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

TechNotes

Editor - Roland Asp, CET #499 11/08/2022

Best of October 2022

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 October 2022. This information is being brought forward as the "Best of October 2022." 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.

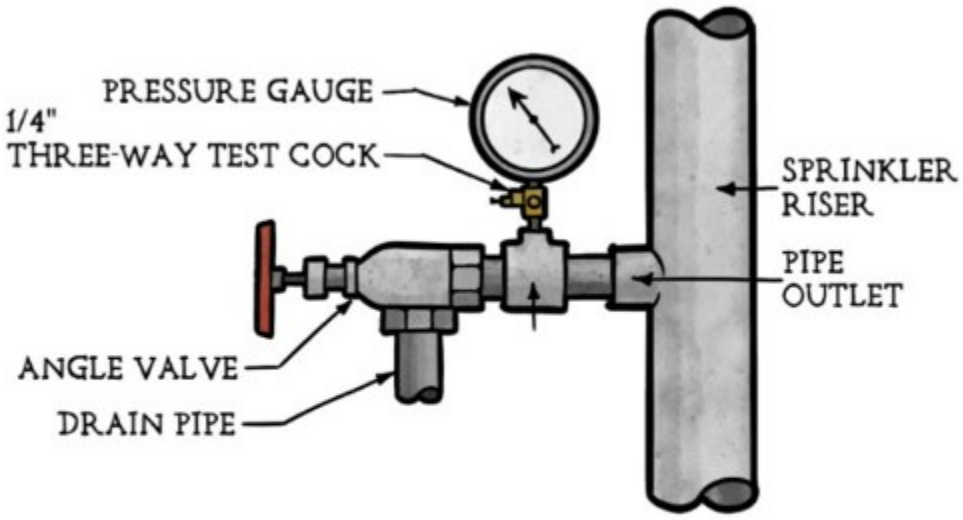
Question #1 – Main Drain Gauge Location

A facility has multiple wet pipe sprinkler systems and the main drain test results are inconsistent between systems and are inconsistent from quarter to quarter. One common denominator is all of the gauge readings that are inconsistent are arranged with the gauge located on the nipple to the drain valve. All of the other systems that have consistent readings have the gauge located on the riser pipe.

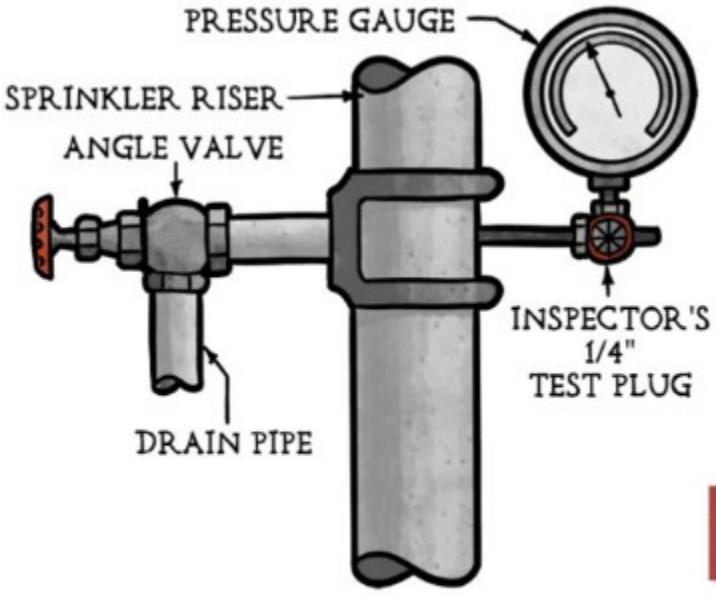
Should the pressure gauge for a main drain be located on the riser itself or can it be located on the nipple to the main drain?

The main drain pressure gauge should be located on the riser itself. The fact that the pressure gauge is located on the main drain piping is a likely cause of the inconsistent pressure readings for a few reasons. One issue is the considerable turbulence caused by the mechanical tee and the elbow on the main drain. These fittings create considerable turbulence in the water flow and could create issues when attempting to achieve consistent pressure readings. Another issue is the mechanical tee, the internal diameter of the apparatus the pressure gauge is installed on and the internal diameter of the drainpipe itself. Changes in diameter in the pipe in which water is flowing and pressure is taken from can create a venturi effect which will modify pressure depending on the amount of change in that diameter.

While the body of the 2016 edition of NFPA 13 does not specifically state that the pressure gauge for the main drain must be located on the riser, annex note A.8.16.2.4 and its associated figures does and states that a pressure gauge located on the main drain piping is unacceptable and will not show an accurate residual reading but will show an excessive pressure drop.



UNACCEPTABLE GAUGE LOCATION
FOR MAIN DRAIN



ACCEPTABLE GAUGE LOCATION
FOR MAIN DRAIN

Question #2 – NFPA 13R Exterior Stairway/Walkway Roof Deck

A low-rise residential building is being equipped with a fire sprinkler system in accordance with the 2016 edition of NFPA 13R. This apartment complex contains canopies that exceed 4'-0 in width and are above exterior stairways and walkways. Section 6.6.5 states that sprinklers are not required in open and attached porches, balconies, and corridors.

Does this section apply to the referenced stairways and walkways?

Based solely on the 2016 edition of NFPA 13R, sprinklers are not required under covered corridors and stairwells that are “open and attached” as described. Section 6.6.5.1 is applicable to covered balconies, decks and patios that directly serve a dwelling unit and is not applicable to these features that serve common areas.

However, this concept must be further investigated to ensure that the building code requirements are met as well. The 2015 edition of the International Building Code (IBC) added Section 903.3.1.2.2 which requires sprinklers in open ended corridors and associated stairways that are not separated. This requirement is also found in Section 1027.6 of the IBC, but the ICC felt it needed to flag the requirement in the NFPA 13R sprinkler section as well.

Based upon the above building code requirement, Section 6.6.5 of NFPA 13R was changed in both the 2019 and the 2022 editions. The 2022 edition of NFPA 13R has modified this requirement (in Section 6.6.5) to read that sprinklers are not required in open and attached: “Corridors that are not part of the means of egress.”

Based upon the building code requirements and changes in current editions of NFPA 13R, it would be prudent to investigate (or have the architect investigate) these building features as they relate to the Building Code (Sections 903.3.1.2.2 & 1027.6 Exception 3 in the 2015 and 2018 editions).

Question #3 – Insulation on the Exhaust Pipe and Muffler of a Fire Pump

Based upon the 2013 edition of NFPA 20, is it a requirement to install insulation on the exhaust pipe and muffler if they are not "touchable" by humans or are installed at a certain height such as 7 feet above the finished floor?

No, the exhaust pipe is not required by the standard to be insulated. NFPA 20, 2013 edition, Section 11.5.2.4 indicates the exhaust pipe shall be covered with high-temperature insulation or otherwise guarded to protect personnel from injury. The “or” statement in the standard permits the exhaust pipe to be guarded to protect personnel from injury in lieu of insulation.

The standard does require the pipe to be insulated or guarded. Locating the exhaust pipe 7 ft. AFF would not meet the requirement of the standard to be guarded. The option to guard the pipe in lieu of insulation would include a physical covering to project personnel from touching the exhaust pipe even it is located out of reach from the floor.

Question #4 – PVC Pipe under Foundation

A project utilizes a PVC underground service that extends under the foundation and up into the riser room. A reviewer noted that this pipe is required to be ductile iron or stainless steel.

In accordance with the 2019 edition of NFPA 13 (and NFPA 24), is it permissible for a PVC service to be run under foundations and extend into the riser room?

Yes, NFPA 13, 2019 edition, Section 6.4.3 permits fire service mains supplying fire protection systems within the building to extend no more than 10 feet, as measured from the outside of the building, under the building to the riser location. This includes PVC piping.

Section A.6.4.3.1.1 indicates the individual piping standards should be followed for load and bury depth, accounting for the load and stresses imposed by the building foundation. Sections 6.1.1 references the individual piping standards.

The concern is with PVC pipe as it enters the building and transitions to aboveground pipe. Section 6.1.4 indicates underground piping is permitted to extend into the building through the slab or wall not more than 24 inches. This again includes PVC underground pipe which is permitted by the standard to extend into the building through the slab or wall not more than 24 inches.

Annex Section A.6.1.4, while not part of the enforceable standard, provides additional explanatory information. It indicates that where nonmetallic underground pipe is located inside the building or above grade, the following items should be considered:

1. Exposure to sunlight
2. Compatibility with chemicals (such as floor coatings and insecticides)
3. The ability of the nonmetallic pipe to support the weight of the riser and riser equipment

This was further addressed in NFPA 13, 2022 edition, Section 6.1.4 which now indicates regardless of pipe type, underground piping shall be permitted to extend into the building through the slab or wall not more than 24 inches.

PVC underground pipe is permitted to extend up to 10 feet under the building to serve a sprinkler riser and extend up to 24 inches into the building. While permitted by the standard, there may be local water department ordinances and/or contract specification requirements that address the installation of PVC pipe under the building or into the building.

Question #5 – Combined Standpipe/Sprinkler with Floor Control Valves in NFPA 13R

A four-story building is to be equipped with a sprinkler system installed in accordance with the 2013 edition of NFPA 13R and a standpipe in accordance with NFPA 14. This is to be a combined system with the sprinkler systems fed from the standpipe riser.

Is it "required" to have each floor zoned off with a control valve and flow switch?

No, not necessarily. Each point where the sprinkler system connects to the standpipe system must have an individual control valve. However, this is not required at each floor. A single connection is permitted to serve multiple levels.

The 2013 edition of NFPA 13 does have a requirement that each floor of a multistory building be equipped with a floor control assembly (see Section 8.16.1.5); however, this requirement does not apply to NFPA 13R systems. This concept was clarified in the 2019 edition of NFPA 13R in Section 6.8.8.

The 2019 edition also added language specific to combined systems. Section 6.8.10 in the 2019 edition of 13R states “each connection from a standpipe that is part of a combined system to a sprinkler system or floor shall have an individual control valve and check valve.” The associated annex section indicates that this connection (and associated control valve and check valve) can occur just once or at each floor if the owner prefers.

Question #6 - Temporary Storage within 18 inches of Sprinkler Deflector

In a laboratory space equipped with extended coverage sprinklers, the top shelf of the proposed lab benches are 25 inches below the deflectors of the sprinklers above. If there are items such as bottles or boxes temporarily placed on the top shelf, they could extend into the 18 inches clearance zone.

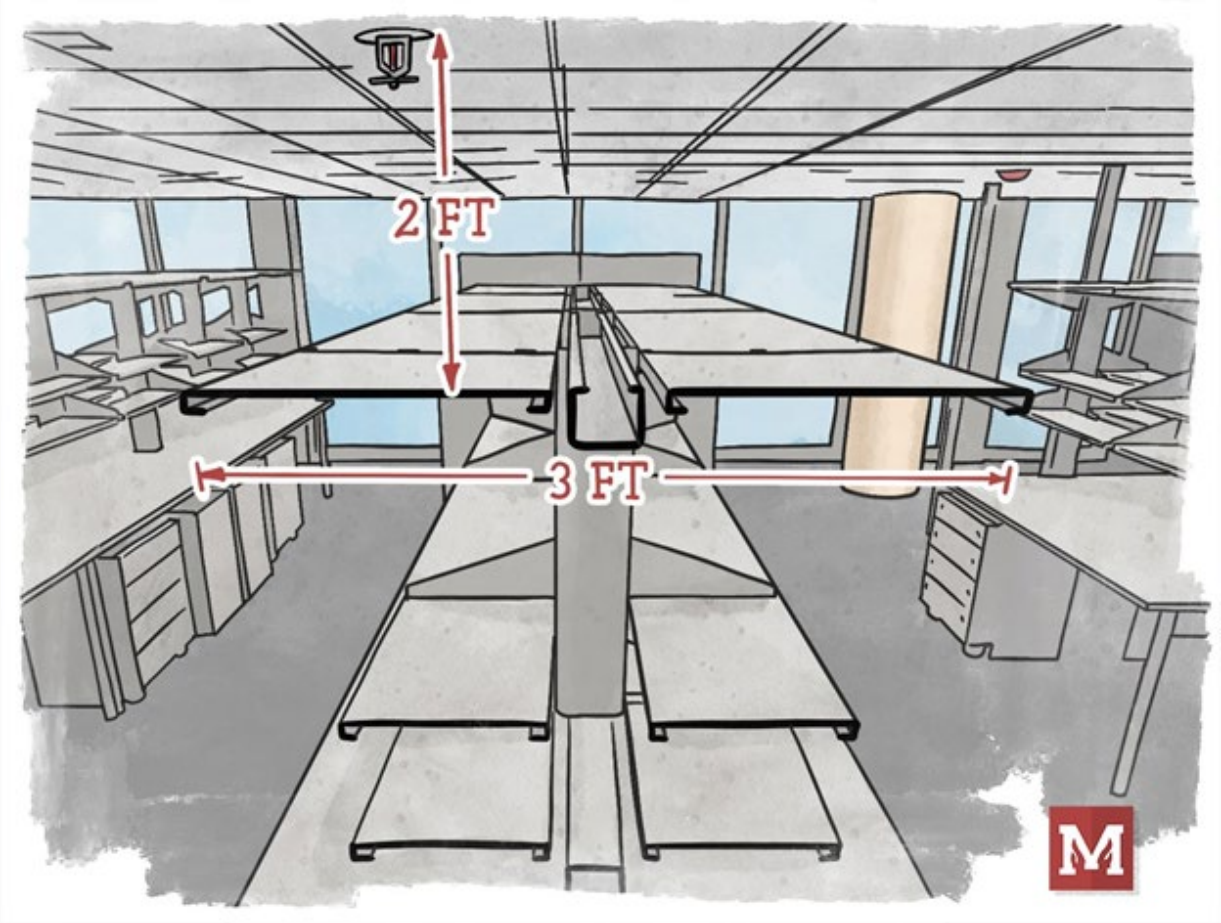
Would this count as an obstruction?

Yes, as stated in Section 11.2.7.1 of the 2019 edition of NFPA 13, the required clearance from the top of storage and the sprinkler deflector is 18 inches or greater.

Section 11.2.7.2.1 does allow for shelves along the wall to have storage within the 18 inch plane below the sprinklers; however, the shelves cannot be directly below the sprinkler.

If the proposed shelves are not against the wall, or against the wall and directly below the sprinkler, they cannot have storage within 18 inches of the sprinkler deflector.

The standard does not include an exception if this storage is temporary.



Question #7 – How to Calculate a Manual Standpipe

When calculating a manual standpipe, does the calculation end at the fire department connection (FDC) or is it required to obtain a pump curve from the fire department to simulate the pumper trucks curve and uses that as a supply at the FDC?

A manual standpipe with a system demand calculated to provide 100 psi through the outlet of the hydraulically most demanding remote 2 ½ inch hose valve for the required flow, with the calculations terminating at the FDC, would be appropriate. See Section 7.8.1.2* of the 2019 edition of NFPA 14.

Manual standpipes are designed (sized) to provide the require 100 psi through the topmost hose connection using fire department apparatus pumps as the source of pressure and flow.

The local fire department should be consulted regarding the department's pump capabilities but a simulated “pumper truck curve” is not required.

Flow testing requirements for manual standpipes can be found in Section 11.5.2. Please note the annex figures A.11.5.2(a)-(c) for flow testing verification options.

Signage is required at the FDC for all manual standpipes and must indicate where the system is wet or dry. The signage must also indicate when inlet pressure greater than 150 psi are required to meet system demand from the FDC.

Question #8 – Underground Valves on Fire Service Lead-Ins

A private water loop serving both domestic and fire is installed at an apartment development consisting of six separate buildings. Each sprinklered building has a dedicated lead-in from the water loop.

Does Section 6.6.2 (2) in the 2013 edition of NFPA 24 require underground valves located outside the building required for all fire lead-ins?

No. Each of the fire services are required to have a dedicated control valve so that they can be isolated, but it is not required to be an underground valve.

Each of the lead-ins requires a control valve in accordance with one of the seven options listed in Section 6.2.11. Not all these options are required to be underground or outside the building (See Options 2 (wall hydrant), Option 6 (Control valves installed in a fire-rated room accessible from the exterior) and Option 7 (Control valves in a fire-rated stair enclosure accessible from the exterior where permitted by the AHJ.)

Section 6.6 which has been referenced is titled Sectional Valves and is not concerned specifically with a single lead-in to the building but rather would apply to the underground water loop serving the six buildings.

Section 6.6.1 states that sectional valves must be provided in the looped main so that the number of fire protection connections between sectional valves does not exceed six. The purpose of a sectional control valve is to ensure the ability to isolate a segment of the underground main for maintenance or repair while affecting as few systems as possible.

This is noted in annex Section A.6.6.1, this requirement is to limit the number of connections that would be impaired due to a pipe break or during repairs to the system.

This annex note also defines fire protection connections as “sprinkler system lead-ins, hydrants, or other fire protection connections.”

It should also be noted that the 2022 edition of NFPA 24 modified the language of this section to clarify that it applies to looped systems only. Based upon the above, Section 6.6.2 (2) would not apply to a single lead-in to a building but rather to the underground loop feeding the six buildings.

Question #9 – Exterior projections - Fenced In

A project includes a noncombustible exterior projection over 4 feet categorized as a break area (no storage) which would not require sprinkler protection based upon Section 9.2.3 of the 2022 edition of NFPA 13. This projection, however, is surrounded by a fence which limits egress from the area.

Does a fence that limits egress alter the applicability of sprinkler requirements under exterior projections?

No, the omission of sprinklers for exterior canopies is not based upon on the ability to egress from the space. NFPA 13 permits the omission of sprinklers for canopies over balconies as well which could be at a high elevation and would require egress through the building with the same criteria as a canopy at ground level.

Sprinklers are permitted to be omitted for exterior projections strictly based on the likelihood of a fire originating in that area and the risk of the canopy being large enough to increase the chance the fire would extend into the building. So long as the criteria for the canopy are met to permit the omission of sprinklers it is permitted without regard to the fencing around the projection.

Question #10 – NFPA 30 Secondary Containment

An indoor liquid storage room requires secondary containment in accordance with NFPA 30.

Is it required to add the in-rack sprinkler water and foam liquid to the overhead sprinkler discharge when calculating the required secondary containment volume?

NFPA 30 has lacked clear containment guidance since the beginning which will likely be updated in the next cycle. The International Fire Code (IFC) provides more specific guidance stating

“Secondary containment for indoor storage areas shall be designed to contain a spill from the largest vessel plus the design flow volume of fire protection calculated to discharge from the fire-extinguishing system over the minimum required system design area or are of the room or area which the storage is located, whichever is smaller. The containment capacity shall be designed to contain the flow for a period of 20 minutes.”

Therefore, the total flow determined by the calculations should be used to determine the volume of water and foam solution that needs to be accounted for in the containment volume. If the demand requires both ceiling level sprinklers and in-racks to be flowing, both should be included in the containment volume including the foam solution.

Question #11 – Maintain heat in building via backup generator

As part of a pre-occupancy warehouse inspection, it was stated that a backup generator would be required to maintain the heat at 55F degrees during a power outage.

Does NFPA 13, NFPA 20 or the building code require the installation of a back-up generator to maintain heat in the event of a power failure?

No, there is no requirement in IBC Section 2702.2 or NFPA 13 for a backup generator to be provided to maintain heat in case of a power outage. NFPA 20 requires the pump space to be provided with heat, but no requirement for a backup power supply for the heat source.

It is possible this comes from a local amendment to the code. If it is a local amendment to the code, the authority having jurisdiction should be able to provide you with a copy of that amendment.

Question #12 – Steeply Pitched Ceiling and Residential Sprinklers

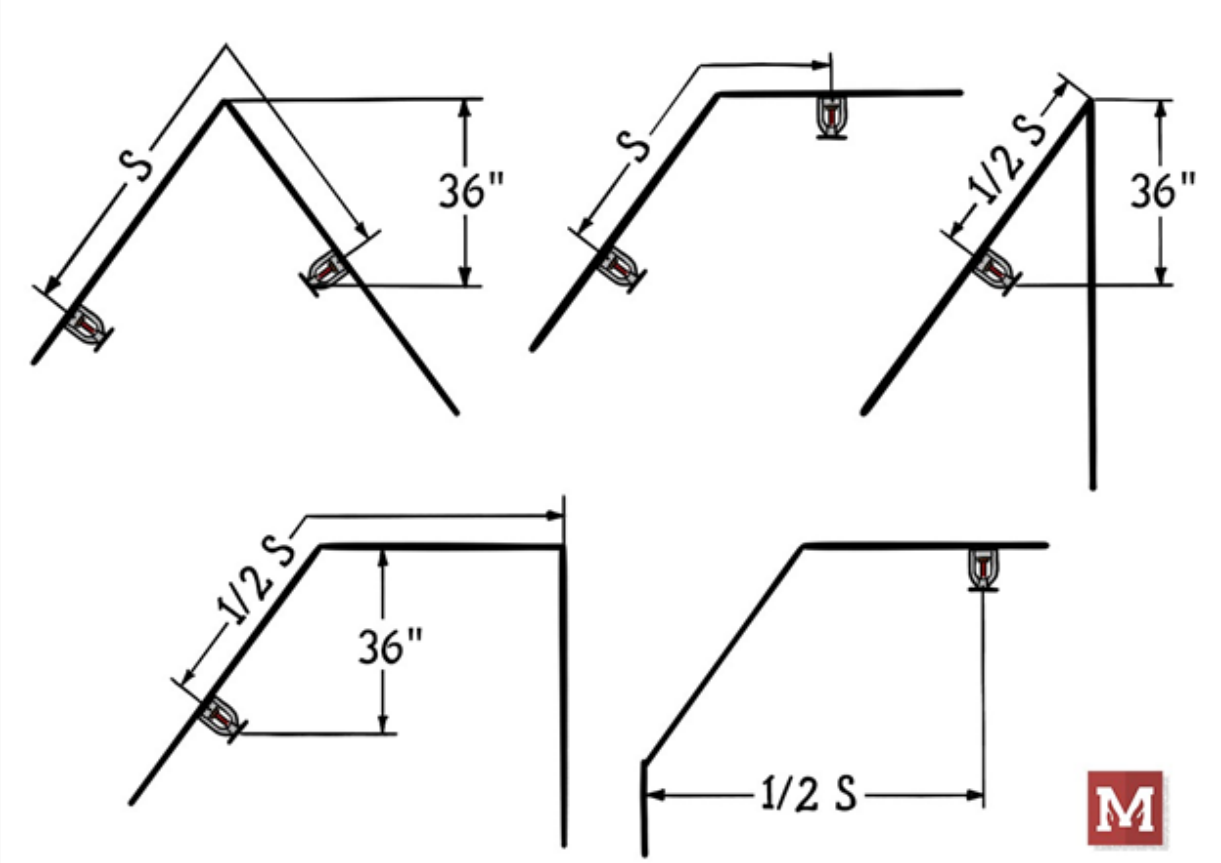
A house is being protected with a NFPA 13D sprinkler system and includes pitched ceilings. NFPA 13 requires a sprinkler to be located within 36 inches of the peak; however, there is not similar language in NFPA 13D for residential sprinklers.

Are residential sprinklers required to be located no more than 36 inches below the peak of a sloped ceiling?

Yes, however, this requirement was added in the 2022 edition of NFPA 13D (as well as in NFPA 13R and the residential chapter of NFPA 13.) Section 8.1.1.3, which was new to the 2022 edition, specifically requires that a sprinkler be installed within 36 inches vertically of the peak or in accordance with the listing of the sprinkler.

This section was added based open a correlating committee comment (CC #7) which directed the residential committee to “review residential sprinkler installation under peaked roofs and determine if the maximum 3 foot vertical distance down from peak requirement for standard spray sprinklers is also applicable to residential sprinklers.” The committee reviewed this comment and agreed that the 36 inches below the peak requirement is applicable to residential sprinklers.

Additionally figure 8.1.1.1 was modified to illustrate this concept.



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Best of NFSA's Expert of the Day: NFPA 25 – ITM	Inspection and Testing for the Fire Sprinkler Industry	Layout Technician: Application
November 15th at 12:30 pm ET Virtual	December 13th at 8 am ET Linthicum Heights, MD	January 24th at 8 am ET Virtual

Learning & Development Oppotunities

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

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Contact Us

National Fire Sprinkler Association
514 Progress Drive, Linthicum Heights, MD 21090
1-800-683-NFSA (6372)