NFSA NATIONAL FIRE SPRINKLER ASSOCIATION
The Voice of the Fire Sprinkler Industry
TechNotes

Editor - Roland Asp, CET | #465 | 06/08/2021

Best of May 2021

The following are a dozen questions answered by the NFSA's Codes, Standards, and Public Fire Protection staff as part of the Expert of the Day (EOD) member assistance program during the month of May 2021. This information is being brought forward as the "Best of May 2021." If you have a question for the NFSA EOD submit your question online through the "My EOD" portal.

It should be noted that the following are the opinions of the NFSA Engineering, Codes, and Standards staff, generated as members of the relevant NFPA and ICC 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 or ICC Council Policy #11 and should therefore not be considered, nor relied upon, as the official positions of the NFSA, NFPA, ICC, or its Committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

Question #1 – Odd Ceiling Tiles

On a project the architect has chosen a ceiling tile that is 55% open and 45% closed. The tile is an odd mesh pattern (see image below). The space above this ceiling is noncombustible. As these tiles are not greater than 70% open and they do not meet the criteria for open-grid ceilings, this ceiling is being treated as "solid" and pendent sprinklers will be installed within the ceiling tile and sprinklers are also being installed in the concealed space above these tiles.

As the tiles are 55% open, it is being interpreted as the tile is sufficient "solid" to collect heat enough to activate these pendent sprinklers. Is this interpretation correct?

We are not convinced that the open grid ceiling language (Section 8.15.14) can be interpreted such that if the open type ceiling grid does not meet the criteria of this section they should be treated as solid tiles and will collect sufficient heat to activate a sprinkler installed in this tile.

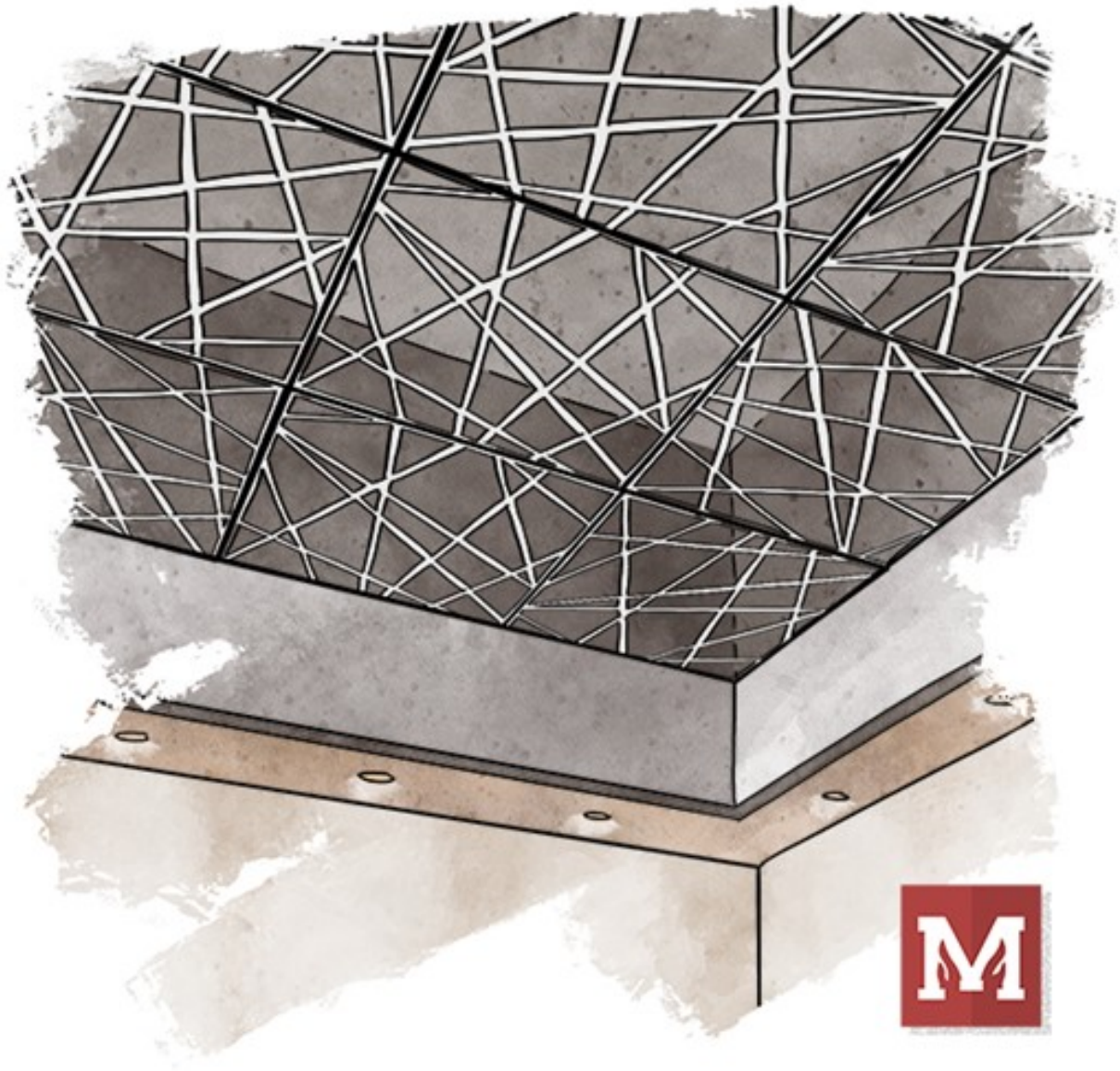
In fact, this section states that open grid ceilings shall only be installed beneath sprinklers where they meet the conditions of option (1) which states that the tile must be at least 70 % open among other requirements or Option (2) which allows specifically listed open-grid ceilings.

It must be noted that this section limits the type of allowed open-grid ceilings to account for interruptions of the spray pattern and does not account for sprinkler activation issues (see A.8.15.14).

Based upon the description of the open-grid ceiling tile, this type of tile is an open-grid type ceiling but does not meet the options listed in Section 8.15.14 and would not be permitted to be installed beneath sprinklers. Additionally, we do not believe these tiles can be treated as “solid” simply because they are less than 70% open. It does not appear that these tiles are “solid” enough to trap heat to the extent that the sprinkler installed in the tile will activate in a timely manner. Additionally, sprinklers installed in these tiles would not be protected from cold soldering from the sprinkler above.

This situation is one that is not directly addressed by NFPA 13. The following may be acceptable options:

1. Convince the building owner or architect to use a solid tile or an open-grid tile that meets the requirements of 8.15.14. and install sprinklers above the tile only.
2. If these “open tiles” are to be used, convince the owner or architect to install a barrier above the tile to trap heat and protect from overspray from the ceiling sprinklers above. We have seen similar installations where a black “fabric” barrier was installed on top of an open ceiling to address similar situations.
3. Have an engineer perform fire modeling or calculations to justify an alternative arrangement and increased clearance from the sprinkler to the ceiling as permitted in Section 8.1.1(6). Depending on the distance between the structural ceiling and the open tiles, an engineer may be able to make the case that sprinklers installed in these open tiles may still activate in an acceptable time frame.



Question #2 – Dry System with Sloped Roof - Room Design Method

We are designing a dry system for an existing wood building that has a roof exceeding a 1 in 6 pitch. We are looking at using the room design method. Is a 30% increase of the area of the room required to account for the pitch of the roof with the room design method?

No, the pitch of the roof does not need to be accounted for when using the room design method. The assumption is that all of the sprinklers are going to open in the room and the walls will have enough fire resistance to keep the fire in the room until the sprinklers activate, or the fire department has arrived to handle final suppression. Be careful about following all the rules regarding automatic door closers on all the doors and making sure that the doors have the appropriate fire resistance rating. Only in light hazard occupancies can the door rules be ignored by adding two sprinklers in the adjoining room.

Question #3 – Pressure Tank – Capacity of Air Compressor

We are working on a project that will utilize a pressure tank as the water supply. The calculations indicate that the total water demand will be 5,400 gallons. As NFPA 22 requires the tanks to be approximately 2/3 filled with water, the total tank size will be 7,200 gallons.

How is the size of the air compressor determined?

The answer to this question is found in Section 7.2.10.1 in the 2018 edition of NFPA 22. This section states that for tanks of 7,500-gallon total capacity or less, the air compressor must be capable of delivering not less than 16 cubic feet per minute. For tanks larger than 7,500 gallons, the compressor must be capable of delivering at least 20 cubic feet per minute.

Based upon this section and the fact the total capacity of the pressure tank in this case is 7,200 gallons, the air compressor would be required to be capable of delivery at least 16 cubic feet per minute of free air.

Question #4 – When are Pressure-Regulating Valves (PRV) Required?

A midrise (non-high rise) building with a combined sprinkler/manual wet standpipe with a 1000gpm standpipe design was described. The system requires 230 psi at the fire department connection (FDC). The 2016 edition of NFPA 14 is being enforced.

Are listed pressure-regulating valve (PRVs) required?

No, as long as the static system pressure does not exceed 175 psi at the hose connection, a listed pressure-reducing device is not required on the hose connection. The system pressure at the FDC is not used in determining the requirements for PRVs.

Section 7.2.3 provides the pressure limitations for hose connections and specifically Section 7.2.3.2 requirements for a 2 1/2 in. hose connection. Where pressure exceeds 175 psi static at the hose connection, a listed pressure-regulating device shall be provided to limit pressure.

The over pressuring of hose valves from the FDC is a possibility and caution should be used by the fire department when supplying all FDC's.

Question #5 – ESFR Remote Area Size

NFPA 13 requires that 12 ESFR sprinklers be included in the hydraulic calculation. NFPA states that minimum area of operation for an ESFR sprinkler is 64 square feet which multiplied by 12 sprinklers would equal 768 square feet. I am being told, however, that the minimum area of the calculation must also be at least 960 square feet, but I cannot find this information in NFPA 13.

Is there a minimum square foot area for an ESFR calculation?

No. However, there was a minimum design area in NFPA 13 for ESFR sprinklers up to the 2007 edition. When preparing the 2010 edition, the NFPA 13 technical committee eliminated the minimum area requirement with the following statement:

"Analysis from Factory Mutual has determined that the 960 sq ft design area is not necessary as long as the minimum spacing rules are followed."

Question #6 – FDC Height Required

What is the required minimum and maximum fire department connection (FDC) height in accordance with NFPA 13?

NFPA 13, 2019 edition, Section 16.12.5.1.2 requires the FDC be located not less than 18 in. and not more than 4 ft above the level of the adjacent grade or access level. This requirement is new to the 2019 edition and was previously located in the standard as annex material in Section A.8.17.2 of the 2016 edition. The 2022 edition will maintain this requirement in the body of the standard.

Question #7 -Fire Pump Test using Flowmeter to Tank

It appears that Section 8.3.3.9.2 of the 2020 edition of NFPA 25 states that a flowmeter that discharges to a tank without requiring this test to be performed with a standard test header and hoses every three years.

Is this correct?

Yes, that is correct, in accordance Section 8.3.3.9.2 of NFPA 25 2020 edition, if using a flow meter to drain or suction reservoir you do not have to flow water using any other methods such as hose streams. The only time that water must be discharged is when using the closed looped metering method, which is discharging water back to the fire pump suction directly. When using closed loop metering, flow must be conducted once every three years via hose stream or back to drain/suction reservoir.

Question #8 – Floor Penetration Clearance

Section 9.3.4.5 of the 2016 edition of NFPA 13 allows one to omit clearance for floor penetrations if Section 9.3.2.3.1(2) requirements are met. However, flexible couplings within 12 in. above and within 24 in. below floor penetration are required per Section 9.3.2.3.1(2). It appears that floor penetration clearance is not required in either case.

In other words does not one section make the other section mute because it is required to be applied in order to adhere to NFPA 13 standards?

It is true that Section 9.3.4.5 and Section 9.3.2.3.1(2) both state that clearance is not required for piping penetrating a floor where flexible coupling are provided within 12 in. above and 24 in. below the floor.

We do not agree, however, that one section makes the other section mute but is rather a clarifying statement. Section 9.3.2.3.1 is limited to required locations for flexible couplings while Section 9.3.4 is specific to clearance requirements.

Section 9.3.4.5 is simply stating that as long as flexible couplings are provided above and below floors as required by 9.3.2.3.1(2) – no clearance is required.

Question #9 – Zero Lot Line Covered Walkway

There is a new building (sprinklered) with an attached noncombustible overhang/covered walkway. Due to the walkway, there is not proper separation from the adjoining building.

As the two buildings do not have the proper separation - Is the walkway required to be sprinklered?

No, sprinkler protection would not be required under the walkway. Section 8.15.7 of NFPA 13 (2016) states that sprinklers are permitted to be omitted where exterior canopies and similar projections are constructed with materials that are noncombustible. The zero-lot line situation created would not trigger sprinklers being required.

However, it is important to note that the *International Fire Code* and NFPA 13 do have provisions for required sprinklers when combustible storage is

under these projections. If this space is going to have any type of combustible storage, then sprinklers would be required.

Question #10 – Pipe Schedule for Standpipes

The 2003 edition included Table 7.8.2.1 which showed the pipe schedule method of sizing standpipes. This table does not seem to be included in the 2016 edition of NFPA 14.

Are standpipes now required to be hydraulically calculated?

Yes, hydraulic calculation is required for proper standpipe pipe sizing. The pipe schedule sizing Table 7.8.2.1 found in the 2003 edition of NFPA 14, was removed during the 2009 fall second draft revision cycle, for the 2010 edition. The committee removed the table with a committee statement that all standpipe systems should be hydraulically calculated. The hydraulic calculation requirements for pipe sizing, Section 7.10.1.2* (NFPA 14, 2016) for standpipes are based on providing 250 gpm at the two hydraulically most remote hose connections and at the point of each additional standpipe at the minimum pressure required by 7.8 (NFPA 14, 2016).

Question #11 – Ethyl Alcohol in Wood Barrels

We are working on a project that consists of a 2,000 square foot. warehouse that will store distilled spirits in wood barrels. In the 2018 edition of NFPA 30, all chapters seem to exclude flammable liquid stored in wood barrels.

Where would we find the appropriate protection scheme for this scenario?

Wooden barrels are excluded from NFPA 30 (2018) as noted in Section 9.1.4(7). During a fire, wooden barrels lose containment slowly adding fuel to the fire rather than failing abruptly like plastic containers. It would be prudent for a licensed fire protection engineer to evaluate the project as a whole with this specific hazard in mind and determine an acceptable design criterion that is acceptable to the AHJ.

It should also be noted that the Distilled Spirits Council of the United States (DISUS) maintains a guideline document entitled "*Recommended Fire Protection Practices for Distilled Spirits Beverage Facilities*", as well as Factory Mutual Data Sheet 8-9, which may provide guidance.

Question #12 – Long Drop and Upward Restraint

It appears that the intent of Section 9.2.3.5.2 of the 2016 edition of NFPA 13 is to prevent the high reaction force from dislodging the sprinkler. It would seem logical that a long drop would have weight to resist the upward thrust, but NFPA 13 does not seem to take this into consideration.

Can any consideration be given to the length of the drop and therefore the weight of the water filled pipe itself resisting the upward thrust?

There is no consideration for the length of vertical piping on a drop as to what would be an acceptable length to negate the need for a restraint to restrict the upward movement of the piping provided in NFPA 13.

NFPA 13 Section 1.5 does allow engineered equivalency. If the thrust force can be calculated for the arm over in question and is shown to be less than the weight of the piping, this may be acceptable so long as the AHJ has approved this methodology.

Layout Technician Training

Layout Technician Training Class

The Layout Technician Training class is designed to take a person with basic knowledge of math, physical science and drafting skills and teach them to be productive basic sprinkler layout and detailing technicians. All of the work elements necessary for NICET Level II Certification will be covered by the course.

Layout Technician Training
August 10 - Sept 2, 2021

Blended Layout Practicum
August 25 - Sept 2, 2021

Blended Layout Tech Practicum

This class is the ***second part*** of the Layout Tech Blended program. The class focuses on the application of the course materials through layout, design and calculation of multiple types of sprinkler systems. This portion also includes information on NFPA updates, Project Management, Stock-listing and Estimating.

Layout Technician Training
Nov 2 - Dec 2, 2021

Blended Layout Practicum
Nov 17 - Dec 2, 2021

Register Here

New EOD Process

Starting on July 15, 2020, the NFSA has a new EOD process where members can submit questions, track the progress, and view their EOD cases. The step by step process is detailed in **TechNotes #442**.

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