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NFSA NATIONAL FIRE SPRINKLER ASSOCIATION The Voice of the Fire Sprinkler Industry

TechNotes

Editor - Mark Hopkins, P.E Issue # 406 November 13, 2018

TechNotes Issue # 406
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Best of October 2018

Following are a dozen questions answered by the engineering staff as part of the NFSA's Expert of the Day (EOD) member assistance program during the month of October 2018. This information is being brought forward as the "Best of October 2018." If you have a question for the NFSA EOD (and you are an NFSA member), send your question to eod@nfsa.org and the EOD will get back to you.

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 formal interpretations in accordance with the NFPA Regulations Governing Committee Projects and should therefore not be considered, nor relied upon, as the official positions of the NFPA or its Committees. Unless otherwise noted the most recent published edition of the standard referenced was used.

Question 1 - Diesel Pump Relief Valves

A single relief valve has been provided in a building with two diesel fire pumps arranged as primary and secondary pumps. If the relief valves discharge to atmosphere, would it be acceptable to connect two separate pressure relief valves into a single discharge pipe?

Answer: The answer is that it would be a troubling installation, but it is not expressly prohibited by NFPA 20.

NFPA 20-2019 section 4.20 applies to the relief valve arrangement (previous editions have similar language). This section only prohibits combining the discharge from relief valves when the discharge is piped back to the source of water supply (such as an aboveground storage tank) in section 4.20.6.3. When the relief valve discharge is piped to an atmospheric drain, the standard is silent on whether the discharge can be combined for the two relieve valves.

Even though the standard is silent on the subject, there are some concerns that need to be raised. Specifically, from an operational standpoint, there would be two concerns about combining the discharge from two pumps:

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1) If the discharges from the relief valves are combined and the relief valve opens while one pump is running, the discharge will back up and put backpressure on the back side of the other relief valve. These valves are not designed to have water pressure pushing against the back side of the device and it could damage the relief valve.

2) The pump operator is supposed to be able to look at the drain to see that the relief valve is functioning. If the operator sees water flowing from a combined discharge pipe, it is difficult to tell which relief valve the water is coming from.

In this particular case, it has been mentioned that the pumps are designated as a primary and a secondary. With that in mind, only one pump should be running at a time, so the second issue discussed above may not be an issue. But the first still might be a concern.

In order to eliminate the concern, there has been discussion of putting a check valve in the discharge piping, but that brings with it extra maintenance and operational concerns. Most of the time, we put control valves on either side of check valves and section 4.20.9 prohibits the installation of control valves in the relief valve discharge.

In summary, combining the discharge from relief valves is not prohibited when the discharge leads to an atmospheric drain. In situations where the two pumps are redundant, consideration should be given to making sure that each of the relief valves will be operational after the other relief valve opens, putting backpressure on the closed relief valve. Perhaps an extra test should be performed after a relief valve has opened to make sure that the other relief valve will work after it has had pressure applied to the back side.

Question 2 - Trapeze Hanger - Component Sizes

For a situation where a 6-inch main will be supported by a trapeze hanger spaced 15 feet to the next hanger, it has been proposed to use 2½-inch schedule 10 black steel pipe with 2½-inch pipe hanger rings and 3/8-inch all-thread rod (ATR) to attach to the trapeze hanger to the building structure. The main will be supported from the trapeze using a heavy-duty band hanger with ½ -inch ATR.

Is this permissible in accordance with NFPA 13-2016?

Answer: The answer to your question is "no, as indicated in the requirements outlined below". All components of the trapeze assembly must be sized for supporting the 6-inch pipe, including the hangers supporting the 2½-inch trapeze member.

1) Verify that the 2½-inch trapeze member is sized appropriately as per NFPA 13 section 9.1.1.7.1. 2½-inch schedule 10 is suitable for a trapeze member with a section modulus up to 0.69 as per NFPA 13 Table 9.1.1.7.1(b) which permits a span of up to 5 feet supporting 6-inch schedule 10

pipe or up to 4.5 feet supporting 6-inch schedule 40 pipe as per NFPA 13 Table 9.1.1.7.1(a).

> ***9.1.1.7.1*** *For trapeze hangers, the minimum size of steel angle or pipe span between purlins or joists shall be such that the section modulus required in Table 9.1.1.7.1(a) does not exceed the available section modulus of the trapeze member from Table 9.1.1.7.1(b).*

2) The attachments to the structure and trapeze member must be sized based on the 6-inch pipe supported by the trapeze assembly as per NFPA 13 section 9.1.1.7.5. This will require heavy duty pipe rings and structural attachments with ½-inch ATR as per NFPA 13 Table 9.1.2.1.

> ***9.1.1.7.5**** *All components of each hanger assembly that attach to a trapeze member shall conform to 9.1.1.5 and be sized to support the suspended sprinkler pipe.*

3) The hanger supporting the 6-inch main from the trapeze is also required to be sized for ½-inch ATR as per NFPA 13 section 9.1.1.7.5 and Table 9.1.2.1.

Question 3 - Dry Pipe Underground

A building owner would like to install an Auxiliary dry pipe sprinkler system to feed an adjacent go-cart storage building. The dry pipe valve would be located in the main building with a dry underground pipe run approximately 60 ft. to the go-cart building. There is no way to add a drain on the underground piping. It has been proposed to add a valve on each side of the underground so that the underground pipe can be isolated and then have outlets, so an air compressor can be hooked up twice a year to blow the condensation out of the dry underground pipe.

Is this arrangement acceptable per NFPA 13?

Answer: The answer is that this arrangement would need to be approved by the AHJ. The drainage methods described do not meet the prescriptive auxiliary drainage provisions of NFPA 13 and as such would need to be approved by the AHJ.

Dry pipes are permitted to be installed underground as stated in NFPA 13-2016 section 8.15.21. The pipe must be protected from corrosion and appropriate for underground use as well as use in dry pipe sprinkler systems. Section 8.15.21 reads as follows:

> ***8.15.21 Dry Pipe Underground.***
> ***8.15.21.1*** *Where necessary to place pipe that will be under air pressure underground, the pipe shall be protected against corrosion.*
> ***8.15.21.2*** *Unprotected cast-iron or ductile-iron pipe shall be permitted where joined with a gasketed joint listed for air service underground.*

Additionally, The AHJ needs to be consulted regarding the protection of multiple detached buildings with a single

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sprinkler system. This practice is permitted but would need to be approved by the AHJ. See NFPA 13-2016 section 8.2.6.

> ***8.2.6* Detached Buildings.***
> ***8.2.6.1*** *Unless the requirements of 8.2.6.2 apply, detached buildings, regardless of separation distance, that do not meet the criteria of 8.2.5 shall be provided with separate fire sprinkler systems.*
> ***8.2.6.2*** *When acceptable to the authority having jurisdiction, detached structures shall be permitted to be supplied by the fire sprinkler system of an adjacent building.*

The annex section to this section gives further guidance.

> **A.8.2.6** Buildings adjacent to a primary structure can be protected by extending the fire sprinkler system from the primary structure. This eliminates the need to provide a separate fire sprinkler system for small auxiliary buildings. Items that should be considered before finalizing fire sprinkler design should include the following:
> (1) Actual physical distance between adjacent structures
> (2) Potential for the property to be split into separate parcels and sold separately
> (3) Square footage of both the primary and auxiliary structures
> (4) Difficulties in providing a separate water supply to the auxiliary structure
> (5) Occupancy/hazard of the auxiliary structure
> (6) Ability of emergency response personnel to easily identify the structure from which waterflow is originating

Question 4 - Melt Away Ceiling

For a building having protection above a suspended ceiling, the project engineer has required pendent sprinklers installed to be installed in melt away tile ceiling panels.

Are melt away tiles permissible in accordance with NFPA 13? Would pendent sprinkler permitted to be installed in the melt away tiles?

Answer: The answer to this question is "*yes, drop out (melt away) tiles are permitted to be used, the criteria is found in NFPA 13-2016 section 8.15.15, which is titled Drop-Out Ceilings and Ceiling Materials*." Pendent sprinklers are not permitted to be installed in drop-out (melt away) tiles.

It should be noted that the requirements for drop-out ceilings have been in NFPA 13 very long time and were expanded to include drop-out ceiling materials as part of the 2016 edition to acknowledge new products being listed for use during renovations. As a result, the section was renamed from "Drop-Out Ceilings," to "Drop-Out Ceilings and Ceiling Materials," which is found in Section 8.15.15 of NFPA 13-2016.

> ***8.15.15 Drop-Out Ceilings and Ceiling Materials.***

> ***8.15.15.1**** *Drop-out ceilings and ceiling materials shall be permitted to be installed beneath sprinklers where the ceiling panels or ceiling materials are listed for that service and are installed in accordance with their listings.*
>
> ***A.8.15.15.1*** *There are ceiling panels and ceiling materials that have been investigated as a ceiling material in accordance with UL Subject 723S, Outline of Investigation for Drop-Out Ceilings Installed Beneath Automatic Sprinklers, or as FM Class Number 4651, Plastic Suspended Ceiling Panels. Such ceiling panels and ceiling materials are designed such that the activation of the sprinkler and the ability of the sprinkler discharge to reach the hazard being protected are not adversely impacted.*
>
> ***8.15.15.2*** *Drop-out ceilings and ceiling materials meeting the criteria in 8.15.15.1 shall not be installed below quick-response or extended coverage sprinklers unless specifically listed for that application.*
>
> ***8.15.15.3*** *Drop-out ceilings and ceiling materials meeting the criteria in 8.15.15.1 shall not be considered ceilings within the context of this standard.*
>
> ***8.15.15.4**** *Piping installed above drop-out ceilings and ceiling materials meeting the criteria in 8.15.15.1 shall not be considered concealed piping.*
>
> ***A.8.15.15.4*** *Drop-out ceilings do not provide the required protection for soft-soldered copper joints or other piping that requires protection.*
>
> ***8.15.15.5**** *Sprinklers shall not be installed beneath drop-out ceilings or ceiling materials meeting the criteria in 8.15.15.1.*
>
> ***A.8.15.15.5*** *The ceiling tiles might drop before sprinkler operation. Delayed operation might occur because heat must then bank down from the deck above before sprinklers will operate.*

The use of drop-out or melt away ceiling tiles pre-dates concealed sprinklers. The ceiling tiles will pull away from the ceiling grid and will drop out allowing hot gases to rise up to the sprinklers installed below the upper ceiling. These tiles are either UL listed or FM approved for use. The installation of pendent sprinklers in the ceiling tiles would have questionable benefit since the plastic tiles are not typically intended to have pendent sprinklers installed. The purpose of the tiles was to conceal the sprinklers and piping above the ceiling. The use of pendent sprinklers below the ceiling panels should be investigated for use prior to installation to determine if it is permitted based on the listing of the ceiling tiles. Installation of pendent sprinklers will likely preclude the use of drop-out tiles. It should be noted that drop out ceilings are not listed for use with quick response sprinklers. This concept was previously discussed in TechNotes #66, dated 09/19/06 which can be viewed in the members only section of the NFSA website. It would be advisable to consider replacement of the ceiling tiles

with noncombustible or limited combustible ceiling tiles if pendent sprinklers must be installed beneath the lower ceiling.

The Tech Tuesday titled "Unusual Ceilings," which aired on November 21, 2017 also discussed the use of drop-out ceilings.

Question 5 - Pumps for NFPA 13D Applications

Several questions were asked regarding the use of pumps for NFPA 13D applications. Each question has been answered separately.

Question 5.1: Is a pump allowed to be added to a system so that smaller size pipe can be used in the system?

Answer 5.1: The answer to this question is yes. This would be true for all fire protection systems, not just those designed under NFPA 13D. While there is some slight decrease in reliability of the system due to the fact that the pump is a mechanical device and no mechanical device is 100% perfect, the position of the sprinkler standards is that a system with a properly installed pump still has an acceptable level of performance, so the pump would be allowed. Most people try to avoid pumps just because of the cost, but if the owner is willing to trade cost for aesthetics, that is a choice they are allowed to make.

Question 5.2: Does the pump need to meet NFPA 20?

Answer 5.2: The answer to this question is no. NFPA 13D specifically allows unlisted pumps and intentionally does not reference NFPA 20. For this reason, it should be noted that the pump is not referred to as a "fire pump." It is just a "pump", which is acceptable for NFPA 13D systems. Technically speaking, since NFPA 13D does not require a listed product, a contractor could assembly their own pump and control equipment. However, from a practical perspective, many contractors don't do that. There are a variety of manufacturers that market pump packages with control equipment for the NFPA 13D market.

Question 5.3: What should a plan reviewer be looking for regarding the use of a pump in NFPA 13D?

Answer 5.3: The answer to this question is found in NFPA 13D section 6.2.1, but the pump rules have essentially been unchanged for several editions. Section 6.2.1 requires four items for a pump that is not a part of a pump and tank combination:

> ***6.2.1*** *Where a pump is the source of pressure for the water supply for a fire sprinkler system but is not a portion of the domestic water system, the following shall be met:*
>
> *(1) A test connection shall be provided downstream of the pump that creates a flow of water equal to the smallest sprinkler K-factor on the system.*
> *(2) Pump motors using ac power shall be rated for 240 V and wired in accordance with the NEC (NFPA 70).*

(3) Any disconnecting means for the pump shall be approved.
(4) The pump shall be located not less than 1½ in. off the floor.

Question 5.4: What about maintenance of the pump?

Answer 5.4: NFPA 13D does not require inspection, testing or maintenance to be performed on a regular basis due to the cultural, political, and legal issues of people wanting to enjoy their homes without state or local amendments. However, even though maintenance is not required, it is heavily suggested. Section 12.1 of NFPA 13D does require that the installing contractor turn over to the building owner information on how to inspect, test and maintain the system properly. In the case of a pump being installed on the system, the contractor needs to include testing and maintenance instructions for the pump in the information that gets turned over to the building owner. The AHJ certainly has a right to ask for copies of that information in advance so that they can determine whether the information is sufficient. The pump manufacturer should be able to provide a list of recommended activities and frequencies to maintain the pump in good working order.

Question 6 - NFPA 13 Hanging and Bracing Clarification

Two questions have been asked regarding the application of hanging and bracing requirements of NFPA 13-2016. Each question has been answered separately.

Question 6.1: Are hangers permitted to be attached to the lower chords of joists or beams?

Answer 6.1: The answer to this question is "yes, unless the manufacturer's listing instructions for the structural attachment selected specify otherwise". Note, however, that the project specifications may require attachment to the top chord. This is typically a more favorable point of attachment from a structural point of view and may be specified by the registered design professional responsible for the structure.

Question 6.2: Are seismic braces/restraints permitted to be attached to the lower chords of joists or beams?

The answer to this question is "yes, provided that they have sufficient structural capacity to resist the anticipated seismic forces as per NFPA 13-2016 section 9.3.5.1.2". This is typically determined by the registered design professional responsible for the structure.

9.3.5.1.2 *The structural components to which bracing is attached shall be determined to be capable of resisting the added applied seismic loads.*

Question 7 - Use of CPVC in High-Rise Buildings

Is it acceptable to use CPVC pipe in lieu of steel pipe in a high-rise structure (196 ft) R-1?

Answer: The answer to this question is "yes", in accordance with NFPA 13-2016, listed CPVC pipe is acceptable in high-rise applications as long as the occupancy is considered light hazard as defined by NFPA 13. As you have indicated this structure is a R-1 occupancy, it should be considered light hazard and CPVC should be acceptable as long as it is installed in accordance with NFPA 13, its listing and the manufacturer's instructions.

As CPVC is a nonmetallic pipe that is listed for light hazard occupancies and not all areas of a predominately light hazard building could be light hazard, there may be areas within the building where CPVC would not be allowed. Listed CPVC is permitted in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 sq. ft (see NFPA 13 (2016) section 6.3.9.6). Any ordinary hazard rooms larger than 400 sq. ft or rooms of a greater hazard classification would need to be steel pipe.

As you have stated that this structure is 196 ft tall, another consideration that must be kept in mind is that CPVC has a pressure rating of 175 psi at a temperature of 150F and the use of pressure reducing valves may be warranted in a high-rise structure.

That being said, there are local jurisdictions that do have restrictions on the use CPVC piping in high-rise buildings and you would need to check with the local jurisdiction for any restriction in the use of CPVC pipe.

Question 8 - Phantom Flow

You have indicated that you are attempting to gain an understanding of phantom flow as it relates to NFPA 13-2013 section 23.4.4.1.1.4. You indicated that required protection is based on ordinary hazard group 2 (OH2) requirements including a 1,500 sq.ft. area, however, only 500 sq.ft. of the area is OH2 and the remainder is light hazard. You identified that step one would be to apply the OH2 density to the actual area (500 sq.ft. x 0.2 gpm/sq.ft. = 100 gpm). Step two would be apply the OH2 density to the required area (1,500 sq.ft. x 0.2 gpm/sq.ft. = 300 gpm). Step three is to identify the difference (300 gpm - 100 gpm = 200 gpm) which would be applied at the connection of the most remote branchline to the main. You have asked if the calculations would include 4 sprinklers at 0.2 density and add the 200 gpm phantom flow.

Answer: The answer to your question is "the requirement of NFPA 13 section 23.4.4.1.1.4 for phantom flow was added to allow for an alternative design option."

> ***23.4.4.1.1.4**** *Where the available floor area for a specific area/density design criteria, including any extension of area as required by 11.1.2 and Section 12.3, is less than the required*
> *minimum design area, the design area shall be permitted to only include those sprinklers within the available*

design area.

A.23.4.4.1.1.4 *The following steps outline the procedure for calculation in accordance with 23.4.4.1.1.4:*
(1) Calculate the hydraulic design discharge including those sprinklers within the available floor area.
(2) Calculate the minimum required discharge by multiplying the required design density times the required minimum design area.
(3) Subtract the discharge calculated in Step 1 from the discharge calculated in Step 2.
(4) Where the discharge calculated in Step 3 is greater than 0, the hydraulic design discharge is recalculated including an additional flow equal to that calculated in Step 3. The additional flow is added at the point of connection of the branch line to the cross main furthest from the source.
(5) Where the discharge calculated in Step 3 is less than or equal to 0, the hydraulic design discharge is as calculated in Step 1.

For a building having multiple hazards or multiple systems, there are several possible options. The phantom flow can be applied to minimize system demand. The section can be applied when, as you have described, there is a portion of the system required to protect a higher occupancy hazard than the surrounding area(s). For the scenario the was described, all sprinklers protecting the 500 sq.ft. area would need to be included in the hydraulic calculations. Step one indicates to "calculate the hydraulic design discharge including those sprinklers within the available design area." This would be all sprinklers within the 500 sq.ft. area. Step two would be to "calculate the minimum required discharge by multiplying the required design density times the required minimum design area. This would be 300 gpm as indicated (1,500 sq.ft. x 0.2 gpm/sq.ft. = 300 gpm). Step three would then be to "subtract the discharge calculated in step 1 from the discharge calculated in step 2." For simplicity, this would be 200 gpm as you asked. In reality you would need to calculate the discharge based on the actual system layout. The flow determined in step 3 is the "phantom flow." Step 4 would be to apply the phantom flow determined in step 3 at the point of connection of the branchline to the cross main furthest from the source, e.g. the feed to the most remote branchline. Step 5 applies when the result of step 3 is less than or equal to 0.

Prior to the inclusion of this phantom flow option, the design area would have to be applied to a physical 1,500 sq.ft. design area, meaning that 1,000 sq.ft. of the system protection based on light hazard criteria would need to be included. In this scenario, the sprinklers in the light hazard area would likely over-discharge due to the higher pressure requirements based on the OH2 protection. The higher pressure need would result in higher corresponding sprinkler discharge. This would ultimately result in larger pipes, larger system demands and increased cost.

A third option could include the application of the room design method in accordance with NFPA 13 section 11.2.3.3 for the OH2 area if it is separated by a fire resistance rated construction meeting the water supply duration requirements

(60 min or 90 min) and doors have self-closing or automatic closing devices.

Another similar scenario with the phantom flow requirements is applied when an ancillary dry pipe or preaction system is attached to a wet pipe sprinkler system, but has a protection area less than the minimum design area, and the requirements of the room design method are not met.

Question 5 of the TechNotes No. 292, titled "Best of March 2014" and the article titled "Phantom Flow," published in the Technically Speaking column written by Ken Isman discuss a similar issue applying the concept of phantom flow.

In summary, there are typically three approaches that can be used.

1. Use the room design method for calculation, if the conditions of NFPA 13 section 11.2.3.3 are met.
2. Extend the design area to account for the entire 1,500 sq. ft. (this could be smaller if the quick response reduction is permitted to be applied) or 1,950 sq. ft. in the case of dry pipe or preaction systems.
3. Calculate the demand for the for the actual area having the higher hazard and add a "phantom flow" to the wet pipe system branchline furthest from the source.

Question 9 - Outside Bell

Does a sprinkler system that is being monitored by a service that notifies the fire department and three other designated individuals still require a bell on the outside of a building?

Answer: The answer is that the system still needs to have some sort of local notification that there is waterflow in the sprinkler system. That local notification could be a bell on the outside of the building or it could be an alarm internal to the building. But in some way, shape or form, people inside the building need to be alerted to the fact that water is flowing in the building.

While monitoring services are a wonderful supplement to the local alarm, they do not replace the very important function of notifying people actually in the building of the fact that a sprinkler has opened. The requirement is found in section NFPA 13 section 8.17.1.1 (similar sections were provided in all other recent editions). In the annex to this section, the committee actually says that alarm monitoring services are a "supplement" to the local alarm, which means they are not a substitute for such an alarm.

Note that there is nothing in the standard the requires the alarm to be outside. It is frequently installed outside to deal with the fact that a fire might happen when the building is vacant, in which case there is a chance at least that a passerby will hear it and call the fire department, but there is no requirement that it be outside. Note that a building fire alarm would also be considered a "local alarm", so if the

sprinkler system was designed to sound the building fire alarm (as is required by the Life Safety Code when a building has both a sprinkler system and a fire alarm) then you would not need any additional equipment to meet the local alarm rule.

Question 10 - Use of Cellophane or Paper Bags to Protect Sprinklers

Clarification was requested regarding the use of cellophane bags having a thickness of 0.003 in. or less, or thin paper bags, can be used to protect fire sprinklers in areas of buildings other than spray areas and mixing rooms in resin application areas as permitted by NFPA 13-2016 section 6.2.6.4.2. If allowed, please advise on suitability for both non-ESFR and ESFR fire sprinklers.

The issue applies to a system having sprinklers installed approximately 20-feet above finish floor that become loaded easily (and frequently) and are not readily accessible to be dusted or blown away, in manufacturing & warehouse areas for compliance with NFPA 25 A.5.2.1.1.2(5).

Can cellophane or paper bags be used to protect sprinklers from the build-up of materials, in applications other than spray areas and mixing rooms, as discussed in NFPA 13 section 6.2.6.4?

Answer:

The answer is "no, unless the AHJ is willing to allow it under an alternative or equivalency basis."

In general, the placement of a bag of any kind over a sprinkler is going to negatively affect the operating time of the sprinkler. In the case of the spray situations discussed in NFPA 13, the overspray onto sprinklers without the bags is so prevalent that the sprinklers in some cases would need to be replaced daily if there were no bags there to protect the sprinklers and there has been significant work as well as cost/benefit analysis applied to make sure that the reaction time is still sufficient. You mentioned ESFR sprinklers in your question. It is extremely critical that these sprinklers open very early in the fire scenario. There is tremendous doubt that such sprinklers would respond in time to provide fire protection if they were covered with a bag of any kind.

Additional research might be necessary to support the use of cellophane or paper bags in these applications. If the owner is willing to pay for research that could be used to support a recommendation, then the AHJ could grant a variance from the rules of NFPA 13 based upon use of section 1.5 as an equivalency or alternative.

Question 11 - NFPA 24 Hydrostatic Test Criteria

The following is from NFPA 24-2013:

> ***10.10.2.2.1**** *All piping and attached appurtenances subjected to system working pressure shall be*

hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.5 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure at ±5 psi (0.35 bar) for 2 hours.

We are in the process of completing a hydrostatic test of new dedicated HDPE fire mains. The minimum required test pressure is 225 psi. The standard allows a tolerance of +- 5 psi. So the question has come up that if the hydro test is started with a pressure of 228 psi, is the tolerance based on the required pressure of 225 or the starting pressure of the test? I believe what the engineers are wanting to do is start at a higher pressure because they know that the pipe is not going to gain pressure because we are testing at night. Starting at 228 psi would then allow them to decrease in pressure to 220 because that is still in the range of 220-230 psi. So there would be gaining an extra 3 psi of tolerance.

I contend that the minimum starting pressure is 225 psi. If the project chooses to start at 228 psi, that is acceptable but the 5 psi tolerance is from 228 not 225 psi. So if the pressure dropped below 223 psi, the test has failed.

Any insight on this situation would be much appreciated.

Answer: Specifically, you have asked what the failure criteria (in psi) is for a hydrostatic test of underground pipe where the test is required to be performed with at least 225 psi, but it starts at 228 psi instead.

The answer is that the failure criteria, based on pressure drop, would be if the pressure dropped below 223 psi. Starting the test at a higher pressure does not increase the amount of pressure that you are allowed to lose during the test. Both sections 10.10.2.2.1 and 10.10.2.2.2 make it clear that if the pressure drops more than 5 psi from where it starts, you have a problem.

The purpose of the hydrostatic test is to make sure that there is no significant leakage from the underground pipe. If you start the test at 228 psi and it drops to 220 psi, you have a problem that needs to be addressed. You can't ignore the problem because you started at a higher pressure than the test required.

Question 12 - Sprinkler Pipe Clearance Requirements

Clarification has been requested regarding the requirements of the 2019 edition of NFPA 13 and any requirements restricting sprinkler piping from touching other non-sprinkler system components such as ductwork or plumbing pipe.

Specifically, NFPA 13-2019 section 18.4.9 was referenced, which reads: "The installed horizontal and upward vertical clearance between horizontal sprinkler piping and structural members not penetrated or used, collectively or independently, to support the piping shall be at least 2in."

Does this section (18.4.9) apply to non-sprinkler system components as well? It was noted that no additional weight is

being applied to the sprinkler system.

Answer 12.1: The answer is "no", section 18.4.9 which is in the seismic protection section of NFPA 13-2019 is only applicable to the clearance between the sprinkler pipe and structural members.

Question 12.2: Is there another section in NFPA 13 that would apply to clearance between sprinkler piping and other non-sprinkler system components such as ductwork or plumbing pipe?

Answer 12.2: The answer is "no," while NFPA 13 addresses clearances from structural members and through walls and floors in its seismic requirements, we are not aware of any code or standard that contains specific minimum clearance requirements for sprinkler pipe or hangers from other mechanical equipment. There are sections of NFPA 70 that require certain clearances for electrical components. There are also sections of NFPA 13 that require de facto clearances for the sprinklers themselves, i.e. the obstruction rules. But none of these rules apply to sprinkler pipe, hangers or braces. Prior to the 2007 edition of NFPA 13, restraint of branch lines was required where upward or lateral movement could result in an impact against the building structure, equipment, or finish materials. Such restraint is now required for all branch lines in areas where the earthquake protection criteria is applied, and it is presumed that the equipment of other trades is likewise restrained against impact on sprinkler systems.

In general, common sense dictates some degree of clearance around pipe and fittings for all systems in order to accomplish maintenance and repairs. We have also seen the need to prevent inadvertent contact that could result in corrosion, inappropriate grounding, or, in the case of CPVC piping, the potential for environmental stress cracking (ESC) from contact with incompatible materials.