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STANDPIPE AND HOSE SYSTEMS 1963

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National Fire Protection Association

International

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This is one of a large number of publications on fire safety issued by the Association. All NFPA standards and recommended practices, including this text, are prepared by the technical committees of the NFPA and adopted at an Annual Meeting of the Association. They are intended to prescribe reasonable measures for minimizing losses of life and property by fire.

This text and most other NFPA standards and recommended practices are published in the **National Fire Codes**, a compilation of NFPA's official technical material. Full information on the availability of these Codes and other NFPA publications can be secured from the Association.

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SHALL is intended to indicate requirements.

SHOULD is intended to indicate recommendations, or that which is advised but not required.

APPROVED refers to approval by the authority having jurisdiction.

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Standard for the Installation of Standpipe and Hose Systems

NFPA No. 14 — 1963

1963 Edition of No. 14

This is a revision of Standard for the Installation of Standpipes and Hose Systems, NFPA No. 14, 1952, as published by the National Fire Protection Association and National Board of Fire Underwriters. The amendments presented in this edition are principally editorial to bring the standard up to date and clarify requirements. The service required of the systems has been restated and criteria for judging the suitability, for these systems, of pipe other than wrought iron or mild steel have been given. Section 631 has been reworded to be consistent with a similar provision of Standard on Sprinkler Systems, NFPA No. 13.

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 and 1963.

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Standard for the Installation of

Standpipe and Hose Systems

NFPA No. 14 — 1963

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.

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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 at the upper stories of high buildings and of furnishing such streams in the shortest possible space of time.

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. Class of System.

131. Standpipe systems are classified as follows:

(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. Approved Devices.

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

15. Closets and Cabinets.

151. Closets and cabinets used to contain fire hose shall be of sufficient size to permit the installation of the nccessary equipment at hose stations, and so designed as not to interfere with the prompt handling of the hose and equipment at time of fire. They shall be used for fire equipment only, and each should be provided with a conspicuous sign reading "FIRE HOSE."

16. Plans and Specifications.

161. 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.

17. Experienced Workmen.

171. 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 OF STANDPIPES.

21. Factors Governing Size.

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.

22. Schedule of Sizes.

221. Standpipe systems for Class I and Class III services shall have risers which are not less than 4 inches in size for buildings not exceeding 6 stories or 75 feet in height, and 6 inches for buildings in excess of 6 stories or 75 feet in height.

222. Standpipe systems for Class II service shall have risers of not less than 2 inches in size for buildings not exceeding 4 stories or 50 feet in height and 2½ inches for buildings in excess of 4 stories in height.

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. 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 fire walls shall be such that all portions of each story of the building are within 20 feet of a nozzle when attached to not more than 75 feet of hose. 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.

NOTE: The standpipes supplying the 2½-inch hose streams may also be used to supply the small hose streams. 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.)

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 2½-inch hose connections on each floor.

342. Standpipes for Class II service shall be provided with 1½-inch hose connections on each floor.

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

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 and Class III services 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 shall 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 type should 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 and III services) shall be equipped with not more than 75 feet and preferably not more than 50 feet of approved small fire hose attached and ready for use.

NOTE: Long lengths of hose should be avoided as they are difficult to handle, likely to kink and interfere with the effectiveness of the streams and cause loss of time when it is most valuable. For information on the selection of hose, see Care of Fire Hose, NFPA No. 198.

43. Hose Racks.

431. Each station provided with small hose shall be equipped with an approved rack securely fastened in position.

NOTE: 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 should be provided with a sign reading "Fire Hose for Use by Occupants of Building." Signs shall be securely fastened in position.

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 for small hose exceeds 100 pounds per square inch, an approved device shall be installed at the outlet to reduce the pressure so that the nozzle pressure will be approximately 80 pounds per square inch. See Appendix.

NOTE: Pressure reducers are not required on standpipe outlets for 2½-inch hose because it is assumed 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 should be provided with a suitable open or automatic drip connection so installed that any slight leakage past the valve seat will be carried off and prevented from entering the fire 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 Threads for Fire Hose Couplings, NFPA No. 194A.

45. Nozzles.

451. Nozzles shall be of an approved type. Size of nozzles for small hose shall be not larger than ½ inch.

452. Shutoff nozzles shall be provided when required by the authority having jurisdiction.

NOTE: Combination nozzles which give a spray or a solid stream are advantageous in certain locations where the use of a solid stream may contribute to the spread of fire by scattering the burning material or where the existence of flammable liquids makes the use of spray stream desirable.

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 and Standard for the Installation of Centrifugal Fire Pumps, NFPA No. 20.

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. The secondary sources of water supply should be capable of furnishing the number of streams required for the full protection of the plant 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.

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 at least 250 gallons per minute for one standpipe, and at least 500 gallons per minute in buildings where two or more standpipes are required, for a period of at least thirty minutes. These supplies should preferably be such that a residual pressure of 40 to 50 pounds per square inch will be maintained at the topmost outlet (not including the roof outlet) while water is being discharged through 50 feet of 2½-inch cotton rubberlined hose with a 1⅛-inch nozzle. No water supply shall be accepted which provides less than 20 pounds per square inch residual pressure at the topmost outlet (not including roof outlet). The water supply or combination of supplies shall be sufficient to comply with the above requirement but the minimum sizes which should be recognized are: fire pump, 250 gallons per minute; pressure tank, 4,500 gallons; gravity tank, 5,000 gallons.

532. At least one fire department connection shall be provided for each standpipe system where there is a public fire department equipped with pumpers.

NOTE: See Standard for Fire Department Connections for Sprinkler and Standpipe Systems, NFPA No. 23.

54. Minimum Supply for Class II Service.

541. The minimum supply for Class II service shall be calculated on the basis of 70 gallons per minute flowing at the specified pressure so as to afford two good small hose streams simultaneously. The pressure should be sufficient to provide at least 25 pounds per square inch at the highest hose outlet with water flowing. No supply shall be accepted which affords less than 12 pounds per square inch at the highest outlet with 70 gallons per minute flowing. The supply or supplies shall be sufficient to provide for continuous operation of two hose streams for 30 minutes.

55. Minimum Supply for Class III Service.

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

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 2½ 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.

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. Gate and Check Valves.

621. Connections to each water supply, except to fire department connections, shall be provided with an approved gate and check valve located close to the supply, as at tank, pump and in connection from waterworks system. Where the water supply feeds the standpipes in more than one building or section of a building, the check valves shall be placed in a safe position in the underground connections, where not exposed to danger from fire or falling buildings.

622. Sufficient stop valves or check valves should be provided to permit cutting off 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 outside indicator post gate valve at a safe distance from the building or an approved indicator valve at the header.

625. Fire department connections shall be provided with an approved straightway check valve located in the building or valve pit, but not with a gate valve. Piping between the check valve and the fire department connections shall be arranged to drain automatically.

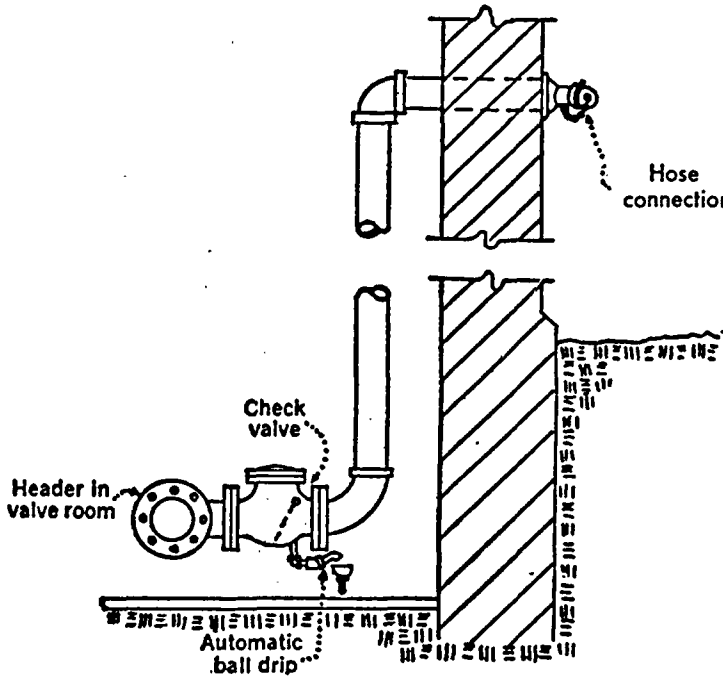

Fig. 625. Fire department connection.

NOTE: See Standard for Fire Department Connections for Sprinkler and Standpipe Systems, NFPA No. 23.

626. Gate and check valves shall be of the approved extra heavy flanged 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.

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 used in standpipe systems should be wrought steel or wrought iron. The chemical and physical properties of this pipe should be at least equal to those manufactured in accordance with the specifications of the American Society for Testing and

Materials for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses, ASTM Designation A120-62T, or for Welded Wrought-Iron Pipe, ASTM Designation A-72-62T. Dimensions for all pipe should be in accordance with the American Standard for Wrought Steel and Wrought Iron Pipe, ASA No. B-36.10-1959. Pipe used in standpipe systems should be designed to withstand a working pressure of not less than 175 pounds per square inch. It is intended that this standpipe standard permit the use of "standard wall" pipe for pressures up to 300 pounds per square inch. Schedule 40 pipe as described in ASA B-36.10-1959 is considered "standard wall" pipe. Schedule 30 pipe is, however, acceptable in sizes 8 inches and the larger.

NOTE: ASTM refers to American Society for Testing and Materials, 1916 Race St., Philadelphia 3, Pa. ASA Standard B-36.10-1959 is prepared by a Sectional Committee of the American Standards Association on Standardization of Wrought-Steel and Wrought-Iron Pipe and Tubing for which ASTM and ASME are joint sponsors. ASA B-36.10-1959 is published by American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y.

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. The use of pipe or tube other than that described in Section 631 must involve consideration of many factors, for example the following:

(1) Pressure rating.

(2) Beam strength (hangers).

(3) Corrosion (chemical and electrolytic).

(4) Resistance to failure when exposed to elevated temperatures.

(5) Methods of joining (strength, permanence, fire hazard).

(6) Availability of fittings (for hose outlets and proper routing).

633. The galvanizing of pipe shall be done as described in specifications of the American Society for Testing and Materials for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses, ASTM Designation A120-62T.

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. Fittings should be of flanged pattern for sizes in excess of 6 inches. All piping shall be installed by means of screwed 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. When done in the field, the fire hazard of the process shall be suitably safeguarded.

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. Drains.

661. The system shall be provided with a system of drain pipes large enough to carry off the water from the open drain while they are discharging under pressure.

662. The drains should be so arranged as to be free from the possibility of causing water damage and not exposed to freezing. If practicable, the drain should be so arranged that the discharge will be visible from the point of operation of the drain valve.

67. Pressure Gages.

671. An approved 3½-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.

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. Leakage should not exceed the following:

Pipe Size:	6-inch	8-inch	10-inch	12-inch	16-inch
Leakage, quarts per 10 joints per hour	2½	3¼	4	5	6½

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.

716. Before restoring to service and before water is turned into it, a standpipe system which has been out of service a number of years should be tested with air at a pressure not exceeding 25 pounds per square inch to determine its tightness.

NOTE: This test is suggested to avoid water damage in buildings in the event that pipes have become broken off or disconnected.

72. Periodic Inspection.

721. Systematic periodic inspection of all portions of the standpipe system is essential, and personnel to whom this duty is entrusted should be held strictly responsible for its condition.

722. The tanks shall be kept properly filled, and where pressure tanks are employed, a pressure of at least 75 pounds per square inch shall be maintained at all times. Special attention should be given to the condition of the tanks during freezing weather.

NOTE: For further details, see Standard for Water Tanks for Private Fire Protection, NFPA No. 22.

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

NOTE: 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.

724. Inspections should be made frequently to assure that the hose is in proper position on the racks, and that all of the equipment is in place and in good condition. The hose should be removed and re-racked at intervals at least annually and new gaskets installed in the couplings, both at the hose valves and at the nozzles. Where couplings are polished, care should be taken to see that polish used does not touch fabric of hose.

NOTE: For further details, see Care of Fire Hose, NFPA No. 198.

725. When a standpipe is out of service for any reason, notice should be given to the local fire department and a sign should be posted on each fire department connection indicating that the standpipe is out of service.

CHAPTER 8. BUILDINGS UNDER CONSTRUCTION.

81. Standpipe Installations in Buildings under Construction.

811. Buildings over 100 feet in height, while in the process of construction, offer a very serious problem to the fire department in fighting fires at the higher levels. A standpipe system, either temporary or permanent in nature, should be installed before the building has reached the height of approximately 70 feet (the exact limiting height to be determined by the longest aerial ladder in the local fire department) above the street grade