



e-TechNotes

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Best Questions of March 2012

This month, we have selected the following “baker’s dozen” of questions as the “Best of March 2012” answered by the engineering staff as part of the NFSA’s EOD member assistance program:

Question 1 – Ceiling slope and deflector orientation

Do sprinkler deflectors always have to be installed parallel to the slope of the ceiling? We have questions about three different scenarios all related to this basic question. The first is where the ceiling slope is very slight; can the sprinkler be installed horizontally? The second is where the ceiling slope is significant, but the sprinkler piping and deflector do not follow the slope exactly; is there an acceptable tolerance? And the third scenario is when the ceiling is horizontal, but the sprinkler gets installed at a slight angle; is there an acceptable tolerance?

Answer: Section 8.5.4.2, which applies to all sprinklers, states that sprinklers are required to be installed with the deflectors parallel to ceiling. There is no tolerance specifically stated. It would be up to the authority having jurisdiction to decide whether any specific tolerance would be permitted. However, section 8.6.4.2.3, which only applies to upright and pendent spray sprinklers installed at standard spacing, has more to say about the subject. This section allows ceilings with a slight pitch (2 in 12 or less) to be considered horizontal, which would permit deflectors to be installed horizontally, and not parallel to the ceiling slope.

In effect, section 8.6.4.2.3 establishes an acceptable tolerance for upright and pendent spray sprinklers that are installed at standard spacing. Whether the ceiling is slightly pitched and the deflector is horizontal, or whether the ceiling is horizontal and the deflector is slightly pitched, does not matter to the performance of the sprinkler. Either way, the slope of the sprinkler and the ceiling are permitted to be different by a slope of 2 in 12, which translates to an angle of about 9.5 degrees. Therefore, a case could be made using the equivalency clauses in NFPA 13 that there is a tolerance of 9.5 degrees for upright and pendent spray sprinklers installed at standard spacing. This tolerance could be applied to sprinklers under ceilings of any pitch.

Question 2 – Multiple Buildings with a Single System and Firewall Penetrations

A single structure is being constructed with a significant fire wall dividing it into two “buildings” under the building code. Can these two buildings be protected by a single sprinkler system and would the piping from a riser on one side of the fire wall be permitted to penetrate the fire wall?

Answer: Section 8.2.4 of NFPA 13 specifically allows two buildings that share a common wall to be protected by a single sprinkler system with a single riser as long as the total area in both buildings does not exceed 52,000 sq ft per floor for light hazard and ordinary hazard or 40,000 sq ft for extra hazard or high-piled storage.

The piping is permitted by the International Building Code to penetrate the fire wall as long as the penetration is sealed in such a manner as to maintain the fire resistance rating of the wall. In order for the wall to completely separate the structure sufficiently to consider the separate portions of the structure as separate buildings, the fire wall would have to have a very high fire resistance rating, which would make it very expensive to seal any penetrations.

Question 3 – Storage Height and Catwalks

We have a building that is 30 ft high from floor to ceiling. Inside the building, shelf structures will be constructed with catwalks at 8 ft intervals and sprinklers under the catwalks. Three levels are planned with the top of the storage 6 ft from the ceiling (24 ft above the floor). Should this be treated as 24 ft high storage or can the sprinklers under the catwalks each just be designed to handle 8 ft high storage?

Answer: This storage arrangement would need to be protected as 24 ft high storage. The sprinklers under the catwalks would be there as supplemental protection to the ceiling sprinklers to handle a fire under the obstruction created by the catwalk, but the potential for a fire to start at the bottom and work its way up the shelf structure and involve the whole 24 ft array is possible, so the ceiling sprinkler system would need to be capable of handling such a fire. Section 14.5 of NFPA 13 discusses this scenario in greater detail.

Question 4 – Penetration of a Ceiling with a Sprinkler

When installing a drop that has a sprinkler attached to it, do you have to fire caulk the hole through the drywall around the pipe when using an escutcheon?

Answer: Generally, the answer to that question is “no”. The hole in the ceiling drywall is called a “membrane penetration” by the building code and the only requirement regarding a membrane penetration of a sprinkler is to put a metallic escutcheon over the hole (see exception 3 to section 712.3.2 in the International Building Code).

Question 5 – Putting Sprinklers on the Other Side of an Obstruction in NFPA 13R

Where an NFPA 13R sprinkler system is being installed and a sprinkler is too close to an obstruction to protect to the other side of the obstruction, is it acceptable to put a sprinkler on the other side of the obstruction? We don't see where NFPA 13R explicitly allows this protection.

Answer: It is true that there is not an explicit statement that sprinklers on both sides of obstructions (less than 4 feet in width) comply with the obstruction criteria. However, the guidelines for handling obstructions assume that the user is trying to spray around/under/over the obstruction and cover the area beyond the interference. When a sprinkler is near an obstruction and another sprinkler is on the other side, then it would be obvious that the floor area is adequately protected.

The writers of NFPA 13R have tried to keep the document short and simple. In trying to keep the document that way, they have not copied many of the obvious rules out of NFPA 13. This is one of those obvious situations that did not get specifically stated, but should apply.

Question 6 – Shut-Off Valve for Sprinklers in Elevator Shaft

Where sprinklers are being installed at the top and/or bottom of an elevator shaft, is there a requirement to have a shut-off valve installed for the sprinklers installed in the shaft.

Answer: There are no national requirements in the National Elevator Code (ASME A17.1), the International Building Code, or any NFPA code or standard that we are aware of for a shut off valve in the sprinkler line feeding sprinklers in an elevator shaft. The possibility exists that someone has added this to a local code as an amendment, but there is no such requirement the national codes that we are aware of.

Question 7 – Tall Lockers and 18-inch Clearance

In a situation where tall lockers are placed in rows such that it is impossible to maintain the 18 inch clearance between the top of the lockers and sprinkler deflectors, would it be acceptable to place sprinklers in each aisle?

Answer: Yes, as long as the minimum distance between sprinklers is maintained. If the aisles are less than 6 ft (on center) apart, this might necessitate the staggering of sprinklers in order to meet the spacing rules of section 8.6. The 18 inch clearance requirement is in the standard to insure that the sprinklers can spray over obstructions to protect area on the far side. With sprinklers on the far side of the lockers, the water does not need to get over the lockers and the situation is adequately protected.

Question 8 – Rubber Hose for Air Line to Dry-Pipe System

Can rubber hose be used for the connection from the air compressor to the dry pipe trim or is this required to be steel pipe and fittings?

Answer: Section 7.2.6.3 of NFPA 13 requires the air supply connections for dry pipe sprinkler systems to be “pipe”. This section does not require a specific type of pipe material, therefore steel pipe and fittings would be acceptable as would other types of pipe and fittings acceptable to the authority having jurisdiction. But rubber hose would not be considered a type of “pipe” and should not be used.

Question 9 – Back-Up Power for Compressors for Dry-Pipe Systems

Is it the intent of section 7.2.6.2.1 to require the air compressor to be wired to an emergency power source?

Answer: The answer to your question depends on the specific codes and standards being enforced and the type of building that contains the dry-pipe sprinkler system.

NFPA 13 does not intend for the compressor to be provided with standby power. The compressor is not considered a necessary device for fire protection, which is why it is not required to be listed (see A.7.2.6.5.1). If the power fails, the sprinkler system will work just fine if there is a fire. The lack of a compressor will have no effect on the system’s ability to react to a fire.

The section that you have referenced in NFPA 13 is intended to prevent people from filling the air in dry-pipe systems from temporary sources. The committee did not want someone to wheel in a compressor during the acceptance test of the system, fill it with air, disconnect the compressor, and leave the system without an air supply. The dry-pipe system needs an air supply. The concept of “available at all times” does not mean that it needs to be connected to an emergency power supply; it just means that the filling of air needs to be accomplished automatically, without the need for people to hook up a temporary air supply. Certainly the owner is allowed to hook up the air compressor to an emergency power supply. This would improve system performance. But this is not required by NFPA 13.

There are some codes that have decided to add the requirement for air compressors on dry-pipe systems to be connected to emergency power because it is not required by NFPA 13, but they want it in certain

situations. For example, a new section in the 2012 edition of the Life Safety Code (NFPA 101) requires the compressor on a dry-pipe system in a high-rise building to be connected to the standby power system (see new section 11.8.5.2.4(3) for the requirement). When this was working its way through the NFPA process, the sprinkler industry did not object because the high-rise building would need to have standby power anyway, and it's a relatively small item to make sure that the compressor load is added to the other building loads in sizing the generator.

In summary, there is no requirement for compressors to have back-up power in NFPA 13, but other codes and standards might require this for specific situations.

Question 10 – Almost Concealed Spaces on Both Sides of a Corridor

If the walls of a corridor don't go all the way to the (noncombustible) deck and spaces that are almost concealed spaces (the only opening is at the corridor) are formed by the drop ceiling in the rooms adjacent to the corridor (as shown in Figure 1 below), are sprinklers required completely throughout these almost concealed spaces?

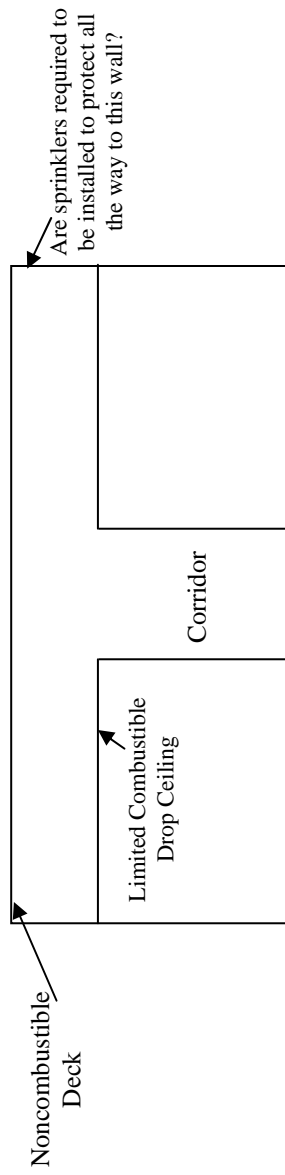


Figure 1 – Situation in Question

Answer: The answer to this question depends on the hazard classification of the corridor and the dimensions involved. For all editions of NFPA 13 prior to 2010, the answer to this question would have been “yes” in every situation. But in the 2010 edition, a new section was added to recognize that in completely noncombustible and limited combustible spaces, the only concern is a fire coming from the space open to this “almost concealed” space (in this case, the corridor) and the sprinkler protection of the entire space was recognized as being unimportant past a certain point.

Section 8.15.22.3 was added to the standard to allow sprinkler protection to be omitted when it was more than half of the required length of 1.2 times the square root of the design area into the “almost concealed” space as long as the length of the space being protected was at least 24 ft. So, for a situation where the corridor is light hazard with a design area of 900 sq ft, the space above the rooms needs to be protected for at least 24 ft (since 24 is greater than 18, which is 0.6 times the square root of 900). See Figure 2.

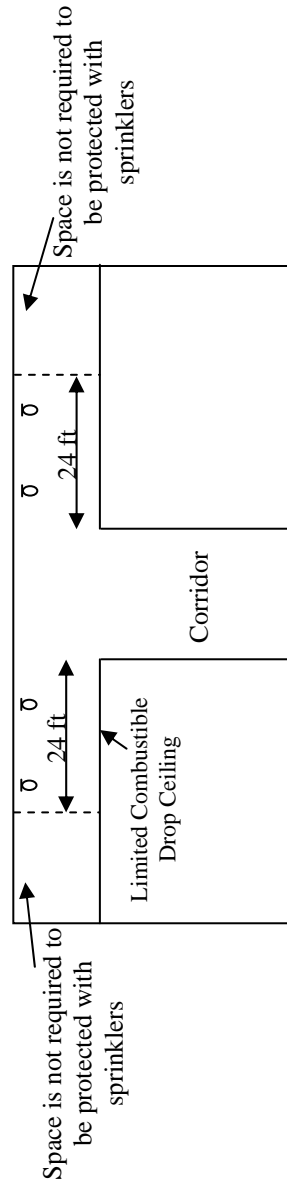


Figure 2 – Light Hazard Corridor

But if the situation in the corridor was extra hazard with a design area of 2500 sq ft, the space above the rooms would need to be protected for a length of 30 ft (0.6 times the square root of 2500) as shown in Figure 3. Note that in both of the cases shown in Figure 2 and Figure 3, the corridor is open on two sides, but the protection is still acceptable because the “almost concealed” spaces are only open on a single side, and section 8.15.22.3 is written from the point of view of the almost concealed space, not the space that it is opening onto.

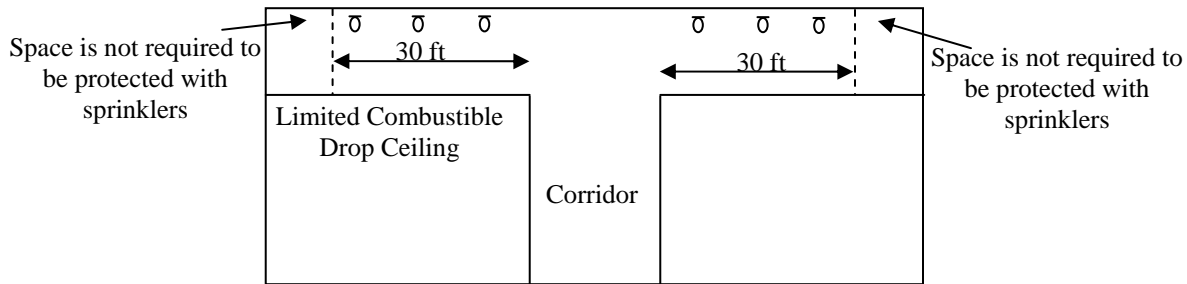


Figure 3 – Extra Hazard Corridor

Question 11 – Sprinklers Under a Building Overhang

If a building has an overhang constructed of all non-combustible materials and the overhang has occupied space above it, does NFPA 13 require sprinkler protection under the overhang if it is just a walkway leading to an entrance/exit with a few plants in the area (no storage)?

Answer: This is one of those questions that NFPA 13 does not answer directly. Section 8.15.7 implies that as long as the overhang is non-combustible and the area below the overhang is not used for storage, that sprinklers are not required. However, in the annex note that accompanies this section, there is a statement about sprinklers being considered if the overhang does have occupied space above it. Since the annex of the standard is not legally enforceable, and since the annex does not come right out and say that sprinklers should be installed in every such occasion, we would conclude that it would be difficult to force an owner to put sprinklers into every situation where there was occupied space above an overhang. Yet, it is something that every specifying engineer should think about and determine if it is necessary for each individual situation.

Question 12 – Interior Hose Stations for Storage Occupancies

Does NFPA require interior hose valves for warehouse buildings that are fully protected by an ESFR sprinkler system?

Answer: The answer to your question depends on which edition of NFPA 13 you are using. In the 2002 and previous editions, hose stations were required for all storage occupancies except for those where the material being stored was Class I-IV and the material was 12 ft or less in height. This rule applied regardless of the kind of sprinklers being used at the ceiling. Therefore, if the ESFR sprinklers were protecting storage of Class I-IV commodity over 12 ft in height or any other kind of storage, hose stations were required. See section 12.1.3 for the base requirement and section 12.2.2.1.3 for the exemption for class I-IV commodities stored less than 12 ft in height.

For the 2007 and 2010 editions of NFPA 13, the committee has changed the rule slightly. Section 12.2 only requires the hose station if the Authority Having Jurisdiction specifically says that the hose stations are necessary. The rule was written this way due to concerns by building owners over interpretations of

OSHA standards. According to many interpretations of OSHA standards, a building owner has to provide fire fighter training and equipment (including personal protective gear) for everyone that works near a hose connection who is supposed to use the hose to fight a fire. This is an onerous requirement for most building owners. Rather than provide firefighter training to their warehouse employees, the owners are petitioning to get the hose connections removed. The sprinkler committee agrees that it is better to get everyone out of the building and let the sprinkler system do its job. Therefore, the standard has been changed. Now, you really only need the hose stations if the fire department is saying that they need the stations in order to do their job.

Question 13 – Protecting Exposed Plastics on Racks up to 25 ft High

Section 17.2.1.2 in the 2010 edition of NFPA 13 (similar sections in previous editions) limits the use of Figures 17.2.1.2.1(a) through 17.2.1.2.1(f) to the protection of Group A plastics in cartons. How do you protect exposed unexpanded Group A plastics stored on racks up to 25 ft in height without going to CMSA or ESFR sprinklers?

Answer: The user of NFPA 13 has a number of options for protecting exposed unexpanded plastics on racks with spray sprinklers and density/area criteria:

1. Section 17.3.4 contains arrangements of ceiling and in-rack sprinklers that work for storage of exposed unexpanded plastics over 25 ft in height. These same criteria would work for storage under 25 ft in height if you followed the same rules.
2. For the 2013 edition, the committee has approved additional protection in a rewrite of Chapter 17 that more explicitly deals with the storage of exposed plastics. See the ROC on the NFPA website for more detail.
3. Section 17.2.5.1 contains rules for slatted shelves (that were originally written for big-box stores, but are applicable to other situations as well). Open racks are better than slatted shelves, so you can use section 17.2.5.1 for exposed unexpanded Group A plastics if you can meet all of the 10 criteria listed in the section regarding rack arrangement, ceiling sprinklers, and aisles.
4. Use one of the options in section 20.3. This section contains six different options for spray sprinklers and density/area criteria. If you can meet all of the criteria for one of the options, protection of exposed unexpanded plastics is permitted.

Upcoming NFSA “Technical Tuesday” Seminar – April 17th

Topic: Manual Standpipe Systems

Instructors: Jeff Hugo, CBO

Date: Tuesday, April 17, 2012- 10:30 am EST

This seminar will cover the rules of installing and designing manual standpipe systems. It will cover the definitions of manual dry and wet systems and where these systems can be used, as well as some of the critical components of the system. There will also be a discussion of simple calculations and examination of the water supply for these systems from local fire department equipment.

To register or for more information, click [HERE](#) or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org.

Layout Technician Training Course (2-week course)

Fishkill, NY – October 8-19, 2012

For more information, contact Nicole Sprague using Sprague@nfsa.org or by calling 845-878-4200 ext. 149 or click [HERE](#).

Upcoming In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country, and in recognition of the current recession has adopted a new reduced fee structure. Here are some upcoming seminars:

Apr 10 (SPECIAL RATE!!)	Hayward, CA	Inspection, Testing & Maintenance for the AHJ
Apr 10-12 Industry	Libertyville, IL	3-Day Inspection & Testing for the Sprinkler
April 10-11	Willoughby, OH	Two-Day NFPA 13 Overview
April 12	Willoughby, OH	Inspection, Testing & Maintenance
Apr 12 (SPECIAL RATE!!)	Roseville, CA	Inspection, Testing & Maintenance for the AHJ
Apr 17	Denver, CO	Inspection, Testing & Maintenance for the AHJ
Apr 18	Denver, CO	Pumps for Fire Protection
Apr 19 Piping	Denver, CO	Commissioning & Acceptance Testing/Underground
Apr 24	Grand Chute, WI	Hydraulics for Fire Protection
Apr 25	Grand Chute, WI	Plan Review Procedures & Policies
Apr 25	Portland, OR	Advanced Hydraulics

These seminars qualify for continuing education as required by NICET, and meet mandatory Continuing Education Requirements for Businesses and Authorities Having Jurisdiction.

To register for these in-class seminars, click [HERE](#). Or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org for more information.

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About the National Fire Sprinkler Association

Established in 1905, the National Fire Sprinkler Association (NFSA) is the voice of the fire sprinkler industry. NFSA leads the drive to get life-saving and property protecting fire sprinklers into all buildings; provides support and resources for its members – fire sprinkler contractors, manufacturers and suppliers; and educates authorities having jurisdiction on fire protection issues. Headquartered in Patterson, N.Y., NFSA has regional operations offices throughout the country. www.nfsa.org.

