

Defining Smooth Ceilings – How Smooth is Smooth?

What is a smooth ceiling in terms of NFPA 13 and why is it important? Let's take the second part first. The determination of whether a ceiling is smooth obviously creates the potential for what is defined in annex Section A.3.7.2(3) as smooth ceiling construction, which is one type of unobstructed construction, determining limitations on sprinkler positioning and spacing. In the NFPA 13 index, the term smooth ceiling is referenced to Sections 8.7.4.1.3 and 8.9.4.1.3, neither of which contain the word smooth. The intended references appear to be Sections 8.4.2 and 8.4.3, indicating the allowed uses of sidewall spray sprinklers and extended coverage sprinklers. Sidewall sprinklers can only be used in light hazard occupancies under "smooth, horizontal or sloped, flat ceilings" (8.4.2(1)) and when specially listed for ordinary hazard occupancies under "smooth flat ceilings" (8.4.2(2)). Extended coverage sprinklers are permitted under "flat, smooth ceilings" with limited slope (8.4.3(1)), and where otherwise specially listed.

Where does NFPA 13 address the degree of smoothness? The basic definition in Section 3.3.5.4 (2002 edition) states that a smooth ceiling is "a continuous ceiling free from significant irregularities, lumps or indentations." The standard does not define the size of an irregularity, lump or indentation that would disqualify a ceiling, meaning that it becomes a matter of tolerances. Zero plus or minus something, where something is the tolerance. In NFPA standards, all allowable tolerances are decided by the Authority Having Jurisdiction. It should be noted, however, that a ceiling does not have to be a "smooth ceiling" to qualify as "smooth ceiling construction". Section A.3.7.2 includes a number of ceilings with irregularities within its descriptions of types of smooth ceiling construction, such as pan-type reinforced concrete and ceilings with open-web-type steel beams, regardless of spacing.

This apparent contradiction is due to the difference between "smooth" and "unobstructed", which is much more forgiving. Unobstructed construction is defined in Section 3.7.2 as "construction where beams, trusses, or other members do not impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire." Annex Section A.3.7.2 includes bar joist, open-grid, standard mill and wood truss construction as examples of unobstructed construction.

The key historical distinction is whether or not the ceiling members would channel heat, preventing the development of a uniform ceiling jet that would normally be expected to spread across the ceiling and activate sprinklers. In the case of pendent and upright sprinklers the impeded heat flow could skew the operating pattern and delay the activation of critical sprinklers, and in the case of sidewall sprinklers could substantially compromise performance.

At what depth of members does channeling become a concern? Under the definition of wood truss construction still contained in A.3.7.2(5), it would appear that top and bottom wood chords could exceed 4 inches in depth and still be considered unobstructed construction. However, the newer annex Section A.8.14.1.6, relating to the use of special listed sprinkler sprinklers in combustible concealed spaces, recommends "surfaces should be considered to channel heat when the surface or supporting members are greater than 2 in. in depth." Is this another contradiction? Not considering the expected lower height of most concealed spaces. Since the thickness of the ceiling jet is proportional to the height of the ceiling above the fire, the thinner ceiling jet in concealed spaces would be more prone to channeling under members with less depth.

An interesting sidelight of the issue can be seen in a change recently adopted for the 2007 edition of NFPA 13. An additional sentence will be added to Section 8.5.4.1 describing sprinkler deflector distance below ceilings: "For corrugated metal deck roofs up to 3 in. (76 mm) in depth, the distance shall be measured to the sprinkler from the bottom of the deck. For deeper decks, the distance shall be measured to the highest point on the deck." Although this addresses the definition of the ceiling plane rather than the degree of smoothness, it is clear that the issues are related. The distance between corrugations tends to increase with depth of corrugations. If a deck theoretically had 12-inch corrugations supported by open-web steel beams, it would still qualify as smooth ceiling construction but would leave virtually no room for positioning of sprinklers.

New NFSA "Technical Tuesday" Online Seminar Series Announced

The NFSA has announced a new series of online technical seminars for the second half of 2006 that focus on ten areas commonly leading to installation problems with sprinkler systems. Some of these ten areas are traditional problems of understanding the installation rules, while some relate to problem areas surfacing with regard to new technologies. Over the course of the ten programs, each area will be explored with the view that problems can be prevented through the use of proper procedures. The programs will be:

July 11	CPVC Piping Compatibility and Use
Aug. 1	Where Codes Override Installation Standards
Aug. 22	Sprinkler Obstructions
Sept. 12	Concealed Spaces
Sept. 26	Commissioning of Systems
Oct. 10	Draft Stops and Closely-Spaced Sprinklers
Oct. 24	Confusing Aspects of Storage Protection
Nov. 7	Emerging Issues for Residential Sprinkler Systems
Nov. 21	Protective Coatings for Piping
Dec. 12	Other Problem Areas/Frequently Asked Questions

A discount of 30 percent is available when signing up now for all ten seminars in the series. Information and registration for this seminar is available at www.nfsa.org.

NFSA Launches “Business Thursday” Online Seminars

Building on the success of the “Technical Tuesday” online seminars that the NFSA has been conducting for many years, the NFSA is presenting a series of ten “Business Thursday” online seminars for the second half of 2006. Aimed at the contractor or project manager rather than the technician, these seminars will follow the same format, starting at 10:30 am Eastern time and continuing for 1 to 1-1/2 hours. The schedule of dates and topics is as follows:

July 6	Safety and Risk Management
July 20	Contract Language Pitfalls
August 10	Change Orders
August 24	Insurance Programs: OCIPs and CCIPs
September 14	Pre-Job Planning
September 28	Mold Remediation
October 19	Project Scheduling
November 2	Prompt Pay and Retainage
November 16	Water Charges: Impact and Standby Fees
December 7	AHJ Relationships

A discount of 30 percent is available when signing up now for all ten seminars in the series. Information and registration for this seminar is available at www.nfsa.org.

Upcoming NFSA Technical Tuesday Online Seminar

Topic: CPVC Piping Compatibility and Use

Instructor: Russell P. Fleming, P.E., NFSA Executive Vice President

Date: July 11, 2006

Although introduced as a special listed product, the CPVC piping system has become the industry standard for residential and similar applications. Some specific rules relating to CPVC pipe and fittings are now found within the NFPA standards. Special precautions must be taken with regard to hanging, testing, and other aspects of use. There are also newer concerns of compatibility with other products found in sprinkler systems that require attention to prevent system failures. The focus of this seminar will be on identifying and avoiding these compatibility problems.

Information and registration for this seminar is available at www.nfsa.org.

2006 Basic and Advanced Technician Training, NICET Inspection Seminars

The NFSA is the only organization that offers two-week basic technician training seminars, 3-day advanced technician training seminars, and NICET-oriented inspection and testing review seminars at various locations across the United States. The 2006 schedule has been set for the following dates and locations:

2-week Basic Technician Training

August 14-25, 2006 – Seattle, WA
October 16-27, 2006 – Philadelphia, PA

3-day Advanced Technician Training

October 3-5, 2006 – Minneapolis, MN

3-day NICET Inspection and Testing Certification Review

June 27-29, 2006 – Sugarland, TX
July 11-13, 2006 – Edwards, CO
September 6-8, 2006 – Dallas, TX
November 14-16, 2006 – Anchorage, AK

For more information, contact Nicole Sprague using Sprague@nfsa.org

NFSA In-Class Training Opportunities

NFSA also offers in-class training on a variety of subjects at locations across the country. Here are some upcoming seminars:

June 27	Oak Creek, WI	Introduction to Sprinkler Systems (1/2 day)
June 28	Menomonee Falls, WI	Inspection, Testing & Maintenance
June 29	Oak Creek, WI	Residential: Homes to High-Rise
June 28	Wilmington, DE	Pumps for Fire Protection
June 29	Wilmington, DE	Standpipe Systems (1/2 day)
June 29	Wilmington, DE	Seismic Protection (1/2 day)
June 30	Wilmington, DE	Inspection, Testing & Maintenance
July 11-12	Providence, RI	NFPA 13 Overview & Intro to Plan Review
July 13	Providence, RI	Hydraulics for Fire Protection
July 18-19	Prescott Valley, AZ	NFPA 13 Overview & Intro to Plan Review
July 20	Prescott Valley, AZ	Inspection, Testing & Maintenance
July 18	Albuquerque, NM	Hydraulics for Fire Protection
July 19	Albuquerque, NM	Pumps for Fire Protection
July 20	Albuquerque, NM	Sprinkler Protection for General Storage
July 25	Centerville, OH	Sprinkler Protection for General Storage
July 26	Centerville, OH	Sprinkler Protection for Rack Storage
July 27	Centerville, OH	Sprinkler Protection for Special Storage

For more information or to register, visit www.nfsa.org or call 845-878-4207.

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