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STANDPIPE AND HOSE SYSTEMS 1980



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**Standard for the
Installation of
Standpipe and Hose Systems**

NFPA 14 — 1980

1980 Edition of NFPA 14

This 1980 edition of NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, was prepared by the Technical Committee on Standpipes and was adopted by the National Fire Protection Association, Inc. on November 20, 1980, at its Fall Meeting in San Diego, California. It was released for publication by the Standards Council on December 10, 1980.

Changes other than editorial are denoted by a vertical line in the margin of the pages in which they appear.

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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 and Outside Protection recommended revisions adopted in 1949, 1952, 1963, 1968, 1969, 1970, 1971, 1973, 1974, 1976, 1978, and 1980.

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Contents

Chapter 1	General Information	14- 7
1-1	Scope	14- 7
1-2	Purpose	14- 7
1-3	Definition of a Standpipe System	14- 7
1-4	Efficiency	14- 7
1-5	Units	14- 8
1-6	Class of Service	14- 8
1-7	Type of System	14- 9
1-8	Approved Devices	14- 9
1-9	Closets and Cabinets	14- 9
1-10	Plans and Specifications	14-10
1-11	Experienced Workers	14-11
Chapter 2	Size and Arrangement of Standpipes	14-11
2-1	Design Basis	14-11
Chapter 3	Number and Location of Standpipes	14-14
3-1	Factors Governing	14-14
3-2	Number of Standpipes	14-14
3-3	Location of Standpipes	14-14
Chapter 4	Hose Connections	14-15
4-1	General	14-15
4-2	Hose Valves	14-15
4-3	Hose Connections for Class I Service	14-15
4-4	Hose Connections for Class II Service	14-16
4-5	Hose Connections for Class III Service	14-16
4-6	Hose Connections for Dry Standpipes	14-17
Chapter 5	Water Supplies	14-18
5-1	Factors Governing	14-18
5-2	Character of Water Supplies	14-18
5-3	Minimum Supply for Class I Service	14-19
5-4	Minimum Supply for Class II Service	14-19
5-5	Minimum Supply for Class III Service	14-19
5-6	Fire Department Connections	14-20

Chapter 6 Combined Systems	14-22
Chapter 7 Piping, Valves, Fittings, and Hangers	14-24
7-1 Connections to Systems	14-24
7-2 Isolation and Check Valves	14-24
7-3 Piping Specifications	14-25
7-4 Protection of Piping	14-26
7-5 Fittings	14-27
7-6 Hangers	14-28
7-7 Pressure Gages	14-29
7-8 Water Flow Alarms	14-29
Chapter 8 Tests	14-30
8-1 Tests	14-30
8-2 Periodic Inspection	14-30
Chapter 9 Buildings Under Construction	14-32
9-1 Standpipe Installations in Buildings Under Construction	14-32
Appendix A	14-33
Appendix B	14-41

Standard for the Installation of Standpipe and Hose Systems

NFPA 14 — 1980

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 Appendix B.

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 Definition of a Standpipe System. A standpipe system is an arrangement of piping, valves, hose outlets and allied equipment installed in a building or structure with outlets located in such a manner that water can be discharged in streams or spray patterns through hose and nozzles attached to such hose outlets, 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 outlets.

1-4 Efficiency. Standpipe systems which 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.

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.

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 conversions and information, see ASTM E380.

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: For use by fire departments and those trained in handling heavy fire streams (2½-in. hose).

1-6.1.2* Class II: For use primarily by the building occupants until the arrival of the fire department (1½-in. hose).

1-6.1.3 Class III: For use by either fire departments and those trained in handling heavy hose streams (2½-in. hose) or by the building occupants (1½-in. hose).

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 watchmen 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 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 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.

Exception: Sections 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 shall be conspicuously identified.

1-9.2 Where a "break glass" type protective cover for a latching device is provided, the maximum area of the glass panel shall not exceed 25 sq in. (0.016 m²). 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 completely sprinklered, 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 hydraulically designed to provide the required water supplies at a minimum residual pressure of 65 psi (4.5 bars) at the topmost outlet or sized in accordance with the pipe schedule of Table 2-1.1.

Table 2-1.1 Pipe Schedule — Standpipes and Supply Piping
Minimum Nominal Pipe Size in Inches

Total Accumulated Flow — GPM	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
1250 and over	8	8	8

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

2-1.2 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. in size.

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

2-1.3 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 exceeding 275 ft (83.9 m) may be permitted when a listed pressure regulating device, which controls nozzle pressure under both flow and no flow conditions, is installed at each outlet, and

- (a) the maximum zone height is not more than 400 ft (122 m);*
- (b) the pressure regulating device is arranged to regulate pressure at the hose valve outlet to a pressure not exceeding 100 psi (6.9 bars);*
- (c) the pressure on the inlet side of the pressure regulating device does not exceed working pressure rating of the device;*
- (d) all other pipe fittings, and devices, on the system are rated for not less than the maximum system pressure.*

2-1.4 The minimum size of riser(s) for combined systems shall be 6 in., except when the building is completely sprinklered, the risers may be hydraulically calculated (see Section 6-1) in accordance with Chapter 7 of NFPA 13, *Standard for the Installation of Sprinkler Systems*.

2-1.5 Each zone requiring pumps shall be provided with a separate pump but this shall not preclude the use of pumps arranged in series.

2-1.6 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 which 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 which they serve.

2-1.7 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 2-1.6. 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.

2-1.8 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.

2-1.9 An approved means of maintaining a positive pressure on all zones of standpipe systems shall be provided.

2-1.10 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).

2-1.10.1 Standpipes not exceeding 50 ft (15.2 m) in height shall be at least 2 in. in size.

2-1.10.2 Standpipes in excess of 50 ft (15.2 m) in height shall be at least 2½ in. in size.

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 hose stations 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 hose stations 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.

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 where not likely to be obstructed.

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

4-1.3 Hose connection threads shall conform to the American National Fire Hose Connection Screw Threads, as specified in NFPA 1963, *Screw Threads and Gaskets for Fire Hose Connections*.

Exception No. 1: Where local hose coupling threads do not conform to the American National Fire Hose Connection Screw Threads, the authority having jurisdiction shall designate the threads to be used.

Exception No. 2: Where local hose couplings are of a type without threads, the authority having jurisdiction shall designate the type of couplings 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.

4-2.2* Where the pressure at any standpipe outlet exceeds 100 lb per sq in. (6.9 bars), an approved device shall be installed at the outlet to reduce the pressure with required flow at the outlet to 100 lb per sq. in. (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. If a pressure greater than 150 psi (10.3 bars) is available, an appropriate warning sign shall be provided.

4-2.3 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 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 Services.

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

4-4.2 Valves of approved indicating type shall be provided at the main riser for controlling branch lines for Class II service supplying more than one hose station so that, in the event that the branch is broken during the fire, the fire fighters may shut off this branch, conserving the water for their use.

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. lined, collapsible or non-collapsible fire hose attached and ready for use. (*See NFPA 1961, Standard for Fire Hose.*)

Exception: Unlined hose may be used on existing standpipe installations made prior to June 1976.

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

4-4.3.3 Each rack or storage facility for 1½-in. 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.

4-4.3.5* Shutoff nozzles shall not be provided when the pressure at the hose valves exceeds 175 lb per sq in. (12.1 bars) unless a listed pressure regulating device which regulates pressure under both flow and no-flow conditions is installed.

4-5 Hose Connections for Class III Service.

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

4-5.2 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.

4-6 Hose Connections for Dry Standpipes.

4-6.1 Each hose connection for dry standpipes shall be provided with a conspicuous, durable and permanently legible sign reading "Dry Standpipe for Fire Department Use Only."

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 dry standpipes, 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*).

NOTE: See NFPA 22, *Standard for Water Tanks for Private Fire Protection*, and NFPA 20, *Standard for the Installation of Centrifugal Fire Pumps*.

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 min.

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 min.

The supply shall be sufficient to maintain a residual pressure of 65 lb per sq in. (4.5 bars) at the topmost outlet of each standpipe with 500 gpm (1893 L/min) flowing from the topmost outlet of the 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.

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 lb per sq. in. (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 min. The supply shall be sufficient to maintain a residual pressure of 65 lb per sq in. (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 lb per sq in. (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.¹

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 An approved straightway 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 Hose 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 Hose coupling threads shall conform to the American National Fire Hose Connection Screw Threads, as specified in NFPA 1963, *Screw Threads and Gaskets for Fire Hose Connections*.

Exception No. 1: Where local hose coupling threads do not conform to the American National Fire Hose Connection Screw Threads, the authority having jurisdiction shall designate the threads to be used.

Exception No. 2: Where local hose couplings are of a type without threads, the authority having jurisdiction shall designate the type of coupling to be used.

¹See NFPA 13E, *Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems*.

5-6.9 (a) Hose 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) Hose 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 hose connection serves only a portion of a building, an appropriate and durable sign shall be attached indicating the portions of the building served.

Chapter 6 Combined Systems

6-1 A combined system is one where the water piping serves both 2½-in. 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 this standard in regard to sizing of vertical risers and water supplies. When the building is completely sprinklered, the risers may be sized by hydraulic calculations. (See 2-1.4.)

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 completely sprinklered building, 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 completely sprinklered buildings 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 larger of 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: The authority having jurisdiction may modify this requirement based on local conditions.

6-5 In combined systems, when the building is completely sprinklered, 1½-in. 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. hose valve, a 2½-in by 1½-in. 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 which 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 off 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. For information on "air lock" see NFPA 13.

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 tank, pump and in connection 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 which 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 which 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. (See NFPA 24, *Standard for Outside Protection*.)

7-2.5* Valves shall be of the approved extra heavy flanged pattern where the system pressure (including the pressure at shut-off as measured at the discharge flange of the permanently installed fire pump) exceeds 175 lb per sq in. (12.1 bars).

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).

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).

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).....	ANSI A21.51
Electric-Resistance Welded Steel Pipe	ASTM A135
Welded and Seamless Steel Pipe for Ordinary Uses, Spec. for Black and Hot-Dipped Zinc Coated (Galvanized).....	ASTM A120
Welded and Seamless Steel Pipe	ASTM A53
Wrought-Steel and Wrought-Iron Pipe	ANSI B36.10
Copper Tube (Drawn, Seamless)	
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

7-3.4 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 standpipe risers or horizontal standpipe runs pass through unheated areas, basements, concealed spaces or exposed areas, proper safeguards shall be provided to prevent freezing. A minimum water temperature of 40°F (4.4°C) shall be maintained.

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 Screwed Fittings, 125 and 250 lb.	ANSI B16.4
Cast Iron Pipe Flanges and Flanged Fittings, 125 and 250 lb.	ANSI B16.1
Malleable Iron	
Malleable Iron Screwed Fittings, 150 and 300 lb.	ANSI B16.3
Ductile Iron	
Gray-Iron and Ductile-Iron Fittings, 2 in. through 48 in. for Water and Other Liquids	ANSI A21.10
Steel	
Factory-Made Wrought Steel Buttweld Fittings	ANSI B16.9
Buttwelding Ends 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.

7-5.2 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 which must support the added load of the water-filled pipe plus a minimum of 250 lbs (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 lbs (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 which 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.

7-7.1* An approved 3 1/2-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.

7-8.1* When required by the authority having jurisdiction, water flow alarms shall be provided.

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 lb per sq in. (13.8 bars) pressure for 2 hr, or at 50 lb per sq in. (3.5 bars) in excess of the normal pressure when the normal pressure is in excess of 150 lb per sq in. (10.3 bars). The inside standpipe piping shall show no leakage. Refer to NFPA 24, *Standard for Outside Protection*, for permissible leakage in underground piping.

8-1.2 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.

8-1.2.1 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 which may have accumulated in this pipe prior to the completion of the system and prior to the installation of the fire department connection.

8-1.3 In a standpipe system any piping which normally remains dry shall be hydrostatically tested at 50 psi (3.4 bars) above the normal pressure at intervals of not less than 5 years.

8-1.4* Before it is restored to service and before water is turned into it, a standpipe system which has been out of service a number of years shall be tested with air at a pressure not exceeding 25 lb per sq in. (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 lb per sq in. (5.2 bars) shall be maintained at all times. Special attention shall be given to the condition of the tanks during freezing weather.

NOTE: For further details, see NFPA 22, *Standard for Water Tanks for Private Fire Protection*.

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 connection threads shall conform to the American National Fire Hose Connection Screw Threads, as specified in NFPA 1963, *Screw Threads and Gaskets for Fire Hose Connections*.

Exception No. 1: Where local hose coupling threads do not conform to the American National Fire Hose Connection Screw Threads, the authority having jurisdiction shall designate the threads to be used.

Exception No. 2: Where local hose couplings are of a type without threads, the authority having jurisdiction shall designate the type of coupling to be used.

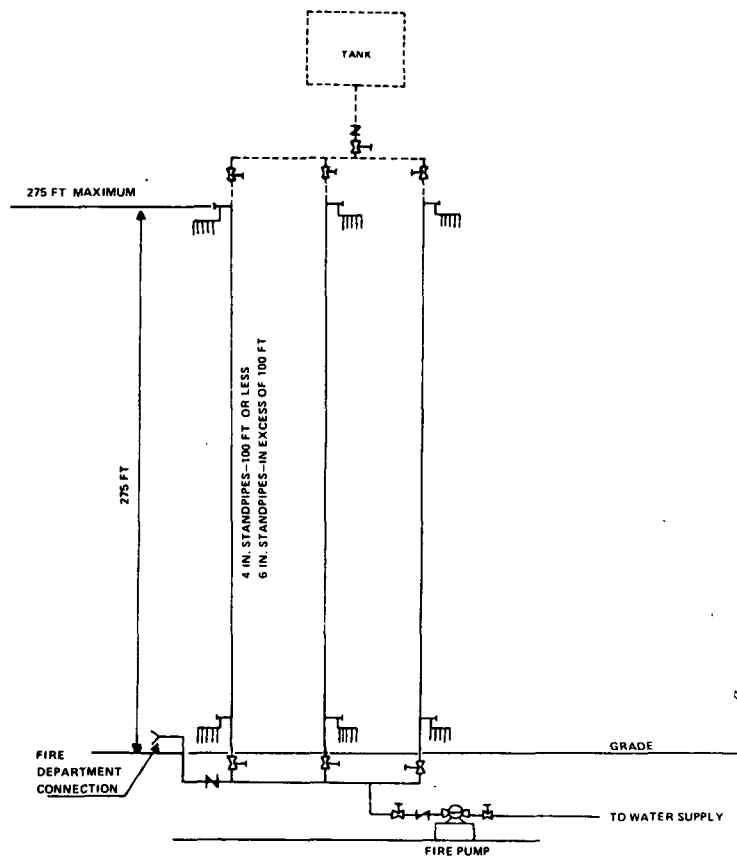
9-1.1.6* Standpipes shall be carried up with each floor and securely capped at the top.

9-1.1.7 Temporary standpipes shall remain in service until the permanent standpipe installation is complete.

Appendix A

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

A-1-6.1.2 Hose smaller than 1½ in. may be used with the approval of the authority having jurisdiction.



1 inch = 25.4 millimetre

1 foot = 0.305 metre

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

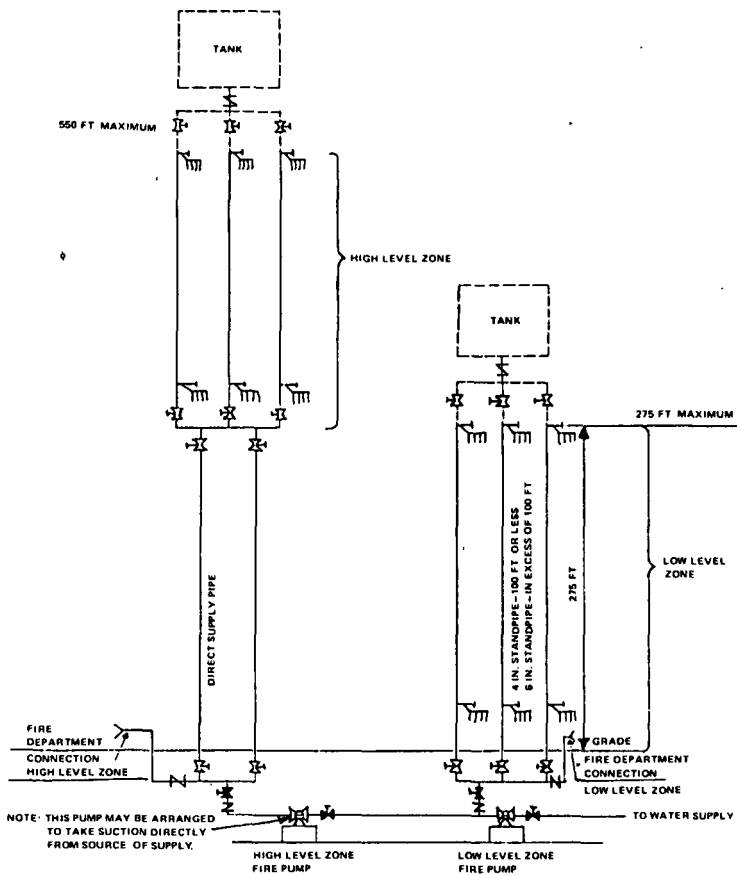


Figure A-2-1B. Typical two zone system.

1 inch = 25.4 millimetre

1 foot = 0.305 metre

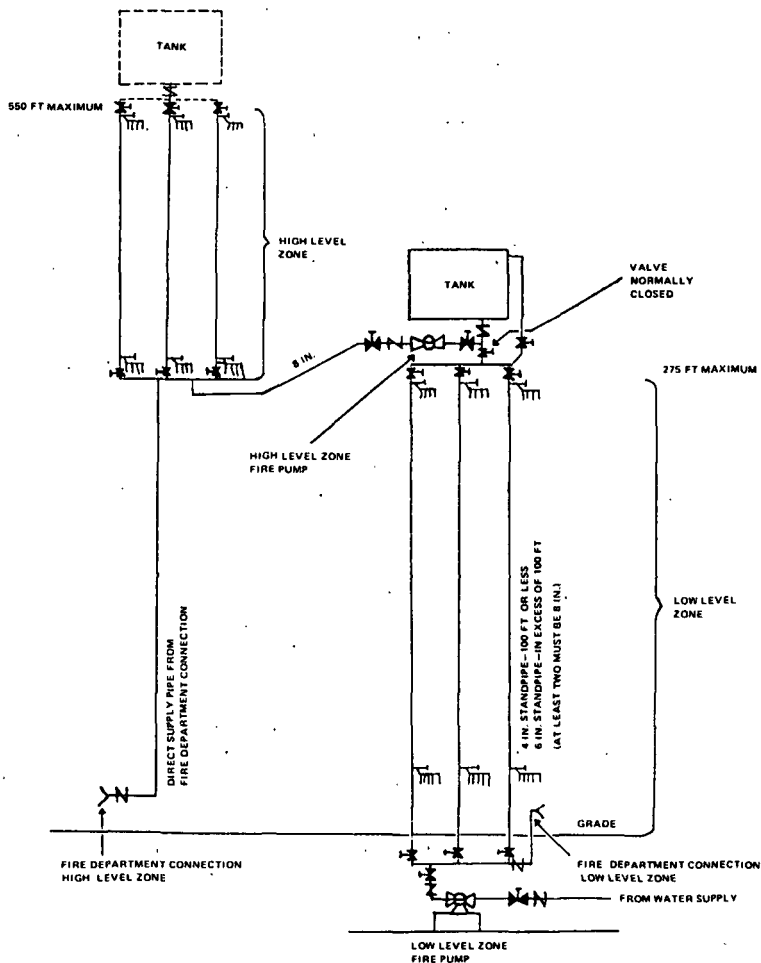


Figure A-2-1C. Alternate typical two zone system.

1 inch = 25.4 millimetre

1 foot = 0.305 metre

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-4-2.2 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:

$$Q = K A \sqrt{2 g h} \quad (1)$$

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.