

Best of April 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 April 2023. This information is being brought forward as the "Best of April 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.

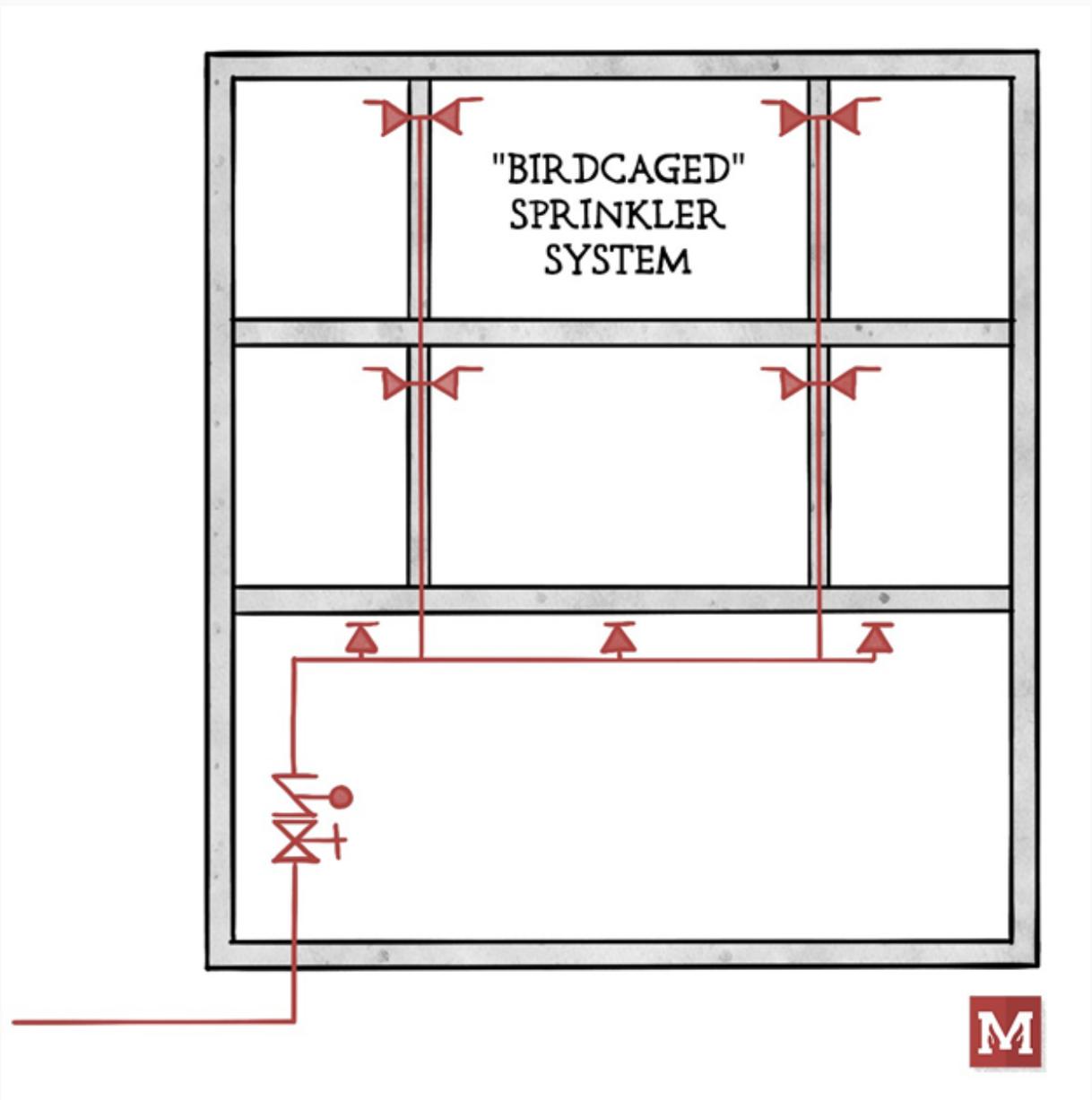
Question #1 – Birdcaged Sprinkler System in NFPA 13 Building

Does NFPA 13 allow you to protect a multistory building with horizontal sprinkler pipe on the 1st floor and vertical rises off that pipe to feed the floors above when the total square footage doesn't exceed 52,000 square feet when all floors are combined?

Yes, the standard allows a multi-story building to be arranged with horizontal piping on the first floor and vertical risers off that pipe to feed the upper floors when the total square footage of all floors combined does not exceed 52,000 square feet in a light hazard residential occupancy.

NFPA 13, 2016 edition, Section 16.9.10 requires floor control valve assemblies. Section 16.9.10.1 requires multi-story buildings exceeding two stories in height be provided with a floor control valve, check valve, pressure gauge, main drain valve, and flow switch for isolation, control, and annunciation of water flow for each individual floor level. However, Section 16.9.10.3 indicates the floor control valve, check valve, pressure gauge, main drain valve, and flow switch required by 16.9.10.1 shall not be required where the total area of all floors combined does not exceed the system protection area limitations of 4.4.1.

Residential occupancies are an example of light hazard in Section 4.3.2. Section 4.4.1 indicates the maximum floor area on any one floor to be protected by sprinklers supplied by any one sprinkler system riser or combined system riser shall be 52,000 square feet for light hazard.



Question #2 – Fire Pump Flow Test Evaluation

Section 8.3.7.4 of the 2014 edition of NFPA 25 states that if there is degradation “in excess of 5 percent of the pressure of the initial unadjusted acceptance test curve or nameplate”, an investigation to find the cause is required.

Does the 5 percent apply to churn pressure and pressure at 150% capacity, or it is only for pressure at rating capacity?

The 5 percent degradation applies to all three test points; Churn, Rated, and 150%. This is clarified in Section 8.3.7.2.3(2) of the 2017 edition of NFPA 25. The reason for this is that NFPA 20 allows for a layout technician to design a sprinkler system using up to 150% of the fire pump capacity and this test will ensure that the pump can meet the fire system demands. Note that if a main pressure relief valve is installed on a fire pump as allowed prior to 1993, the churn test may not meet the 5 percent based on the amount of water allowed to discharge from the main relief valve.

Question #3 – Sprinklers under Combustible Pergolas

Are sprinklers required under combustible pergolas (cedar) over 4 feet in width?

Is Section 8.15.1.2.18 in the 2016 edition of NFPA 13 the appropriate section for this situation?

The question asked is, are sprinklers required “under the pergola,” however the section cited was 8.15.1.2.18 titled “Exterior Soffits, Eaves, Overhangs, and Decorative Frame Elements.” This section is concerned with the requirement for sprinklers within a concealed space formed by the mentioned building elements. It should be noted that the charging section is 8.15.1 which is titled “Concealed Spaces.”

It is unlikely that a pergola would include concealed spaces and as the question was related to sprinklers under this structure, a more appropriate section would likely be section 8.15.7 titled “Exterior Projections”. This section deals with the requirements for sprinklers located under these building features.

This section (8.15.7) generally requires sprinklers under combustible projections exceeding 4 feet in width (section 8.15.7.1) unless one of the exceptions listed in 8.15.7.2, 8.15.7.3 or 8.15.7.4 are met.

However, as pergolas generally do not have a solid roof, sprinklers located underneath would likely not operate. The 2016 edition of NFPA 13 does not state this, or define an exterior projection; however, the 2022 edition did clarify this concept.

In the 2022 edition of NFPA 13, a definition of exterior projections was added to the standard, see section 3.3.73. This section defines an exterior projection as:

An extension beyond an exterior wall capable of collecting heat below.

Based upon this clarification, to be classified as an exterior projection, the structure must be capable of collecting heat so that any sprinkler located under would activate. If the pergola in question has an open “trellis” type ceiling, it would not be capable of collecting heat, and sprinklers would not be required under, based upon the new 2022 definition noted above.

If the pergola has a solid roof, it would be capable of collecting heat and sprinklers would be required per section 8.15.7 unless one of the exceptions noted above were met. These exceptions are:

- Pergola is constructed of noncombustible, limited-combustible, or fire retardant-treated wood or has a noncombustible frame with flame-resistant fabric overlay as demonstrated by Test Method 2 in accordance with NFPA 701, Section 8.15.7.2.
- The pergola's finish material is noncombustible, limited-combustible, or fire retardant-treated wood and there are no unsprinklered combustible concealed spaces, or the combustible concealed spaces meet one of the three conditions listed, Section 8.15.7.3.
- The pergola is an open exterior exit corridor, Section 8.15.7.4.

Question #4 – Residential Sidewall Sprinklers with Differing Deflector Distances

Would it be allowed to have residential sidewall sprinklers in the same space/room to be at different elevations from the ceiling (for example, one at 6 inches and one at 12 inches) to minimize or avoid an adjacent obstruction which would only affect one of the sprinklers.

Yes, the standard permits residential sidewall sprinklers in the same compartment to be installed at different elevations from the ceiling.

NFPA 13, 2013 edition, Section 8.10.4 for residential sprinkler deflector position from ceilings indicates in Section 8.10.4.2 that residential sidewall sprinklers shall be positioned so that the deflectors are within 4 inches to 6 inches from the ceiling unless the listing allows greater distances. There are residential sidewall sprinklers that are listed with 6 inches to 12 inches deflector distance to the ceiling.

There is no provision in the standard that requires the sprinklers to be located at the same distance from the ceiling when located in the same compartment. The standard allows the sprinklers to be installed within the listed range from 4 inches to 12 inches. Variations within this range can be used to adjust the deflector distance from the ceiling to address obstructions.



Question #5 – Fittings Under a Building

NFPA 24 allows the underground piping to extend 10 feet under the building.

Obviously, it is acceptable to have an elbow rising vertically to the riser, but is it acceptable to have a horizontal elbow on the water service entry under the building as long as the 10 foot dimension is not exceeded?

Yes, NFPA 24 does not regulate elbows on the underground. However, the elbows must be taken into consideration for the hydraulic calculations.

NFPA 24, 2019 edition, Section 10.4.3 allows the underground to extend up to 10 feet under the building but does not address or limit the fittings or elbows.

The wording of this section was changed in the 2022 edition to state that the underground service can “extend horizontally no more than 10 feet cumulatively...” By adding the word “cumulatively”, this section would allow a horizontal fitting in these 10 feet run of horizontal piping. The 2022 edition also added the following note, "The intent of this section is to limit the total length of horizontal pipe beneath the building to not more than 10 feet."

It should be noted that any fitting cannot be located directly under the footings.

Question #6 - Shadow Areas Outside Coverage Area of Sprinkler

A residential building is being protected with a sprinkler system in accordance with the 2016 edition of NFPA 13R. NFPA 13R allows shadow areas of up to 15 square feet. Can these shadow area provisions be applied to the ends of corridors that a sprinklers coverage area cannot reach?

No. The shadow area rules (6.4.6.3.3.1) cannot be utilized for a sprinkler that is spaced too far from a wall. In order to be classified as shadow area, the space must be:

1. Within the protection area of the sprinkler
2. An area that is blocked by a wall or a partition

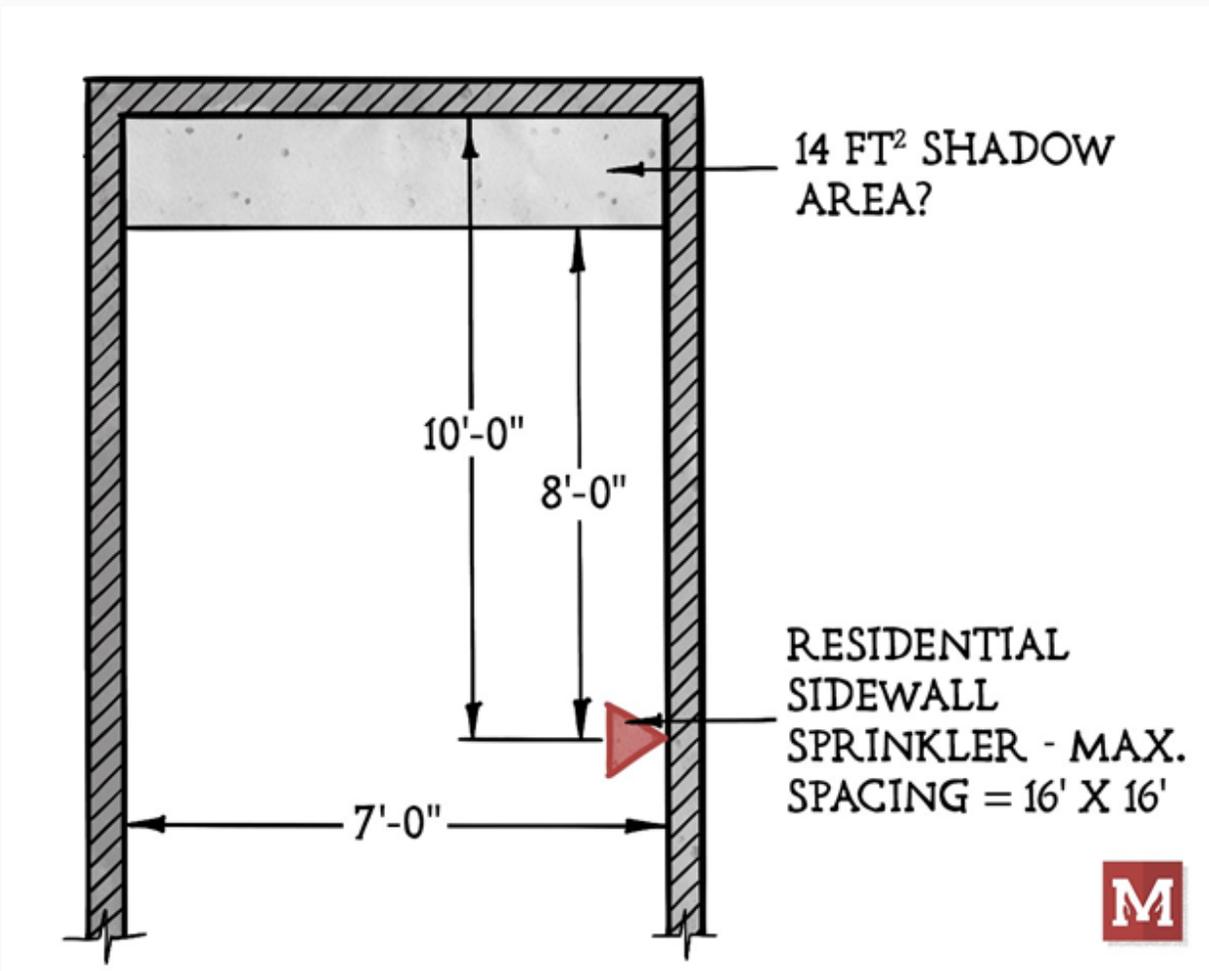
This concept is found in the definition of a shadow area (Section 3.3.10) which reads:

Shadow Area. The dry floor area within the protection area of a sprinkler created by the portion of sprinkler discharge that is blocked by a wall or partition.

The annex to this section (A.3.3.10) reinforces this concept and reads in part:

...In order to be acceptable, the shadow area needs to be within the coverage area of a sprinkler, meaning that water would discharge to the space directly if the structural or architectural feature was not there. ...

The situation described does not meet these conditions, it is not within the protection area of the sprinkler nor is it blocked by a wall or partition. Instead, it is simply spaced too far from a wall.



Question #7 – Automatic Ball Drip Location

Can you install a ball drip anywhere between the check valve and the FDC?

No, the ball drip must be located at the lowest point of the fire department connection piping to allow complete drainage and in cases where water in the piping between the system side and the fire department connection check valve would be trapped, an auxiliary drain is required.

NFPA 13, 2016 edition, Section 8.17.2.6 for drainage indicates the piping between the check valve and the outside hose coupling shall be equipped with an approved automatic drain valve in areas subject to freezing.

Annex Section A.8.17.2.6 indicates in cases where water in the piping between the system side and the fire department connection check valve would be trapped, an auxiliary drain is required.

If the check valve in the fire department connection leaks, the purpose of the automatic drain (ball drip) is to drain this water to a safe location and to maintain the piping between the check valve and the hose couplings free of water. Without the automatic drain, collected water could freeze and prevent the fire department from pumping into the system under fire conditions. Because this portion of the pipe is already free of water, this automatic drain also facilitates maintenance of the fire department connection piping. The drain should be located at the lowest point of the fire department connection piping to allow complete drainage.

Question #8 – Private Waterworks System

A new prison is being built with a sprinkler system in accordance with the 2022 edition of NFPA 13. This project will include a private tank and pump serving a combination domestic water and fire loop. The pump is a domestic type and is not in compliance with NFPA 20.

Can a domestic pump and tank feed a combination domestic water and fire loop for a prison?

Yes, a pump and tank system could be used to serve both domestic and fire protection systems if it is an approved public or private waterworks system.

NFPA 13, 2022 edition, Section 5.2 for the acceptable types of water supplies indicates a connection to an approved public or private waterworks system in accordance with 5.2.2 is acceptable. Section 5.2.2 indicates a connection to a reliable waterworks system shall be an acceptable water supply source.

It is important to note that the standard requires the water supply to be from an “approved” public or private waterworks system. Section 3.2.1 defines approved as acceptable to the authority having jurisdiction (AHJ). Section A.3.2.1 explains that the authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

It should also be noted that NFPA 20 recognizes the use of pumps in public and private water supplies that provide water for both domestic and fire protection use. Section A.4.7.1 of the 2022 edition of NFPA 20 states of these installations:

Such pumps are not fire pumps and are not expected to meet all the requirements of this standard. Such pumps are permitted for fire protection if they are considered reliable by the analysis

mandated in Section 4.6. Evaluating the reliability should include at least the levels of supervision and rapid response to problems as are typical in municipal water systems.

In this case it appears a private water works system that is approved by the AHJ could be used to serve both domestic and fire protection system demands.



Question #9 – Unreinforced Plastic Pallets Without Marking.

A project is utilizing plastic pallets that are believed to be unreinforced by the owner, however they are not marked.

The 2019 edition of NFPA 13 states that the commodity classification is increased one class for unreinforced plastic pallets and two classes for reinforced plastic pallets. Additionally, NFPA 13 requires that unreinforced pallets be permanently marked.

Is it the intent of Section 20.3.2.2.1.1 that the permanent symbol indicating that the pallet is reinforced be provided by the manufacturer of the pallet or can the owner provide this symbol?

The permanent symbol must be applied by the manufacturer. The intent is for the manufacturer to permanently stamp or indicate somewhere on the pallet that it is unreinforced.

In many cases, there is no way to determine if the pallet is reinforced vs. unreinforced because the manufacturer did not indicate anything on the pallet. That is why Section 20.3.2.2.2.2 requires that the pallet be assumed to be reinforced if no marking is provided on the pallet.

Question #10 – Underground Valves and Monitoring

A private underground service mains includes an underground gate valve in a roadway box. NFPA 24 specifically states that these valves are not required to be supervised; however, there does not seem to be an exception to the supervision requirements in the International Fire Code for underground valves in Section 903.4.

Are underground gate valves in a roadway box serving a sprinkler system required to be electrically supervised.

Based upon the 2021 edition of the IFC the answer is no. In earlier editions of the fire code, technically, these types of valves would be required to be monitored because they are not specifically exempted in Section 903.4. However, a new exception was added to the 2021 IFC addressing this issue. NFSA worked to get this exception into the 2021 IFC exempting these valves from the monitoring and supervision requirements in Section 903.4.

The intent of this change in the 2021 IFC was to correlate the supervision of underground gate valve requirements in the IBC, IFC, and IEBC. It removes the monitoring requirement to private underground gate valves and places it in the supervision exceptions. The result: underground gate valves with special keys are not required to be supervised or monitored. Per 2015 IFC Commentary for Section 903.4.1: "Exception 1 recognizes that underground key or hub valves in roadway boxes are not normally supervised or required to be supervised by this section or NFPA 13." Based on this Commentary language, it was not the intent of the IBC/IFC to require these valves to be monitored; however, they were not specifically exempted until the 2021 IFC. In addition, the IFC references NFPA 24 (via IFC 507.2.1) for installation of private service mains. NFPA 24, Section 6.7.3, does not require supervision of underground roadway gate valves, regardless of ownership.

Question #11 – Quick-Response Sprinklers and Bathrooms in NFPA 13R

The 2016 edition of NFPA 13R states that quick-response sprinklers can be used instead of residential sprinklers where there are four or fewer sprinklers in the dwelling unit. NFPA 13R also allows sprinklers to be omitted from bathrooms that are 55 square feet or smaller.

Can sprinklers be omitted in these small bathrooms if quick response sprinklers are used instead of residential sprinklers?

Yes, NFPA 13R permits the omission of sprinklers in bathrooms that do not exceed 55 square feet due to the low fire load and reduced risk in a typical bathroom. This omission is not dependent on the sprinkler type.

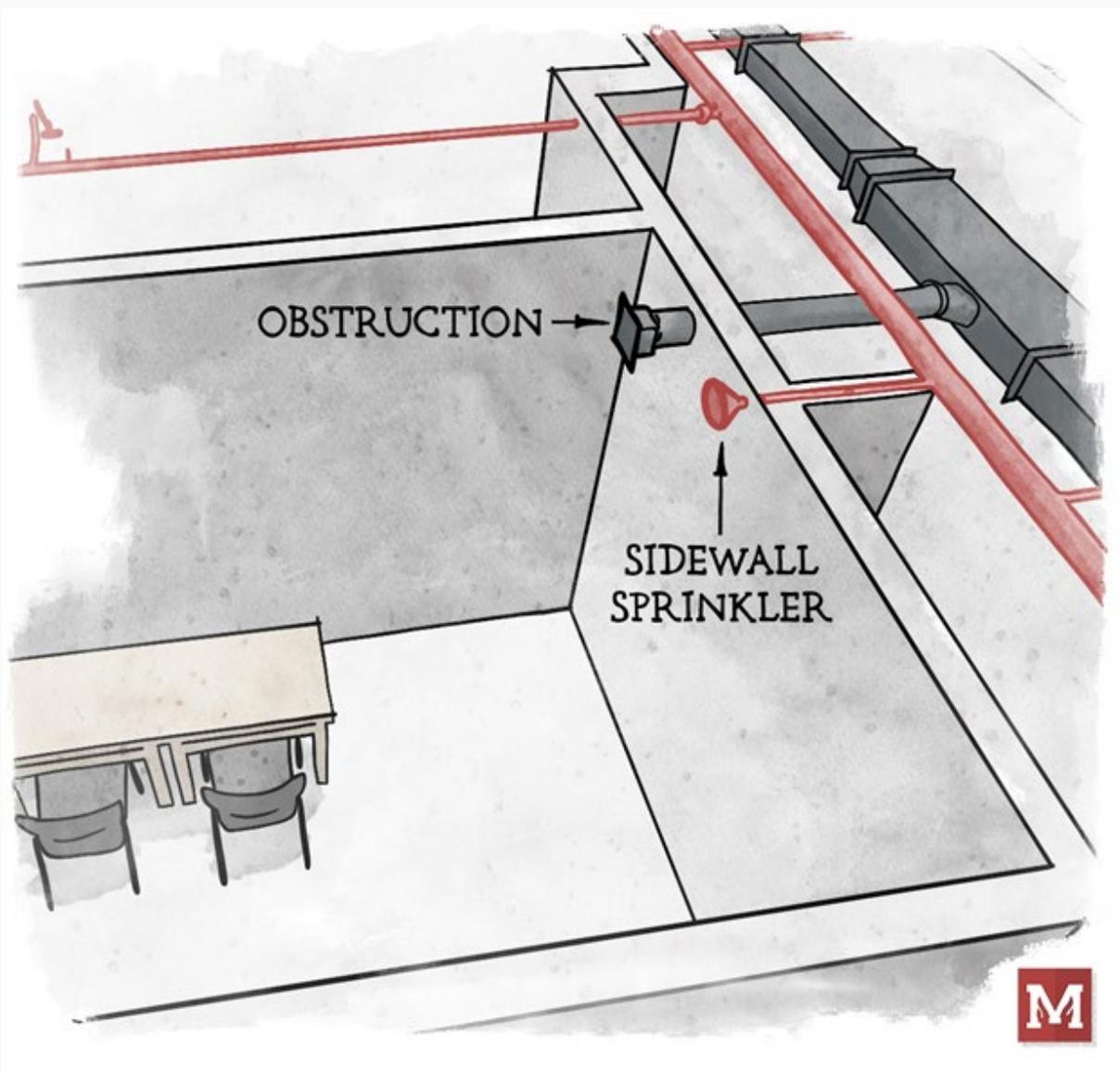
If the entire dwelling unit can be protected with four or less sprinklers, quick response sprinklers may be used as stated in section 6.2.1.3 and sprinklers are permitted to be omitted from bathrooms that do not exceed 55 square feet as allowed by Section 6.6.2.

Question #12 – Obstruction on Same Wall as Extended Coverage Sidewall Sprinkler

A mechanical duct is protruding from the same wall that an extended coverage sidewall sprinkler will be installed. See attached figure.

Is this considered an obstruction to the sprinkler and what is the proper obstruction rule based upon the 2022 edition of NFPA 13?

Yes, this duct would be considered an isolated obstruction (impacts a single sprinkler) to the EC sidewall sprinkler. Section 11.3 of the 2022 edition of NFPA 13 provides the installation requirements for extended coverage horizontal sidewall sprinklers. Based on the image provided, Section 11.3.6.1.5 could be applied. This section states that obstructions protruding from the same wall as the extended coverage sprinkler shall be at least 6 inches away from the sprinkler.





Learning and Development



Sign-Up for one of our Layout Technician Pathway Courses

NFSA’s newly updated fire sprinkler Layout Technician Pathway (LTP) prepares fire sprinkler layout and design professionals for NICET Levels I & II certifications. It also provides a great refresher for those who have been designing systems but need a comprehensive refresher. Students will receive a hard copy of the recently updated and revised “Layout Book” as well as a copy of the 2022 edition of the NFPA 13 standard.

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:

Members: \$2,200.00

Non-members: \$4,400.00 – [Join here](#) to save 50%!

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

[Check Out All Options Here](#)

[Click Here to See All Learning & Development Opportunities](#)

The National Fire Sprinkler Association is proud to present our NEW 2019-2020 Edition EOD Handbook

The EOD Handbook is now a three-volume set of over 1,500 pages covering hundreds of topics that are relevant to automatic fire sprinkler systems, standpipes, water supplies, inspection, testing and maintenance, codes, and standards.

Order the latest volume, the 2019-2020 Edition, as a single book or order the three-volume set!



National Fire Sprinkler Association

514 Progress Dr, Ste A,
Linthicum Heights, MD 21090
1-800-683-NFSA (6372)



[Contact Us](#)



National Fire Sprinkler Association
514 Progress Drive, Linthicum Heights, MD 21090
1-800-683-NFSA (6372)

[Unsubscribe](#)