

Number 144

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Editor – Russell P. Fleming, P.E.

Best Questions of March 2009

We have selected the following questions as the “Best of March 2009” answered by the engineering staff as part of the NFSA’s “Expert of the Day” member assistance program:

Question 1 – Wide Soffit Options

Regarding Section 8.6.5.1.2 of NFPA 13 - 2007, if you have a 31-inch wide soffit against a wall, can you use Table 8.6.5.1.2 and Figure 8.6.5.1.2 (a) to address the obstruction created by this soffit?

Answer: Absolutely. Section 8.6.5.1.2 specifically states that the user only has to pick one of the three options that are listed as a part of its subsections. If you can’t use option (3) because the soffit is wider than 30 inches, you can certainly use option (1).

Question 2- Sprinkler Location Directly Under Skylights

We are currently involved in a project in which concern has been expressed by the fire marshal about the protection of several skylights. The skylights are less than 32 square feet in area, less than 36 inches deep, and spaced more than 10 ft apart. The standard response standard spray upright sprinklers under the deck are spaced to protect the entire floor area below. In some cases the sprinkler falls directly under the skylight. Would we be required to add any sprinklers in the skylights? Would we be required to add any sprinklers on either side of the skylights? And, would it be necessary to space the sprinklers around the perimeter of the skylights? The AHJ is looking for a specific answer to the question of deflector distance from the top of the skylight. Sprinklers are currently installed with deflectors 9 inches below the deck, but the skylights are about 30 inches above the deck. What rules apply if the sprinkler falls directly under the skylight (i.e., deflector distance from top of skylights)?

Answer: NFPA 13 (2007) Section 8.5.7 states: “*Sprinklers shall be permitted to be omitted from skylights and similar ceiling pockets not exceeding 32 ft² in area, regardless of hazard classification, that are separated by at least 10 ft horizontally from any other skylight or unprotected ceiling pocket.*” To answer your questions:

- *Would we be required to add any sprinklers in the skylights?* No, you appear to meet the above requirement.
- *Would we be required to add any sprinklers on either side of the skylight?* No, provided the sprinkler spacing can sufficiently protect all floor areas.
- *Would it be necessary to space the sprinklers around the perimeter of the skylight?* Not necessarily, provided floor areas can be protected by sprinklers on one side of the skylights.
- *Do sprinklers located directly under skylights need to meet the maximum deflector distance to ceiling rules?* Yes, the allowance to omit sprinklers from the skylight itself does not automatically allow a sprinkler to be located an extraordinary distance below the skylight itself. Section 8.6.1.1.1 requires a sprinkler deflector to be located a maximum 12 inches below an unobstructed ceiling “throughout the area of coverage of a sprinkler.” While Section 8.6.4.1.1.3 and the ceiling pocket rule of Section 8.6.7 allow greater distances within the coverage area of a sprinkler, they do not allow a greater distance directly above a sprinkler. However, Section 8.1.1(6) allows greater distances between sprinklers and ceilings than as otherwise specified in the rules “provided that tests or calculations demonstrate comparable sensitivity and performance of the sprinklers to those installed in conformance with these sections.” This

would allow a modeling analysis that could show the sprinklers directly below skylights would not be unduly delayed in their operation.

Question 3 – Solid Shelf Protection Criteria for Storage Less Than 12 feet

In NFPA-13, 2007, design criteria in the Chapter 16 tables for rack storage over 12 ft in height specify “without solid shelves”. Table 13.2.1 (for miscellaneous storage and Class I-IV storage 12 ft or less) does not mention “without solid shelves”. I’m assuming that solid shelves are permitted regardless of the number of tiers of storage so long as the top of storage is less than 12 ft, and that solid shelves can be used in such applications throughout a warehouse or miscellaneous storage area without in-rack sprinklers. Is this correct, or must the commodities be stored in racks “without solid shelves” even when using Table 13.2.1?

Answer: “Solid” shelves result from blocking of any of the longitudinal or transverse flues, regardless if the shelf is less than 4 ft in width. In Chapters 16 and 17 NFPA 13 starts to require in-rack sprinklers when the solid shelf is over 20 sq ft. In Chapter 13 nothing is said, and as long as you stay under 4 ft in width the standard does not require sprinklers below the rack shelving. Once the shelves exceed 4 ft in width, then Section 8.6.5.3.3 requires sprinklers below these obstructions.

Question 4 – Four-way Bracing for Riser Nipples

I am working on a sprinkler system in a seismic area that has riser nipples 4 feet long and 1-1/2-inch in diameter, connecting the branch lines to the mains. Are four-way braces required at the top of the riser nipples?

Answer: No. NFPA 13 Section 9-3.5.1.1 states that the tops of risers exceeding 3 ft in length require a four-way brace. However, the intent of the committee was not to include riser nipples. This is clear in the committee action in the Report on Comments (ROC) as the committee prepares the 2010 edition of NFPA 13. Comment number 13-279 adds a new section to the annex of NFPA 13, which will read as follows: “Risers do not include riser nipples as defined in 3.6.8.” This means that four-way braces are not required at the tops of riser nipples.

Question 5 – Close-Spaced Sprinklers around Mezzanine Stairways

Does a vertical opening for a stairwell from a first floor to the mezzanine slab have to be protected with closely spaced sprinklers and/or draft curtain per Section 8.14.4? Very loosely interpreted it seems that a mezzanine counts as neither a story nor a floor and this protection is therefore not required by the code. However it is still a vertical opening, through which smoke and heat could propagate.

Answer: No, although this answer does need to be clarified. The annex states that it is “the intent of this section to require closely spaced sprinklers and draft stops to openings where protection or enclosure is required by building and life safety codes” (A.8.15.4.1). Model building codes generally do not contain requirements for enclosure of mezzanines that would call this section into use, but what appears to be a mezzanine may in fact be an enclosed and protected partial floor. It is best to clarify this with your local building official for the project.

Question 6 – Sprinklers for Gas Furnaces in NFPA 13R Attics

Section 6.9.6 of NFPA 13R (2007 edition) states where sprinklers may be omitted from concealed spaces and includes areas not intended for living purposes or storage that do not contain fuel fired equipment. In a 13R application, would a gas furnace in the attic trigger full attic protection, i.e. a dry or antifreeze system? Is it reasonable to provide localized protection of the furnace? Is there a definition of fuel fired equipment and does the gas furnace fall within that definition?

Answer: Fuel fired equipment is a general term used for equipment or appliances that use LPG, natural gas, kerosene, fuel oil, etc. to produce heat, such as for a furnace or hot water heater. Codes and standards use this term in a general all-inclusive way, but in definition form they specifically define the actual piece of equipment. The fuel fired furnace in the 13R system negates the attic exception, meaning that the attic is now required to be sprinklered. However, the standard does say that concealed

spaces that do not contain storage, living spaces, or fuel fired equipment are exempt from sprinklers. As such, if the furnace is isolated within a “furnace space” constructed of a reasonable fire resistive barrier (comparable to type of construction or duration of water supply), then it is separated from the attic space, and only the “furnace room” would be required to be sprinklered. In preparing the 2010 edition of NFPA 13R, the committee looked at this section and did not want to require that the whole attic or concealed space be sprinklered for just one piece of equipment like a gas heater. They have tentatively modified the 2010 edition to allow a single quick response sprinkler to be installed over the fuel fired equipment if that is the only reason that the attic or concealed space needs sprinklers. While this is not yet final and the NFPA membership will vote on proposed changes in June 2009, it should be noted that no public comments were received relative to this item, indicating a lack of opposition.

Question 7 – Sprinklers in the Corridor Rule

We were just discussing an application where the Room Design Method is being looked at with regard to corridors in a light hazard occupancy with unprotected openings. Section 11.2.3.3.5(2) of the 2007 edition of NFPA 13 is pretty clear. When the “room” is not a corridor, you calculate every sprinkler in the room plus a maximum of two in each communicating space (such as an adjacent corridor). Section 11.2.3.3.7 also looks pretty clear - when the “room” is a corridor with unprotected openings in a light hazard occupancy the maximum number of sprinklers that needs to be calculated is five. The question is whether those two sections need to be read in conjunction with each other or as separate requirements? We’ve always thought that since one section does not reference the other they should be read independently, but in the NFPA’s *Automatic Sprinkler Systems Handbook* the commentary located between 11.2.3.3.6 and 11.3.2.2.7 suggests that it is necessary to add additional sprinklers. Also, the commentary is confusing since it discusses a seven-sprinkler design with respect to 11.3.2.2.6, which only calls for five corridor sprinklers, but the commentary also references 11.2.3.3.5(2).

Answer: If the “room” under consideration is not a corridor, you have to calculate the whole room plus two sprinklers outside the room if you have a light hazard occupancy that does not have protected doors. If the room under consideration is a corridor, you calculate five sprinklers regardless of the doors. The water supply needs to be able to handle both situations (independently, not added together). The commentary in the 2007 edition of the *Automatic Sprinkler Systems Handbook* appears to be carried over in error from the 2002 edition. Section 11.2.3.3.8 of the 2002 edition required a 7-sprinkler design area for a corridor in which the openings were not protected.

Question 8 – Galvanized Pipe for CMSA Sprinklers

The March/April 2009 edition of NFSA’s *Sprinkler TechNotes* indicates that rules for large drop and specific application control mode sprinklers are being merged as rules for “CMSA” (control mode specific application) sprinklers. Will the requirement for internally galvanized steel pipe (found in Section 8.4.7.2 of the 2007 NFPA 13 for large drop sprinklers) remain a requirement for all applications of CMSA sprinklers on dry and preaction systems?

Answer: Yes, as proposed the requirement would remain that all steel pipe for dry and preaction systems with CMSA sprinklers be internally galvanized. However, an exception has been added for systems protecting freezers (kept below 32 degrees F) that use nitrogen or air from a compressor with a regenerative drier.

Question 9 – Stockpiles vs. Storage

NFPA 13, 2007 edition, Section 5.3.1 refers to stockpiles. What is the difference between a stockpile and miscellaneous storage? When does a stockpile become miscellaneous storage? An 8 ft Class 3 stockpile is protected with an ordinary hazard group 1 density, while the same Class 3 material is required to have an ordinary group 2 density if it is classified as miscellaneous storage.

Answer: This is explained in annex section A.5.3: “Stockpiles are considered to include display merchandise (mercantile) and arrangements of combustible materials ancillary to operations within the occupancy as opposed to dedicated storage areas where the fire loading is generally more severe.” NFPA 13 uses the term “stockpiles” to intentionally avoid pulling in the storage protection rules of Chapters 12 through 20 for applications like conventional retail stores and industrial assembly operations.

Question 10 – High Temp Sprinklers below Downward-Discharging Unit Heaters

In NFPA 13 - 2007, Table 8.3.2.5(a), why does a horizontal discharge unit heater require a high temperature sprinkler 2 ft below the heater but a vertical downward discharge heater does not require a high temperature sprinkler 2 ft below the heater? This seems backwards.

Answer: For downward discharging unit heaters, any sprinkler up to 7 ft directly below the heater needs to be high temperature rated. You can see this in the table where immediately after the words “vertical downward discharge” in the first column, the table includes the note “for sprinklers below unit heaters, see Figure 8.3.2.5.” The figure shows the high temperature zone 7 ft in the direction of airflow. For a downward discharging unit heater, this means any sprinkler within 7 ft below the unit heater would have to be high temperature rated. If sprinklers were more than 7 ft below the heater (rare, but it could happen in some in-rack arrangements) intermediate temperature sprinklers would be required to up to 20 ft below the heater.

Question 11 – Design Densities for a Sloped Ceiling

Pages 670 and 671 from the 2002 *Automatic Sprinkler Systems Handbook* address density requirements, including under sloped ceilings. When a sloped ceiling is present and the sprinkler is spaced at 130 sq ft at the slope, with a projected horizontal coverage on the floor area of 122 sq ft, is the density (0.10 gpm/sq ft) applied to the floor area or the slope? Section 14.4.4.3.2 states floor area, but the explanation in the handbook on page 671 says: “The area of coverage per sprinkler for spacing and density purposes is based on the area of coverage of the sprinkler as determined by 8.5.2.1 – that is, along branch lines and between branch lines.””. Doesn’t this imply the density is based on the distances and area along the slope?

Answer: Use the horizontal area along the floor for density purposes. Another section of the commentary on the top of page 671 specifically states: “When evaluating remote area requirements for sprinkler systems installed under sloping roofs or ceilings, the actual horizontal floor area calculated must be equal to or greater than the required remote area.” The sentence that you highlighted regarding the use of section 8.5.2.1 for calculating the area is also true, but refers to the S x L rules, which have nothing to do with slopes. Section 8.5.2.1 tells the user to take the distances between sprinklers and walls at right angles to the walls and tells the user that the area is calculated using the dimension between sprinklers or twice the distance to the wall, whichever is greater.

These are important rules to follow for determining area of sprinklers for density application purposes, even when measuring along the floor area. This commentary is important because users of NFPA 13 years ago were able to employ an “imaginary wall” concept to allow spacing of sprinklers that would violate the S x L rules. The committee doesn’t want people using the imaginary wall concept for the application of densities, so they mandate the S x L rules, along the floor.

Question 12 – Adding Inside Hose to Sprinkler Calculations

Where does NFPA 13 indicate the need to include the hose stream demand in hydraulic calculations? Must it be at the base of riser node, or can it be at the pump node? Where can we find this in NFPA 13?

Answer: The answer to your question depends on where the hose stations are and whether or not the building is a storage warehouse. Here are some of the possible situations:

- If you have inside hose stations in a light, ordinary or extra hazard occupancy, you add the inside hose demand (50 gpm or 100 gpm depending on the number of hose stations) at the point of connection of the hose station to the sprinkler system (see 11.1.5.5(3)).
- If you have inside hose stations in a storage warehouse, you add the inside hose demand (50 gpm or 100 gpm depending on the number of hose stations) at the point of connection of the hose station to the sprinkler system (see 12.8.4(3)).
- If you have a light, ordinary or extra hazard occupancy with no inside hose stations, you add the outside hose demand (100 gpm, 250 gpm or 500 gpm based on Table 11.2.3.1.2) at the connection of the sprinkler system to the city main or at a yard hydrant, whichever point is closer to the sprinkler system riser (see 11.1.5.4).

- If you have a storage warehouse with no inside hose stations, you add the outside hose demand (250 gpm or 500 gpm based on Chapters 14-20) at the connection of the sprinkler system to the city main or the closest yard hydrant, whichever point is closer to the sprinkler system riser (see 12.8.3).
- If you have a light, ordinary or extra hazard occupancy with inside hose stations, you add the outside hose demand (0 gpm, 50 gpm, 150 gpm, 200 gpm, 400 gpm or 450 gpm based on Table 11.2.3.1.2 and 11.1.5.5(1) and 11.1.5.5(2)) at the connection of the sprinkler system to the city main or the closest yard hydrant, whichever point is closer to the sprinkler system riser (see 11.1.5.4).
- If you have a storage warehouse with inside hose stations, you add the outside hose demand (150 gpm, 200 gpm, 400 gpm or 450 gpm based on Chapters 14 to 20 and 12.8.4(1) and 12.8.4(2)) at the connection of the sprinkler system to the city main or the closest yard hydrant, whichever point is closer to the sprinkler system riser (see 12.8.3).
- If you have a fire pump, you add the hose demand as discussed above and size the fire pump to handle whatever is downstream. This will be different depending on whether or not there are inside hose stations downstream and whether or not there are hydrants downstream (11.1.5.3 and 12.8.2).
- No inside or outside hose allowance is required where tanks supply sprinklers only (11.1.5.1 and 12.8.1).

Upcoming "Business Thursday" Online Seminar – April 16th

Topic: Best Practices Update

Instructor: Brian Cullen

Date: April 16, 2009

Brian Cullen is a seasoned insurance industry professional who effectively uses his skills in leadership, development and coaching to help clients achieve their most favorable business results. His presentation will include an overview of best practices and what is being done to help the fire sprinkler industry achieve its goals.

Upcoming "Technical Tuesday" Online Seminar – April 21st

Topic: Questions on Single Family Sprinkler Installations

Instructor: Jeff Hugo, CBO, NFSA Manager of Codes

Date: April 21, 2009

With the passage of mandatory sprinkler requirements in the 2009 edition of the International Residential Code, the number of questions regarding the use of NFPA 13D has increased. This seminar will cover the common questions regarding the design of sprinkler systems, arrangements of water supplies and the potential use of wells and well pumps to meet system demand.

Additional training opportunities available through the NFSA engineering department include...

Two-Week Layout Technician Training

September 14-25, 2009

Baltimore, MD

October 12-23, 2009

Phoenix, AZ

Inspection and Testing for the Sprinkler Industry

April 21-23, 2009

Nashville, TN

June 16-18, 2009

Leominster, MA

Advanced Technician Training

June 23-25, 2009

Denver, CO

For more information on the above classes, contact Nicole Sprague using Sprague@nfsa.org or by calling 845-878-4200 ext. 149.

In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country. Here are some upcoming seminars:

NFPA 13 Overview & Intro to Plan Review	Richmond, CA	April 21-22
Hydraulics for Fire Protection	Richmond, CA	April 23
Sprinkler Protection for Rack Storage	Orlando, FL	April 29
Sprinkler Protection for Flammable (1/2 Day)	Orlando, FL	April 30
Sprinklers for Dwellings	McFarland, WI	May 6
CPVC Piping Installation Requirements (1/2 Day)	McFarland, WI	May 7
Foam Water Sprinkler Systems (1/2 Day)	McFarland, WI	May 7
Inspection, Testing & Maintenance	McFarland, WI	May 8
CPVC Piping Installation Requirements (1/2 Day)	Lincoln, NE	May 12
Commissioning & Acceptance Testing (1/2 Day)	Lincoln, NE	May 12
Inspection, Testing & Maintenance	Lincoln, NE	May 13
NFPA 13 Update 2007	Lincoln, NE	May 14
Hydraulics for Fire Protection	Colorado Springs, CO	May 19
Inspection, Testing & Maintenance	Colorado Springs, CO	May 20
Sprinklers for Dwellings	Colorado Springs, CO	May 21
NFPA 13 Overview & Intro to Plan Review	Anaheim, CA	May 26-27
Plan Review Policies & Procedures	Anaheim, CA	May 28
NFPA 13 Overview & Intro to Plan Review	Branson, MO	June 2-3
Inspection, Testing & Maintenance	Branson, MO	June 4
Introduction to Sprinkler Systems (1/2 Day)	Hillsboro, OR	June 15
Sprinkler Protection for General Storage	Hillsboro, OR	June 16
Hydraulics for Fire Protection	Hillsboro, OR	June 17
Basic Seismic (1/2 Day)	Hillsboro, OR	June 18
Advanced Seismic (1/2 Day)	Hillsboro, OR	June 18
Residential Homes to High Rise	Albany, NY	June 23
Introduction to Sprinkler Systems (1/2 Day)	Albany, NY	June 24
Commissioning & Acceptance Testing (1/2 Day)	Albany, NY	June 24
Sprinkler Protection for Special Storage	Albany, NY	June 25
Hydraulics for Fire Protection	New Lenox, IL	July 7
NFPA 13 Overview & Intro to Plan Review	New Lenox, IL	July 8-9
Commissioning and Acceptance Testing (1/2 Day)	Apple Valley, CA	July 28
CPVC Piping Installation Requirements (1/2 Day)	Apple Valley, CA	July 28
Inspection, Testing & Maintenance	Apple Valley, CA	July 29
Sprinkler Protection for Rack Storage	Apple Valley, CA	July 30
NFPA 13 Overview & Intro to Plan Review	Brighton, MI	August 19-20
Sprinklers for Dwellings	Brighton, MI	August 21
NFPA 13 Overview & Intro to Plan Review	Anaheim, CA	Sept. 22
Hydraulics for Fire Protection	Anaheim, CA	Sept. 23
Underground Piping (1/2 Day)	Anaheim, CA	Sept 24
Basic Seismic (1/2 Day)	Anaheim, CA	Sept 24
Underground Piping (1/2 Day)	Woodland, CA	Oct 20
Commissioning & Acceptance Testing (1/2 Day)	Woodland, CA	Oct 20
Sprinkler Protection for Special Storage	Woodland, CA	Oct 21

These seminars qualify for continuing education as required by NICET.

To register or for more information, contact: Dawn Fitzmaurice at (845) 878-4207, E-Mail: seminars@nfsa.org

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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.

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