

## Best of April 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 April 2021. This information is being brought forward as the "Best of April 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 – Sidewall Sprinklers Protecting Balconies

**The 2018 edition of the International Fire Code (IFC), Section 903.3.1.2.1 allows sidewall sprinklers to be installed such that the deflector is 6-inches below joists and up to 14-inches below the deck.**

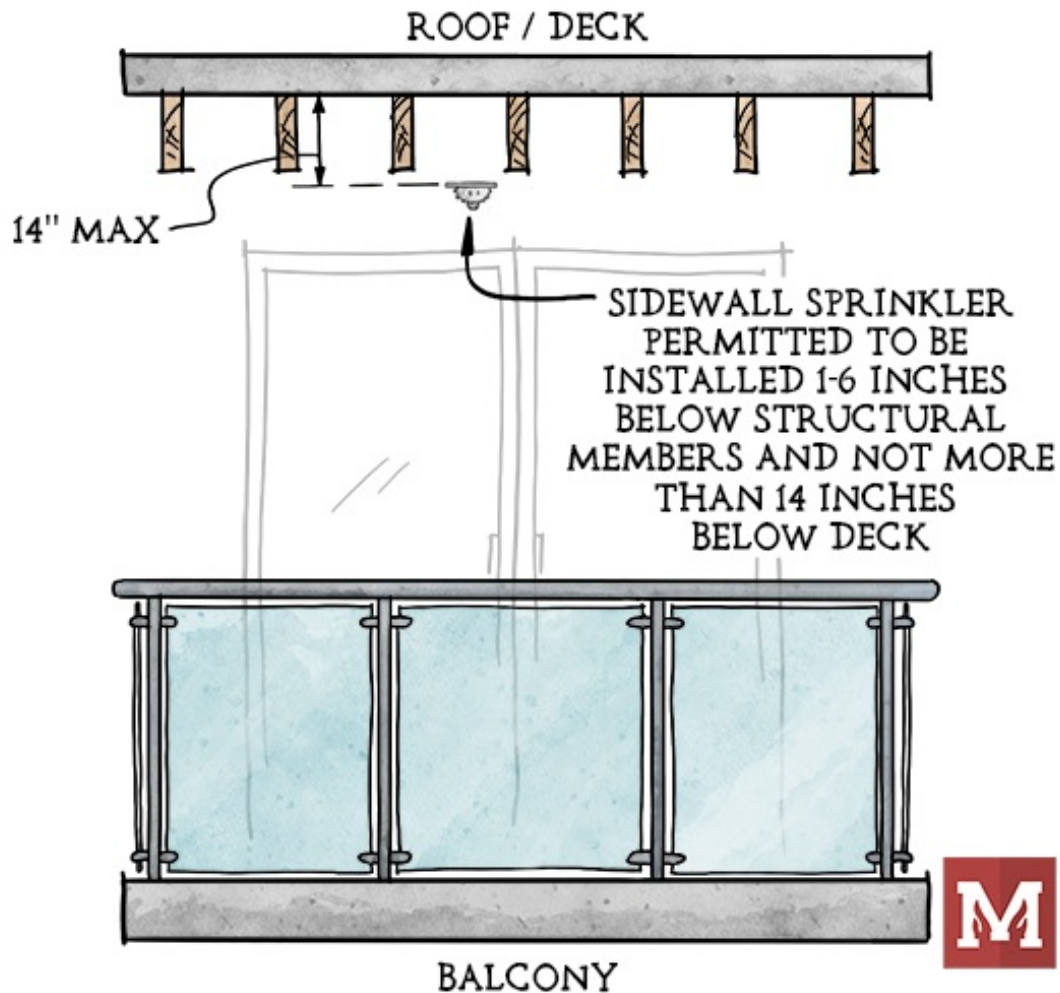
**Does this apply to NFPA 13 systems or just NFPA 13R systems? If the listing of the sidewall sprinkler is for a maximum of 12" below deck, does this supersede the IFC design allowance of that the sprinkler may be positioned up to 14" below the deck above?**

This requirement can apply to both NFPA 13 and NFPA 13R systems. When this requirement was introduced to the IFC (and IBC), NFPA 13R did not have a requirement to protect the balconies and decks of dwelling units that were built using Type V construction. In order to harmonize the documents, similar requirements have 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.

In this case, the sidewall sprinkler can be installed outside its listing (up to

14-inch down). Sidewall sprinklers are only listed under smooth flat ceiling, installing under wood joists is outside its listing . If this particular situation consists of open joists, they can be installed 6 in below joist and up to 14 in below the deck even in NFPA 13.

It should be noted the next edition of NFPA 13 will likely include language to require sprinklers under balconies serving dwelling units and will include the same positioning requirements for sidewall sprinklers. It should also be noted that sprinklers are permitted to be used outside their listing in accordance with Section 9.4.1.2 of the 2019 NFPA 13.



**Question #2 – Combined Automatic Sprinkler System/Manual Standpipe System**

**Is it permitted to have a manual wet standpipe system that is part of a combined standpipe/sprinkler system with a fire pump that only supplies the system demand for the sprinkler system?**

Yes, a manual wet standpipe system can be used in a combined system. The term “combined” is referencing the configuration of shared risers supplying both the standpipe and sprinkler systems. The requirement for the type of standpipe, manual vs. automatic, is triggered by other requirements such as height, size or use of a building.

Combined systems in mid-rise building (less than 75 feet above or below the level of fire department vehicle access) is a common and popular design choice. The NFPA 14 standpipe standard permits manual standpipes in non-high-rise buildings. The use of a small fire pump to meet the fire sprinkler demand, including hose allowance requirements, is also allowed and does not require the separation of the systems risers.

The standpipe flow rates (gpm) required by Section 7.10.1.3 for combined systems still applies but are allowed to be supplied by the fire department connection (Section 7.7.1).

### **Question #3 – IBC and Sprinkler System Penetrations of Stairwells**

**In a school where sprinkler standpipes and sprinkler piping feed into and out of stairwells (floor control valves, pipe, sprinklers), the fire marshal is referencing the 2012 International Building Code (IBC), Section 1022.5 and is stating that multiple penetrations of the stairwell enclosure by the sprinkler system is not permitted.**

**Does the building code allow multiple penetrations of the stair enclosure by fire system piping?**

This section of the IBC allows the standpipe and fire sprinkler riser (or combination thereof) to serve the stair enclosure and allows the penetration of the enclosure. The fire sprinkler system is permitted to protect the stair enclosure, then exit to serve the adjacent area, however, the sprinkler piping outside the enclosure, such as branch lines serving the adjacent area, are not permitted to re-enter the enclosure. In other words, fire protection piping can exit the stair enclosure, but it cannot re-enter.

Standpipes, sprinklers, combined systems are allowed in the stair enclosure and penetrate the stair enclosure to serve the floor. What this section is trying to do is prohibit the stair shaft for being a raceway for nonessential systems and equipment. Where some contractors or layout technicians get in trouble is they will use the stair enclosure as a short cut for branch lines for the ceiling system, meaning the branch line is uninterrupted by the stair enclosure. This is not permitted by the IBC.

## Question #4 – Armovert to Upright Sprinkler

On a project, there is an armovert feeding an upright sprinkler. This armovert exceeds 12-inches and the system pressure does not exceed 100 psi. We have been directed to add a hanger or cut back the armovert to less than 12-inches in accordance with NFPA 13 Section 9.2.3.5.3.

Is an armovert to an upright sprinkler permitted to exceed 12 -inches in length without a hanger and does Section 9.2.3.5.2 apply in this situation?

Section 9.2.3.5.2 only applies to sprinklers that are installed in a ceiling or a wall where the thrust force created by the pressure exceeding 100 psi could create enough lift to the piping sufficient enough to lift the pendant out of the ceiling which would obstruct the sprinkler flow.

This arrangement would fall under Section 9.2.3.5.1 that states the cumulative horizontal length of an unsupported armovert to a sprinkler, sprinkler drop, or sprig shall not exceed 24-inches for steel pipe.

## Question #5 - Insulating/Tenting of Sprinkler Piping

On a recent project, sprinkler piping was protected from freezing by “tenting” the insulation. It was noted that within the cavity formed by the insulation are electrical wires along with the sprinkler pipe. The wiring is not touching or hanging from the sprinkler piping.

Is electrical wire (or other non-sprinkler equipment) permitted to be installed in the insulated space along with the sprinkler piping?

The NFPA sprinkler installation standards (NFPA 13, NFPA 13R, and NFPA 13D) all allow the tenting of insulation to prevent water filled piping from freezing. In essence, the tenting of insulation extends the insulated envelope of the building to ensure the piping is installed in an area that is not subject to freezing. Tenting of insulation can be extremely effective assuming that the insulation is not installed between the heated space and the piping and that sufficient insulation is installed over the pipe which will trap the heat coming up from the conditioned space above.

It is very important that the insulation is not disturbed once installed, however, the installation standards do not address whether other items such as electrical wires can be in the tented space. From a practical standpoint, the presence of wires in the tented area would lessen the effectiveness of the insulation however there are some practical concerns:

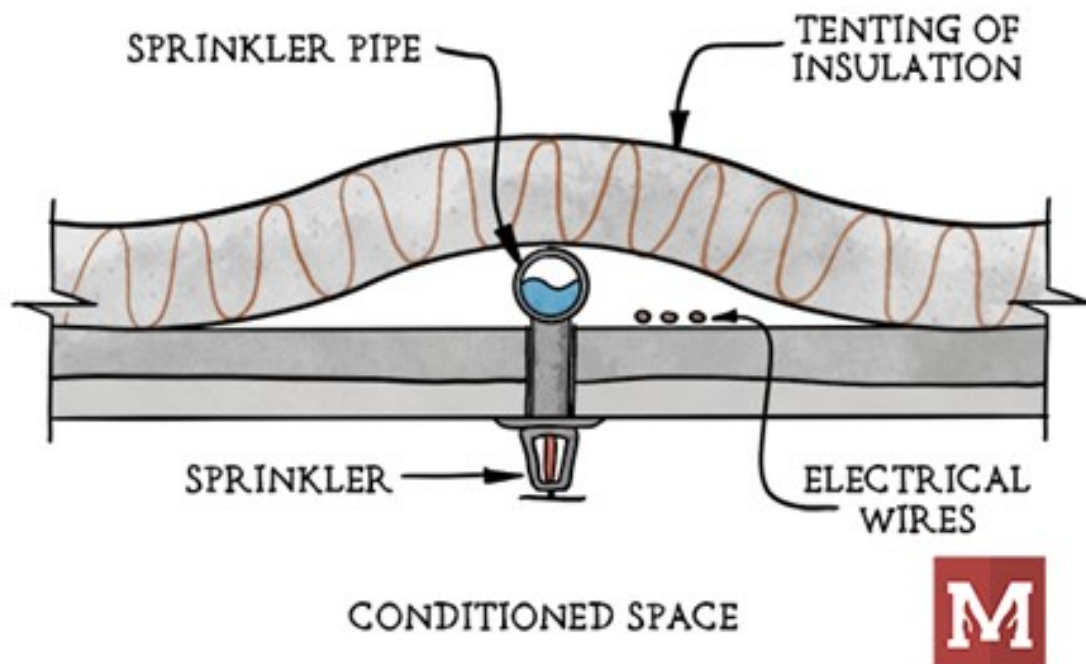


- If the piping is nonmetallic (CPVC), any compatibility concerns must be addressed (the wire should not be in contact with the pipe).
- The integrity of the insulation envelope must be maintained.

In order to address the above concerns, it may be good practice to limit the insulation envelope to the fire sprinkler system only, however the NFPA standards do not forbid other systems in this space.

NFSA did produce guidelines for Insulation for fire sprinklers (INSULATION FOR FIRE SPRINKLERS GUIDE) <https://nfsa.org/wp-content/uploads/2021/02/Insulation-White-Paper-final-2.pdf>

These guidelines do not specifically address the concern regarding sharing the insulated space with other equipment.



## Question #6 - Ethylene Glycol

**A 60% solution of Ethylene glycol is used in an existing fire sprinkler system.**

**As this is an existing installation, can this solution remain in service?**

No, ethylene glycol is not permitted in fire sprinkler systems. Depending on when the system was installed, for example the 2010 edition of NFPA 13, it did permit ethylene glycol in a fire sprinkler system when connected to nonpotable water source. Antifreeze systems, at that same time, connected to a potable source, such as a city water main, must use propylene glycol or glycerin. Since the 2010 edition of NFPA 13, a lot has happened in antifreeze systems. Not all of it can be summarized in a short response, however, as an owner, it is important to know that NFPA 25 is the enforced standard that maintains existing fire sprinklers systems. In the current

standard (2020 edition), Section 5.3.4 is where the rules for existing sprinkler systems testing and maintenance with antifreeze can be found. NFPA 25 does not have guidance on maintaining an existing ethylene glycol system, in fact, Section 5.3.4.4.1 requires existing systems installed before 2012, either had to update to a listed antifreeze , or keep limited concentrations of propylene glycol and glycerin in systems. This means an existing system with ethylene should have been converted to another approved antifreeze (a listed antifreeze, propylene glycol or glycerin product). Replacing the existing approved propylene glycol system with ethylene or keeping the existing ethylene system in service would not be permitted. The same section does have a specific prohibition on ethylene glycol in CPVC systems. In summary, an existing system, even if permitted with ethylene glycol in the past is no longer allowed today.

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## Question #7 - Trench Clarification

**The 2016 edition of NFPA 13 states in Section 10.4.3.2.2 that it is acceptable to install piping in covered trenches where the trenches are accessible from within the building. This is so the private main may extend more than 10-foot into the building.**

**What is the definition of a trench in this case?**

While the question is specific to the 2016 edition of NFPA 13, the 2019 edition does provide better guidance as to what is considered an acceptable trench. Authorities Having Jurisdiction will often accept criteria from later editions of standards when that new standard provides more or better direction on a specific item.

Section 6.4.3.2.1 of the 2019 edition of NFPA 13 gives guidance on the requirements of the covered trench where a private service main extends more than 10 ft into the building. The trench must be covered, and be accessible from within the building, the trench must have rigid walls and base, be constructed of noncombustible materials. and provisions for draining water shall be provided. Section 6.4.3.2.2 through 6.4.3.2.4.1 includes requirements for the piping in the trench.

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## Question #8 – Pipe Schedule and Flexible Sprinkler Hose

**Can flexible sprinkler hose be used on an existing pipe scheduled system?**

Yes, flexible sprinkler connections can be installed on an existing pipe schedule sprinkler system. However, installing flexible sprinkler drops on existing pipe schedule systems cannot occur without hydraulically calculating the system. Flexible drops are typically braided stainless steel and this material is not covered by Table 6.3.1.1 as a typical aboveground piping material.

Therefore, Section 23.7.1.2 requires hydraulic calculations. Flexible drops

are specifically listed with friction loss information in terms of the equivalent length of 1-inch Schedule 40 pipe. The friction loss through flexible drops cannot be ignored and must be accounted for by hydraulic calculations.

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## Question #9 – Long Drops to Single Sprinkler

**Are flexible couplings required for a long drop (15 ft.) to a single sprinkler by Section 18.2.4.2.4 of the 2019 edition of NFPA 13?**

The answer is no; flexible couplings are not required by NFPA 13 in drops to a single sprinkler. Section 18.2.4.2.4 of the 2019 edition of NFPA 13 is titled “Flexible Couplings for Drops”, but this section clarifies that the drops being discussed do not include a drop to a single sprinkler but are limited to drops to “hose lines, rack sprinklers, mezzanines, and free-standing structures”.

While not part of the requirements of the standard, the Automatic Sprinkler Handbook (2019) includes commentary that addresses this specific question and states that this section is not intended to require a flexible coupling on a drop to an individual sprinkler but is limited to drops that feed multiple sprinklers.

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## Question #10 – Extended Coverage - Area/Density vs Room Design

**Section 11.2.3.2.3 states that when using extended coverage sprinklers, at least five sprinklers must be included in the design area. Additionally, when using the quick response reduction, Section 11.2.3.3.2 states that the number of sprinklers in the design area must be at least five. The room design method for corridors (11.2.3.3.6) states that the calculation should include at least five sprinklers or when using extended coverage sprinklers all sprinklers within 75 ft. This may be less than five sprinklers.**

**Can less than five extended coverage sprinklers be used in the room design method when the room has less than five sprinklers?**

Yes, extended coverage sprinklers can be used in the room design method where the room has less than five sprinklers. The assumption behind the room design method is that only the sprinkler(s) within the room will activate and contain the fire within the room and the fire will not extend beyond that area to activate additional sprinklers, only the sprinklers in this room will need to be calculated.

Section 11.2.3.2.3.2 only applies to the Density/Area Method where the fire would have no barrier to prevent the activation of adjacent sprinklers beyond the immediate area of the fire.

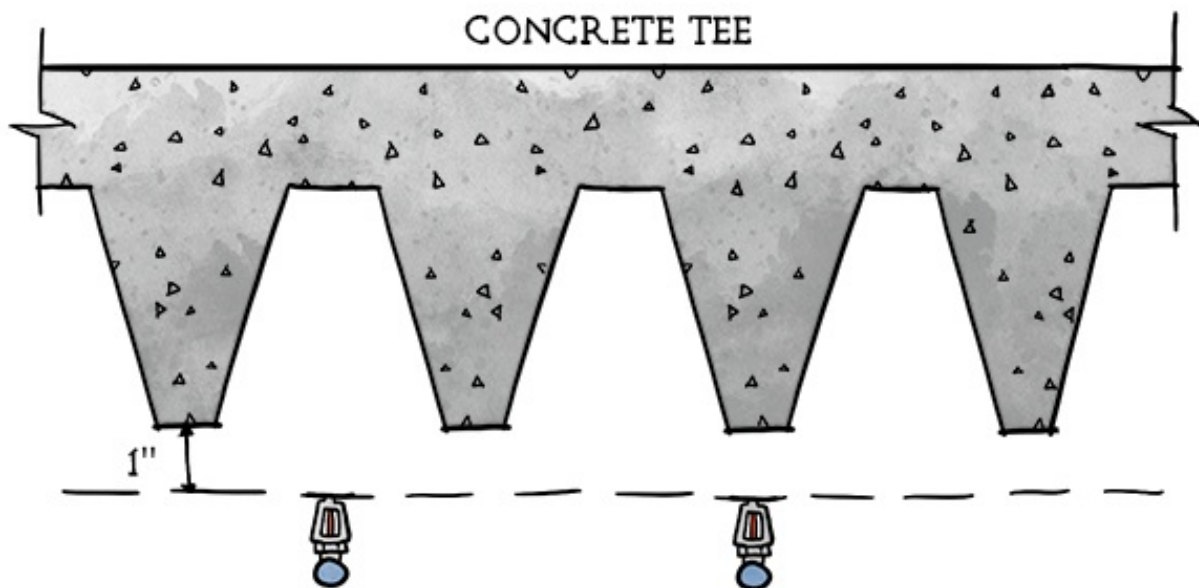
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## Question #11 – Concrete Tee Construction

In concrete tee construction, does the sprinkler deflector need to be located below the actual tee or can it be placed anywhere below the concrete tees as long as it is 1 in. below the tee to meet Section 8.6.4.1.2 (5) in the 2016 edition of NFPA 13?

No, the sprinkler deflector is not required by the standard to be located directly below the concrete tee. Yes, the sprinkler can be located between the concrete stems at or above a horizontal plane 1 in. below the bottom of the stems of the tees and complying with Table 8.6.5.1.2 for the beam rule.

NFPA 13, 2016 edition, Sections 8.6.4.1.2(5), and A.8.6.4.1.2(5) simply require the sprinkler to be located at or above a horizontal plane 1 in. below the bottom of the stems of the tees and complying with Table 8.6.5.1.2 for the beam rule. As explained in the annex material for this section, this includes sprinklers located between the stems.



SPRINKLERS ARE PERMITTED AT OR ABOVE A HORIZONTAL PLANE 1" BELOW BOTTOM OF STEM (IF ABOVE BOTTOM) COMPLY WITH BEAM RULE



## Question #12 – FDC Hydrostatic Testing

Is there an acceptable pressure range for the FDC hydrostatic testing? For example, is it acceptable for the pressure to drop to 144 psi at the conclusion of the two-hour hydrostatic test?

No, there is no prescribed acceptable pressure loss for hydrostatic testing of the fire department connection piping provided in the standard. The intent



of the hydrostatic test is to hold the required pressure for the required duration without loss of pressure to ensure there are not leaks. NFPA 25, 2017 edition, Section 13.8.5 requires the piping from the fire department connection to the fire department check valve shall be hydrostatically tested at 150 psi for 2 hours at least once every 5 years.

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## 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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