

Hose Systems in Buildings

Buildings are typically equipped with one of the two types of hand-hose systems—standpipe systems and sprinkler system hand hose. This article outlines the installation and maintenance requirements for these systems.

STANDPIPE SYSTEMS

The first and most common type of interior hose system is the standpipe system. Building standpipes are installed for many reasons. Guidelines for their installation are found in NFPA 14, Standard for the Installation of Standpipe and Hose Systems.

Standpipe systems are fixed piping systems with associated equipment that transports water from a reliable water supply to designated areas of buildings where hoses can be deployed for firefighting. Such systems are typically provided in tall and large-area buildings. Standpipe systems can significantly improve the efficiency of manual firefighting operations by eliminating the need for long, cumbersome hose lays from fire apparatus to a fire. Even in buildings protected by automatic sprinklers, standpipe systems can serve as a backup for and complement to sprinklers.

All standpipe systems deliver water for manual firefighting. However, designs used to accomplish this purpose vary. One system may involve a simple pipe network for conveying water from fire department apparatus to hose connections in a building, while another may involve a fully automatic water supply and preconnected hoses.

The process of designing or specifying a standpipe system begins with determining whether the system will be used for full-scale firefighting, first-aid firefighting or both.

NFPA 14 defines 3 different classes of standpipe systems. Standpipe systems are designated as Class I, Class II and Class III. Some sources refer to a fourth class called a combined system; however, combined systems are simply Class I or Class III standpipe systems that also supply water to a sprinkler system. In a combined system, the water supply and pipe sizes may be larger to accommodate the added sprinkler system demand.

Sprinkler systems with hose connections are not necessarily considered to be standpipe systems. Such systems are often regarded as sprinkler systems. Other types of hand-hose systems are discussed later.

Class I Systems

Class I systems provide 2.5-in. hose connections at designated locations in a building for full-scale firefighting. These systems are generally intended for fire department use or for fire brigades conducting interior structural firefighting.

Class I systems are typically required in buildings that have more than three stories above or below grade because of the time and difficulty involved in laying hoses from fire apparatus directly to remote floors. Class I systems are sometimes required in malls and other industrial facilities because these occupancies contain areas that are difficult to directly access with hoses from fire apparatus.

Class II Systems

Class II systems provide 1.5-in. hose connections at designated locations in a building for first-aid (incipient level) firefighting. These systems are generally intended for use by incipient-level fire brigades and perhaps building occupants before the fire department arrives. Fire departments rarely use these systems. With Class II systems, a hose, a nozzle and a hose rack are typically installed on each hose connection.

Class II systems are often required in large unsprinklered buildings. They may also be required to protect special hazard areas, such as exhibit halls and stages.

With respect to Class II standpipe systems, members of the fire protection community disagree about the desirability of having standpipe systems available for occupant use; however, when required by building codes, NFPA standards or OSHA standards, they should exist and remain fully functional. Concerns focus on the ability of untrained occupants to safely use a 100-ft-long hose flowing up to 100 gpm and on the wisdom of encouraging occupants to fight a fire instead of evacuating.

These concerns have led to a trend of reducing the requirements for or eliminating the installation of standpipe systems with preconnected hoses. Consequently, the use of Class II systems is declining.

However, at no time is it permissible for a loss prevention consultant to advise or recommend to a customer that it may remove hose from a Class II standpipe.

However, the public-sector authority having jurisdiction (AHJ) may allow or require the hose to be removed.

However if the Class II standpipe exists, then it must be fully maintained, including tests and inspections, in accordance with NFPA 25, Standard for

the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.

Class III Systems

Class III systems combine the features of both Class I and Class II systems. They are provided for both full-scale and first-aid firefighting. These systems are generally intended for use by fire departments, fire brigades and building occupants. Because of their multiple uses, Class III systems are provided with both Class I and Class II hose connections.

This is sometimes accomplished by using 2.5-in. hose valves with easily removable 2.5-in. to 1.5-in. adapters that are permanently chained to hose connections. Class III systems are sometimes used when both Class I and Class II systems are required and no useful purpose would be served by installing separate systems.

Like Class II systems, the use of Class III systems is declining because of concerns about the safety and effectiveness of untrained occupants fighting fires.

Standpipe systems are addressed in OSHA 29 CFR 1910.158. 29 CFR 1910.158(a)(1) and (2) state:

- 1910.158(a)(1) Scope: This section applies to all small hose, Class II and Class III standpipe systems installed to meet the requirements of a particular OSHA standard.
- 1910.158(a)(2): Exception. This section does not apply to Class I standpipe systems.

Much discussion (and misinformation) has been generated in the fire protection community regarding Subpart L of the OSHA standard. Besides Class II standpipes, much discussion has also centered on the definition of incipient stage fires and interior structural firefighting. According to OSHA, Class II standpipes are considered equivalent to portable fire extinguishers relative to incipient level firefighting, even when firefighting occurs within a building.

However, just because the activity occurs within a building does not elevate the activity to “interior structural firefighting” as defined under 29 CFR 1910.155(c)(28).

In fact, a formal interpretation regarding classification of fires and respiratory protection to extinguish fires indicates that a self-contained breathing apparatus (SCBA) may be worn by “incipient-stage brigade members” as long as other OSHA programs, such as the respiratory protection standard, are met. The fire size, not the fire location or use of

SCBA, results in the change from an incipient-level fire to an interior structural fire.

OSHA guidelines or relevant formal interpretations for Section 1910.158 do not mention that hoses are permitted to be permanently removed from the cabinets in Class II or III systems, except as permitted by 1910.158(c)(3)(i), which does allow the storage of the hose in another location as long as the following criteria are met:

The employer shall assure that every 1.5 in. or smaller hose outlet used to meet this standard is equipped with hose connected and ready for use.

In extremely cold climates where such installation may result in damaged equipment, the hose may be stored in another location provided it is readily available and can be connected when needed. NFPA 14 does not define when standpipes are required to be installed within buildings. This role is the domain of the local and building codes, NFPA 5000: Building Construction and Safety Code and other NFPA standards. In addition, NFPA 14 does not cover the inspection and maintenance of standpipe systems; this is covered in Chapter 6 of NFPA 25.

SYSTEM TYPES

In addition to being subdivided into classes that delineate the intended system use (i.e., fire department use or occupant use), standpipe systems are also classified by type. These types delineate the basic characteristics of systems—that is, whether the piping will be filled with water or not (wet versus dry) and whether the water supply for firefighting will be automatically available or not (automatic, semiautomatic or manual).

Beginning with the 1993 edition of NFPA 14, standpipe system types were completely redefined. This resulted in the creation of five categories:

1) Automatic-wet systems have piping that is filled with water at all times and have an automatically available water supply capable of supplying the water demand necessary for firefighting.

2) Automatic-dry systems have piping that is normally filled with pressurized air. These systems are arranged, through the use of devices such as a dry-pipe valve, to automatically admit water into system piping when a hose valve is opened, and they are connected to an automatically available water supply that is capable of supplying the water demand necessary for firefighting.

3) Semiautomatic-dry systems have piping that is normally filled with air that may or may not be pressurized. These systems are arranged through the use of devices, such as a deluge valve, to admit water into system piping when a remote actuation device located at a hose station, such as a pull station, is operated. They also have a preconnected water supply that is capable of supplying the water demand necessary for firefighting.

4) Manual-dry systems have piping that is normally filled with air, and these systems do not have a preconnected water supply. A fire department connection must be used to manually supply water for firefighting.

5) Manual-wet systems have piping that is normally filled with water to allow leaks to be detected. The water supply for these systems is typically provided by a small connection to domestic water piping, and it is not capable of supplying firefighting water demands. A fire department connection must be used to manually supply water for firefighting.

In summary, wet systems have water-filled piping and dry systems do not. Automatic systems provide a water supply for firefighting by opening a hose valve. Semiautomatic systems are connected to a water supply for firefighting but require activation of a device at a hose valve in addition to opening the valve to get water.

Manual systems do not have a preconnected water supply for firefighting, and these systems must be manually supplied by connecting hoses from a fire department pumper truck to a fire department connection.

HOSE, HOSE RACKS, NOZZLES & HOSE CABINETS

When preconnected hoses are installed on Class II or Class III systems, lined hose must be used. Unlined linen hose has been phased out because it is subject to rapid deterioration under moist or wet conditions. Usually, the size of choice is 1.5-in. hose. However, NFPA 14 permits the use of listed hose as small as 1 in. in light-hazard occupancies when approved by the public sector AHJ.

The allowance for smaller hose (mounted on a reel) recognizes that an untrained person may be more capable of using such equipment in the event of a fire. Similar equipment has been used in Europe for many years.

Preconnected hoses on Class II and Class III standpipes are generally limited to 100 ft in length to minimize the difficulty that untrained users may have in advancing a hose and to minimize kinking. Hoses are always required to be kept on compatible racks and should always be positioned in a readily accessible location within convenient reach of a person standing on the floor. Hoses should also be clearly visible and located in a place not likely to be obstructed.

Where hoses are kept in cabinets or closets, the doors should have a glass panel or some other means to allow easy identification. Preconnected hoses must be equipped with approved/listed spray nozzles. Although NFPA 14 at one time allowed solid-stream nozzles,

since July 1, 1981, OSHA has required that all solid-stream nozzles be replaced with shut-off type adjustable spray nozzles under Section 1910.158(c)(4): www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=19698.

SPRINKLER SYSTEM HAND HOSE

Under NFPA 13, Standard for the Installation of Sprinkler Systems, another type of interior hand-hose system exists, which is not considered a standpipe system under NFPA 14. The criteria governing these hand-hose systems are found in Section 12.2 of the 2007 edition of NFPA 13. AHJs have varying requirements for these systems.

Typically, these hand-hose systems are only found in storage occupancies. Examples of the varying requirements include: 1) no-hose stations; 2) hose stations with hose line and nozzles; and 3) hose stations with no hose line or nozzles.

However, NFPA 13 states (design criteria and metric equivalents have been omitted):

- 12.2.1: Small hose connections (1 in.) shall be provided where required by the AHJ in accordance with 8.17.5 for first-aid firefighting and overhaul operations.
 - 12.2.2: Small hose connections shall not be required for the protection of Class I, II, III and IV commodities stored 12 ft or less in height.
- Section 8.17.5 (Hose Connections) of NFPA 13 goes into further detail in 8.17.5.1 Small (1.5 in.) Hose Connections:
- 8.17.5.1.1: Where required, small (1.5 in.) hose connections shall be installed. Valves shall be available to reach all portions of the area with 100 ft of hose plus 30 ft of hose stream distance.
 - 8.17.5.1.1.1: Where the building is protected throughout by an approved automatic sprinkler system, the presence of 1.5-in. hose lines for use by the building occupants shall not be required, subject to the approval of the AHJ.
 - 8.17.5.1.2: The hose connections shall not be required to meet the requirements of Class II hose systems defined by NFPA 14. In 8.17.5.2, Hose Connections for Fire Department Use, additional detail includes:
 - 8.17.5.2.1: In buildings of light or ordinary hazard occupancy, 2.5-in. hose valves for fire department use shall be permitted to be attached to wet pipe sprinkler system risers.

WHAT TO LOOK FOR DURING A SURVEY

Several elements should be noted when surveying a building with standpipes or hand hose systems:

- The hose station or cabinet shall be used for fire equipment only.

- Each cabinet or hose station shall be conspicuously identified. Each rack or hose storage facility for 1.5 in. or smaller hose shall be provided with a label that includes the wording “Fire Hose for use by Trained Personnel” and operating instructions.
- Hose cabinets shall be marked to indicate the contents.
- Signs shall be permanently marked and shall be constructed of weather-resistant metal or rigid plastic materials. Paper signs slid into plastic sleeves are not considered acceptable.
- Inspections can be conducted internally by trained/ qualified personnel or can be contracted similar to portable fire extinguisher inspections/servicing.
 - a) monthly—control valves (if electrically supervised or locked), otherwise weekly if sealed;
 - b) quarterly—pressure-regulating devices, piping and hose connections;
 - c) annually—cabinet, hose and hose storage device.
- a) Testing can be done internally by trained/qualified personnel or can be contracted similar to portable fire extinguisher inspections/servicing.
 - b) quarterly—waterflow alarm device if a pressure switch; vane type can be tested semiannually;
 - c) annually—hose nozzle, hose storage device and main drain test;
 - d) every 5 years—hose, pressure control valve, pressure-reducing valve, hydrostatic test and flow test.
- Maintenance can be performed internally by trained/qualified personnel or can be contracted similar to portable fire extinguisher inspections/servicing.
 - a) annually—hose connections and valves (all types).
- Records of inspections, tests and maintenance of the system and its components shall be made available upon request. If the customer/contact is a tenant, ask to see the records or ask that a copy of the prior year’s records be forwarded to you for review and comment.
 - a) Records shall indicate the procedure performed (e.g., inspection, test or maintenance), the organization that performed the work, the results and the date.
 - b) The owner shall maintain the records.
 - c) Original records shall be retained for the life of the system.
 - d) Subsequent records shall be retained for a period of 1 year after the next inspection, test or maintenance (i.e., 5-year intervals) required by NFPA 25.
- Inspection tags will suffice for any of the inspections and tests listed above. Maintenance is typically not documented via tags. However, remember that no tag (or inspection form or written record) means assume that no inspections, no testing and no maintenance are occurring.