5.2.1.4.13 Nitrogen. Where used, nitrogen shall be introduced through a pressure regulator set to maintain system pressure in accordance with 5.2.1.4.5.

5.2.2 Auxiliary Systems. A wet standpipe system shall be permitted to supply an auxiliary dry standpipe system, provided the water supply is capable of supplying the system demand.

5.2.3* Semiautomatic Dry.

A.5.2.3 A dry pipe system should be installed only where heat is not adequate to prevent freezing of water in all parts of, or in sections of, the system.

5.2.3.1 A listed remote control activation device shall be provided at each hose connection within 3 ft (1 m) and shall be visible and identified as to its intended use and in accordance with the manufacturer's specifications.

5.2.3.1.1 The remote control activation device shall be permitted to be secured in an approved manner to prevent unauthorized system activation.

One method of protecting the remote control activation device is to enclose it in a transparent plastic cover fitted with an alarm horn.

5.2.3.1.2 The remote control activation system shall be installed in accordance with *NFPA 72*.

The fire control panel that the remote control devices report to should be listed as required by *NFPA 72®, National Fire Alarm and Signaling Code®*.

5.2.3.1.3* The remote control activation circuits shall be protected from mechanical damage.

Remote control wiring should be installed in steel electrical conduit where subject to mechanical damage.

A.5.2.3.1.3 Remote control activation circuits should not be placed in unsprinklered areas of combustible construction.

The authority having jurisdiction (AHJ) may allow the remote control device wiring in unsprinklered combustible construction if the wiring is 2-hour rated in accordance with *NFPA 70®, National Electrical Code®*, Article 760, and *NFPA 72*.

5.2.3.1.4 All wiring for actuation of semiautomatic systems shall be supervised in accordance with *NFPA 72*.

The installation of a fire alarm control panel listed for releasing service is required by 5.2.3.1.4.

5.2.3.2 All remote control activation devices of the semiautomatic dry standpipe system shall be compatible and listed for the intended use.

5.2.3.3 The automatic water control valve shall be provided with hydraulic means or mechanical manual means for operation that is independent of the remote control activation device.

A manual release mechanical valve with pull handle, piped before the electrical release solenoid and vented to atmosphere, is a standard trim accessory for this type of valve.

5.2.3.4 Pressure Gauges. Approved pressure gauges conforming with Section 5.5 shall be installed as follows:

(1) Above and below preaction valve and below deluge valve
(2) On air supply to preaction and deluge valves [**13:**7.3.1.3]

5.2.3.5 Location and Protection of System Water Control Valves. [**13:**7.3.1.8]

5.2.3.5.1 System water control valves and supply pipes shall be protected against freezing and mechanical injury. [**13:**7.3.1.8.1]

5.2.3.5.2 Valve Rooms. [**13:**7.3.1.8.2]

5.2.3.5.2.1 Valve rooms shall be lighted and heated. [**13:**7.3.1.8.2.1]

5.2.3.5.2.2 The source of heat shall be of a permanently installed type. [**13:**7.3.1.8.2.2]

5.2.3.5.2.3 Heat tape shall not be used in lieu of heated valve enclosure rooms to protect preaction and deluge valves and supply pipe against freezing. [**13:**7.3.1.8.2.3]

5.2.3.6 Semiautomatic dry systems shall be one of the following types:

(1) A single interlock system, which admits water to piping upon operation of the remote control activation device
(2) A non-interlock system, which admits water to piping upon operation of remote control activation device or hose valve
(3) A double interlock system, which admits water to piping upon operation of both remote control activation devices and hose valves

Double interlocked systems are most advantageous where vandalism is likely to occur.

5.3 Classes of Standpipe Systems.

5.3.1 Class I Systems. A Class I standpipe system shall provide 2½ in. (65 mm) hose connections to supply water for use by fire departments and those trained in handling heavy fire streams.

Exhibit II.5.5 shows an example of a Class I standpipe system.

5.3.2 Class II Systems.

5.3.2.1 A Class II standpipe system shall provide either 1½ in. (40 mm) hose stations to supply water for use by trained personnel or a hose connection for the fire department during initial response.

See NFPA 600, *Standard on Facility Fire Brigades*, for qualifications for trained personnel.

5.3.2.2 A minimum 1 in. (25.4 mm) hose shall be permitted to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the authority having jurisdiction (AHJ).

A 1 in. (25.4 mm) hose does not deliver an adequate amount of water for anything other than a small fire. It is important to consult with the authority having jurisdiction (AHJ) prior to installing such a small diameter hose.

EXHIBIT II.5.5 *Class I Standpipe System.*

5.3.3 Class III Systems. A Class III standpipe system shall provide 1½ in. (40 mm) hose stations to supply water for use by trained personnel and 2½ in. (65 mm) hose connections to supply a larger volume of water for use by fire departments and those trained in handling heavy fire streams.

5.3.3.1 A minimum 1 in. (25.4 mm) hose shall be permitted to be used for hose stations in light hazard occupancies where investigated and listed for this service and where approved by the authority having jurisdiction.

5.3.3.2 Where the building is protected throughout by an approved automatic sprinkler system, Class II hose stations for use by trained personnel shall not be required, subject to the approval of the AHJ, provided that each Class I hose connection is 2½ in. (65 mm) and is equipped with a 2½ in. × 1½ in. (65 mm × 40 mm) reducer and a cap attached with a chain.

Paragraph 5.3.3.2 allows the use of a reducer and cap in lieu of a 1½ in. (40 mm) hose connection and hose for a Class III standpipe system. In many jurisdictions the fire service would prefer no hose be installed on a Class III standpipe system. This is because the fire service supplies their own hose as part of their high-rise pack, hose which they know has been tested and maintained in accordance with NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances*. When installed, the hose is intended for use by trained personnel or the fire service. If the hose is not installed, it prevents untrained building occupants from attempting to use the hose to fight a fire. It is the intent of building and

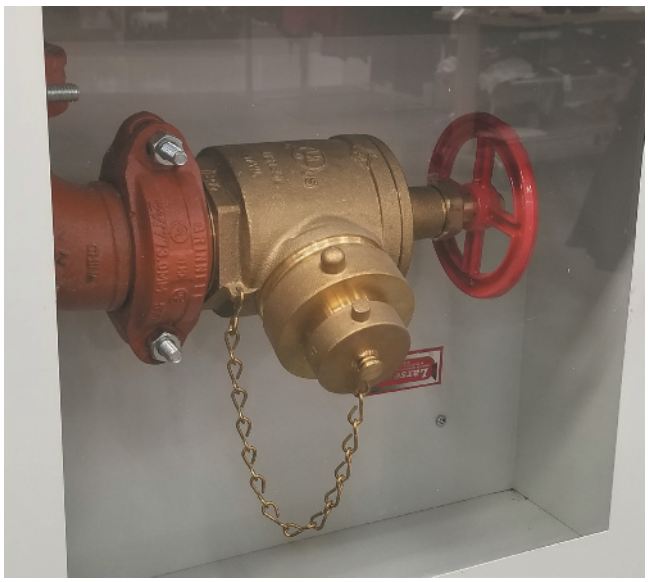


EXHIBIT II.5.6 *Class III Standpipe with 2½ in. (65 mm) Hose Connection, Equipped with a 2½ in. × 1½ in. (65 mm × 40 mm) Reducer and a Cap Attached with a Chain. (Courtesy of Jeremy Souza)*

life safety codes and standards that, unless a building is designed for "protect in place" scenarios, building occupants will always evacuate when alerted to a potential incident. Exhibit II.5.6 shows a 2½ in. (65 mm) hose connection equipped with a 2½ in. × 1½ in. (65 mm × 40 mm) reducer and a cap attached with a chain.

5.3.3.2.1 Class III standpipes meeting the provisions of 5.3.3.2 shall not be required to meet the pressure requirements of 7.2.3.1 or the travel requirements of 7.3.3.

DESIGN ALERT

Prior to the design and installation of a standpipe system, the registered design professional (RDP) should review locally adopted amendments to codes and standards. It is not uncommon for jurisdictions to amend the travel distance within NFPA 14 based on fire-fighting tactics and the length of hose contained in their high-rise packs.

5.4* Required Type of System.

A.5.4 The committee's intent is to permit the omission of a fire pump as part of the standpipe system in non-high-rise buildings where the automatic sprinkler system can be designed and installed with the available water supply and the flow and pressure demands of the standpipe system can be provided by the fire department apparatus through the fire department connection.

DESIGN ALERT

The authority having jurisdiction (AHJ) should be consulted to determine whether a manual standpipe system is acceptable and the capability of the fire department to supply the required pressure and flow for the standpipe system. Where a manual standpipe system is designed, the registered design professional (RDP) will need to acquire the pump characteristics of the fire department pumper apparatus from the fire department in order to perform the hydraulic calculations. In addition, the acceptance test will have to be coordinated with the fire service because the fire department pumper will be needed to perform the test.

In most jurisdictions, standard operating procedure is to provide 150 psi (10.3 bar) whenever the fire service connects to a fire department connection (FDC). If the required inlet pressure at the FDC is greater than 150 psi (10.3 psi), it is important that a sign be provided stating the required inlet pressure.

5.4.1 Class I Standpipe Systems.

5.4.1.1* Class I standpipe systems shall be permitted to be automatic dry, automatic wet, semiautomatic dry, manual dry, or manual wet in buildings not classified as high-rise buildings.

A.5.4.1.1 A fire pump can be installed to supply the sprinkler demand and inside hose requirements only. The fire pump is not required to supply the manual wet standpipe system demand at the most remote hose outlets.

Installing a fire pump that supplies only the sprinkler system demand allows the fire pump to be much smaller than what would be required for an automatic standpipe and therefore reduces equipment and installation costs.

5.4.1.2 Class I standpipe systems in buildings classified as high-rise buildings shall be automatic or semiautomatic.

When installing a semiautomatic standpipe, it is important that the remote control activation devices are part of a fire alarm control system listed for release functions.

5.4.1.2.1 In buildings classified as high-rise, all required standpipes shall be automatic or semiautomatic, including partial height and horizontal standpipes that serve only a portion or limited number of floors within the building.

This requirement includes standpipes serving floors below grade and podiums, regardless of the ability of the city water supply to provide the required pressure and flow.

5.4.1.3 Where an existing standpipe system having standpipes with a minimum diameter of 4 in. (100 mm) is to be utilized to supply a new retrofit sprinkler system, the water supply required by Sections 7.8 and 7.10 shall not be required to be provided by automatic or semiautomatic means, provided that the water supply is adequate to supply the hydraulic demand of the sprinkler system in accordance with NFPA 13.

Paragraph 5.4.1.3 allows for a manual wet standpipe system to be converted into a combined standpipe system, provided the attached water supply is capable of providing the necessary flow and pressures needed for the sprinkler system to operate automatically. This will be supported with hydraulic calculations in accordance with NFPA 13. The standpipe system will still need the fire department pumper, connected to the fire department connection (FDC), to provide the flow and pressure required by sections 7.8 and 7.10.

5.4.1.4 Class I standpipe systems shall be wet systems except where piping is subject to freezing.

Wet standpipe systems are preferred due to the lag time in dry standpipe systems for water to reach the hose connection and fire fighter nozzle. NFPA 14 allows for up to a 3-minute water delivery time for dry standpipe systems, during which time a fire can experience significant growth while fire fighters

wait for water. Dry standpipe systems are commonly found in exposed parking garages or unheated enclosed stairs on the exterior of a building where subject to freezing temperatures.

5.4.2 Class II and Class III Standpipe Systems. Class II and Class III standpipe systems with 1½ in. (40 mm) hose stations shall be automatic wet systems unless located in a facility where piping is subject to freezing and where a fire brigade is trained to operate the system without fire department intervention, in which case an automatic dry or semiautomatic dry system shall be permitted.

Subsection 5.4.2 is most commonly applied in industrial settings where the fire brigade is trained in accordance with NFPA 600.

5.4.2.1* In a non-high-rise building, the Class I portion of a Class III system shall be permitted to be manual. The Class II portion of a Class III system shall be automatic.

A.5.4.2.1 A manual wet standpipe system can be used to satisfy the demand for a Class III system as long as the water supply can provide 100 gpm at 65 psi (379 L/min at 4.5 bar) to the most remote 1½ in. (40 mm) hose outlet. The fire department can provide the rest of the demand through the fire department connection.

Where a manual standpipe is installed, it is important that a sign clearly indicate the standpipe system is manual and whether it is wet or dry in accordance with 6.4.5.2. Additionally, a sign should be provided in accordance with 6.4.5.2.2 indicating the required inlet pressure needed to achieve the flow and pressure required by Sections 7.8 and 7.10 at the most remote hose connection.

5.5* Gauges.

A.5.5 Additional pressure gauges located at the base of the standpipes might be desirable in some equipment, particularly in large plants and high-rise buildings.

Additional gauges assist the facility staff and the fire inspectors in monitoring system pressures for overpressurization.

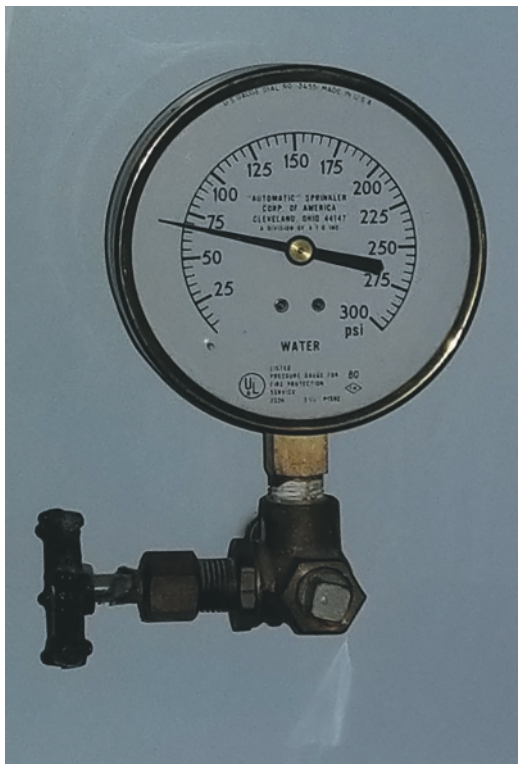
5.5.1 An approved pressure gauge with a connection not smaller than ¼ in. (6 mm) shall be installed at each discharge pipe from the fire pump and the public waterworks, at the pressure tank, at each main drain connection, at the air pump supplying the pressure tank, and at the top of each standpipe.

5.5.1.1 Gauges shall be located to permit removal and shall be located where they will not be subject to freezing.

5.5.1.2 Each gauge connection shall be equipped with a shutoff valve and provisions for draining.

Gauges are installed in a shutoff valve, typically a 3-way globe valve or petcock, so that they can be easily inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*. NFPA 25 requires gauges to be inspected monthly for operability and physical damage and replaced or tested against a calibrated gauge every 5 years. Exhibit II.5.7 shows a pressure gauge installed in a 3-way globe valve.

EXHIBIT II.5.7 *3-Way Globe Valve with Pressure Gauge. (Courtesy of Jeremy Souza)*



5.5.1.3 Where several standpipes are interconnected at the top, a single gauge shall be permitted to be substituted for a gauge at the top of each standpipe.

5.5.1.4 Pressure gauges shall be installed above and below each alarm check valve, dry pipe valve, deluge valve, backflow preventer, or system riser check valve where such devices are present.

Pressure gauges assist maintenance staff and fire inspectors in confirming proper operation by comparing the pressure differential on both sides of the devices.

5.5.2* Pressure-Regulating Device.

A.5.5.2 It is the intent of the standard that pressures can be read on each floor where pressure-regulating devices are installed and that a valved outlet be provided for a pressure gauge. A permanently installed pressure gauge is not required.

Proper setting and testing of pressure-regulating devices requires an accurate pressure reading on each floor level. Because setting and testing of the devices does not occur on a regular basis and must be performed by trained personnel, the gauges used are usually calibrated and liquid-filled in order to acquire the most accurate readings.

5.5.2.1 A valved outlet for a pressure gauge shall be installed on the upstream side of every pressure-regulating device.

5.5.2.2 Approved pressure gauges shall be installed on both upstream and downstream sides of every pressure-regulating device installed in accordance with 7.2.4(6).

5.6* Waterflow and Supervisory Alarms.

A.5.6 Audible alarms are normally located on the outside of the building. Approved electric gong bells, horns, or sirens located inside the building or both inside and outside are sometimes advisable.

Audible alarms notify building occupants or passersby that water is flowing somewhere in a building. These alarms also assist the fire service in locating the valve room or fire department connection (FDC), depending on where the audible device is located. See Exhibit II.5.8 and Exhibit II.5.9.

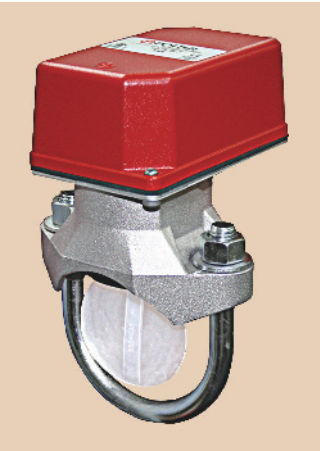


EXHIBIT II.5.8 *Paddle-Type Waterflow Switch Assembly. (Courtesy of Potter Electric Signal Company)*

EXHIBIT II.5.9 *Water Motor and Gong Assembly. (Courtesy of Reliable Automatic Sprinkler Co., Inc.)*

5.6.1 Except for manual dry systems, listed waterflow devices shall be provided for each standpipe system.

Waterflow devices include vane-type switches and pressure switches, depending on the system being monitored.

5.6.2 Waterflow alarms shall utilize a sensing mechanism appropriate to the type of standpipe.

5.6.3 Paddle-type waterflow alarms shall be used on wet standpipe systems only.

The installation of paddle-type waterflow switches on any system other than a wet standpipe system can cause a separation of the paddle from the switch on activation of the system. If this happens, the paddle can travel through the pipe to a point where it could become wedged and block water flow in the system.

5.6.4* A means for testing the waterflow device shall be provided.

A.5.6.4 It is acceptable to utilize a hose valve on the standpipe to test the waterflow device as long as the water is dispersed to an acceptable location. This could be done with a hose valve on the roof or by using a hose connected to a hose valve discharging to a suitable location.

5.6.5 Alarm and supervisory devices shall be installed in accordance with *NFPA 72*.

References Cited in Commentary

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2019 edition.
NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2017 edition.
NFPA 70®, National Electrical Code®, 2017 edition.
NFPA 72®, National Fire Alarm and Signaling Code®, 2019 edition.
NFPA *101®, Life Safety Code®*, 2018 edition.
NFPA 600, *Standard on Facility Fire Brigades,* 2015 edition.
NFPA 1962, *Standard for the Care, Use, Inspection, Service Testing, and Replacement of Fire Hose, Couplings, Nozzles, and Fire Hose Appliances,* 2018 edition.

Installation Requirements 6

6.1* Location and Protection of Piping.

A.6.1 Connections from fire pumps and sources outside the building should be made at the base of the standpipes.

6.1.1 Location of Dry Standpipes. Dry standpipes shall be monitored in accordance with *NFPA 72* with supervisory air pressure.

This requirement provides assurance to the fire department that the standpipe system is intact and functional.

6.1.2 Protection of Aboveground Piping.

6.1.2.1* Standpipe system piping shall be protected from mechanical damage and fire damage in accordance with this section.

For the purpose of this standard, *mechanical damage* refers to damage resulting from contact between the pipe and an object. In unsprinklered buildings, all mechanical components are more susceptible to failure from impinging fire and heat. If these components fail and contact the standpipe system piping, the added stresses, strains, and loading might cause a premature failure of the standpipe system piping.

Where standpipes are exposed, such as in parking garages, the standpipe should be protected from impact with an automobile; this can be accomplished by using bollards.

A.6.1.2.1 Standpipes should not be installed in nonsprinklered areas of combustible construction.

6.1.2.2* Standpipe systems shall be protected in accordance with Table 6.1.2.2.

TABLE 6.1.2.2 *Protection of Aboveground Piping*

		High-Rise Buildings			*Non-High-Rise Buildings*		
Construction Type	***Sprinkler Protection***	***Standpipe***	***Horizontal[a]***	***Branchline***	***Standpipe***	***Horizontal[a]***	***Branchline***
I	AS[b]	✓	N/A	N/A	✓	N/A	N/A
I	NS[c]	✓	✓	✓	✓	N/A	N/A
II	AS	✓	N/A	N/A	✓	N/A	N/A
II	NS	✓	✓	✓	✓	N/A	N/A
III, IV, & V	AS/NS	✓	✓	✓	✓	N/A	N/A

Notes:

[a]Refers to either a horizontal standpipe or the horizontal portion of any standpipe such as a feed main.

[b]AS = fully sprinklered building in accordance with NFPA 13

[c]NS = nonsprinklered or partially sprinklered building