NFSA The Voice of the Fire Sprinkler Industry

TechNotes

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Best of July 2016

Following are a dozen questions answered by the engineering staff as part of the NFSA's Expert of the Day (EOD) member assistance program being brought forward as the "Best of July 2016." If you have a question for the NFSA EOD (and you are an NFSA member), send your question to eod@nfsa.org and the EOD will get back to you.

It should be noted that the following are the opinions of the NFSA Engineering Department staff, generated as members of the relevant NFPA 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 and should therefore not be considered, nor relied upon, as the official positions of the NFPA or its Committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

Question 1 - Standpipe Locations
A Class I standpipe system is being installed. There are 3 stairways, and the center stair is 171 feet from the stairway to the north and 86 feet from the stairway to the south. Specifically, can hose connections be installed solely in the center stair since the other two stairways are within 200 feet from the center stair?

Answer: No. NFPA 14 requires that hose connections be installed in all required exit stairways. NFPA 14 then requires additional hose connections to be installed throughout a building if the travel distance from any of the already mandatory hose connections exceeds 200 feet for a fully sprinklered building. There is also an exception to omit hose connections from each side of a horizontal exit, however this does not apply to hose connections in exit stairways. There is no exception to remove hose connections from required exit stairways.

Question 2 - Inside Hose Stream Demand for Pipe Schedule Systems
NFPA 13 discusses adding an inside hose stream allowance of either 50 gpm or 100 gpm when inside hose connections are provided. Are hose allowances required to be added to the system demand for pipe schedule systems?

Answer: Yes, the hose allowance requirements found in **11.1.6** apply whether sprinkler demand is calculated using **11.2.2** for pipe schedule systems or **11.2.3** for hydraulically calculated systems. Note that **Table 11.2.2.1** for pipe schedule systems includes any required *inside* hose allowance in the acceptable flow at the base of the riser only.

Question 3 - Testing Requirements for Changing Sprinklers
Fire sprinklers are being replaced within the piping network of an existing system. Following NFPA 25, the testing requirements, including the hydrostatic test, need to be in accordance with NFPA 13 due to the number of fire sprinklers being changed (approximately 100 in this case). Does the system need to be hydrostatically tested at system working pressure or at 200 psi for 2 hours following the

replacement of sprinklers?

Answer: The system is required to be hydrostatically tested at the system working pressure. The hydrostatic test is an important item in the fire sprinkler system to ensure that the system will not leak over time. However, it is not advisable to boost the pressure in an existing piping network to 200 psi when it is only rated for 175 psi. This is why Section 25.2.1.4.2 in NFPA 13 (2016) states, "Modifications that cannot be isolated, such as relocated drops, shall require testing at system working pressure." This same concept would apply when only the sprinklers are being replaced. There is no way to isolate the new sprinklers from the existing piping; this means the testing would be done at system working pressure.

The language on modifications is intended to address situations when sections of the piping are also modified or in situations where an addition is made to the system. Typically, these can be isolated for the test. In addition, it is testing new piping connections as well as the sprinklers attached. Simply replacing sprinklers should not be considered a modification that would require a 200 psi hydrostatic test.

Question 4 -Solvents and Paint On Sprinklers
Is there any guidance in NFPA 13 (2016) that would allow for a solvent to be used to clean paint off of a sprinkler?

Answer: No. NFPA 13 requires that if a sprinkler has had paint applied to it other than a manufacturer's applied coating, then that sprinkler should be replaced. This is found under section 6.2.6.2.2 of NFPA 13 (2016). NFPA 25 (2014) also has the requirement that sprinklers shall not be altered in any respect or have any type of ornamentation, paint, or coating applied after shipment from the place of manufacturing. Therefore you would not be permitted to use a solvent to clean a sprinkler off, and the sprinkler with paint applied to it would need to be replaced.

Question 5 - Large Seismic Separation
There is a seismic separation joint that is 18 inches in width. It has been noted that NFPA 13 states that the seismic separation assembly in a fire sprinkler system needs to accommodate twice the seismic separation. The largest seismic separation assembly in a loop/flexible hose style can handle 24 inches, according to products currently available. Specifically, can this large opening (18 inches) omit a seismic separation assembly?

Answer: Any time fire protection piping crosses a seismic separation, a seismic separation assembly must be used so that the piping is not damaged during an earthquake. If there are 18 inches between the first structure and the second structure, then the building is being designed such that 9 inches of movement could occur in each building. If the seismic force impacts the building such that the building each move 9 inches away from each other (the maximum displacement expected based on the gap), there would be 36 inches for the pipe to cross (9 inches displacement + 18 inch gap + 9 inches displacement = 36 inches). This distance will need to be accommodated.

There is more than one option for a seismic separation assembly, although the loops incorporating flexible hose are the most common option recently. The traditional method of using six (6) flexible elbows as depicted in Figure A.9.3.3(a) could also be used. If a loop cannot be procured to accommodate the anticipated movement from an earthquake, then the six flexible elbow arrangement is a method to handle the expected movement.

Alternatively, it may be possible to arrange the piping using more than one flexible loop. For example, two loops that can each accommodate 12 inches would more than accommodate the 18 inches expected in this scenario.

Another avenue is also to install multiple risers such that the fire protection piping does not have to cross the seismic separation. This would mean that no assembly is necessary as the piping will not be subjected to this movement should an earthquake occur.

Question 6 - What is "Encapsulated"?
Does a 6 sided wood box meet the definition of encapsulated?

Answer: In order to meet the definition of encapsulation, the combustible commodity must be wrapped in plastic on the top and sides (the bottom can remain unwrapped.) The definition in the 2016 edition of NFPA 13 (similar in earlier editions) is as follows:

> *3.9.1.11* Encapsulation. A method of packaging that either consists of a plastic sheet completely enclosing the sides and top of a pallet load containing a combustible commodity, a combustible package, or a group of combustible commodities or combustible packages, or consists of combustible commodities individually wrapped in plastic sheeting and stored exposed in a pallet load.*

The definition indicates that there are two types of encapsulation.

1) The first is a pallet load consisting of a combustible commodity, a combustible package or a group of combustibles where the pallet load is wrapped in a plastic sheet that completely covers the top and sides of the pallet load.
2) The second type of encapsulation is a group of combustible commodities that are individually wrapped in plastic and stored on a pallet.

A wooden box that is not wrapped in plastic is not considered encapsulated. The problem with encapsulation is that the plastic on top of the pallet load acts as a shield, keeping the combustibles dry when sprinklers activate. This makes it harder to control the fire since the combustibles adjacent to the fire are not getting pre-wet. Usually a greater density is required from the ceiling sprinklers when protecting encapsulated commodities.

Question 7 - Rack Storage above Garage Doors
A new tenant is occupying an existing warehouse currently protected by a dry pipe sprinkler system designed for protection of miscellaneous storage up to 8 ft and providing 0.2 gpm/sq.ft. over 1,950 sq.ft. The tenant would like to add single row racks positioned against the west wall above loading doors. Use of the racks will consist of storage above the doors starting at approximately 10 ft above finished floor and will have a maximum height of 16 ft. The racks will be used for storage of packaging materials including rolls of plastic and hard plastic storage totes (bins with lids). Can the rack storage identified be protected by the existing sprinkler system as miscellaneous storage per Chapter 13?

Answer: No, in this situation, the storage height is measured from the top of the door to the top of storage in accordance with NFPA 13-2013 section 12.1.3.3, which results in a storage height of 6 ft. The commodity classification would likely be exposed unexpanded Group A plastic (which should be verified). Although the materials are used for packaging or packing, these materials are still considered as their own commodity when stored as described.

Referring to section 13.2.1 and Table 13.2.1, the rack storage arrangement would be considered an exposed, unexpanded Group A plastic with a rack storage height > 5 ft to ≤ 8 ft. For this particular configuration, the maximum ceiling height is limited to 15 ft and would require protection as an extra hazard group 2 occupancy in accordance with Figure 13.2.1. Since the existing building is greater than 15 ft high, use of the existing sprinkler system design basis would not be acceptable.Based on this, the storage arrangement would need to comply with the requirements of Chapter 17 for protection of plastic and rubber commodities.

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Sprinkler System Plan Review

Aug 30-31 Brea, CA
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Sept 1 Brea, CA
NFPA 13, 13R & 13D Update 2016

Sept 7 Elmsford, NY
Coordinating NFPA 25 & 72

Sept 9 Worcester, MA
Coordinating NFPA 25 & 72

Sept 12 Billerica, MA
Understanding, Applying & Enforcing NFPA 25

Question 8 - Design Area for Dry Residential Sprinklers
Section 11.3.1.1 of the 2010 edition of NFPA 13 states that for residential sprinklers, "The design area shall be the area that includes the four adjacent sprinklers that produce the greatest hydraulic demand."Does the four sprinkler design also apply to residential sprinklers in a dry system?

Answer: Yes, the four sprinkler design method specified in section 11.3.1.1 also applies to residential sprinklers installed in a dry system.

The 30 percent increase in design area for dry systems is limited to the density/area method of hydraulic calculations and does not apply to the special design method for residential systems. The purpose of this increase for the density/area method is to deal with the delay in water delivery from a dry system. Residential systems deal with this by requiring a maximum water delivery time of 15 seconds in dwelling units. See NFPA 13 (2010) section 7.2.3.6.3 which reads:

> ***7.2.3.6.3*** *For dry pipe systems protecting dwelling unit portions of any occupancy, the sprinklers in the dwelling unit shall have a maximum water delivery time of 15 seconds to the single most remote sprinkler.*

Also note that residential sprinklers must be specifically listed to be used in a dry system as stated in section 7.2.3.6.4.

> ***7.2.3.6.4*** *Residential sprinklers shall be listed for dry pipe applications.*

The manufacturer's instructions for these residential sprinklers listed for use in dry systems also make clear that the number of design sprinklers is not required to be increased when used in a dry system.

Question 9 - Fire Separation between Sprinkler Systems
Is there a requirement in NFPA 13 to have a fire separation (rated walls) between adjacent sprinkler system boundaries?

Answer: NFPA 13 does not require adjacent sprinkler systems to be separated by rated walls or similar construction. It is quite common to install two or more systems in the same building without separation. For example a large warehouse may need to be provided with multiple systems to comply with the system protection area limitations of NFPA 13 section 8.2. These adjacent systems are not required to be physically separated by a barrier.

There may however be specific instances where adjacent systems may need some form of separation. For example, section 8.4.6.4 of NFPA 13 (2016) states that where ESFR systems are installed adjacent to systems with standard- response sprinklers, a draft curtain is required between the two systems.

Question 10 - Inspection Record Deficiency?
A fire sprinkler system has no tag or record of a five year inspection. Would this be considered a deficiency according to NFPA 25?

Answer: This issue was recently brought up to the NFPA 25 technical committee during the last revision cycle (for the 2017 Edition) and a certified amending motion (CAM) was then brought to NFPA's technical session for membership consideration. This would have introduced language that would make the absence of records or tagging of multi-year interval inspections and testing a deficiency to the system. This language failed both the technical committee ballots and the technical session floor votes. Therefore, it is not the intent to make the absence of a tag or record a deficiency to a system. It is the building owners' responsibility to provide the required inspection testing and maintenance for a system as well as provide the documentation of such.

Did You Know??

The NFSA keeps a member of the Engineering Department staff on duty every business day to answer your technical questions live. We call this the Expert of the Day (EOD) program and it is available to our members by phone, fax or e-mail. Call us at (845) 878-4200 and press 2, or you can send a fax to (845) 878-4215, or you can e-mail us at eod@nfsa.org. Last year we answered more than 2600 requests for assistance.

Question 11 - Moveable Rack Structure
A project is proposed to use moveable rack structures to store Class I-IV commodities. The moveable racks will be less than 12 feet in height. Would the requirements found in NFPA 13 (2016), Chapter 13 for Miscellaneous and Low-Piled Storage apply for Class I-IV commodities on movable racks.

Answer: Yes, movable racks are paralleled to multiple-row racks as they can be arranged such that aisles are small or nonexistent. Low-piled multiple-row rack storage is permitted to use the low-piled and miscellaneous storage requirements of Chapter 13 per Section 16.2.1.2.1 which is directed there when storage is under 12 feet. Therefore, the same would apply to movable racks.

Question 12 - Trellis Obstructions below Sprinkler
Standard spray upright sprinklers are installed at roof deck with a trellis installed approximately 4 feet below this. The trellis is constructed with 2 inch wide members spaced approximately 1 foot on center. Is this trellis an obstruction to the upright sprinklers above?

Answer: NFPA 13 handles obstructions in two primary categories. The first category is obstructions that prevent sprinkler spray pattern from developing which deal with obstructions within 18 inches vertically from the bottom of the deflector for standard spray sprinklers. The other is obstructions which prevent sprinkler discharge from reaching the hazard, which consists of obstructions below 18 inches from the sprinkler deflector. Since this trellis is located approximately 4 feet from the bottom of the sprinkler, this would fall into obstructions which prevent sprinkler discharge from reaching the hazard, section 8.6.5.3 of NFPA 13 (2016). Section 8.6.5.3 goes on to require that sprinklers shall be installed under fixed obstructions where over 4 feet wide. As the trellis is comprised of small members and large openings, this would not typically require sprinklers below it.