

Best of December 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 December 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 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 – Auxiliary Drains

Is a drum drip or auxiliary drain required downstream of the dry pipe valve in a sprinkler system if all the system piping slopes back to the riser?

Answer: No. Section 8.16.2.5.1 in NFPA 13 would only require an auxiliary drain if the piping cannot be pitched to drain all of the water through the main drain on the riser. The system described is able to pitch all of the piping back towards the riser and so it can be drained using the main drain. Therefore, no auxiliary drain would be needed. Furthermore, a drum drip would be used to drain pipe in an enclosure or area that is subject to temperatures 40 degrees Fahrenheit or lower, but if there are not trapped sections of pipe that cannot be drained through the main drain, then it does not have a function and is not necessary.

Question 2 – Verify Pipe Slope

Following NFPA 25 for the inspection of a sprinkler system, is it required to check the slope or pitch of the piping?

Answer: No. When conducting an inspection, it is a review of existing systems. In order for the building to be occupied, the system was approved when it was installed. The purpose of an inspection is to confirm that the system is as it was when installed. The pipe pitch is not specifically called out for the inspection portion of fire sprinkler systems in NFPA 25 and does not explicitly need to be checked.

Question 3 – Special Design for Compact Storage

There is a record storage scenario that will be protected in accordance with NFPA 13. Section 20.6, which is a special design of compact storage, will be followed. Following the guidelines, the space may be protected as light hazard. As NFPA 13 allows this type of storage to be classified as light hazard; can Extended Coverage pendent sprinklers be used?

Answer: No, Section 20.6.3 states that the sprinklers shall be ordinary temperature, quick response (QR), standard spray upright or pendent sprinklers. Extended coverage sprinklers are not standard spray and cannot be used in this protection scenario. Chapter 20 contains specific protection criteria for specific storage arrangements and the criteria listed must be followed. In this case, QR standard spray sprinklers must be used. NFPA 13 handles configurations of mobile compact storage in Section 20.6. If these requirements do not fit the scenario being protected, either in materials stored or desired components used for protection, then an alternate scheme would have to be created and approved by the authority having jurisdiction.

Question 4 – Distance Below Concrete Tees

A parking garage has concrete tee construction with 30-inch deep stems. The majority of concrete tees have stems that are 6 ft apart but there are some with the stems spaced at less than 3 ft on center. Where the stems are less than 3 ft on center, the Beam Rule (Section 8.6.5.1.2) in NFPA 13 is being followed. To spray below the beams, the sprinklers are planned for 24.5 inches below the ceiling deck. Can the sprinkler deflectors be located more than 22 inches below the deck in concrete tee construction when using Table 8.6.5.1.2?

Answer: Yes, Section 8.6.4.1.2(5) in NFPA 13 states that for concrete tee construction, regardless of the depth of the tee, the sprinkler deflector is allowed to be positioned so that it is within 1 inch below the bottom of the stem. This would permit distances greater than the 22 inches allowed under obstructed construction guidelines. The sprinkler can also be located above the bottom of the stem when meeting the distances in Table 8.6.5.1.2 that allow it to spray water under the stem. It is clear that the 22-inch deflector distance is not required for this section as it states "regardless of the depth of the tee".

This section was modified for the 2016 edition of NFPA 13. In earlier editions the stems of the concrete tees needed to be between 3 ft and 7.5 ft on center. However, the change permits the sprinklers to be spaced below the ceiling as described above for all concrete tee construction where the stems are less than 7.5 ft on center.

This reason that concrete tee construction is not subject to the maximum distance of 22 inches below the deck is that concrete can withstand the heat from a fire better than most materials.

Question 5 – Distance Below Deck with Insulation

A building is comprised of Z-purlins 5 ft on-center, which qualifies it as obstructed construction according to NFPA 13, Section 8.6.4.1.2 in the 2016 Edition. Insulation has been installed between the purlins. Next to the purlin the insulation is 1-inch thick and at the midpoint it is 3-inch thick. Can the sprinkler can be located up to 12 inches below the insulation midpoint determined according to Section 8.5.4.1.3.2?

Answer: No. This situation is combining obstructed construction spacing requirements and spacing requirements when insulation is present. Therefore, the sprinklers would need to be located no more than 22 inches from the deck while being 1 inch to 6 inches below the structural members per the obstructed construction guidelines. In this situation, the maximum 22-inch measurement would be taken from the insulation level (midpoint determined according to Section 8.5.4.1.3.2), and the sprinklers would still need to be between 1 and 6 inches of the Z-purlins.

Question 6 – Clearance in Elevator Machine Rooms

ASME A17.1A-2008 has been referenced in regards to sprinkler piping in elevator machine rooms. Sections 2.8.3.3 and 2.8.3.5 were cited. Specifically, do equipment clearance requirements in elevator machine rooms apply to fire sprinkler pipe?

Answer: Yes, the clearances need to be maintained. Section 2.8.3.3 states that sprinkler systems and piping shall be permitted to be installed in the hoistway, machinery space, machine rooms, control space or control room as long as they are installed to NFPA 13 or the NBCC and meet sections 2.8.3.3.1 through 2.8.3.3.4. Section 2.8.3.5 goes on to state that when piping is permitted to be installed in these areas, per section 2.8.3.3 for sprinkler piping, that the piping will not encroach on the required clearances.

Question 7 – Residential Sprinklers in the Corridor

There is a hallway in a residential building protected using NFPA 13. The hallway is proposed to be protected using residential sprinklers as permitted by Section 11.3.1.5. How many sprinklers are needed for the hydraulic calculations when using residential sprinklers in this situation?

Answer: The four (4) most remote adjacent sprinklers that produce the greatest hydraulic demand would be calculated per Section 11.3.1.1. In this situation, since both the rooms and corridors will be served by residential sprinklers, the same design method would be used for all. The most remote adjacent sprinklers may fall all in room(s), all in the corridor, or in some combination of the two. More than one calculation may be needed to determine the greatest hydraulic demand.

Question 8 – Determine Net Pressure

If a fire pump is in an existing building, how can the net pressure be determined?

Answer: First, the net pressure of the fire pump will vary with flow. The net pressure is simply the amount of pressure that the fire pump is adding to the flowing water. For example, if the water has 20 psi when it reaches the pump and 100 psi when it leaves the pump, the net pressure from the pump is 80 psi. The net pressure at the fire pump's rated flow should appear on its nameplate. For net pressure at other flows, the pump curve information from the pump's initial shop test or subsequent flow tests can be used to determine net pressure at any given flow.

Question 9 – Mixing Sprinklers in a Compartment

A residence hall is being protected in accordance with NFPA 13, 2010 edition. Per that edition Section 8.4.5.3 says "all sprinklers within the compartment shall be of the fast-response type." Can commercial quick response and residential sprinklers be mixed within the same dorm room?

Answer: No. In earlier editions of NFPA 13 there was a contradiction between a couple of sections and it was not clear if residential sprinklers could be mixed with other fast-response sprinklers in the same compartment. Since the 2013 edition that has been cleared up. Section 8.4.5.3 now states that when residential sprinklers are installed in a compartment, all of the sprinklers in that compartment must be residential. Although both quick response sprinklers and residential sprinklers are fast-response, it is not permitted for them to be installed in the same compartment.

Question 10 – Seismic Separation Assembly

Is it the intent of NFPA 13 is to require a seismic separation assembly on each side of the building seismic joint?

Answer: No. The seismic separation assembly required in Section 9.3.3.1 of NFPA 13 is written to require one seismic separation assembly for pipe crossing the seismic separation of a structure. This will allow for the piping to move if the buildings move due to an earthquake. It must be provided for every pipe that crosses the gap, but only one seismic separation assembly is required for each pipe that crosses the seismic joint. It should be noted that there are two 4-way braces for each seismic separation assembly, one on each side within six feet of the seismic separation to make sure that the piping moves with the structure as intended.

Question 11 – Protection of Standpipes Not in Stairways

Do auxiliary vertical standpipes located outside of stair towers (because of travel distance requirements) need to be protected by a degree of fire resistance equal to that required for enclosed exit stairways in the building?

Answer: Yes. All standpipes are required to be protected by fire resistive construction unless specifically allowed to be omitted in fully sprinklered buildings under Section 6.1.2.2.1. The standpipes act as an extension of the water supply for fire fighters during a fire incident. They need to be protected so that the intended water supply is available for use when needed.

Question 12 – Standpipe System Piping in Unsprinklered Parking Garage

There is a multilevel parking garage with no fire sprinkler protection. Would this situation require the standpipe system piping to be protected by a degree of fire resistance equal to that required for enclosed exit stairways within the attached building?

Answer: Section 6.1.2.2.2 of NFPA 14 states that where exit stairways are not required to be enclosed in fire-rated construction, standpipe systems shall be permitted to be installed without the fire resistance required by Section 6.1.2.2. If enclosed fire-rated construction for exit stairways is required in the parking garage, then the standpipe system would be required to be protected with fire resistance equal to the fire rating of the enclosed exit stairways. If the stairways are not required to be enclosed, then it is acceptable to leave the pipe exposed.