

Best of Month December 2016

Following are a dozen questions answered by the engineering staff as part of the NFSA's Expert of the Day (EOD) member assistance program being brought forward as the "Best of January 2017." If you have a question for the NFSA EOD (and you are an NFSA member), send your question to eod@nfsa.org and the EOD will get back to you.

It should be noted that the following are the opinions of the NFSA Engineering Department staff, generated as members of the relevant NFPA 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 and should therefore not be considered, nor relied upon, as the official positions of the NFPA or its Committees.

Unless otherwise noted the most recent published edition of the standard referenced was used.

Question 1 - Painting of Sprinkler Piping

Is there a code requirement for sprinkler piping to be painted a specific color?

Answer: The answer to this question is no. Although sprinkler piping is often painted red, it is also common for sprinkler piping to be painted to match the color of nearby walls, ceilings or siding (outside applications) for aesthetic purposes. In general, a specific color requirement for sprinkler piping is not provided in NFPA standards or the model building and fire codes. However, some local regulations require a specific color paint (often red) to be used. It is also important to recognize that there are instances where the AHJ or owner may want to see the manufacturers markings on the pipe and fittings prior to painting. For these reasons, it is advisable to discuss painting with the AHJ and building owner prior to fabrication and installation.



Question 2 - Synthetic (Polyethylene) Ice

A business plaza is currently being renovated to have a synthetic ice rink, which occupies 800 ft². The synthetic ice consists of 1/2 in. thick polyethylene. The building is protected by an existing dry pipe system, which was laid out and installed based on ordinary hazard group 1 occupancy criteria. A dry pipe system was used since portions of the system piping were routed through unheated areas of the building. Is this protection appropriate or is a higher level of protection required since polyethylene flooring will be used for the rink?

Answer: The use of the polyethylene ice rink flooring would require protection as an ordinary hazard group 2 (OH2) occupancy. Polyethylene would be considered a group A plastic in accordance with NFPA 13-2016, section 5.6.4.1(15). This material has been considered a group

A plastic based on its burning rate exceeding 1,500 BTU/ft²/min indicating a high rate of heat release rate. The existing system configuration based on an ordinary hazard group 1 (OH1) occupancy classification would be inappropriate since OH1 is limited to fires with moderate rates of heat release. The system should be evaluated for consideration as OH2. This is also consistent with storage of an exposed unexpanded group A plastic up to and including 5 ft in height, which would be protected as an OH2 occupancy as identified in NFPA 13 Table 13.2.1. It is advised to discuss this issue with the fire protection engineer working on the project to have a more thorough analysis conducted regarding the use of the polyethylene ice material.

Question 3 - Use of Intermediate Temperature Sprinklers in Light Hazard Occupancies

Why are intermediate temperature sprinklers now permitted in light hazard areas where the temperature is not expected to be above 100° F degrees?

Answer: Prior to the 2010 edition of NFPA 13, ordinary temperature sprinklers were required throughout all light hazard occupancies unless a higher temperature sprinkler was needed due to the presence of a heat source or higher than normal ambient ceiling temperatures (greater than 100°F) existed. The change occurred during the 2010 code cycle, which now permits either ordinary temperature or intermediate temperature sprinklers to be installed throughout the building, unless of course a higher temperature sprinkler would be necessary due to its proximity to a heat source.

The change to NFPA 13 was made in part to ensure consistent sprinkler response characteristics within a building or fire area. By allowing intermediate temperature



You just took away your seismic joint's freedom to move

[Click here for the key to full rated movement](#)

The seismic BreakAway Coupling connector



MAY 3-6, 2017

Red Rock Resort Las Vegas, NV

in partnership with



Register Now

sprinklers to be used throughout a building, differences in temperature rating would be substantially reduced.

Activation time is, of course, important to successful sprinkler operation. The need for ordinary temperature sprinklers to be used throughout a building was important when sprinkler selections were limited to those with standard response operating elements having large and inconsistent RTIs. The need for restricting use to ordinary temperature sprinklers has become less critical due to the mandatory requirement for quick response sprinklers (having lower RTI values $\leq 50 \text{ m-s}^{1/2}$) to be used in light hazard occupancies. The intermediate temperature quick response sprinklers used today have been found to have unsubstantial differences in activation times from the ordinary temperature standard response sprinklers used in the past.

To further explain this change, below is a paraphrased excerpt from NFPA's Report on Proposal (ROP) from the 2010 revision that led to this change of the standard.

13-125 Log #89 AUT-SSI Final Action: *Accept in Principle (8.3.2.3)*

Recommendation: *Add a new 8.3.2.3 Intermediate sprinklers shall be permitted to be used throughout buildings. Re-number remainder 8.3.2. Revise current 8.3.2.3 Intermediate and High-temperature shall be permitted to be used throughout ordinary and extra hazard.*

Substantiation: *Many commercial facilities are omitting a drop ceiling (simply painting the upper area black) and often installing many HVAC diffusers. This has led to some cases where 1/3 of the sprinklers have an intermediate rating in order to satisfy Table 8.3.2.5(a). With standard response sprinklers, a lower temperature rating makes sense. Now that quick response sprinklers are required, the difference in activation time between the two temperature ratings is not significant but the impact on installation is significant.*

Committee Meeting Action: *Accept in Principle*

Revise proposal as follows: 8.3.2.1 - Add "and intermediate" to existing language 8.3.2.3 - Delete "intermediate" from existing language as suggested by proponent.

Committee Statement: *The committee agrees with the submitter's intent but believes that it is more appropriate to modify 8.3.2.1 than to add a new 8.3.2.3.*

Number Eligible to Vote: 27 Ballot Results: Affirmative: 27

**Upcoming Technical
Tuesdays**

January 17

**Sprinklers
Installed Outside**

**NEW REDUCED PRICE
FOR MEMBERS!**

Register Here



View older issues in the "Member's Only" section

**Upcoming In-Class
Seminars**

Jan 25-26 Marshalltown,
IA
Sprinkler System
Plan Review

Feb 14-16 Pharr, TX
-Standpipe Systems, NFPA
14
-Fire Service Mains
&
-Rough and Final
Inspection
(One Day Class Each)

Register Here

Did You Know??

The NFSA keeps a member of the Engineering Department staff on duty every business day to answer your technical questions live. We call this the Expert of the Day (EOD) program and it is available to our members by phone, fax or e-mail. Call us at (845) 878-4200 and press

2, or you can send a fax to (845) 878-4215, or you can e-mail us at eod@nfsa.org. Last year we answered more than 2600 requests for assistance.

Question 4 - Fire Department Connections in High Rise Buildings

A combination standpipe/sprinkler system located in a high-rise building includes two fire pumps in series. A fire pump located on the ground floor serves the lower standpipe zone and supplies suction to a second fire pump on an immediate floor which serves the high zone standpipe system. Several questions were asked:

Question 4.1: Would separate fire department connections (FDCs) be needed for each fire pump or would a single FDC be allowed?

Answer 4.1: A separate FDC would be required for each zone (therefore each pump). This requirement is noted in NFPA 14 (2013) in section 7.12.1 which reads as follows:

7.12.1 One or more fire department connections shall be provided for each zone of each Class I or Class III standpipe system.

An exception to this requirement is found in section 7.12.1.1 which states: The "high zone fire department connection(s) shall not be required to be provided where section 7.9.3 applies. Section 7.9.3 reads as follows:

7.9.3 For systems with two or more zones in which any portion of the higher zones cannot be supplied by means of fire department pumpers through a fire department connection, an auxiliary means of supply in the form of high-level water storage with additional pumping equipment or other means acceptable to the AHJ shall be provided.*

Figure A.7.1(d) in the annex of NFPA 14-2013 shows both a low zone FDC and a separate high zone FDC. This Figure is titled "Vertically Staged Pumps for Two-Zone System"

Question 4.2: Do the requirement of NFPA 13 section 8.17.2.4.8 apply since the pumps are in series?

Answer 4.2: This is a complex question since both NFPA 13 section 8.17.2.4.8 and NFPA 14 section 6.4.3.1 (2013) state that the fire department connection shall not be connected to the suction side of the fire pump. Technically, for pumps in series, the discharge pipe from the low zone is considered the suction pipe of the high zone pump. This is stated in NFPA 20 (2016) in section 4.15.1.2. Therefore, the low zone FDC would be connected to the suction pipe of the high zone pipe. However, this is the arrangement shown in Figure A.7.1(d).

There is an apparent inconsistency since NFPA 14 requires

FDCs to serve all zones. The reason for restricting the FDC from being connected on the suction side of a fire pump is twofold; first, the FDC is considered a separate independent water supply; and secondly, to prevent over-pressurization of the system when the fire pump is running and the Fire Department connects to the FDC. In the case described, this would only be a potential problem if both the low zone and the high zone pumps were operating and the Fire Department connects to the low zone Fire Department Connection. Perhaps these sections should state the FDC shall not be connected to the suction side of the fire pump for the specific zone being served.

Question 4.3: If required, where is the FDC line connected for the pump located mid-way up the building (high zone pump)?

Answer 3: The FDC connection for the high zone would need to be connected to the high zone piping (after the high zone pump discharge). Again, NFPA 14 (2013) includes an annex figure which may provide guidance. Refer to Figure A.7.1(d).

Question 5 - Omitting Sprinklers in Small Bathrooms Under Dwelling Unit Stairs

A residential building is being protected with an NFPA 13 (2010) sprinkler system. The building contains two-story dwelling units with stairs of combustible construction located entirely within the dwelling units. There are small bathrooms located directly under the stairs. You note that NFPA 13 allows sprinklers to be omitted from bathrooms under 55 square-feet in area but 8.15.3.1 states that sprinklers are required beneath all stairwells of combustible construction.

Does NFPA 13 section 8.15.3.1, which requires sprinklers to be installed beneath all stairwells of combustible construction supersede the allowance provided in section 8.15.8.1.1 allowing the omission of sprinklers in bathrooms under 55 square-feet and therefore require the bathroom under the stairs to be protected?

Answer: The answer to this question is "yes", when there is a bathroom (under 55 square-feet) located under a stairway of combustible construction, sprinklers need to be installed beneath that stair. The requirement to provide sprinklers under combustible stairwells (section 8.15.3.1) would supersede the allowance to omit sprinklers in small bathrooms within dwelling units (section 8.15.8.1.1).

When there are conflicting requirements (or allowances) the more restrictive would need to be applied. In this case, even though section 8.15.8.1.1 would allow sprinklers to be omitted from this small bathroom, sprinklers would need to be provided as section 8.15.3.1 requires sprinklers to be installed under combustible stairs. The more restrictive

requirement would need to be met even if this area happens to be in a small bathroom.

This would be considered best practice since this stair (even if it is a convenience stair) is a vital egress component in the case of a fire. If this stair is compromised, occupants could be trapped on the second floor of the dwelling unit.

Question 6 - Closed Loop Metering

A fire pump installation has a flooded suction from an underground storage tank. This pump is also equipped with a test header and the client would like to add a flow meter as a means to test the fire pump. Is it acceptable to configure the flow meter piping to discharge into the tank suction line?

Answer: Yes, NFPA 20-2016 allows this arrangement under the closed-loop metering requirements. In order to utilize this method, a check valve would need to be installed on the discharge side of the flow meter to prevent water from flowing backwards through the meter. In addition, a throttling control valve needs to be provided downstream of the meter to control the flow through the meter. Annex section A.4.21.1.2 of NFPA 20-2016 provides guidance including diagrams on flow meter installation.

It should be noted that while this is a permitted flow test arrangement, the standard does require that when using a closed loop system, an alternate means of testing be provided. This is found under section 4.21.2.10 and is required to be able to test the water supply at a range of flows necessary to conduct a full flow test (which is not possible with a flow meter through a closed-loop test) and also to verify the accuracy of the flow meter. This can be done through the existing test header.

Question 7 - Aircraft Hangar with Spray Paint Operations

A Group III Aircraft Hangar is protected with a ceiling foam system installed per Chapter 7 of NFPA 409-2016. There will be spray paint operations in the hangar. Is sprinkler protection required in the spray paint booth in accordance with NFPA 13?

Answer: Yes, NFPA 409 section 8.8.1.2.4 requires protection of spray paint areas in Group III aircraft hangars in accordance with Chapter 7. Section 7.1.4 states that automatic closed-head sprinkler protection be provided for the hazard present in accordance with NFPA 13.

The sprinkler is limited to the paint spray area in accordance with NFPA 33 section 9.4.2.1, which states that "the sprinkler design area shall not be required to exceed the area of the booth or room in which spraying or resin

application is conducted".

Question 8 - Group A Plastics with Open Top Container

There is a project where palletized exposed Group A plastics in open top containers will be stored up to a maximum 22 feet in a building with a maximum ceiling height of 40 feet. Protection based on NFPA 13 Table 15.3.1 using CMSA sprinklers is limited to cartoned unexpanded plastics in a building having a maximum height of 40 feet. Protection using ESFR sprinklers is not permitted for open top containers. Are there any appropriate protection schemes for storage of open-top containers in a building with a height of 40 feet?

Answer: No, there no known prescriptive protection schemes for open-top Group A plastic containers. Protection schemes using CMDA sprinklers are limited building have a maximum height of 35 feet. Protection using CMSA sprinklers in building having height of 40 feet is permitted for cartoned Group A plastic storage only. Protection of open top containers is not permitted using either CMSA or ESFR sprinklers for the heights identified.

Referring to other protection schemes based on testing of Group A plastics, such as those found in FM Data Sheet 8-9, there are no permissible arrangements allowing for storage of open top containers to a height of 22 feet in a building having a height of 40 feet. Allowable commodities for this storage height in a building with 40 feet are limited to Class 1 through 4 and Cartoned Unexpanded Group A Plastics. The only protection scheme for a building with a maximum 40 foot height would be where the open top containers are limited to the bottom tier in a rack storage installation. This is noted in A.3.9.1.19 of NFPA 13 (2016) as well as in the FMDS 8-9.

Question 9 - The Small Room Rule & Glass Walls

The "small room" rule requirements of NFPA 13-2016, section 8.6.3.2.4 are being applied to a room that is less than 800 square-feet in area with a section of the wall constructed of glass located below an 8-inch lintel and having a width greater than 36 inches. Is the glass considered to be part of the wall or as part of the opening?

Answer: To apply the small room rule, it does not matter if the glass section is considered an opening or as part of the wall as long as it is no more than 8 feet in width. Since the glass is less than 8 feet wide and the section of the wall containing the glass includes a lintel over 8 inches deep, this would be an acceptable arrangement. A small room is defined as: a "compartment" that is light hazard, is of unobstructed construction, and is 800 square-feet or less in

area. The definition of a compartment allows openings with lintels of up to 8 feet in width. The 36 inch limitation is for openings without a lintel.

As long as this room is of light hazard classification, is of unobstructed construction, is 800 square-feet or less in area, and the openings meet the definition of a compartment, the "small room rule" would apply. It is important to note that the definition of a compartment and the definition of a small room do not require that the walls or opening protectives have a fire resistive rating.

Question 10 - The Beam Rule; Maximum Spacing to Sprinkler on Other Side

A standard spray upright sprinkler will be located next to a continuous obstruction. In order to comply with NFPA 13-2016 Table 8.6.5.1.2 to clear the obstruction, the sprinkler must be installed with the deflector 6 inches above the bottom of the obstruction and at least 2 feet 6 inches away horizontally. Another sprinkler will be installed on the other side of the obstruction.

Can the sprinkler on the opposite side of the obstruction be installed 15 feet from the sprinkler described above?

Answer: The answer to your question is "yes," provided that the first sprinkler has been placed to achieve spray beneath the obstruction in accordance with Table 8.6.5.1.2, normal spacing can be maintained. If the first sprinkler has been installed to comply with the "beam rule", it will be able to reach its entire normal coverage area so spacing to the next sprinkler will not be affected.

Question 11 - Closets in Group I-2 Health Care

A rehabilitation center classified as an I-2 Health Care Facility has an area of 69,000 square feet. The building is Type V construction and has sprinkler protection throughout. The facility contains approximately 80 typical semi-private patient rooms approximately 160 square feet each. Each room is provided with a small closet having a footprint on the order of 5 to 6 square feet. The governing codes and standards are NFPA 13 (2010) and NFPA 101 (2000). Both NFPA 13 -2010 section 8.15.8.2* and NFPA 13-2013 section 8.15.9* have been cited.

These sections state:

8.15.8.2 Closets and Pantries. Sprinklers are not required in clothes closets, linen closets, and pantries within dwelling units in hotels and motels where the area of the space does not exceed 24 ft² (2.2 m²), the least dimension does not exceed 3 ft (0.9 m), and the walls and ceilings are surfaced with noncombustible or limited-combustible materials.*

8.15.9 Hospital Clothes Closets. Sprinklers shall not be required in clothes closets of patient sleeping rooms in hospitals where the area of the closet does not exceed 6 ft² (0.55 m²), provided the distance from the sprinkler in the patient sleeping room to the back wall of the closet does not exceed the maximum distance permitted by 8.5.3.2.*

Would sprinklers be required in these small closets?

Answer: The answer to your question is "yes, with regards to the exemption provided in section 8.15.8.2*" as it only applies to hotels and motels; with regards to section 8.15.9* it would depend on whether the AHJ agreed that that rehabilitation center qualified as a 'hospital' under IBC". Both hospitals and nursing homes are defined as Group I-2 but only hospitals are provided with the exception identified in section 8.15.9*. (IBC (2015) cited below.)

HOSPITALS AND PSYCHIATRIC HOSPITALS. Facilities that provide care or treatment for the medical, psychiatric, obstetrical, or surgical treatment of care recipients who are incapable of self-preservation.

NURSING HOMES. Facilities that provide care, including both intermediate care facilities and skilled nursing facilities where any of the persons are incapable of self-preservation.

Question 12 - NFPA 13 & NFPA 13R in the Same Building

A multiuse building having a height of 50 feet contains mercantile use on the first floor, business use on the second floor and residential use on the third floor. Would it be permitted to protect the first two floors with a sprinkler system laid out in accordance with NFPA 13 and the third with a system laid out in accordance with NFPA 13R?

Answer: The answer to your question is "no," this arrangement would require the use of NFPA 13 throughout the entire building since this mixed-use application is outside the scope of NFPA 13R. It is not commonly accepted practice to apply more than one installation standard within the same building. There are exceptions when the same structure is effectively divided into more than one "building" as defined in the prevailing building code. Typically, this would require the use of vertical firewalls between buildings or the use of the pedestal building rules for a horizontal separation.

for which no NFSA Technical Tuesday Online Seminar is scheduled. Statements and conclusions are based on the best judgment of the NFSA Engineering staff, and are not the official position of the NFPA or its technical committees or those of other organizations except as noted. Opinions expressed herein are not intended, and should not be relied upon, to provide professional consultation or services. Please send comments to Mark Hopkins, P.E. at Hopkins@nfsa.org.

