



TechNotes

Editor - Roland Asp, CET

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Best of May 2024

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 May 2024. This information is being brought forward as the "Best of May 2024." 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 – ½ inch Pipe Nipples

A project consists of adding a dropped ceiling causing obstructions to the existing pendant sprinklers. Is it possible to lower the pendants 3 inches max using ½ inch diameter nipples in order to avoid cutting the ceiling open to access the existing drops?

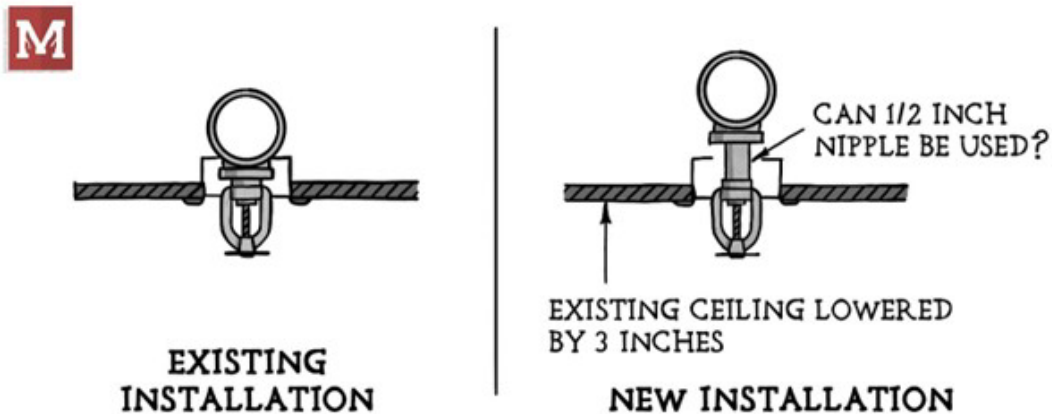
Yes, there are two possible solutions in the 2016 edition of NFPA 13 to "lower" an existing sprinkler.

1. Extension fittings: A new definition was added for extension fittings in the 2016 edition. These adapters are commonly used to adjust the final fit of a sprinkler installed in finished walls and ceilings. This new definition compliments new requirements for these fittings that have been added in section 6.4.8. Section 6.4.8 allows a single extension fitting (multiple extension fittings are not permitted to be connected) to be used meeting the following:
 - a. Sprinklers must be K-8 or smaller (6.4.8.1)
 - b. Light and ordinary hazard occupancies only (6.4.8.2)
 - c. Internal diameter of extension fitting must equal the inlet diameter (nominal) of the sprinkler (6.4.8.3)

- d. Extension fittings longer than 2 inches must be listed (6.4.8.4 and 6.4.8.4.1)
- e. Extension fittings longer than 2 inches must be included in the hydraulic calculations.

As the distance needed in the described situation is 3 inches, the extension fitting must be listed and included in the hydraulic calculations. I have not researched if 3-inch listed extension fittings are available.

1. Revamping: Section 8.15.20.4 (for pipe schedule systems) and Section 8.15.20.5 (for hydraulic design systems) both allow a ½ inch nipple to a maximum length of 4-inches to be used when “revamping” a system. This would include dropping a sprinkler to meet the ceiling elevation. The following conditions would need to be met:
 - a. Calculation to verify the required flow rate is met. As stated in the annex (A.8.15.20.5.2) this is not intended to be a full hydraulic analysis.
 - b. Nipples less than 1-inch in diameter attached to an armover are not permitted where seismic design is required.



Question #2 – Missing Escutcheon

There appears to be a contradiction in the 2020 edition of NFPA 25. Section 5.2.1.1.5 states that if the escutcheon is missing for recessed, flush and concealed sprinklers, it needs to be replaced. Section 5.2.1.1.6 states that if the escutcheon is missing for pendent sprinklers that are not recessed, flush and concealed sprinklers, the escutcheon does not need to be replaced.

Please explain the differing requirements for these two sections.

The key difference is that Section 5.2.1.1.5 deals with recessed, flush, and concealed sprinklers. Section 5.2.1.1.6 deals with pendent sprinklers that are NOT recessed, flush, or concealed.

Many recessed, flush, and concealed sprinklers are tested and listed as an assembly with their cover plates or escutcheons. These items may be necessary for the assembly to trap heat to activate the sprinkler; when not present, the sprinkler may not activate as intended and, therefore, the items should be present.

Standard escutcheons on pendent sprinklers extending below the ceiling (those that are not recessed, flush, or concealed) tend not to affect sprinkler activation or performance and are not considered a deficiency per NFPA 25.

Question #3 – Exterior Closets

An apartment building that is under the 2021 edition of the International Building Code has exterior storage closets with no direct access to inside the units.

Are these exterior closets required to be protected?

Yes, sprinklers are required in the exterior closets since NFPA 13 is the design standard. Unlike NFPA 13R, NFPA 13 does not contain an exception for exterior closets on decks and balconies. Therefore, sprinklers are required in each closet.

Question #4 – FDC Located Upstream of the Main PRV of the Multi-Systems

The six-level parking garage is protected by 6 dry systems fed by a fire pump. A main PRV, equipped with two shutoff valves on both ends, is positioned upstream of these dry systems to regulate the system pressure at 165 psi.

The FDC is installed upstream of the main PRV. Is it acceptable?

While NFPA 13 does not specifically prohibit the FDC from connecting upstream of the pressure reducing valve, this arrangement may not be advisable for a few reasons. One of which is the fact that the piping and components upstream (system side) of the check valve, including the check valve would need to be rated for the maximum pump discharge pressure plus the pump suction pressure.

In addition, there is no real benefit to installing the FDC upstream of the PRV. There is no concern of the pressure from the FDC. Since these flows are in parallel the pressures do not compound, rather the flow at any given pressure is increased. So long as the maximum pressure rating of the system is noted on the signage of the FDC the responding fire fighters will not over pressurize the system.

The third reason is the fact that pressure reducing valves can fail and prohibit the responding fire department from charging the system from the exterior. While NFPA 13 (2013) Section 8.16.1.1.1.3 prohibits shut off valves between each system and the FDC, the intent is to not install any components that can prevent the fire fighters from charging the system.

It should be noted that while permitted by NFPA 13, NFPA 20 actually prohibits sizing the pump that exceeds the system rated pressure and installing a reducing valve downstream. Since the PRV is installed downstream of the fire pump discharge isolation valve the installation of the PRV is acceptable, however, caution should be used with a pump that has high discharge pressure.

Question #5 – Globe Style Valve - Discharge Piping of Fire Pump

Can a globe style valve be installed on the discharge piping from a fire pump?

No, a globe style valve is not permitted by NFPA 20, 2022 edition, on the fire pump discharge piping.

Section 4.17.8 indicates a listed indicating gate or butterfly valve shall be installed on the fire protection system side of the pump discharge check valve. This section specifically permits a gate or butterfly valve and does not include a globe style valve.

The handbook commentary on this section explains isolation valves on the discharge side of the fire pump do not affect the operation of the pump, so approved indicating valves that are not outside screw and yoke (OS&Y) type are permitted.

While it appears a listed and indicating globe valve could be installed on the fire pump discharge piping as it would not be expected to affect the pump's performance, the requirements of the body of the standard specifically indicate only listed gate or butterfly valves may be used.

You could consider proposing an equivalency approach per Section 1.5. I am not aware of any reason why the standard would not permit the use of a listed and indicating globe valve on the fire pump discharge piping. It may be difficult to find a listed globe valve that is indicating as in my experience most globe valves have a non-rising stem and are not indicating type valves.

This requirement appears to be unchanged back to at least the 1976 edition of NFPA 20.

Question #6 - Obstructions Over Air Handling Units

Are sprinklers required below large duct over the air handling unit as shown in the attached figure?

NFPA 13 (2010 edition) – Section 8.5.5.3.1 states: “Sprinklers shall be installed under fixed obstructions over 4 feet (1.2 m) wide such as ducts, decks, open grate flooring, cutting tables, and overhead doors.”

Based on the above, it appears that sprinklers need to be installed under the two ductwork obstructions in your diagram.

Newer editions of NFPA 13 have added language to clarify that obstructions greater than 4 feet in width do not need additional coverage if they are close to the ground. NFPA 13 (2022

Section 16.3.3 dictates minimum requirements for threaded piping.

Lastly, Section 16.3.4 permits the use of specifically listed pipe and dictates that the pressure limitations and wall thickness for steel pipe specifically listed in accordance with section 7.3.3 shall be permitted to be in accordance with the pipe listing requirements. Since the pipe being installed is listed, Section 16.3.4 applies not 16.3.2; therefore, the installation requirements must follow the manufacturer's requirements in compliance with the listing.

Question #8 – Quick Response Reduction

Can the quick response reduction of Section 11.2.3.2.3.1 in the 2013 edition of NFPA 13 be used where the area of the room is less than 1500 square feet?

No, the quick response design area reduction cannot be used with an initial design area of less than 1,500 square feet.

NFPA 13, 2013 edition, Section 11.2.3.2.3 is specific to the use of the density area design method which requires a minimum design area of 1,500 square feet. Therefore, when applying Section 11.2.3.2.3 you would start with a base design area of 1,500 square feet and apply the quick response sprinkler reduction to that area.

Section 11.2.3.3 provides the requirements for the room design method which may be applicable in this case. There is no quick response area reduction permitted when using the room design method.



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Question #9 – NFPA 25 Tag Location

Does NFPA 25 mandate a specific location to affix the Inspection Tag?

There are no requirements in NFPA 25 for a specific location for inspection tags. There are requirements for written documentation of inspection findings and any corrective actions taken. There are also requirements for retaining these records for one year following a successive inspection activity (NFPA 25 - 2023 edition - Section 4.3.5). Since NFPA 25 – (2023 edition) Section 4.3.1.2 allows electronic methods for maintaining inspection, testing, and maintenance records, it is not the intent of NFPA 25 to require a "tag" or a specific location for posting.

NFPA 25 - Annex G contains guidance for tags (when used). Explanatory comments in NFPA 25 include the statement: "While NFPA 25 does not mandate system status tagging, it is desirable that a certain level of consistency exist between programs."

Question #10 – Quick Response Sprinkler Next to ESFR Sprinkler

Can quick response sprinklers be installed immediately adjacent to an ESFR sprinkler in accordance with the 2010 edition of NFPA 13?

Yes. There is no prohibition in the 2010 (or later) editions of NFPA 13 to install quick response sprinklers immediately adjacent to an ESFR sprinkler. Section 8.4.6.4.1 of NFPA 13 only requires a draft curtain between ESFR sprinklers and standard response sprinklers. Since quick response sprinklers are not standard response sprinklers, no draft curtain is required. There is no need for a draft curtain between ESFR sprinklers and quick response sprinklers. While it is true that ESFR sprinklers and quick response sprinklers might have slightly different RTI's (one might be 40 while the other is 45 for example), but there is no need to be worried about such small differences.

The reason for the draft curtain between standard response sprinklers and ESFR sprinklers is to deal with the concern that a fire under the standard response sprinklers will open ESFR sprinklers remote from the fire prior to opening standard response sprinklers over the fire. That concern goes away when the two different types of sprinklers are both fast response. A small differential in RTI would still not allow an ESFR sprinkler remote from the fire from opening before the quick response sprinklers above the fire.

There are so many variables that affect the time when a sprinkler opens including the horizontal distance between the sprinkler and the fire, the vertical distance between the sprinkler and the fire, the distance of the sprinkler below the ceiling, the conductivity between the sprinkler and the water-filled piping, and the size of the fire. With all of these variables, the slight difference between two different types of fast response sprinklers is irrelevant.

Question #11 – Supervision of Test Valve

Does the fire pump test valve need to be supervised?

Yes. Section 4.18.2 of NFPA 20 requires the pump header test valve to be supervised in the closed position. The easiest way to think about this situation is if the normal position of a valve is disrupted, would that impact the performance of the fire protection system? For example, if water were flowing through the fire pump test header because that control valve was open (and normally it should be closed), would the fire protection system be able to meet its needed demand? In general, the answer to that is no. Although the references, as, discuss the valves that are normally in the open position, the concerns are the same. Water needs to flow to the part of the system that has a fire incident. If water is diverted through one of these other valves during a fire incident, there may not be sufficient water where it is needed. Therefore, it becomes important to supervise them in the normal position of closed.

Question #12 – Distance Between Top of Storage a Sprinklers K-11.2 and Larger

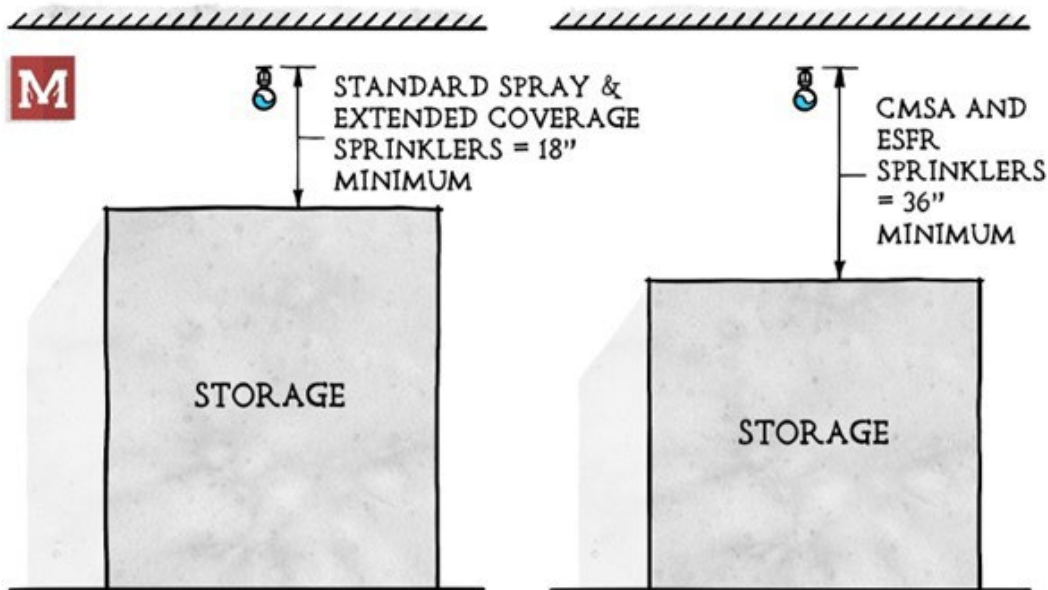
We are trying to figure out if there is a 36 inch clearance requirement from top of storage solid pile and deflector when using K-11.2 or larger sprinklers? We know 18 inch is typical but thought larger K factors like 11.2 and larger require a 36 inch clearance from top of storage and deflector for CMDA, CMSA, and ESFR.

NFPA 13 (2022 edition) contains minimum requirements for sprinkler deflector distances to top of storage for various types of sprinklers:

- Standard Spray Pendent (SSP), Upright (SSU), and Sidewall: 18 inches – Section 10.2.8.1
- Extended Coverage (EC): 18 inches – Section 11.3.7
- Control Mode Special Application (CMSA): 36 inches – Section 13.2.9
- Early Suppression Fast Response (ESFR): 36 inches – Section 14.2.12

In addition, there are a couple of other considerations:

- The specific sprinkler manufacturer may have greater distances from deflector to top of storage.
- Some of the storage design applications (Chapters 20 and 24) specify maximum storage height and maximum ceiling / roof heights (typically a greater distance from storage to ceiling requires more density) so sometimes there is a balance between maintaining the minimum distances but not getting too far away so as to increase the density.



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