NFPA Update
What’s New in the 2016 Edition
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Research that Led to Change
- Concealed Spaces and Cloud Ceilings
- Obstruction Criteria (Three-Times Rule)
- Exposed Expanded Plastics Stored on Racks
- Commodity Classifications

NFPA 13 – 2016
- Issued by the NFPA in Fall 2015
- About 1000 Public Inputs and First Revisions
- About 400 Public Comments and Second Revisions
- Focus on research that led to substantial change

What is a Concealed Space?
- Never has been a definition in NFPA 13
- Intent of the Committee
  - Surrounded on all sides by material
  - 2013 and previous editions allowed “small openings such as those used as return air for a plenum”
    - Generally use a 2 ft x 2 ft grill about every 100 sq ft
    - That’s about 4% of the area of the ceiling
Cloud Ceilings

• 2013 Edition and Prior
  – No definition
  – Intent of the committee is any ceiling that does not create a “concealed space”
  – Cloud Ceilings, Non-continuous Ceilings, “Islands in the Sky” are all the same thing

2013 and Previous Editions

Cloud Ceiling

- Drop Ceiling
- Openings > 4%
- Sprinkler above and below the drop ceiling

Concealed Space

- Continuous Drop Ceiling

Concealed Space

- Drop Ceiling
- Openings ≤ 4%
2013 and Previous Editions
Cloud Ceiling

Small portions of drop ceiling
Sprinkler above and below if portions of drop ceiling exceed 4 ft in both horizontal dimensions

Changes for 2016
Regarding Cloud Ceilings

3.3.5.1 Definition of Cloud Ceiling - Any ceiling system installed in the same plane with horizontal openings to the structure above on all sides. This does not include sloped ceilings as defined in 3.3.5.4.

Fire Protection Research Foundation

• Research Report “Sprinkler Protection for Cloud Ceilings”
• Two Phases to the Reports
• Available at: http://www.nfpa.org/research/fire-protection-research-foundation/projects-reports-and-proceedings/suppression/other-sprinkler-protection/sprinkler-protection-for-cloud-ceilings

8.15.1.2.1.2
Openings in Concealed Spaces

• A new section
• Allows concealed spaces of noncombustible and limited combustible construction
  – Openings that are 20% or less of the floor area
  – Opening is going to be more than 4 ft (1.2m) long, it cannot be more than 8 inches (20cm) wide
• Permits the space above a drop ceiling to be considered a concealed space
• Omit sprinklers without having to call the space a “cloud ceiling”.

8.15.24 Cloud Ceiling Rules

• New section
• Omitted from above cloud ceilings even if the space is not considered a “concealed” space
• Table provides information on the maximum sprinkler spacing permitted based on
  – Height of the drop ceiling
  – Gap between clouds

Cloud Ceiling
If sprinklers are omitted, these other rules apply

• All sprinklers shall be quick response standard spray or extended coverage pendent or upright sprinklers
• Where extended coverage sprinklers are used, the maximum distance between sprinklers shall not exceed 16 ft
• Maximum cloud ceiling height shall not exceed 20 ft
• Cloud ceilings shall be of smooth ceiling construction

Table 8.15.24.1 Maximum Sprinkler Protection Area Based on Ceiling Cloud Width and Opening Width

<table>
<thead>
<tr>
<th>Ceiling Cloud — Minimum Width Dimension (ft)</th>
<th>Maximum Area (ft²) — Opening Width ≤0.5 in./ft of Ceiling Height</th>
<th>Maximum Area (ft²) — Opening Width ≤0.75 in./ft of Ceiling Height</th>
<th>Maximum Area (ft²) — Opening Width ≤1 in./ft of Ceiling Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–2.5</td>
<td>175</td>
<td>70</td>
<td>NP</td>
</tr>
<tr>
<td>2.5–4</td>
<td>225</td>
<td>120</td>
<td>70</td>
</tr>
<tr>
<td>&gt;4</td>
<td>225</td>
<td>150</td>
<td>150</td>
</tr>
</tbody>
</table>

Example Using Table

18/20 = 0.9 inches of opening per ft of ceiling height
1.1.2.3.2.3.1 Area Reduction (QR Sprinklers) and Cloud Ceilings

- Reduction in the design area **is not** permitted when sprinklers are omitted from above a drop ceiling in accordance with section 8.15.24
- Reduction in design area **is** permitted for a concealed space with openings as described in section 8.15.1.2.1.2

### Three-Times Rule 8.6.5.2.1.3

- Sprinklers shall be positioned away from obstructions a minimum distance of three times the maximum dimension of the obstruction in accordance with Figure 8.6.5.2.1.3(a) and Figure 8.6.5.2.1.3(b).
  - (A) The maximum clear distance required shall be 24 in.
  - (B) The maximum clear distance shall not be applied to obstructions in the vertical orientation (e.g., columns).
Exposed Plastics Stored on Racks

- Question: Can I use the rules that apply to cartoned storage of plastics on racks for protection of exposed plastics on racks?
- Answer: No

- Evolution of rules from NFPA 231C to NFPA 13
  - 1995 and previous NFPA 231C
  - 1998 NFPA 231C
    - Copied into 1999 NFPA 13
    - Stayed the same up through 2010 NFPA 13
  - 2013 NFPA 13

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**Decision Tree in 1995 (and older) NFPA 231C**

- **Plastics**
  - Group A
  - Group B: Class IV
  - Group C: Class III
  - Cartoned
  - Expanded or nonexpanded

- **Exposed (Outside the scope of NFPA 231C)**

- **Stable**
  - Figure 8-2 (parts a-j)
  - 8-3.1 and 8-3.2

- **Free Flowing**
  - Class IV

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**Decision Tree in 1998 NFPA 231C**

- **Plastics**
  - Group A
  - Group B: Class IV
  - Group C: Class III

- **Cartoned, expanded or unexpanded, and exposed, unexpanded**

- **Exposed, expanded (Outside the scope of Chapter 8)**

- **Stable**
  - Figures 8-2(a) through (g) Section 8-3, and 8-3.1

- **Free Flowing**
  - Class IV
Exposed Expanded Group A on Racks

New Section 17.3.3.5*
- Single-, double-, and multiple-row racks
- Maximum storage height of 35 ft
- Maximum ceiling height of 40 ft
- Sprinklers shall be K-25 ESFR (intermediate temp)
- Design area of 12 sprinklers (4 on 3 branch lines)
- Minimum operating pressure of 60 psi
- Hose stream allowance of 250 gpm
- Water supply duration of 60 minutes
- Minimum aisle width of 8 ft

Exposed Expanded Group A on Racks

- Solid vertical barrier in rack from one of the following:
  - 3/8 in. plywood or particleboard
  - 22 gauge sheet metal
  - Equivalent
- Barrier extends from face of rack to face of rack (across longitudinal flue)
- Barrier spaced at a maximum 16.5 ft interval
- Barrier extends from a maximum of 4 in. above the floor to the maximum storage height.
- Plan area of storage between vertical barriers and aisles shall not exceed 124 ft²
- Commodity is permitted to extend a nominal 4 in. beyond the vertical barrier at the aisle
Exposed Expanded Group A Plastics

Max 40 ft ceiling

Max 35 ft storage

16.5 ft max

Exposed Expanded Plastics on Racks

• Show video of tests
• https://www.youtube.com/watch?v=6hpJUjNK3_w

Commodity Classifications

• Class III – Limits on the amount of plastic
  – Use the weight to evaluate the unexpanded plastic
  – Use the volume to evaluate the expanded plastic
  – The limit is still 5% in both cases.

Commodity Classifications

• Class IV – Limits on the amount of plastic
  – Will depend on whether the commodity is in cartons or is exposed
  – Will depend on whether the plastic is expanded, non-expanded, or a mixture of expanded and non-expanded material
  – If the material is a mixture of expanded and non-expanded products
    • Figures have been added to Chapter 5
    • Define whether the object can be considered as
      – Class IV
      – Unexpanded Group A
      – Expanded Group A
Cartoned Commodities

Exposed Commodities

Commodity Classifications

- Table A.5.6 Commodities Not Addressed
  - Carpet rolls
  - Lithium-ion batteries
  - Fireworks.
- Table A.5.6.1.1 Guide to Identifying Commodities
  - A new table
  - Help the user understand what the committee has in mind for each of the commodity classifications.
- Table A.5.6.3 Alphabetical Listing of Commodities

Research for 2019

- More exploration of the “three-times” rule
- More arrangements of cloud ceilings
- Sloped ceilings and storage
Thank You!