Warehouse Fire Sprinkler Codes and Impact on Storage Racks

Presented by:
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Today’s Topics

- Warehouse fire statistics
- Recent significant warehouse fires
- Sprinkler system design basics
- Impact on racking layout
- Current code enforcement trends
Warehouse fire statistics

Figure 1. Reported Structure Fires in U.S. Warehouses, 1980-2013
Warehouse fire statistics

Figure 2. Inflation-Adjusted Direct Property Damage, 1980-2013 in Warehouse Structure Fires
Warehouse fire statistics

Figure 3. Structure Fires in Warehouses by Leading Cause, 2009-2013 Annual Averages (top 5 listed)
Recent significant warehouse fires

Record storage – NJ
Recent significant warehouse fires

Plastics ASRS - SC
Recent significant warehouse fires

Refrigerated processed meat – NJ
Recent significant warehouse fires

Retail store with storage in rear - SC
Recent significant warehouse fires

Gap clothing - NY
Recent significant warehouse fires

Furniture storage - IL
Solutions: Sprinklers – effective

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Percent of structure fires in warehouses reporting some type of sprinkler present</td>
<td>32%</td>
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<tr>
<td>Percent of fires with wet pipe sprinklers in which sprinklers operated</td>
<td>86%</td>
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<tr>
<td>Percent of fires with wet pipe sprinklers present in which sprinklers operated effectively</td>
<td>84%</td>
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<tr>
<td>Reduction in civilian deaths per thousand fires when wet pipe sprinklers were present</td>
<td>61%</td>
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* Excludes properties under construction and fires where sprinklers were not present in the fire area.

Source: NFIRS 5.0 and NFPA survey.
Pertinent design & building codes

- National Fire Protection Assn. (NFPA) 13
- International Fire Code
- Edition varies by jurisdiction
- Authority Having Jurisdiction (AHJ) role
- FM Global Data Sheets
Design process: 3 Basic Questions

- What is stored?
- How is it stored?
- How high is it stored?
What is stored?

- Class I: “..non-combustible on pallets, ..single-layered carton..”
What is stored?

- Class II: “…non-combustible in wooden crates, multiple-layered carton..”
What is stored?

- Class III: “…product fashioned from wood, paper, natural fibers ..or Group C plastics
What is stored?

- Class IV: “Group B plastics or partial (5-25%) Group A plastics.”
  - Cellulosics
  - Chlorophrene rubber
  - Fluroplastics
  - Natural rubber
  - Nylon
  - Silicone rubber
What is stored?

• Group A Plastics
What is stored?

- Mixed commodities
How is it stored?

- Solid Shelving
How is it stored? Pallets matter

- Commodity classes assume wooden pallets
- Plastic pallets with FM or UL approval considered wood
- *Unreinforced* plastic pallets get automatic 1 class increase
- *Reinforced* plastic pallets get 2 class increase
- Unlabeled automatically assumes *Reinforced* (+ 2 classes)
How *high* is it stored?

- < 12 feet
- < = 25 feet
- > 25 feet
Special cases

- Tires
Special cases

• Paper file storage
Special cases

• Movable office shelving
Special cases

• High volume, low velocity fans
Impact of sprinklers on rack design

- Flue spaces
  - Transverse
  - Longitudinal
- IFC 2012 code change – AHJ can demand “devices
Impact of sprinklers on rack design

- Flue devices
Impact of sprinklers on rack design

• “Open” shelves
Impact of sprinklers on rack design

• Solid shelving
Impact of sprinklers on rack design

- Clearances for water spray
Impact of sprinklers on rack design

• Location to prevent head damage from lift equipment
Impact of sprinklers on rack design

• Solid baffles (horizontal & vertical)
  – Aerosols
  – Auto fluids
  – Plastics
  – Furniture
  – Liquors
Current code enforcement trends
Issues being heard

- Why all the recent concern about warehouse fire protection?
- I need longer row spacers
- I need longer beams
- I need a device to keep product out of “flue” spaces
- I need something called a “baffle” or “barrier”
- Do all these requirements really make a difference?
- Why is my rack permit being held up by the fire marshal?
- I need a “High Pile Permit”?
Reason # 1: Changes in commodities being stored
Reason # 1: Changes in commodities being stored

A Millennial Christmas
Reason # 1: Changes in commodities being stored
Reason # 2: *Fire fighting philosophy*

- [Link to Video](https://video.search.yahoo.com/search/video;_ylt=A0L EVwk7HgFY18UAWrVXNyoA;_ylu=X3oDMTB0N2Noc21lBGNvbG8DYmYxBHBvcwMxBHZ0aWQDBHNIYwNwaXZz?p=gap+warehouse+fire+fishkill+ny&fr=yfp-t-s&fr2=piv-web#id=3&vid=cc34dfcb06abce49768fa7e3451c9a76&action=view)
Reason # 3: Larger financial loses
Reason # 4: Changes in protection schemes / equipment

Rack geometry, in conjunction with the customer’s product size & placement, is an integral part of the overall fire suppression scheme.
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