

Best of October 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 October 2015." 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 a formal interpretation in accordance with the NFPA Regulations Governing Committee Projects and should therefore not be considered, nor relied upon, as the official position of the NFPA or its Committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

Question 1 – Room Design Method for Flammable Liquid Storage Room

There is a 20,000 sq ft warehouse facility with a 2,000 sq ft flammable storage area located in one corner of the building. The flammable storage area will be enclosed by 2-hour fire-resistance rated construction. A density and area of 0.30 gpm over 3,000 square-feet has been established for the flammable liquid storage area. The remainder of the warehouse has been protected following criteria for Ordinary Hazard Group 2 (OH2), utilizing 0.20 gpm over 1500 sq ft for its design. Can the design area for the flammable liquid area be calculated based on the size of the room or is it necessary to pick up additional area from the adjacent warehouse space to meet the full 3,000 sq ft design area?

Answer: First, the assumption is that NFPA 30 is being used to protect the area containing flammable and combustible liquids. NFPA 30 clearly states criteria for where hazards are not separated by a physical barrier, as does NFPA 13. However, this situation has a 2-hour fire separation.

The concept of calculating only the area of the room, even though it is less than the area required by the standards under a density/area methodology would describe the Room Design Method as specified in NFPA 13. This method is permitted for extra hazard occupancies, which often use similar amounts of water as flammable or combustible liquids in protecting the space. There are requirements in order to use this method, such as any doors connecting the space to adjacent spaces must be self

closing. In addition, the fire resistance rating of the walls (including the appropriate rating for doors) must be equal to or greater than the required water supply duration. If these conditions can be met, then calculating the area of the room (2,000 sq ft) should be acceptable. If these conditions cannot be met, then additional area from the adjacent hazard will need to be added to the calculations to achieve the design area of 3,000 sq ft.

Question 2 – Sway Bracing Non-Metallic Piping

A high-rise building will have to provide seismic protection of the building. This will include the mechanical systems. The sprinkler system has a 2-inch main using CPVC pipe. Is this pipe required to have sway bracing?

Answer: Yes. NFPA 13, Section 9.3.3.5.5.1 requires lateral sway bracing on all feed and cross mains. In addition, Section 9.3.5.6.1 requires longitudinal sway bracing on all feed and cross mains. NFPA 13 does not differentiate based on the material of the pipe serving as a main. If the pipe is a main, then it will need to have the bracing required so that system functions as a unit within the building structure and remains operational following a seismic event.

Question 3 – Missing Sprinklers in an NFPA 25 Inspection

During typical inspection, testing and maintenance of fire sprinkler systems, a space was found without fire sprinklers. Is this lack of sprinklers in a building considered a "deficiency" under NFPA 25?

Answer: No. The scope of NFPA 25 is limited to inspecting, testing, and maintaining sprinkler systems (or other water-based fire protection systems). The general concept from the Committee is that something not present cannot be inspected or tested. The only exceptions are where the standard specifically requires the inspector to note and remedy something that is "missing" such as, beginning with the 2014 edition, the hydraulic design information sign of section 5.2.6.1.

Next, the term "deficiency" has been defined in the recent editions of NFPA 25. The lack of sprinklers in a building does not meet the definition. Whether or not sprinklers are, or should be there, is a design issue. Section 1.3.1 in NFPA 25 (similar language in previous editions) states, "This standard does not require the inspector to verify the adequacy of the design of the system."

The information could be passed along to the owner, but it is important to separate the recommendations or suggestions from the deficiencies/impairments reported on the NFPA 25 report.

Question 4 – Quick Response Sprinklers Protecting Miscellaneous Storage

Low-piled or miscellaneous storage arrangements are redirected in many cases to use the protection criteria for ordinary or extra hazard occupancies. If this is the case, does Section 12.6.6 in NFPA 13 apply, which requires the use of standard response sprinklers?

Answer: No. The requirement for standard response sprinklers is for high piled storage arrangements. The concern is that, with a high challenge fire, too many quick response sprinklers not directly over the fire scenario might operate from traveling hot gases.

The determination for use of quick response sprinklers will vary with the hazard level protected. Ordinary hazard spaces are permitted to use quick response sprinklers. Extra hazard arrangements are not permitted to use quick response sprinklers when following the density/area method in accordance with Section 8.4.1.2. In addition, the low-piled or miscellaneous storage would have to follow Section 11.2.3.2.2.2, which notes that if there are substantial amounts of flammable or combustible liquids or combustible dusts, quick response sprinklers are not permitted.

Question 5 – Hangers at the Ends of High-Pressure Branch Lines with Flexible Drops

A system is being modified. The static pressure in the system exceeds 100 psi. Steel branch lines in this system will supply flexible drops. Section 9.2.3.4.4.2 from NFPA 13 has been referenced. Are hangers required within 12 inches of the end of the branch lines when using flexible sprinkler hose to feed the pendent sprinklers?

Answer: No. The intent of the section is to make sure the hanger is located on the branch line such that the pendent sprinkler will not end up above the ceiling upon activation with a significant pressure in the system. A flexible sprinkler hose feeding a pendent sprinkler is not required to be treated the same as a pendent sprinkler or drop nipple for purposes of that requirement. Under the listing of the flexible sprinkler hoses, the bracket supporting the hose and sprinkler is tested. These tests are conducted to ensure that the sprinkler will remain in its intended location. Therefore, the arrangement meets the intent of the section as its listed bracket can resist the pressures.

Question 6 – Locating Residential Sprinklers in a Room

A residential sprinkler that is listed for a coverage area of 20 ft by 20 ft has been selected for a project. The room being protected is 17 ft wide. Does the sprinkler provide better coverage if it is placed in the center of the room as opposed to the sprinkler being located 10-ft from one wall?

Answer: No. Placing a sprinkler in the center of the room does not provide any better coverage than if it was placed its maximum distance from a single wall, offset from the center. First, the sprinkler is designed to provide the same level of protection for its entire coverage area. Secondly, due to other architectural features, such as lighting, electricians generally claim the center of the room with a light fixture and it has been a standard practice not to place a sprinkler in the center of the room because of this. If a fire did occur within the sprinklers coverage area, the heat plume generated by the fire would create ceiling jets that would disperse across the ceiling outward from the fire evenly throughout the room, assuming the ceiling is smooth, flat and horizontal, and would activate the sprinkler in that area. As long as the entire room is covered by

sprinklers installed per their manufacturer's installation instructions and in accordance with the applicable installation standard (NFPA 13, NFPA 13R or NFPA 13D) the hazard(s) will be properly addressed.

Question 7 – Calculating Hose Connection Demands per the IFC

There is a project that consists of a covered mall building that is equipped with a sprinkler system and is not required to be equipped with a standpipe system. Instead of a NFPA14 type standpipe, this building is equipped with hose connections fed from the sprinkler system as required by the IFC, section 905.3.3. It is noted that NFPA 13 and the IFC have different requirements for calculating hose connections fed from a sprinkler system. How is the system and its hose connections hydraulically calculated?

Answer: In the hierarchy of codes and standards, the requirements of a building code supersede that of a referenced standard within the document. Therefore, the requirements of the IFC 905.3.3 (the IBC has the same requirements) would take precedence.

In this case, the sprinkler system is calculated in accordance with NFPA 13 and a flow of 250 gpm at the most remote hose connection per the IFC is added. The system would need to be sized to deliver this 250 gpm at the same time as supply the required sprinkler system demand. This is more water than would be required following NFPA 13, section 11.1.6.3 which would require 50 gpm per hose connection to a maximum of 100 gpm.

These rules are for when a standpipe is not installed and the sprinkler system includes the hose connections required by IFC 905.3.3. If, however, a NFPA 14 standpipe system (including the option of a combined system) is installed, you would follow the requirements of NFPA 14 for calculating the standpipe and NFPA 13 for calculating the sprinkler system. Under that situation, inside standpipe hose connections would not be included in the fire sprinkler system demand.

Question 8 – Residential Sprinklers and Skylights

Residential sprinklers are installed in a room that has a skylight. Section 8.10.8 in NFPA 13 has rules dealing with ceiling pockets in the compartment with residential sprinklers. One of the rules is that in order to omit a sprinkler from inside the ceiling pocket it cannot be more than 12 inches deep. Would a skylight that is less than 32 sq ft in area have to comply with the maximum 12-inch depth requirement of the ceiling pocket rule in order to omit a sprinkler from within the skylight when residential sprinklers are utilized?

Answer: No. Sprinklers would not be required to be installed in small skylights that are 32 sq. ft. or less regardless of the depth. This is in accordance with NFPA 13, Section 8.5.7, which applies to all types of sprinklers unless modified in the specific sprinkler requirements. Residential sprinklers do permit this omission. The ceiling pocket rule need not be applied to the small skylight that complies with Section 8.5.7.

Question 9 – Emergency Vent Piping in NFPA 20

NFPA 20, Section 11.4.1.2.8.3, which relates to vent piping for diesel tanks, has been referenced. Is this requirement applicable to emergency vent piping?

Answer: Yes, NFPA 20 addresses all fuel tank vent piping without exception. Therefore, standard vents and emergency vents have to discharge the vapors away from the building with outlets at least 5 ft away. Emergency vents are intended to relieve severe pressure build-ups, such as those caused by fire exposure that could produce a catastrophic tank rupture. In the event of such an occurrence, the last thing desired would be returning combustible vapors back into the room, which is occupied while the pump is running during a fire.

Question 10 – Trapeze Member Hangers

Trapeze hangers are needed to properly support the sprinkler system piping. This situation calls for a 3-inch trapeze member to support an 8-inch sprinkler main. Are 8-inch hangers required to support the ends of the trapeze member?

Answer: Yes, the hangers on the trapeze member must be able to support the load of the 8-inch sprinkler pipe. However, it is important to note that an 8-inch ring should not be installed on the 3-inch trapeze member as it could elongate over time and not provide appropriate support. Where rings are used as part of the hanger assembly, a heavy duty ring is needed. This is a ring that physically fits the trapeze member, 3-inch pipe in this case, but is listed to support the load of the sprinkler piping, 8-inch pipe in this case. These rings also accommodate the appropriate rod diameter to support the heavier system piping.

Question 11 – Omitting Sprinklers in Bathrooms without Lintels

A noncombustible construction high-rise hotel is being protected with an NFPA 13 sprinkler system. Sprinklers have been omitted in bathrooms under 55 sq ft per Section 8.15.8.1.1. Some dwelling units have bathrooms with a full height glass partition creating 2 separate areas under 55 sq ft each. Access to the main (toilet) area is via a 36-inch wide sliding door. The secondary (Jacuzzi) area is then accessed through a 32-inch glass door in the partition. There is no header provided above the door in the partition leaving an opening of about 8 to 10 inches in height above the partition door. Can sprinklers be omitted from both bathroom areas based on the definition of a compartment provided in Section 3.3.6?

Answer: First, each area qualifies as a separate bathroom using the definition in Section 3.3.2. However, even though the secondary Jacuzzi area qualifies as a bathroom and meets the definition of a compartment for the purposes permitting the sprinkler to be omitted, the main toilet area does not. The main area does not meet the definition of a compartment because the definition allows a doorway without a lintel only if there are no other openings to adjoining spaces. However, the scenario should be discussed with the authority having jurisdiction (AHJ). The AHJ may agree that the main bathroom area qualifies as a 'room' under the common usage of the word and permit the sprinkler in that area to be omitted as well.

Question 12 – Sprinklers in Closets with Obstructions

A building is being protected using NFPA 13. Is there anything in the standard that would allow small spaces, such as closets, to disregard obstruction rules?

Answer: Yes. Language was added in the 2013 Edition of NFPA 13 in Section 8.5.5.4 to allow obstructions in small closets and compartments to be disregarded. This section does limit the volume of the closet or space to a maximum of 400 cu ft. The allowance is based on a single sprinkler providing sufficient water to cool the space and control a possible fire even with obstructions present.