

Best of June 2023

The following are a dozen questions answered by the NFSA's Codes, Standards, and Public Fire Protection staff as part of the Expert of the Day (EOD) member assistance program during the month of June 2023. This information is being brought forward as the "Best of June 2023." If you have a question for the NFSA EOD submit your question online through the "My EOD" portal.

It should be noted that the following are the opinions of the NFSA Engineering, Codes, and Standards staff, generated as members of the relevant NFPA and ICC 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 or ICC Council Policy #11 and should therefore not be considered, nor relied upon, as the official positions of the NFSA, NFPA, ICC, or its Committees. Unless otherwise noted the most recently published edition of the standard referenced was used.

Question #1 – Flushing of Underground

A sprinkler system with a fire pump is being installed in accordance with the 2016 editions of the NFPA standards. The underground portion is being installed by a separate contractor than the aboveground sprinkler system.

As a fire pump is being utilized, the aboveground contractor is requesting the underground piping to be flushed per NFPA 20 (2016 Edition) Table 14.1.1.1, which is 2,350 gpm for the 8 inch pipe. However, the underground contractor claims that the underground system is installed per NFPA 24 which requires 1,560 gpm (2016 Edition, Table 10.10.2.1.3).

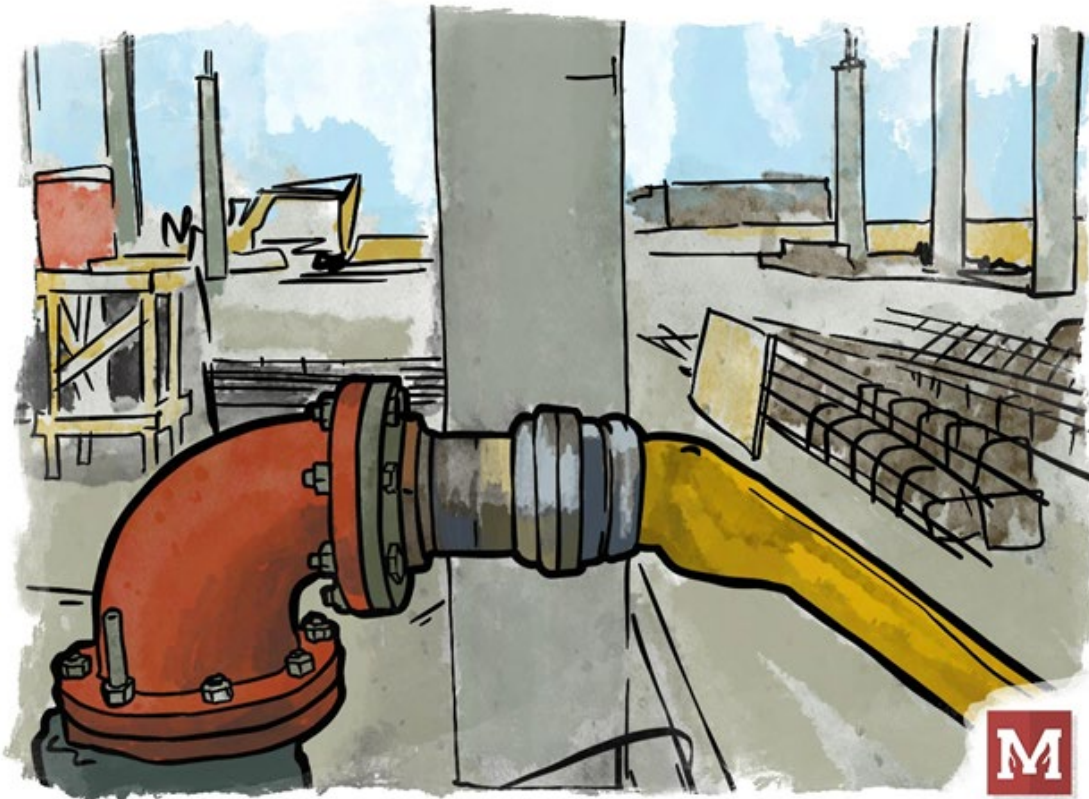
Which contractor is responsible for flushing underground per flow rates required by NFPA 20, utilities (lead-in underground water supply) or sprinkler (aboveground) contractor?

Section 10.10.1 of the 2016 edition of NFPA 24 states that the "installing contractor" is responsible for performing all required acceptance tests. As the scope of NFPA 24 is the private fire service mains, the installing contractor in this case would be the underground contractor.

Unfortunately, the 2016 edition of NFPA 24 is not very clear on the increased flushing rates required when a fire pump is to be utilized. Section 10.10.2.1.3 states that the minimum flow rate for flushing must be in accordance with Table 10.10.2.1.3 which in this case would be 1,560 gpm. The annex to this section does state that NFPA 20 requires greater flows for flushing the pipe where the underground pipe serves as suction pipe for a fire pump.

As this note is only in the annex, the stated problem is all too common. It must be noted that the current edition of NFPA 24 (2022) did add a new section (10.10.2.1.3.2) stating that the suction piping "supplying fire pump(s) shall be flushed prior to connecting to the fire pump(s) based on the requirements of NFPA 20."

In this case, it is suggested that this situation be brought to the owner, project engineer and general contractor to ensure that flushing at the proper flow rate (per NFPA 20) is performed.



Question #2 – UG Velocity from Storage Tank

What is the maximum velocity allowed in the pipe from an underground storage tank to a wet well with a vertical turbine fire pump?

NFPA 20, 2022 edition, Section A.7.2.2.2 for wet pit installations indicates the velocities in the approach channel or intake pipe should not exceed approximately 2 ft/sec, and the velocity in the wet pit should not exceed approximately 1 ft/sec. (See Figure A.7.2.2.2.)

Question #3 – Relief Valve on Wet System

Are relief valves required on all wet pipe sprinkler systems even if the normal working pressure does not reach 175 psi and there is no fire pump or excess pressure pump in the system?

Yes. Section 7.1.2.1 in the 2013 edition of NFPA 13 requires all wet pipe systems be provided with a listed relief valve, not less than $\frac{1}{2}$ inch in size set to operate at 175 psi or 10 psi in excess of the maximum system pressure, whichever is greater. Section 7.1.2.2 provides an exception to this requirement when auxiliary air reservoirs are installed to absorb pressure increases, a relief valve is not required.

Temperature differences in a building can increase pressure, and since wet pipe systems are closed systems, static pressure can sometimes exceed 175 psi. The fact is, many sprinkler components listed for 175 psi have been tested at higher pressures, so there are few documented total failures of sprinkler system components when a pressure relief valve is installed. That said, it's essentially a safety factor (or valve) for the system as a whole.

GET MORE STORAGE
from your storage space
N28 Sprinkler



Reliable

Question #4 – Choosing Outside Temperature

What is the recommended practice for choosing outside temperature for dry pendent sprinklers?

An isothermal map of the U.S. appeared in past editions of NFPA 13 and was intended to provide guidance for the designer. It was removed from the 2022 edition of NFPA 13 for a couple of reasons:

This map was originally intended for determining burial depth of underground piping; it was extracted from NFPA 24.

Some concerns were raised about the accuracy of the isothermal map. It was thought that other sources – such as the National Weather Service – would have more accurate data for a particular area.

NFPA 13 (2022 edition) now states: 16.4.1.1.1 The weather temperature used to determine if an unheated portion of a system is subject to freezing must be based on the "lowest mean temperature for one day, obtained from an approved source.

While NFPA 13 does not specify an approved source (this decision would be up to the authority having jurisdiction or AHJ) NFPA 13R and NFPA 13D do offer some suggestions (see Section A.6.7.2.1.2 of the 2022 edition of NFPA 13R.). This annex note suggests that *dependable sources of information on historic temperatures include the following:*

- National Oceanic and Atmospheric Administration — National Climatic Data Center
- National Weather Service
- Plant Hardiness Zone Maps (See <https://planthardiness.ars.usda.gov>)
- American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
- Other approved sources

Question #5 – 4-Way Brace on Vertical Pipe

A project includes an 8-inch run of main running horizontally which is supported and braced to steel columns. There is a 6-inch pipe that drops down to feed a foam monitor nozzle. This pipe is supported and braced using a pipe stand at the bottom. The inspector is citing Section 9.3.5.8.1 calling this vertical pipe a riser and is requiring a 4-way brace. Calculations by a registered structural engineer were performed and found that the brackets on the columns and the pipe stands are adequate for the support and lateral/longitudinal bracing.

Does this vertical pipe require a 4-way brace at the top?

The answer to your question is yes 4-way braces are required in the locations in question per NFPA 13 (2016) Section 9.3.5.8.1. NFPA 13 Section 3.5.10 defines a riser as "The vertical

supply pipes in a sprinkler system” this means any vertical supply pipe is considered a riser. By this definition the vertical pipes in your description and photo are considered risers.

Section 9.3.1.2 states “Alternative methods of providing earthquake protection of sprinkler systems based on a seismic analysis certified by a registered professional engineer such that system performance will be at least equal to that of the building structure under expected seismic forces shall be permitted.”

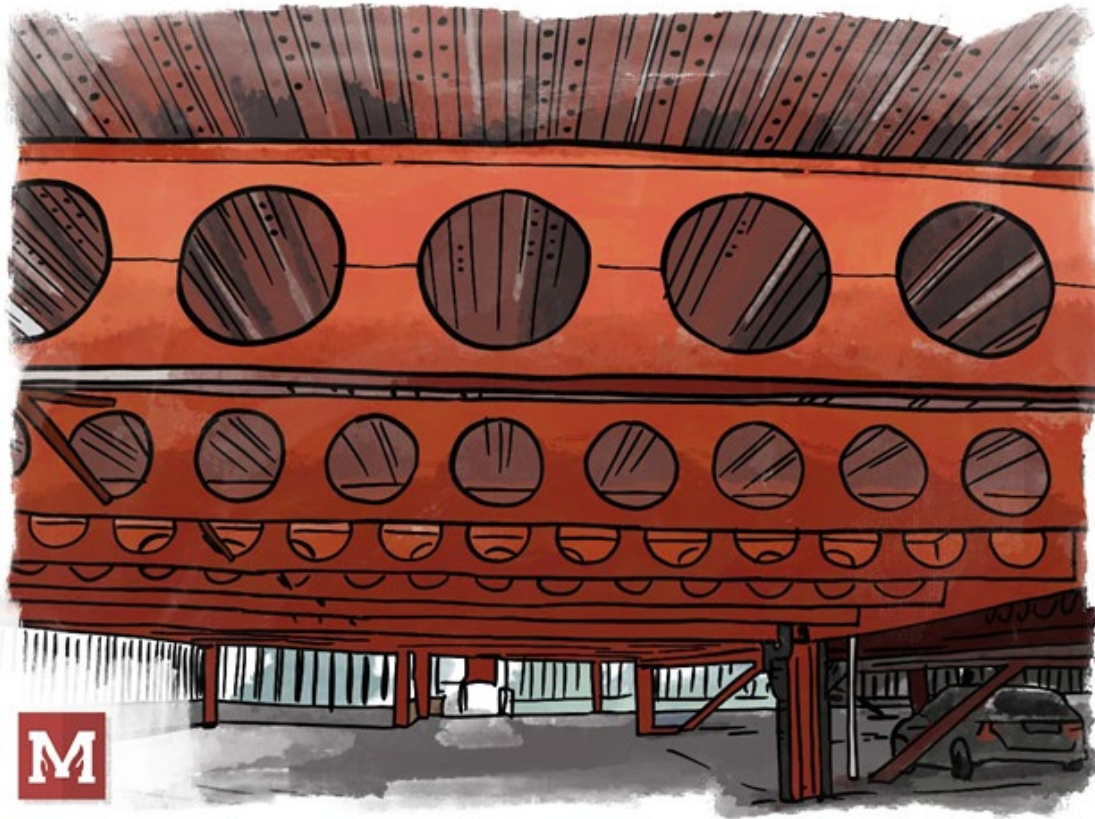
In accordance with this section, the calculations performed by the professional engineer could be used to avoid the installation of the four-way brace as long as the documentation is provided to the AHJ and approved.

Question #6 - Castellated Beams

Are castellated beams considered obstructed or unobstructed construction?

A castellated beam is basically a beam with a regular and repeating pattern of holes. The answer to this question depends on the size and shape of the holes in the beam (hexagonal, circular, octagonal, diamond, etc.) and/or the spacing of the structural members. Keep in mind that the cross-section area must be at least 70% open and the depth of the member must not exceed the least dimension of the openings, or where the spacing of the beams exceeds 7 ½ feet on center.

Many castellated beams will not meet the 70% open criteria, however, if the structural members are spaced 7 ½ feet or more on center, it will meet the definition of unobstructed construction.





Question #7 – Listed Head Guards

Does NFPA 13 require that head guards be listed?

Yes. NFPA 13 Section 16.2.6 (2019 and 2022 editions, Section 6.2.8 in previous editions), states that sprinklers subject to mechanical injury shall be protected with listed guards.

Components are listed to ensure that they meet the appropriate standard or have been tested and found suitable for a specific purpose. Guards, by design, can disrupt the intended spray pattern of the sprinkler. Listed guards are evaluated with specific types of sprinklers to verify and minimize the potential impact.

Question #8 – Sprinklers in a Dome Ceiling

How to measure distance between two sprinklers or from sprinkler to a wall when installed in a dome or curved ceiling?

Under a curved ceiling, you would measure the distance from the wall to the first sprinkler horizontally parallel to the floor rather than along the slope of the curved ceiling. NFPA 13, 2013 edition, Section 8.6.3.2.5, for the maximum distance to a wall for a standard spray sprinkler indicates that under curved surfaces, the horizontal distance shall be measured at the floor level from the wall, or the intersection of the curved surface and the floor to the nearest sprinkler shall not be greater than one-half the allowable distance between sprinklers.

Under a curved ceiling, the distance between sprinklers is measured along the slope created between the two sprinklers. This concept is outlined in Section 8.5.3.1.2 which indicates the maximum distance shall be measured along the slope of the ceiling. The handbook commentary on this section indicates for curved ceilings the distance should be measured along the slope projected between the two sprinklers as indicated in Exhibit 8.8. This exhibit shows the S dimension between sprinklers measured along the slope projected from the sprinkler to the adjacent sprinkler(s).

Question #9 – Fire Pump Room

A warehouse is being protected with a sprinkler system which includes a fire pump. The pump was supposed to be in a room and now the room will only have walls, but no ceiling.

Does the code require this room to have a ceiling that matches the fire rating of the walls?

Yes, the fire pump room is required to be rated including a ceiling if it is located within the building.

The 2018 edition of the International Building Code (IBC) Section 913.1 requires the fire pump to be in a room separated from all other areas of the building by one hour fire barriers.

The 2016 edition of NFPA 20, Section 4.13, also requires the fire pump room to be one hour rated.

In this case, with the fire pump located in a room with walls that do not extend to the roof deck of the warehouse and no rated ceiling for the room, the fire pump equipment is not protected from a fire in the building outside the fire pump room. The fire pump room walls would be required to extend to the roof deck or a one hour rated ceiling be provided.



Question #10 – Underground Water tank refill

A project includes a 20,000-gallon underground fiberglass fire water storage tank. Section 11.7.3 of the 2018 edition of NFPA 22 requires the tank to have an accessible method of filling the tank above grade. It doesn't mention an automatic refill.

Is an automatic refill required in accordance with section 14.4.1?

No, there is no blanket requirement in NFPA 22, except for "Break Tanks" as covered in Section 14.5, for the fill mechanism to be automatic.

Section 14.4 does require a permanent tank fill connection connected to a reliable water supply (14.4.1) which can fill the tank within 8 hours (4.2.1.4). These sections stated a permanent fill connection is required but do not indicate that the fill be automatic.

Section 14.4.1.1 identifies that the connection is not required if there is no permanent water supply available and there is a plan for manually refilling the tank which is acceptable to the authority having jurisdiction.

It must be noted that the tank must be kept full at all times (14.4.3) and that the impairment procedures of NFPA 25 must be followed when the tank does not have sufficient capacity to meet the fire protection demand.

NFPA 22 does not have a specific statement stating that an automatic fill is not required; however, there are statements that allude to this. For example, 14.4.7 includes the statement that "Where a separate fill pipe is used, automatic filling shall be permitted."

Additionally, the size of the tank may be able to be reduced with the use of a reliable automatic refill. Section 4.1.6 states that the tank be sized so that the stored supply plus reliable automatic refill meets the system demand for the required duration.

Question #11 – NFPA 13D Pumps

A three-story townhome that is going to be sprinklered in accordance with NFPA 13D. A domestic booster pump will be provided for the domestic water system. Can the domestic system booster pump also be used for the residential sprinkler system? The plan is to come in with a single 1-inch feed and then split inside the unit. The pump would have to be before the split and backflow preventer.

Yes, domestic pumps are permitted on NFPA 13D systems. Section 6.2 says a connection to a reliable waterworks system with or without an automatically operated pump is considered an approved water supply. Since the pump will be connected to the domestic water supply, the conditions outlined in Section 6.2.1 in NFPA 13D will not apply. The International

Residential Code (IRC) also does not contain any requirements for domestic booster pumps (other than it being lead-free).

Question #12 – Corrosion Resistance Application

Section 10.6.2.5 in the 2016 edition of NFPA 24 states that, "After installation, rods, nuts, bolts, washers, clamps, and other restraining devices shall be cleaned and thoroughly coated."

Question #1: Does this statement apply to all metals such as carbon steel, zinc, galvanized, stainless steel and fluoropolymer coatings?

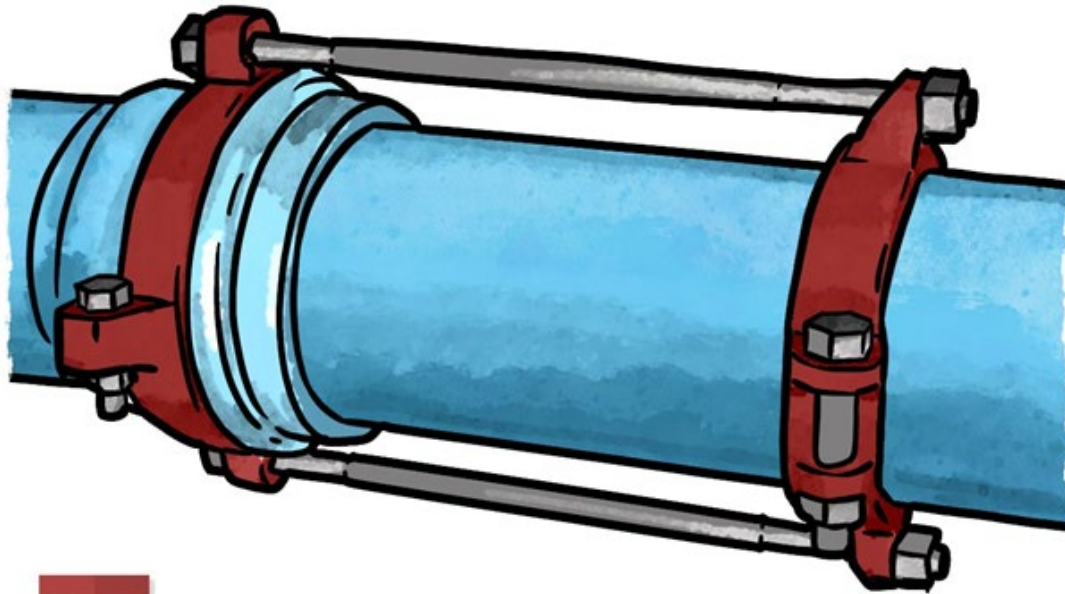
Question #2: Does the "after installation" statement mean that all coated materials, no matter what the coating is, still require coating with a bituminous or other acceptable corrosion-retarding material?

Answer to question #1: The way this section is written in Section 10.6.2.5, the answer is "yes" as this section reads "all". However, the associated annex section specifically mentions steel and iron components and also states that, "The materials specified in A.10.6.2.5 (1) through (6) do not preclude the use of other materials that also satisfy the requirements of this section."

Based upon this, if the components used have a corrosion resistance at least equal to the steel "components coated with a bituminous or other acceptable corrosion-retarding material" this specific requirement would not apply, and an additional coating would not be required.

Answer to question #2: No. As stated above, if the components used have a corrosion resistance at least equal to the steel "components coated with a bituminous or other acceptable corrosion-retarding material" this specific requirement would not apply, and an additional coating would not be required.

As this section does not specifically state this, it would be prudent to discuss with the AHJ. Section 1.4, titled equivalency allows a comparable material to be utilized as long as the alternate material is deemed at least "equivalent" to the requirements of the standard.



Savings you
can measure.

NFSA members
can save up to

45% on ship- ▶

Training and Education



Sign-Up for one of our Layout Technician Pathway Courses

NFSA's newly updated fire sprinkler Layout Technician Pathway (LTP) prepares fire sprinkler layout and design professionals for NICET Levels I & II certifications. It also provides a great refresher for those who have been designing systems but need a comprehensive refresher. Students will receive a hard copy of the recently updated and revised "Layout Book" as well as a copy of the 2022 edition of the NFPA 13 standard.

The LTP consists of two parts. Students must first complete the on-line Part 1: Fundamentals before attending the in-person Part 2: Application session. The 25 self-paced online modules cover everything from "Parts of a Sprinkler" to "Introduction to Fire Sprinkler Calculations." The 3-day in-person instructor-led Part 2: Application class

applies the content learned in the previous Fundamentals course. There are four in-person and one virtual session offered in 2023.

NOTE: Students must register for Part 1: Application at least one month before the start of in-person Part 2: session in order to allow enough time to complete the on-line modules.

Layout Technician Pathway cost:

Members: \$2,200.00

Non-members: \$4,400.00 – [Join here](#) to save 50%!

Registration Deadline for Fundamental & Application	Layout Technician: Fundamentals Completion Deadline	Layout Technician: Application Class Dates	Location
28-Aug-23	25-Sep-23	September 26-28, 2023	WA
14-Oct-23	13-Nov-23	November 14-16, 2023	MD
2-Jan-24	29-Jan-24	January 30-February 1, 2024	FL

[Check Out All Options Here](#)

[Click Here to See All Learning & Development Opportunities](#)

The National Fire Sprinkler Association is proud to present our NEW 2019-2020 Edition EOD Handbook

The EOD Handbook is now a three-volume set of over 1,500 pages covering hundreds of topics that are relevant to automatic fire sprinkler systems, standpipes, water supplies, inspection, testing and maintenance, codes, and standards.

Order the latest volume, the 2019-2020 Edition, as a single book or order the three-volume set!



National Fire Sprinkler Association

514 Progress Dr, Ste A,
Linthicum Heights, MD 21090
1-800-683-NFSA (6372)



© 2023 Microsoft Dynamics. All rights reserved.

National Fire Sprinkler Association 514 Progress Drive Suite A Linthicum Heights, MD 21090

[Unsubscribe](#)