

Best of March 2023

The following are a dozen questions answered by the NFSA's Codes, Standards, and Public Fire Protection staff as part of the Expert of the Day (EOD) member assistance program during the month of March 2023. This information is being brought forward as the "Best of March 2023." If you have a question for the NFSA EOD submit your question online through the "My EOD" portal.

It should be noted that the following are the opinions of the NFSA Engineering, Codes, and Standards staff, generated as members of the relevant NFPA and ICC technical committees and through our general experience in writing and interpreting codes and standards. They have not been processed as formal interpretations in accordance with the NFPA Regulations Governing Committee Projects or ICC Council Policy #11 and should therefore not be considered, nor relied upon, as the official positions of the NFSA, NFPA, ICC, or its Committees. Unless otherwise noted the most recently published edition of the standard referenced was used.

Question #1 – PRV serving Multiple Hose Valves

A project includes a NFPA-14 (2016) standpipe system that includes a fire pump. There are multiple hose valves serving both horizontal exits and additional hose valves per floor to meet hose travel coverage. These hose valves are to be supplied with horizontal bulk piping and not have a dedicated standpipe.

Instead of having a PRV type hose valve at each location and a PRV floor control valve we were thinking of using ONE PRV which would supply a manifold supplying the multiple hose valves.

Is this arrangement permitted by NFPA 14?

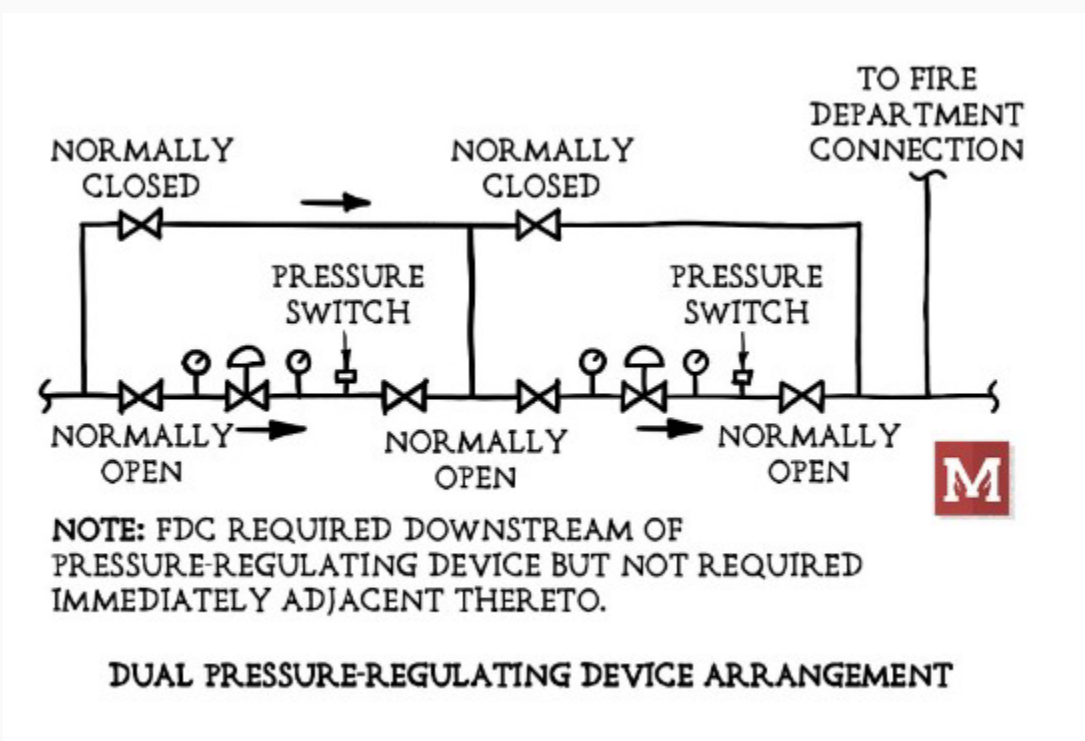
No, NFPA 14 *Standard for the installation of Standpipe and Hose Systems*, does not allow multiple hose connections (>2) to be served from a single pressure-reducing valve (PRV) without redundancy.

Section 7.2.4 (3) limits the number of hose connections that are served downstream by a single PRV and requires redundancy when two or more are installed downstream.

Pressure-reducing valves (PRV) may fail in the open position and redundancy is required to prevent any single device failure from providing pressures in excess of 175 psi, to the downstream hose connections.

This provides an extra level of reliability for fire operations, as this design serves multiple hose lines and crews that without it, would have a single point of failure serving multiple hose connections.

To summarize, once two or more hose connections are installed downstream of a PRV, all the requirements of 7.2.4 (1)-(9) must be met. The use of a master listed Pressure-Reducing Valve as described in this section provides an extra level of reliability for fire operations, as this design serves multiple hose lines and crews and without it would have a single point of failure serving multiple hose connections.



Question #2 – Clearance to Storage for ESFR Sprinklers under Obstructions

A project utilizing ESFR sprinklers includes a line of ESFR sprinklers under an obstruction (ductwork). Does the requirement for 36 inches of clearance from sprinkler deflector to top of storage apply to the deflectors of these obstruction sprinklers or just the ceiling level sprinklers?

Yes, the requirement for a minimum 36 inches of clearance from ESFR sprinklers to the top of storage is applicable to both sprinklers located at the ceiling and to sprinklers under obstructions. NFPA 13, 2022 edition, Section 14.2.12 requires the clearance between the deflector and the top of storage be 36 inches or greater and does not provide an exception for sprinklers located below an

obstruction. The reasoning for this requirement is with clearances less than 36 inches, the sprinklers (installed per the allowable spacing guidelines) would not provide sufficient overlapping of adjacent sprinkler discharge patterns.

Question #3 – Fire Pump Room and Roof Access

As per 4.13.1.1.5 of NFPA 20 (2016), is it the intention of the Standard to not permit roof access ladders from being installed in a fire-sprinklered fire pump equipment room? Do “penetrations not essential to the operation of the pump and related components” refer to wall, ceiling, and/or floor openings?

The standard would allow roof access ladders to be installed in the fire pump room. The intent of the standard is to protect the equipment and personnel in the fire pump room during a fire in the building. To that end, Section 4.13.1.1.5 requires rooms containing fire pumps be free from penetrations not essential to the operation of the pump and related components.

This is to help ensure the integrity of the fire pump room rated separations as required by Section 4.13.1.1.2. The intent is to separate the fire pump room from the remainder of the building. An access hatch penetration to the exterior at the roof would not be a penetration in a rated separation assembly intended to protect the fire pump room.

Question #4 – Sprinkler Requirement during Construction

An existing 7-story building has combined standpipe and fire sprinkler riser on every floor. Construction will be happening in levels 2-4. Existing sprinklers will be demolished in this level up to standpipe and new sprinkler system will be installed.

During construction, these levels do not have sprinkler coverage. Is occupancy allowed on other floors where there is no construction work per section 8.7.3.4 of NFPA 241?

Yes, NFPA 241, 2016 edition, Section 8.7.3.4 permits occupancy of floors not under construction while other floors are under construction provided the occupied floors are sprinkler protected and the sprinkler protection of the floors remaining under construction are supplied by separate systems and control valves such that incompleteness of protection in no way impairs the sprinkler protection of the occupied floors. This is accomplished with the use of floor control valve assemblies (separate sprinkler systems) on each floor.

The code requirements for sprinkler systems during construction comes from the applicable building code and fire code with reference to NFPA 241.

The IBC, 2021 edition, Chapter 33 provides the requirements for safeguards during construction. Section 3302.1 requires fire protection be maintained at all times during alterations. Exception 1 indicates where such required elements (including fire protection systems) are being altered,

adequate substitute provisions shall be made. Section 3312.1 indicates in buildings where an automatic sprinkler system is required, it shall be unlawful to occupy any portion of the building or structure until the automatic sprinkler system installation has been tested and approved, except as provided in Section 111.3. Section 111.3 allows for a temporary occupancy by the building official. Section 3314.1 provides the requirements for a fire watch.

The IFC, 2021 edition, Chapter 33 provides the requirements for fire safety during construction and demolition. Section 3301.1 requires compliance with NFPA 241, 2019 edition. Section 3303 outlines the owner's responsibilities and the fire safety program requirements. Section 3305.5 provides the requirements for a fire watch. Section 3315 provides the requirements for sprinklers systems and is the same as the IBC requirement.

NFPA 241, 2019 edition, Section 7.9 allows for temporary sprinkler protection during construction. Section 8.7.3.4 indicates the provision of 8.7.3.3 shall not prohibit occupancy of completed floors of a building, even where other floors are in various stages of construction or protection, provided that both of the following conditions are satisfied: the sprinkler protection of the occupied floors has been completed and tested in accordance with 8.7.3.3 and the sprinkler protection of the floors remaining under construction is supplied by entirely separate systems and separate control valves so that the absence or incompleteness of protection in no way impairs the sprinkler protection of the occupied floors. Section 10.8 provides the requirements for fire protection during demolition. Section 10.8.2* for system operation indicates where a building is equipped with sprinklers, the sprinkler protection shall be retained in service as long as the condition requiring the use of sprinklers exists. Section A.10.8.2 goes on to explain the existing sprinklers should be retained in service as long as is reasonable by cutting off and capping the system at the floor or area being razed. Modification of the sprinkler systems to allow alterations or additional demolition should be done under the direction of the authority having jurisdiction and should be expedited so that automatic protection can be restored as quickly as possible.

The situation in your case of renovating floors of the building while other floors are occupied is usually outlined and addressed in the fire safety plan for review and approval of the fire department. The sprinkler system remains in service in all occupied areas and as long as possible in the areas of construction. It is returned to service on the floors under construction as soon as possible. Typically, if entire floors are taken out of service for more than a day, especially those located below occupied floors, the AHJ requires additional measures such as a fire watch or temporary sprinkler protection.

Please also note that based on recent concerns with fires in buildings construction, NFPA 241, 2022 edition, included many updates to the requirements for sprinkler protection during construction. Generally, this edition places the requirements for sprinkler protection during construction as a requirement to be addressed by the fire prevention program and includes several items that must be considered to place sprinkler systems temporarily in service during construction. These items are found in Chapter 4.



Question #5 Trellis Sprinkler Protection

A project includes an open trellis of combustible construction located on an upper roof level deck, and we are being told that the requirements for exterior projections apply and sprinkler protection is required in accordance with section 9.2.3.1 of the 2019 edition of NFPA 13.

Are sprinklers required under an open trellis?

No, this open trellis is not required to be protected with sprinklers based on NFPA 13. The reason is a trellis is not considered a canopy or a projection of the building. Therefore, the requirements in NFPA 13 for exterior projections do not apply. A trellis does not have a continuous cover for heat to collect allowing a sprinkler to activate in a timely manner.

As an exterior projection was not defined prior to the 2022 edition of NFPA 13, leading to confusion on what is and is not considered an exterior projection, a definition of exterior projections (originating from a NFSA submitted input) was added in section 3.3.73. This new section defines an exterior projection as: “An extension beyond an exterior wall capable of collecting heat below.”

An open trellis is not capable of “collecting heat” and as such is not considered an exterior projection in accordance NFPA 13.

Question #6 – Pressure Rating for Pipe Serving Remote Fire Department Connection

A project includes a remote fire department connection. This FDC is located on the discharge size of the backflow preventer and runs to the fire sprinkler riser. The installed underground pipe has a pressure rating of 235 psi (DR18 PVC in accordance with AWWA C900).

It was noted during acceptance testing that the fire department “trucks can have higher pressure than the 235 psi that DR18 is rated for” and we are being told that the DR18 pipe must be replaced with a pipe with a higher-pressure rating such as DR14.

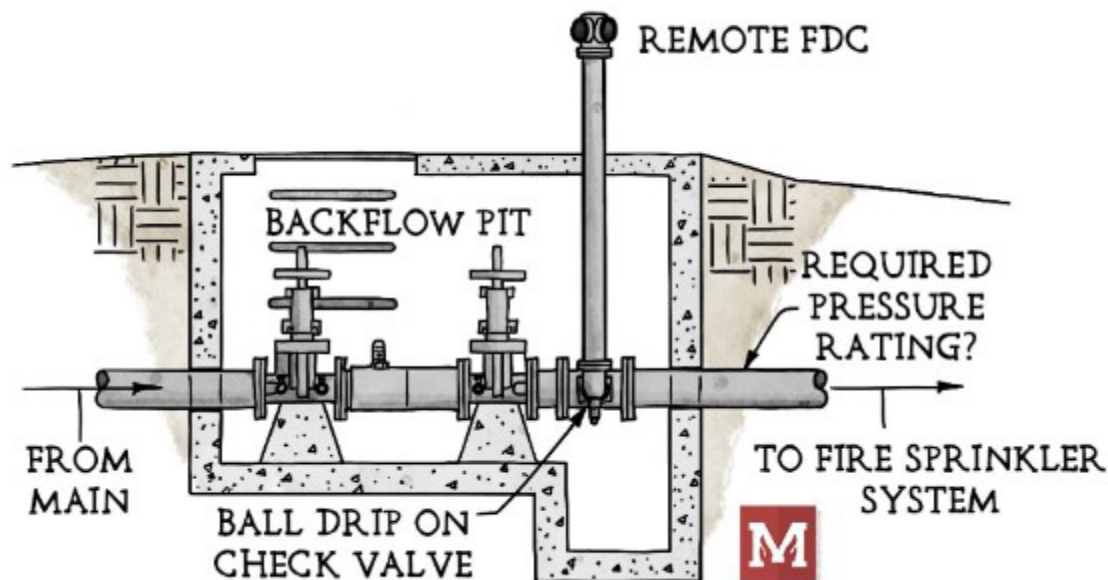
Does the 2016 edition of NFPA 13 or NFPA 24 require the components to match the highest possible pressure rating from the fire department equipment?

No. Based upon the requirements of the 2016 edition of NFPA 24 (which is the appropriate standard for this issue) and the 2016 edition of NFPA 13, piping rated at 235 psi (DR18) is acceptable for the FDC piping.

Section 10.1.2 of the 2016 edition of NFPA 24 clearly states that the underground piping must be rated for the maximum system working pressure to which the piping is exposed but not less than 150 psi. The annex to this section specifically states that “It is not the intent of this section to include the pressures generated through fire department connections as part of the maximum working pressure.” This is supported by the definition of system working pressure found in the 2016 edition of NFPA 13 (Section 3.3.24) which states that system working pressure is:

- *“The maximum anticipated static (nonflowing) or flowing pressure applied to sprinkler system components exclusive of surge pressures and exclusive of pressure from the fire department connection.”*

It should be noted that if the system being served by this remote FDC is a standpipe system, this concept (FDC pressure not included in working pressure) may not apply. While the 2016 edition of NFPA 14 has the same definition as NFPA 13 (noted above), this definition has changed in more recent editions of NFPA 14. The 2019 edition of NFPA 14 changed the definition of system working pressure and deleted the wording “and exclusive of pressure from the fire department connection.” Further the next edition of NFPA 14 (2023) appears to have revised the definition even further and will specifically state that system working pressure is “inclusive of the system design/demand pressure from the fire department connection.”



Question #7 – Skylight Sprinklers included in Design Area

A dry system porte cochere has a large skylight running the length of it down the center which is protected with three sprinklers. The skylight is within the hydraulic design area. The applicable standard is the 2013 edition of NFPA 13.

Do the three “skylight” sprinklers need to be included in the hydraulic calculation?

Yes, NFPA 13, 2013 edition, Section 23.4.4.6 for hydraulic design procedures using the area density method requires all sprinklers in the remote area to be included in the hydraulic calculation.

There are some exceptions for small rooms, additional sprinklers for obstructions, CMSA, and ESFR designs provided in Section 23.4.4.6 that would not be applicable to sprinklers installed in a skylight.

Question #8 – Soffits against Wall Exceeding 30 inches

A project protected by standard spray pendent sprinklers includes a soffit against the wall that exceeds 30 inches.

Figure E 8.6.5.1.2(b) in the 2016 edition shows a soffit up to 30 inches wide against a wall not needing protection if you can spray underneath.

Can the beam rule (FIGURE 8.6.5.1.2(a)) be used to omit sprinklers under a soffit exceeding 30 inches?

Yes, the beam rule (Table and figure 8.6.5.1.2) would be an acceptable method to “prove” that the sprinkler discharge would adequately spray under a soffit exceeding 30 inches deep.

In the 2016 edition of NFPA 13 the base rule for dealing with obstructions is section 8.6.5.1.2. This section gives four (4) options for dealing with obstructions. As this section includes the language that sprinklers must, “comply with one of the following arrangements,” any one of these four options can be chosen. Option 1 is the “beam rule.”

Based upon the fact that the soffit in question exceeds 30 inches off the wall, it appears that there are only two options: 1) meet the provisions of 8.6.5.1.2 (“beam rule”) or 2) provide a sprinkler under the soffit.



Question #9 – Portable on Demand Storage (PODS)

I do not see criteria in the 2016 edition of NFPA 13 for the protection of Portable on Demand Storage (PODS) containers.

Is a fire protection engineer required to confirm the occupancy classification for these containers?

Yes. Per Section A.5.6 in the 2016 edition of NFPA 13, these types of containers are not specifically addressed in the standard and are considered outside the scope of NFPA 13.

It is recommended that the owner provide an analysis of the fire risk completed by a registered design professional to provide adequate protection with respect to the specific commodities stored and the shielding provided by the container.

The reason the NFPA 13 committee has not addressed this issue is it is difficult to know what is being stored in these PODS. Therefore, it is difficult to apply a commodity classification in a generic manner. The 2022 edition also does not provide any guidance on this topic. There was talk at the committee level to research possible guidance for PODS, but we are not aware of any progress on this issue.

Question #10 – Residential Sprinklers in Nursing Home

Are residential sprinklers permitted in sleeping rooms in nursing homes in accordance with the 2013 edition of NFPA 13?

Residential sprinklers are permitted in dwelling units; however, the sleeping rooms only contain a bedroom and a washroom with no cooking facilities.

Yes, a sleeping room in a nursing home is considered a type of dwelling unit and the use of residential sprinklers is appropriate in the sleeping room, bathrooms within the dwelling room and the corridors leading to the sleeping rooms.

The definition of dwelling units found in Section 3.3.10 of the 2013 edition of NFPA 13 makes this clear. A dwelling unit is *"One or more rooms arranged for the use of one or more individuals living together, as in a single housekeeping unit normally having cooking, living, sanitary, and sleeping facilities..."* While this definition does state "normally having cooking facilities, it is not a requirement that cooking facilities be present to be considered a dwelling unit.

This definition goes on to specifically cite "sleeping rooms in nursing homes" as an example of a dwelling unit.

Per Section 8.4.5, residential sprinklers are permitted in both sleeping rooms and their adjoining corridors.

Question #11 – Methods of Forward Flow Testing a Backflow Preventer

In a jurisdiction that has adopted the 2016 edition of NFPA 13, the AHJ is using language from 2022 to justify installing a backflow test header with a 2 1/2 inch hose valve for each 250 gpm of system flow demand.

Are there any other means to provide this test within the standard?

Is a tee and cap at the system side of the backflow preventer an acceptable means to perform a forward flow test?

It is true that the 2022 edition of NFPA 13 added a requirement to install a 2 ½ inch hose connection down stream of backflow preventors for every 250 gpm of system demand (Section 16.14.5.1.1) as a way to perform a forward flow test; however, this is not the only acceptable option in the 2022 edition. Section 16.14.5.1.2 allows the use of existing hose connections and Section 16.14.5.1.3 allows the use of other means as long as:

- The system doesn't require modification to perform the forward flow test.
- The other means are sized to meet system demand.

The tee and cap described does not appear to meet these requirements as the system would require modification to perform the forward flow test. Using this method, in order to perform a forward flow test, the system must be shut, the cap removed, and a hose or discharge pipe must be installed. This would be considered a modification and would not be permitted.

This concept first appeared in the 2019 edition in section 16.14.5.1.1 which stated that forward flow testing means must be “serviceable without requiring the owner to modify the system to perform the test.”

Here is the committee's substantiation for the 2019 change:

The proposed new section 8.17.4.5.1.1 is intended to clarify the intent of section 8.17.4.5.1. The commentary in the NFPA 13 Handbook describes that, 'Reversing the check valve orientation is unacceptable for new systems because it is unlikely that property owners will undertake such effort and expense to conduct this important test.' If the intent is to have a serviceable arrangement, then the standard should clarify that.

The 2016 edition (in section 8.17.4.5) was much vaguer on these requirements (simply stating a means must be provided) which is why the committee chose to add the language discussed above. The annex to this section (A.8.17.4.5.1) did suggest some possible means to perform this test (test header or other connection downstream of the valve or a bypass around the check valve in the fire department connector line with a control valve in the normally closed position) It should be noted

that simply a tee and cap were not mentioned and the suggested methods do not require the system to be modified to flow the system demand.

Based upon the guidance found in the 2019 and 2022 edition of NFPA 13, it does not appear that simply a tee and a cap is an adequate means to perform a forward flow test as the system must be modified to run the test as described above.

Question #12 – Floor Control Valve Assemblies located in a Riser Room

A multi-story building is to be equipped with a fire sprinkler system and floor control valve assemblies are required.

Are the floor control valve assemblies required to be located on the floor that they serve, or can they be located in the riser room?

The required floor control valve assembly (FCVA) may be located in a valve room remote from the floor that they serve. The applicable edition of NFPA 13 was not specified; however, this allowance was clarified in the 2016 edition of the standard.

In the 2013 edition of NFPA 13, Section 8.16.1.5.1 added the requirement to provide floor control valves on buildings exceeding 2 stories. This section stated that these FCVAs (consisting of a floor control valve, check valve, main drain valve, and flow switch) be located “on each floor area”.

This requirement was modified in the 2016 edition. Section 8.2.4.1 (relocated 8.16.1.5) was modified to state that the required FCVA be located “for each individual floor level.”

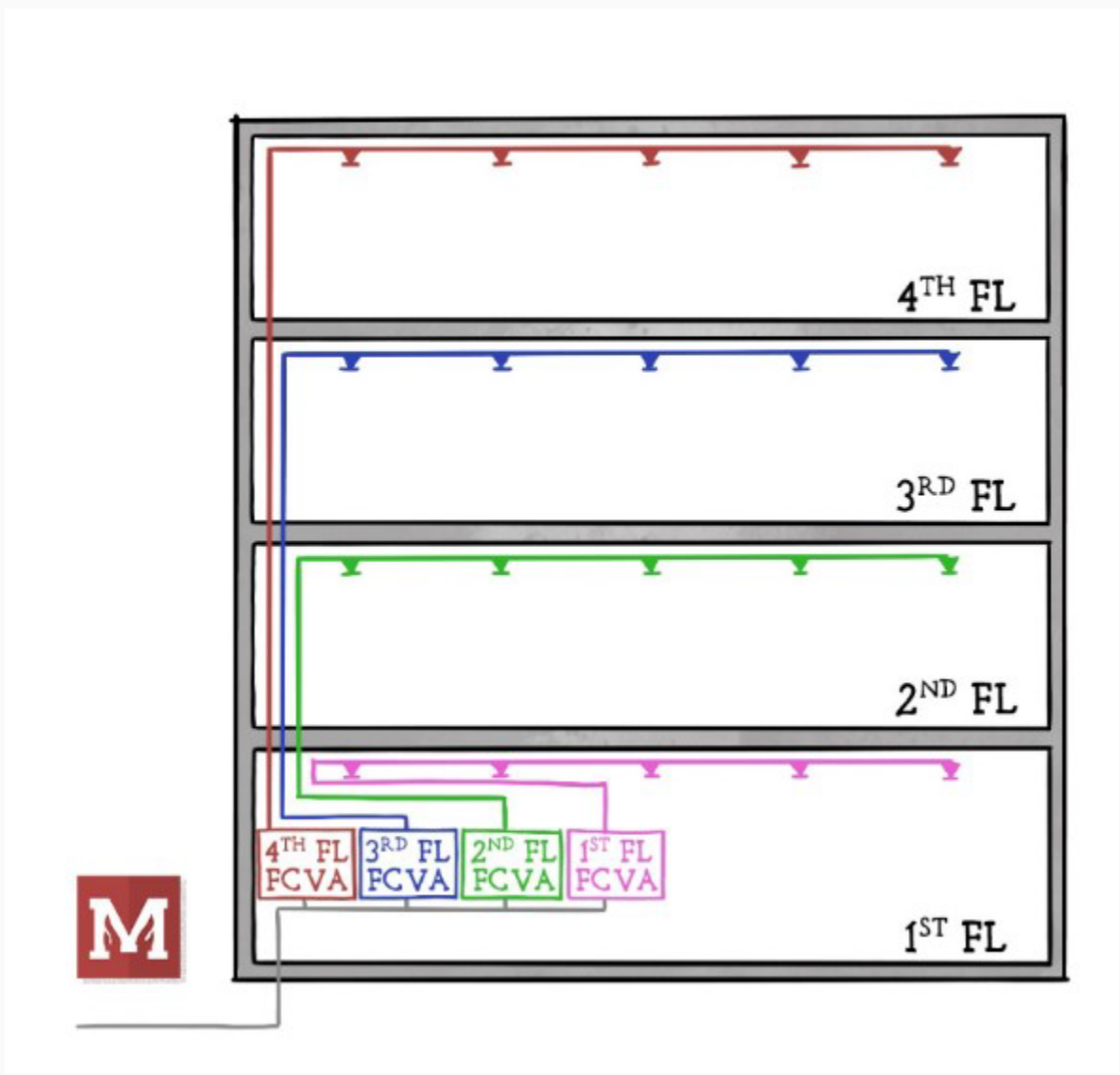
The 2013 edition states “...on each floor level” and the 2016 language reads “...for each individual floor level.”. This change was specifically made to permit all the floor control valves to be located remote from the floor that they serve.

NFSA proposed this change to allow the floor control valves be located in a central location and not necessary on the floor that they serve.

The committee's intent is stated in the substantiation of this change (Second Revision No. 29) which reads as follows:

This proposed change of "on each floor level" to "for each floor level" would allow the required floor control valve assemblies to be located on a level remote from the level being served. It is, at times, more practical to locate all sprinkler equipment in a central Committee location such as a riser room or another area remote from the floor being served. This revision will not change the requirement that all floors in multistory building be equipped with a floor control valve but facilitate ease of installation and of inspection, test and maintenance of the systems.

The 2019 and 2022 edition maintain the “for each floor level” verbiage indicating that the floor control valve can be remote from the floor it serves.



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The LTP consists of two parts. Students must first complete the on-line Part 1: Fundamentals before attending the in-person Part 2: Application session. The 25 self-paced online modules cover everything from “Parts of a Sprinkler” to “Introduction to Fire Sprinkler Calculations.” The 3-day in-person instructor-led Part 2: Application class applies the content learned in the previous Fundamentals course. There are four in-person and one virtual session offered in 2023.

NOTE: Students must register for Part 1: Application at least one month before the start of in-person Part 2: session in order to allow enough time to complete the on-line modules.

Layout Technician Pathway cost:

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2023 Registration Deadlines	Part 1: Fundamentals completion deadline	Part 2: Application session dates	Part 2: Application session locations
Feb. 28	March 27	March 28-30	Virtual
April 23	May 22	May 23-25	Shoreview, MN
June 25	July 24	July 25-27	Linthicum Heights, MD
Aug. 28	Sept. 25	Sept. 26-28	Tacoma, WA
Oct. 14	Nov. 13	Nov. 14-16	Linthicum Heights, MD



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