

## Best of November 2015

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 November 2015." If you have a question for the NFSA EOD (and you are an NFSA member), send your question to [eod@nfsa.org](mailto: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 - Mixing NFPA 13 and 13R Protection Criteria

A sprinkler system for a rehab/skilled nursing facility is being designed with the common areas meeting NFPA 13 and the patient rooms meeting NFPA 13R. This allows elimination of sprinklers from the bathrooms and closets in the patient rooms. The state inspector is telling them they can't do it this way. Is the mixed design criteria from these two standards allowed?

**Answer:** No, it is not permissible to use one installation standard in part of a building and another installation standard in another. The entire building must be provided with sprinkler protection according to either NFPA 13 or NFPA 13R, assuming that the prevailing building code permits NFPA 13R to be used in this case. While there are sections of NFPA 13R that invoke NFPA 13 criteria for some building areas, the building would still be considered to be sprinklered in accordance with NFPA 13R, which in accordance with its title and scope is intended for use in low-rise

residential occupancies. It should be noted that the definition of “residential occupancies” within the standard does not include nursing homes.

Due to this building being a medical facility, it is likely that it falls under federal requirements to follow NFPA 101 (2000 edition) in addition to the building code. The sprinkler requirements for sprinklers in patient bathrooms and closets can actually be more stringent than those found in either NFPA 13 or NFPA 13R.

### **Question 2 - Using a Single PRV for Both Sprinklers and Standpipe**

Is it possible to install a single PRV from a combined standpipe to serve both sprinklers and the Class 1 hose valve for each floor?

**Answer:** Yes, this is permissible. NFPA 13 (2013 edition) does not prohibit this arrangement as long as it meets the requirements of Section 8.16.1.2.1 and related sections 8.16.1.2.2 through 8.16.1.2.5, including requirements for pressure gauges, a relief valve, an indicating valve, and means for performing a flow test at the system demand. Likewise, NFPA 14 (2013 edition) does not prohibit this arrangement provided the requirements for pressure-regulating devices are followed, including 7.2.3 Maximum Pressure at Hose Connections and 7.2.4 if more than one hose connection will be downstream of the PRV.

### **Question 3 - Shallow Lintel Separating Close-Spaced Sprinklers**

A header or lintel running across a hallway extends 4 inches down from a ceiling. There are two standard spray recessed pendent fire sprinklers on opposite sides that are about 4 ft apart. The deflectors of the pendent sprinklers are approximately 3 inches above the bottom of the lintel. Do these two sprinklers require a minimum separation of 6 ft. to comply with NFPA 13 (2016 edition)?

**Answer:** No, because the minimum 6-ft separation distance between sprinklers, found in Section 8.6.3.4.1, does not apply if the requirements of 8.6.3.4.2, 8.6.3.4.3 or 8.6.3.4.4 are met. In this case the lintel meets the requirements of 8.6.3.4.2, serving as a baffle between the two sprinklers.

### **Question 4 - Sprinkler Orientation in Grease Duct per Handbook**

We are being asked to add protection to a horizontal section of an exhaust grease duct and we have proposed installing pendant type sprinklers in the side of the duct at the midpoint of the duct. We did this based on the commentary to Section 7.10.3 of the 2010 edition NFPA 13 *Automatic Sprinkler Systems Handbook*, which states: *“Within the duct, any type of standard spray sprinkler can be used, whether it is an upright, pendent, or sidewall sprinkler. Sprinkler activation is not affected by sprinkler type, and the development of a pattern is not a concern within the confined area of a protected duct.”* Is this acceptable despite the fact that the sprinkler would not be installed in its listed position?

**Answer:** **Yes.** It should be recognized that the handbook commentary is not an enforceable part of the standard, and does not by itself provide permission to circumvent the requirements of the standard. Nevertheless, it can provide useful guidance. In this case, the commentary should point to Section 8.3.1.2, which allows sprinklers to be used outside of their listing... *“where construction features or other special situations require unusual water distribution, and listed sprinklers shall be permitted to be installed in positions other than anticipated by their listing to achieve specific results.”*

#### **Question 5 - Accessibility of Drains for Trapped Sections of Piping**

I am working on a project where the owner does not want to install access panels in the drywall ceiling to access the plug provided to drain a trapped section of piping that contains less than 5 gallons of water. The current idea is that unless there is something wrong with that specific piece of pipe the water would never have to be drained, and in the case that there is something wrong with the trapped section of piping it is likely the drywall would have to cut out in order to repair/replace the section of piping anyway. The location of the drain plug would be clearly identified on a set of drawings that is to be provided to the owner. Would the scenario described above be acceptable per NFPA 13 since this amount of water is not required to be piped to an “accessible location”?

**Answer:** Section 8.16.2.1 requires that all sprinkler pipe and fittings be installed so that the system can be drained, but the answer to your question on accessibility depends on the type of system.

You stated that the owner is presuming that the specific piece of pipe in question would never have to be drained under normal circumstances. It therefore would be reasonable to assume that we are dealing with a wet

pipe sprinkler system, since auxiliary drains in dry pipe systems must be drained regularly. Section 8.16.2.5.3.2 specifically states that auxiliary drains “located in areas subject to freezing shall be accessible”, but even such drains located in heated areas that are serving areas subject to freezing must be accessible since there is a potential for an undrained trapped section to back up into an unheated area.

You have noted that the capacity of this trapped section is less than 5 gallons. This obviously avoids the requirement of Section 8.16.2.5.2.1 applicable to isolated trapped sections with capacities exceeding 50 gallons, which must be “piped to an accessible location”. For smaller trapped sections in wet pipe systems there is no specific requirement for accessibility.

While it is preferable to keep all drains reasonable accessible, you have indicated the owner is comfortable cutting the drywall in the event access is needed, and that the location of the drain would be clearly identified on drawings provided to the owner. Since drawings are often lost, we would suggest that the drain location also be noted at the system riser, similar to the requirement that exists for dry pipe systems in Section 8.16.2.5.3.7. This could be especially important in climates subject to freezing, to avoid damage to system piping in the event the system is drained and the building is secured and mothballed for an extended period of time.

### **Question 6 - Using Unlisted Glycerin-Filled Gauges**

I have a customer that has multiple deluge risers with standard gauges that are UL/FM listed. They have a problem with the gauges being hammered when the fire pump comes on and are constantly changing them out. They would like to know if they can use glycerin-filled gauges, which are not UL/FM listed, to help reduce the water hammer effects. Would this be acceptable?

**Answer:** Yes, with the approval of the AHJ. NFPA 13 (2013 edition) does not require that gauges be listed, only “approved”. Based on the history of the system in question, it would be reasonable for an AHJ to approve good quality glycerin-filled gauges that meet the requirements of Section 8.17.3 as referenced by Section 7.3.1.3.

### **Question 7 – Sharing a Remote Design Area Between Systems**

We are reviewing hydraulic calculations from a sprinkler contractor. The project includes renovation of a single story building with three sprinkler risers. Each riser is equipped with a control valve, alarm check valve, tamper and flow switches. The 1500 sq ft most remote area includes sprinklers from two different system risers. Is this acceptable, or does each system need to be calculated separately?

**Answer:** A hydraulically remote area for each system should be calculated. NFPA 13 states that a single fire scenario is assumed (Section 1.1.3) which means the most demanding value from the three systems would be used to size the water supply and lead-in piping for the building. If the remote area were to be split across two systems, then it would actually be less demanding, since the flow would be divided between two mains and/or risers (varying with the specific arrangements). All of the requirements for design approaches (Chapter 11) and the water demand are based on what is needed for "a system." Therefore, the hydraulically most remote area should be calculated on a single system.

### **Question 8 - Mixing of QR and QREC Sprinklers in a Compartment**

Can quick response standard coverage and quick response extended coverage sprinklers be used in the same room in light hazard occupancies?

**Answer:** Yes. NFPA 13 Section 8.3.3.2 (2016 edition with similar text in previous editions) states: "Where quick-response sprinklers are installed, all sprinklers within a compartment shall be quick-response unless otherwise permitted in 8.3.3.3, 8.3.3.4, or 8.3.3.5." Either standard spray or extended coverage spray sprinklers can be of the quick response type. Therefore, it would be acceptable (assuming installation guidelines are followed appropriately for each) to have both quick response and quick response extended coverage sprinklers within the same area.

### **Question 9 - Change in Sidewall Sprinkler Column Obstruction**

I have a column obstruction from a sidewall residential sprinkler. The obstruction is 12 inches wide x 5 inches deep, located 5 ft away from the sprinkler. Reviewing Figure 8.10.7.2.1.4 in the 2013 edition of NFPA 13, these would respectively appear to be the C, D, and A dimensions. Figure 8.10.7.2.1.4 states that dimension A must be greater than or equal to 4C or

4D, whichever is greater, but it also states that dimension A is less than or equal to 36 in.

Does this mean Figure 8.10.7.2.1.4 only applies when dimension A is less than or equal to 36 inches? If this is so, it appears NFPA 13 allows for the obstruction described above without adding a sprinkler to cover behind the obstruction. Or is it only acceptable to proceed without adding a sprinkler to protect the shadow area created by the obstruction because the 5 ft distance is greater than 4 times the 1 ft width of the column?

**Answer:** Although the notes on the figure can be misinterpreted, the text of Section 8.10.7.2.1.3 clarifies the requirement:

*8.10.7.2.1.3 Unless the requirements of 8.10.7.2.1.4 through 8.10.7.2.1.7 are met, sprinklers shall be positioned away from obstructions a minimum distance of four times the maximum dimension of the obstruction. The maximum clear distance required shall be 36 in. (914 mm) from the sprinkler (e.g., truss webs and chords, pipe, columns, and fixtures).*

However, it should be noted that, as a result of fire research, the maximum distance allowance in 8.10.7.2.1.3 **has been disallowed for vertically oriented obstructions like columns in the 2016 edition** of the standard with the addition of new subsection 8.10.7.2.1.3\*(B):

*8.10.7.2.1.3\* Unless the requirements of 8.10.7.2.1.4 through 8.10.7.2.1.7 are met, sprinklers shall be positioned away from obstructions a minimum distance of four times the maximum dimension of the obstruction (e.g., truss webs and chords, pipe, columns, and fixtures).*

*(A) The maximum clear distance required from obstructions in the horizontal orientation (e.g., light fixtures and truss chords) shall be 36 in. (900 mm).*

*(B) The maximum clear distance shall not be applied to obstructions in the vertical orientation (e.g., columns).*

In the specific scenario you have provided, the 5-foot separation between the sprinkler and obstruction exceeds the minimum required by the 2013 edition and still meets the more conservative requirement of the 2016 edition without adding an additional sprinkler to protect the shadow area created by the column. However, the change in the 2016 edition makes

obvious sense if one envisions an even wider column just beyond the older 36-inch limit of concern.

### **Question 10 - NFPA 13R Balcony Criteria for NFPA 13**

Section 903.3.1.2.1 of the International Building Code (IBC) contains special criteria for sprinkler protection of exterior balconies in combustible construction. Am I correct that the language applies only when the fire sprinkler system is installed in accordance with NFPA 13R, and not with an NFPA 13 system?

**Answer:** Yes. When this requirement was introduced to the IBC (and IFC), NFPA 13R did not have a requirement to sprinkler the balconies and decks of dwelling units that were built using Type V construction. In order to harmonize the documents it has also been added to NFPA 13R in more recent editions. However, for many years NFPA 13 has contained language on when to protect exterior projections, which include balconies and decks (Section 8.15.7). Therefore, no additional language was needed to cover this arrangement and the language was added only to cover Type V construction protected with NFPA 13R.

### **Question 11 - Plastic Pallet Protection in the 2007 Edition of NFPA 13**

Section 12.12.2.2(1) in the 2007 edition of NFPA 13 provides protection criteria for idle plastic pallets stored in cutoff rooms, and is followed by Section 12.12.2.2(2) for storage of the pallets when not cutoff from other storage. However, other than a limitation on storage height to 4 ft, a requirement to use high temperature rated sprinklers, and requirements for pile separation, no design criteria is provided. What was intended for design criteria when idle plastic pallets are not stored in cutoff rooms?

**Answer:** What appears to be an omission was finally clarified in the 2013 edition of the standard. The intent of the section is that limiting the stack size to 4 ft, utilizing high temperature-rated sprinklers, and following the separation rules allows the idle plastic pallet storage arrangement to be protected without special design criteria. This is laid out more explicitly in the corresponding section of the 2013 edition, Section 12.12.2.2.4.3:

*“12.12.2.2.4.3 Plastic pallets shall have no impact on the required sprinkler protection when stored as follows:*

*(1) Storage shall be piled no higher than 4 ft (1.2 m).*

- (2) Sprinkler protection shall employ high temperature-rated sprinklers.*
- (3) Each pallet pile of no more than two stacks shall be separated from other pallet piles by at least 8 ft (2.4 m) of clear space or 25 ft (7.6 m) of stored commodity.*
- (4) Minimum ceiling design of OH2 shall be used.”*

## **Question 12 – Changes in NFPA 30 In-Rack Sprinkler Pressures**

Section 16.6.2 of NFPA 30 in the 2012 and prior editions specify design criteria for “Fire Protection System Design Scheme B” and in subsection 16.6.2.4 (3) required a minimum in-rack sprinkler operation pressure of 50 psi. The 2015 edition of NFPA 30 changes this requirement to a minimum flow of 57 gpm and a minimum in-rack sprinkler operating pressure of 10 psi. This change between the 2012 and 2015 editions is major, and in one of my current projects could make a difference as to whether a fire pump is needed to protect the flammable liquid storage area. What was the methodology behind the adoption of the new criteria for the 2015 edition? Were tests conducted? Was the 50 psi discharge pressure required in the 2012 edition oversized?

**Answer:** You are correct that Section 16.6.2.4(3) in the 2012 edition of NFPA required a minimum in-rack sprinkler operating pressure of 50 psi, and that the change to the standard in the 2015 edition requires a minimum flow of 57 gpm with a minimum pressure of 10 psi. This was not considered to be a substantive change in the requirement, but rather an allowance to use sprinklers with larger orifices. It should be noted that a other nominal K-8.0 sprinkler at 50 psi produces the required flow of 57 gpm. You can now use different K-factor sprinklers to produce the minimum 57 gpm as long as you do not go below 10 psi. This essentially allows the use of up to a K-16.8 sprinkler.