

## Best of October 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 October 2016." 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 - Bounding a Ceiling Pocket

NFPA 13 defines a ceiling pocket as "an architectural ceiling feature that consists of a bounded area of ceiling located at a higher elevation than the attached lower ceiling." There is a space where one side of a ceiling pocket is bounded by a wall. Does this type of space comply with the definition of ceiling pocket?

**Answer:** Yes. The concept of bounding a space is just to create an area where the heat will collect. A ceiling pocket could be bounded by lower elevation ceilings or walls in order to make a pocket. The heat will collect as expected similar to bounding by a lower ceiling.

### Question 2 - Different K-factors in One Compartment

A building with a roof sloped from 38 feet in height at the outside wall to 43 feet at the peak is protected with K-22.4 ESFR sprinklers in areas where the ceiling height is 40 feet or more and with K-16.8 ESFR sprinklers in the areas where the ceiling height is less than 40 feet. The K-22.4 sprinkler layout meets the requirements for a ceiling height up to 45 feet and the K-16.8 sprinkler layout meets the requirements for a ceiling height up to 40 feet in accordance with NFPA 13. Section 23.4.4.9 states, "...mixing of sprinklers of different K-factors by reducing the K-factor of adjacent sprinklers on the same branch line leading back to the main for the purpose of minimizing sprinkler over discharge shall not be permitted." Is it permissible to use ESFR sprinklers with different K-factors in the same compartment?

**Answer:** Yes, it is not the intent of Section 23.4.4.9.2 to prohibit using different K-factors in different protection areas as clarified in the annex commentary. It states, "The use of sprinklers with differing K-factors in situations where different protection areas are needed is not considered balancing..." It should be noted that this assumes that the hazard protected is uniform throughout the compartment. Where different hazards or design methods are adjacent in the same compartment, the requirements of Section 11.1.2 Adjacent Hazards or Design Methods must be met.



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### Question 3 - Incidental Ordinary Hazard Spaces

NFPA 13, Section 6.3.10.2, permits pipe or tube listed for light hazard occupancies to be used in ordinary hazard rooms up to 400 sq ft in otherwise light hazard occupancies. Does this apply to multiple adjacent ordinary hazard rooms, each individually less than 400 sq ft, but having an aggregate area exceeding 400 sq ft?

**Answer:** Yes, as long as the building is considered predominately light hazard. NFPA 13, Sections 6.3.10.2 and 6.3.9.6 do not identify that there is a requirement limiting the application to one room or to consider the total aggregate area of multiple ordinary hazard rooms. These sections reference ordinary hazard rooms and identify that "the ordinary hazard room" be limited to 400 sq ft. Therefore, it would be possible to have more than one ordinary hazard room and use the pipe listed for light hazard as long as these higher hazard spaces are minimal overall.

### Question 4 - Double Wall Diesel Fuel Tank

Is it permitted to use a double wall diesel fuel tank as an alternative to a dike wall in order to provide containment when installing a diesel fuel tank for a fire pump installation per NFPA 20?

**Answer:** Yes. NFPA 20 provides the guidance on tank construction in Section 11.4.1.4 and only requires a wall, dike or curb to be built when a single wall tank is used. However, the criteria in NFPA 20 would only apply to tanks supplying a fire pump where the tank's capacity is less than 1320 gallons. For tanks with a higher capacity, NFPA 37 would need to be referenced and may have additional requirements for the installation.

**11.4.1.4.1** Tanks shall be single wall or double wall and shall be constructed in accordance with recognized engineering standards, such as ANSI/UL 142, *Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids*

**11.4.1.4.2** Tanks shall be securely mounted on noncombustible supports

**11.4.1.4.3** Tanks used in accordance with the rules of this standard shall be limited in size to 1320 gal. (4996 l).

**11.4.1.4.4.** Single wall fuel tanks shall be enclosed with a wall, curb or dike sufficient to hold the entire capacity of the tank.

### Question 5 - Using Intermediate Temperature Sprinklers

There is a small internet technology (IT) room with servers in an office building. Do intermediate temperature sprinklers have to be used in the space?

**Answer:** Section 8.3.2.1 of NFPA 13 allows the use of ordinary- and intermediate-temperature sprinklers throughout the building unless specified in the requirements of Sections 8.3.2.2, 8.3.2.3, 8.3.2.4 or 8.3.2.5. Section 8.3.2.2 goes on to say that where the expected maximum ceiling temperature exceeds that permitted by the type of sprinkler initially selected; it shall be increased to an appropriate temperature rating. Therefore, the expected temperature at the ceiling in the server room will have to be determined. There are many variables that can impact the temperature in this server room, such as the amount of equipment, type of equipment and if the space is conditioned and/or ventilated. Evaluating these will give an appropriate temperature rating for the sprinklers in the space. However, it should be noted that it is permitted to install either an ordinary- or intermediate temperature sprinkler in the space regardless, so there is nothing prohibiting the use intermediate sprinklers.

### Question 6 - Spacing Near a Light Fixture

A light fixture is located in close proximity to a sprinkler in a light

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hazardous residential facility protected in accordance with NFPA 13 (2013). The light fixture is a pendant type that is 18 inches in diameter which is supported from a stem. The bottom of the fixture is approximately 10 to 12 inches below the ceiling. A sprinkler has been installed approximately 3 inches from the edge of the light fixture with its deflector approximately 1 inch below the ceiling. Requirements were referenced for sprinklers below large obstructions, those more than 4 ft wide.

Is another sprinkler required on the other side of the light fixture?

**Answer:** No, the applicable obstruction rule in this case would be Section 8.6.5.2.1.3, the 'Three Times Rule', but that rule may be disregarded for nonstructural obstructions in light or ordinary hazard occupancies as per Section 8.6.5.2.1.4. The requirements of Section 8.6.5.1.2 are not intended to be applied to noncontinuous obstructions; particularly obstructions that are not at or above the level of the deflector. This installation is not ideal but it does comply with the obstruction spacing requirements.

#### Question 7 - Room Design Method

This is in reference to NFPA 13. There is a double interlock preaction system being installed. Can the room design method be used to calculate the hydraulic demand of this type of system?

**Answer:** Yes. All types of systems are permitted the option of using the room design method. Section 11.2.3 indicates that the room design method can be used. This is an acceptable approach for wet, dry or preaction systems. Of course, the requirements for using the room design method such as the required fire resistance rating of the walls, etc. need to be met, but this option can be used for preaction systems.

#### Question 8 - Using the Beam Rule

There is a 9 ft ceiling in a hallway and an adjacent alcove with a ceiling height of 8 ft. Is a sprinkler required to be located under the alcove area?

**Answer:** Yes, a sprinkler would be required under the 8 ft high alcove area for this situation using standard spray sprinklers. Section 8.6.4.1.1.3(B) of NFPA 13 which was referenced, would not allow you to omit this sprinkler under the lower ceiling area. Section 8.6.4.1.1.3 deals with vertical change in ceiling elevations and shows situations where the requirement of section 8.6.4.1.1.1 (the sprinkler deflector must be within 1 inch to 12 inch from the ceiling throughout the area of coverage of the sprinkler) would not apply. Section 8.6.4.1.1.3(B) could not be applied in this case as it states that the obstruction rules be followed. This section reads as follows:

**8.6.4.1.1.3(B)** Where the distance between the upper ceiling and the sprinkler deflector is less than or equal to 36 in. (900 mm), the sprinklers shall be permitted to be spaced as though the ceiling was flat, provided the obstruction rules are observed as shown in Figure 8.6.4.1.1.3(B).

The applicable obstruction rule in this case would be the beam rule as shown in Table and Figure 8.6.5.1.2. The sprinkler at the higher elevation (9 ft) is located 3 ft from the lower elevation alcove (8 ft) in this situation. Based upon Table 8.6.5.1.2, a sprinkler located 3 ft from an obstruction would need to have its deflector located no more than 9 1/2 inches above the bottom of the obstruction in order for the water from the sprinkler to spray below the obstruction. In this case, the deflector of the sprinkler in the upper ceiling level exceeds that 9 1/2 inch maximum distance so an additional sprinkler must be located under the alcove.

As an alternative, the sprinkler located in the hallway (9 ft elevation)



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may be moved 6 inches further away from the alcove (8 ft elevation). This additional distance would allow the hallway sprinkler to meet the rules of section 8.6.5.1.2 to allow the water to spray below the obstruction and an additional sprinkler would not be required to be located under the alcove area. If the sprinkler in the hallway was located 3 ft 6 in horizontally from the obstruction, table 8.6.5.1.2 indicates that the sprinkler deflector may be located up to 12 inches above the bottom of the obstruction. If the hallway sprinkler is moved, care must be taken to ensure that the sprinkler is located no more than 7 ft 6 inches from the wall.

#### **Question 9 - Hazard below Canopy**

A 7-foot wide combustible canopy is attached to the front of a strip mall where no permanent combustibles will be present. Since the building is a strip mall, the occupancy use of the tenant space can range from light to ordinary hazard occupancies. It has been indicated that tenants might include retail, restaurants and offices. Is this canopy required to use a classification of ordinary hazard for the sprinklers installed below it?

**Answer:**No. The canopy would be considered light hazard in accordance with NFPA 13, Section A.5.2 for "eaves and overhangs." Any displays in front of the store, which are removed at night, would be considered transient and not permanent. Spacing and design of sprinklers installed beneath the canopy would be in accordance with light hazard requirements. However, it would be advisable to discuss the situation with the owner to determine if there is a need to increase the sprinkler beyond the code minimum for flexibility in future use. The intention would be to determine if the owner is interested in allocating additional funds to increase the hazard classification to ordinary hazard to allow for permanent sales displays or storage in the future.

#### **Question 10 - Sprinkler Pipe Supporting Sprinkler Pipe**

Is it acceptable to hang sprinkler piping from other sprinkler system piping?

**Answer:** Yes, sprinkler piping can be hung from other sprinkler system piping. Annex section A.9.1.1.8.1 of NFPA 13 states "...NFPA 13 provides the option to support sprinkler piping from other sprinkler piping where the requirements of 9.1.1.2 are met." Section 9.1.1.2 contains the performance requirements for a hanger. Therefore it must be verified that the structure at the points of attachment and the hangers can support the weight of both piping runs. If traditional hanger rings do not meet the necessary loads for the scenario, then "heavy duty rings" may be able to support the loads. These are produced by multiple manufacturers so that the ring size fits appropriately on the pipe but can suspend heavier loads. However, as long as the loads can be adequately supported, it would be acceptable to hang one sprinkler pipe from another.

#### **Question 11 - Check Valves in the Riser**

There is a project that will have three separate sprinkler systems (one dry and two wet) all fed from a common underground supply. These systems are all on a single floor level. The underground supply has a backflow preventer. Does each of the separate risers require a separate check valve?

**Answer:** The answer depends on the arrangement of the fire department connection (FDC) and the automatic water supply. Section 8.16.1.1.3 of NFPA 13 requires a check valve for each water supply (to prevent the water from one water supply going to the other water supply rather than the sprinklers during a fire). In this case, the FDC counts as a water supply. You need a check valve that is located so that the water being pumped into the fire department connection does not return to the automatic water supply or the hydrant where it is originally being pumped from.

In this case, the backflow preventer is serving as the check valve on

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the automatic water supply as permitted by 8.16.1.1.3.2 of NFPA 13. The FDC (which is also a water supply) is also equipped with a check valve. As long as the FDC is tied to a point in the system downstream of the backflow preventer (which is considered a check valve), there is no requirement to install a separate check valve on each separate riser.

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### Question 12 - Sprinklers in Dwelling Unit Closets

An existing apartment building is being renovated. There are some closets in this building under 12 sq.ft. and others that are more than 12 sq.ft. but less than 24 sq.ft. According to NFPA 13, 2010 Edition, do these closets need fire sprinklers within them?

**Answer:** Yes. This is based on NFPA 13, Section 8.15.8.2, which states, "Closets and Pantries. Sprinklers are not required in clothes closets, linen closets, and pantries within dwelling units in hotels and motels where the area of the space does not exceed 24 sq.ft. (2.2 sq.m.) and the walls and ceilings are surfaced with noncombustible or limited-combustible materials." This section only applies to dwelling units, but it also only applies to hotels and motels. It was noted that the scenario at hand is an apartment, which means sprinklers would be required to be installed. The difference between these types of spaces is that hotels and motels are transitory occupancies, so it is anticipated that the amount of fuel stored in these closets will be less.

### Did You Know??

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