Pick modules and automatic sprinklers
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Risk Engineering
Agenda

- Review selected pick module configurations
- Discuss limited pick module loss experience
- Share actions in response to losses
PICK MODULES
What is a pick module
Exterior view – Five level configuration

Example of a 5-level pick module (Photo source: Zurich)
What is a pick module
Interior view – an example

Photo source: The Zurich Services Corporation
How are pick modules protected
Zurich experience

• Scenario 1
  – Protect the storage ignoring the walkways
  – Then, add sprinklers below the walkways
  – Develop a hydraulic design concept

• Scenario 2
  – Provide a mezzanine at each walkway level
  – Protect each level as a floor
Five selected cases

PICK MODULE CASE VARIATIONS
Pick module cases
Case 1 - Solid mezzanine

- Each level forms a mezzanine
- Racks shelves at the walkways
  - Tight to walkways
  - Tight to cross walkways
Pick module cases
Case 1 - Solid mezzanines

Photo source: Rich Gallagher, The Zurich Services Corporation
Pick module cases
Case 2 - Mezzanines with small gaps

- Each level forms a mezzanine
- However
  - There are small gaps
  - ~12 mm (½ in.) wide
  - Along the walkways

Image source: Rich Gallagher, The Zurich Services Corporation
Pick module cases
Case 2 - Mezzanines with small gaps

Photo source: Rich Gallagher, The Zurich Services Corporation
Pick module cases
Case 3 – Mezzanine opening at rack uprights

- Each level forms a mezzanine
- But, gaps are getting larger
  - 80 mm (3 in.) wide
  - Extending between rack uprights

Image source: Rich Gallagher, The Zurich Services Corporation
Pick module cases
Case 3 – Mezzanine opening at rack uprights

Openings between rack uprights (legs)
Pick module cases
Case 4 - Open storage arrays with solid walkways

- Racks are open
- Walkways are solid

Image source: Rich Gallagher, The Zurich Services Corporation
Pick module cases
Case 4 - Open storage arrays with solid walkways

Photo source: The Zurich Services Corporation
Pick module cases
Case 5 - Open storage arrays and open grate walkways

- Racks are open
- Walkways are open grate
Pick module cases
Case 5 - Open storage arrays and open grate walkways

Photo source: Rich Gallagher, The Zurich Services Corporation
ZURICH LOSS EXPERIENCE
Zurich loss experience

Summary

Case 1
Solid mezzanine
1 loss
Fire 1 level
$0.2M USD

Case 2

Case 3

Case 4

Case 5

Image source: Rich Gallagher, The Zurich Services Corporation
Zurich loss experience

Summary

Case 1
- Solid mezzanine
- 1 loss
- Fire 1 level
- $0.2M USD

Case 2
- Small gaps along walkway
- 3 losses
- Fire 2 levels

Case 3
- No loss estimates

Case 4

Case 5

Image source: Rich Gallagher, The Zurich Services Corporation
Zurich loss experience

Summary

Case 1  Case 2  Case 3  Case 4  Case 5

Solid mezzanine  Small gaps along walkway  Gaps between uprights

1 loss  3 losses  1 loss

Fire 1 level  Fire 2 levels  Fire 4 level

$0.2M USD  No loss estimates  $25M USD

Image source: Rich Gallagher, The Zurich Services Corporation
Zurich loss experience

Summary

Case 1            Case 2            Case 3            Case 4            Case 5
Solid mezzanine   Small gaps along walkway   Gaps between uprights   Open racks, solid walkways   Open racks, open walkways
3 losses
1 loss
Fire 2 levels
Fire 1 level
No loss estimates
No losses yet
Aware of multiple sites with total values > $100M

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Image source: Rich Gallagher, The Zurich Services Corporation
Zurich loss experience

Summary

Case 1
- Solid mezzanine
- 1 loss
- Fire 1 level
- $0.2M USD

Case 2
- Small gaps along walkway
- 3 losses
- Fire 2 levels

Case 3
- Gaps between uprights
- 1 loss
- Fire 4 level
- $25M USD

Case 4 or 5
- Unknown.

Image source: Rich Gallagher, The Zurich Services Corporation
Option 1

- Arrangement proven by full-scale fire test
  E.g. *Cartoned Records with Catwalk Access* (see NFPA 13-2016 Section 20.5)

Option 2

- Solid mezzanines
- Sprinklers below each mezzanine per sprinkler standards

Image source: Rich Gallagher, The Zurich Services Corporation
Problem statement
- Presence of solid or open metal grate walkways in storage arrays

Research objectives - Phase 1
- Identify knowledge gaps
- Develop a research plan considering factors such as
  - Aisles
    - Width
  - Walkways
    - Solid vs. open
    - Impact upon ceiling sprinkler water delivery
    - Sprinklers below - type, spacing, distance below walkway
20.5.7.3
- Aisles.

20.5.7.3.1*
- “Aisles required by Chapters 21 through 24 shall not be obstructed unless Chapters 21 through 24 include specific guidance allowing aisle obstructions.”

A.20.5.7.3.1
- “Full scale storage fire tests are typically performed with no obstructions in aisles. Obstructions such as catwalks, whether solid or open grate, are not typically evaluated in the full scale fire tests forming the basis of this standard.”
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