e-TechNotes

Editor-Kenneth E. Isman, P.E. *Issue No. 246* *August 14, 2012*

Best of July 2012

This month, we have selected the following dozen questions as the "Best of July 2012" 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. These 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 – Sprinkler Systems as Mechanical Systems

The building code references ASCE-7 for seismic considerations regarding building structures and building systems. In Chapter 13 of ASCE-7, there are exemptions from the seismic requirements for mechanical systems in buildings in certain seismic design categories. Do these exemptions apply to sprinkler systems?

Answer: Absolutely. ASCE-7 considers sprinkler systems to be just another type of mechanical system. In fact, it is within the discussion of mechanical systems that ASCE-7 references NFPA 13. Since they place their discussion of sprinkler systems within their section on mechanical systems, they must consider them a type of mechanical system.

Question 2 – Freight Elevators

Are freight elevators required to have sprinklers at the top of the hoistway?

Answer: Using the 2010 edition of NFPA 13 (and recent previous editions), the answer is yes because the section that allows sprinklers to be omitted from hoistways only applies to passenger elevators. However, the new 2013 edition will not require sprinklers in any elevator hoistways so long as the area is dedicated to elevator equipment only, there is automatic fire detection equipment installed in the area, the area is separated from the rest of the building with a fire separation as required by the building code, and no materials unrelated to the elevator equipment are stored there.

Question 3 – Other Equipment in Pump Room

Is other mechanical equipment allowed in a pump room?

Answer: No. Section 4.12.1.1.4 of NFPA 20 prohibits the installation of other mechanical equipment in the pump room. The pump needs its own room. Section 4.12.1.1.5 allows some other domestic water stuff in the pump room due to the difficulty in separating that equipment out as the water supply is typically common coming into the building. But that is it. The only equipment in the pump room is supposed to be the equipment essential for the operation of the pump.

Question 4 – Low Suction Throttling Valve for a Fire Pump

Is a valve that senses the suction pressure and partially closes when the suction pressure is low

permitted to be installed in a fire pump system?

Answer: Yes, as long as the valve is physically installed on the discharge side of the pump. The valve can have a sensing line that goes to the suction side so that it knows the suction pressure, but the portion of the valve that closes must be on the discharge side so that the pump does not get starved of water. See section 4.15.9.1 in NFPA 20 (2010 edition-similar sections in previous editions) for more information on the installation of this valve. Also note that when this kind of valve is used, NFPA 25 requires an extra test to be performed to make sure that the valve senses the low pressure on the suction side and partially closes, then reopens when the pressure returns.

Question 5 – Inspection of Buried Check Valves

NFPA 25 requires the internal inspection of all check valves on a 5-year basis. There is no exception for buried valves. In our case, there is a buried check valve in the lead-in to a sprinkler system from the public water main, but the water utility has indicated that the owner is responsible for the maintenance of this check valve. Is it the intent of NFPA 25 to have buried check valves dug up and inspected every 5 years?

Answer: NFPA 13 has always prohibited the practice of burying check valves in inaccessible locations (section 8.1.2 in the 2010 edition, similar sections in previous editions). Therefore, if a check valve has been buried, one of two situations probably occurred:

1. The check valve is not considered a part of the fire sprinkler system.

2. The AHJ allowed the valve to be buried such that it is inaccessible.

If Situation 1 is the case, the valve is not a part of the sprinkler system and is not subjected to following the requirements of NFPA 25. This would be true regardless of who is responsible for maintaining the valve. In your case, the water utility may have said that the owner is responsible for maintaining the valve for practical reasons, but that still does not make it a part of the fire protection system. It could be considered part of the water supply that the owner has agreed to maintain.

If number two is the case, then the valve should not be required to be internally inspected. The AHJ, either explicitly or implicitly, allowed the valve to be installed in such a location that it is not accessible. At this point in time, it is impractical to require any such valve to be dug up every five years for an inspection. It is just as impractical to tell people that they have to dig up and relocate every such valve.

When working on the 2011 edition of NFPA 25, the committee considered a proposal that would have explicitly stated that buried check valves do not need to be internally inspected (see Proposal 25-169 in the Annual Meeting 2010 Report on Proposals). The committee initially accepted this language in a new section 13.4.2.2. However, during the public comment period, concern was raised over how this section made it look like the users of NFPA standards could use this section to violate NFPA 13 and bury check valves underground. The committee was concerned that they would not be able to explain to people that this was just for valves that got buried due to some variance from the standard or some other extenuating circumstance, so they decided not to put the section in (see Comment 25-92 in the Report on Comments). But it is safe to say that once a valve is buried, it is not the intent of the committee to require that the valve be internally inspected every five years.

Question 6 – Multiple Relief Valves on Fire Pumps

Can the relief valve discharge pipes from four diesel fire pumps drawing from suction tanks be routed back to the pump suction piping? Or, does section 5.18 require four individual discharge pipes routed back to the two suction tanks?

Answer: Each individual relief valve discharge pipe is permitted to be connected back to the suction

pipe for the pump that it originally came from, as long as it has an extra circulation relief valve in that circuit. But you are not permitted to gang the relief valve discharge lines together. We don't want the potential for discharge when one pump is running to back up and pressurize the back side of one of the relief valves and we don't want check valves in the discharge piping from the relief valves.

Another alternative is to pipe the discharge back to the tanks. I prefer to pipe the discharge back to the tanks because it saves water and creates a true break to atmosphere, which better helps to deal with the pressure issue.

Question 7 – Testing of Manual Standpipe Systems

Does NFPA 25 require a flow test of a manual standpipe system every five years?

Answer: No. Section 8.3.1.1 of NFPA 25 requires the regular testing of automatic standpipe systems. Since the system is manual and not automatic, it does not need to be tested on any regular basis.

Question 8 – Doors to Concealed Spaces

NFPA 13 allows sprinklers to be omitted from concealed spaces that have "limited access". If there is a full-height door leading into the concealed space, does it still constitute "limited access"?

Answer: NFPA 13 does not define the term "limited access", so it is up the Authority Having Jurisdiction (AHJ) to determine. Usually, a full-height door is an invitation to allow storage in a space, which would need to be sprinklered and typically would not be considered "concealed". However, there are some truly "concealed" spaces that might have a door for convenience of maintenance personnel that need to occasionally get into the space. If the door is locked and the owner institutes security procedures so that nobody stores anything in the space, the AHJ might be convinced that the space can be considered a concealed space. Locking the door, providing a sign indicated that this space is not to be used for storage, limiting access to maintenance and servicing of equipment, and instituting inspection procedures to make sure nothing gets installed in the space could all be examples of practices that might help an AHJ determine whether the door would be considered "limited access".

Question 9 – ESFR Sprinklers and Tire Storage

As an AHJ, we have come across a set of plans that were approved in 2006 with an ESFR design, (K-14.0 uprights, 12 sprinkler discharge area at 50 psi). Currently, the facility has all on-floor storage of semi-trailer tires, some on tread, some on side 8 feet high, and some packaged in plastic. Is it reasonable to apply ESFR protection to the on-floor storage of these tires?

Answer: In general, ESFR sprinklers are not permitted to protect solid piled or palletized storage of rubber tires. The shape of the tires and close proximity of storage piles creates challenges for the ESFR sprinklers. The natural breaks that occur in racks due to rack uprights and rack shelves help limit the spread of fire early in the scenario until the ESFR sprinklers can establish control or suppression. There are two ways that the ESFR protection might have been allowed for solid piled or palletized storage:

1. The owner might have been able to convince the AHJ that they were providing storage of the tires in a similar manner with similar flue spaces as the rack storage. If the AHJ agreed that the situation was close enough, they might have given their consent.

2. Under Table 13.2.1, some arrangements of Miscellaneous Storage of rubber tires can be protected in accordance with the rules for Ordinary Hazard. Section 12.6.7 allows ESFR sprinklers to always protect Ordinary Hazard.

Question 10 – Inspector's Test Connection on Dry-Pipe System

What size is the orifice at the end of an inspector's test connection on a dry-pipe system required to be?

Answer: NFPA 13 does not actually refer to this connection as an "inspector's test" connection in the installation rules. Instead, NFPA 13 refers to this connection as a "trip test connection" because it speaks better of the purpose of the connection. This connection is frequently called an "inspector's test connection" in the field and even in the acceptance testing portions of NFPA 13, but this is not the terminology used in the installation chapters. Considering that the connection is intended to simulate the opening of a single sprinkler and considering that we generally test "worse-case" conditions, it would be logical to assume that the orifice should be the same as the smallest orifice in the sprinkler system. However, that's not exactly what NFPA 13 says even though many people think that it does.

Regarding dry-pipe systems, section 8.17.4.3.1 of the 2010 edition of NFPA 13 (with similar sections going back at least as far as 1983) says, "A trip test connection or manifold not less than 1 in. (25 mm) in diameter, terminating in a smooth bore corrosion-resistant orifice, to provide a flow equivalent to one sprinkler of a type installed on the particular system, shall be installed." Using the language, "of a type installed on the particular system" allows the user to pick any size sprinkler orifice, not necessarily the smallest one. Note that this is different from wet pipe systems, which are required to use an orifice simulating the smallest sprinkler on the system in the alarm test connection (commonly called an inspector's test connection as well).

During the development of the 2013 edition of NFPA 13, a proposal was made to change the requirement to having the orifice simulate the smallest orifice on the system, similar to the requirement for wet pipe systems. This proposal was rejected by the committee, so the 2013 edition of NFPA 13 will remain the same as the previous ones on this issue.

Question 11 – Armovers to Flexible Drops

When using a flexible sprinkler hose that is 48 inches in length, how long can the arm-over be that the flexible hose is connected to?

Answer: Section 9.2.3.5 would apply for any rigid piping before the flexible sprinkler hose. This means that the cumulative horizontal length of the rigid piping must be less than 24 inches or it will need a hanger. If there are high pressures (more than 100 psi) that distance is reduced to 12 inches. The flexible sprinkler hose portion is governed by Section 9.2.1.3.3. When the flexible sprinkler hose is longer than 6 feet it will need to have a hanger to support it.

Question 12 – Flexible Couplings at the Top of Drops

Section 9.3.2.3(5) of NFPA 13 requires flexible couplings within 24 in. (610 mm) of the top of drops exceeding 15 ft (4.6 m) in length to portions of systems supplying more than one sprinkler, regardless of pipe size Are there additional requirements for these drops?

Answer: This answer should be broken into two situations. The first situation to discuss is drops that supply multiple sprinklers. This is addressed in a couple of ways. Section 9.3.2.3 (5) is the one you noted in your question. However, what the drop is feeding is important to look at in the discussion. Section 9.3.2.4 has additional requirements for the bottom of the drop when it is feeding hose lines, rack sprinklers and mezzanines, or situations similar to any of those. When lengths get long, it is sometimes advantageous to put in points of support so that the system stays where intended over its lifespan. Depending on how this is done, additional flexibility may be needed (See Section 9.3.2.3(6)).

Where this drop feeds many sprinklers, such as an in-rack system or a segregated area at a lower elevation (meaning it is more than just a branch line extension), this vertical pipe would be treated as a riser where it would need sway bracing in addition to the flexibility and clearance requirements.

The second situation to discuss is a drop that supplies a single sprinkler. This is treated with much more leniency because if something happens to this section of pipe, only one sprinkler is affected. The biggest concern here, in addition to the flexibility needed at the top of the drop, is where materials are penetrated. For example, does the drop penetrate acoustical tile that is creating a lower elevation ceiling or is it penetrating a corrugated metal deck? Clearance or additional flexibility may be needed depending on the material (if any) the pipe is run through.

Upcoming NFSA "Technical Tuesday" Seminar – August 21

Topic: System Appurtenances
Instructors: Jeff Hugo, CBO
Date: Tuesday, August 21, 2012- 10:30 am EST

There are many devices that are used in sprinkler systems beyond sprinklers and piping. Alarm connections, relief valves, and gauges are examples of these devices that assist in proper functioning of the sprinkler system. Drains, inspector's test connections, and air release valves are examples of these components that help to maintain the system over its lifetime. These parts will all be discussed including when they are required and where they fit into the system.

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)

Fishkill, NY – October 8-19, 2012

Advanced Technician Training

Atlanta, GA-August 21-23, 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:

Aug 15	Mashantucket, CT	I.T.M. of Water-Based Fire Protection Systems
Aug 21-23	Phoenix, AZ	3 Day Inspection & Testing for the Fire Sprinkler Industry
Aug 28	Colorado Sprgs, CO	Sprinkler System Installation Requirements
Aug 29	Colorado Sprgs, CO	Fire Service Mains & Their Appurtenances
Aug 30	Colorado Sprgs, CO	I.T.M. of Water-Based Fire Protection Systems

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.