

Change in Schedule for TechNotes

For the last few years, TechNotes has been issued by the NFSA on every Tuesday when there is not an on-line seminar being delivered by the NFSA (about 28 per year). This has been in keeping with our idea of providing some new information to our members every week on Tuesday (hence the name Technical Tuesday). But the NFSA is reorganizing its training schedule and while the number of hours of seminars that we will offer is going up, the number of seminars that we are going to offer on a Tuesday is going down.

Not wanting to increase the burden on the NFSA staff, we're going to move TechNotes to a twice monthly delivery schedule. Starting in July, we'll deliver TechNotes on the second and fourth Tuesday of the month, regardless of whether or not this corresponds to a seminar being delivered the same day. We hope with this more regular schedule, you'll look forward to receiving each and every one of these valuable newsletters.

Best of May 2014

This month, we have selected the following dozen questions as the "Best of May 2014" answered by the engineering staff as part of the NFSA's EOD member assistance program. If you have a question (and you're a member of the NFSA), you can send your question to eod@nfsa.org and we'll answer it as soon as we can. This compilation was put together by Jeffrey M. Hugo, CBO, NFSA's Manager of Codes, which Jeff turned in on time. Any delay in publication is the editor's fault.

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 a formal interpretation in accordance with the NFPA Regulations Governing Committee Projects and should therefore not be considered, nor relied upon, as the official position of the NFPA or its Committees.

Question 1 - Curtain Style Draftstops

A floor opening in a two story building is using draft stops and closely spaced sprinklers as an alternative to a rated enclosure. It has been proposed that instead of traditional draft stops, an 18 inch deep ceiling pocket with closely spaced sprinklers is to be installed around the perimeter of the floor opening. Is the 18 inch deep ceiling pocket or channel permitted to serve as the draftstop?

Answer: No. Draftstops protecting vertical openings that are required by the building codes and installed according to NFPA 13 are curtain style,



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which descend from the ceiling surface or plane. The purpose of the draft stop is to bank heat to activate the closely spaced sprinklers that now serve as the alternative to the stair enclosure. The draft stop and closely spaced sprinklers prevent the vertical spread of products of combustion from spreading to the rest of the building through the vertical opening. In a fire scenario, the fire plume may be able to "jump" the ceiling pocket or channel and bypass this required separation of the vertical opening.

Question 2 - Miscellaneous Storage

In the definition of miscellaneous storage, what does, "incidental to another occupancy use group" mean?

Answer: The reason that the phrase, "incidental to another occupancy use group" is in the definition of miscellaneous storage is to make sure that miscellaneous storage only happens in non-storage occupancies. The concept of miscellaneous storage was invented to deal with situations like storage rooms in hotels where extra chairs and tables are kept between meetings and back stock rooms in retail stores. In these cases, the storage is incidental to the hotel or retail sales occupancies. That's what the phrase, "incidental to another occupancy use group" is referring to. In order to qualify for the rules of "Miscellaneous Storage", the building has to have been constructed for some purpose other than storage. The storage has to be incidental to that other use.

Question 3 - Flexible Drops on Pipe Schedule Systems

Is it the intent of the 2013 edition of NFPA 13, Section 23.5.1.2, to require existing pipe scheduled systems that are modified with flexible drops to be hydraulically calculated?

Answer: Yes. Systems with flexible sprinkler drops must be hydraulically calculated. You cannot install flexible sprinkler drops under the pipe schedule method when extending an existing pipe schedule system without hydraulically calculating the system. These flexible drops are typically braided stainless steel and this material is not covered by Table 6.3.1.1 as a typical aboveground piping material. Therefore Section 23.5.1.2. requires hydraulic calculations. Flexible drops are specifically listed with friction loss information in terms of the equivalent length of 1-inch Schedule 40 pipe. The friction loss through flexible drops cannot be ignored and must be accounted for by hydraulic calculations.

Question 4 - Arm-over's, Drops, and Flexible Drops in the Zone of Influence

When calculating the loads in the Zone of Influence (ZOI), do I add in the loads for the arm-over's, drops and flexible drops?

Answer: Yes. The Zone of Influence (ZOI) would include the piping that is there, including the arm-over's, drops and flexible sprinkler drops. The arm-over's, drops, and flexible drops add to the load of the branch lines.

The definition of a branch line was amended a few cycles ago to specifically exclude arm-overs and drops. An unintended consequence of this change is found in Section 9.3.5.9.6. It is not the intent of the committee to exclude the weights associated with the arm-overs and drops from the seismic load calculations. This is a situation where a change in one section of the standard affects a separate section in a way not anticipated by the committee.

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Question 5 - Other Equipment in Fire Pump Rooms

Can duct work and electrical wiring that serves other parts of the building run through the fire pump room?

Answer: No. NFPA 20, Section 4.12.1.1.4 states, "...rooms that contain fire pumps shall be free from storage, equipment and penetrations not essential to the operation of the pump and related components." The one and only exception is that the domestic water distribution equipment can be located within the fire pump room.

Fire pump rooms are dedicated spaces and need to be treated very similar to how exit enclosures (stairwells) are treated. What sets the fire pump room apart from any other space of the building is that the fire pump room is occupied during the pump operation. This means that during a fire, a qualified person is in the fire pump room monitoring the equipment during operation. Extra penetrations, such as from duct work that runs through to supply other spaces would increase the probability of smoke and fire entering the fire pump room, thus increasing the difficulty for a person to stay in the pump room and monitor the fire pump that is supplying water to the fire protection system.

Question 6 - Spare Sprinklers for Multiple Properties

On a property, there are several buildings such as apartment buildings. Would it be permitted to have one central location for the spare sprinklers and wrenches?

Answer: Yes. There is a new section in the 2013 edition of NFPA 13R that directly addresses this situation. Section 11.1.8, states: "*On a single property with multiple buildings under the same ownership, it shall be acceptable to provide the required spare sprinklers in a single location.*"

Furthermore in the Annex of the same section, "*It is not the intent to provide a spare sprinkler box for each building in the one location. A sufficient-sized cabinet(s) capable of meeting the requirements for a single building is adequate. The box should contain all the various types found on the property in the quantities prescribed by Chapter 11. A prime example is an apartment complex.*"

As for NFPA 13, the standard does allow a facility with multiple buildings to locate the required spare sprinklers in a central location. NFPA 13 (2013), Section 6.2.9.1 states "*A supply of at least six spare sprinklers shall be maintained on the premises so that any sprinklers that have operated or been damaged in any way can be promptly replaced*".

The wording of this section uses the term premises and not building. When a number of buildings are all owned by the same entity (like a military base or a college campus), NFPA 13 and NFPA 25 are met by simply having one central location for spare sprinklers, which might be better than scattering them where they can be lost, stolen or tampered with. The intent is to make sure that a sprinkler can be promptly replaced following activation so that the system can be returned to service. Of course, with such a central replacement location, replacements for all of the sprinklers in the complex need to be available, no matter how many different kinds of sprinklers there are.

Question 7 - ESFR Design Area with Obstructions

In the 2010 edition of NFPA 13, when calculating a system with ESFR



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sprinklers with additional sprinklers protecting under the obstructions, the design area would include 14 sprinklers. It appears that this section in the 2013 NFPA 13 is removed. Do I need to calculate two additional ESFR sprinklers in the 2013 under the obstructions?

Answer: No. The 2010 edition of NFPA 13, Section 22.4.4.6.4 states that when using ESFR sprinklers and when there are additional sprinklers below obstructions, it is not required to include all of the sprinklers (both above and below the obstruction) located in the design area in the hydraulic calculations. However, when there are additional sprinklers below obstructions, Section 22.4.4.6.4.1 requires that two additional sprinklers be added to the hydraulic calculations.

The justification for including these two additional sprinklers was that Factory Mutual, who originally proposed this rule, was concerned that the 12 sprinkler design area may not be adequate when additional sprinklers were installed under obstructions. Factory Mutual had since removed this requirement to add two additional sprinklers to the ESFR design area from their requirements. As a result, section 22.4.4.6.4.1 was removed from the 2013 addition of NFPA 13.

To summarize, when calculating the same system (ESFR system with sprinklers under obstructions) using the 2013 edition of NFPA 13, the design area would only need to include 12 sprinklers, not 14 as in the 2010 edition.

Question 8 - Limited Area Systems using NFPA 13D

A local AHJ is requiring a limited area sprinkler system (basement only) in a single family dwelling. I see there are rules for limited area systems in NFPA 13; but are there rules for installing a limited area system for NFPA 13D?

Answer: No. NFPA 13D does not recognize limited area systems and while NFPA 13 does mention them, these partial systems are not the intent of this standard. It is the intent of both these installation standards that the entire structure be equipped with sprinklers.

A limited area system for NFPA 13D will not comply with the installation standards, guidance on the required design densities and design area would not be specifically addressed in the standards. This information must be determined with consultation with the AHJ and based upon the performance goals of this system.

Question 9 - Clean Agent Systems in Fully Sprinklered Buildings

We have a computer server room that is a "building within the building." It is covered by a clean agent system. Are sprinklers also required in this room to consider the building a "fully sprinklered" building?

Answer: Yes. Computer server rooms are not specifically exempted from sprinklers in both NFPA 13 and the building codes. When a fire sprinkler system is installed, the building and fire codes require the system to be sprinklered throughout the building. Specifically, in Section 8.1.1(1) of NFPA 13, it states that sprinklers shall be installed throughout the premises.

To remove sprinklers from the server room would technically put the building out of compliance with the building code and NFPA 13. This would be considered a partially sprinklered building and none of the trade-offs from the building code could be applied.

A clean agent system does not have the same duration as a fire sprinkler system. Most clean agent systems are "one-shot" suppression systems. If a



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fire rekindles or is not suppressed, there is no more agent available to control or attempt to suppress again. When the fire continues to grow and grow beyond the room of origin, then the surrounding fire sprinkler system may not be able to control the fire. When this occurs, it is reported that the sprinkler system "failed."

It should be noted that NFPA 75, which is the design standard for protecting computer server rooms and other IT technology rooms specifically states that when the building is required to be sprinklered, the sprinkler system must extend to the computer server room as well.

A pre-action sprinkler system could serve this room, satisfy the owner's concerns, and keep the requirements of "sprinklered throughout" of both the building code and NFPA 13.

Question 10 - Wood Column Protection

Sprinklers are being retrofitted in an existing 100,000 square foot storage building with 18 ft high rack storage or Class I Commodity. The existing structure is all wood including the columns, which are very large pieces of solid lumber. NFPA 13, Section 16.1.4 specifically references steel columns and requires some sort of sprinkler protection (either special sprinkler protection at the ceiling or sprinklers to spray on the columns) if the columns do not have a specific fire resistance rating. Would wood columns be required to be protected in the same manner?

Answer: No. Section 16.1.4 of NFPA 13 was created from specific testing that used steel columns. This section references Annex C.10 which states the criteria used for the testing. No one did testing on heavy timber columns and beams. Essentially, a heavy timber column has a fire rating because of wood's ability to absorb heat. The width, depth and species would determine the fire rating and without this information it would be difficult to state what that rating would be.

The existing building appears to be of Type IV (Heavy Timber) construction and this type of construction, although wood, is comparable in fire rating to a Type IIA (protected steel) structure. According to this section (16.1.4), if the columns are fireproofed, then the column sprinklers can be eliminated. If these wood columns are such that they also have a fire rating, then the same requirements should apply.

Question 11 - Secondary Water Supply for High Rises

In a high rise building in a seismic zone, would the IBC require a second connection from the pump to the city water main(s) when you have already provided a secondary water supply in the building?

Answer: Yes. The IBC does not provide an exception to the requirement for the pump to be fed from two separate mains (or a single main valved to be separated from a break) if a secondary supply is maintained in the building. While the thought of only having one suction connection for the pump due to the fact that you have a secondary water supply in the building makes sense, the IBC/IFC have not specifically acknowledged it.

In the 2015 edition of the IBC, the requirement has been changed so that the second suction supply to the fire pumps for high rise buildings are only required in buildings that are over 420 ft high.

Question 12 - Fire Pump Test Header

Does NFPA 20 require the pump test be performed with the required flow being discharged from a test header or from a single riser on a standpipe system?

Answer: No. While a test header is the most common method means for obtaining the flow for the pump test, this is not a requirement of NFPA 20.

The NFPA 20 requirement for the means to test the fire pump is a performance based one and is found in section 4.20.1.1. This section states the *"A fire pump installation shall be arranged to allow the test of the pump at its rated conditions as well as the suction supply at the maximum flow available from the fire pump"* This section or other sections of NFPA 20 do not contain requirements that this flow must be obtained through a test header or a single riser.

Furthermore, Section 4.20.3.1.3 states that where outlets are being used as a means to test the fire pump the outlets must be on a test header or may be wall hydrants, yard hydrants or standpipe outlets of sufficient number and size to allow testing of the pump. It does not state that these outlets must be on a single riser.

As stated in the annex Section A.4.20.3.1.3(1) the outlets for obtaining this flow is typically provided through a test header but this section goes on to state, *"...the objectives of testing the pump can be achieved with other arrangements as well."*

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