

TechNotes Issue # 437
April 14, 2020

Best of March 2020

Roland Asp, CET, new TechNotes editor

Congratulations to Roland Asp, as we have selected him to carry on a great tradition within NFSA. In 1978, Russ Fleming, PE, started a technical service for NFSA members, a regular technical newsletter called, *Sprinkler Technotes*, to keep the members informed as the rules regarding fire protection system installation changes. The twice-a-month publication remains a key membership publication for contractors, layout technicians, code officials and engineers. The list of editors since Russ, include Ken Isman, PE, Victoria Valentine, PE, and Mark Hopkins, PE. It is a great pleasure to see Roland Asp, CET as the next and newest editor of TechNotes. Roland has been with the NFSA since 2012 and is NFSA's Manager of Codes and Standards and Secretary of NFSA's Engineering and Standards Committee. I know you will all join me in welcoming him to this new role!

Sincerely, Shane Ray, President

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Following are a dozen questions answered by the NFSA's Codes, Standards, and Public Fire Protection Department staff as part of the NFSA's Expert of the Day (EOD) member assistance program during the month of March 2020. This information is being brought forward as the "Best of March 2020." If you have a question for the NFSA EOD (and you are an NFSA member), send your question to eod@nfsa.org.

It should be noted that the following are the opinions of the NFSA 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

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Via Email : eod@nfsa.org

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To improve your response time, please include in the email subject line the following information: code/standard and edition year (example: NFPA 13 2016, 2018 IBC, 2017 NFPA 25, etc.).

Thank you for your membership in the NFSA.



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the NFSA, NFPA, ICC, or their committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

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Question #1 - 5 Year Flow Test

Do small pressure reducing valves (1-1/2 in. or less) need to have a 5-year full flow test per the 2014 edition of NFPA 25?

Answer: Yes. The valve(s) would require a 5-year full flow test. NFPA 25 does not differentiate required tests based on the size or type of pressure reducing valve. The only exception would be a master pressure reducing valve which has separate ITM requirements in the standard.

Per NFPA 25:

13.5.1 Inspection and Testing of Sprinkler Pressure-Reducing Valves. *Sprinkler pressure-reducing valves shall be inspected and tested as described in 13.5.1.1. and 13.5.1.2.*

13.5.1.1 *All valves shall be inspected quarterly to verify that the valves are in the following conditions*

- (1) In the open position*
- (2) Not leaking*
- (3) Maintaining downstream pressures in accordance with the design criteria*
- (4) In good condition, with handwheels installed and unbroken*

13.5.1.2* *A full flow test shall be conducted on each valve at 5-year intervals and shall be compared to previous test results.*

Question #2 - Sidewall Sprinkler Positioning under catwalks



An open grate catwalk is installed and will require additional sprinkler protection underneath as it exceeds 4 ft in width. Sidewalls are requested, but the construction of the catwalk would not constitute a smooth, flat ceiling. Is there a way that sidewalls can still be installed?

Answer: Yes, sidewall sprinklers are permitted to be installed "under obstructions that require sprinklers". The 2019 edition of NFPA 13 allows standard spray sprinklers to be utilized in six specific locations as found in section 10.3.2:

10.3.2 Sidewall Spray Sprinklers. *Sidewall sprinklers shall only be installed as follows:*

- (1) Light hazard occupancies with smooth, horizontal or sloped, flat ceilings*
- (2) Ordinary hazard occupancies with smooth, flat ceilings where specifically listed for such use*
- (3) To protect areas below overhead doors*
- (4) At the top and bottom of elevator hoistways*
- (5) For the protection of steel building columns*
- (6) Under obstructions that require sprinklers*

Subsection (6) specifically allows sidewall sprinklers to be located under obstructions even if the "ceiling" is not considered a smooth, flat ceiling. The open grate catwalk is considered an obstruction that prevents sprinkler discharge from reaching the hazard as shown in section 9.5.5.3.1.1. It should be noted that subsections (4), (5) and (6) of section 10.3.2 is new language in the 2019 edition of NFPA 13.

In addition, these sprinklers below the open grating would be required to be intermediate-rack type or otherwise shielded from the discharge of overhead sprinklers per Section 9.5.5.3.4 to prevent overspray and cold soldering from the sprinklers at the ceiling level. As there are no intermediate level sidewall sprinklers available, the sprinkler must shielded by other means. The annex section A.9.5.5.3.4 suggests that the shield "should not be less, in least dimension, than four times the distance between the shield and fusible element..."

It should also be noted that section 9.5.5.3 includes the rules for installing sprinklers under obstructions and should be reviewed.

Question #3 - Failure to Conduct Required ITM

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If a test required by NFPA 25 is not performed, is that considered a deficiency?

Answer: No, failure to conduct inspections, testing, or maintenance (ITM) required by NFPA 25 is not considered a deficiency in accordance with NFPA 25.

This issue has been debated at some length, but the consensus is that verifying long-cycle ITM items, such as 3- and 5-year, is outside the scope of NFPA 25. NFSA presented an input into the 2017 revision cycle of NFPA 25 arguing that failure to conduct long-cycle ITM is a non-critical deficiency as defined in Section 3.3.7.2:

3.3.7.2 Noncritical Deficiency. *A deficiency that does not have a material effect on the ability of the fire protection system or unit to function in a fire event, but correction is needed to meet the requirements of this standard or for the proper inspection, testing, and maintenance of the system or unit.*


That proposal was rejected both by the committee and by a floor vote at the 2016 annual technical meeting in Chicago.

Note that the failure to maintain the system in accordance with NFPA 25, including the require long-cycle ITM, is a violation of building and fire codes. While it is not reported as a deficiency under NFPA 25, it is a code violation enforceable by the authority having jurisdiction.

Question #4 - Unventilated Concealed Spaces

Does the 2013 edition of NFPA 13, Section 8.3.2.5 require intermediate temperature sprinklers in unventilated attic spaces or any unventilated concealed space between floors?

Answer: Yes, Section 8.3.2.5(5) of the 2013 edition of NFPA 13 applies to all unventilated concealed spaces. This includes attics, unventilated concealed spaces (such as between floors), and concealed spaces beneath roofs. These spaces can experience higher temperature than normal ambient temperature experienced in the occupied and climate-controlled spaces. Temperatures above 100°F can be experienced for extended periods of time. Table 6.2.5.1 identifies that a maximum ceiling temperature of 100°F applies to ordinary temperature sprinklers and indicates a maximum ceiling temperature of 150°F for intermediate temperature sprinklers. Unventilated attics, unventilated concealed spaces, and concealed space beneath roofs should be expected to experience maximum temperatures above 100°F and below 150°F.



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Therefore, intermediate temperature sprinklers are required, per NFPA 13-2013:

8.3.2.5* *The following practices shall be observed to provide sprinklers of other than ordinary-temperature classification unless other temperatures are determined or unless high-temperature sprinklers are used throughout, and temperature selection shall be in accordance with Table 8.3.2.5(a), Table 8.3.2.5(b), Table 8.3.2.5(c), and Figure 8.3.2.5:*

...

(5) Sprinklers in an unventilated, concealed space, under an uninsulated roof, or in an unventilated attic shall be of the intermediate-temperature classification.

...

Keep in mind that Section 8.3.2.1 permits the use of intermediate temperature sprinklers throughout buildings so regardless of the requirements of Section 8.3.2.5, intermediate temperature sprinklers could be used anywhere.

8.3.2.1* *Unless the requirements of 8.3.2.2, 8.3.2.3, 8.3.2.4, or 8.3.2.5 are met, ordinary- and intermediate-temperature sprinklers shall be used throughout buildings.*

It is also evident that intermediate temperature sprinklers are required when looking at specific application concealed (interstitial) space sprinklers and attic sprinklers. These special sprinklers are only offered in intermediate temperatures ratings. Options with ordinary temperature ratings are not available.

Question #5 - Heat-tracing Supervision

Listed heat tracing is to be used to protect fire sprinkler piping from freezing. Does the 2016 edition of NFPA 13 require the heat tracing to be connected to a fire alarm panel? The authority having jurisdiction (AHJ) is stating that a light emitting diode (LED) light at the end of the heat trace system is sufficient.

Answer: NFPA 13 does not specifically require heat tracing to be connected to a fire alarm panel. There was a first draft revision to the 2016 edition of NFPA 13 that would have required heat tracing to be supervised by either:

1. Central station, proprietary, or remote station signaling service
2. Local signaling service that will cause a signal at a constantly attended location

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This first draft revision, however, was rejected during the public comment stage in favor of the previous language which stated:

Electric supervision of the heat-tracing system shall provide positive confirmation that the circuit is energized

The committee statement for this action was:

This proposal is not appropriate for NFPA 13, which provides the minimum requirements, such that the waterflow alarm and the control valves do not require electrical supervision. The proposal for such severe electrical supervision for heat tracing is therefore beyond what can be reasonably asked for. The existing requirement to simply provide positive confirmation should stay in effect.

Based upon this action, NFPA 13 simply requires that heat tracing systems include electric supervision providing a positive conformation of the energized circuit. See section 8.16.4.1.4.2 of the 2016 edition of NFPA 13.

The only definition of supervision in NFPA 13 applies to marine systems which is not applicable in this case. Another definition of supervision can be found in the 2014 edition of NFPA 25:

3.3.45 Supervision. *In water-based fire protection systems, a means of monitoring system status and indicating abnormal conditions.*

As heat tracing systems are required to be listed per section 8.16.4.1.4.1, the manufactures instructions need also to be reviewed.

The LED light and the end of the heat trace system as suggested by the AHJ may fulfill the requirement to provide positive conformation of the energized circuit. If accepted, the owner should institute a policy to monitor this confirmation (LED) during freezing weather to ensure the heat trace system is operational when needed.

Question #6 - Hydraulic Design Information Sign

Is the hydraulic design information sign required by the 2016 edition of NFPA 13, Section 25.5 required for every floor of a high-rise building?

Answer: Yes. Beginning with the 2013 edition of NFPA 13, the definition of "sprinkler system" changed, such as, if a floor of a high-rise building includes a water supply source, a water control valve, a waterflow alarm, and a drain, then it is regarded as a separate system.

All new high-rise buildings officially include separate systems for each floor, and each is required to have a hydraulic design information sign.

Question #7 - Grease Ducts

Sprinklers are to be installed in ducts serving commercial-type cooking equipment in accordance with section 8.9 of the 2019 edition of NFPA 13.

These ducts run horizontal for about 30 ft., and then turn and run vertically up, in excess of 75 ft, and exit on the roof level.

The following questions are answered individually below.

Question 7a: Is the 75 ft. length requirement per NFPA 13 the total footage horizontal length, vertical length, or both vertical & horizontal length?

Answer: If the duct is longer than 75 ft in length (horizontal, vertical, or a combination of the two) and are not protected per NFPA 96, then sprinklers must be installed in the grease ducts per NFPA 13.

Per the 2019 edition of NFPA 13:

8.9.3.4.1 Where ducts do not exceed 75 ft (23 m) in length and the entire exhaust duct is protected in accordance with NFPA 96, sprinkler(s) or automatic spray nozzle(s) shall not be required.

Question 7b: If sprinklers are used, what temperature rating should be selected?

Answer: At a minimum utilize extra high-temperature sprinklers (325°F to 375°F). Temperature rating should be selected per the 2019 edition of NFPA 13, Section 8.9.6:

8.9.6 Sprinkler and Automatic Spray Nozzle Temperature Ratings and K-Factors.

8.9.6.1 Where the exposed temperature is expected to be 300°F (149°C) or less, sprinklers or automatic spray nozzles being used in duct, duct collar, and plenum areas shall be of the extra high-temperature classification [325°F to 375°F (163°C to 191°C)].

8.9.6.2 When use of a temperature-measuring device indicates temperatures above 300°F (149°C), a sprinkler or automatic spray nozzle of higher classification shall be used.

Question #8 - Replacing ¾ in. Steel Pipe

Which section of the 2010 edition of NFPA 13 specifically states that ¾ in. pipe in pipe schedule system needs to be replaced when modifying the system?

Answer: Section 8.15.19.4. Pipe less than ¾ in. in diameter in an area being revamped needs to be replaced unless it is installed in an existing outlet and the nipple does not exceed 4 in. If it is installed in a seismically protected system, no pipe smaller than ¾ in. may be installed. Per the 2010 edition of NFPA 13:

8.15.19.4 Revamping of Pipe Schedule Systems.

8.15.19.4.1 *When pipe schedule systems are revamped, a nipple not exceeding 4 in. in length shall be permitted to be installed in the branch line fitting.*

8.15.19.4.2 *All piping other than the nipple permitted in 8.15.19.4.1 and 8.15.19.4.3 shall be a minimum of 1 in. in diameter in accordance with Figure 8.15.19.4.2.*

8.15.19.4.3 *When it is necessary to pipe two new ceiling sprinklers from an existing outlet in an overhead system, the use of a nipple not exceeding 4 in. in length and of the same pipe thread size as the existing outlet shall be permitted, provided that a hydraulic calculation verifies that the design flow rate will be achieved in accordance with Figure 8.15.19.4.3.*

8.15.19.4.4 *The use of pipe nipples less than 1 in. in diameter shall not be permitted where seismic design is required on the system.*

Question #9 - Floor Control Assemblies

In the 2013 edition of NFPA 13 a new section was added requiring floor control assemblies on each floor of a multistory building with annex language that seems to contradict the requirements. Is the intent of A.8.16.1.5.1 to allow for buildings (such as a 4-story, 62,000 square foot apartment bldg.) to have one single sprinkler zone?

Answer: No. As stated in Section 8.16.1.5.3, the small buildings that the annex is alluding to are buildings "where the total area of all floors combined does not exceed the system protection area limitations of 8.2.1.". An apartment building is typically classified as a light or ordinary hazard occupancy and the system area limitation would be 52,000 sq. ft. If the four-story apartment building had a total square footage of 52,000 sq. ft. or less, then the floor control valve assemblies

(FCVA) on each floor would not be required. However, as this building is 62,000 sq. ft, the requirements of 8.16.1.5.1 would apply and each floor would need a FCVA.

Question #10 - Portable Classrooms

For a project in southern California, is there a code section that specifies whether or not portable classrooms are required to have sprinklers installed.

Answer: The 2019 California Building Code (CBC) has two thresholds for fire sprinklers in educational occupancies. The first threshold comes from Section 903.2.3. It would require sprinklers for portable or relocatable classrooms if any of these three conditions are met:

- Over 12,000 sf
- An occupant load greater than 300
- Has rooms with laboratories, vocational shops, or other special hazards

The second threshold is for public school buildings on a campus in the CBC. Per Section 903.2.19, all buildings on a campus are required to be sprinklered, however, there is an exception for portable or relocatable buildings. Section 903.2.20 states when the relocatable building is intended to be on site for less than three years and is on a temporary foundation, fire sprinklers are not required.

Relocatable buildings are defined in the CBC Administrative code, Section 4-314. They are required to have an integral floor structure that can be readily movable, and the school district needs to issue a statement recognizing the substandard and temporary foundation. This means that the foundation isn't meant to provide permanence to the structure and would be the trigger for providing the fire sprinkler exception from 903.2.19.

Question #11 - Secondary Supplies

Based upon the 2010 edition of NFPA 13, do buildings with floor areas exceeding 52,000 sq. ft require a second supply feed to the building?

Answer: No. Other factors, such as building height, may require a secondary supply into a building, but an area that exceeds 52,000 sq. ft only requires a separate sprinkler system per the 2010 edition of NFPA 13, Section 8.2.1, which can be split off from a common supply.

The definition of a sprinkler system was updated in the 2013 edition of NFPA 13 to clarify this issue. This new

definition implies that every combination of a water control valve, flow alarm, and drain constitutes a unique sprinkler system. This answers the age-old question regarding a floor control assembly and whether it makes for separate systems on each floor or not. The answer under this new definition is "yes." A multiple story building with separate floor control assemblies that include control valves, alarms, and drains will be considered a bunch of separate sprinkler systems instead of one system. This will have significant implications on the inspection, testing and maintenance requirements.

Question #12 - Standpipe Calculations

For a standpipe system with a three-way roof manifold on the most remote riser, what outlets should be used for hydraulic calculations using the 2007 edition of NFPA 14?

Answer: In this case if the most hydraulically remote has the three-way manifold on the roof, two of those outlets would be used. Each hose valve would have a demand of 250 gpm. Per NFPA 14, Section 7.10.1.1.1:

7.10.1.1.1 For class I and class II systems, the minimum flow rate for the hydraulically most remote standpipe shall be 500 gpm though the most remote 2-1/2 in. hose connection and the calculation procedure shall be in accordance with 7.10.1.2

The use of the term remote is defined by Merriam-Webster as separated by an interval or space greater than usual or far removed in space, time or relation. However, the term "remote" in this case is not in reference to the placement of individual hose connections but indicates remoteness on the system based on hydraulic demand.

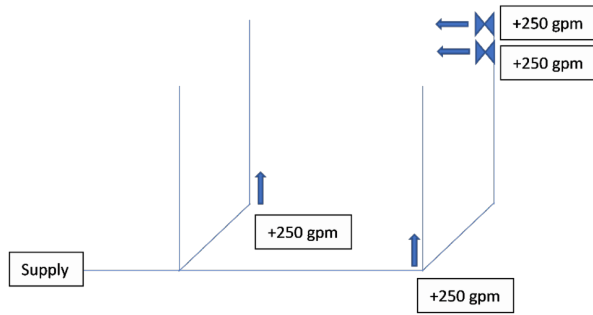
Figures A.11.5.2(a) and A.11.5.2(b) in the 2019 edition of NFPA 14 shows examples of standpipe flow test methods. Figure A.11.5.2(a) shows the two remote hose connection to be located at the roof manifold.

Please note that the hydraulic calculation must include the hose connections on the most hydraulically remote riser, but additional riser demands are taken at the point of connection to the common supply pipes. Per NFPA 14:

7.10.1.2.1 Hydraulic calculations and pipe sizes for each standpipe shall be based on providing 250 gpm at the two hydraulically most remote hose connections on the standpipe and at the connection point of each of the other standpipes at the minimum residual pressure required by section

7.8.

Below is an example for a standpipe system in a fully sprinklered building (Maximum 1,000 gpm demand):



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