

Best of May 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 May 2023. This information is being brought forward as the "Best of May 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.

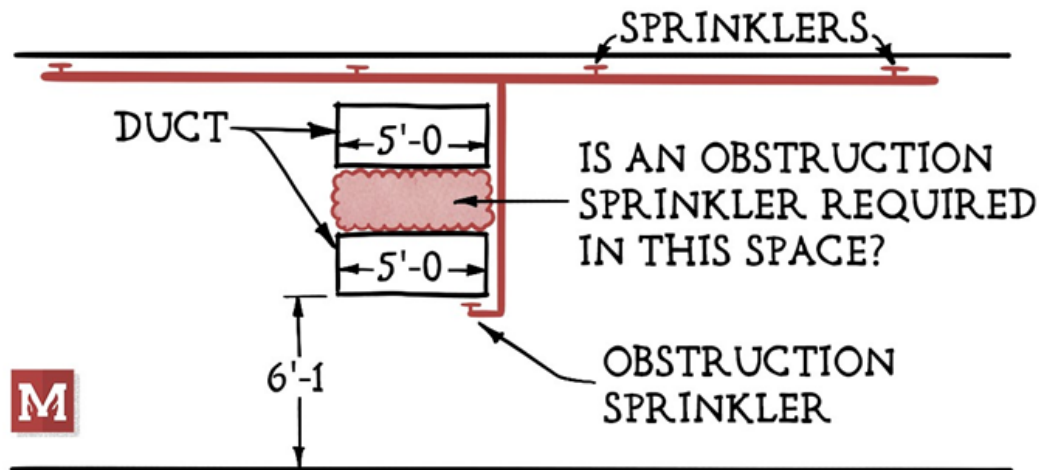
Question #1 – Two Levels of Obstructions

If there are two ducts over 4'-0" wide that are stacked vertically but there is a gap between them, are sprinklers required in the space between the ducts or is only one level of sprinklers required below the lowest duct? See attached sketch. Please provide applicable code reference if possible.

No, if there are two obstructions to sprinkler discharge reaching the hazard greater than 4 ft. in width on top of each other with a gap between them as shown in your sketch, and there is no hazard between the two levels of obstructions, sprinkler protection is not required between the obstructions.

NFPA 13, 2019 edition, the purpose of Section 9.5.5.3 is to provide sprinkler protection under fixed obstructions greater than 4 ft. wide that prevent the ceiling sprinkler discharge from reaching the hazard. In your case, assuming the hazard is on the floor below the two stacked obstructions and there is no hazard between the two levels of obstructions, sprinkler protection would be required below the lower obstruction only. There is no need for additional sprinkler protection between the obstructions as there is no hazard in this area to protect.

This concept can be found in Annex section A.9.5.5.3.1.1 of the 2019 edition of NFPA 13.



Question #2 – Baffle Size for Recessed and Concealed Sprinklers

The 2019 edition of NFPA 13, Section 10.2.5.4.2 (3) states that the minimum baffle size is 8 inches long x 6 inches deep. Section 10.2.5.4.2 (5) indicates the bottom of the baffle must extend downward to a level at least even with the deflector of pendent sprinklers.

When a baffle is needed for semi-recessed or concealed sprinklers and the deflector only projects 1" below the ceiling would it be acceptable to provide a baffle that is 8" long x 2" deep?

No. While it may be true that recessed and concealed sprinklers (with operating elements above the ceiling) are less prone to cold soldering from the spray from adjacent sprinklers, NFPA 13 does not give any allowance for a baffle smaller than the dimensions outlined in the standard.

NFPA 13 does not allow a reduction in baffle size. Section 10.2.5.4.2 is worded in such a manner that all five conditions must be satisfied. If the committee responsible for NFPA 13 would have desired that only one of the five be met, they would have included a phrase similar to "where one of the following conditions are satisfied:".

Question #3 – Heavy Timber and Limited Combustible

In accordance with the 2013 edition of NFPA 13, would an exterior projection, greater than 4 ft in width, constructed of heavy timber (Douglas fir) meet the definition of limited-combustible and not require sprinkler protection beneath it? the

No, heavy timber (Douglas Fir) does not meet the definition of limited combustible in NFPA 13, 2013 edition, for the purpose of determining the requirements for sprinkler protection under an exterior projection.

Section 8.15.7.1 indicates unless the requirements of 8.15.7.2, 8.15.7.3, or 8.15.7.4 are met, sprinklers must be installed under exterior projections exceeding 4 ft. in width.

Section 8.15.7.2 indicates sprinklers may be omitted where the exterior projections are constructed with materials that are noncombustible, limited-combustible, or fire retardant-treated wood.

Section 3.3.16 defines limited-combustible (material) as *a building construction material not complying with the definition of noncombustible material that, in the form in which it is used, has a potential heat value not exceeding 3500 Btu/lb (8141 kJ/kg), where tested in accordance with NFPA 259, and includes either of the following: (1) materials having a structural base of noncombustible material, with a surfacing not exceeding a thickness of 1/8 in. (3.2 mm) that has a flame spread index not greater than 50; or (2) materials, in the form and thickness used, having neither a flame spread index greater than 25 nor evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material on any plane would have neither a flame spread index greater than 25 nor evidence of continued progressive combustion, when tested in accordance with ASTM E 84, Standard Test Method of Surface Burning Characteristics of Building Materials, or ANSI/UL 723, Standard Test Method of Surface Burning Characteristics of Building Materials.*

It is our understanding that the potential heat value of Douglas Fir is approximately 8,500 Btu/lb which exceeds the values defined for limited combustibles materials.



Question #4 – Non-Combustible Exterior Canopy

A building to be protected with sprinklers installed in accordance with the 2013 edition of NFPA 13 includes an exterior projection that is non-combustible. There are however bicycle racks located under this projection.

Is the presence of bicycle racks considered storage of combustibles which would then require the installation of sprinklers under this noncombustible projection.

NFPA 13 (2013 edition) – Section 8.15.7.2 allows the exclusion of sprinklers under exterior projections when the projection is non-combustible. This section needs to be read and applied in concert with Section 8.15.7.5 that requires sprinklers where combustibles are stored.

Most bicycle components would be non-combustible, but the bicycle might have small amounts of combustible items (such as the seat, cable coatings, and tires). The amount of combustibles on a bicycle, if ignited, would likely not generate enough heat to activate any sprinklers installed above.

The annex note for Section 8.15.7.5 states: “A.8.15.7.5 Short-term transient storage, such as that for delivered packages, and the presence of planters, newspaper machines, and so forth, should not be considered for storage or handling of combustibles. The presence of combustible furniture on balconies for occupant use should not require sprinkler protection.”

Since this section intends to allow combustible furniture – with a much higher rate of heat release than what would be found on a bicycle or even multiple bicycles – it is logical to assume that that this is not the type of risk that NFPA 13 was contemplating when it required exterior combustible storage under projections. It was primarily looking at the combustible fuel loads found under projections at retail and mercantile facilities.

Question #5 – Location of Exterior Alarm

The 2016 edition of NFPA 13 does not state a maximum distance a waterflow alarm device (bell) is to be installed, on the exterior of a building, from the riser.

Can the waterflow alarm device (bell) be installed on any exterior wall?

NFPA 13 does not specify where the waterflow alarm device should be installed on the exterior of the building. In fact, as most buildings are required to have a fire alarm system, a separate exterior alarm may not be required by NFPA 13.

Section 6.8.3.1 states that the alarm must be a listed “mechanical alarm, horn, or siren or a listed electric gong, bell, speaker, horn, or siren”; however, the annex to this section states that this audible alarm is normally located on the outside of the building but also states:

Outside alarms might not be necessary where the sprinkler system is used as part of a central station, auxiliary, remote station, or proprietary signaling fire alarm system, utilizing listed audible inside alarm devices.

However, the International Fire Code (IFC) in Section 903.4.2 specifies that an approved audible device, located on an exterior of the building in an approved location, shall be connected to each sprinkler system. “Approved” is defined in the IFC as, “acceptable to the fire code official” (IFC Chapter 2). Therefore, based on IFC Section 903.4.2, the notification appliance must be in a location that the AHJ finds acceptable.

Question #6 - Concealed Spaces and Sprinkler Requirements

The 2016 edition of NFPA 13, in Section 8.15.1.2.1 states that "Concealed spaces of non-combustible and limited combustible construction with minimal combustible loading having no access shall not require sprinkler protection."

As shown in the attached figure, the building includes a parapet that is constructed with aluminum studding and T&G sheathing (plywood).

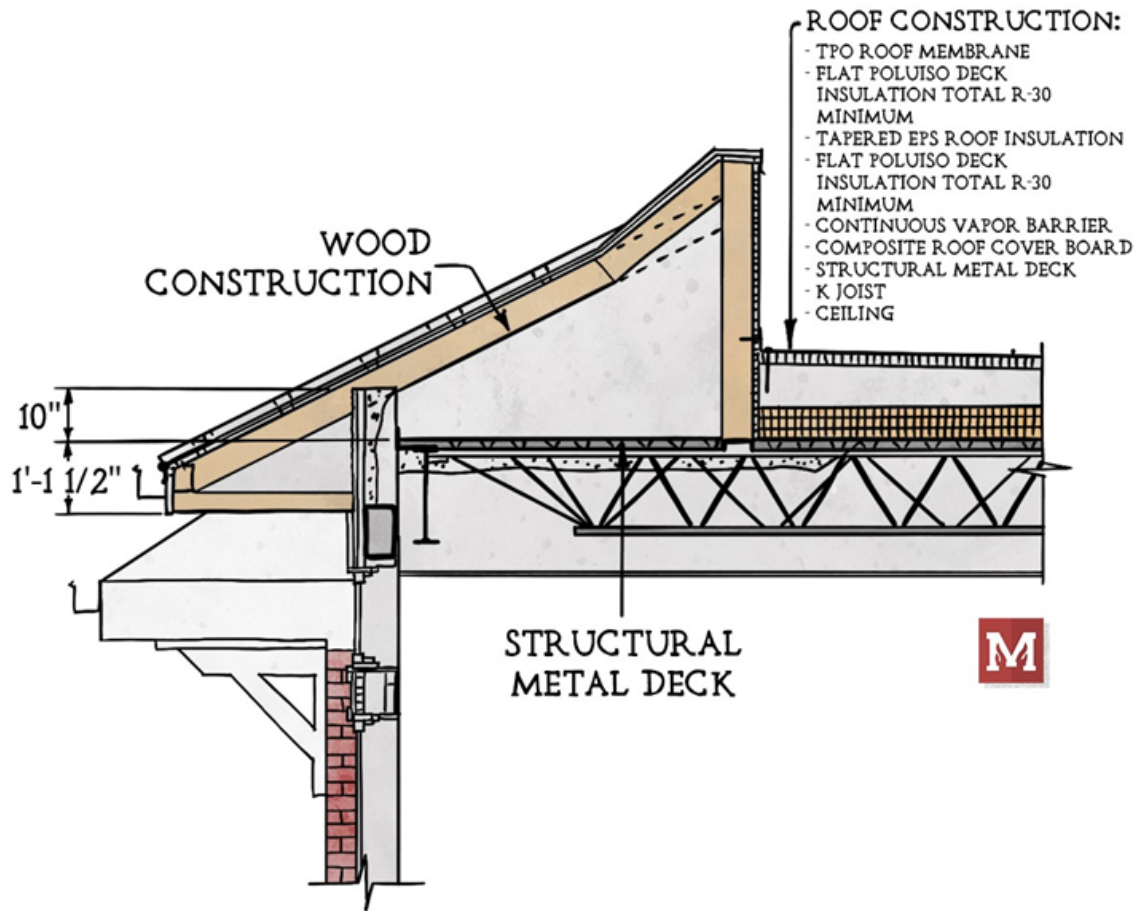
Would the plywood sheathing be considered “minimal combustible loading” as stated in Section 8.15.1.2.1 so that sprinklers may be omitted in the concealed space of the parapet?

No. Plywood would not be considered “minimal combustible loading” as outlined in Section 8.15.1.2.1.

Based on the attachment and your explanation, perhaps a better section for this scenario would be Section 8.15.1.2.18 covering exterior soffits, eaves, overhangs, and decorative frame elements. This section allows the omission of sprinklers when the following conditions are met:

- The soffit, eave, overhang...does not exceed 4 feet in width.
- The soffit, eave, overhang...shall be draft stopped with material equivalent to that of the soffit into volumes not exceeding 160 cubic feet.
- The soffit, eave, overhang...shall be separated from the interior of the building by walls or roofs of noncombustible or limited-combustible construction.
- The soffit, eave, overhang...shall have no openings or unprotected penetrations directly into the building.

Based on the description, Section 8.15.1.2.18 appears to meet this scenario better than Section 8.15.1.2.1. If the four conditions referenced above can be met, sprinklers may be omitted from the space.



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Question #7 – Hydrostatic Testing

A new dry pipe sprinkler system is being installed in an existing freezer in accordance with the 2013 edition of NFPA 13. This freezer may never be above freezing.

Is an air test an acceptable substitute for the hydrostatic test permanently?

No. All systems must be hydrostatically tested at 200 psi for 2 hours. There is an exception in 25.2.1.3 of NFPA 13, but that section only allows a delay in the hydrostatic test until the temperature is above freezing. The only acceptable test is the hydrostatic test.

While “pressure is pressure,” the effect of that pressure can be different when the pressure is generated by a different source. The key difference is in the ability of air versus water to compress. Air undergoes a substantial volume change when compressed while water does not. If the pressure confinement is suddenly eliminated, through the failure of a section of piping or a fitting, both the air and water go back to their pre-pressurized volumes. For water this is negligible but for air this considerable expansion can result in projectile movement of

loose and damaged parts of the system; essentially creating shrapnel. It is for this reason that NFPA 13 limits air pressure tests to a maximum of 40 psi.

Question #8 – Standpipe System / 13D System House

A project consists of a Group R-3 two-family three stories plus a basement and roof. The roof floor is 35 feet high, and we have a 477 square foot living space (playroom) on the roof.

Is a standpipe required? The 1st, 2nd, 3rd, and roof are one house, and I don't see the right locations for house valves.

No, standpipes and hose connections are not required in four-story R-3 (one- and two-family) residential occupancies.

The 2018 International Building Code (IBC) Section 905.3 has an exception stating that standpipes are not required in Group R-3 occupancies.

The code had a conflict where the height limitation of Section 905.3.1 triggers the standpipe requirement in four story buildings. However, there are no required locations in these occupancies for requiring the installation of hose connections in the code.

While Section 905.3.1 of the International Building Code (IBC) requires standpipes in all buildings greater than four-stories, hose connections at each level are only required in an internal exit stairway. The IBC defines an interior exit stairway as a protected path of egress. One- and two-family and townhouses (R-2 & R-3) are not required to meet the interior exit stairway requirements and as such, do not have a requirement for hose connection locations.

NFSA submitted a change (F78-21) to the 2024 edition of the IBC in 2021 to add clarify to this issue in Section 905.3. The 2024 edition now exempts standpipes in both Group R-2 and R-3 providing additional clarification.

Question #9 – Small Room Rule

Can the small room rule to exterior canopies or breezeways where one side is open to the outside? The area of this canopy is less than 800 square feet.

No, the small room rule cannot be applied to exterior canopies or breezeways. The reason is, "small room" is defined by the 2019 edition of NFPA 13 (Section 3.3.196) as, "a compartment of light hazard occupancy classification having unobstructed construction and a floor area not exceeding 800 ft²." A compartment is defined by NFPA 13 (Section 3.3.38) as a space "completely enclosed by walls and a ceiling...".

While NFPA 13 does allow a limited amount of openings in the compartment, an exterior canopy or breezeway would not meet this requirement.



Question #10 – Quick Response Reduction and Combustible Concealed Spaces

Can the QR reduction rule be applied in a combustibile concealed space protected by QR Dry Upright sprinklers from a wet-pipe system?

Yes. The scenario described meets all five requirements found in NFPA 13 to utilize the design area reduction for quick-response sprinklers.

Per Section 11.2.3.2.3.1 of NFPA 13 (2013) where listed quick-response sprinklers, including extended coverage quick response sprinklers, are used throughout a system or portion of a system having the same hydraulic design basis, the system area of operation shall be permitted to be reduced without revising the density as indicated in Figure 11.2.3.2.3.1 when all of the following conditions are satisfied:

1. Wet pipe system
2. Light hazard or ordinary hazard occupancy
3. 20-foot maximum ceiling height
4. No unprotected ceiling pockets as allowed by 8.6.7 and 8.8.7 exceeding 32 square feet

Combustible concealed spaces are typically classified as light or ordinary hazard and as long as the sprinkler system in the combustible concealed space is a wet pipe system and the other requirements are met, the use of Figure 11.2.3.2.3.1 is permitted utilizing the distance from the inside face of the ceiling enclosing the concealed space to the roof deck. Note that Section 8.15.1.3 specifically states that concealed spaces having no access for storage or other uses may be protected with light hazard requirements.

Question #11 – 13R Underground Hydrostatic Test

Why does NFPA 13R not require underground water supplies under 4" that supply the aboveground system to pass a hydrostatic test?

If the water supply (under 4 inches) feeds a fire department connection, is a Hydrostatic test then required?

NFPA 13R does not require underground piping under 4 inches to be hydrostatically tested however NFPA 13R does suggest that all fire department connections (and associated FDC piping) must be hydrostatically tested (even when connected to the underground).

The 2019 edition NFPA 13R states in section 5.3 that "Any type of pipe or tube acceptable under the plumbing code for underground supply pipe" is acceptable. The annex to this section further suggests that for underground pipe 4 inches and larger, the rules of NFPA 24 should be followed. It should be noted that the 2022 edition of NFPA 13R requires underground piping 4 inches and larger to follow NFPA 24.

However, regardless of the type of underground pipe utilized, the acceptance test requirements of Chapter 10 must be followed. Section 10.2.1 requires the underground to be flushed. Section 10.2.2 which is titled Hydrostatic Pressure Tests limits the requirement for hydrostatic testing to the aboveground pipe; however, the Annex to section 10.2.2 clarifies that when fire department connections are provided, "hydrostatic tests in accordance with NFPA 13 are required." This annex section (while not legally enforceable) does not differentiate between FDC connected to the riser or connected to the underground and suggests the even remote FDCs are considered aboveground and therefore must be tested.

It should also be noted that while NFPA 13R does allow the underground to meet plumbing code requirements, when FDC are connected to the underground, the underground piping must be rated to at least 175 psi (see Section 6.11.5.)

As for the reasoning for why NFPA 13R does not specifically require the underground to be hydrostatically tested, as piping per the plumbing code is permitted, this piping must be installed per the plumbing code requirements and the applicable quality control measure

specified by the code and the manufacturer's instructions of the piping are required to be used.

Question #12 – Concealed Spaces Less than 6-inches Deep

What is NFSA's opinion on NFPA 13-2019 section 9.2.1.5 when there are no joists? This section specifically states that sprinklers can be omitted from concealed spaces less than 6 inches where "wood joists or similar solid member construction" is present. Our understanding is that the standard's intent is that at less than 6-inches, a spray pattern cannot develop, and it is physically installed the piping. As such sprinklers can be omitted. But the code also recognizes that composite wood joists could result in greater fire growth. We have two scenarios we would like an opinion on:

1) Plywood – What if the walls were the supporting structure at say 8-feet on center. Thicker plywood was installed with no joists in between. A suspended ceiling was installed not more than 6-inches down from this smooth flat plywood. Can sprinklers be omitted from the space?

2) SIP (Structurally Insulated Panels) – Glulam every 8-feet on-center with a SIP panel spanning. A suspended ceiling was installed not more than 6-inches down from this smooth OSB surface. Can sprinklers be omitted from the space? Any concerns similar to composite wood joists?

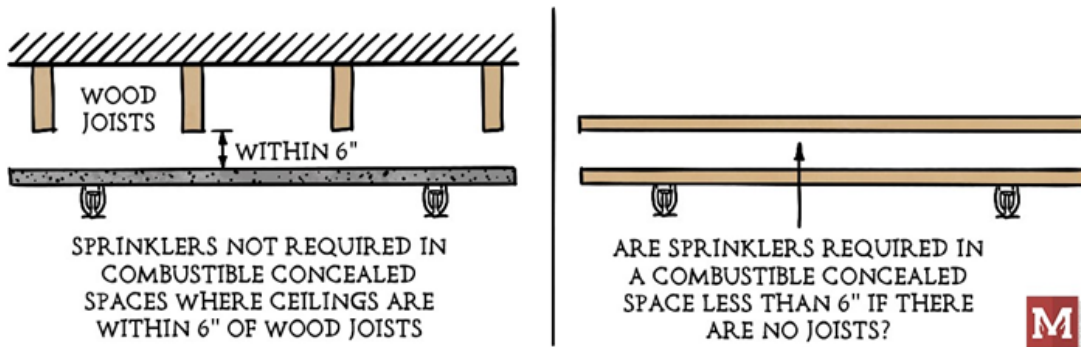
NFPA 13, 2019 edition, Section 9.2.1.5 would be applicable to all concealed combustible void spaces less than 6 inches in height.

Section 9.2.1.5 indicates concealed spaces formed by ceilings attached directly to or within 6 inches (150 mm) of wood joist or similar solid member construction shall not require sprinkler protection.

In your case (both question 1 and 2) the entire combustible void space is less than 6 inches in height and would not require sprinkler protection. If there were exposed joists, then the lower ceiling would be required to be within 6 inches of the bottom of the solid joists to omit sprinkler protection.

As noted, Section 9.2.1.6 goes on to address additional requirements for exposed composite wood joists in the combustible void space.

Be sure to also review Section 19.3.3.1.5 for design criteria for unsprinklered combustible concealed spaces.





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Oct. 14	Nov. 13	Nov. 14-16	Linthicum Heights, MD

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