e-TechNotes

Editor-Russell P. Fleming, P.E. *Issue No. 226* *December 6, 2011*

Best Questions of November 2011

We have selected the following questions as the "Best of November 2011" answered by the engineering staff as part of the NFSA's EOD member assistance program:

Question 1 – Protecting Back-to-Back Storage with High Temperature Sprinklers

When protecting back-to-back shelf storage of Class IV commodity up to 15 ft in height, one would simply refer to NFPA 13 (2010 edition) Section 14.2.4.7, which directs you to Figure 14.2.4.1 for storage greater than 12 ft, but doesn't allow for a density reduction per Figure 14.2.4.3. But what happens in an existing facility which is fitted with 286°F sprinklers? My answer to our designers is that the high-temperature sprinklers are acceptable, but just utilize the reduced density as allowed in Figure 14.2.4.2. Do you agree that the density reductions per Figure 14.2.4.3 would still not be allowed?

Answer: Yes, you are allowed to use high temperature sprinklers when protecting back-to-back storage, but you can't take any design discharge credit (reduction) for the use of these sprinklers, even the density credit built into Figure 14.2.4.2. The Committee thought that it had clarified this issue through the rejection of Proposal 13-417 in the ROP for the 2013 edition. That proposal would have referenced the high temperature curves of Figure 14.2.4.2 when using high temperature sprinklers, but this was rejected by the Committee. The Committee position is that you could use the high temperature sprinklers, but not the density usually associated with those sprinklers. Unfortunately, that position did not make it into the official Committee Statement.

Question 2 – Sizing Tanks for Diesel Pumps

NFPA 20 (2010 edition) Section 11.4.2.1 states that fuel supply tanks (for diesel pumps) shall have a capacity at least equal to 1 gal per horsepower (HP), plus 5% volume for expansion and 5% volume for sump. My question is whether this is this based on the HP of the motor, or the HP of the pump? We had a manufacturer ship us a 70 gal fuel storage tank with a diesel pump setup. The motor is 85 HP, and the pump specifically states 22 HP (this is only a 250 gpm @ 75 psi pump). Do we need a 94 gal fuel tank, or a 25 gal fuel tank? We have asked the manufacturer for input, and they point us to the 8 hour supply referenced in the annex. They say that the diesel engine provided consumes 3.5 gal/hr of diesel, so the 70 gal tank provides 20 hours of fuel storage. Does the 70 gal tank meet the intent of NFPA 20?

Answer: The requirement in NFPA 20 is to size the tank based on the horsepower of the driver (engine). When a pump has a horsepower rating associated with it, the horsepower rating is a statement of the power necessary to produce the pressure and flow combinations assumed by the manufacturer. This

helps the driver manufacturer match the pump with a driver. In your case, the pump needs a driver with at least 22 horsepower. The person putting that pump together with a driver mated it to a driver with a much larger horsepower rating than what was necessary (perhaps because they don't have a smaller driver listed).

For whatever reason, you ended up with an 85 horsepower driver, so you need a 93.5 gallon tank to meet NFPA 20. It would be inappropriate to use an annex note in the standard to override a specific requirement in the standard. Yes, the general rules were written to achieve an 8 hour supply of fuel. But, rather than force people to do a fairly complex calculation to determine how much fuel they need, the standard was simplified to make everyone size their tanks the same with the one gallon per horsepower rule plus 10%.

You might want to contact the AHJ and ask if the smaller tank would be considered an acceptable alternate arrangement (permitted under Section 1.5 of NFPA 20). However, when you do that, you need to make sure you are calculating the fuel used by the engine under load conditions, not idle conditions. The number you referenced in your question could be the fuel consumption under idle conditions. Under full load (150% of rated flow) the engine might be consuming significantly more fuel.

Question 3 – Thrust Block Locations

I have a question about the correct placement of a thrust block at a tee. The tee is existing, but the outlet tee was cut and a blind flange (cap) installed. The tee already has a thrust block behind it. Is it now necessary to install an additional thrust block at the new blind flange (cap)? Why or why not?

Answer: Any time the water changes direction, the pipe needs to be restrained against the movement of the pipe that is caused by the momentum of the water changing direction. A thrust block is one way of providing this restraint.

Your description indicates the existing thrust block was installed behind the tee because a change in direction was taking place at the tee. If we understand correctly, you have now capped off the center outlet of the tee, limiting the flow through the fitting to the straight flow from one side to the other. Since there is no change in direction of flow, there should be no special need for a second thrust block. However, it could serve as one means of securing the blind flange (cap). If the mechanism used to attach the blind flange is suitably pressure rated, no additional thrust protection should be needed.

Question 4 – Distance of Ordinary Temperature Sprinkler from a Diffuser

Is there a specific requirement as to the distance an ordinary temperature rated sprinkler must be maintained from a diffuser installed in an acoustical or gypsum board ceiling? A fire marshal is claiming we must maintain a minimum distance of 18 inches away from any diffuser. I see no such requirement in Table 8.3.2.5(a) of NFPA 13 (2010 edition).

Answer: Not in those particular words. However, Table 8.3.2.5(a) does have minimum distances for an ordinary temperature sprinkler to be located from a diffuser as item (1)(c). It states minimum radial distances from the edge of the diffuser within which an intermediate temperature sprinkler would be required. The distances depend on whether the diffuser is discharging downward or horizontally across

the ceiling and range from 1 ft to 2 ft 6 inches accordingly. Any sprinkler located beyond those distances could be ordinary temperature rated.

Question 5 – Mixed Single and Double Row Racks

I have a rack arrangements similar to NFPA 13 (2010 edition) Section 17.3.1.2(b) with a double row rack adjacent to a single row rack with a 4 ft aisle in between, except there is no wall behind the single row rack.

My question is this… can the single row rack be protected like 17.3.1.2.1(a) or does it need to be protected like 17.3.1.2(b) because it is adjacent to a double?

Answer: Unfortunately, NFPA 13 is not very clear on this subject. The rules go back to when Group A plastics were only supposed to be stored on single row racks. As the protection rules evolved, the committee did a poor job of showing what was required and what was an option.

The intent of NFPA 13 is for the rules in Figures 17.3.1.2.1(a) through (c) to always be applicable to any single row rack storage. If you use these rules, the single row racks are always considered correctly protected, even if there are other types of racks elsewhere in the building as long, as the aisle is at least 4 ft wide to the other type of racks. Figures 17.3.1.2(a) and (b) were intended to be requirements for double-row racks and options for single-row racks that were mixed with double-row racks.

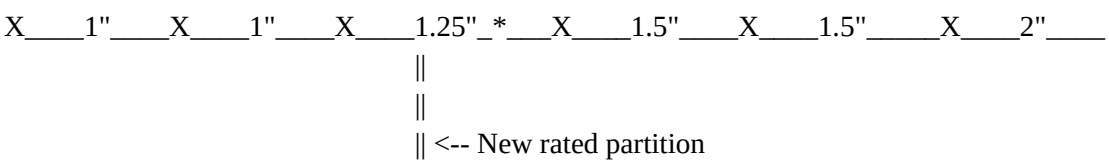
The Committee straightened this out at their meeting in September of this year, completely rewriting the chapter to make this clear. Although the actions have been successfully balloted, they will not be officially published until early 2012 because the Technical Correlating Committee still needs to review all of the decisions of the individual technical committees. To see the evolution of these rules, you could go back to the 1986 edition of NFPA 231C and follow the commentary in the subsequent committee reports that document the changes and why they were made.

Question 6 – Upgrading Old Pipe Schedule Systems

I have a question about a situation that tends to come up rather often with old pipe-schedule systems. We have a system originally installed in 1917. The end pieces of pipe have been upgraded to 1-inch and, before the current remodel, the pipe schedule for the line in question was 1, 1, 1 1/4, 1 1/2, 1 1/2, 2, etc. There are no suspended ceilings in the area in question. The occupancy is Ordinary Hazard Group 2. There are many new partitions in the building, all full height and rated one-hour or more.

In the case of our problem branchline, a new partition was added between the third and fourth sprinklers. The partition created a condition where the fourth sprinkler was over-spaced to the new partition. A new sprinkler is required between the third and fourth sprinklers, located on the upstream side of the wall.

Sprinkler line:



X = existing sprinkler
* = new sprinkler required to be added here

Can the case be made that this added sprinkler might be considered acceptable per the pipe schedule for up-over-down sprinklers (revamping rules)? The thinking would be that the partition is functioning much like a ceiling would function in separating fire areas. In fact, many ceilings are not rated (typical t-bar for example), but this partition IS rated.

Answer: The pipes will need to be sized according to the schedule. Based on the sketch you included this means that a few of the pipes will have to be changed to be the larger diameter needed to feed the sprinklers. In following the pipe schedule method there is no consideration given to the compartments in the building, the pipe is sized as if the walls do not exist.

Question 7 – Sidewall Sprinkler Obstructions

In the 2010 edition of NFPA 13, Table 8.7.5.1.3 provides a guide for the distance from a sidewall sprinkler to an obstruction. It goes out to 8 ft – 6 in., where the obstruction can be 14 inches below the sprinkler. What happens after 8 ft – 6 in.? Can you then go down to 18 inches or 3 ft?

Answer: No. The line you referenced in Table 8.7.5.1.3 reads “8 feet 6 inches or greater…” This means that when the obstruction is further than 8 feet 6 inches it would still be required to be no more than 14 inches above the bottom of the obstruction.

Question 8 – In-Rack Sprinkler Vertical Spacing

Figure 17.3.1.2.1(b) in NFPA 13 (2010 edition) states that a storage cube will measure 4 ft to 5 ft on a side. Based on the detail illustrated the distance between the levels of protection would be 12 ft to 15 ft. But the notes indicate that the in-rack sprinklers are to be spaced 10 ft apart vertically. Can the in-rack sprinklers be spaced greater than the 10 ft indicated?

Answer: Yes, in-rack sprinklers are permitted to be spaced up to 15 ft apart vertically when using the protection outlined in Figure 17.3.1.2.1(b). The note is not a limitation on in-rack spacing. The note does not say that in-rack sprinklers are limited to 10 ft vertical spacing. Instead, the note just says that if you put in-rack sprinklers at 10 ft spacing, you might have 2 loads between the sprinklers or you might have 7 loads between the sprinklers, depending on the height of each load.

The note is a standard note that goes on all in-rack sprinkler diagrams in NFPA 13. If you look at any of the diagrams, you will see the same note. The note is simply providing an example, it has nothing to do with vertical spacing requirements.

Question 9 – Recording Gauge Pressure Reading During NFPA 25 Testing

We note there is no code section in NFPA 25 that mandates pressure gauge readings be recorded during a main drain sprinkler test. Are we missing this or is this something that should be included in NFPA 25?

Answer: You are correct that the language in the body of NFPA 25 doesn't specifically require that the gauge readings be recorded. However, A.13.2.5 (2011 edition) provides an outline as to how the test is conducted and states that the static pressure should be recorded as well as the residual pressure after the flow has stabilized. This language is unenforceable since it is in the annex, but these two pieces of information are necessary to properly evaluate the system. The language below has been culled from A.13.2.5 for your convenience:

A.13.2.5 …..…

The main drain test is conducted in the following manner:

(1) Record the pressure indicated by the supply water gauge.

(2) Close the alarm control valve on alarm valves.

(3) Fully open the main drain valve.

(4) After the flow has stabilized, record the residual (flowing)pressure indicated by the water supply gauge.

(5) Close the main drain valve slowly.

(6) Record the time taken for the supply water pressure to return to the original static (nonflowing) pressure.

(7) Open the alarm control valve.

The pressure readings are required to be recorded in the Contractor's Material and Test Certificate by NFPA 13 (see the middle of the second page of the form in Figure 24.1 of NFPA 13, which is in the body of the standard and is a mandatory requirement). This certificate is required by NFPA 25 to be kept by the owner for the life of the system. Since Section 13.2.5.2 of NFPA 25 requires that a reduction of more than 10 percent from the original acceptance test results or previously performed tests trigger an identification and possible correction of the cause of the reduction, the acceptance test results tend to be of greatest significance. Yes, it would be advantageous to have a complete record of many different tests over the years to establish a pattern, but not absolutely necessary.

Question 10 – Minimum Protection for Openings

I was wondering if you could help clarify NFPA 13 (2007 edition) Section 11.2.3.3.5(2):

"For light hazard occupancies with unprotected openings in walls, a minimum lintel depth of 8 in. is required for openings and the opening shall not exceed 8 ft. in width."

Isn't this stating that in light hazard, I can use a lintel, as long as it is a minimum of 8 inches deep, and no wider than 8 feet? NFPA 13 does not have a definition of "opening protection" or "unprotected opening."

Per Section 3.3.5, an opening in a wall of a compartment having a minimum lintel depth of 8 inches from the ceiling with an opening not exceeding 8 ft in width is permitted.

If I understand this correctly, a compartment with such an opening can be treated the same as a compartment not having an opening at all. Therefore, the room design method of 11.2.3.3 can apply to this compartment, not requiring sprinklers in the adjacent room to be calculated.

Answer: To begin with, we disagree with your assertion that NFPA 13 has no definition of "opening protection". Section 11.2.3.3.5(1) effectively defines a protected opening as one having automatic door closers or self-closers. Section 11.2.3.3.5(2) only applies to those situations where openings are not protected in accordance with 11.2.3.3.5(1). In that case, additional sprinklers must be picked up beyond unprotected openings from the original room. The wording helps make the distinction between situations where you are picking up additional sprinklers beyond limited unprotected openings versus the situation where you've effectively got a larger room to consider. The wording of 11.2.3.3.5 (2) allows an unlimited number of "linteled" unprotected openings up to 8 ft wide each, or one "nonlinteled" unprotected opening up to 36 inches wide. When using the room design method, additional sprinklers will need to be added for each unprotected opening. Exceeding the size or number of allowed unprotected openings means that your base room is simply larger, incorporating the area beyond the opening as well.

Question 11 – Class I Standpipe Hose Valve Location

What technical justification was provided to make the change in location (Section 7.3.2(1)) of Class I standpipe hose valves from the 2007 edition of NFPA 14 to the 2010 edition? We have installed the first two standpipe risers in the stairs of a parking garage, the first of nine total standpipe risers which will go up through six levels. The standpipe system is to be a manual dry system such that the fire department will be providing the water supply through its own pumpers. When we designed the system we referenced the 2010 edition of NFPA 14, which requires the hose valves to be installed in the main landings. The fire inspector was recently at the site and told us that it is their policy that the hose valves be installed in the intermediate landing, as required by the 2007 edition of NFPA 14. However, he said that he would be interested to know why the change was made between the 2007 edition and the 2010 edition, and if we had any clarification in this regard he would consider it.

Answer: The following is the proposal and comment taken from the ROP and ROC for cycle F2009 published on NFPA's website:

> **Proposal 14-52** Log #67 Final Action: Reject
>
> (7.3.2 and 7.3.2.1) Submitter: Stephen M. Leyton, Protection Design and Consulting
>
> *Recommendation:* Revise text to read as follows:

7.3.2 Class I Systems. Class I systems shall be provided with 2½ in. (65 mm) hose connections in the following locations:

(1) At the intermediate or main floor level landing of every required exit stairway, as approved by the authority having jurisdiction. Where more than one intermediate landing occurs between floors, connections shall be located at the highest intermediate landing.

~~7.3.2.1 Hose connections shall be permitted to be located at the main floor landings in exit stairways where approved by the authority having jurisdiction.~~

Substantiation: Consolidates 7.3.2(1) and the exception in 7.3.2.1, and rewrites 7.3.2(1) so that it is closer to the language of the International Building Code. As written, users of the standard can be confused by the apparent bias toward intermediate landing locations – in fact, many building and fire officials require standpipe connections on main floor landings, especially in high-rise buildings. Placing both options in the same subsection highlights the significance of the AHJ's requirements.

Committee Meeting Action: Reject

Committee Statement: Already covered in the standard.

Explanation of Negative:

SCHWAB, P.: I agree with Mr. Leyton on this proposal. Many of installations we perform are on the main landing. The jurisdictions that require the intermediate landing do so simply because the standard is written that this is the mandatory location and the main landing is the exception. As the proposal is written, the AHJ does not have to make a decision that is contrary to the "preferred" location. The other issue of contention is that even though the intermediate landing requirement has been required for several cycles, architects have not adopted the practice of increasing the size of the landings. Placing the standpipe and associated equipment on an intermediate landing while staying outside of the egress path is in many situations impossible to accomplish.

Comment 14-18 Log #3 Final Action: Accept

(7.3.2) Submitter: David R. Hague, Liberty Mutual Property

Recommendation: Revise text as follows:

7.3.2 Class I Systems. Class I systems shall be provided with 2½ in. (65 mm) hose connections in the following locations:

(1) At the main floor landing in exit stairways

7.3.2.1 Hose connections shall be permitted to be located at the ~~main floor~~ highest intermediate landing~~s~~ between floor levels in exit stairways where ~~approved~~ required by the authority having jurisdiction.

Substantiation: The main floor landing should be the preferred location for hose connections. Where local firefighting tactics require staging of firefighting operations on the intermediate

landings, location of hose valves on the intermediate landing should be referenced as an acceptable alternate location.

Committee Meeting Action: Accept

The substantiations and comments above tell the story. The standard previously allowed hose connections on the main level per the AHJ, and now it permits them on the intermediate landing where required by the AHJ. One of the primary reasons is the necessary egress widths and the ability to achieve those values. However, the Committee recognizes that the hose connections are for fire department use and therefore may need to be on the intermediate landing if the fire department response plan calls for it.

Question 12 – Protecting Diesel Fuel Tank Rooms

Section 11.3.3 of NFPA 20 (2010 edition) calls for protecting a diesel pump room with sprinklers, but what about a fuel tank if it is in a separate room (s small room with only the tank and 2 ft of space on all sides and over the top to the ceiling. Does it still need a sprinkler, even if the room has a 2-hour fire resistance rating?

Answer: Yes, sprinklers need to be installed in a room that is just for a diesel fuel tank. NFPA 13 requires all areas of a building to have sprinkler protection unless there is a specific exemption written into the standard (see 8.1.1 and all of its sub-sections). There is no exemption for diesel fuel storage rooms.

Upcoming NFSA "Technical Tuesday" Seminar – December 27th

NOTE: This seminar, originally scheduled for December 13th, has been rescheduled for December 27th due to a conflict.

Topic: Types of Pipe
Instructor: Russell P. Fleming, P.E., NFSA Executive Vice President
Date: Tuesday, December 27, 2011- 10:30 am EST

This seminar will provide an update on the types of pipe allowed for use in fire sprinkler systems under the various NFPA sprinkler installation standards and different occupancy hazard classifications, as well as new types not yet addressed in the NFPA standards. It will include a review of the joining methods permitted for the various types. It will also address the limitations of special listed piping products, such protection requirements versus when piping can be exposed, and discuss current compatibility concerns.

To register or for more information, click HERE or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org.

Register Now for 2012 "Tech Tuesday" Series on Standpipes

NFSA Engineering has announced a new series of 12 "Technical Tuesday" online seminars for the first half of 2012, focusing on all aspects of standpipe system design, installation, testing and inspection. The

series starts on January 10th, so register now and take advantage of the multi-seminar discounts of up to 25 percent:

Jan 10th - Introduction to Standpipes
Jan 24th - Class II Standpipe Systems
Feb 7th - Class I and Class III Standpipe Systems
Feb 21st - Pressure Control in Buildings with Standpipe
Mar 6th - Pumps and Standpipe Systems
Mar 20th - NFPA 20 and NFPA 14 for High-Rise Buildings
April 3rd - Hanging, Bracing and Protection of Standpipe System Piping
April 17th - Manual Standpipe Systems
May 8th - Dry Standpipe Systems
May 22nd - Horizontal Standpipes and Lateral Piping
June 5th - Acceptance Testing of Standpipes
June 19th - Inspection, Testing and Maintenance of Standpipe Systems

Price for NFSA Members - $125 per session
Price for Non-Members - $250 per session

********** Special Offer **********
Order 12 or more seminars now and receive 25% off regular price
Order 10 or 11 seminars now and receive 20% off regular price
Order 8 or 9 seminars now and receive 15% off regular price
Order 6 or 7 seminars now and receive 10% off regular price

To register or for more information, click HERE or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org.

Layout Technician Training Course (2-week course)

Orlando, FL – February 6-17, 2012

For more information, contact Nicole Sprague using Sprague@nfsa.org or by calling 845-878-4200 ext. 149 or click HERE.

Upcoming In-Class Training Seminars

The NFSA training department also offers in-class training on a variety of subjects at locations across the country, and in recognition of the current recession has adopted a new reduced fee structure. Here are some upcoming seminars:

Dec 13-15	Noblesville, IN	Inspection and Testing for the Sprinkler Industry
Jan 10	Poughkeepsie, NY	NFPA 13, 13R & 13D Update 2007/2010
Jan 11	Poughkeepsie, NY	Seismic Protection/Protection of Flammable & Combustible Liquids
Jan 12	Poughkeepsie, NY	Inspection, Testing & Maintenance for the AHJ

These seminars qualify for continuing education as required by NICET, and meet mandatory Continuing Education Requirements for Businesses and Authorities Having Jurisdiction.

To register for these in-class seminars, click HERE. Or contact Michael Repko at (845) 878-4207 or e-mail to seminars@nfsa.org for more information.

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.