NFSA The Voice of the Fire Sprinkler Industry

TechNotes

Editor-Kenneth E. Isman, P.E. | Issue# 283 | December 24, 2013

Best of November 2013

This month, we have selected the following dozen questions as the "Best of November 2013" answered by the engineering staff as part of the NFSA's EOD member assistance program.

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 – Sprinklers in Concealed Spaces

Can standard spray quick response sprinklers be used in a concealed space (like an attic) even though they are not specifically listed for concealed spaces?

Answer: Yes, as long as the space does not meet all of the following criteria:

1. The top of the space is horizontal (slope of 2 in 12 or less)
2. The construction is combustible wood truss, wood joist, or bar joist with a combustible upper surface
3. The depth of the space is less than 36 inches from deck to deck (for double wood joist construction, the 36 inches is measured from the top of the bottom joist to the bottom of the upper joist).

If all of the three criteria above are present in the concealed space, then section 8.15.1.6 of NFPA 13 would require the use of sprinklers that are specifically listed for concealed spaces.

Question 2 – QR Area Reduction in Building with Different Ceiling Heights

We are protecting a building that is all light hazard with varying ceiling heights. The most remote area has a ceiling height of 11-feet 8-inches, but other portions of the building have 15 ft or 20 ft ceiling heights. Are we still permitted to apply the Quick Response design area reduction from NFPA 13 due to the varying ceiling heights found in the building?

Answer: Yes. It might be necessary to perform additional calculations in the areas with a higher ceiling due to the fact that they might be hydraulically more demanding even though they are not physically in the

Upcoming Technical Tuesdays

Jan 7
Centrifugal and Positive Displacement Pumps

Jan 21
Fire Pump Location and Protection

Feb 4
Sizing Fire Pumps

Feb 18
Suction Piping and Appurtenances

Register Here

View older issues in the

most remote portion of the building.

Question 3 – Plastic Pallets

Can the criteria of NFPA 13, Chapter 15 (solid piled and palletized storage of Group A plastics), be used as an alternative to section 12.12 (Protection of Idle Pallets) to protect idle plastic pallets?

Answer: No. The storage of idle plastic pallets must be protected in accordance with section 12.12 (NFPA 13), titled Plastic Pallets. Even though these pallets may be of a similar material to unexpanded Group A plastics, Chapter 15 would not contain an appropriate level of protection for this particular hazard. The reason for this is due to unique configuration of pallets especially when they are stacked in piles.

As the annex states in A.12.12, stacks of idle pallets are one of the greatest challenges to sprinklers. The undersides of the pallets create a dry area on which a fire can grow and expand to adjacent pallets. This process will continue until the fire bursts through the top of the stack. At this point, it may not be possible for ceiling sprinklers to control this high challenge fire. Due to the severe fire conditions possible with idle pallet storage, the rules of section 12.12 are used to mitigate these challenges.

Question 4 – Low Pressure at High Point in System

We have been asked to evaluate a sprinkler system in a 50-year old 10-story building with a static pressure of only 26 psi on the top floor so that modifications to the system can be made. Is this pressure acceptable? Will we be able to modify this system?

Answer: Without knowing more about the situation, it would be difficult to answer. There is a very good chance that this system was done as a pipe schedule system in the 1960's. For light hazard occupancies, Table 11.2.2.1 in NFPA 13 references a minimum residual pressure at the top level of sprinklers as 15 psi with a flow available from the water supply of 500 or 750 gpm. With a static pressure of 26 psi, it is reasonable to believe that a residual pressure of 15 psi would be available with a flow of 500 or 750 gpm from the water supply. To know for sure, you would need to know the residual pressure in the water supply (probably at the street) at 500 or 750 gpm and then you would have to subtract the elevation loss. If the resulting residual pressure is at least 15 psi, the situation would be acceptable, as long as the building is classified as a light hazard occupancy. For ordinary hazard, Table 11.2.2.1 in NFPA 13 references a minimum residual pressure at the top level of sprinklers as 20 psi with a flow available from the water supply of 850 or 1500 gpm.

Evaluating existing systems is always difficult from a legal perspective. Every code is slightly different in how it forces building owners to meet newer code requirements when any renovation or modification work is done. If the system is a pipe schedule system, section 11.2.2.3(1) of NFPA 13 would allow modifications to the existing pipe schedule system as long as the pipe sizes required by section 23.5 were followed. If you wanted to hydraulically calculate the new portions of the system, you could do that as long as the calculations showed that the new work would meet the demand of the system with the given water supply.

Question 5 – Steeply Pitched Ceiling or Wall

We are installing a sprinkler system in a building with a steeply pitched upper surface (20 in 12 pitch). Do we need to space the sprinklers under

"Members Only" section.

this pitched surface like a sloped ceiling or can we consider this steeply pitched surface a wall?

Answer: There is no definition in NFPA 13 that would help determine when a steeply pitched ceiling becomes a wall. However, NFPA 5000 (Building Construction and Safety Code) helps us out by defining a wall as, “A component that has a slope of 60 degrees or greater with the horizontal plane used to enclose or divide space.”

A 20 in 12 pitch has an angle of 59 degrees, so it would be considered a sloped ceiling and you would have to space the sprinklers under it as you would any other sloped ceiling. If the surface was slightly more pitched (21 in 12) it would have a slope greater than 60 degrees and would be considered a wall.

Question 6 – Use of FM Data Sheets

Can the FM Data Sheets be used in lieu of the NFPA standards for the design and installation of a sprinkler system and its water supply?

Answer: Yes, as long as the Authority Having Jurisdiction recognizes the FM Data Sheets as being equivalent to the NFPA standards or an “alternate arrangement” to the NFPA standards under sections 1.5 or 1.6 of NFPA 13 (similar sections in other NFPA standards).

It really just comes down to whether the local AHJ agrees that the FM Data Sheets have the same overall goals and objectives (or higher). Many AHJ’s do agree with this and allow the FM Data Sheets to be used instead of the NFPA prescriptive requirements. But we can’t speak for all of them.

What we do usually warn people about with these discussions is that if you are going to go down this road, you have to use the FM Data Sheets in their entirety. You can’t pick a few rules out of the FM Data Sheets and then use NFPA standards for the rest.

Question 7 – Cooking Oil Storage Using NFPA 30

We are protecting the storage of cooking oil in accordance with Table 16.5.2.5 and Scheme “A” of NFPA 30 and we are wondering if in–rack sprinklers and a barrier are required above the top 12 ft of storage or if the ceiling sprinklers can handle the top two levels (12 ft) of storage.

Answer: A barrier and in-rack sprinklers are required above the top of the storage. Section 16.6.1.1 of NFPA 30 specifically says, “All liquid storage shall be located beneath a barrier.” Figures 16.6.1.1(a), (b) and (c) show the barrier and in-rack sprinklers above the top of the storage.

The purpose of the ceiling sprinklers is to handle the excess heat from the fire that gets up to the ceiling. Even when the in-rack sprinklers control the fire under the barrier, there is a chance that the fire can give off enough heat to damage the ceiling if those sprinklers don’t open. But the ceiling sprinklers are not sufficient to deal with even two tiers of the combustible liquids being protected using Scheme “A”.

Question 8 – High Pressure in Standpipe

Is the intent of NFPA 14 to prohibit fittings of Schedule 10, 30 & 40, either threaded or roll grooved, in standpipe systems over 300 psi?

Upcoming In-Class Seminars

Jan 13-14 Brighton, MI
Sprinkler Protection of Storage

Jan 14 Apple Valley, CA
NFPA 13, 13R & 13D Update 2013

Jan 15 Brighton, MI
NFPA 13, 13R & 13D Update 2010

Jan 15 Apple Valley, CA
Fire Service Mains & Their Appurtenances

Jan 16 Brighton, MI

Answer: No. NFPA 14, Section 4.3 permits the use of fittings for higher pressures as long as they are stronger than standard weight pattern malleable-iron fittings. The fittings need to be rated for the pressure that will be in the system, but such materials are available.

Question 9 – Minimum Size of Combined Standpipe/Sprinkler Riser

Are we permitted to use 4 inch pipes in combined sprinkler/standpipe systems? A local engineer is interpreting NFPA 14 to require combined sprinkler and standpipe piping to be a minimum of 6" in diameter.

Answer: Yes, 4-inch pipe is permitted as long as the hydraulic calculations show that the system demand will be provided. The section that the engineer is probably looking at is NFPA 14 - 2013 section 7.6.2 (similar sections in earlier editions) which states, "Standpipes that are part of a combined system shall be a least 6 in. (150 mm) in size." However the next section (7.6.3) goes on to state "Where a building is protected throughout by an approved automatic sprinkler system ...., the minimum standpipe size shall be 4 in. for systems hydraulically designed in accordance with 7.8.1."

Section 7.6.2 is leftover from the days when standpipes were permitted to be designed as pipe schedule systems. The concept of pipe schedule standpipe systems has been removed from the standard, so this section is no longer really applies. Assuming the system is hydraulically calculated and the building is fully sprinklered, the applicable section would be 7.6.3 and the minimum allowed size of the combined standpipe would be 4 inches.

Question 10 – Diesel Tanks for Multiple Pumps

Can multiple diesel fire pumps be supplied by a single diesel tank?

Answer: No. NFPA 20 requires separate tanks for each diesel fire pump in Section 11.4.2.4 (2013). In previous editions, this section was combined with the separate fuel line requirement, but in the 2013 edition, the separate tank and separate fuel lines were split into two (separate) sections.

Each diesel fire pump needs to be operable on its own. If a single fire pump fuel supply is out of service, then another fire pump (in many cases, the redundant fire pump) is available. If both fire pumps are supplied by the same fuel tank and the fuel tank is jeopardized, then two fire pumps would be out of service.

Question 11 – Unions in Fire Pump Sensing Lines

What is a ground-face union (discussed in section 4.30.4 of NFPA 20 with respect to the sensing line for a fire pump) and can they be made of cast iron?

Answer: A ground-face union, in the context of NFPA 20, is a joint holding a non-corrosive diaphragm at a right angle to the run of the pipe. The diaphragm will have a 3/32 inch hole in it. The purpose of the diaphragm in the sensing line is to dampen pressure surges from the pump/fire protection system so that the pressure switch in the pump controller does not experience significant fast changes in pressure. The purpose of the small (3/32 inch) hole is to allow the pressure switch in the controller to experience the drop in pressure associated with water being

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 5, 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.

used in the fire protection system, so that the pressure switch can start the pump.

NFPA 20, permits a ground-face union in a pump sensing line if the water supply is so clean that you can guarantee that the small (3/32 inch) hole will not get plugged by debris, sediment or pipe scale. A cast iron union would not be permitted in the pump sensing line as NFPA 20, Section 4.30.3, only permits non-corrosive materials to be used in the pump sensing line. The use of non-corrosive materials ensures that the small hole will not get plugged by pipe scale.

Question 12 – Leaving Sprinklers Out of Computer Rooms

We have a client that is not comfortable with the idea of putting sprinklers in their computer room. If an alternative automatic fire-extinguishing system is installed in a computer room, can the automatic sprinkler system be eliminated?

Answer: It may be possible to eliminate sprinklers from that room with the approval of the AHJ, but doing so would probably not be prudent.

NFPA 75, Standard for Fire Protection for Information Technology Equipment, requires computer rooms in a sprinklered building to be sprinklered (NFPA 75 (2013) 8.1.1). Should your client decide to pursue this exemption anyway, he or she should beware of potential unintended consequences:

1. NFPA 13 requires sprinklers to be installed throughout the building except where omissions are specifically permitted (4.1). As there is no language in NFPA 13 that clearly permits sprinklers to be omitted in a computer room, eliminating those sprinklers would result in a system that would have to meet AHJ approval for a variance in order to be fully NFPA 13 compliant. This could have insurance implications that should be investigated.

2. The International Building Code may allow another automatic fire-extinguishing system as an alternative to required fire sprinkler systems, but it does not accept them “for the purposes of exceptions and reductions allowed by other requirements of this code” (see section 904.2 of the IBC and the IFC). This could have implications on code “trade-offs” (or as we like to refer to them, “trade-ups”) throughout the entire building that should also be investigated.