

This Is A Fire Fresh Document

FIRESAFETY

STANDPIPE AND HOSE SYSTEMS

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1. GENERAL

- 1.01 This section provides guidelines governing the design and installation of standpipe and hose systems in Company buildings.
- 1.02 This section is being reissued to reflect the most recent refinements of the Firesafety Practices.

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- 1.03 The recommendations in this section are based, in general, on the Fire Codes of the National Fire Protection Association (NFPA) and the Model Building and Fire Codes. Many detail features of these source documents have not been covered herein; therefore, source documents should be reviewed for complete details.
- 1.04 Where local, state, federal or Occupational Safety and Health Act (OSHA) regulations require higher degrees of protection, the legislated criteria should be followed to the extent required.
- 1.05 Standpipe and hose systems shall comply with or exceed requirements set forth in Company practices, applicable codes (building and fire codes) and the latest edition of National Fire Protection Association (NFPA) standards. They must also meet requirements of the jurisdictional code enforcement authorities and Company insurance/risk management agreements.
- 1.06 Applicable NFPA standards specifically include, but are not limited to, the latest editions of NFPA 14 "Standpipe and Hose Systems", NFPA 20 "Centrifugal Fire Pumps", NFPA 22 "Water Tanks for Private Fire Protection", NFPA 24 "Outside Protection", NFPA 26 "Supervision of Valves Controlling Water Supplies", and NFPA 214 "Cooling Towers, Water".
- 1.07 Standpipe and hose equipment, with approved spray nozzles, are primarily intended for use on interior fires. These systems, when used by trained personnel, should not prove hazardous when held at distances in excess of 10 feet from live electrical apparatus involving voltages as high as 250,000 VAC.
- 1.08 Hose lines used within the building shall be equipped with approved fog type nozzles. Hose lines using approved solid stream nozzles may be used at the roof outlet.

2. STANDPIPES

- 2.01 **Class of Service:** For the purpose of this section, standpipe systems are defined and recommended for use as follows:

Class I: For use by fire department personnel and persons trained in handling heavy hose fire streams (2-1/2 inch connection), with the approval of the local code enforcement authorities, as an option in buildings that are fully protected by an automatic suppression system (sprinklers, Halon 1301, etc.).

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Class II: For use primarily by the building occupants (first aid) until arrival of the fire department (1-1/2 inch connection) in buildings that are less than four stories and/or less than 30,000 square feet of gross area.

Class III: For use by fire department personnel, persons trained in handling heavy hose streams, or by the building occupants (1-1/2 inch and 2-1/2 inch connections) in all buildings.

2.02 **Application Criteria for Standpipe Systems:** Application recommendations for standpipe and hose systems are based upon a function of building height (number of stories) and area per floor as shown in Table 1.

- (a) At a minimum, all buildings that are four or more stories above grade, two or more stories below grade or more than 30,000 square feet of gross area shall be provided a standpipe and hose system.
- (b) Consideration should also be given to providing a standpipe and hose system wherever a sprinkler system is installed.
- (c) Refer to the following sections for additional application criteria:

SECTION	TITLE
760-600-210	Application Criteria for Telephone Equipment Buildings
760-600-220	Application Criteria for Administrative Buildings
760-600-230	Application Criteria for Electronic Data Processing Centers
760-600-240	Application criteria for Garages and Other Work Centers
760-600-300	Application Criteria for Leased Facilities
760-600-900	Application Criteria for Storage, Warehouse and Distribution Facilities




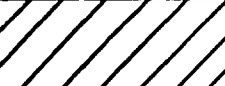







2.03 **Types of Standpipe Systems:** The two types of standpipe systems are:

- (a) **Wet Standpipe System:** Water and pressure maintained to hose valve(s) at all times.
- (b) **Dry Standpipe System:**
 - (1) Water admitted to the system through manual operation of a remote control device located at each hose station.

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GROSS AREA PER FLOOR (SQUARE FEET)

	0 - 5,000	5,000 - 10,000	10,000 - 15,000	> 15,000
ONE STORY ABOVE GRADE *	NA	NA		
TWO STORIES ABOVE GRADE *	NA	NA		
THREE STORIES ABOVE GRADE *	NA			
FOUR STORIES OR GREATER ABOVE GRADE *				



- CLASS II OR CLASS III STANDPIPE SHOULD BE CONSIDERED



- CLASS III STANDPIPE AND HOSE SHALL BE INSTALLED

* UNDERGROUND BUILDINGS - REDUCE AREAS BY 50 PERCENT AND TREAT AS STORIES ABOVE GRADE.

NOTES:

- 1) IN AN EXISTING BUILDING WHERE THERE EXISTS A CLASS II SYSTEM AND WHICH REQUIRES UPGRADING TO A CLASS III SYSTEM, THIS MAY BE ACHIEVED BY THE INSTALLATION OF A CLASS I SYSTEM IN ADDITION TO THE CLASS II SYSTEM.
- 2) CLASS I SYSTEM MAY BE USED IN A BUILDING WHICH IS FULLY PROTECTED BY AN AUTOMATIC SUPPRESSION SYSTEM IN LIEU OF A CLASS II OR CLASS III SYSTEM.

TABLE 1 - Standpipe and Hose Application Criteria

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- (2) Having no permanent water supply-supply via a pumper connection.

- 2.04 **Hose Stations:** The number of hose stations for 1-1/2 inch (first aid) and 2-1/2 inch hose in each building or section of a building within fire-rated walls shall be such that all portions of each story of the building, except cable entrance facilities, transformer vaults, or power boards, are within 130 feet travel distance to the nearest hose station. The 130 feet is based on a hose length of 100 feet and the 30-foot nozzle spray. Location should be such that occupants have free and clear access to them at all times.
- 2.05 **Location of Standpipes:**
- (a) Class I standpipes (generally not recommended except in high-rise buildings fully protected by an automatic suppression system) - the recommended location is within the stairway or fire tower enclosures for the 2-1/2 inch connection.
 - (b) Class II standpipes - the recommended location is in the corridor or adjacent to the stairway enclosure.
 - (c) Class III standpipes - the recommended location is within stairway or fire tower enclosures for the 2-1/2 inch connection.
- 2.06 **Hose Connection on Roof:** Hose connections on the roof are not normally provided on standpipes for class II service. If combustible structures are located on the roof and standpipe(s) for class III service is installed, the standpipe(s) should be extended through the roof and equipped with approved valves. The hose connection should preferably be located in a heated space, such as a penthouse, and equipped with a solid stream nozzle.
- 2.07 **Fire Department Connections (Siamese):** A connection, through which the public fire department can pump water into the standpipe system, shall be provided for standpipes 4 inches and larger in diameter. It shall be located on the street side of the building at a height between 18 and 36 inches above grade and readily accessible. Municipal regulations may require a fire department connection for each street if the building involves more than one street frontage.
- 2.08 Fire department connections shall be provided with an approved straightway check valve located in the building. However, control valves are not permitted in the fire department connection (absolutely no shutoff valve on this connection).

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The fire department connection shall be tied into the free service entrance piping on the system side of all entrance control valves. Piping between the check valve and the fire department connection shall be arranged to drain automatically. The pipe from the standpipe to the fire department connection shall be at least 4 inches in diameter. (See Fig. 1.)

2.09 Fire department connection shall be installed with automatic drip capabilities, cap and chain, complete with base plate and the appropriate designation. Threads are to conform to the local fire district requirements.

2.10 **Test Headers:** Where a standpipe system is supplied by a fire pump, one 2-1/2 inch hose connection for each 250 gallon-per-minute pump capacity is to be provided in the form of a test header installed at ground level. This will provide the fire department with water for use on outside fires and also provide a convenient point for periodic fire pump capacity test. Each 2-1/2 inch header connection should be controlled by a separate valve and properly capped when not in use. Existing fire pump installations without test headers should be reviewed and, if feasible, a test header added.

2.11 **Performance Criteria:**

- (a) Standpipes shall be installed so as to control upward thrust.
- (b) The system shall be protected against freezing, to maintain a minimum temperature of 40 F, as required by NFPA.
- (c) Installation shall comply with all requirements applicable to seismic design.

2.12 **Additions, modifications, and revisions to existing systems:** Perform a review of Hydraulic calculations applicable to existing systems. If necessary, components of existing systems are to be brought up to current standards and requirements. This may require that the work include revisions to existing pipe sizes, connections and other system components. New and existing fire protection systems should be completely compatible in design, installation and operation. Devices and components of existing systems not required, unused and/or abandoned shall be deactivated from service. It is also suggested that they be removed from the building.

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Sign Having Raised Letters
At Least One Inch in Size
Cast On a Plate Or Fitting,
Reading "Standpipe" (Sign
Should Also Indicate Section
Of Building Served If More
Than One Standpipe)

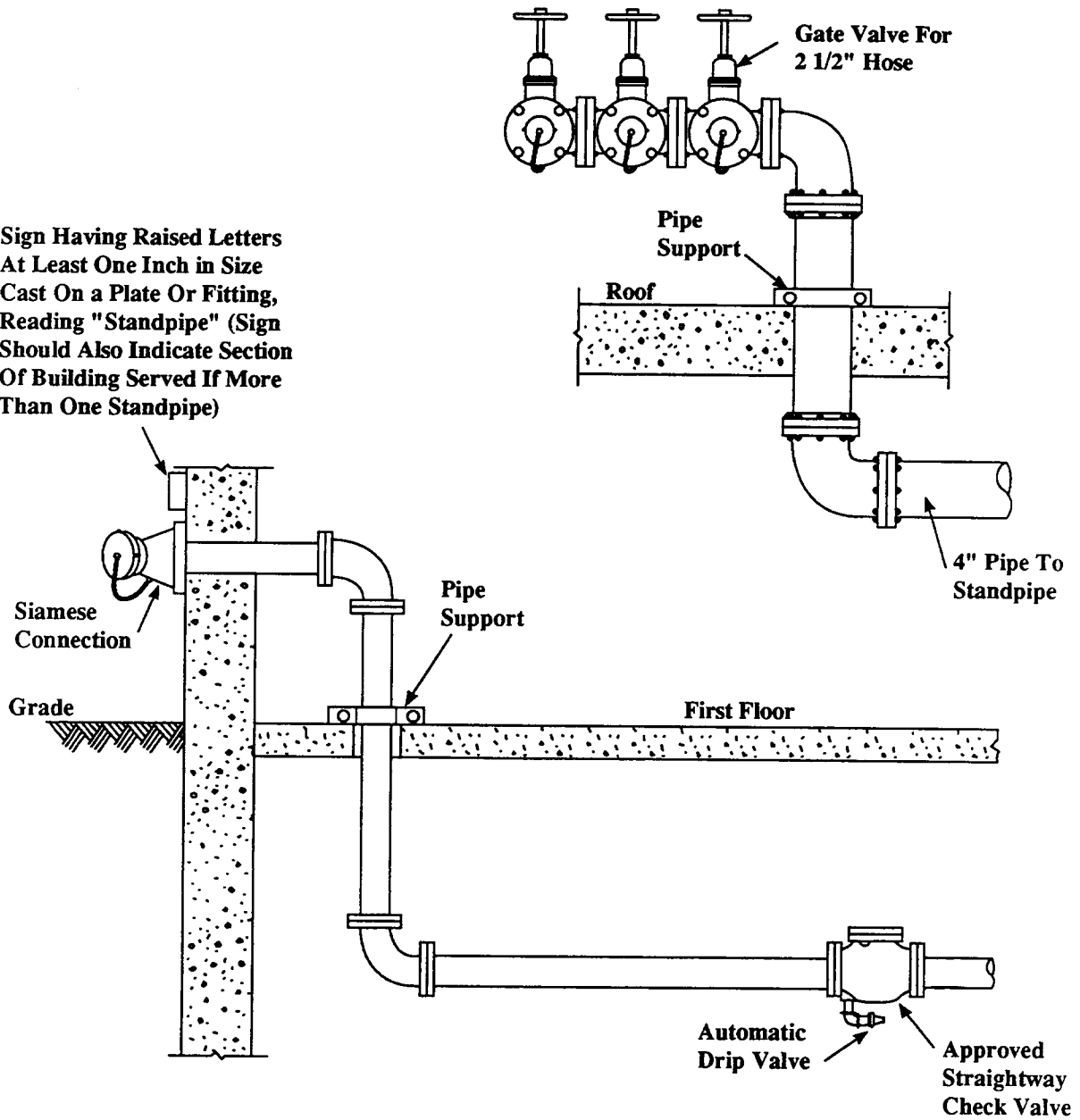


Fig. 1—Typical Fire Department Connection For Wet Standpipe

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3. HOSE STATIONS

- 3.01 **General:** Hose stations shall not be more than 6 feet off the floor. They shall be conspicuously located without any obstructions.
- 3.02 **Connection 2-1/2 Inch:** A 2-1/2 inch connection shall be provided at each floor on each standpipe 4 inches and larger in diameter. The outlet shall be independently controlled by an approved hose valve. The thread on the outlet must be compatible with that used by the fire department (properly sized reducer) and include cap and chain.
- 3.03 **Hose 1-1/2 Inch:** Each 1-1/2 inch hose station inside the building, regardless of the size of the standpipe, is to be equipped with an approved single jacketed lightweight lined hose not exceeding 100 feet in length.
- 3.04 **Hose 2-1/2 Inch:** Unless required by local code, hose shall not be installed at the 2-1/2 inch fire department outlets. When installed, it should be of a type specified by the local fire department. At each location, a sign shall be placed reading **FOR FIRE DEPARTMENT USE ONLY**.
- 3.05 **Roof Installations:** When local regulations require that a hose station be installed on the roof, a sufficient length of hose shall be provided to reach all edges of the roof. To facilitate handling, the hose may be made up in sections with no section being more than 100 feet in length. The hose should be coupled to the hose valve only if it is located in the penthouse or other heated space. If it is necessary to use the arrangement shown in Fig. 2, the hose should be located in an easily accessible hose cabinet in heated space.
- 3.06 **Hose Racks:** Each 1-1/2 inch hose station shall be provided with an approved rack securely fastened in position. Racks and valves may be recessed in a wall; however, fire rated walls shall not be reduced in effective thickness. If a door is used to protect the rack from dust, it should be non-locking and the words **FIRE HOSE** placed on the door.
- 3.07 **Hose Valves:** The hose at each class II station (1-1/2 inch) shall be coupled to a listed hose valve. Where the normal static pressure at any 1-1/2 inch hose connection exceeds 100 psi, an approved device shall be installed at the outlet to reduce the pressure with required flow at the outlet to 100 psi.
- 3.08 **Nozzles:** Only all-fog type nozzles, for use on class A, B, and C fires, shall be installed. These nozzles shall have an adjustment spray pattern only and shall not

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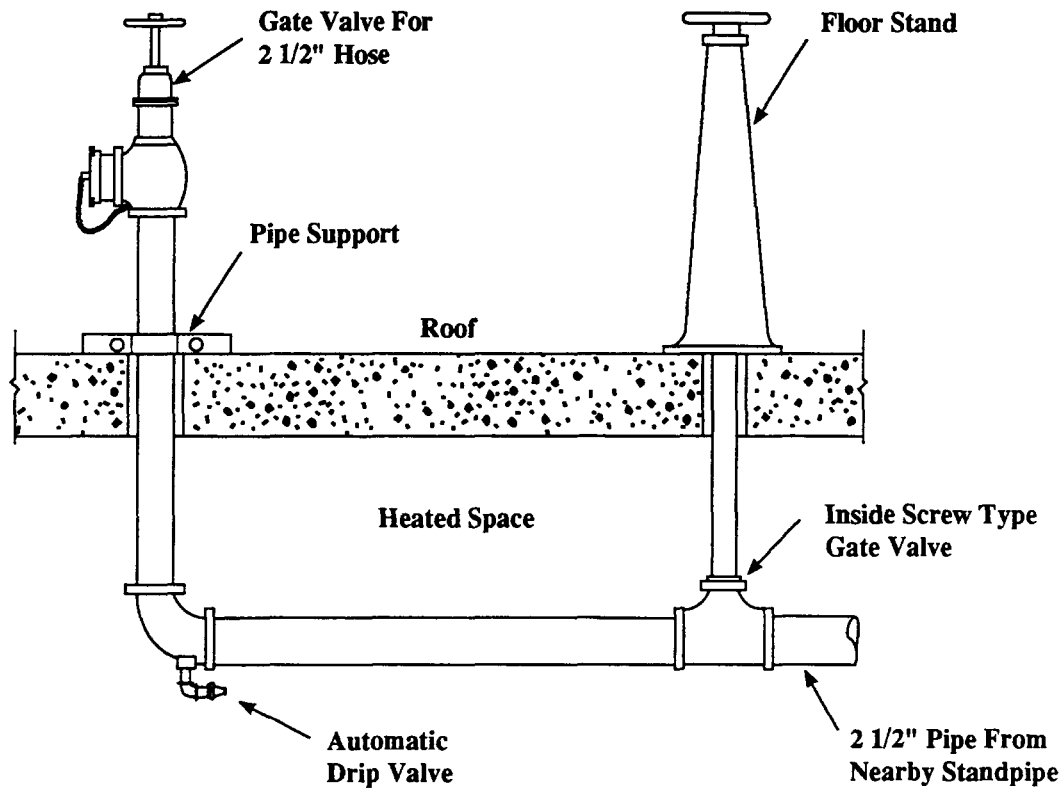


Fig. 2—Typical Roof Installation

at any time pass through a solid stream. The nozzle should be of the type constructed of Lexan (polycarbonate resin). Such nozzles should not prove hazardous when held at distances in excess of 10 feet from live electrical apparatus and circuits involving not in excess of 250,000 volts.

Note: All-fog type nozzles, as listed by UL or approved by F.M., apply only to class B and class C fires. The listing and approval by these agencies for classes B and C presupposes that these nozzles have class A capability.

- 3.09 **Exclusion:** Hoses, hose racks and nozzles may, however, be eliminated with the written approval of the jurisdictional authority (retained on permanent file in the building construction district office).

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Note: In major metropolitan areas, fire departments are normally adequately equipped for fast and effective response to a fire condition and as such would rather not use the building hoses or support use of hoses by the building occupants. In smaller communities this may not be the case. Therefore, the installation and use of hoses should be evaluated on a case by case bases considering the fire fighting capabilities of personal located in the building and effectiveness of fire department response.

4. WATER SUPPLY

4.01 **General:** Wet standpipe systems shall have an adequate water supply. A single source of supply is acceptable where it is capable of supplying all of the fire streams required for the full protection of the property (includes combined demand of the standpipe and hose systems and the sprinkler systems within a building). In some cases, as in the case of high-rise structures, more than a single water supply may be necessary. (See Fig. 3 and 4.)

4.02 **Acceptable Water Supplies:** The acceptable water supplies may be:

- (a) Public water systems where pressure and discharge capacity are adequate,
- (b) Fire or special fire service pumps arranged for automatic starting,
- (c) Pressure tanks,
- (d) Gravity tanks,
- (e) Manually controlled fire pumps operated by a remote control device at each hose station.

4.03 **Supply Requirements:** The recommended design of water supply for a standpipe and hose system is one that provides the following:

- (a) For class II service, the supply for 1-1/2 inch hose lines shall be 100 gallons per minute for at least 30 minutes. The supply shall be sufficient to maintain at lease 65 psi pressure at the topmost 1-1/2 inch hose station on each standpipe (including any roof outlet) with 100 gallons per minute flowing.

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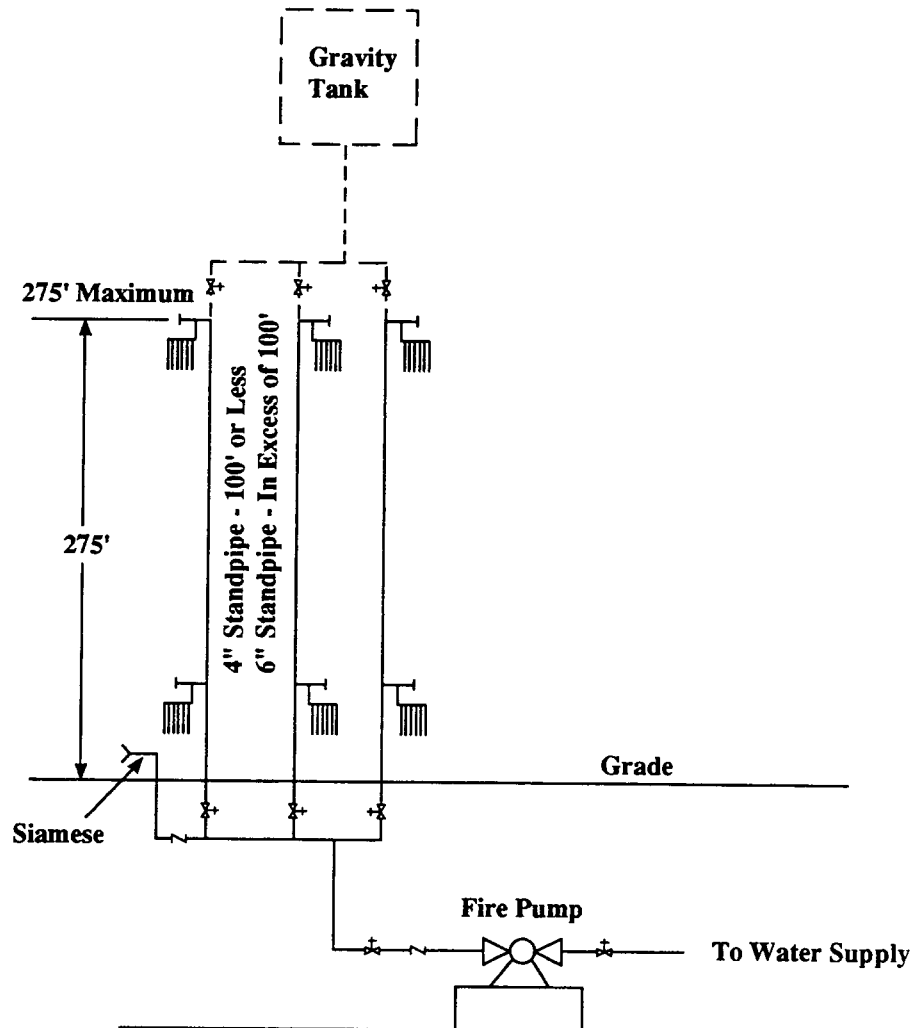


Fig. 3—Fire Standpipe Arrangement (Not Exceeding 275 Feet Height) Single Zone System

- (b) For class I and class III service, the supply shall be sufficient to provide 500 gpm for a period of at least 30 minutes. Where more than one standpipe is required, the initial supply requirement of 500 gpm should be increased by 250 gpm for each additional standpipe. The supply shall be capable of a duration of at least 30 minutes and sufficient to maintain a residual pressure of 65 psi at the topmost outlet of each standpipe (including any roof outlet) at the total required flow rate.

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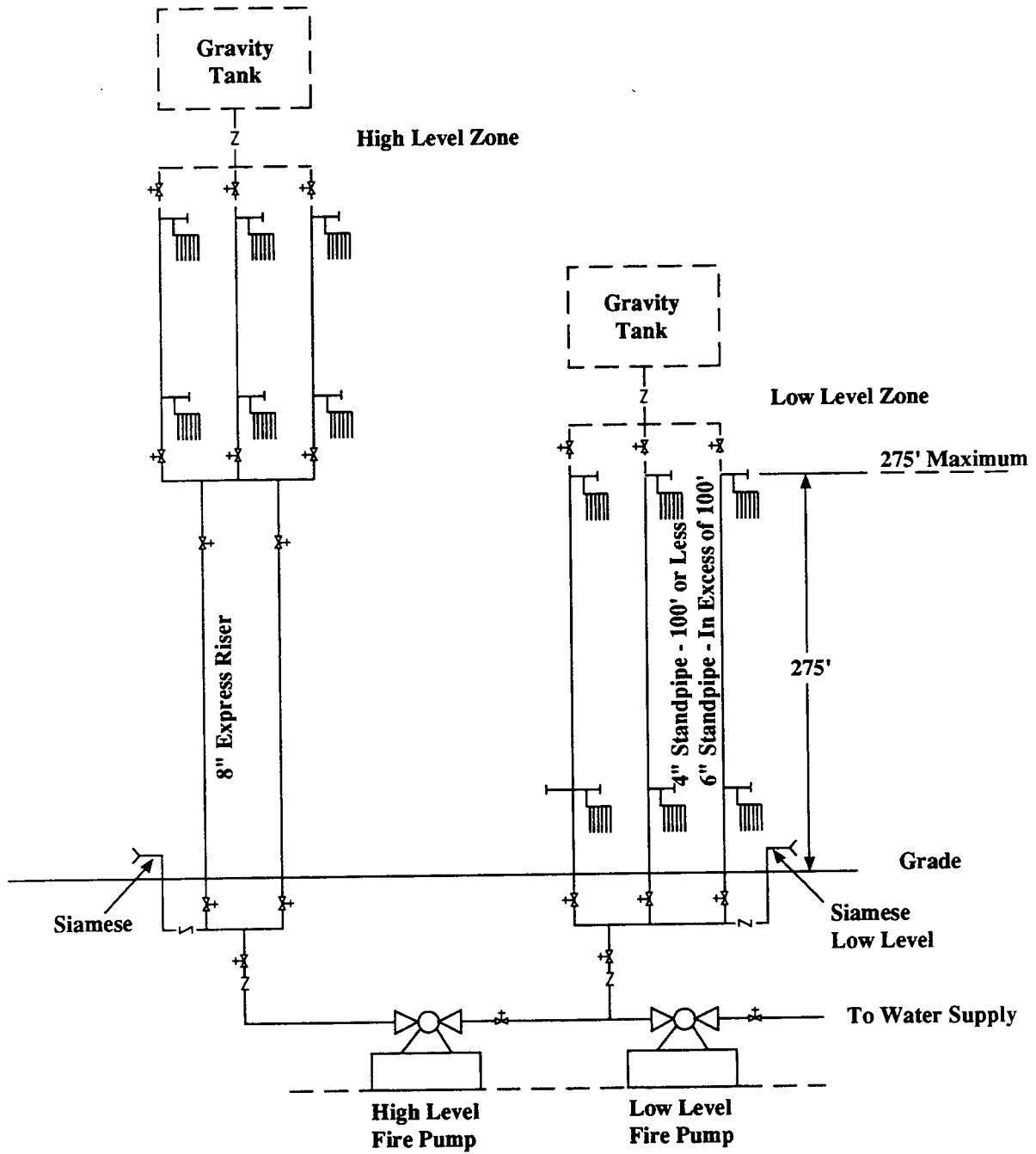


Fig. 4—Fire Standpipe Arrangement (Exceeding 275 Feet Height) Two Zone System

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- (c) The fire service pump (booster), where acceptable to local authorities, can be used when the residual pressure is below 65 psi. (See Section 760-640-320.)
- (d) For class III service, where municipal systems cannot provide the flow/pressure requirements specified in (b), then the water supply requirements specified in (a) shall be used provided there is a Siamese connection to allow the fire department to boost pressure/flow to meet their needs. However, piping for class II systems shall be sized to meet the flow requirements specified in (b).
- 4.04 **Adequacy of Water Supply:** Water supply and pressure shall be verified for all buildings. Perform field tests if adequate water supply data is not available. Documentation of available water supply should be provided with shop drawings.
- 4.05 **Street Connection:** The connection at the street water main shall be 4 inches for the 4-inch standpipe and 6 inches for the 6-inch standpipe. If permitted by the local water company, the standpipe water supply should bypass the water meter. (See Fig. 5.) The minimum size connection is 2-1/2 inches. **It is important to consider the ultimate building growth and the economic advantage of providing required sizes for the future during the initial construction stage.**
- 4.06 Where connection is made from a public water-works system, 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.
- Note: This may necessitate installation of a code approved back-flow prevention device. A double check valve assembly with test ports shall be used unless reduced zone back flow prevention is required.
- 4.07 **Gate Valves:** All gate valves controlling the standpipe system should be listed Outside Screw & Yoke (OS&Y) type and sealed in a wide open position.
- Note: New systems shall have indicating type control valves. Existing standpipe systems containing non-indicating type control valves are acceptable provided they are secured in the fully open position.
- 4.08 **Metering:** If metering is required by local authorities, the standpipe system shall be metered separately. In class II and class III systems, a separate fire service connection shall be provided and a listed fire service meter installed.

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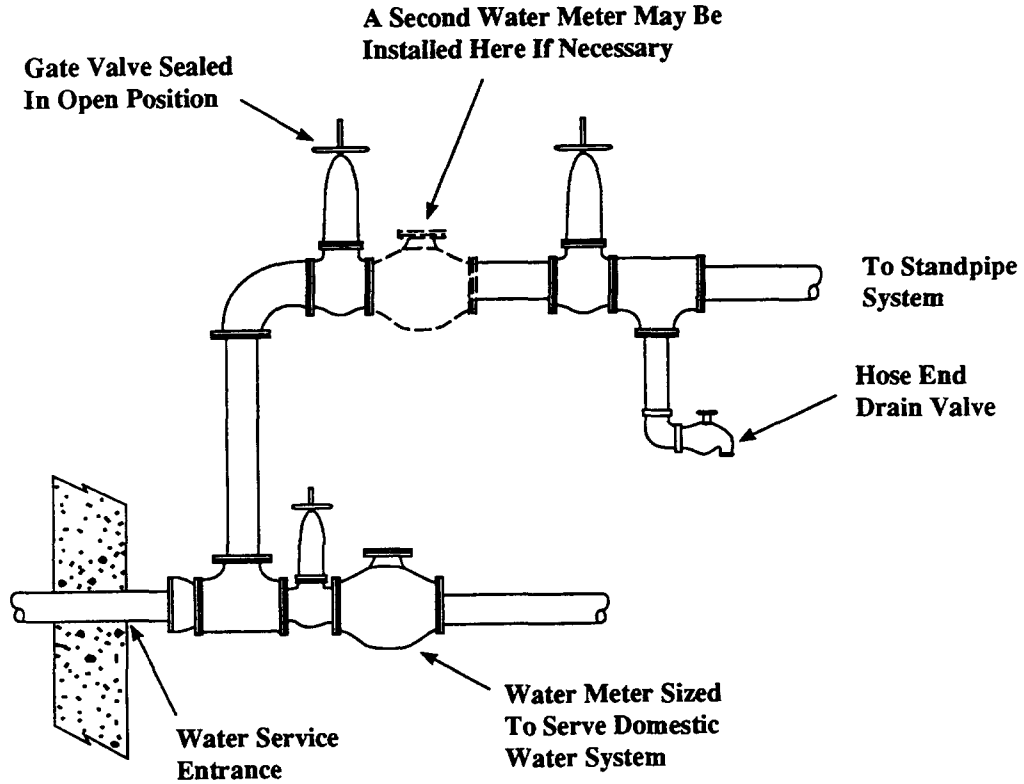


Fig. 5—Standpipe bypassing Domestic Water Meter

5. PRESSURE GAUGES

5.01 A 3-1/2 inch dial-spring pressure gauge shall be provided:

- (a) At the discharge side of fire pump(s),
- (b) In the municipal water supply at the point of entrance into the building,
- (c) At the discharge of a gravity water supply tank,
- (d) On a pressurized supply tank,
- (e) At the top uppermost hose station within the building.

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- 5.02 Gauges shall be located in a place where water will not freeze. Each gauge shall be controlled by a valve having arrangement for draining piping between standpipe and gauge without draining the entire system.

6. SUPERVISION

- 6.01 Installed fire pumps and valves shall be supervised through the building early warning fire detection system, if provided.
- 6.02 Provide exterior building alarm and interior alarm bells with water flow tied to building early warning fire detection system. Provide separate zone(s) to annunciate water flow.
- 6.03 Exclusion: Existing systems do not have to comply with supervision requirements until a major building project is performed or alteration work is completed on the existing standpipe and hose system.

7. BUILDINGS UNDER CONSTRUCTION

- 7.01 **New Building Construction:** Buildings over 100 feet in height could pose a serious problem to the fire department. A standpipe system, either temporary or permanent in nature, should be installed to each floor before the building has reached the height of approximately 75 feet above the street level. Suitable means shall be provided so that fire department personnel can quickly reach all parts of the building. The following considerations apply:
- (a) Temporary dry standpipes with fire department connections should be employed.
 - (b) The size of standpipes, piping, and valves shall be in accordance with the applicable sections of this practice.
 - (c) Standpipes shall be adequately supported and secured at each alternate floor.
 - (d) At the ground level there shall be at least one 4-inch 2-way connection for attaching hose lines from fire department pumpers or other sources of high pressure.
 - (e) Fire department connections should be marked and visible.
- 7.02 **Existing Building Construction:** The presence of a standpipe and hose system is

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a very important and integral part of fire protection relied upon within a building. Therefore, the following considerations apply:

- (a) Temporary Protection: Existing fire protection systems shall be maintained in service until new or revised system work can be permanently cut-over and/or integrated as required.
- (b) Before shutting off a section of the fire protection system to make required connections, plan the work carefully, and assemble all materials to enable completion in the shortest possible time. Work started on connections should be rushed to completion without interruption, and protection restored as promptly as possible.
- (c) During the impairment, contractor shall provide emergency hose lines, additional fire pails and extinguishers, and maintain extra fire watch service in the areas affected.
- (d) When changes involve shutting off fire protection water (serving system devices and components), for more than a few hours, temporary water supply connections should be considered so that reasonable fire protection can be maintained.
- (e) When adding to old systems or revamping them, protection should be restored each night so far as possible.
- (f) Impairments are to be handled as generally outlined in Section 770-340-900 and as required in NFPA.

7.03 Because of the inherent hazards involved in any and all types of building construction work, it is very important that the guidelines covered in Section 760-620-100, Fire Protection During Contracted Work Operations, be followed on projects in new or existing buildings.

8. INSTALLING CONTRACTOR

8.01 The work shall be completed by a qualified contractor. This contractor shall have sole responsibility for the installation of all labor, accessories, tools, equipment and material required to completely execute the installation of the standpipe and hose system shown in drawings and specifications.

8.02 The contractor shall determine proper pipe sizing based on final pipe routing,

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substantiated by hydraulic calculations.

9. WELDING AND CUTTING

- 9.01 Detailed procedures shall be prepared and submitted for approval and contractor employees shall be pre-qualified on them before any welding and cutting is done. Each contractor shall also be responsible for their own welding and cutting and shall be required to follow the applicable requirements of NFPA and Section 760-620-900, Part 9 "Welding and Cutting Permit". Welders and the welding operators shall be certified by the contractor in accordance with the American Welding Society Standards or American Society of Mechanical Engineers, Boiler and Pressure Vessel Code.

10. MATERIAL AND EQUIPMENT

- 10.01 All materials and equipment used shall be **listed by Factory Mutual (FM) or Underwriters Laboratory (UL)** for fire protection system installation.
- 10.02 **Valves** shall be approved for fire protection piping systems and shall be installed as required by NFPA. All valves shall be locked in "open" position with supervisory switches provided to activate fire alarm supervisory alarms if valves are not open.
- 10.03 **Hangers** shall be installed and spaced in accordance with the requirements of NFPA and shall be listed by the Underwriter's Laboratory.
- 10.04 **Sleeves** shall be set for all pipes passing through concrete and masonry walls.
- 10.05 **Inspectors Test Connections** shall be furnished and installed as required by NFPA.
- 10.06 **Enameled metal signs** shall be securely attached at all main drains, auxiliary drains, inspectors' test connections, control valves and other locations required by NFPA. NFPA requirements for placement and labeling of signs shall be followed.
- 10.07 **Tamper Switches** shall be installed on each fire protection valve inside the building and should be designated on the specification drawings. Switches shall be mounted so as not to interfere with the normal operation of the valve control. The tamper proof mechanism shall be contained in a weather-proof housing with tapped conduit entrance and necessary facilities for attachment to the valve. The entire assembly shall be tamper proof and arranged to provide indication if the

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housing cover is removed or if the unit is removed from its mounting.

- 10.08 Supervisory Switches and Gate Valve Switches shall be UL listed and/or FM approved. Supervisory switches shall be wired in conformance with the National Electric Code (NEC).

11. ACCEPTANCE AND TESTING

- 11.01 **New Systems:** All new system piping shall be flushed and hydrostatically tested by the installing contractor. Hydrostatic testing shall not be less than 200 psi pressure for 2 hours or at 50 psi above the normal pressure when the normal pressure is in excess of 150 psi. All piping shall be proved tight.

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

- 11.02 **Fire Pump:** Refer to Section 760-640-320, Considerations for Pumps for Fire Service.

Note: The fire pump controller supplier should be made responsible for checking out and supervising the control wiring for compliance on any pump controllers installed. The supplier should also be responsible for instruction of maintenance personnel on the proper operation and care of the fire pump system.

- 11.03 **Shop Drawings:** Shop drawings are to be submitted to local building code authorities and Company insurance carrier for review and approval prior to system installation. Shop drawing submittal shall include manufactures literature on all system components and hydraulic calculations used to size system piping and components. Submittals shall comply with the requirements of NFPA. Record copies of approved drawings should be maintained in the building project file.

- 11.04 **Approval:** No work shall be concluded unless inspected and approved by the authority having jurisdiction.

- 11.05 Before asking final approval of fire protection system installation by the authority having jurisdiction the installation contractor shall furnish a written statement to the effect that the work covered by this contract has been completed and tested in accordance with the approved specifications and plans. This is covered in NFPA and is referred to as a "Contractors' Material and Test Certificate" (for both above and underground piping). A copy of this certificate should be maintained in the building project file and forwarded to the Company insurance carrier.

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