



Tuesday e-Tech Alert

Number 143

March 31, 2009

Editor – Russell P. Fleming, P.E.

Ceiling Slopes and Heights for Storage Protection

In the 2007 edition of NFPA 13, some new limitations on ceiling slope and height were added to Chapter 12 addressing general requirements for protection of storage:

- **12.1.2 Ceiling Slope.** The sprinkler system criteria specified in Chapter 12 and Chapters 14 through 20 are intended to apply to buildings with ceiling slopes not exceeding 2 in 12 (16.7 percent) unless modified by a specific section in Chapter 12 and Chapters 14 through 20.
- **12.1.3.4* Ceiling Height.**
12.1.3.4.1 For ceiling heights that exceed 30 ft (9.14 m), where the distance between the ceiling height and top of storage exceeds 20 ft (6.1 m), protection shall be provided for the storage height that would result in a 20 ft (6.1 m) distance between the ceiling height and top of storage.

Here are examples of the two main types of questions that have come up in recent months relative to these sections:

Question A – Ceiling Height and Slope Rules for Storage up to 12 Feet in Height

We have a building about 8000 sq ft in area for which the primary use will be storage. Originally the building was to have an acoustical ceiling tile suspended ceiling, but it was removed to expose a sloped roof of 4 in 12, with the peak at about 38 ft. If the building occupancy is determined as Ordinary Hazard Group 2, then there would not be any issues. However, it is also our understanding that to keep this hazard classification any storage in the building would need to be classified as miscellaneous storage and would be limited to 4000 sq ft or 10% of the building area, whichever is greater, along with the other stipulations for miscellaneous storage. However, it is the view point of some in our office that the following section applies:

14.2.3.1 The protection criteria for storage up to and including 12 ft (3.7 m) shall be the same as for miscellaneous storage selected from Chapter 13. The protection criteria in Chapter 13 shall be acceptable for storage of Class I to IV commodities up to and including 12 ft (3.7 m) in height. See Table 13.2.1, Discharge Criteria for Miscellaneous Storage 12 ft (3.7 m) or less in Height for specific Class I to IV storage height protection criteria.

My contention is that this excerpt refers to the protection criteria, i.e. density and sprinkler spacing, but does not permit us to ignore the slope of the roof, or the height of the building. Do the ceiling slope and height limitations apply to storage that does not exceed 12 feet in height?

Answer: The answer needs to be split depending on whether you are protecting Class I-IV commodities or Group A plastics. If a building is constructed for storage purposes, it would be difficult to consider storage of Group A plastics as miscellaneous,

because miscellaneous storage is defined as storage that is “incidental to another occupancy use group” (see 3.9.1.14). Storage cannot be incidental to storage. For storage of Group A plastics, you need to follow the rules of Chapter 15 or Chapter 17 depending on whether or not the storage is on racks. But for Class I through Class IV commodities, the situation is different, because Chapter 13 is not limited to just miscellaneous storage, but is also the portion of the standard that applies to storage of Class I through IV less than 12 ft in height per Section 13.2.2 and the section you cited. Note that Figure 14.2.4.3 does not go below 12 ft in height for storage density adjustments because Chapter 14 is inappropriate to use for storage under 12 ft in height. Section 13.2.2 also states that all of the design criteria and modifiers of Chapter 11 apply to storage at this height. As stated in Section 12.1 and emphasized in 12.1.3.4.2, the ceiling slope and height rules of 12.1.2 and 12.1.3.4.1 do not apply to anything protected in accordance with Chapter 13. In particular, note that the wording of 12.1.3.4.2 gives the allowance for “storage arrangements protected in accordance with Chapter 13”, not just for miscellaneous storage. So, for Class I-IV commodities up to 12 ft in height, the ceiling height limitation does not apply, and the slope can be addressed through the 30 percent area increase of Section 11.2.3.2.4 as allowed by Section 13.2.2.

Question B – Excessive Clearance Above the Top of a Storage Rack

We have an existing facility that is installing single and double row storage racks of a Class IV commodity to an overall storage height of 33 ft. The roof deck is at 62 ft, meaning there is excessive clearance between the top of storage and the sprinklers.

How can we go about protecting the storage racks? Should we go with in-rack sprinklers and face sprinklers as required for 33 ft high storage racks plus put in a row of in-rack sprinklers at the very top tier? Could we put a barrier within the storage rack to cover the top tier of storage with in-racks sprinklers below?

Answer: There are basically three ways to meet the intent of Section 12.1.3.4.1 in this type of situation:

1. Have the owner install a drop ceiling (with sprinklers below) at the 53 ft level so that the clearance from the storage (33 ft) to the ceiling (53 ft) does not exceed the 20 ft allowance.
2. Have the owner extend the racks up to the 42 ft level and install in-rack sprinklers as if the storage was going up to that height, even if the owner never uses it.
3. Provide a barrier over the top of the racks with sprinklers underneath. This is presented in the annex section A.12.1.3.4 of the 2007 edition, which calls for one line of in-rack sprinklers below the barrier, or two lines under the barrier for Class IV and Group A.

As it develops the 2010 edition of the standard, the Committee on Discharge Criteria has deleted the A.12.1.3.4 annex guidance in favor of new wording within the standard itself, calling for one level of supplemental, quick-response in-rack sprinklers located directly below the top tier of storage and at every flue space intersection and deleting all references to barriers at the top of the rack. However, no change has been proposed to annex sections A.16.1.9 and A.17.1.9, which repeat the rack-top barrier guidance for rack storage of Class I-IV and Group A respectively.

Upcoming “Technical Tuesday” Online Seminar – April 7th

Topic: *Older Systems and Components*

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

Date: *April 7, 2009*

Older systems and components are often encountered when dealing with additions and renovations of existing buildings. In many cases the components, designs and installation techniques would not be allowed for a new installation under today’s rules. This seminar will review the official positions of codes, standards, and listings relative to what can be kept in use and what must or should be replaced. This seminar will also address the various fire sprinkler product recall and voluntary replacement programs that have taken place over the years, discuss their status, and review obligations when encountering those products still in service.

Upcoming “Business Thursday” Online Seminar – April 16th

Topic: Best Practices Update

Instructor: Brian Cullen

Date: April 16, 2009

Brian Cullen is a seasoned insurance industry professional who effectively uses his skills in leadership, development and coaching to help clients achieve their most favorable business results. His presentation will include an overview of best practices and what is being done to help the fire sprinkler industry achieve its goals.

Additional training opportunities available through the NFSA engineering department include...

Two-Week Layout Technician Training

September 14-25, 2009

Baltimore, MD

October 12-23, 2009

Phoenix, AZ

Inspection and Testing for the Sprinkler Industry

April 7-9, 2009

Champaign, IL

April 14-16, 2009

Long Island, NY

April 21-23, 2009

Nashville, TN

June 16-18, 2009

Leominster, MA

Advanced Technician Training

June 23-25, 2009

Denver, CO

For more information on the above classes, contact Nicole Sprague using Sprague@nfsa.org or by calling 845-878-4200 ext. 149.

In-Class Training Seminars

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

Hydraulics for Fire Protection	Willoughby, OH	April 1
Sprinkler Protection for General Storage	Willoughby, OH	April 2
NFPA 13 Overview & Intro to Plan Review	Pataskala, OH	April 7-8
Sprinkler Protection for Special Storage	Pataskala, OH	April 9
NFPA 13 Overview & Intro to Plan Review	Richmond, CA	April 21-22
Hydraulics for Fire Protection	Richmond, CA	April 23
Sprinkler Protection for Rack Storage	Orlando, FL	April 29
Sprinkler Protection for Flammable (1/2 Day)	Orlando, FL	April 30
Sprinklers for Dwellings	McFarland, WI	May 6
CPVC Piping Installation Requirements (1/2 Day)	McFarland, WI	May 7
Foam Water Sprinkler Systems (1/2 Day)	McFarland, WI	May 7
Inspection, Testing & Maintenance	McFarland, WI	May 8
CPVC Piping Installation Requirements (1/2 Day)	Lincoln, NE	May 12
Commissioning & Acceptance Testing (1/2 Day)	Lincoln, NE	May 12
Inspection, Testing & Maintenance	Lincoln, NE	May 13
NFPA 13 Update 2007	Lincoln, NE	May 14
Hydraulics for Fire Protection	Colorado Springs, CO	May 19

Inspection, Testing & Maintenance	Colorado Springs, CO	May 20
Sprinklers for Dwellings	Colorado Springs, CO	May 21
NFPA 13 Overview & Intro to Plan Review	Anaheim, CA	May 26-27
Plan Review Policies & Procedures	Anaheim, CA	May 28
NFPA 13 Overview & Intro to Plan Review	Branson, MO	June 2-3
Inspection, Testing & Maintenance	Branson, MO	June 4
Introduction to Sprinkler Systems (1/2 Day)	Hillsboro, OR	June 15
Sprinkler Protection for General Storage	Hillsboro, OR	June 16
Hydraulics for Fire Protection	Hillsboro, OR	June 17
Basic Seismic (1/2 Day)	Hillsboro, OR	June 18
Advanced Seismic (1/2 Day)	Hillsboro, OR	June 18
Residential Homes to High Rise	Albany, NY	June 23
Introduction to Sprinkler Systems (1/2 Day)	Albany, NY	June 24
Commissioning & Acceptance Testing (1/2 Day)	Albany, NY	June 24
Sprinkler Protection for Special Storage	Albany, NY	June 25
Hydraulics for Fire Protection	New Lenox, IL	July 7
NFPA 13 Overview & Intro to Plan Review	New Lenox, IL	July 8-9
Commissioning and Acceptance Testing (1/2 Day)	Apple Valley, CA	July 28
CPVC Piping Installation Requirements (1/2 Day)	Apple Valley, CA	July 28
Inspection, Testing & Maintenance	Apple Valley, CA	July 29
Sprinkler Protection for Rack Storage	Apple Valley, CA	July 30
NFPA 13 Overview & Intro to Plan Review	Brighton, MI	August 19-20
Sprinklers for Dwellings	Brighton, MI	August 21
NFPA 13 Overview & Intro to Plan Review	Anaheim, CA	Sept. 22
Hydraulics for Fire Protection	Anaheim, CA	Sept. 23
Underground Piping (1/2 Day)	Anaheim, CA	Sept 24
Basic Seismic (1/2 Day)	Anaheim, CA	Sept 24
Underground Piping (1/2 Day)	Woodland, CA	Oct 20
Commissioning & Acceptance Testing (1/2 Day)	Woodland, CA	Oct 20
Sprinkler Protection for Special Storage	Woodland, CA	Oct 21

These seminars qualify for continuing education as required by NICET.

To register or for more information, contact: Dawn Fitzmaurice at (845) 878-4207, E-Mail: seminars@nfsa.org

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About the National Fire Sprinkler Association

Established in 1905, the National Fire Sprinkler Association (NFSA) is the voice of the fire sprinkler industry. NFSA leads the drive to get life-saving and property protecting fire sprinklers into all buildings; provides support and resources for its members – fire sprinkler contractors, manufacturers and suppliers; and educates authorities having jurisdiction on fire protection issues. Headquartered in Patterson, N.Y., NFSA has regional operations offices throughout the country. www.nfsa.org.

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