Welcome to the 2019 Annual Conference Educational Sessions

2018 IFC High-Piled Combustible Storage
Based on the International Fire Code® (IFC®)

GOAL
Improve your understanding of the life safety and fire protection requirements in high-piled combustible storage environments.

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OBJECTIVES

- Describe the scope and application of IFC Chapter 32.
- Explain the special code definitions applicable to Chapter 32.

- Explain commodity classification based on Section 3203 criteria and interpret Figures 3203.9.1(1) and (2).
- Interpret Table 3206.2 to apply the requirements for high-piled combustible storage to plan review and inspections.

Tips

Guide to a successful class:
- Slides contain some text and iconic images to help you learn.
- Text and commentary is in the handout.
- Follow along in the course handout.
- Ask Questions, ask questions, ASK QUESTIONS!!!!
Course Outline

- High-Piled Storage Practices
- General Requirements
- Commodity Classifications
- Storage Areas
- Housekeeping/Maintenance
- Fire Protection/Life Safety
- Array Limits

IFC® Definition: High-Piled Storage

“Storage of combustible materials in closely packed piles or combustible materials on pallets, in racks or on shelves where the top of storage is greater than 12 feet (3658 mm) in height”.

High-Piled Storage (cont’d)

“When required by the fire code official, high-piled combustible storage also includes certain high-hazard commodities, such as:

- rubber tires,
- Group A plastics,
- flammable liquids,
- idle pallets, and,
- similar commodities, where the top of storage is greater than 6 feet (1829 mm) in height”.

Photo courtesy: The Boeing Company

Photo courtesy: Integra Code Consultants
High-Piled Storage Practices

Why High-Piled?

- High-piled storage arrays:
  - allow the owner or tenant to maximize amount of goods stored in a smaller footprint,
  - enable rapid construction of large, low-cost warehouses near shifting population and transportation nodes, and,
  - increase efficiency in product handling within the storage configuration.

Fire Challenges

- Increased fuel loads per square foot
- Increased potential fire loss per square foot
- Rapid structural failure
  - First responder endangerment
- Losses can surpass the building construction value
Hidden “Watch-outs”

- “Undeclared” high-piled storage areas
- Storage areas within manufacturing plants
- Shipping and receiving areas of any business
- Speculation warehouses or general storage facilities renting space to individuals
- Consumer retail sales areas

Code Official Challenges

- Determining fire protection features adequacy
- Sprinkler types and designs have improved protection options
- Sprinkler designs can be more complicated
- Fire detection systems may not be suitable for the environment
- Commodity classes may change over time
- Retailers may have special designs for specific merchandising plans
- When in doubt, seek technical assistance

Learning Check

1. The IFC authorizes the code official to use outside resources for technical help.
   True or False

2. Which of the following is not a potential consequence of high-piled storage fires?
   a) Product or structural collapse.
   b) Greater dollar losses per square foot.
   c) First responder endangerment.
   d) Increased tax receipts.
Module #2

General Requirements

Chapter 32: Scope/Application

- Cross-references:
  - General storage – Chapter 3
  - Hazardous materials – Chapter 50
  - Combustible fibers – Chapter 37
  - Aerosols – Chapter 51
  - Flammable & combustible liquids – Chapter 57
  - Paper records storage – NFPA 13

Construction/Operating Permits

- §105.6.22 Operational permit for buildings containing more than 500 ft² of high-piled storage.
- §105.7 Fire protection system installation.
- §3201.3 Approved construction documents and storage plan – maintained on site.
**Documents/Layout Plans**

- Rack locations, dimensions and layout
- Design storage height
- Commodity types
- Sprinkler: commodity clearance
- Aisle dimensions
- Pile volume:
  - Solid pile
  - Palletized
- Commodity classes/locations
- Fire department access doors
- Sprinkler control valves

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**Safety and Evacuation Plan**

- §3201.4 Plan submitted with permit application
  - §403.11 High-piled Storage

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**Safety Plan  §403.11.5**

- Storage area exceeds
  - 500,000 ft² Class I-IV commodities
  - 300,000 ft² high hazard commodities
- Storage area in Group H occupancy
- Storage area in F or M occupancy
  - Occupant load > 500, or,
  - More than 100 above/below level of exit discharge
- Where fire code official requires
Learning Check

1. Which of the following are required to be submitted at the time of permit application?
   a. Rack locations, dimensions and layout
   b. Design storage height
   c. Commodity types
   d. Sprinkler: commodity clearance
   e. All of the above

Learning Check

2. What is the threshold in square feet for an IFC® high-piled storage operational permit?
   a. 250 sq. ft. for high-hazard commodities
   b. 500 sq. ft. for non-combustible products
   c. 500 sq. ft.
   d. 1000 sq. ft.

Learning Check

3. Construction and storage plan documents must remain on the premises of a high-piled storage facility. True or False

4. The fire code official is authorized to require a fire safety and egress plan in any high-piled storage facility. True or False
Module #3

Commodity Classification

Commodity Classification

Fire protection requirements' foundation

“Commodity”

- “A combination of products, packing materials and containers.”

<table>
<thead>
<tr>
<th>Product: item being stored</th>
<th>Coffee mugs, engine blocks, plywood panels, wristwatches, toilet paper . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing materials around the item</td>
<td>Cardboard boxes with dividers, steel containers, shrink wrap, boxes with foam “peanuts” . . .</td>
</tr>
<tr>
<td>Containers: pallets, bins or product storage method</td>
<td>Wood or plastic pallets, plastic, cardboard or paper bin boxes, crates, wooden spools . . .</td>
</tr>
</tbody>
</table>
Commodity Classification

- Class based on estimated or measured heat of combustion and heat release rate (HRR)
  - Influenced by:
    - Material characteristics
    - Material quantity
    - Surface area/density
    - Ventilation

Latent Heat and HRR

- Heat of Combustion (Btu/Lb.)
- Heat Release Rate
  - HRR expressed in:
    - Watts,
    - Kilowatts, or,
    - Megawatts.

Relative Hazard § 3203

<table>
<thead>
<tr>
<th>Commodity Class</th>
<th>Fire Hazard Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-hazard</td>
<td>Highest Fire Hazard</td>
</tr>
<tr>
<td>Class IV</td>
<td></td>
</tr>
<tr>
<td>Class III</td>
<td></td>
</tr>
<tr>
<td>Class II</td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>Lowest Fire Hazard</td>
</tr>
</tbody>
</table>
Commodity Modification

“Materials listed within each commodity classification are assumed to be unmodified for improved combustibility characteristics.”

“Use of flame-retarding modifiers or the physical form of the material could change the classification.”

“See Section 3203.7 for classification of Group A, B and C plastics.”

Geometry Influences

- Product geometry affects HRR

Dimensional lumber: Class III

Cut/assembled into uniform shapes: High Hazard

Section and Table 3203.8
Class I and II Commodities

- § 3203.2 and 3203.3
- Essentially non-combustible items
  - Difference between Class I and II is amount/nature of combustible packaging
- Limited amount of Group A plastics

Class III Commodities

- § 3203.4
- "Ordinary combustibles"
  - Wood
  - Paper
  - Natural fiber
  - Group C plastic
- Limited Group A plastic

Class IV Commodities

- § 3203.5
- Class I, II or III with some Group A plastic
- Group B plastic
- Group A free-flowing plastic
High-hazard Commodities

- § 3203.6
- Includes:
  - Flammable and combustible liquids
  - Group A plastics
    - Unexpanded and expanded
  - Rubber tires
  - Idle pallets

High-hazard Commodities

- Category unique to IFC for fire protection strategies and operational limitations
  - Neither FM Global nor NFPA utilize this commodity designation
  - NFPA 13 uses “commodity-specific” sprinkler designs
    - Roll paper
    - Plastic motor vehicle components
    - Rubber tires
    - Baled cotton
    - Records storage with catwalk access

Plastics (Product or Package)

- Plastics are ranked into Groups A, B and C based on:
  - Heat of combustion
    - Potential heat released upon full combustion (Btu/lb.)
    - Heat Release Rate

- Group A plastics represent the most severe hazard while Group C represent the least severe
Plastic Hazards

- Some plastics may exhibit faster burning rates compared to ordinary combustibles
  - Plastics can produce 1½ - 3 times as much heat per unit of weight as wood or paper
    - Group A or B
- Some plastics behave similarly to ordinary combustibles
  - Group B or C

Sample Heat Release Rates

<table>
<thead>
<tr>
<th>Material</th>
<th>Heat Release Rate (Btu/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PVC Conduit</td>
<td>200, 400, 600, 800, 1000, 1200, 1400, 1600</td>
</tr>
<tr>
<td>ABS Pipe</td>
<td>200, 400, 600, 800, 1000, 1200, 1400, 1600</td>
</tr>
</tbody>
</table>

Section and Table 3203.8
Plastic Geometry

- Geometry influences ease of ignition and heat release rate
- Plastics have three basic geometric forms:
  - Expanded (foam coffee cups)
  - Unexpanded (rigid, dense sheets or molds)
  - Free-flowing (pellets or prill)
- Expanded plastics represent the greatest fire hazard while free-flowing plastics represent least.

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Expanded Group A Plastic

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Unexpanded Group A Plastic
Free-flowing Group A Plastic

Limited Amount: Group A Plastics

Presence of Group A plastics alone does not result in high-hazard commodity classification

- Some amounts allowed in a package or carton or on a pallet without increasing the commodity classification.
- Figures 3203.9 (1) and (2) provide a qualified person guidance to assess Group A plastic content by volume or weight.
  - Compare both: assign commodity classification on higher value

Limited Group A (Example)

- Light fixture in cardboard box
  - Wt. 3.17 lbs
  - 32 per pallet
- Table 3203.8
  - “Housing materials and appliances”
  - “Light fixtures; non-plastic; cartoned”
  - Class II
**Mixed Commodities**

**Figure 3203.9(1) Mixed Commodities Group A by Volume**

Example:

\[ P_{VE} = \frac{V_{PE}}{V_L} \]

\[ P_{VE} = \frac{38,400 \text{ in}^3}{137,216 \text{ in}^3} \]

\[ P_{VE} = 27.98\% \]

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**Mixed Commodities**

**Figure 3203.9(2) Mixed Commodities Group A by Weight**

Example:

\[ P_{WU} = \frac{W_{PU}}{W_L} \]

\[ P_{WU} = \frac{15.75 \text{ lbs}}{158.4 \text{ lbs}} \]

\[ P_{WU} = 9.943\% \]

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**Limited Group A: Outcome (Example)**

- Product
  - Originally Class II
  - 27.98% Group A by volume
  - 9.43% Group A by weight
- What is the commodity classification?
Pallets §3203.10

- Influence fire behavior of "unit load"
  - Wood, metal or plastic
  - High density, low density plastic
  - Solid or open decks

Commodity Influence §3203.10

<table>
<thead>
<tr>
<th>Pallet Composition</th>
<th>Commodity Class</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unreinforced polypropylene or</td>
<td>I-IV</td>
<td>Increase one class</td>
</tr>
<tr>
<td>unreinforced high-density polyethylene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforced polypropylene or</td>
<td>I-III</td>
<td>Increase two classes</td>
</tr>
<tr>
<td>reinforced high-density polyethylene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reinforced polypropylene or</td>
<td>I-IV</td>
<td>Increase to High Hazard</td>
</tr>
<tr>
<td>reinforced high-density polyethylene</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>I-IV</td>
<td>Unless tests prove otherwise, increase two classes</td>
</tr>
</tbody>
</table>

Module # 4

Fire Protection/Life Safety
Fire Protection/Life Safety §3206
- Fire protection/life safety requirements
  - Area
  - Commodity class
- Protection extent
  - Multiple areas

Fire Protection Coverage § 3206.2.1
- Protection extent for Table 3206.2
  - "Lesser of" 15 feet or full-height wall

Fire Protection Coverage § 3206.3.1
- High-piled storage area size, sum:
  - Footprint of storage, racks, shelves or piles
  - Interior aisles
  - Perimeter aisles
    - 44 or 96 in.
Fire Protection Coverage § 3206.3.2
- Multiple high-piled areas
  - Aggregate area, or,
    - One-hour fire barriers, or,
    - 100 feet if sprinklered

Fire Protection Coverage § 3206.2.3.1
- Storage area size – Mixed commodity classes with High-hazard
  - Unless separated: All treated as high hazard
  - Aggregate area

<table>
<thead>
<tr>
<th>Commodity Class</th>
<th>Size of High Piled Storage Area (square feet)</th>
<th>Automatic Fire Extinguishing System</th>
<th>Automatic Fire Detection System</th>
<th>Smoke and Heat Removal</th>
<th>出土 Container</th>
<th>Maximum Pile Dimension *</th>
<th>Maximum Pile Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–500</td>
<td>NR†</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>501 – 2,500</td>
<td>NR†</td>
<td>NR†</td>
<td>NR†</td>
<td>NR†</td>
<td>NR†</td>
<td>NR†</td>
<td>100</td>
</tr>
<tr>
<td>12,001 – 20,000</td>
<td>Non-public Accessible</td>
<td>Yes</td>
<td>NR</td>
<td>NR†</td>
<td>NR†</td>
<td>NR†</td>
<td>100</td>
</tr>
<tr>
<td>12,001 – 20,000</td>
<td>Non-public Accessible Option 1</td>
<td>Yes</td>
<td>NR</td>
<td>NR†</td>
<td>NR†</td>
<td>NR†</td>
<td>100</td>
</tr>
<tr>
<td>12,001 – 25,000</td>
<td>Non-public Accessible Option 2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>12,001 – 30,000</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>&gt; 30,000</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>100</td>
</tr>
</tbody>
</table>
### Table 3206 (Extract)

<table>
<thead>
<tr>
<th>Commodity Class</th>
<th>Size of High Piled Storage Area (square feet)</th>
<th>All Storage Areas</th>
<th>Solid-Piled Storage, Shelf Storage and Palletized Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-IV</td>
<td>2,501 – 12,000 Not open to public Option 1</td>
<td>Yes NR NR NR NR NR</td>
<td>100 40</td>
</tr>
<tr>
<td></td>
<td>2,501 – 12,000 Not open to public Option 2</td>
<td>NR Yes Yes Yes Yes</td>
<td>100 30</td>
</tr>
</tbody>
</table>

### Table 3206.2 – Footnotes

“a. When automatic sprinklers are required for reasons other than those in Chapter 32, the portion of the sprinkler system protecting the high-piled storage area shall be designed and installed in accordance with Sections 3207 and 3208.”

For what other reasons might a sprinkler system be required?
Table 3206.2 – Footnotes

e. Section 503 shall apply for fire apparatus access.

Section 503 allows modifications to fire apparatus access roads when the building is protected by a sprinkler system.

What road modifications would you accept for high-piled storage and why?

Table 3206.2 – Footnotes

f. For high hazard commodity warehouses more than 300,000, and Class I-IV more than 500,000 sq. ft., the fire code official can require special fire protection provisions including, but not limited to:

- fire protection of exposed steel columns;
- increased sprinkler density;
- additional in-rack sprinklers, without associated reductions in ceiling sprinkler density; or,
- additional fire department hose connections.

What additional fire protection features might you require and why?

Automatic Sprinklers §3206.4

Sprinkler system design and installation must meet Section 903.3.1.1.1 [Normally exempt locations].
Fire Sprinkler Design

- NFPA 13, Standard for the Installation of Sprinkler Systems
  - Design and installation guidance
  - Solid-pile and shelf
  - Racks
  - Automated
  - Commodity identification and classification
  - Rack configurations, height and aisle spacing
- Owner/insurance underwriter may require greater protection

Fire Detection Systems §3206.5

- Required for non-sprinklered storage areas

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Area (ft²)</th>
<th>Open to Public</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I-IV</td>
<td>501-2,500</td>
<td>--</td>
</tr>
<tr>
<td>Class I-IV</td>
<td>2,501-12,000</td>
<td>No</td>
</tr>
<tr>
<td>High Hazard</td>
<td>501-2,500</td>
<td>No</td>
</tr>
</tbody>
</table>

Fire Detection Systems

- Although smoke detectors are preferred by IFC® §907.2.15, heat detection may be more appropriate.
- Heat detectors are limited to smooth, beam or sloped ceilings in a building ≤30’ in height
  - Ceilings >30’ in height require a performance design for spot-type heat detectors, or,
  - Linear cable or pneumatic rate-of-rise heat detection system.
Building Access §3206.6 and .7

- Access elements:
  - Fire apparatus access roads
  - Fire department access doors
- §503 requires fire apparatus access roads to all buildings
- Table 3206.2 sets fire department access doors for manual suppression requirements

Access Door Exception §3206.7.1

- If wall does not face fire apparatus access road, and,
  - Opposite wall has access doors
  - Entire interior <150 ft from access door
  - Sprinklered building

Building Access §3206.7.3 – 7.8

- Doors accessible without a ladder.
- One access door in each 125 lineal feet or fraction.
- Access doors at least 3’ wide by 6’ 8” high.
  - Roll-up doors not to be used unless approved.
- Only approved locking devices.
  - Key boxes may be required.
Building Access: Table 3206.2

- Fire department access door threshold:

<table>
<thead>
<tr>
<th>Commodity Classification</th>
<th>Unsprinklered</th>
<th>Sprinklered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I – IV</td>
<td>2,501 ft²</td>
<td>12,001 ft²</td>
</tr>
<tr>
<td>High-hazard</td>
<td>501 ft²</td>
<td>2,501 ft²</td>
</tr>
</tbody>
</table>

Smoke/Heat Removal §3206.8

- Provides aid in salvage and overhaul operations by providing post-extinguishment ventilation

- Significant IFC® 2015 changes:
  - Draft curtains eliminated
  - Smoke and heat vents only in non-sprinklered storage areas
  - Smoke and heat vents or mechanical ventilation in sprinklered areas

Smoke/Heat Removal §910.2.2

- When required by Table 3206, with exceptions
  1. Sprinklered frozen food warehouses used solely for storage of Class I and II commodities.
  2. Buildings protected by ESFR or fast response Control Mode Specific Application (CMSA) sprinklers.
Smoke and Heat Vents §910.3

- Vents must be listed and labeled to demonstrate compliance with:
  - UL 793, Automatically Operated Roof Vents for Smoke and Heat, or,
  - FM 4430, Approval Standard for Heat and Smoke Vents.

Vent Spacing §910.3.3

- At least 10 feet from fire barrier
- At least 20 feet from lot line or fire wall

Mechanical Smoke Removal §910.4

- If used as alternate to smoke/heat vents, must:
  - Sprinklered building
  - Design for two air changes per hour based on volume.
  - Maximum 30,000 CFM per exhaust fan
  - Automatic or manual make-up air
    - Openings within six feet of floor
    - Min. gross area 8 ft²/1000 ft³ of exhaust
Aisles §3206.10

- Limit fire spread
- Provide egress routes
- Provide firefighter access

- Width is dependent on:
  - Sprinkler system design
  - Commodity classification
  - Storage method
  - Open to public

Aisle Widths §3206.10.1.2

<table>
<thead>
<tr>
<th>Sprinkler Protection</th>
<th>Hazard Class</th>
<th>Storage Area</th>
<th>Open to Public</th>
<th>Aisle Width (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>44</td>
</tr>
<tr>
<td>Yes</td>
<td>High</td>
<td>2,500 sq. ft. or more</td>
<td>Yes</td>
<td>96</td>
</tr>
<tr>
<td>Yes</td>
<td>Any</td>
<td>Mechanical stocking</td>
<td>Yes</td>
<td>96</td>
</tr>
<tr>
<td>Yes*</td>
<td>High</td>
<td>Mechanical stocking</td>
<td>Yes</td>
<td>44</td>
</tr>
<tr>
<td>Yes*</td>
<td>High</td>
<td>Mechanical stocking</td>
<td>No</td>
<td>24</td>
</tr>
<tr>
<td>No</td>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>96</td>
</tr>
</tbody>
</table>

* If protected for multiple-row (> 2 adjacent) racks per § 903.3.1.1.

Solid-Piled and Shelf §3207

- Shelf, piles and bin boxes > 5 feet
  - Shelves 12-15 feet: NFPA 13
  - Shelves > 15: approved protection

- Pile dimensions per Table 3206.2
Pile Dimensions Table 3206.2

- Given:
  - Class I-IV commodity
  - Storage area: 2,501 to 12,000 sq. ft.
  - Not open to the public

<table>
<thead>
<tr>
<th>Option</th>
<th>Sprinklers</th>
<th>Max. Dimension (feet)</th>
<th>Max. Height (ft.)</th>
<th>Max. Volume (cu.ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yes</td>
<td>120</td>
<td>40</td>
<td>400,000</td>
</tr>
<tr>
<td>2</td>
<td>No</td>
<td>120</td>
<td>30</td>
<td>200,000</td>
</tr>
</tbody>
</table>

Racks §3208

- Racks and bin boxes > 5 feet
  - Plastic shelves/decks
    - Special fire protection
  - Solid shelves/decks
    - 20 sq. ft. or more
    - Open mesh, slatted or grated
      - 50 % open

Flue Spaces

- Longitudinal
- Transverse
Flue Spaces: Table 3208.3

- Flue spaces provided and maintained.
  - Table may conflict with the requirements of NFPA 13, which is adopted by reference
  - As “code” Table 3208.3 takes preference over NFPA “standard”

Table 3208.3 (Extract)

<table>
<thead>
<tr>
<th>Rack Configuration</th>
<th>Flue Design</th>
<th>Sprinklers at the Ceiling With Minimum In-Rack Sprinklers</th>
<th>In-Rack Sprinklers of Every Tier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-row Rack (Option 1)</td>
<td>Transverse Flue space</td>
<td>Size ≤ 25 feet: 6 inches, &gt; 25 feet: 3 inches</td>
<td>Not Required: Any Height</td>
</tr>
<tr>
<td></td>
<td>Vertically aligned</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Double-row Rack (Option 2)</td>
<td>Longitudinal Flue space</td>
<td>Not Required: 6 inches</td>
<td>Not Required: Not Required</td>
</tr>
<tr>
<td></td>
<td>Vertically aligned</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extra-high-Rack Storage §3208.5

- Buildings with extra-high-rack combustible storage to be protected with a specially engineered automatic sprinkler system.

<table>
<thead>
<tr>
<th>Commodity Class</th>
<th>Height (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I, II, III, IV</td>
<td>&gt; 40</td>
</tr>
<tr>
<td>High-hazard</td>
<td>&gt; 30</td>
</tr>
</tbody>
</table>
Automated Storage §3209

- Carousel storage > 500 ft²
- Option 1: Smoke detection system 15 ft beyond perimeter of unenclosed carousel
- Option 2: Smoke detection in enclosed area
  - Provide local alarm
  - Stop carousel
- Option 3: Single "dead-man" switch

Final Learning Check

1. If used for smoke removal, the maximum capacity of a single mechanical fan is:
   a) Based on the volume of the protected space
   b) 15,000 cfm
   c) 20,000 cfm
   d) 30,000 cfm

2. What is the minimum distance between a manual/automatic rooftop smoke/heat vent and a fire barrier?
   a) 10 feet
   b) 20 feet
   c) 30 feet
   d) 40 feet
Final Learning Check

3. Class I-IV storage more than 30 feet high is classified as extra-high rack storage. True or False

4. In existing buildings, fire access doors may be spaced _____ feet apart.
   a) 125
   b) 150
   c) 175
   d) 200

Final Learning Check

5. In non-sprinklered Class I-IV storage areas open to the public, what is the area threshold where fire detection is required?
   a. 501 sq. ft.
   b. 2501 sq. ft.
   c. 12,000 sq. ft.
   d. 500,000 sq. ft.

Summary

- Describe the scope and application of Chapter 32 of the IFC.
- Explain the special code definitions applicable to Chapter 32.
- Explain the commodity classification system based on the criteria in Section 3203 of the IFC and interpret Figures 3203.9.1(1) and (2).
- Interpret Table 3206.2 to apply the requirements for high-piled combustible storage to plan review and inspections.
Final Reflection

Reflect on the day. What will you take back to the job and apply?

- **What?** What happened and what was observed in the training?
- **So what?** What did you learn? What difference did this training make?
- **Now what?** How will you do things differently back on the job as a result of this training?

Resources


Thank you for participating

To schedule a seminar, contact:

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