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NFPA 14 Installation of Standpipe and Hose Systems 1990 Edition

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Policy Adopted by NFPA Board of Directors on December 3, 1982

The Board of Directors reaffirms that the National Fire Protection Association recognizes that the toxicity of the products of combustion is an important factor in the loss of life from fire. NFPA has dealt with that subject in its technical committee documents for many years.

There is a concern that the growing use of synthetic materials may produce more or additional toxic products of combustion in a fire environment. The Board has, therefore, asked all NFPA technical committees to review the documents for which they are responsible to be sure that the documents respond to this current concern. To assist the committees in meeting this request, the Board has appointed an advisory committee to provide specific guidance to the technical committees on questions relating to assessing the hazards of the products of combustion.

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NFPA 14

Standard for the Installation of

Standpipe and Hose Systems

1990 Edition

This edition of NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, was prepared by the Technical Committee on Standpipes, released by the Correlating Committee on Water Extinguishing Systems, and acted on by the National Fire Protection Association, Inc. at its Fall Meeting held November 13-15, 1989 in Seattle, WA. It was issued by the Standards Council on January 12, 1990, with an effective date of February 5, 1990, and supersedes all previous editions.

The 1990 edition of this document has been approved by the American National Standards Institute.

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

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. Next revisions were presented by the Committee on Field Practice and adopted in 1926, 1927, 1931, 1938 (included action by 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, and 1985. The 1990 edition has attempted to clarify some basic principles by providing the user with more precise definitions and further clarification of the water supply requirements.

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Contents

NFPA 14

Standard for the Installation of

Standpipe and Hose Systems

1990 Edition

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

Information on referenced publications can be found in Chapter 10 and Appendix C.

Chapter 1 General Information

1-1 Scope. This standard covers the minimum requirements for the installation of standpipe and hose systems for buildings and structures.

1-2 Purpose. The purpose of this standard is to provide a reasonable degree of protection for life and property from fire through installation requirements for standpipe systems based upon sound engineering principles, test data, and field experience. Nothing in this standard is intended to restrict new technologies or alternate arrangements providing the level of safety prescribed by the standard is not lowered.

1-3 Definitions.

Approved. Acceptable to the "authority having jurisdiction."

NOTE: 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 or 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 concerned with product evaluations which is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The "authority having jurisdiction" is the organization, office or individual responsible for "approving" equipment, an installation or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner since jurisdictions and "approval" agencies vary as do their responsibilities. Where public safety is primary, the "authority having jurisdiction" may be a federal, state, local or other regional department or individual such as a fire chief, fire marshal, chief of a fire prevention bureau, labor department, 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 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."

Branch Line. A piping system, generally in a horizontal plane, connecting one or more hose connections with a standpipe.

Feed Main. That portion of a standpipe system that supplies water to one or more standpipe risers.

Hose Connection. The point where the fire hose is connected to the standpipe system.

Hose Station. The location of the hose rack, hose nozzle, hose connection, and hose valve.

Hose Valve. The control valve to an individual hose connection.

Listed. Equipment or materials included in a list published by an organization acceptable to the "authority having jurisdiction" and concerned with product evaluation, that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which 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.

Shall. Indicates a mandatory requirement.

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

Standpipe. The riser portion of the system piping that delivers the hose stream water supply vertically from floor to floor.

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 attached hose and nozzles, for the purpose of extinguishing a fire and so protecting a building or structure and its contents in addition to protecting the occupants. This is accomplished by connections to water supply systems or by pumps, tanks, and other equipment necessary to provide an adequate supply of water to the hose connections.

1-4 Efficiency. Standpipe systems that are properly designed, equipped, and maintained are one of the best internal means for extinguishing fires in buildings and structures. Even in buildings equipped with automatic sprinkler systems, standpipes may be a necessary complement. The standpipe system furnishes a reliable means of obtaining effective fire streams in the shortest possible time in places such as the upper stories of high buildings or large-area, low-height buildings and in other structures where construction, size, or other features limit the use of hose streams from the exterior.

1-5 Units. Metric units of measurement in this standard are in accordance with the modernized metric system known as the International System of Units (SI). Two units (liter and bar), outside of but recognized by SI, are commonly used in international fire protection. These units are listed in Table 1-5 with conversion factors.

Table 1-5

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

For additional conversion and information, see ASTM E380.

1-5.1 If a value for measurement as given in this standard is followed by an equivalent value in other units, the first stated is to be regarded as the requirement. A given equivalent value may be approximate.

1-6 Class of Service.

1-6.1 Standpipe systems may be grouped into three general classes of service for the intended use in the extinguishment of fire.

1-6.1.1 Class I. Class I service provides 2½-in. (63.5-mm) hose connections or 2½-in. (63.5-mm) hose stations supplied from a standpipe or combined riser in order to supply water for use by fire departments and those trained in handling heavy fire streams.

1-6.1.2 Class II. Class II service provides 1½-in. (38.1-mm) hose stations supplied from a standpipe, combined riser, or sprinkler system in order to supply water for use primarily by the building occupants or by the fire department during initial response.

Exception: A minimum 1-in. (25.4-mm) hose may be used for Class II service in light hazard occupancies when investigated and listed for this service and when approved by the authority having jurisdiction.

1-6.1.3 Class III. Class III service provides 1½-in. (38.1-mm) and 2½-in. (63.5-mm) hose connections or 1½-in. (38.1-mm) or 2½-in. (63.5-mm) hose stations supplied from a standpipe or combination riser in order to supply water for use by building occupants and a larger volume of water for use by fire departments and those trained in handling heavy fire streams.

1-6.2 Class I service shall be capable of furnishing the effective fire streams required during the more advanced stages of fire on the inside of buildings or for exposure fire protection.

1-6.3 Class II service shall afford a ready means for the control of incipient fires by the occupants of buildings during working hours and by watch personnel and those present during the nighttime and holidays.

1-6.4 Class III service shall be capable of furnishing Class I as well as Class II service.

1-6.5 Standpipe and hose systems not required by the authority having jurisdiction and not meeting the requirements of this standard shall be marked "FOR FIRE BRIGADE USE ONLY."

1-7 Type of System.

1-7.1 Standpipe systems may be of the following types subject to the approval of the authority having jurisdiction.

1-7.1.1 Wet standpipe system having supply valve open and water pressure maintained at all times.

1-7.1.2 Dry standpipe system so arranged through the use of approved devices as to admit water to the system automatically by opening a hose valve.

1-7.1.3 Dry standpipe system arranged to admit water to the system through manual operation of approved remote control devices located at each hose station.

1-7.1.4 Dry standpipe having no permanent water supply. A filled standpipe having a small water supply connection to keep the piping full but requiring water to be pumped into the system shall be considered a dry standpipe of this type.

Exception: Subsections 3-3.4 and 8-1.3 need not apply for a filled standpipe.

1-8 Approved Devices. All devices and materials used in standpipe systems shall be of approved type.

1-9 Closets and Cabinets.

1-9.1 Closets and cabinets used to contain fire hose shall be of sufficient size to permit the installation of the necessary equipment at hose stations and so designed as not to interfere with the prompt use of the hose valves, the hose, and other equipment at the time of fire. Within the cabinet, the hose valves shall be located such that there is at least 1 in. (25 mm) between any part of the cabinet and the handle of the valve when the valve is in any position from fully open to fully closed. The cabinet shall be used for fire equipment only, and each cabinet shall be conspicuously identified.

1-9.2 When a "break glass" type protective cover for a latching device is provided, the device provided to break the glass panel shall be securely attached in the immediate area of the "break glass" panel and shall be so arranged that the device cannot be used to break other glass panels in the cabinet door.

1-10 Plans and Specifications.

1-10.1 Plans showing the location, sizes, and connections of the fixed portion of the standpipe system shall be furnished to the authority having jurisdiction. The plans shall be drawn to scale and shall include the details necessary to indicate

clearly all of the equipment and its arrangement. The plans shall be accompanied by specifications covering the character of the material and the features relating to the installation in detail.

1-10.2 In combined systems when the building is protected throughout by an approved automatic sprinkler system, and risers are sized by hydraulic calculations, a complete set of all calculations shall be submitted when requested by the authority having jurisdiction.

1-10.3 A complete set of "as-built" drawings and calculations shall be furnished by the installation company, when requested by the authority having jurisdiction, at the time of completion of the systems.

1-11 Experienced Workers. The installation of standpipe systems shall be entrusted to none but fully experienced workers. They shall be installed by responsible parties equipped to do the work under the approved detailed plans and specifications.

Chapter 2 Size and Arrangement of Standpipes

2-1* Design Basis.

2-1.1 The size of standpipes in a given case is governed by the building height, by the size and number of fire streams likely to be needed simultaneously, and by the distance of the outlets from the source of water supply.

Standpipes and supply piping shall be either:

(a) Hydraulically designed to provide the required water supplies at a minimum residual pressure of 65 psi (4.5 bars) at the topmost outlet; or

(b) Sized in accordance with the pipe schedule of Table 2-1.1 to provide the required water supplies at a minimum residual pressure of 65 psi (4.5 bars) at the topmost outlet.

Table 2-1.1 Pipe Schedule—Standpipes and Supply Piping

Total Accumulated Flow — gpm	Minimum Nominal Pipe Size in Inches — Total distance of piping from furthest outlet		
	<50 ft	50-100 ft	>100 ft
100	2	2½	3
101-500	4	4	6
501-750	5	5	6
751-1250	6	6	6
1251 and over	8	8	8

For SI Units: 1 gal/min = 3.785 L/min; 1 ft = 0.3048 m.

2-1.2 Class I and Class III. In standpipe systems for Class I and Class III services, each standpipe shall be sized for a minimum flow of 500 gpm (1893 L/min). Where only one standpipe is required, its supply piping shall be sized for a minimum flow of 500 gpm (1893 L/min). Where more than one standpipe is required, all common supply piping shall be sized for a minimum flow of 500 gpm (1893 L/min) for the first standpipe plus 250 gpm (946 L/min) for each additional standpipe, the total not to exceed 2500 gpm (9463 L/min).

2-1.2.1 Standpipes not exceeding 100 ft (30.5 m) in height shall be at least 4 in. (102 mm) in size.

2-1.2.2 Standpipes in excess of 100 ft (30.5 m) in height shall be at least 6 in. (152 mm) in size. The top 100 ft (30.5 m) may be 4 in. (102 mm) in size.

2-1.3 Class II. In standpipe systems for Class II service each standpipe shall be sized for a minimum flow of 100 gpm (379 L/min). Where one or more standpipes are required, all common supply piping shall be sized for a minimum flow of 100 gpm (379 L/min).

2-1.3.1 Standpipes not exceeding 50 ft (15.2 m) in height shall be at least 2 in. (51 mm) in size.

2-1.3.2 Standpipes in excess of 50 ft (15.2 m) in height shall be at least 2½ in. (63.5 mm) in size.

2-1.4 Standpipes shall be limited to 275 ft (83.9 m) in height, and buildings in excess of 275 ft (83.9 m) in height shall be zoned accordingly.

Exception: Standpipe zone heights up to 400 ft (122 m) are permitted when all pipe, fittings, and devices are rated for not less than the maximum system pressure and when the provisions of Section 4-7 are followed.

2-1.5* The minimum size of riser(s) for combined systems shall be 6 in., except, when the building is completely sprinklered, the riser(s) may be hydraulically calculated (*see Section 6-1*).

2-1.6 Each zone requiring pumps shall be provided with a separate pump but this shall not preclude the use of pumps arranged in series.

2-1.7 Where pumps supplying two or more zones are located at the same level, each zone shall have separate and direct supply piping of a size not smaller than the riser that it serves. Zones with two or more standpipes shall have at least two direct supply pipes of a size not smaller than the largest riser that they serve.

2-1.8 Where supply for each zone is pumped from the next lower zone, and the standpipe or standpipes in the lower zone are used to supply the higher zone, such risers shall comply with the provisions for supply lines in 2-1.7. At least two lines shall be provided between zones; one of these lines shall be arranged so that supply can be automatically delivered from the lower to the higher zone.

2-1.9 For systems with two or more zones in which portions of the second and higher zones cannot be supplied with residual pressure of 65 psi (4.5 bars) by fire department pumpers through a fire department connection, another auxiliary means of supply shall be provided. This may be in the form of high level water storage with additional pumping equipment or other means acceptable to the authority having jurisdiction. (*See Figure A-2-1C.*)

2-1.10 An approved means of maintaining a positive pressure on all zones of standpipe systems shall be provided.

Chapter 3 Number and Location of Standpipes

3-1 Factors Governing. The number and arrangement of standpipe equipment necessary for proper protection is governed by the local conditions such as occupancy, character and construction of building, exterior exposures, and accessibility. The authority having jurisdiction shall be consulted as to special requirements.

3-2 Number of Standpipes.

3-2.1* The number of standpipes for Class I and Class III services in each building and in each section of a building divided by fire walls shall be such that all portions of each story of the building are within 30 ft (9.2 m) of a nozzle attached to not more than 100 ft (30.5 m) of hose.

3-2.2* The number of standpipes for Class II service in each building and each section of a building divided by fire walls shall be such that all portions of each story of the building are within 30 ft (9.2 m) of a nozzle when attached to not more than 100 ft (30.5 m) of hose.

Exception: When hose less than 1½ in. (38.1 mm) is used, the number of standpipes for Class II service in each building and each section of building divided by fire walls shall be such that all portions of each story of the building are within 20 ft (6.1 m) of a nozzle when attached to not more than 100 ft (30.5 m) of hose.

3-3 Location of Standpipes.

3-3.1 Standpipes shall be located in noncombustible fire-rated stair enclosures.

Exception No. 1: In buildings having large areas where standpipes installed within the stair enclosures cannot provide the distribution required by Section 3-2, additional standpipes shall be installed in pipe shafts, at the interior columns or at other appropriate locations.

Exception No. 2: Where the building, including stair enclosures, is fully sprinklered, standpipes may be located in stair enclosures of combustible construction having a fire resistance rating.

3-3.2* Standpipe risers and horizontal standpipe runs shall not pass through hazardous areas and shall be located so they are protected from mechanical and fire damage.

3-3.3 Where a building is within 60 ft (18.3 m) of exposing buildings, standpipes for large streams shall be located so as to afford protection to the interior of the building from exterior exposures.

3-3.4 Dry standpipes shall not be concealed in building walls or built into pilasters.

3-3.5 In buildings divided by numerous partitions, standpipes shall be so located that streams can be brought to bear in any room.

Chapter 4 Hose Connections

4-1 General.

4-1.1* Hose connections shall be within easy reach of a person standing on the floor and in no case shall be over 6 ft (1.8 m) from the floor. Hose stations shall be located conspicuously within the immediate area and shall not be obstructed.

4-1.2 The hose connection shall be arranged for easy removal or attachment of caps and hoses.

4-1.3 Hose connections shall have external threads having the NH standard thread, for the valve size specified, as specified in NFPA 1963, *Screw Threads and Gaskets for Fire Hose Connections.*

Exception: Where local fire department connections do not conform to NFPA 1963, the authority having jurisdiction shall designate the connection to be used.

4-2 Hose Valves.

4-2.1 An approved hose valve shall be provided at each standpipe outlet for attachment of hose. Hose valves shall not be obstructed.

4-2.2 Each hose valve having unlined hose shall be provided with a listed automatic drip connection so installed that any slight leakage past the valve seat will be prevented from entering the hose. (*See Exception No. 1 to 4-4.3.1.*)

4-3 Hose Connections for Class I Service.

4-3.1* Standpipes for Class I service shall be provided with 2½-in. hose connections on each floor.

4-3.2 At least one 2½-in. roof outlet shall be provided on structures having combustible roofs or where there are structures on the roof of combustible construction or housing combustible contents, or where needed for exposure protection. When required by the authority having jurisdiction, an approved duplex gated roof outlet shall be provided for testing and maintenance.

4-4 Hose Connections for Class II Service.

4-4.1 Standpipes for Class II service shall be provided with 1½-in. hose connections on each floor.

4-4.2 Valves of the approved indicating type shall be provided at the standpipe for controlling branch lines for Class II service.

4-4.3 Hose, Hose Racks, and Nozzles.

4-4.3.1* Each hose connection provided for use by building occupants (Class II and Class III services) shall be

equipped with not more than 100 ft (30.5 m) of listed 1½-in. (38.1-mm) lined, collapsible or noncollapsible fire hose attached and ready for use.

Exception No. 1: Unlined hose may be used on existing standpipe installations made prior to June 1976.

Exception No. 2: When hose less than 1½ in. (38.1 mm) is used for Class II service, listed noncollapsible hose shall be used.

4-4.3.2* Each station provided with 1½-in. (38.1-mm) hose shall be equipped with a listed rack or other approved storage facility.

Exception: Each station provided with hose less than 1½ in. (38.1 mm) shall be equipped with a listed continuous flow reel.

4-4.3.3 Each rack or storage facility for 1½-in. (38.1-mm) or smaller hose shall be provided with a label affixed to include "Fire Hose for Use by Occupants" and operating instructions.

4-4.3.4 Nozzles for Class II service hose shall be listed and approved.

4-5 Hose Connections for Class III Service.

4-5.1 Standpipes for Class III service shall be provided with both a 2½-in. (63.5-mm) and 1½-in. (38.1-mm) hose connection on each floor. The hose connections may be made through one 2½-in. (63.5-mm) hose valve and an easily removable 2½-in. (63.5-mm) by 1½-in. (38.1-mm) reducer.

4-5.2 At least one 2½-in. (63.5-mm) roof outlet shall be provided on structures having combustible roofs or where there are structures on the roof of combustible construction or housing combustible contents, or where needed for exposure protection. When required by the authority having jurisdiction, an approved duplex gated roof outlet shall be provided for testing and maintenance.

4-6 Hose Connections for Dry Standpipes. Each hose connection for dry standpipes having no permanent water supply shall be provided with a conspicuous, durable, and permanent legible sign reading "Dry Standpipe for Fire Department Use Only."

4-7 Pressure Limitations.

4-7.1* Where flowing pressures at any hose valve outlet exceed 100 psi (6.9 bars), an approved device shall be installed at the outlet to reduce the pressure with required flow at the outlet to 100 psi (6.9 bars). For Class I and Class III systems the approved device shall not be capable of being adjusted to provide pressures higher than 100 psi (6.9 bars) if available, unless specified by the fire department.

4-7.2 Where system pressures at any hose valve outlet exceed 150 psi (10.3 bars), an appropriate warning sign shall be provided at each such outlet unless a pressure regulating device is provided.

4-7.3 Where system pressures exceed 175 psi (12.1 bars), a listed pressure regulating device that regulates pressure under flow and no-flow conditions shall be installed at the hose valve outlet. The pressure on the inlet side of the pressure regulating device shall not exceed the rated working pressure of the device. The pressure regulating device shall be so arranged to regulate pressure at the hose valve outlet to a pressure not exceeding 100 psi (6.9 bars) unless specified by the fire department.

Chapter 5 Water Supplies

5-1 Factors Governing. The water supply requirements for standpipe systems are dependent upon the size and number of fire streams likely to be needed at any fire and the length of time such streams will have to be used. Both of these factors are largely influenced by the conditions at the building or plant to be equipped and it is necessary that the probable number of standard streams for the protection of both the interior and exterior of the building be carefully ascertained before the water supply is decided upon. The selection of water supplies for each installation shall be determined in cooperation with the authority having jurisdiction.

5-2 Character of Water Supplies.

5-2.1 Standpipe systems, other than those dry standpipes that have no permanent water supply, shall have an approved water supply. A single source of supply may be acceptable where it is capable of automatically supplying all of the fire streams required for the full protection of the property for the required period. In some cases more than a single water supply may be necessary.

5-2.2* Acceptable water supplies may be:

(a) Public waterworks system where pressure and discharge capacity are adequate.

(b) Automatic fire pumps.

(c) Manually controlled fire pumps in combination with pressure tanks.

(d) Pressure tanks.

(e) Gravity tanks.

(f) Manually controlled fire pumps operated by remote control devices at each hose station (*see 1-7.1.3*).

5-2.3 At least one water supply shall be automatic and capable of supplying the streams first operated until the secondary sources can be brought into action.

5-2.4 Supply for Class I and Class III services shall be capable of furnishing the number of streams and durations required in Sections 5-3 and 5-5. These minimums may be increased by the authority having jurisdiction.

5-2.5 Where connections are made from public waterworks systems it may be necessary to guard against possible contamination of the public supply. The requirements of the public health authority shall be determined and followed.

5-3 Minimum Supply for Class I Service.

5-3.1* The minimum supply for Class I service shall be sufficient to provide 500 gpm (1893 L/min) for a period of at least 30 minutes.

Where more than one standpipe is required by Chapter 3, the minimum supply shall be 500 gpm (1893 L/min) for the first standpipe and 250 gpm (946 L/min) for each additional standpipe, the total supply not to exceed 2500 gpm (9463 L/min) for a period of at least 30 minutes.

The supply shall be sufficient to maintain a residual pressure of 65 psi (4.5 bars) at the outlet of the topmost 2½-in. (63.5-mm) hose valve with 250 gpm (946 L/min) flowing simultaneously from the two topmost outlets of the hydraulically most remote standpipe and 250 gpm (946 L/min) flowing from the topmost outlet of each of the other standpipes up to a maximum of 2500 gpm (9463 L/min) flowing. Where a building or fire area requires more than one remote 2½-in. (63.5-mm) outlet supplied from more than one standpipe on a floor, the water supply shall be increased 250 gpm (946 L/min) for each additional 2½-in. (63.5-mm) outlet, up to a maximum of 2500 gpm (9463 L/min) flowing.

Exception: For combined systems see Section 6-3.

5-3.2 The minimum water supply at the hydraulically most remote hose connection shall be sufficient to provide a residual pressure of 65 psi (4.5 bars) at the outlet with 500 gpm (1893 L/min) flowing from the outlet.

5-4 Minimum Supply for Class II Service.

5-4.1 The minimum supply for Class II service shall be sufficient to provide 100 gpm (379 L/min) for a period of at least 30 minutes. The supply shall be sufficient to maintain a residual pressure of 65 psi (4.5 bars) at the topmost outlet of each standpipe with 100 gpm (379 L/min) flowing.

5-4.2 The minimum water supply for Class II service at the hydraulically most remote hose connection shall be sufficient to provide a residual pressure of 65 psi (4.5 bars) at the outlet with 100 gpm (379 L/min) flowing from the outlet.

5-5 Minimum Supply for Class III Service.

5-5.1 The minimum supply for Class III service shall be the same as for Class I service.

Exception: For combined systems see Section 6-3.

5-5.2 The minimum supply for the hydraulically most remote hose connection on Class III service shall be the same as for Class I service.

5-6* Fire Department Connections.

5-6.1* A connection through which the public fire department can pump water into the standpipe system makes a desirable auxiliary supply. One or more fire department connections shall be provided for each Class I or Class III standpipe system. (*See Figure A-5-6.1.*)

5-6.2 In high-rise buildings having two or more zones, a fire department connection shall be provided for each zone. (*See Figures A-2-1B and A-2-1C.*)

5-6.3 Fire department connections shall be properly supported.

5-6.4 There shall be no shutoff valve in the fire department connection.

5-6.5 A listed and approved check valve shall be installed in each fire department connection, located as near as practicable to the point where it joins the system.

5-6.6 The pipe between the check valve and the outside hose coupling shall be equipped with an approved automatic drip, arranged to discharge to a proper place.

5-6.7 Fire department connections shall be approved type and shall be equipped with standard caps, properly secured and arranged for easy removal by fire departments.

5-6.8 The fire department connection(s) shall be internal threaded swivel fitting(s) having the NH standard thread, at least one of which shall be the 2.5-7.5 NH standard thread, as specified in NFPA 1963, *Screw Threads and Gaskets for Fire Hose Connections.*

Exception: Where local fire department connections do not conform to NFPA 1963, the authority having jurisdiction shall designate the connection to be used.

5-6.9 (a) Fire department connections shall be on the street side of buildings and shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections.

(b) Fire department connections shall be designated by a sign having raised letters, at least 1 in. (25 mm) in size cast on a plate or fitting, reading "STANDPIPE." If automatic sprinklers are also supplied by the hose connection, the sign or combination of signs shall indicate both designated services, e.g., "STANDPIPE AND AUTOSPKR," or "AUTOSPKR AND STANDPIPE."

(c) Where a fire department connection serves only a portion of a building, an appropriate and durable sign shall be attached indicating the portions of the building served.

5-6.10 Fire department connections shall be located neither less than 18 in. (45.7 cm) nor more than 48 in. (121.9 cm) above the level of the adjoining ground, sidewalk, or grade surface.

Chapter 6 Combined Systems

6-1 A combined system is one where the water piping serves both 2½-in. (63.5-mm) outlets for fire department use and outlets for automatic sprinklers. Such combined systems shall comply with the requirements of NFPA 13, *Standard for the Installation of Sprinkler Systems*, in regard to the automatic sprinkler portions of the system, and with NFPA 14 in regard to number and sizing of vertical risers and water supplies. When the building is protected throughout by an approved automatic sprinkler system, the risers may be sized by hydraulic calculations. (*See 2-1.5.*)

6-2 The water supply for a combined system shall comply with the requirements given in Section 5-3 or 5-5. When the building is completely sprinklered, the water supplies shall comply with Section 6-3. When the building is provided with partial sprinkler protection, the water supplies shall comply with Section 6-4.

6-3* For a building protected throughout by an approved automatic sprinkler system, the water supply required in Section 5-3 or 5-5 may also serve the sprinkler system. Sprinkler demand need not be added.

Exception: Where the sprinkler system demand, including hose stream allowance as determined in NFPA 13, Standard for the Installation of Sprinkler Systems, exceeds the supply required in Section 5-3 or 5-5, the larger of the two values shall be provided. The water supply required for a combined system in a building protected throughout by an approved automatic sprinkler system need not exceed 1500 gpm (5678 L/min) in a light hazard occupancy building and 2000 gpm (7570 L/min) in an ordinary hazard building unless required by the authority having jurisdiction.

6-4 For a combined system in a building equipped with partial automatic sprinkler protection the water supply requirements of Section 5-3 or 5-5 shall be increased by an amount equal to the hydraulically calculated sprinkler demand or by 150 gpm (568 L/min) for light hazard occupancies or by 500 gpm (1893 L/min) for ordinary hazard occupancies.

Exception No. 1: Where the hydraulically calculated sprinkler demand is less than 150 gpm (in light hazard occupancies) or 500 gpm (in ordinary hazard occupancies), the hydraulically calculated sprinkler demand may be added to the water supply requirements of Section 5-3 or 5-5.

Exception No. 2: The authority having jurisdiction may modify this requirement based on local conditions.

6-5 In combined systems, when the building is protected throughout by an approved automatic sprinkler system, 1½-in. (38.1-mm) hose for use by the building occupants (Class II service) may be omitted, subject to the approval of the authority having jurisdiction, provided that each standpipe outlet location is equipped with a 2½-in. (63.5-mm) hose valve, a 2½-in. by 1½-in. (63.5-mm × 38.1-mm) reducer, and a cap with attachment chain.

6-6 Each connection from a combined riser to the sprinkler system shall have an individual control valve of the same size as the connection.

Chapter 7 Piping, Valves, Fittings, and Hangers

7-1 Connections to Systems.

7-1.1 Connections from gravity tanks (on buildings) and pressure tanks (on top floor or roof) shall be made to the top of the standpipe system. The size of such connections shall not be smaller than the standpipes that they serve.

Exception: Where the tanks are used as a supply to standpipes in several buildings, or sections of a building, the connections shall be made at the base of the standpipes.

7-1.2* Where a gravity tank and a pressure tank are connected to a common riser, approved means shall be provided to prevent residual air pressure in the pressure tank (after water has been drained from it) from holding the gravity tank check valve closed, a condition known as "air lock." Under normal conditions, "air lock" may be conveniently prevented in new equipment by connecting the gravity tank and pressure tank discharge pipes together 45 ft (13.7 m) or more below the bottom of the gravity tank and placing the gravity tank check valve at the level of this connection.

7-1.3* Connections from fire pumps and sources outside the building shall be large enough to deliver the full required water demand without excessive friction loss.

7-1.4 Where two or more standpipes are installed in the same building or section of a building, they shall be interconnected at the bottom. Where standpipes in a single building are supplied by tanks they shall also be interconnected at the top; in such cases, check valves may be installed at the base of each riser to prevent circulation.

7-2 Isolation and Check Valves.

7-2.1 Connections to each water supply, except to fire department connections, shall be provided with an approved indicating-type valve and check valve located close to the supply, as at tanks, pumps, and in connections from waterworks system.

7-2.2 Valves shall be provided to permit isolating a standpipe riser without interrupting the supply to other risers from the same source of supply.

7-2.3 Connections to public water systems shall be controlled by indicator post valves of an approved type located at least 40 ft (12.2 m) from the building protected. All valves shall be plainly marked to indicate the service that they control.

Exception No. 1: When the valve cannot be located at least 40 ft (12.2 m) from the building, it shall be placed where it will be readily accessible in case of fire and not be subject to injury.

Exception No. 2: When post indicator valves cannot be used, underground valves may be used. The valve locations, directions to open, and services that they control shall be plainly marked on the buildings.

7-2.4* Where the standpipes are supplied from a yard main or header in another building, the connection shall be provided with an approved indicating-type valve located outside at a safe distance from the building or at the header.

7-2.5* Valves shall be rated for working pressures not less than the maximum pressure to be developed at that point in the system under any condition including the pressure measured when a permanently installed fire pump is operating at shut-off.

7-2.6 Valves Controlling Standpipe Systems. Valves on connections to water supplies, isolation control valves, and other valves in supply pipes to standpipes shall be supervised open by one of the following methods:

(a) Central station, proprietary, or remote station signaling service.

(b) Local signaling service that will cause the sounding of an audible signal at a constantly attended point.

(c) Locking valves open.

(d) Sealing of valves and approved weekly recorded inspection when valves are located within fenced enclosures under the control of the owner.

Exception: Underground gate valves with roadway boxes need not be supervised.

7-3 Piping Specifications.

7-3.1 Pipe and tube used in standpipe systems shall be made of the materials listed in Table 7-3.1. The chemical properties, physical properties, and dimensions of the materials listed in Table 7-3.1 shall be at least equivalent to the standards cited in the table. Pipe and tube used in standpipe systems shall be designed to withstand a system working pressure of not less than 175 psi (12.1 bars).

Table 7-3.1

Material and Dimensions (Specifications)	Standard
Ferrous Piping	
Ductile-Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Water or Other Liquids	AWWA C151
Electric-Resistance Welded Steel Pipe	ASTM A135
Spec. for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use	ASTM A795
Welded and Seamless Steel Pipe	ASTM A53
Wrought-Steel and Wrought-Iron Pipe	ANSI B36.10
Copper Tube (Drawn, Seeamless)	
Seamless Copper Tube	ASTM B75
Seamless Copper Water Tube	ASTM B88
General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	ASTM B251
Brazing Filler Metal (Classifications BCuP-3 or BCuP-4)	AWS A5.8

7-3.2 When welded and seamless pipe listed in Table 7-3.1 is used and joined by welding as referenced in 7-5.2 or by roll grooving, the minimum wall thickness for pressures up to 300 psi (20.7 bars) shall be in accordance with Schedule 10 for sizes up to 5-in. pipe, 0.134 in. (3.40 mm) for 6-in. pipe, and 0.188 in. (4.78 mm) for 8- and 10-in. pipe.

7-3.3 When steel pipe listed in Table 7-3.1 is used and joined by threaded fittings listed in Table 7-5.1.1 or by couplings used with pipe with cut grooves, the minimum wall thickness shall not be less than Schedule 30 (in sizes 8 in. or larger) or Schedule 40 (in sizes less than 8 in.) for pressure up to 300 psi (20.7 bars).

7-3.4 Other types of pipe or tube may be used, but only those investigated and listed for this service by a testing and inspection agency laboratory and acceptable to the authority having jurisdiction.

7-3.5 Brazed joints for the connection of pipe or tube and fittings may be used. The fire hazard of the process shall be suitably safeguarded.

7-4 Protection of Piping.

7-4.1 When a standpipe riser or lateral that is normally filled with water passes through an area subject to freezing temperatures, it shall be protected by a reliable means to maintain the temperature of the water in the piping at or above 40°F (4.4°C).

7-4.2 Where corrosive conditions exist, or piping is exposed to the weather, types of pipe, tube, fittings and hangers, and protective corrosion-resistive coatings shall be used. If steel pipe is used underground, it shall be protected against corrosion before being buried.

7-4.3 To minimize or prevent pipe breakage where subject to earthquakes, standpipe systems shall be protected in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

7-5 Fittings.

7-5.1 Type of Fittings.

7-5.1.1 Fittings used in standpipe systems shall be of the materials listed in Table 7-5.1.1 or in accordance with 7-5.1.2. The chemical properties, physical properties, and dimensions of materials listed in Table 7-5.1.1 shall be at least equivalent to the standards cited in the table. Fittings used in standpipe systems shall be designed to withstand the system working pressures, but not less than 175 psi (12.1 bars) cold water [125 psi (8.6 bars)] saturated steam pressure.

Table 7-5.1.1

Material and Dimensions	Standard
Cast Iron	
Cast Iron Threaded Fittings, Class 125 and 250	ANSI B16.4
Cast Iron Pipe Flanges and Flanged Fittings, Class 125 and 250	ANSI B16.1
Malleable Iron	
Malleable Iron Threaded Fittings, Class 150 and 300	ANSI B16.3
Ductile Iron	
Gray-Iron and Ductile-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids	AWWA C110
Steel	
Factory-Made Wrought Steel Buttweld Fittings	ANSI B16.9
Buttwelding Endings for Pipe, Valves, Flanges, and Fittings	ANSI B16.25
Spec. for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures	ASTM A234
Steel Pipe Flanges and Flanged Fittings	ANSI B16.5
Forged Steel Fittings, Socket Welded and Threaded	ANSI B16.11
Copper	
Wrought Copper and Bronze Solder-Joint Pressure Fittings	ANSI B16.22
Cast Bronze Solder Joint Pressure Fittings	ANSI B16.18

7-5.1.2 Other types of fittings may be used, but only those investigated and listed for this service by a testing and inspection agency laboratory and acceptable to the authority having jurisdiction.

7-5.1.3 Fittings used in standpipe systems shall be extra-heavy pattern where pressures exceed 175 psi (12.1 bars).

Exception No. 1: Standard weight pattern cast-iron fittings 2 in. size and smaller may be used where pressures do not exceed 300 psi (20.7 bars).

Exception No. 2: Standard weight pattern malleable iron fittings 6 in. size and smaller may be used where pressures do not exceed 300 psi (20.7 bars).

Exception No. 3: Fittings may be used for system pressures up to the limits specified in listings by a testing laboratory.

7-5.1.4 Where water pressures are 175 to 300 psi (12.1 to 20.7 bars), the ANSI standards permit the use of standard wall pipe and extra heavy valves. Until pressure ratings for valves are standardized, the manufacturer's ratings shall be observed.

7-5.1.5 Where system water pressure exceeds 300 psi (20.7 bars), fittings used on standpipe systems shall be designed to withstand system pressure.

7-5.2 All piping shall be installed by means of threaded or flanged fittings, flexible couplings, or other approved means. Welding of joints may be allowed. Permission for this work shall be obtained from the authority having jurisdiction. Welding shall be done in the shop and welding fittings used. Welding fittings shall comply with ANSI B16.9, ANSI B16.25, and ASTM A234.

Exception: Welding may be done on the premises with the approval of the authority having jurisdiction.

7-5.2.1 Certification of Welders and Brazers. Welders or brazers shall be certified by contractor as being qualified for welding and/or brazing in accordance with the requirements of ASME *Boiler and Pressure Vessel Code, Section IX, Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators*, or AWS D10.9 Level AR-3, *Standard for Qualifications of Welding Procedures and Welders for Piping and Tubing.*

7-5.3 Approved expansion joints or flexible couplings shall be provided where necessary.

7-6 Hangers.

7-6.1 General.

7-6.1.1 Pipe hangers shall be of an approved type so arranged that they will sustain the loads and retain the piping securely in position.

7-6.1.2 Standpipe piping shall be substantially supported from the building structure that must support the added load of the water-filled pipe plus a minimum of 250 lb (114 kg) applied at the point of hanging.

7-6.1.3 The hangers on horizontal runs of pipe shall support a load of 5 times the weight of the water-filled pipe plus a minimum of 250 lb (114 kg) applied at the point of hanging.

7-6.2 Support of Standpipe Risers.

7-6.2.1 Standpipe risers shall be supported by attachments directly to the risers.

7-6.2.2 Standpipe riser supports shall be provided at the lowest level, at each alternate level above, and at the top of the risers. Supports above the lowest level shall restrain the pipe to prevent movement by an upward thrust when flexible fittings are used.

7-6.2.3 Clamps supporting pipe by means of set screws shall not be used.

7-6.3 Support of Horizontal Runs.

7-6.3.1 Lateral runs from the standpipe to the hose valve that are over 18 in. (457 mm) in length shall be provided with hangers.

7-6.3.2 Horizontal standpipe runs shall be provided with hangers spaced at a maximum distance of 15 ft (4.6 m). The pipe shall be restrained to prevent movement by a horizontal thrust when flexible fittings are used.

7-7* Pressure Gages. An approved 3½-in. (87-mm) dial spring pressure gage shall be connected with each discharge pipe from fire pump and public waterworks, at the pressure tank, at the air pump supplying pressure tank, and at the top of each standpipe. Gages shall be located in a suitable place where water will not freeze. Each gage will be controlled by a valve having arrangement for draining.

Exception: Where several standpipes are interconnected at the top, a single gage properly located may be substituted for the gages at the top of each standpipe.

7-8* Water Flow Alarms. When required by the authority having jurisdiction, water flow alarms shall be provided.

7-9 Drains. Each standpipe shall be provided with a means of draining. A drain valve and piping, located at the lowest point of the standpipe piping downstream of the isolation valve, shall be arranged to discharge water where flooding of the building will not occur. Sizing shall be as follows:

Standpipe Size	Size of Drain Connection
Up to 2 in.	¾ in. or larger
2½ in., 3 in., or 3½ in.	1¼ in. or larger
4 in. or larger	2 in. only

Chapter 8 Tests and Inspection

8-1 Tests.

8-1.1* All new systems including yard piping shall be tested hydrostatically at not less than 200 psi (13.8 bars) pressure for 2 hr, or at 50 psi (3.5 bars) in excess of the normal pressure when the normal pressure is in excess of 150 psi

(10.3 bars). The hydrostatic test pressure shall be measured at the low elevation point of the individual system or zone being tested. The inside standpipe piping shall show no leakage.

8-1.2* A flow test shall be conducted at the hydraulically most remote outlet to assure the requirements of 5-3.2 are met.

8-1.3 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.

8-1.3.1 Piping between the fire department connection and the check valve in the inlet pipe shall be flushed with a sufficient volume of water so as to remove all construction debris and trash that may have accumulated in this pipe prior to the completion of the system and prior to the installation of the fire department connection.

8-1.4 In a standpipe system, any piping that normally remains dry shall be hydrostatically tested at 50 psi (3.4 bars) above the normal pressure at intervals of not more than 5 years.

8-1.5* Before it is restored to service and before water is turned into it, a standpipe system that has been out of service a number of years shall be tested with air at a pressure not exceeding 25 psi (1.7 bars) to determine its tightness. The standpipe system shall also be hydrostatically tested at 50 psi (3.4 bars) above the normal pressure.

8-2 Periodic Inspection.

8-2.1 Systematic periodic inspections of all portions of the standpipe system are essential, and personnel to whom this duty is entrusted shall be held strictly responsible for its condition.

8-2.2* The tanks shall be kept properly filled, and, where pressure tanks are employed, a pressure of at least 75 psi (5.2 bars) shall be maintained at all times. Special attention shall be given to the condition of the tanks during freezing weather.

8-2.3* The valves in the main connection to the automatic sources of water supply shall be open at all times. The hose valves shall be frequently examined to see that they are tight.

8-2.4 Inspections shall be made frequently to assure that the hose on Class II and Class III systems is in proper position on the racks and that all of the equipment is in place and in good condition. The hose, including gaskets, shall be removed and inspected and the hose re-racked or reeled at intervals in accordance with NFPA 1962, *Standard for the Care, Use, and Maintenance of Fire Hose Including Connections and Nozzles*. Where couplings are polished, care shall be taken to see that polish used does not touch fabric of hose.

8-2.5 When a standpipe system or any portion thereof is out of service for any reason, notice shall be given to the local fire department and a sign shall be posted on each fire department connection indicating what portion of the system is out of service.

Chapter 9 Buildings under Construction

9-1 Standpipe Installations in Buildings under Construction.

9-1.1 When required by the authority having jurisdiction, in buildings under construction, a standpipe system, either temporary or permanent in nature, shall be installed in accordance with the following:

9-1.1.1* The standpipes shall be provided with conspicuously marked and readily accessible fire department connections on the outside of the building at the street level and shall have at least one standard hose outlet at each floor.

9-1.1.2 Pipe sizes, hose valves, hose, water supply, and other details for new construction shall be in accordance with this standard.

9-1.1.3 Standpipes shall be securely supported and restrained at each alternate floor.

9-1.1.4* At each floor level there shall be provided at least one approved hose valve for attaching fire department hose. Valves shall be kept closed at all times and guarded against mechanical injury.

9-1.1.5 Hose valve(s) shall have external threads having the NH standard thread, for the valve size specified, as specified in NFPA 1963, *Screw Threads and Gaskets for Fire Hose Connections*.

Exception: Where local fire department connections do not conform to NFPA 1963, the authority having jurisdiction shall designate the connection to be used.

9-1.1.6* Standpipes shall be extended up with each floor and securely capped at the top.

9-1.1.7 Temporary standpipes shall remain in service until the permanent standpipe is complete. When temporary standpipes normally contain water, the piping shall be protected against freezing.

9-1.1.8 When construction reaches a height at which public waterworks system pressure is no longer adequate, temporary or permanent fire pumps shall be installed to provide protection to the uppermost level or to the height as required by the authority having jurisdiction.

Exception: Unless local fire department pumping apparatus is acceptable to the authority having jurisdiction as adequate for the standpipe pressure required.

Chapter 10 Referenced Publications

10-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is current as of the date of the NFPA issuance of this document.

10-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 13-1989, *Standard for the Installation of Sprinkler Systems*

NFPA 1962-1988, *Standard for the Care, Use, and Maintenance of Fire Hose Including Connections and Nozzles*

NFPA 1963-1985, *Standard for Screw Threads and Gaskets for Fire Hose Connections.*

10-1.2 ANSI Standards. American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

ANSI B16.1-1975, *Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800*

ANSI B16.3-1985, *Malleable Iron Threaded Fittings, Class 150 and 300*

ANSI B16.4-1985, *Cast-Iron Threaded Fittings, Class 125 and 250*

ANSI B16.5-1981, *Steel Pipe Flanges and Flanged Fittings, Class 125 and 250*

ANSI B16.9-1986, *Factory-Made Wrought Steel Buttweld Fittings (ISO-285)*

ANSI B36.10-1985, *Welded and Seamless Wrought Steel Pipe (ISO-64)*

ANSI B16.11-1980, *Forged Steel Fittings, Socket Welded and Threaded*

ANSI B16.18-1984, *Cast Bronze Solder-Joint Pressure Fittings*

ANSI B16.22-1980, *Wrought Copper and Bronze Solder-Joint Pressure Fittings*

ANSI B16.25-1986, *Buttwelding Ends for Pipe, Valves, Flanges and Fittings.*

10-1.3 ASME Code. American Society of Mechanical Engineers, 345 East 47th St., New York, NY 10017.

ASME *Boiler and Pressure Vessel Code*, 1983.

10-1.4 ASTM Standards. American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103.

ASTM A53-1987, *Specifications for Welded and Seamless Pipe*

ASTM A135-1983, *Specifications for Electric-Resistance-Welded Steel Pipe*

ASTM A234-1987, *Specifications for Piping Fittings of Wrought Carbon Steel Alloy Steel for Moderate and Elevated Temperatures*

ASTM B75-1986, *Specifications for Seamless Copper Tube*

ASTM B88-1986, *Specifications for Seamless Copper Water Tube*

ASTM B251-1987, *Specifications for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube*

ASTM E380-1986, *Standard for Metric Practice.*

ASTM A795-1985, *Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use*

10-1.5 AWS Standards. American Welding Society, 550 N. LeJeune Road, P.O. Box 351040, Miami, FL 33135.

AWS A5.8-1981, *Brazing Filler Metal (Classification B Cu P-3 or B Cu P-4)*

AWS D10.9-1980, *Standard for Qualifications of Welding Procedures and Welders for Piping and Tubing.*

10-1.6 AWWA Standards. American Water Works Association, 6666 W. Quincy Ave., Denver, CO 80235.

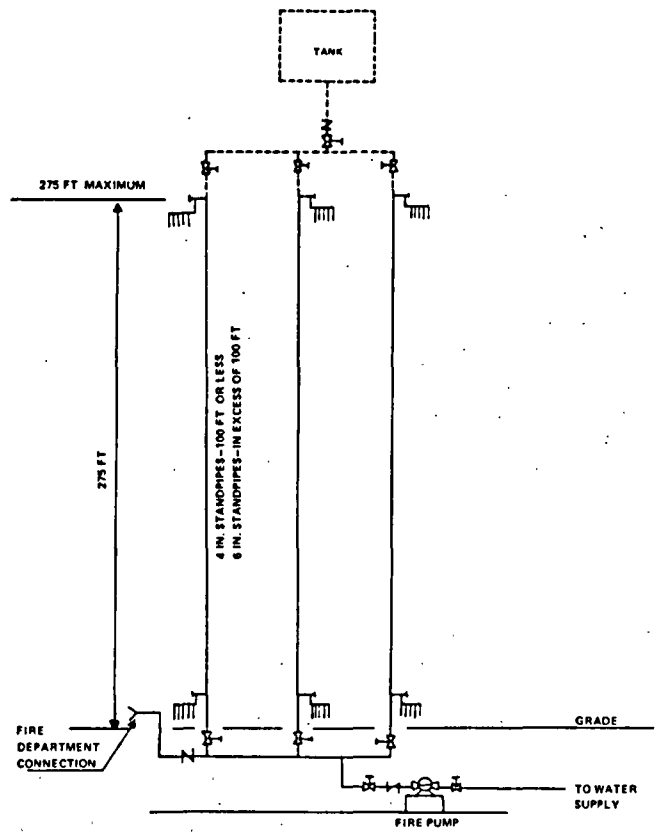
AWWA C110-82, *Ductile-Iron and Gray-Iron Fittings 3 in. Through 48 in. for Water and Other Liquids*

AWWA C151-81, *Ductile-Iron Pipe Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water and Other Liquids.*

Appendix A

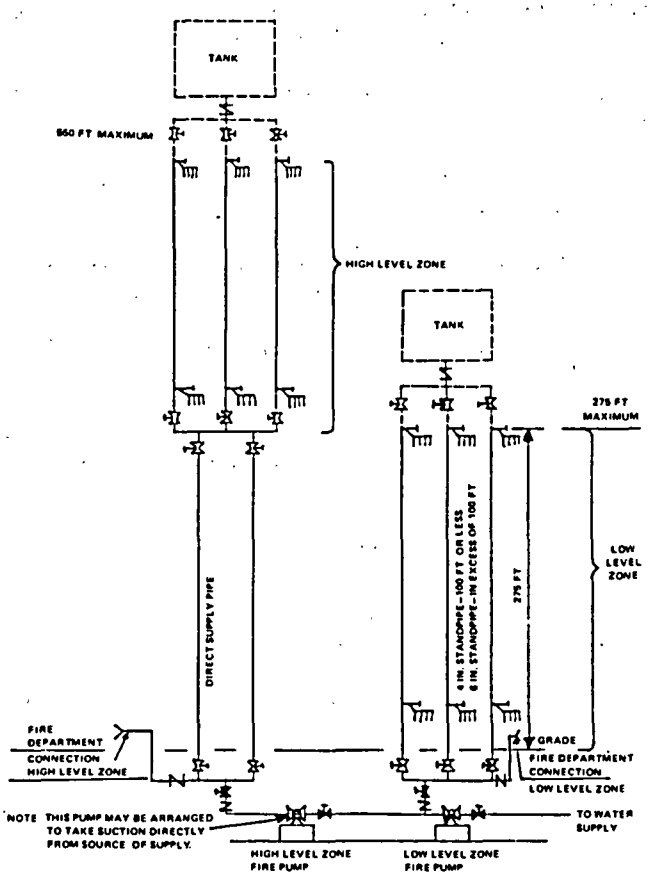
This Appendix is not a part of the requirements of this NFPA document, but is included for information purposes only.

A-2-1 See Figures A-2-1A, A-2-1B, and A-2-1C.



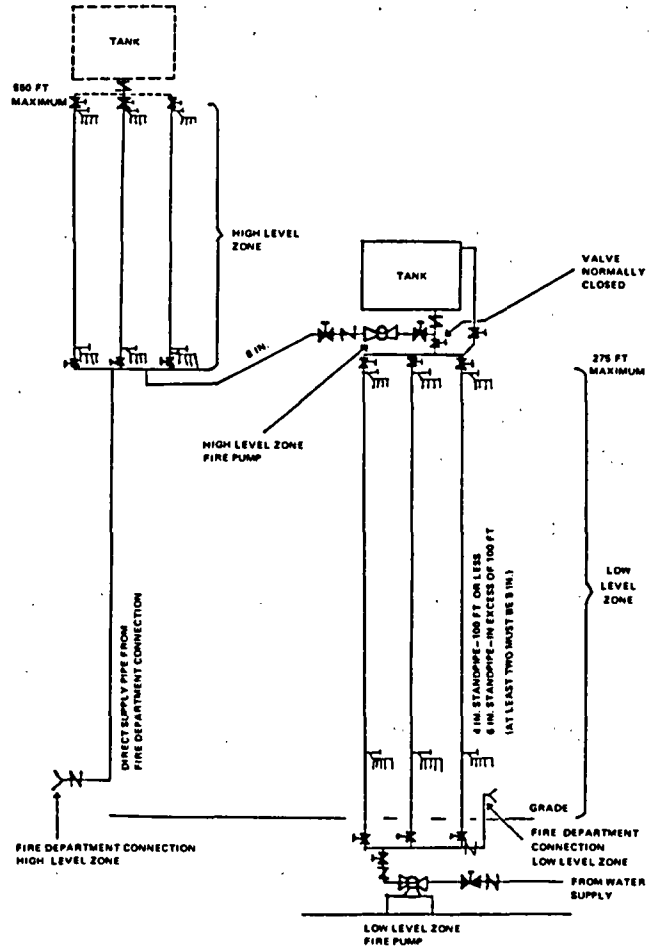
For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m.

Figure A-2-1A Typical single zone system.



For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m.

Figure A-2-1B Typical two zone system.



For SI Units: 1 in. = 25.4 mm; 1 ft = 0.3048 m.

Figure A-2-1C Alternate typical two zone system.

A-2-1.5 See Chapter 7 of NFPA 13, *Standard for the Installation of Sprinkler Systems.*

A-3-2.1 Equipment should be so arranged as to permit directing the discharge from the nozzle into all portions of important enclosures such as closets and like enclosures.

A-3-2.2 Equipment should be so arranged as to permit directing the discharge from the nozzle into all portions of important enclosures such as closets and like enclosures. When the area of the building is large, separate standpipes or branches for the small hose streams may be necessary. Class II service hose may be supplied from an automatic sprinkler system. (*See NFPA 13, Standard for the Installation of Sprinkler Systems.*)

A-3-3.2 They should not be placed in unsprinklered areas of combustible construction.

A-4-1.1 Hose may 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 service should be located in a stairway enclosure, and for Class II service in the corridor or space adjacent to the stairway enclosure and connected through the wall to the standpipe. For Class III service, the connections for 2½-in. hose should be located in a stairway enclosure, and for Class II service hose, located in the corridor or space adjacent to the stairway enclosure. These arrangements make it possible to use Class II service hose streams promptly in case the stairway is filled with people escaping at the time of fire. In buildings having large areas, connections for Class I and Class III service may be located at interior columns. (*See 3-3.1.*)

A-4-3.1(a) Hose connections may be located at intermediate landings between floors in addition to the hose connections located at the floor landing.

(b) Where a standpipe system is supplied by a fire pump, one 2½-in. hose outlet for each 250 gpm (946 L/min) pump capacity may be provided in the form of a wall outlet at the ground level from which the fire department may take water for use on exposing fires. Each outlet should be controlled by a separate valve and should be properly capped when not in use.

A-4-4.3.1 See NFPA 1961, *Standard for Fire Hose.*

A-4-4.3.2 The factors to be considered in selecting a rack or reel for storage of 1½-in. hose are the number of persons likely to be available to place the equipment into operation and the extent to which potential users are trained. With hose

racks of the "semi-automatic" or "one-person" type, the hose valve should first be opened wide. The nozzle should then be grasped firmly and the hose lines drawn toward the fire. The water is automatically released as the last few feet of hose are pulled from the rack.

A-4-7.1 Regulating Nozzle Pressures. Where excessive pressures in standpipes are regulated by the insertion of a disc with a restricting orifice, the approximate size of the orifice may be calculated as follows:

$$Q = KA\sqrt{2gh} \quad (1)$$

Where
Q is quantity of water discharged
K is a constant
A is area of orifice
g is acceleration due to gravity
h is pressure head.

Revising, in terms ordinarily used in the consideration of hose streams, this formula (using 0.62 as average value of K) becomes:

$$A = 0.0425 \frac{Q}{\sqrt{P_1 - P_2}} \quad (2)$$

Where
A is area of orifice in square inches
Q is water discharge in gallons per minute
P_1 is pressure in standpipe at hose outlet in question, in psi produced by the water with 250 gpm for Class I systems or 100 gpm flowing for Class II systems
P_2 Is pressure on nozzle side of orifice (that is, nozzle pressure plus friction loss in hose line) in psi produced by the water with 250 gpm for Class I systems or 1200 gpm flowing for Class II systems

For SI Units:

$$A = 1.902 \frac{Q}{\sqrt{P_1 - P_2}} \quad (3)$$

Where
A is area in square millimeters
Q is water discharge in liters per minute
P_1 is pressure in standpipe at hose outlet in question, in bars produced by the water with 946 L/min for Class I systems or 379 L/min flowing for Class II systems
P_2 Is pressure on nozzle side of orifice (that is, nozzle pressure plus friction loss in hose line) in bars produced by the water with 946 L/min for Class I systems or 379 L/min flowing for Class II systems

When automatic regulating valves equipped with a fire department override are provided on standpipe systems with a working pressure in excess of 150 psi (10.3 bars), an approved sign having letters at least 1 in. (25 mm) in size should be affixed to the valve or other conspicuous location immediately adjacent to the valve reading as follows: "WARNING, FIRE DEPARTMENT: SECOND STAGE PRESSURE IN EXCESS OF 150 PSI (10.3 BARS)."

A-5-2.2 See NFPA 22, *Standard for Water Tanks for Private Fire Protection*, and NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps.*

A-5-3.1 If a water supply system supplies more than one building or more than one fire area, the total supply may be reduced to 500 gpm (1893 L/min) for the first standpipe plus 250 gpm (946 L/min) for each additional standpipe in the building or fire area requiring the greatest number of standpipes.

A-5-6 See NFPA 13E, *Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems.*

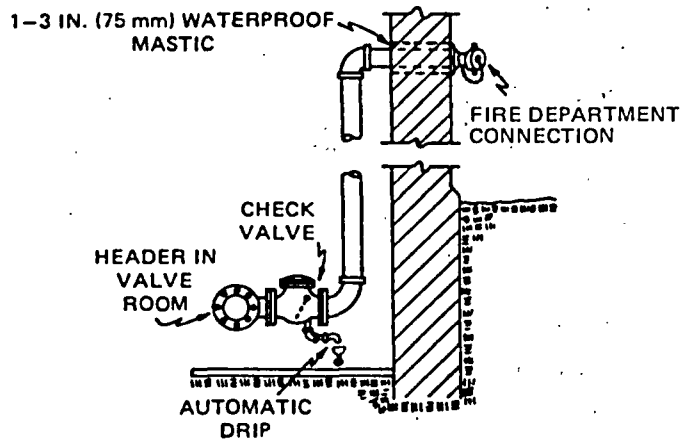


Figure A-5-6.1 Typical fire department connection for wet standpipes.

A-6-3 Light Hazard. Occupancies or portions of other occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected.

Light Hazard Occupancies include occupancies such as:

Churches

Clubs

Educational

Hospitals

Institutional

Libraries, except large stack rooms

Museums

Nursing or convalescent homes

Office, including data processing

Residential

Restaurant seating areas

Theaters and auditoriums excluding stages and prosceniums

Ordinary Hazard (Group 1). Occupancies or portions of other occupancies where combustibility is of low quantity or combustibles are moderate, stock piles of combustibles do not exceed 8 ft (2.4 m), and fire with moderate rates of heat release are expected.

Ordinary Hazard Occupancies (Group 1) include occupancies having conditions similar to:

Automobile parking garages

Bakeries

Beverage manufacturing

Canneries

Dairy products manufacturing and processing

Electronic plants

Glass and glass products manufacturing

Laundries

Restaurant service areas

Ordinary Hazard (Group 2). Occupancies or portions of other occupancies where quantity and combustibility of contents is moderate, stockpiles do not exceed 12 ft (3.7 m), and fires with moderate rate of heat release are expected.

Ordinary Hazard Occupancies (Group 2) include occupancies having conditions similar to:

Cereal mills

Chemical plants — ordinary

Cold storage warehouses

Confectionery products

Distilleries

Leather goods manufacturing

Libraries — large stack room areas

Machine shops

Mercantiles

Metal working

Printing and publishing

Textile manufacturing

Tobacco products manufacturing

Wood product assembly

Ordinary Hazard (Group 3). Occupancies or portions of other occupancies where quantity and/or combustibility of contents is high and fires of high rate of heat release are expected.

Ordinary Hazard Occupancies (Group 3) include occupancies having conditions similar to:

Feed mills

Paper and pulp mills

Paper process plants

Piers and wharves

Repair garages

Tire manufacturing

Warehouses (having moderate to higher combustibility of content, such as paper, household furniture, paint, general storage, whiskey, etc.)

Wood machining

When hazards in those buildings or portions of buildings of this occupancy group are severe, the authority having jurisdiction should be consulted for special rulings regarding water supplies, types of equipment, and pipe sizes.

A-7-1.2 For information on "air lock," see 3-1.4 of NFPA 22, *Standard for Water Tanks for Private Fire Protection.*

A-7-1.3 Connections from fire pumps and sources outside the building should be made at the base of the standpipes.

A-7-2.4 See NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances.*

A-7-2.5 The use of standard-weight valves should ordinarily be confined to the upper stories of very high buildings and to equipments where the highest available pressures are less than 175 psi (12.1 bars).

A-7-7 Additional pressure gages at the base of the standpipes may be desirable in some equipments, particularly in large plants and high buildings.

A-7-8 Audible alarms are normally located on the outside of the building. Approved electric gong bells, horns, or sirens inside the building or a combination inside and outside are sometimes advisable.

A-8-1.1 Where standpipe connections are built in the walls or partitions, the hydrostatic tests should be made before they are covered in or permanently sealed.

Example of Required Hydrostatic Test Pressure: A sprinkler system has for its water supply the connection to a public water service main. A 100 psi (6.9 bars) rated pump is installed in the connection. With a maximum normal public water supply pressure of 70 psi (4.9 bars) at the low elevation point of the system or zone being tested and a 120 psi (8.3 bars) pump (churn) pressure the hydrostatic test pressure is 70 + 120 + 50 or 240 psi (16.6 bars).

Refer to NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances,* for permissible leakage in underground piping.

A-8-1.2 When a flow test at the most hydraulically remote outlet is not practical, the authority having jurisdiction should be consulted for the appropriate location of the test.

A-8-1.5 This test is to avoid water damage in the event that pipes have become broken off or disconnected.

A-8-2.2 For further details, see NFPA 22, *Standard for Water Tanks for Private Fire Protection.*

A-8-2.3 Leakage at the hose valves may be detected by inspection of the drips at the valves, and care should be taken to see that these are not clogged with dirt or sediment.

A-9-1.1.1 Threaded plugs should be inserted in fire department hose connections, and they should be properly guarded against physical damage.

A-9-1.1.4 At the highest hose outlet there should be maintained a substantial box, preferably of metal, in which should be kept a sufficient amount of hose to reach all parts of the floor, a 1⅛-in. (29-mm) nozzle, spanner wrenches, and hose straps.

A-9-1.1.6 Top hose outlets should at all times be not more than one floor below the highest forms, staging, and like combustibles.

Appendix B Existing Buildings

B-1 A need to retrofit standpipes into existing buildings may arise in one of at least three ways:

(a) Annexation of existing nonconforming buildings into a jurisdiction.

(b) Adoption of regulations where none previously existed.

(c) Changing perceptions of fire protection needs, e.g., extending the standpipe requirement to previously noncovered buildings.

B-2 A retroactive requirement may be applied only to certain occupancies or building heights, e.g., schools four stories in height, institutions 55 ft in height.

B-3 The retroactive installation of standpipes may involve considerable expense for water supply and pipe installation. Therefore, the authority having jurisdiction may specify the most suitable type and class of standpipe as specified in Sections 1-6 and 1-7 dictated by local fire fighting needs and circumstances.

B-4 The above not withstanding, to achieve uniform fire protection the authority having jurisdiction may require that nonconforming buildings be provided with standpipe systems in full compliance with the present requirements. In the case of governmental units this should be accomplished with appropriate legislation.

Appendix C Referenced Publications

C-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus should not be considered part of the requirements of this document. The edition indicated for each reference is current as of the date of the NFPA issuance of this document.

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

NFPA 13E-1989, *Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems*

NFPA 20-1990, *Standard for the Installation of Centrifugal Fire Pumps*

NFPA 22-1987, *Standard for Water Tanks for Private Fire Protection*

NFPA 24-1987, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*

NFPA 1961-1987, *Standard for Fire Hose.*

Index