

NFPA No.

14

# STANDPIPE AND HOSE SYSTEMS 1973



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

**NFPA No. 14 --- 1973**

**1973 Edition of No. 14**

*1971*

This edition of NFPA 14 supersedes the *1964* edition. It incorporates amendments recommended by the Committee of Standpipes and Outside Protection and adopted at the 1973 NFPA Annual Meeting.

Changes other than editorial are denoted by a vertical line in the margin of the pages in which they appear except completely revised Section 14 and former Section 66 which was deleted.

**Origin and Development of No. 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 and 1973.

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

**NFPA No. 14 — 1973**

This standard covers the installation of standpipe and hose systems for buildings and structures. Special conditions may call for a modification of this standard. In any case the authority having jurisdiction should be consulted.

General information on the subject is given in the first chapter and more specific information relative to the various features covered in paragraphs at the beginning of each chapter and in the explanatory notes following the paragraphs.

**CHAPTER 1. GENERAL INFORMATION.**

**11. Efficiency.**

**111.** 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 in other structures where construction, size, or other features limit the use of hose streams from the exterior.

**12. Class of Service.**

**121.** Standpipe systems may be grouped into three general classes of service for the intended use in the extinguishment of fire.

(a) **Class I:** For use by fire departments and those trained in handling heavy fire streams (2½-inch hose).

(b) **Class II:** For use primarily by the building occupants until the arrival of the fire department (small hose).

(c) **Class III:** For use by either fire departments and those trained in handling heavy hose streams or by the building occupants.

**122.** 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.

**123.** 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 night time and holidays.

**124.** Class III Service shall be capable of furnishing the effective fire streams required during the more advanced stages of fire on the inside of buildings as well as providing a ready means for the control of fires by the occupants of the building.

### **13. Type of System.**

**131.** Standpipe systems may be of the following types:

- (1) Wet standpipe system having supply valve open and water pressure maintained at all times.
- (2) Standpipe system so arranged through the use of approved devices as to admit water to the system automatically by opening a hose valve.
- (3) Standpipe system arranged to admit water to the system through manual operation of approved remote control devices located at each hose station.
- (4) Dry standpipe having no permanent water supply.

**NOTE:** Dry standpipes properly located and maintained are of value to a public fire department in reducing the time required to put hose lines into action on upper floors of tall buildings.

### **14. Combined Systems.**

**141.** A combined system is one where the vertical water piping serves both  $2\frac{1}{2}$ -inch outlets for fire department use and outlets for automatic sprinklers. Such combined systems shall comply with the requirements of NFPA No. 13 in regard to the automatic sprinkler portions of the system, and with NFPA No. 14 in regard to sizing of vertical risers and water supplies. When the building is completely sprinklered, the risers may be sized by hydraulic calculations.

**142.** The water supply for a combined system shall comply with the requirements given in Section 212. When the building is completely sprinklered, the water supplies shall comply with Paragraphs 143 and 144.

**143.** The minimum water supplies for a combined system for a light hazard high-rise occupancy building (completely sprinklered) shall be 500 gallons per minute. The minimum water supply for other types of high-rise buildings (completely sprinklered) shall be 1000 gallons per minute.

**144.** The maximum water supply required for a combined system in a light hazard high-rise occupancy building (completely sprinklered) shall not exceed 1500 gallons per minute.

**145.** In combined systems, when the building is completely sprinklered, small hose for use by the building occupants (Class II service) may be omitted, provided that each standpipe outlet location is equipped with a  $2\frac{1}{2}$ -inch hose valve, a  $2\frac{1}{2}$ -inch by  $1\frac{1}{2}$ -inch reducer, and a cap with attachment chain.

**146.** Each outlet from a combined riser to the sprinkler system shall have an individual control valve of the same size as the outlet.

## **15. Approved Devices.**

**151.** All devices and materials used in standpipe systems shall be of approved type.

## **16. Closets and Cabinets.**

**161.** 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 inch 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.

NOTE: Where a "break glass" type protective cover for a latching device is provided, the maximum area of the glass panel should not exceed 25 square inches. The device provided to break the glass panel should be securely attached in the immediate area of the "break glass" panel and should be so arranged that the device cannot be used to break other glass panels in the cabinet door.

## **17. Plans and Specifications.**

**171.** Plans showing the location, sizes and connections of the fixed portion of the standpipe system should be furnished the authority having jurisdiction. The plans should be drawn to scale, and should include the details necessary to indicate clearly all of the equipment and its arrangement. The plans should be accompanied by specifications covering the character of the material and the features relating to the installation in detail.

## **18. Experienced Workmen.**

**181.** The installation of standpipe systems should be entrusted to none but fully experienced workmen. They should be installed by responsible parties equipped to do the work under the approved detailed plans and specifications.

## CHAPTER 2. SIZE AND ARRANGEMENT OF STANDPIPES.

### 21. Design Basis.

211. The size of standpipes in a given case is governed 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.

212. In standpipe systems for Class I and Class III services, each standpipe shall be sized for a minimum flow of 500 gallons per minute. Where only one standpipe is required, its supply piping shall be sized for a minimum flow of 500 gallons per minute. Where more than one standpipe is required, all common supply piping shall be sized for a minimum flow of 500 gallons per minute for the first standpipe plus 250 gallons per minute for each additional standpipe, the total not to exceed 2500 gallons per minute.

(a) Standpipes not exceeding 100 feet in height shall be at least 4 inches in size.

(b) Standpipes in excess of 100 feet in height shall be at least 6 inches in size.

(c) Standpipes shall be limited to 275 feet of height, and buildings in excess of 275 feet of height shall be zoned accordingly except as provided for in Paragraph 213.

213. Standpipe zone heights exceeding 275 feet shall be permitted when a listed positive, fail-safe, pressure regulating device is installed at each hose outlet and

(a) The maximum pressure at the base of a zone does not exceed 250 psi.

(b) The pressure regulating device is arranged to regulate pressure at the hose valve outlet to a pressure not exceeding 100 psi under any conditions of flow.

(c) The pressure on the inlet side of the pressure regulating device does not exceed the working pressure rating of the device.

(d) All other pipe fittings and devices on the system are rated for not less than the system working pressure.

(e) The installation shall be arranged so that the pressure at the valve outlet is capable of being adjusted upwards when installed for Class I and Class III service (see Paragraph 442).

214. Where  $2\frac{1}{2}$ -inch hose outlets are provided on combined automatic sprinkler and standpipe risers, the minimum size of risers shall be 6 inches, except when the building is completely sprinklered, the risers may be hydraulically calculated (see Paragraph 141) in accordance with Chapter 7 of NFPA Standard No. 13, 1973.

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

216. Where pumps supplying two or more zones are located at the same level, each zone shall have separate and direct supply piping not less than 8 inches in size. Zones with two or more standpipes shall have at least two direct supply pipes at least 8 inches in size.

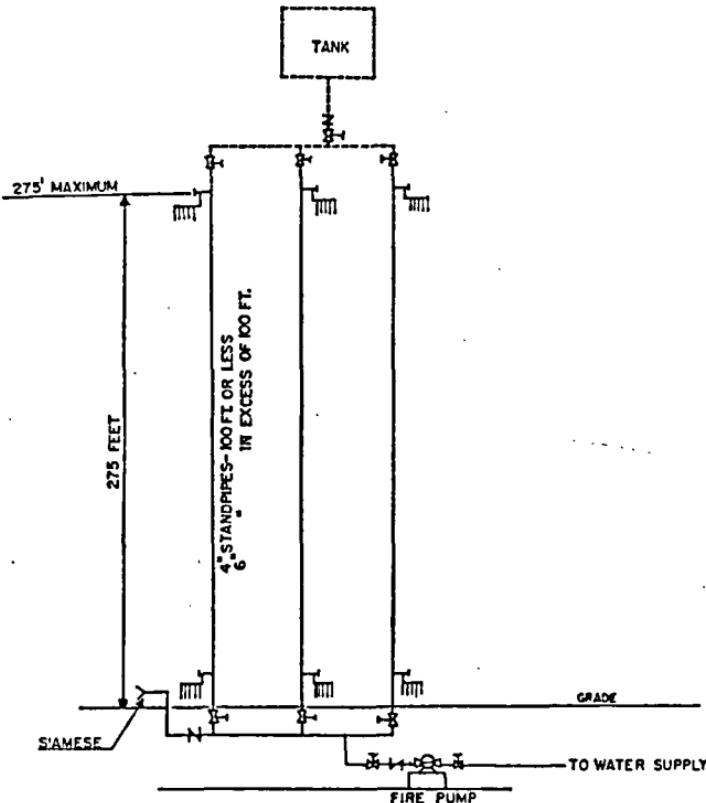


Figure 21-1. Typical single zone system.

**217.** 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 Paragraph 216. 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.

**218.** An approved means of maintaining a positive pressure on all zones of standpipe systems shall be provided.

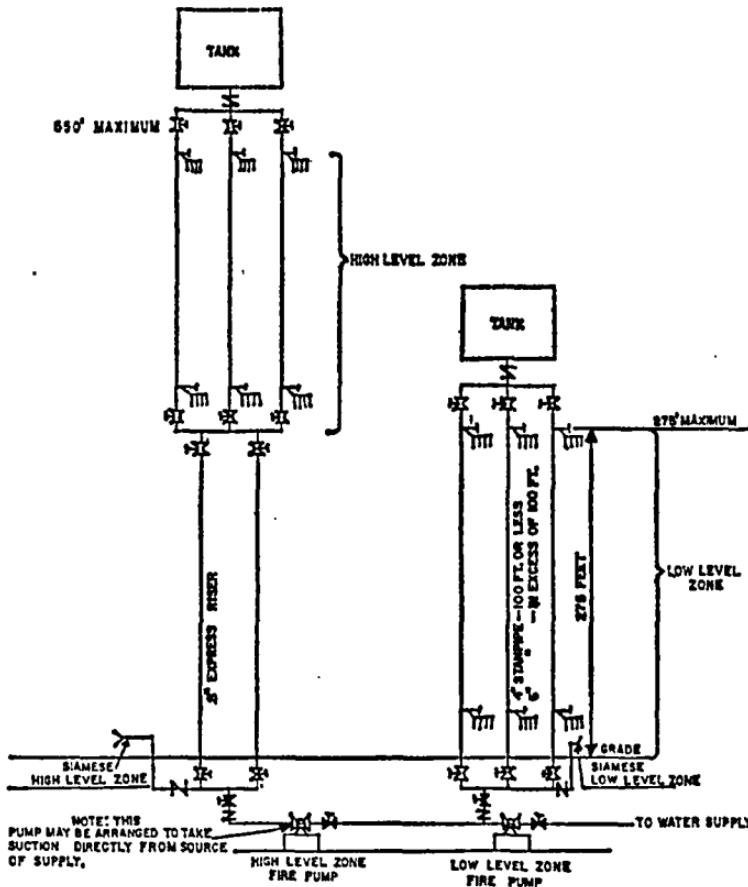


Figure 21-2. Typical two zone system.

219. In standpipe systems for Class II service each standpipe shall be sized for a minimum flow of 100 gallons per minute. Where one or more standpipes are required, all common supply piping shall be sized for a minimum flow of 100 gallons per minute.

(a) Standpipes not exceeding 50 feet in height shall be at least 2 inches in size.

(b) Standpipes in excess of 50 feet in height shall be at least  $2\frac{1}{2}$  inches in size.

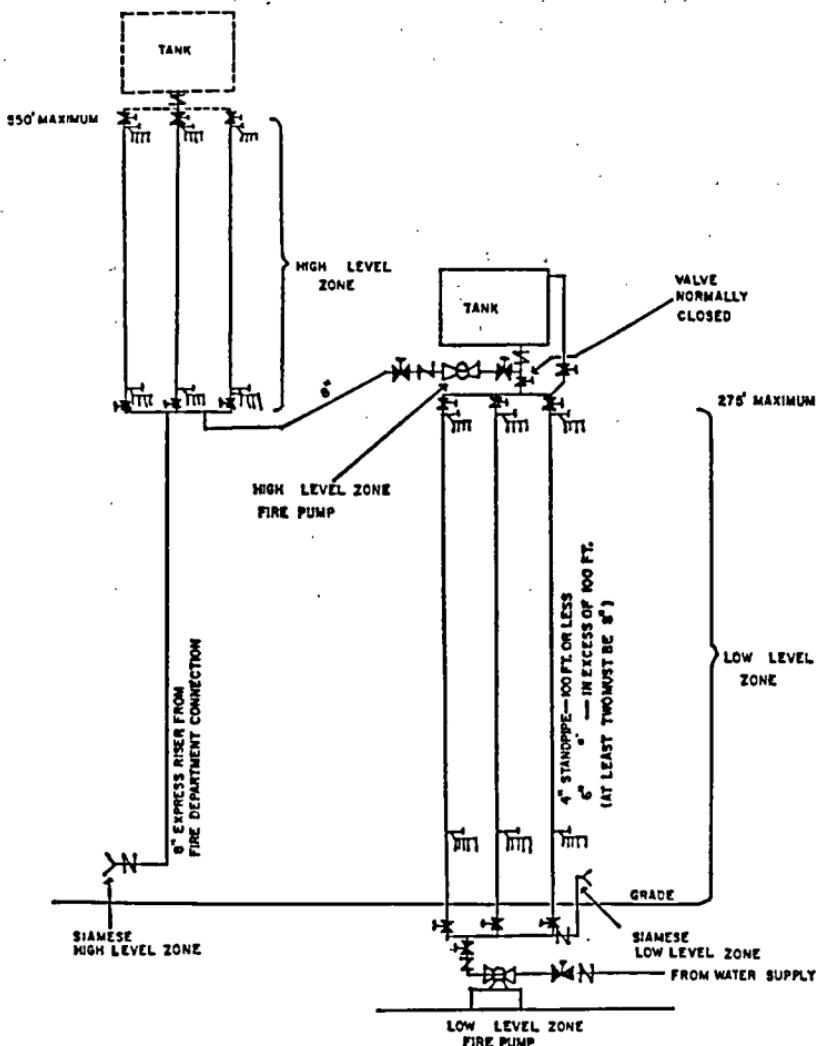


Figure 21-3. Alternate typical two zone system.

## CHAPTER 3. NUMBER AND LOCATION OF STANDPIPES AND HOSE CONNECTIONS.

### 31. Factors Governing.

311. 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 should be consulted as to special requirements.

### 32. Number of Standpipes.

321. 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 feet of a nozzle attached to not more than 100 feet of hose.

NOTE: 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.

322. The number of hose stations for Class II service in each building and each section of a building divided by firewalls shall be such that all portions of each story of the building are within 30 feet of a nozzle when attached to not more than 100 feet of hose.

NOTE: 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. Small hose streams may sometimes be supplied from an automatic sprinkler system. (See Standard for the Installation of Sprinkler Systems NFPA No. 13, 1973).

### 33. Location of Standpipes.

331. Where buildings are within 60 feet of exposing buildings, standpipes for large streams should be located so as to afford protection against exterior exposures as well as to the interior of the buildings.

332. Standpipes shall be so located that they are protected against mechanical and fire damage.

333. Dry standpipes should not be concealed in building walls or built into pilasters.

334. In buildings divided by numerous partitions, standpipes should be so located that the streams can be brought to bear in any room.

335. In buildings having large areas the standpipes may be located at interior columns.

### 34. Hose Connections.

341. Standpipes for Class I service shall be provided with  $2\frac{1}{2}$ -inch hose connections on each floor. At least one 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.

342. Standpipes for Class II service shall be provided with  $1\frac{1}{2}$ -inch hose connections on each floor.

343. Standpipes for Class III service shall be provided with both a  $2\frac{1}{2}$ -inch and  $1\frac{1}{2}$ -inch hose connection on each floor. The hose connections may be through one  $2\frac{1}{2}$ -inch hose valve and an easily removable  $2\frac{1}{2}$ -inch by  $1\frac{1}{2}$ -inch adapter. At least one 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.

## CHAPTER 4. HOSE OUTLETS.

### 41. Location of Hose.

411. Hose outlets shall be within easy reach of a person standing on the floor and in no case should be over six feet from the floor. Hose stations shall be located conspicuously within the immediate area and where not likely to be obstructed.

NOTE: Hose may be located at one side of the standpipe and supplied by short lateral connections to the standpipe where necessary to avoid obstructions.

**412.** Hose outlets 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 outlets for large hose should be located in a stairway enclosure, and for small hose located in the corridor or space adjacent to the stairway enclosure.

NOTE: The above arrangements make it possible to use small hose streams promptly in case the stairway is filled with people escaping at the time of fire.

**413.** Valves of approved indicating type shall be provided at the main riser for controlling branch lines to hose outlets so that in the event that the branch is broken during the fire, the fire department may shut off this branch, conserving the water for their use.

**414.** Where a standpipe system is supplied by fire pump, one  $2\frac{1}{2}$ -inch hose outlet for each 250 gallons per minute 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.

## **42. Hose.**

**421.** Each hose outlet provided for the use of building occupants (Class II & III services) shall be equipped with not more than 100 feet of approved small fire hose attached and ready for use.

## **43. Hose Racks.**

**431.** Each station provided with small hose shall be equipped with a listed rack or other approved storage facility.

NOTE: The factors to be considered in selecting a rack or reel for storage of small 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-man" 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.

**432.** Each rack for small hose shall be provided with a label affixed to include "Fire Hose for Use by Occupants" and operating instructions.

**44. Hose Valves.**

**441.** An approved hose valve shall be provided at each outlet for attachment of hose.

**442.** Where the static pressure at any standpipe outlet having hose for occupants use exceeds 100 pounds per square inch, an approved device shall be installed at the outlet to reduce the pressure at the outlet to 100 pounds per square inch, with a flow of 75 gallons per minute.

**NOTE:** Pressure reducers are not required on standpipe outlets for 2½-inch hose because it is expected that 2½-inch hose will be attached only when the persons likely to use it are trained in handling large streams.

**443.** Each hose valve on a wet system having linen 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.

**444.** The hose connection at each hose valve should have threads conforming to those used by the public fire department. National (American) Standard Fire Hose Coupling Screw Threads shall be used whenever they will fit existing equipment.

**NOTE:** See Standard for Screw Threads and Gaskets for Fire Hose Couplings, NFPA No. 194-1968.

**45. Nozzles.**

**451.** Nozzles shall be of an approved type and have a discharge (K) coefficient not exceeding 7.5.

**NOTE:** K is discharge coefficient in formula  $Q = K \sqrt{P}$  where Q is discharge in gpm and P is pressure in psi.

**452.** Shutoff nozzles shall not be provided when the static pressure at the hose valve exceeds 200 pounds per square inch.

**NOTE:** Since the use of a solid stream may contribute to the spread of fire by scattering the burning material, the use of combination nozzles is recommended.

**46. Dry Standpipe Identification.**

**461.** Each hose connection on 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.

### 51. Factors Governing.

**511.** 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 interior and exterior of the building be carefully ascertained before the water supply is decided upon. The selection of water supplies for each installation should be determined in co-operation with the authority having jurisdiction.

### 52. Character of Water Supplies.

**521.** 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.

**522.** Acceptable water supplies may be:

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

(2) Automatic fire pumps.

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

(4) Pressure tanks.

(5) Gravity tanks.

(6) Manually controlled fire pumps operated by remote control devices at each hose station. [See Section 131 (3).]

NOTE: See Standard for Water Tanks for Private Fire Protection, NFPA No. 22-1971 and Standard for the Installation of Centrifugal Fire Pumps, NFPA No. 20-1972.

**523.** At least one water supply should be automatic and capable of supplying the streams first operated until the secondary sources can be brought into action.

**524.** Supply for Class I and Class III services should be capable of furnishing the number of streams required for full protection for long periods.

**525.** Where the system will supply sprinklers in addition to standpipes, the water supply requirements of both shall be considered.

**NOTE:** See also Standard for the Installation of Sprinkler Systems, NFPA No. 13, 1973.

**526.** 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 should be determined and followed.

#### **53. Minimum Supply for Class I Service.**

**531.** The minimum supply for Class I service shall be sufficient to provide 500 gallons per minute for a period of at least thirty (30) minutes.

Where more than one standpipe is required, the minimum supply shall be 500 gallons per minute for the first standpipe and 250 gallons per minute for each additional standpipe, the total supply not to exceed 2500 gallons a minute, for a period of at least thirty (30) minutes.

The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch at the topmost outlet of each standpipe with 500 gallons per minute flowing.

#### **54. Minimum Supply for Class II Service.**

**541.** The minimum supply for Class II service shall be sufficient to provide 100 gallons per minute for a period of at least thirty (30) minutes. The supply shall be sufficient to maintain a residual pressure of 65 pounds per square inch at the topmost outlet of each standpipe with 100 gallons per minute flowing.

#### **55. Minimum Supply for Class III Service.**

**551.** The minimum supply for Class III service shall be the same as for Class I service.

**56. Fire Department Connections.\***

**561.** 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.

**562.** In high-rise buildings having two or more zones, a fire department connection shall be provided for each zone. (See Figures 21-2 and 21-3.)

**563.** Fire department connections shall be properly supported.

**564.** There shall be no shutoff valve in the fire department connection.

**565.** 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.

**566.** 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.

**567.** Hose connections shall be approved type and shall be equipped with standard caps, properly secured and arranged for easy removal by fire departments.

**568.** Hose coupling threads shall conform to those used by the local fire department. (American) National Standard Fire-Hose Coupling Screw Threads shall be used whenever they will fit the local fire department hose threads.

NOTE: See Standard for Screw Threads and Gaskets for Fire Hose Couplings, NFPA No. 194 — 1968.

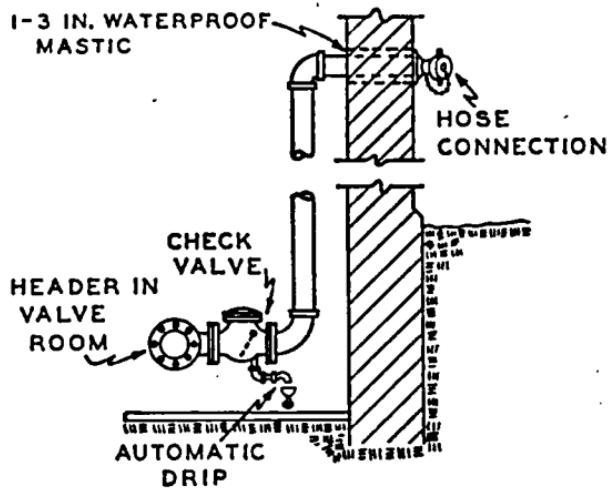
**569. (a)** Hose connections should be on the street side of buildings and shall be located and arranged so that hose lines can be readily and conveniently attached to the inlets without interference from any nearby objects including buildings, fences, posts, or other fire department connections.

**(b)** Hose connections shall be designated by a sign having raised letters at least one inch in size cast on a plate or fitting, reading "STANDPIPE." If automatic sprinklers are also supplied by the hose connection the sign shall read "STANDPIPE AND AUTO. SPKR."

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\*See Recommendations for Fire Department Operations in Properties Protected by Sprinkler and Standpipe Systems (NFPA No. 13E — 1973).

(c) If hose connection does not serve all of the building an appropriate and durable sign shall be attached indicating the portions of the building served.



## CHAPTER 6. PIPING, VALVES AND FITTINGS.

### 61. Connections to Systems.

**611.** Connections from gravity tanks (on buildings) and pressure tanks (on top floor or roof) should be made to the top of the standpipe system except where the tanks are used as a supply to standpipes in several buildings or sections of a building, in which cases they should be made at the base of the standpipes. Such connections to standpipes for Class I and III services shall be at least 4 inches; for Class II Service at least  $2\frac{1}{2}$  inches.

**612.** 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 feet or more below the bottom of the gravity tank and placing the gravity tank check valve at the level of this connection.

**NOTE:** See Standard for Water Tanks for Private Fire Protection, NFPA No. 22-1971.

**613.** Connections from fire pumps and sources outside the building should be made at the base of the standpipes. The connection from each supply should be large enough to deliver its full rated capacity without excessive friction losses.

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

### 62. Isolation and Check Valves.

**621.** Connections to each water supply, except to fire department connections, shall be provided with an approved indi-

cating type valve and check valve located close to the supply, as at tank, pump and in connection from waterworks system.

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

**623.** Connections to public works systems should, where feasible, be controlled by indicator post gate valves of an approved type located not less than 40 feet from the building protected; or if this cannot be done, placed where they will be readily accessible in case of fire and not subject to injury. Where indicator post valves cannot be readily used, as in a city street, underground gate valves should conform to the above as far as possible and their locations and directions to open shall be plainly marked on the buildings. All indicator post valves shall be plainly marked to indicate the service they control.

**624.** 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 outside at a safe distance from the building or at the header.

**625.** Valves shall be of the approved extra heavy flanged pattern where the system pressure (including the pressure at shutoff as measured at the discharge flange of the permanently installed fire pump) exceeds 175 pounds per square inch.

**NOTE:** 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 pounds per square inch.

### **63. Piping.**

**631.** Pipe and tube used in standpipe systems should be of the materials listed in Table 631. The chemical properties, physical properties and dimensions of the materials listed in Table 631 should conform at least to the standards cited in the Table. Pipe and tube used in standpipe systems should be designed to withstand a working pressure of not less than 175 psi.

**632.** Other types of pipe or tube may be used, but only those investigated and listed for this service by a nationally recognized testing and inspection agency and acceptable to the authority having jurisdiction.

TABLE 631

<u>Material</u>	<u>Standard</u>
<u>Ferrous Piping (Welded and Seamless)</u>	
Black Steel Pipe	ASTM A120-72a ANSI Standard B36.10—1970*
Hot Dipped, zinc coated (Galvanized) Steel Pipe	ASTM A120-72a ANSI Standard B36.10—1970*
Wrought Iron Pipe	ASTM A72-68 ANSI Standard B36.10—1970*
<u>Non-Ferrous Tube (Drawn, Seamless)</u>	
Copper (Listed)	ASTM B75-72 ASTM B251-71
Brazing Alloy	AWS Classification BCuP-3 AWS Specification A5.8-69

\*\*"Standard wall" schedule 40 pipe permitted for pressures up to 300 psi.  
Schedule 30 pipe acceptable in sizes 8" and larger.

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

#### 64. Fittings.

**641.** The fittings in the standpipe and connections should be of the extra heavy pattern where the pressures are in excess of 175 pounds per square inch or where the pressures are likely to be in excess of this amount.

**642.** All piping shall be installed by means of threaded or flanged fittings or other approved means. Welding of joints may be allowed. Permission for this work shall be obtained from the authority having jurisdiction. Welding should preferably be done in the shop and welding fittings used. Welding fittings should comply with ANSI Standard B16.9—1971, ANSI Standard B16.25—1964 and ASTM Designation A234—71."

**643.** Approved expansion joints or flexible couplings should be provided where necessary.

#### 65. Pipe Hangers.

**651.** The pipe hangers shall be of approved type, so arranged that they will sustain the loads and retain the piping securely in position. They shall be used in sufficient number to prevent vibration in the piping when the standpipe is in use.

**66. Pressure Gages.**

**661.** An approved  $3\frac{1}{2}$ -inch 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.

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

**67. Water Flow Alarms**

**671.** Water flow alarms should be provided on all standpipe risers where required by the authority having jurisdiction.

## CHAPTER 7. TESTS AND MAINTENANCE.

### 71. Tests.

**711.** All new systems including yard piping shall be tested hydrostatically at not less than 200 pounds per square inch pressure for two hours, or at 50 pounds per square inch in excess of the normal pressure when the normal pressure is in excess of 150 pounds per square inch.

**NOTE:** Where standpipe connections are built in the walls or partitions the above tests should be made before they are covered in or permanently concealed.

**712.** The amount of leakage in underground piping should be measured at the specified test pressure by pumping from a calibrated container.

**713.** (a) New pipe laid with rubber gasketed joints should, if the workmanship is satisfactory, have no leakage at the joints. Unsatisfactory amounts of leakage usually result from twisted, pinched, or cut gaskets. However, some leakage might result from small amounts of grit or small imperfections. The amount of leakage at the joints should not exceed 2 quarts per hour per 100 joints irrespective of pipe diameter. The leakage should be distributed over all joints. If such leakage occurs at a few joints the installation should be considered unsatisfactory and necessary repairs made.

(b) New pipe laid with caulked lead or lead-substitute joints, should, if the workmanship is satisfactory, have little or no leakage at the joints. Any joint having leakage or more than a "slight drip" or "weeping" should be repaired. Leakage should not exceed 1 oz. (liquid measure) per hour per inch of pipe diameter per joint. The leakage should be distributed over all joints. If such leakage occurs almost entirely at a few joints, the installation should be considered unsatisfactory and necessary repairs made.

**714.** Piping between the fire department connection and the check valve in the inlet pipe should be tested the same as the balance of the system.

**715.** In a standpipe system any piping which normally remains dry should be pressure-tested at intervals of not less than 5 years.