

1.5 Units.

1.5.1 Metric units of measurement in this standard shall be in accordance with the modernized metric system known as the International System of Units (SI).

1.5.1.1 Two units (liter and bar) are outside of but recognized by SI, and are commonly used in international fire protection.

1.5.1.2 These units with conversion factors shall be used as listed in Table 1.5.1.2.

1.5.2 If a value for a measurement given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement.

Table 1.5.1.2 Conversion Table for SI Units

Quantity	Name of Unit	Unit Symbol	Conversion Factor
Length	Meter	m	1 ft = 0.3048 m
Area	Square meter	m ²	1 ft ² = 0.092903 m ²
Volume	Cubic meter	m ³	1 ft ³ = 0.028317 m ³
Fluid capacity	Liter	L	1 gal = 3.785 L
Flow	Liter per minute	L/min	1 gpm = 3.785 L/min
Pressure	Bar Kilopascal Newton per square meter	bar kPa N/m ²	1 psi = 0.0689 bar 1 psi = 6.894757 kPa 1 lbf/ft ² = 47.8800 N/m ²
Temperature	Degrees Celsius	°C	1°F = $\frac{5}{9} \times ^\circ\text{C} + 32$
Velocity	Meter per second	m/sec	1 fps = 0.3048 m/sec
Force	Newton	N	1 lbf = 4.448822 N
Stress	Kilonewton per square meter Megapascal	kN/m ² MPa	1 lbf/ft ² = 0.047880 kN/m ² 1 lbf/in. ² = 0.006895 MPa

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

1.5.3* It shall be acceptable to use the exact conversion or the conversions stated in the standard, even though they might not be exact.

1.6 New Technology.

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

1.6.2 Materials or devices not specifically designated by this standard shall be utilized in complete accord with all conditions, requirements, and limitations of their listings.

Chapter 2 Referenced Publications

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

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

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2025 edition.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*, 2025 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies*, 2025 edition.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2025 edition.

NFPA 22, *Standard for Water Tanks for Private Fire Protection*, 2023 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 2023 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems*, 2023 edition.

NFPA 1960, *Standard for Fire Hose Connections, Spray Nozzles, Manufacturer's Design of Fire Department Ground Ladders, Fire Hose, and Powered Rescue Tools*, 2024 edition.

2.3 Other Publications.

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

ASME B1.20.1, *Pipe Threads, General Purpose, Inch*, 2013 (R2018).

ASME B16.1, *Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250*, 2020.

ASME B16.3, *Malleable Iron Threaded Fittings, Classes 150 and 300*, 2021.

ASME B16.4, *Gray Iron Threaded Fittings, Classes 125 and 250*, 2021.

ASME B16.15, *Cast Copper Alloy Threaded Fittings: Classes 125 and 250*, 2018.

ASME B16.18, *Cast Copper Alloy Solder Joint Pressure Fittings*, 2021.

ASME B16.22, *Wrought Copper and Copper Alloy Solder Joint Pressure Fittings*, 2021.

2.3.2 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*, 2022.

ASTM A135/A135M, *Standard Specification for Electric-Resistance-Welded Steel Pipe*, 2021.

ASTM A312/312M, *Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes*, 2022.

ASTM A403/A403M, *Specification for Wrought Austenitic Stainless Steel Pipe Fittings*, 2022.

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

ASTM B43, *Specification for Seamless Red Brass Pipe, Standard Sizes*, 2020.

ASTM B75/B75M, *Specification for Seamless Copper Tube*, 2020.

ASTM B88, *Specification for Seamless Copper Water Tube*, 2020.

ASTM B251/B251M, *Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube*, 2017.

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

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

AWWA C104/A21.4, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings*, 2023.

AWWA C105/A21.5, *Polyethylene Encasement for Ductile-Iron Pipe Systems*, 2018.

AWWA C110/A21.10, *Ductile-Iron and Gray-Iron Fittings*, 2021.

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

AWWA C115/A21.15, *Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges*, 2020.

AWWA C150/A21.50, *Thickness Design of Ductile-Iron Pipe*, 2021.

AWWA C151/A21.51, *Ductile-Iron Pipe, Centrifugally Cast*, 2017, errata 2018.

AWWA C153/A21.53, *Ductile-Iron Compact Fittings*, 2019.

AWWA C300, *Reinforced Concrete Pressure Pipe, Steel-Cylinder Type*, 2016.

AWWA C301, *Prestressed Concrete Pressure Pipe, Steel-Cylinder Type*, 2014 reaffirmed without revision 2019.

AWWA C302, *Reinforced Concrete Pressure Pipe, Noncylinder Type*, 2022.

AWWA C303, *Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type*, 2017.

AWWA C600, *Installation of Ductile-Iron Water Mains and Their Appurtenances*, 2017.

AWWA C602, *Cement-Mortar Lining of Water Pipelines Lines in Place, 4 in. (100 mm) and Larger*, 2023.

AWWA C900, *Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. Through 60 in. (100 mm Through 1,500 mm)*, 2022.

AWWA C906, *Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) Through 65 in. (1,650 mm) for Waterworks*, 2021.

AWWA C909, *Molecularly Oriented Polyvinyl Chloride (PVC) Pressure Pipe, 4 in. – 24 in. (100 mm – 600 mm) for Water, Wastewater, and Reclaimed Water Service*, 2022.

AWWA M9, *Concrete Pressure Pipe*, 2008, errata 2014.

AWWA M23, *PVC Pipe — Design and Installation*, 2020.

AWWA M55, *PE Pipe — Design and Installation*, 2020.

2.3.4 Other Publications.

Merriam-Webster's *Collegiate Dictionary*, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

2.4 References for Extracts in Mandatory Sections.

NFPA 20, *Standard for the Installation of Stationary Pumps for Fire Protection*, 2025 edition.

Chapter 3 Definitions

3.1 General.

3.1.1 The definitions contained in this chapter shall apply to the terms used in this standard.

3.1.2 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.

3.1.3 Merriam-Webster's *Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

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

3.2.3 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.4* 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.

3.2.5 Shall. Indicates a mandatory requirement.

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

3.2.7 Standard. An NFPA standard, the main text of which contains only mandatory provisions using the word "shall" to indicate requirements and that is in a form generally suitable

for mandatory reference by another standard or code or for adoption into law. Nonmandatory provisions are not to be considered a part of the requirements of a standard and shall be located in an appendix, annex, footnote, informational note, or other means as permitted in the NFPA manuals of style. When used in a generic sense, such as in the phrases “standards development process” or “standards development activities,” the term “standards” includes all NFPA standards, including codes, standards, recommended practices, and guides.

3.3 General Definitions.

3.3.1 Appurtenance. An accessory or attachment that enables the private fire service main to perform its intended function.

3.3.2 Automatic Drain Valve (Automatic Drip or Ball Drip). A device intended to remove water using gravity from piping or valve cavities, which is required to be empty when the system is not discharging water.

3.3.3* Control Valve (Shutoff Valve). A valve controlling flow to water-based fire protection systems and devices.

3.3.4 Corrosion-Resistant Piping. Piping that has the property of being able to withstand deterioration of its surface or its properties when exposed to its environment.

3.3.5 Corrosion-Retarding Material. A lining or coating material that when applied to piping or appurtenances has the property of reducing or slowing the deterioration of the object's surface or properties when exposed to its environment.

3.3.6 Fire Department Connection. A connection through which the fire department can pump supplemental water into the sprinkler system, standpipe, or other water-based fire protection systems, thereby supplementing existing water supplies.

3.3.7 Fire Pump. A pump that is a provider of liquid flow and pressure dedicated to fire protection. [20, 2025]

3.3.8 Hose House. An enclosure located over or adjacent to a hydrant or other water supply designed to contain the necessary hose nozzles, hose wrenches, gaskets, and spanners to be used in firefighting in conjunction with and to provide aid to the local fire department.

3.3.9 Hydrant Butt. The hose connection outlet of a hydrant.

3.3.10 Hydraulically Calculated Water Demand Flow Rate. The waterflow rate for a system or hose stream that has been calculated using accepted engineering practices.

3.3.11 Pressure.

3.3.11.1 Residual Pressure. The pressure that exists in the distribution system, measured at the residual hydrant at the time the flow readings are taken at the flow hydrants.

3.3.11.2 Static Pressure. The pressure that exists at a given point under normal distribution system conditions measured at the residual hydrant with no hydrants flowing.

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

3.3.13* Private Fire Service Main. A private fire service main, as used in this standard, is that pipe and its appurtenances on private property that is between a source of water and the base

of the system riser for water-based fire protection systems; between a source of water and inlets to foam-making systems; between a source of water and the base elbow of private hydrants or monitor nozzles; and used as fire pump suction and discharge piping, beginning at the inlet side of the check valve on a gravity or pressure tank.

3.3.14 Pumper Outlet. The hydrant outlet intended to be connected to a fire department pumper for use in taking supply from the hydrant.

3.3.15 Rated Capacity. The flow, either measured or calculated, that is available from a hydrant at the designated residual pressure (rated pressure).

3.3.16 System Working Pressure. The maximum anticipated static (nonflowing) or flowing pressure applied to fire protection system components exclusive of surge pressures and exclusive of pressure from the fire department connection.

3.3.17 Test.

3.3.17.1 Flow Test. A test performed by the flow and measurement of water from one hydrant and the static and residual pressures from an adjacent hydrant for the purpose of determining the available water supply at that location.

3.3.17.2 Flushing Test. A test of a piping system using flow rates intended to remove debris from the piping system prior to it being placed in service.

3.3.17.3 Hydrostatic Test. A test of a closed piping system and its attached appurtenances consisting of subjecting the piping to an increased internal pressure for a specified duration to verify system integrity and system leakage rates.

3.3.18 Valve.

3.3.18.1 Check Valve. A valve that allows flow in one direction only.

3.3.18.2* Indicating Valve. A valve that has components that provide the valve operating condition, open or closed.

3.4 Hydrant Definitions.

3.4.1 Hydrant. An exterior valved connection to a water supply system that provides hose connections.

3.4.1.1* Dry Barrel Hydrant (Frostproof Hydrant). A type of hydrant with the main control valve below the frost line between the footpiece and the barrel.

3.4.1.2 Flow Hydrant. The hydrant that is used for the flow and flow measurement of water during a flow test.

3.4.1.3* Private Fire Hydrant. A valved connection on a water supply system having one or more outlets that is used to supply hose and fire department pumpers with water on private property.

3.4.1.4 Public Hydrant. A valved connection on a water supply system having one or more outlets that is used to supply hose and fire department pumpers with water.

3.4.1.5 Residual Hydrant. The hydrant that is used for measuring static and residual pressures during a flow test.

3.4.1.6 Wet Barrel Hydrant. A type of hydrant that is intended for use where there is no danger of freezing weather and where each outlet is provided with a valve and an outlet.

Chapter 4 General Requirements

4.1* Plans.

4.1.1 Working plans shall be submitted for approval to the authority having jurisdiction before any equipment is installed or remodeled.

4.1.2 Deviation from approved plans shall require permission of the authority having jurisdiction.

4.1.3 Working plans shall be drawn to an indicated scale on sheets of uniform size, with a plan of each floor as applicable, and shall include the following items that pertain to the design of the system:

- (1) Name of owner
- (2) Location, including street address
- (3) Point of compass
- (4) A graphic representation of the scale used on all plans
- (5) Name and address of contractor
- (6) Size and location of all water supplies
- (7) Size and location of standpipe risers, hose outlets, hand hose, monitor nozzles, and related equipment
- (8) The following items that pertain to private fire service mains:
 - (a) Size
 - (b) Length
 - (c) Location
 - (d) Weight
 - (e) Material
 - (f) Point of connection to city main
 - (g) Sizes, types, and locations of valves, valve indicators, regulators, meters, and valve pits
 - (h) Depth at which the top of the pipe is laid below grade
 - (i) Method of restraint
- (9) The following items that pertain to hydrants:
 - (a) Size and location, including size and number of outlets and whether outlets are to be equipped with independent gate valves
 - (b) Thread size and coupling adapter specifications if different from NFPA 1960
 - (c) Whether hose houses and equipment are to be provided, and by whom
 - (d) Static and residual hydrants used in flow
 - (e) Method of restraint
- (10) Size, location, and piping arrangement of fire department connections

4.1.4 The working plan submittal shall include the manufacturer's installation instructions for any specially listed equipment, including descriptions, applications, and limitations for any devices, piping, or fittings.

4.2 Installation Work.

4.2.1 Installation work shall be performed by fully experienced and responsible persons.

4.2.2 The authority having jurisdiction shall always be consulted before the installation or remodeling of private fire service mains.

Chapter 5 Water Supplies

5.1* Connection to Waterworks Systems.

5.1.1 A connection to a reliable waterworks system shall be an acceptable water supply source.

5.1.2* The flow rate and pressure of a public water supply shall be determined from waterflow test data or other approved method.

5.2 Size of Fire Mains.

5.2.1 Private Fire Service Mains.

5.2.1.1 Hydraulic calculations shall show that the main is able to supply the total flow rate at the required design pressure.

Δ 5.2.1.2 For mains that supply hydrants, pipe size shall not be less than 6 in. (150 mm) nominal size.

5.2.2 Mains Not Supplying Hydrants. For mains that do not supply hydrants, pipe sizes less than 6 in. (150 mm) nominal size shall be permitted to be used subject to the following restrictions:

- (1) The main shall supply only the following types of systems:
 - (a) Automatic sprinkler systems
 - (b) Open sprinkler systems
 - (c) Water spray fixed systems
 - (d) Foam systems
 - (e) Standpipe systems
- (2) Hydraulic calculations shall show that the main is able to supply the total flow rate at the required design pressure.
- (3) Systems that are not hydraulically calculated shall have a main at least as large as the riser.

5.3 Pressure-Regulating Devices and Meters.

5.3.1 Pressure-regulating valves shall not be used.

5.3.1.1 Pressure-regulating valves shall be permitted to be used when acceptable to the AHJ.

5.3.2 Where meters are required, they shall be listed for fire protection service.

5.4* Connection from Waterworks Systems.

5.4.1 The requirements of the public health AHJ shall be determined and followed.

5.4.2 Where a backflow prevention device is installed to guard against possible cross-contamination of the public water system, it shall be listed for fire protection service.

5.4.2.1* Where a check valve or alarm check valve is permitted by the AHJ in lieu of a backflow preventer, it shall be listed for fire protection service.

5.5 Connections to Public Water Systems. Connections to public water systems shall be arranged to be isolated by one of the methods permitted in 6.2.9.

5.6* Pumps. Fire pump units installed in accordance with NFPA 20 and connected to a water supply source complying with Sections 5.5, 5.7, or 5.8 shall use an acceptable water supply source.

5.7 Tanks. Tanks shall be installed in accordance with NFPA 22.

5.8 Penstocks, Rivers, Lakes, or Reservoirs. Water supply connections from penstocks, rivers, lakes, or reservoirs shall be designed to prevent the introduction of mud and sediment and shall be provided with approved, double, removable screens or approved strainers installed in an approved manner.

5.8.1* When water supply connections are from penstocks, rivers, lakes, or reservoirs, measures shall be taken to prevent freezing at the water supply inlet.

5.9* Remote Fire Department Connections.

5.9.1 General. Where the AHJ requires a remote fire department connection for systems requiring one by another standard, a fire department connection shall be provided as described in Section 5.9.

5.9.1.1 Fire department connections shall be permitted to be omitted where approved by the AHJ.

5.9.1.2 A single fire department connection shall be permitted to supply multiple buildings where acceptable to the AHJ.

5.9.1.3 Fire department connections shall be of an approved type.

5.9.1.4 Fire department connections shall be equipped with approved plugs or caps that are secured and arranged for removal by fire departments.

5.9.1.5 Fire department connections shall be protected where subject to mechanical damage.

5.9.2 Couplings.

5.9.2.1 The fire department connection(s) shall use an NH internal threaded swivel fitting(s) with an NH standard thread(s), except as permitted by 5.9.2.3 and 5.9.2.4.

5.9.2.2 At least one of the connections shall be the 2.5 to 7.5 NH standard thread specified in NFPA 1960.

5.9.2.3 Where local fire department connections use threads that do not conform to NFPA 1960, the AHJ shall designate the thread to be used.

5.9.2.4 Nonthreaded couplings shall be permitted where required by the AHJ.

5.9.2.4.1 Nonthreaded couplings shall be listed.

5.9.3 Valves.

5.9.3.1 A listed check valve shall be installed in the piping from each fire department connection.

5.9.3.2 Control valves shall not be installed in the piping from the fire department connection to the fire service main.

5.9.3.2.1* Control valves shall be permitted in the system piping downstream of the fire department connection piping.

5.9.4 Drainage.

5.9.4.1 The pipe between the check valve and the outside hose coupling shall be equipped with an approved automatic drain valve.

5.9.4.2 The automatic drain valve shall be installed in a location that permits inspection and testing as required by NFPA 25 and reduces the likelihood of freezing.

5.9.4.2.1 The automatic drip shall be permitted to be buried where permitted by the AHJ.

5.9.4.2.2 Where the automatic drip is buried as allowed by 5.9.4.2.1, the outlet shall discharge into a bed of crushed stone or pea gravel.

5.9.4.3 An automatic drain valve is permitted to be omitted from areas where the piping is not subject to freezing.

5.9.5 Location and Signage.

5.9.5.1* Remote fire department connections shall be located adjacent to a street or an access route to permit fire department apparatus accessibility, or at a location approved by the AHJ.

5.9.5.2* Remote fire department connections shall be located and arranged so that hose lines can be attached to the inlets without interference.

5.9.5.3 Each remote fire department connection shall be designated by a sign as follows:

- (1) The sign shall have raised or engraved letters at least 1 in. (25 mm) in height on a plate or fitting.
- (2)* The sign shall indicate the type of system for which the connection is intended.

5.9.5.4 Where the system demand pressure exceeds 150 psi (10.3 bar), a sign located at the fire department connection shall indicate the required inlet pressure.

5.9.5.5 Where a remote fire department connection only supplies a portion(s) of the building, a sign shall be attached to indicate the portion(s) of the building supplied.

5.9.5.6 Remote fire department connections shall not be connected on the suction side of fire pumps.

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

Chapter 6 Water Supply Connections

6.1 Valves.

6.1.1 All valves controlling connections to water supplies and to supply pipes to water-based fire protection systems shall be listed indicating valves, except as permitted by 6.1.1.3 and 6.1.1.4.

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

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

6.1.1.3* A listed, nonindicating valve, such as an underground gate valve, including a T-wrench, shall be permitted to be installed in a roadway box when acceptable to the AHJ.

6.1.1.3.1 For new installations, where more than one nonindicating underground gate valve is installed in a water system, all underground gate valves shall be of the same opening direction.

6.1.1.4* A new connection to a municipal water supply shall be permitted to utilize a nonlisted, nonindicating valve, including a T-wrench as part of a tapping assembly.

6.1.1.4.1 For new installations, where more than one nonindicating underground gate valve is installed in a water system, all underground gate valves shall be of the same opening direction.

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

6.2 Connections to Water Supplies.

6.2.1 A valve in accordance with Section 6.1 shall be installed in each pipeline from each water supply.

6.2.1.1 Control valves shall not be installed in the piping from the fire department connection to the point it connects to the fire service main.

6.2.1.2 Control valves shall be permitted in the system piping downstream of the fire department connection.

6.2.2 Where more than one water supply exists, a check valve shall be installed in each connection.

6.2.2.1 Except for the check valve installed in the fire department connection piping, all check valves shall have a control valve installed upstream and downstream of the check valve.

6.2.2.2* When water supply connections serve as one source of supply, valves shall be installed in accordance with 6.1.1 on both sides of all check valves required in 6.2.2.

6.2.3 Check valves shall not be required in a break tank where break tanks are used with automatic fire pumps.

6.2.4 In the discharge pipe from a pressure tank or a gravity tank of less than 15,000 gal (57 m³) capacity, a control valve shall not be required to be installed on the tank side of the check valve.

6.2.5* The following requirements shall apply where a gravity tank is located on a tower in the yard:

- (1) The control valve on the tank side of the check valve shall be an outside screw and yoke or a listed indicating valve.
- (2) The other control valve shall be an outside screw and yoke, a listed indicating valve, or a listed valve having a post-type indicator.

6.2.6* The following requirements shall apply where a gravity tank is located on a building:

- (1) Both control valves shall be outside screw and yoke or listed indicating valves.
- (2) All fittings inside the building, except the drain tee and heater connections, shall be under the control of a listed valve.

6.2.7 Where a pump is located in a combustible pump house or exposed to danger from fire or falling walls, or where a tank discharges into a private fire service main fed by another supply, one of the following requirements shall be met:

- (1)* The check valve in the connection shall be located in a pit.
- (2) The control valve shall be of the post indicator type and located not less than 40 ft (12 m) from outside buildings.

- (3) For buildings less than 40 ft (12 m) in height, a post indicator valve shall be permitted to be installed closer than 40 ft (12 m) but at least as far from the building as the height of the wall facing the post indicator valve.

6.2.8* All control valves shall be located where accessible and free of obstructions.

6.2.9 All connections to private fire service mains for fire protection systems shall be arranged in accordance with one of the following so that they can be isolated:

- (1)* A post indicator valve installed not less than 40 ft (12 m) from the building
 - (a) For buildings less than 40 ft (12 m) in height, a post indicator valve shall be permitted to be installed closer than 40 ft (12 m) but at least as far from the building as the height of the wall facing the post indicator valve.
 - (b) Post indicating valves shall be allowed to be closer than 40 ft (12 m) to the building when a property line or other physical barriers make it impossible to have a post indicating valve 40 ft (12 m) away.
 - (c) Post indicating valves shall be allowed to be closer than 40 ft (12 m) to the building when building driveway or fire access roadways or other building traffic make it impractical to be 40 ft (12 m).
- (2) A wall post indicator valve on risers located within the building, either a nonrising stem gate valve with a wall post indicator or a listed butterfly valve with an indicating handle extending out through the building wall.
- (3) An indicating valve in a pit, installed in accordance with Section 6.4
- (4)* A backflow preventer with at least one indicating valve not less than 40 ft (12 m) from the building
 - (a) For buildings less than 40 ft (12 m) in height, a backflow preventer with at least one indicating valve shall be permitted to be installed closer than 40 ft (12 m) but at least as far from the building as the height of the wall facing the backflow preventer.
 - (b) Backflow preventer valves shall be allowed to be closer than 40 ft (12 m) to the building when a property line or other physical barriers make it impossible to have a backflow preventer valve 40 ft (12 m) away.
 - (c) Backflow preventer valves shall be allowed to be closer than 40 ft (12 m) to the building when building driveway or fire access roadways or other building traffic make it impractical to be 40 ft (12 m).
- (5)* A nonindicating valve, such as an underground nonrising stem gate valve with an approved roadway box, complete with T-wrench, located not less than 40 ft (12 m) from the building
 - (a) For buildings less than 40 ft (12 m) in height, a nonindicating valve, such as an underground nonrising stem gate valve with an approved roadway box, complete with T-wrench, shall be permitted to be installed closer than 40 ft (12 m) but at least as far from the building as the height of the wall facing the nonindicating valve.
 - (b) A nonindicating valve, such as an underground nonrising stem gate valve with an approved roadway box complete with T-wrench shall be allowed to be closer than 40 ft (12 m) to the building when a

property line or other physical barriers make it impossible to have the valve 40 ft (12 m) away.

- (6) Indicating control valves installed in a fire-rated room accessible from the exterior
- (7) Indicating control valves in a fire-rated stair enclosure accessible from the exterior as permitted by the AHJ
- (8) Any other valve type or location as permitted by the AHJ.

6.3 Post Indicator Valves.

6.3.1 Where post indicator valves are used, they shall be set so that the top of each post is 32 in. to 40 in. (800 mm to 1000 mm) above the final grade.

6.3.2 Where post indicator valves are used, they shall be protected against mechanical damage where needed.

6.4 Valves in Pits.

6.4.1 Valve pits located on the discharge pipe of an elevated tank shall be designed in accordance with NFPA 22.

6.4.2 Where used, valve pits shall be of a size to permit access for inspection, operation, testing, maintenance, and removal of equipment contained therein.

6.4.3 Valve pits shall be constructed and arranged to protect the installed equipment from movement of earth, freezing, and accumulation of water.

6.4.3.1 Depending on soil conditions and the size of the pit, valve pits shall be permitted to be constructed of any of the following materials:

- (1) Poured-in-place or precast concrete, with or without reinforcement
- (2) Brick
- (3) Other approved materials

6.4.3.2 Where the water table is low and the soil is porous, crushed stone or gravel shall be permitted to be used for the floor of the pit.

6.4.4 The location of the valve shall be marked, and the cover of the pit shall be kept free of obstructions.

6.5 Backflow Prevention Assemblies.

6.5.1 Where used in accordance with 6.2.9(4), backflow prevention assemblies shall be installed in accordance with their installation instructions.

6.5.2 Backflow prevention assemblies shall be protected against mechanical damage and freezing where the potential exists.

6.6 Sectional Valves.

6.6.1* Sectional valves shall be provided on looped systems at locations within piping sections such that the number of fire protection connections between sectional valves does not exceed six.

6.6.2 A sectional valve shall be provided at the following locations:

- (1) On each bank of a river, pond, or lake where a main crosses water
- (2) Outside the building foundation(s) where a main or a section of a main is installed under a building

6.7 Identifying and Securing Valves.

6.7.1 Identification signs shall be provided at each valve to indicate the valve's function and the part of the system the valve controls.

6.7.1.1 Identification signs in 6.7.1 shall not be required for underground gate valves with roadway boxes.

6.7.2* Control valves shall be supervised by one of the following methods:

- (1) Central station, proprietary, or remote station signaling service
- (2) Local signaling service that causes the sounding of an audible signal at a constantly attended location
- (3) An approved procedure to ensure that valves are locked in the correct position
- (4) An approved procedure to verify that valves are located within fenced enclosures under the control of the owner, sealed in the open position, and inspected weekly

6.7.3 Supervision of underground gate valves with roadway boxes shall not be required.

6.8 Check Valves. Check valves shall be permitted to be installed in a vertical or horizontal position in accordance with their listing.

Chapter 7 Hydrants

7.1* General.

7.1.1 Hydrants shall be listed and approved.

7.1.1.1 The connection from the hydrant to the main shall not be less than 6 in. (150) (nominal).

7.1.1.2 A listed control valve shall be installed in each hydrant connection.

7.1.1.2.1 A valve required by 7.1.1.2 shall be permitted to be a listed, nonindicating valve, such as an underground gate valve in a roadway box.

7.1.1.2.2 Valves required by 7.1.1.2 shall be installed within 20 ft (6.1 m) of the hydrant.

7.1.1.2.2.1 Valves shall be clearly identified and kept free of obstructions.

7.1.1.2.3 Where valves cannot be located in accordance with 7.1.1.2.2, valve locations shall be permitted where approved by the AHJ.

7.1.1.3* The number, size, and arrangement of outlets; the size of the main valve opening; the size of the barrel; and the color of the hydrant shall be determined by the required flow and pressure for the protection to be provided and shall be approved by the AHJ.

7.1.1.4 Independent gate valves on 2½ in. (65 mm) outlets shall be permitted.

7.1.2 Hydrant outlet threads shall have NHS external threads for the size outlet(s) supplied as specified in NFPA 1960.

7.1.3 Where local fire department connections do not conform to NFPA 1960, the AHJ shall designate the connection to be used.

7.2 Number and Location.

7.2.1* Hydrants shall be provided and spaced in accordance with the requirements of the AHJ.

7.2.2 Public hydrants shall be permitted to be recognized as meeting all or part of the requirements of Section 7.2.

7.2.3* Hydrants shall be located not less than 40 ft (12 m) from the buildings or structures to be protected.

7.2.4 Where hydrants cannot be located in accordance with 7.2.3, hydrants located closer than 40 ft (12 m) from the building or wall hydrants shall be permitted to be used where approved by the AHJ.

7.3 Installation.

7.3.1* Hydrants shall be installed on flat stones, concrete slabs, or other approved materials.

7.3.2 Small stones or an approved equivalent shall be provided below and around the drain in an adequate amount to prevent the weep hole from being clogged with native soil, mud, or debris that would prevent adequate drainage for dry barrel hydrants.

7.3.2.1 Where soil is such that the hydrants will not drain with the arrangement specified in 7.3.2, or where groundwater stands at levels above that of the drain, the hydrant drain shall be plugged before installation.

7.3.2.1.1* Hydrants with drain plugs shall be marked to indicate the need for pumping out after usage.

7.3.3* The center of a hose outlet shall be not less than 18 in. (450 mm) above final grade.

7.3.3.1 The center of a hose outlet shall not be more than 36 in. (900 mm) above final grade.

7.3.3.2 The center of a hose outlet located in a hose house shall not be less than 12 in. (300 mm) above the floor.

N 7.3.3.3* Where a 4 in. (100 mm) outlet or larger is provided on a hydrant, this outlet shall be installed facing the access utilized by the responding fire apparatus.

7.3.4 Hydrants shall be restrained in accordance with the requirements of Chapter 10.

7.3.5 Hydrants shall be protected if subject to mechanical damage, in accordance with the requirements of Chapter 10.

7.3.5.1 The means of hydrant protection shall be arranged so that it does not interfere with the connection to, or operation of, hydrants.

7.3.6 The following shall not be installed between a fire hydrant and the control valve for that hydrant:

- (1) Check valves
- (2) Detector check valves
- (3) Backflow prevention valves
- (4) Other similar appurtenances

Chapter 8 Hose Houses and Equipment

8.1 General.

8.1.1* A supply of hose and equipment shall be provided where hydrants are intended for use by plant personnel or a fire brigade.

8.1.1.1 The quantity and type of hose and equipment shall depend on the following:

- (1) Number and location of hydrants relative to the protected property
- (2) Extent of the hazard
- (3) Firefighting capabilities of potential users

8.1.1.2 The AHJ shall be consulted regarding quantity and type of hose.

8.1.2 Hose shall be stored so it is accessible and is protected from the weather.

8.1.2.1 Hose shall be permitted to be stored in hose houses or by placing hose reels or hose carriers in weather-protected enclosures.

8.1.3* Hose shall conform to NFPA 1960.

8.1.4 Hose Connections.

8.1.4.1 Hose connections shall have external national hose standard (NHS) threads, for the valve size specified, in accordance with NFPA 1960.

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

8.1.4.3 Where local fire department hose threads do not conform to NFPA 1960, the AHJ shall designate the hose threads to be used.

8.2 Location.

8.2.1 Where hose houses are utilized, they shall be located over, or immediately adjacent to, the hydrant.

8.2.2 Hydrants within hose houses shall be located at the front of the house with space behind the doors for the hose gates and the attached hose.

8.2.3 Where hose reels or hose carriers are utilized, they shall be located so that the hose can be brought into use at a hydrant.

8.3 Construction.

8.3.1 The construction shall protect the hose from weather and vermin.

8.3.2 Clearance shall be provided for operation of the hydrant wrench.

8.3.3 Ventilation shall be provided.

8.3.4 The exterior shall be painted or otherwise protected against deterioration.

8.4* Size and Arrangement. Hose houses shall be of a size and arrangement that provide shelves or racks for the hose and equipment.

8.5 Marking. Hose houses shall be plainly identified.

8.6 General Equipment.

8.6.1* Where hose houses are used in addition to the hose, each shall be equipped with the following:

- (1) Two approved adjustable spray-solid stream nozzles equipped with shutoff features for each size of hose provided
- (2) One hydrant wrench (in addition to wrench on hydrant)
- (3) Four coupling spanners for each size hose provided
- (4) Two hose coupling gaskets for each size hose

8.6.2 Where two sizes of hose and nozzles are provided, reducers or gated wyes shall be included in the hose house equipment.

8.7 Domestic Service Use Prohibited. The use of hydrants and hose for purposes other than fire-related services shall be prohibited.

Chapter 9 Master Streams

9.1* Master Streams. Master streams shall be delivered by monitor nozzles, hydrant-mounted monitor nozzles, and other master stream equipment capable of delivering more than 250 gpm (950 L/min).

9.2 Application and Special Situations. Master streams shall be provided as protection for the following:

- (1) Large amounts of combustible materials located in yards
- (2) Large amounts of combustible materials in inaccessible locations

- (3) Occupancies presenting special hazards, as required by the AHJ

Chapter 10 Underground Requirements

10.1* Piping.

10.1.1* All piping used in private fire service mains shall be in accordance with 10.1.1.1, 10.1.1.2, or 10.1.1.3.

10.1.1.1 Use. Piping manufactured in accordance with Table 10.1.1.1 shall be permitted to be used.

10.1.1.2 Piping specifically listed for use in private fire service mains shall be permitted to be used.

10.1.1.2.1 Where listed pipe is used, it shall be installed in accordance with the listing limitations including installation instructions.

10.1.1.2.2 Where listing limitations or installation instructions differ from the requirements of this standard, the listing limitations and installation instructions shall apply.

10.1.1.3 Steel piping manufactured in accordance with Table 10.1.1.3 that is externally coated and wrapped and internally galvanized shall be permitted to be used between the hose coupling(s) on the fire department connection and the check valve installed in the fire department connection piping.

10.1.1.3.1 External coating and wrapping as required by 10.1.1.3 shall be approved.

Table 10.1.1.1 Manufacturing Standards for Underground Pipe

Materials and Dimensions	Standard
Ductile Iron	
Cement-mortar lining for ductile-iron pipe and fittings	AWWA C104/A21.4
Polyethylene encasement for ductile-iron pipe systems	AWWA C105/A21.5
Rubber-gasket joints for ductile-iron pressure pipe and fittings	AWWA C111/A21.11
Flanged ductile-iron pipe with ductile-iron or gray-iron threaded flanges	AWWA C115/A21.15
Thickness design of ductile-iron pipe	AWWA C150/A21.50
Ductile-iron pipe, centrifugally cast	AWWA C151/A21.51
Ductile iron water mains and their appurtenances	AWWA C600
Concrete	
Reinforced concrete pressure pipe, steel-cylinder type	AWWA C300
Prestressed concrete pressure pipe, steel-cylinder type	AWWA C301
Reinforced concrete pressure pipe, non-cylinder type	AWWA C302
Reinforced concrete pressure pipe, steel-cylinder type, pretensioned	AWWA C303
Cement-mortar lining of water pipe lines in place, 4 in. (100 mm) and larger	AWWA C602
Plastic	
Polyvinyl chloride (PVC) pressure pipe and fabricated fittings, 4 in. through 60 in. (100 mm through 1,500 mm)	AWWA C900
Polyethylene (PE) pressure pipe and fittings, 4 in. (100 mm) through 63 in. (1575 mm) for waterworks	AWWA C906
Molecularly oriented polyvinyl chloride (PVCO), 4 in. through 24 in. (100 mm through 600 mm) for water, wastewater, and reclaimed water service	AWWA C909
Brass	
Seamless red brass pipe, standard sizes	ASTM B43
Copper	
Seamless copper tube	ASTM B75/B75M
Seamless copper water tube	ASTM B88
Wrought seamless copper and copper-alloy tube	ASTM B251/B251M
Stainless Steel	
Seamless, welded, and heavily cold worked austenitic stainless steel pipes	ASTM A312/312M

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



Table 10.1.1.3 Steel Piping for Fire Department Connections

Materials and Dimensions	Standard
Black and hot-dipped zinc-coated (galvanized) welded and seamless steel pipe for fire protection use	ASTM A795/A795M
Pipe, steel, black and hot-dipped, zinc-coated, welded and seamless	ASTM A53/A53M
Electric-resistance-welded steel pipe	ASTM A135/A135M

N 10.1.1.3.2 The requirements of 10.1.1.3 shall not apply to listed stainless steel piping.

10.1.2* All piping used in private fire service mains shall be rated for the maximum system working pressure to which the piping is exposed to but shall not be rated at less than 150 psi (10.3 bar).

10.1.3* When lined piping is used, the manufacturer's literature for internal diameter shall be used for all hydraulic calculations.

10.1.4* Regardless of pipe type, underground piping shall be permitted to extend into the building through the slab or wall not more than 24 in. (600 mm).

10.1.4.1 Underground piping extended vertically into the building through the slab shall be installed plumb.

10.2 Fittings.

10.2.1 All fittings used in private fire service mains shall be in accordance with 10.2.1.1 or 10.2.1.2.

10.2.1.1 Fittings manufactured in accordance with Table 10.2.1.1 shall be permitted to be used.

10.2.1.2 Special Listed Fittings. Fittings specifically listed for use in private fire service mains shall be permitted to be used.

Table 10.2.1.1 Fittings Materials and Dimensions

Materials and Dimensions	Standard
Cast Iron	
Gray iron threaded fittings, classes 125 and 250	ASME B16.4
Gray iron pipe flanges and flanged fittings, classes 25, 125, and 250	ASME B16.1
Ductile Iron	
Ductile-iron and gray-iron fittings	AWWA C110/A21.10
Ductile-iron compact fittings	AWWA C153/A21.53
Malleable Iron	
Malleable iron threaded fittings, classes 150 and 300	ASME B16.3
Copper	
Wrought copper and copper alloy solder joint pressure fittings	ASME B16.22
Cast copper alloy solder joint pressure fitting	ASME B16.18
Bronze Fittings	
Cast copper alloy threaded fittings, classes 125 and 250	ASME B16.15
Stainless Steel	
Wrought austenitic stainless steel pipe fittings	ASTM A403/A403M

10.2.1.2.1 Where listed fittings are used, they shall be installed in accordance with their listing limitations including installation instructions.

10.2.1.2.2 Where listing limitations or installation instructions differ from the requirements of this standard, the listing limitations and installation instructions shall apply.

10.2.2 All fittings used in private fire service mains shall be rated for the maximum system working pressure to which the fittings are exposed, but shall not be rated at less than 150 psi (10.3 bar).

10.2.3 Where fittings installed in a private fire service main must be installed above grade, the fittings shall conform to NFPA 13.

10.2.3.1 Fittings in accordance with 10.2.1 shall be permitted for the transition to the above ground piping or fittings.

10.3 Connection of Pipe, Fittings, and Appurtenances.

10.3.1* Connection of all fittings and appurtenances to piping shall be in accordance with Section 10.3.

10.3.2 Connections of pipe and fittings indicated in Table 10.1.1.1 and Table 10.2.1.1 shall be in accordance with the referenced standard in the table.

10.3.3 Listed Connections. Connections utilizing listed products shall be in accordance with the listing limitations and the manufacturer's installation instructions.

10.3.3.1 Where listing limitations or installation instructions differ from the requirements of this standard, the listing limitations and installation instructions shall apply.

10.3.4 Threaded Pipe and Fittings. Where pipe, fittings, or appurtenances are connected using threads, all threads shall be in accordance with ASME B1.20.1, *Pipe Threads, General Purpose, Inch*.

10.3.5 Grooved Connections. Where pipe, fittings, or appurtenances are connected using grooves, they shall be connected in accordance with 10.3.5.1 through 10.3.5.3.

10.3.5.1 Pipe, fittings, and appurtenances to be joined with grooved couplings shall contain cut, rolled, or cast grooves that are dimensionally compatible with the couplings.