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

Editor - Roland Asp, CET | #459 | 03/09/2021

Best of February 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 February 2021. This information is being brought forward as the "Best of February 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 – Cloud Ceilings in NFPA 13

There are classrooms that have "cloud ceilings" with acoustical ceiling tiles. The maximum distance from the edge of the ceiling to the wall is 1 ft.

Since the ceiling construction is considered non-combustible/limited combustible and no storage or occupancy is above the ceiling, can this be considered a "concealed space" in accordance with the 2013 edition of NFPA 13?

No. NFPA 13, 2013 edition, Section 8.15.1.2.1 indicates concealed spaces of noncombustible and limited-combustible construction with minimal combustible loading having no access shall not require sprinkler protection. The one-foot gap around the perimeter of the ceiling is not considered an access issue.

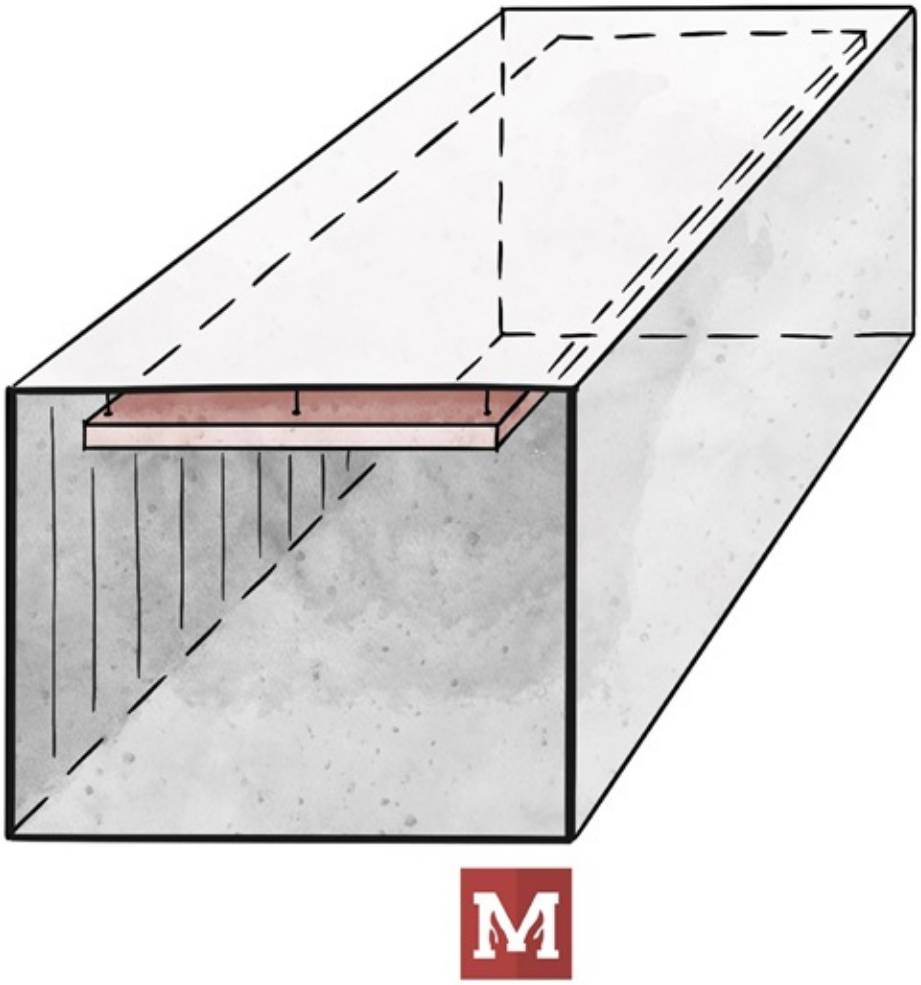
Section 8.15.1.2.1.1 indicates the space shall be considered a concealed space even with small openings such as those used as return air for a plenum. It is not believed that the perimeter openings would be considered "small" for return air.

NFPA 13, 2013 edition, does not address the cloud ceiling situation however, the 2016 edition was changed to address this specific situation. Typically, when the applicable edition of the standard does not

address a situation, consider working with the AHJ to use the newer edition material(s).

NFPA 13, 2016 edition, Section 8.15.1.2.1.3 indicates the space above cloud ceilings that meets the requirements in Section 8.15.24.1 and has openings with a combined total area of not more than 20 percent of the ceiling shall permit sprinkler protection to be omitted. Section 8.15.24.1 provides the specific provisions that allow sprinklers to be omitted above a cloud ceiling.

Based on the NFPA 13, 2013 edition, this would not be considered a noncombustible void space. However, based on the 2016 or 2019 editions, it may be able to classify this situation as a cloud ceiling that does not require sprinkler protection above.



Question #2 – Walk-in Cooler and the IBC

The building department is requiring sprinklers in the noncombustible concealed space above walk-in coolers and freezers. Section 2603.4.1.2 of the International Building Code (IBC) is being interpreted as requiring sprinklers inside and above coolers and freezers. Sprinklers are installed inside and in rooms with coolers

and freezers, however the space above the coolers is noncombustible and not used for storage.

Question 1: Are sprinklers required above the coolers and freezers?

Question 2: If sprinklers are installed above the coolers, do they need to extend throughout the concealed space?

Answer to question 1: Where the coolers have the metallic covering (as most do), the space above the coolers would be considered non-combustible and exempt from sprinklers per NFPA 13, Section 8.15.1.2.1 (as long as the remainder of the space above is noncombustible). Unsprinklered noncombustible concealed spaces are permitted by NFPA 13 and are still considered fully-sprinklered buildings per the International Building Code (IBC).

The cooler issue in the IBC, Section 2603.4, has to do with a thermal barrier. Section 2603.4 is the charging section; it states a cooler needs a thermal barrier of ½ gypsum to protect the foam from exposure. If the owner does not want to provide a thermal barrier between the cooler walls (up to 10 in. thick) and the unsprinklered space, then Section 2603.4.1.2 gives four exceptions, one of which is sprinklers inside and around the cooler. It can be summed up by adding ½ inch gypsum on the cooler portion facing the unsprinklered concealed space or adding sprinklers above (a tradeoff for the ½ in. gypsum).

The IBC does give some exceptions for the cooler walls/ceiling that the architect may want to dig into that may further qualify exempting the thermal barrier. Section 2603.4 allows the foam to be exempt from the thermal barrier when passing the NFPA 275 Temperature Transmission and Integrity Fire test, or through Section 2603.9 by passing the NFPA 286, FM 4880, UL 1040, or UL 1715 tests.

Answer to question 2: In short, NFPA 13 does not really give guidance on how far to extend the sprinkler protection into the concealed space above the coolers . Since this fire sprinkler installation requirement comes from the IBC (and previously BOCA) and it (IBC or BOCA) does not specify the extent of the system beyond the cooler, using the 15 feet beyond the cooler in the concealed space matches what NFPA 13 does for adjacent hazards. The purpose of the thermal barrier is to protect the foam plastic from fire on the exterior side, so, the sprinklers are doing the same, i.e., controlling fire in the concealed space from igniting the foam plastic. The tradeoff is for localized protection of the foam plastic of the cooler. The sprinkler system extending 15 feet beyond puts a row of sprinklers between the unsprinklered concealed space and the cooler.

Some code history on this section: The IBC Section exception (2603.4.1.2 #4) requires sprinklers in, “…that part of the building in which it [the cooler] is located shall be sprinklered.” This section in the current IBC comes from the legacy codes, specifically the BOCA (Ohio, Michigan, Indiana, Pennsylvania were big BOCA states prior to the IBC) code where it was a new requirement/tradeoff in the 1993 edition. The language in the current IBC is nearly the same 30 years later, however, the point to make is the word “part” in the code text. The BOCA code used the term part in many

portions of the code, so, it is reasonable to translate to the IBC that only the area of the building where the cooler is present would be sprinklered. Other areas of BOCA and IBC uses the term fire area, which are bounded by fire-rated walls, floors, and ceilings. Part and fire area are important distinctions, so, the intent here is, again, just to protect the space (part) where the cooler is, not the entire concealed space.

Question #3 – Reuse of Dry Sprinklers

Do only sprinklers that match the NFPA 13 definition of dry sprinklers (secured in an extension nipple that has a seal at the inlet end to prevent water from entering the nipple until the sprinkler operates) qualify for the exception to be re-used found in Section 6.2.1.1.1 of the 2016 edition of NFPA 13? Or is it any sprinklers that are listed for use on dry systems qualify for the exception?

Section 6.2.1.1.1 is intended for sprinklers meeting the definition of a dry sprinkler (Section 3.6.3.2) only. The reasoning is that if these sprinklers are removed from the fitting that they are attached to, torque is not being applied to the sprinkler itself. Instead, the wrench will be applied to the end of the extension nipple which will not impact or deform the sprinkler itself. As stated in this section, follow the manufacturers' instructions.

For other types of sprinklers, see Section 6.2.1.1 and its associated annex section (A.6.2.1.1). This section states that when a sprinkler is removed from a fitting it shall not be reused. This is because of the concern that the action of removing the sprinkler from a fitting with a wrench will apply torque to the sprinkler and it may be damaged. However, as stated in A.6.2.1.1, it should be allowed to remove a sprinkler along with its attached fitting and reuse that sprinkler. An example is removing an entire drop with an attached sprinkler. As a wrench was not applied to the sprinkler itself, it should be ok to reuse that sprinkler as long as care was taken not to damage it.

Question #4 – Temperature Rating of Sprinklers

Can ordinary- temperature and intermediate-temperature sprinklers be mixed in the same room without a heat source that would require a sprinkler with a higher temperature rating than ordinary temperature?

Yes, ordinary, and intermediate temperature rated sprinklers can be mixed in the same room or compartment regardless of the reason. Section 8.3.2.1 of the 2013 edition of NFPA 13 permits the use of ordinary and intermediate temperature rated sprinklers throughout buildings. It is not only permitted, but often required to mix sprinklers with different temperature classifications

in the same room or compartment. It is not uncommon to have sprinklers with two or even three different temperature ratings required in a single room or compartment due to the presence of localized heat sources such as unit heaters. However, NFPA 13 does not state that mixing of sprinklers with different temperature ratings are limited to areas with heat sources. Therefore, there is no restriction in the standard to mix sprinkler temperature rating in the same room or compartment.

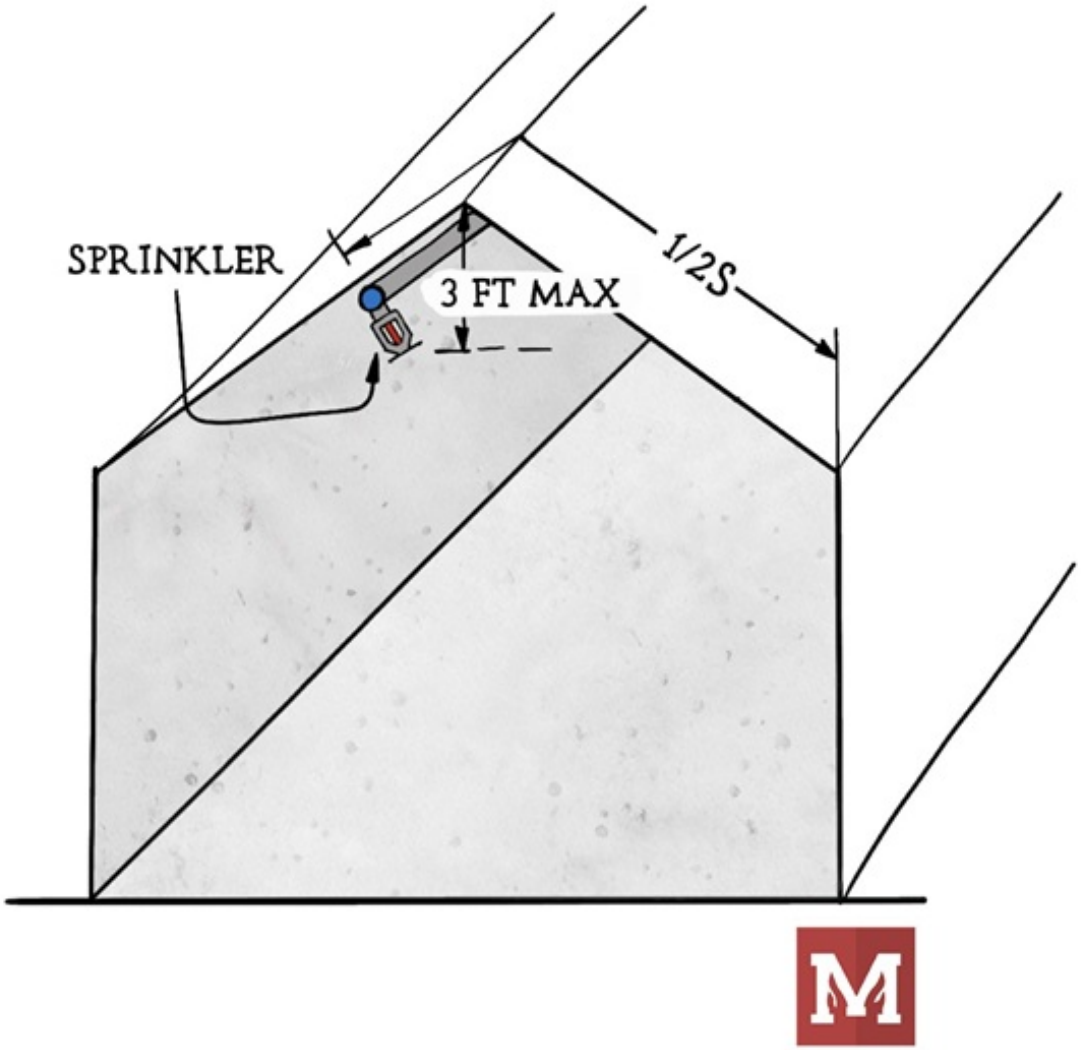
On the other hand, sprinkler thermal sensitivity or RTI is more directly associated with sprinkler activation time when compared to temperature rating. For this reason, Section 8.3.3.2 requires sprinklers in the same compartment to be the same thermal sensitivity.

Question #5 - Sprinklers Under Peak Ceiling

Does a sprinkler have to be located directly below the peak of a cathedral ceiling if a sprinkler is not spaced more than ½ the allowable distance between sprinklers from the wall as shown on the accompanying figure?

A sprinkler is not required to be directly under the peak as long as there is a sprinkler located no more than 36 inches below the high point of the ceiling. Section 10.2.6.1.3.1 of the 2019 edition of NFPA 13 states that "...sprinklers under or near the peak..." need to be located with the deflector no more than 36 inches below the peak.

Based upon the provided illustration, this requirement is met. The sprinkler shown offset from the centerline of the peak is certainly "near the peak" and as long as it is within 36 inches below the peak and the spacing rules (15 feet between sprinklers and 7 1/2 feet from wall) are met, this arrangement would be considered compliant.



Question #6 - Outboard Sprinklers on a Gridded System

Company policy limits the number of sprinklers per outboard line of a gridded sprinkler system to two before additional hydraulic calculations are performed.

Is there a limit to the number of sprinklers allowed on an "outboard" line of a gridded system before calculations are required?

No, there is nothing in NFPA 13 that states how many sprinklers must be calculated on the outriggers or “outboard line” of a gridded system. The dead-end line should be calculated regardless of the number of sprinklers on them. Usually, the calculations can handle one or two sprinklers without a problem, but these outriggers can prove to be more hydraulically demanding than the gridded portion. Either way, the "outboard" sprinklers need to be calculated to prove that they are not hydraulically more demanding than the gridded portion of the system.

Question #7 - Paint on Inside of Sprinkler Pipe

A system is partially installed and not all openings in the pipe have had sprinklers, fittings, plugs, or coverings installed. It was noted that while painting the exterior of the pipe there has been overspray into the interior of the pipe through these openings.

Is it allowable to have paint overspray on the inside of steel pipe?

NFPA 13 is silent on this topic of paint overspray on the inside of sprinkler piping. However, it is recommended to consult the installation instructions for both the pipe and fittings to determine if this issue is addressed by the listed installation instructions. Paint could possibly interfere with the proper installation of fittings. This small amount of paint over spray into the pipe ends may not cause obstructions to the water flow, but it does raise a quality control issue to ensure excessive amounts are not present.

Question #8 – Flow Test of New Standpipe System

What is the purpose or reasoning behind the requirement to flow test the standpipe system when it has been hydraulically calculated?

NFPA 14 requires an acceptance flow test to verify that the hydraulic calculation or system demand is correct and to provide a base line of performance for future inspection testing and maintenance requirements. The flow test is also done in conjunction with other acceptance testing requirements, allowing for a reasonable verification that the entire system will operate as designed. In some cases, the authority having jurisdiction (AHJ) can waive the requirement found in Section 11.5.2 for manual standpipes, however the annex section Figures A.11.5.2(a) & (b) gives guidance on how best to accomplish this test.

Question #9 – Large Vertical Openings

A 3-story fully sprinklered school has a large vertical opening (approximately 22 ft x 55 ft) that runs from the 1st floor to the 3rd floor with a skylight on top. In

between the 2nd and 3rd floor is a horizontal fire curtain that will close in case of fire. Since the fire curtain is not typically open it is assumed that sprinklers are not required underneath, but sprinklers would be required at the highest point, which is a skylight. The 2013 edition of NFPA 13 is applicable.

This is a 3-part question.

1. **Is a water curtain required?**
2. **Is coverage beneath the louver required?**
3. **Is it possible to eliminate sprinklers from the skylight?**

Answer to question 1: No, in accordance with the 2013 edition of NFPA 13 large openings over 1,000 sq. ft and where each side is over 20 ft in length are not required to be protected with draft stops and closely spaced sprinklers per Section 8.15.4.4.

Answer to question 2: This is not an issue that is directly addressed by NFPA 13. The closest section would be Section 8.15.14 which discusses open-grid ceilings and possibly Section 8.5.5.3.2 which requires sprinkler protection under fixed obstructions that are over 4 ft in height. As the described arrangement, however, is not directly addressed by NFPA 13, it is suggested that this question be discussed with the project engineer and with the authority having jurisdiction (AHJ).

Answer to question 3: In accordance with NFPA 13, sprinklers may be omitted in skylights that do not exceed (32 sq ft in area per Section 8.5.7) or in accordance with the ceiling pocket rules (Section 8.6.7). However, it should also be noted that both the International Building Code (Sections 404.6 and 712) and NFPA 101 (Section 8.6) considers these spaces as atriums and requires fire sprinklers in the atrium. The presence of the skylight, ceiling pocket, or horizontal fire curtain does not eliminate sprinklers when the building code or life safety code calls for a space to be sprinklered.

Question #10 – Water Source is a Pond

An existing sprinklered building is undergoing a change in occupancy from a residential to an educational occupancy. As part of the project, the fire sprinkler system is being evaluated for compliance with NFPA 13. The current water source for this system is a pond.

Is a pond an acceptable water source?

Ponds are unique water sources but are allowed by the 2016 edition (and others) of NFPA 13, Section 24.2.1(6) and installed per Section 24.2.6. The change in occupancy would not necessarily initiate a change in the water source. The residential and education occupancy, assuming the same NFPA 13 standards, are both light hazard occupancies per Section A.5.3.1 with the same minimum area, density, duration, and hose stream requirement from Chapter 11. The demand on the pond does not change, however, the pond, as with any water supply needs to be maintained and

remain adequate to provide the sprinkler system demand. If the pond conditions have changed from the original design and if the current pond cannot meet the needs of the new system, then the owner needs to evaluate the water supply per NFPA 25, Section 4.1.6.

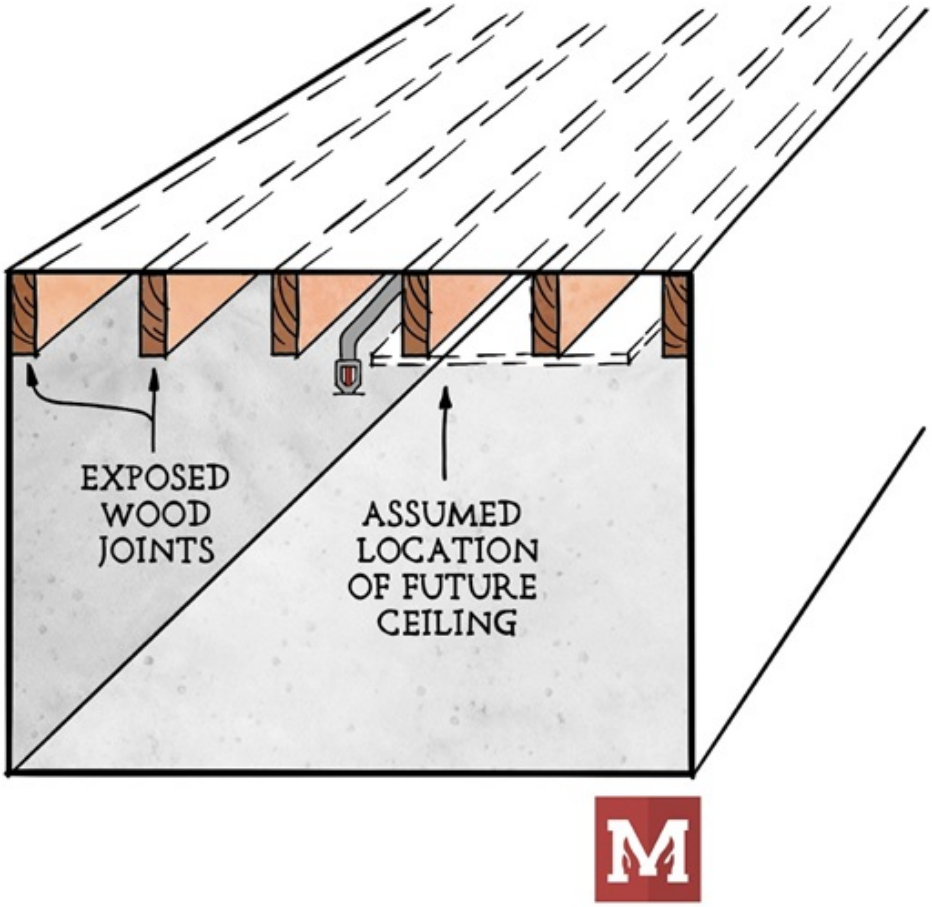
Question #11 – NFPA 13D in Unfinished Basement

Residential sprinklers are listed for use under smooth flat ceilings and an unfinished basement is anything but smooth and flat and it was suggested that this space should be protected in accordance with NFPA 13.

Is it acceptable to use NFPA 13D and residential sprinklers in an unfinished basement with exposed wood joists?

Yes, it is acceptable to use NFPA 13D and residential sprinklers in the unfinished basement of a one-or two-family home. It is true that residential sprinklers are not typically listed for use under exposed wood joists, however this situation is specifically addressed in NFPA 13D in Section 8.2.4. This section stated that residential sprinklers are permitted to be installed in an unfinished basement and positioned as if a ceiling was installed. It must be noted that this section applies to metallic pipe and nonmetallic pipe where a ceiling is not required to protect the pipe. The specific requirements for exposed installations of nonmetallic pipe can be found in the specific listings. It should also be noted that this section does require the owner to actually install a ceiling.

This section was first added to NFPA 13D in the 1994 edition to address the conflict that basements need to be provided with residential sprinklers (and residential basements are often unfinished) and the fact that residential sprinklers are listed with smooth flat ceilings. While the exposed joist ceiling may delay the activation of the sprinklers, the committee deemed this acceptable as NFPA 13D is a life-safety standard and it would not be common for people to sleep in an unfinished basement. Sprinklers in such basements are expected to activate in time to control a fire and give the occupants in the occupied portion of the house time to evacuate.



Question #12 – Entry Vestibule

There are two entry vestibules that are located within the envelope of the building structure and are open to exterior on one side. These spaces are roughly 19 ft x 14 ft and exposed surfaces are aluminum panels and glass.

Would sprinkler protection be required in these exterior areas?

Yes, the 2019 edition of NFPA 13 in Section 4.1.1 requires a building, where protected by an automatic sprinkler system, to be provided with sprinklers in all areas except where specific sections of this standard permit the omission of sprinklers. Section 9.1.1 indicates the basic principle is sprinklers shall be installed throughout the premises.

There is no exception to the basic requirement of the standard to provide sprinkler protection throughout that would be applicable to entry vestibules.

There was a second revision (SR-429) accepted to the 2019 edition of NFPA 13 that would have allowed sprinklers to be omitted in noncombustible or limited combustible vestibules that do not contain combustibles and were 150 sq ft or less in area. However, this concept was rejected during a vote at the technical session by a wide majority (427-96)

of the NFPA membership who voted at his session. This motion was Certified Amending Motion #13-8. The argument to require sprinkler protection for these vestibules was due to the fact that these vestibules are often in the path of egress and it would not be possible to keep these spaces clear of combustibles and that these spaces need to be protected.

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.

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
April 20 - May 20, 2021

Layout Technician Training
August 10 - Sept 9, 2021

Layout Technician Training
Nov 2 - Dec 9, 2021

Blended Layout Practicum
May 11 - May 20, 2021

Blended Layout Practicum
August 31 - Sept 9, 2021

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NFSA TOP TECH COMPETITION 2021

The 2021 Top Tech Competition will open for registrations on **April 1, 2021**. We look forward to your participation. Keep studying!

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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