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Warehouse Fires & Pre-Fire Planning

Ian Childs

F.IPEA; Comp.IEAust; PM.FPAA; M.SFS; M.SBSE; M.AIES; NAM; ESM; CFSP F043175A.

ENGINEERS AUSTRALIA
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Data in this presentation sourced & adapted (metric) from FM Global Documentation

What Would You Expect?

- Building: circa 1960; ~ 70,000 m^2.
- Original occupancy: machine shop
- Current occupancy: 6m height rack storage-plastic parts
- Sprinklers: original ceiling-only system
- Water supply: manual-start pumps

Fire starts at approximately 0700 hours…

Warehouse Fires & Pre-Fire Planning

"As warehouse configurations increase in height, include more complex rack storage configurations and continue to expand the volume of plastic packaging and commodities, the challenge to provide adequate fire protection is one that must always evolve."

Warehouse Fires & Pre-Fire Planning

“Hey, it’s only property –

that’s what insurance is for!”

Warehouse Fires & Pre-Fire Planning

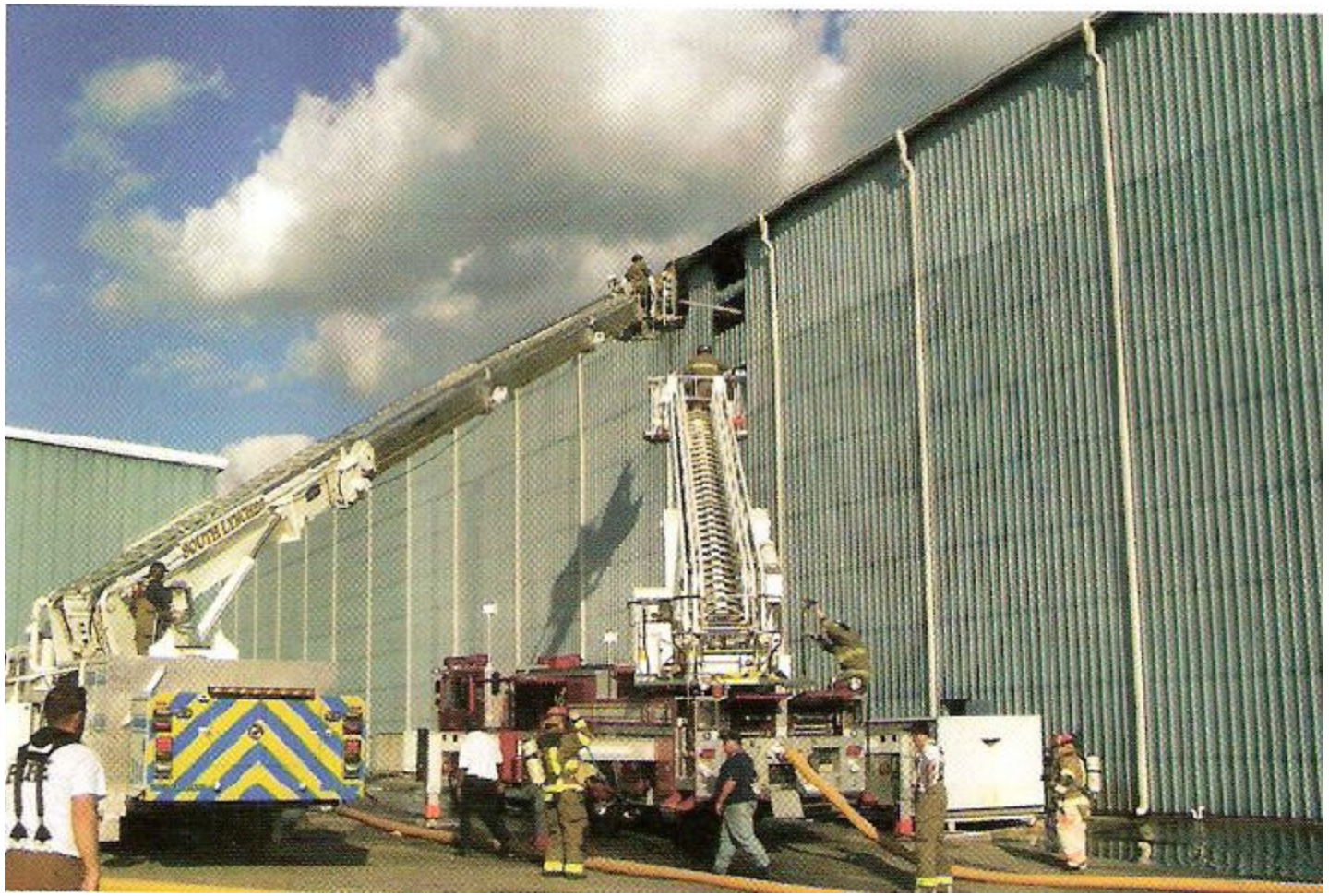
- Occupant Life Safety
- Firefighter Safety
- Loss to Property
- Insurance voided where introduced hazard has not been appropriately addressed to mitigate loss.

Warehouse Fires & Pre-Fire Planning

“What could be the most challenging warehouse fire?”

Warehouse Fires & Pre-Fire Planning

- “The Controlled Fire”
  - Sprinklers working effectively
  - Reduced visibility
  - Difficult to ventilate
  - Warehouse layout & difficult interior operations
  - Exact location of the seat of the fire
  - Coordinating sprinkler operation with manual suppression



Warehouse Fires & Pre-Fire Planning

- Agenda
  - Warehouse Fire Protection
  - New In-Rack Sprinkler Protection Option
  - AS 2118.1and FM Global Data Sheet 10-1
  - AS 2419.1

Outline

- Evolution of in-rack sprinklers (IRAS)
- Current guidance for IRAS
- FM Global's Recent IRAS Testing
- New guidance for IRAS

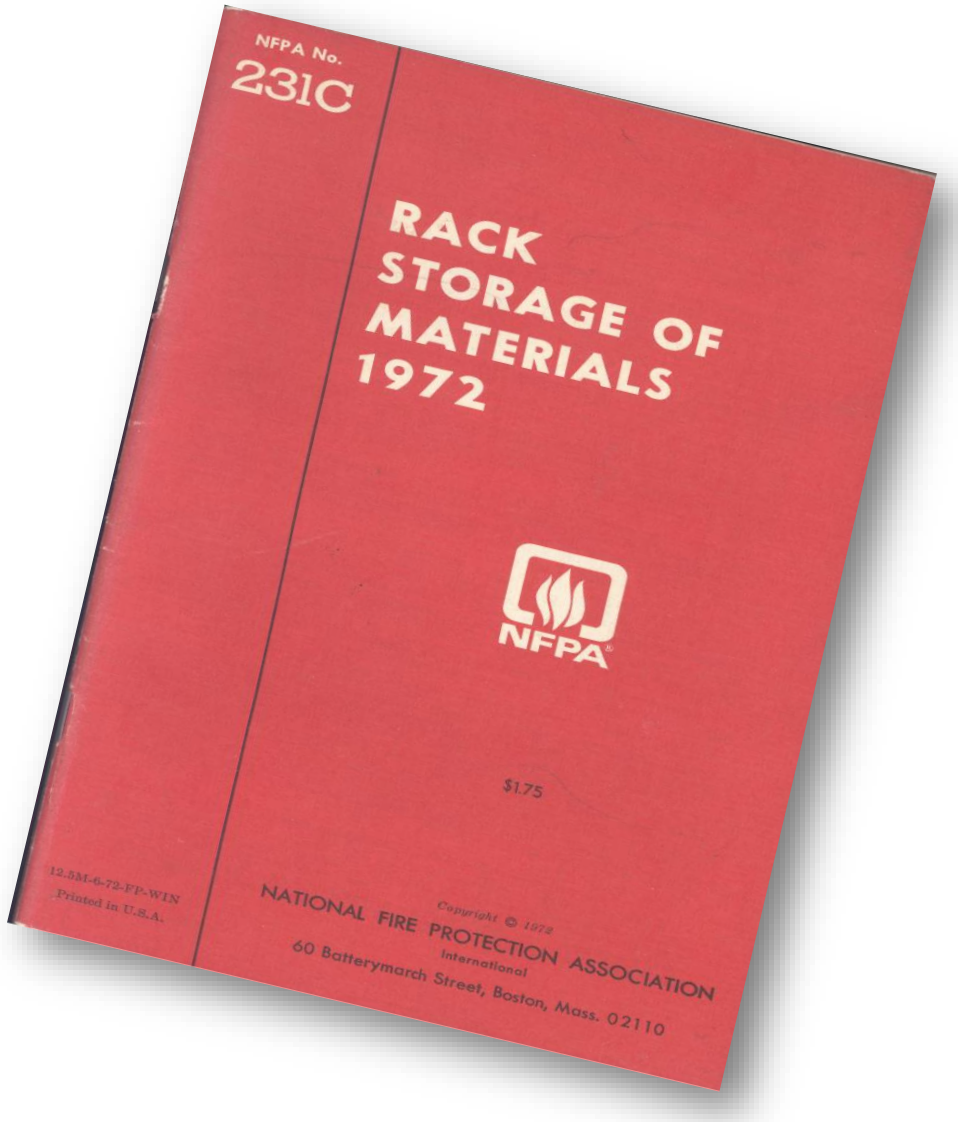
Evolution:
In-Rack Automatic Sprinklers (IRAS)

Background

Fire Protection Consortium for NFPA 231C

Testing with in-rack sprinklers started on October 1, 1969 and ran through January 13, 1976.

Over that time a total of 49 tests with in-rack sprinklers were conducted



Background

Since 1968, close to 60 different projects involving roughly 160 full-scale fire tests have been conducted involving in-rack sprinkler protection

Projects have included testing of:

- Aerosols
- Carpet
- Distilled Spirits
- Flammable Liquids
- Hanging Garments
- Lithium Batteries
- Nonwovens
- Tires
- Class 2, 3 and 4
- Cartoned Plastics
- Uncartoned Plastics

Today's Guidance

Current Guidance

Ceiling-only protection is available up to:

15m. ceilings

- Class 1-3
- Cartoned Unexpanded Plastics

12m. ceilings

- Cartoned Expanded Plastics
- Uncartoned Plastics

Trend towards higher storage heights

Current Guidance

Maximum vertical increments for IRAS

- 6m. → Class 3
- 6m. → Cartoned Unexpanded Plastics
- 5m. → Cartoned Expanded Plastics
- 3m. → Uncartoned Plastics

Maximum storage above IRAS

- Maximum 3m. above top level IRAS

Current Guidance

Hypothetical Warehouse

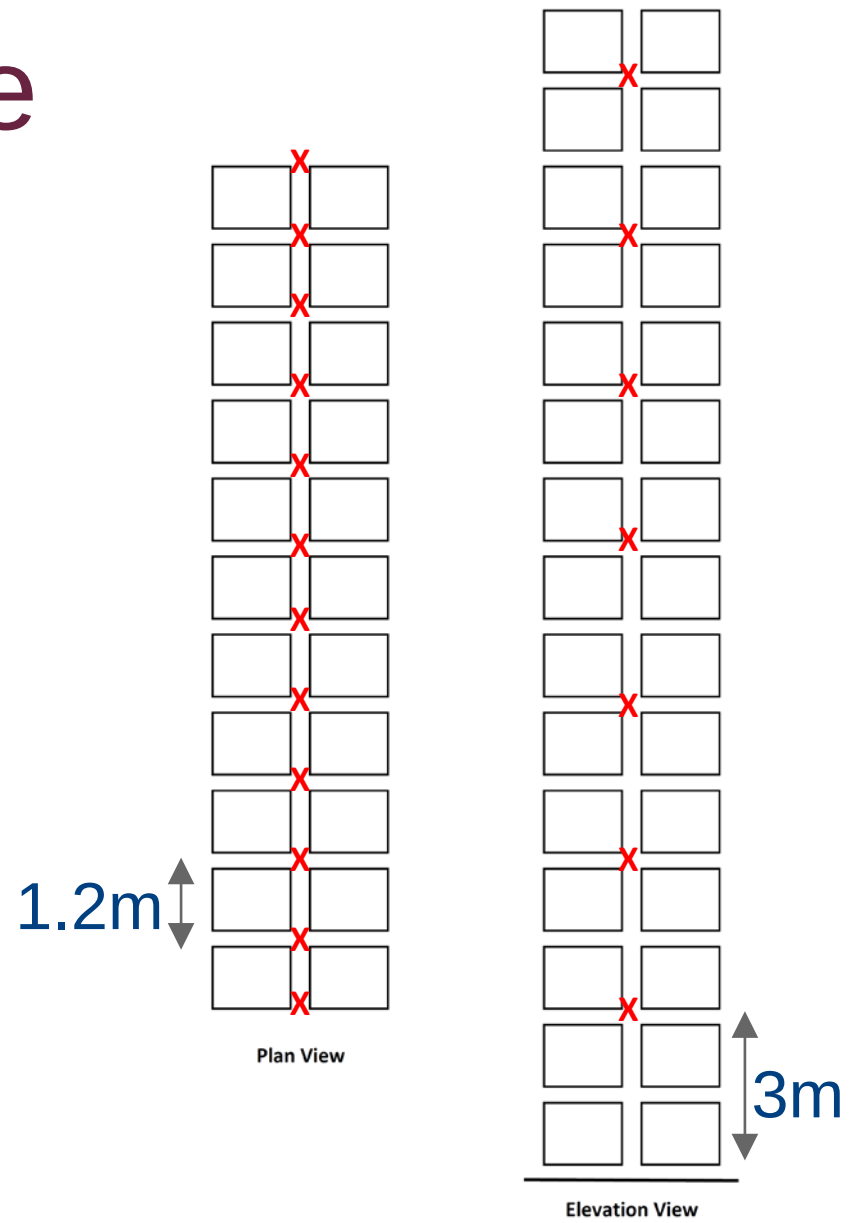
- Storage Height: 20m.
- Ceiling Height: 25m.
- Open-frame Double Row Rack
- Commodity: Cartoned Unexpanded Plastics

Current Guidance

Hypothetical Warehouse

Option 1 IRAS Design:

- Longitudinal only
- K5.6, 74°,C QR
- 110 L/m
- 7 levels of IRAS every 3m.

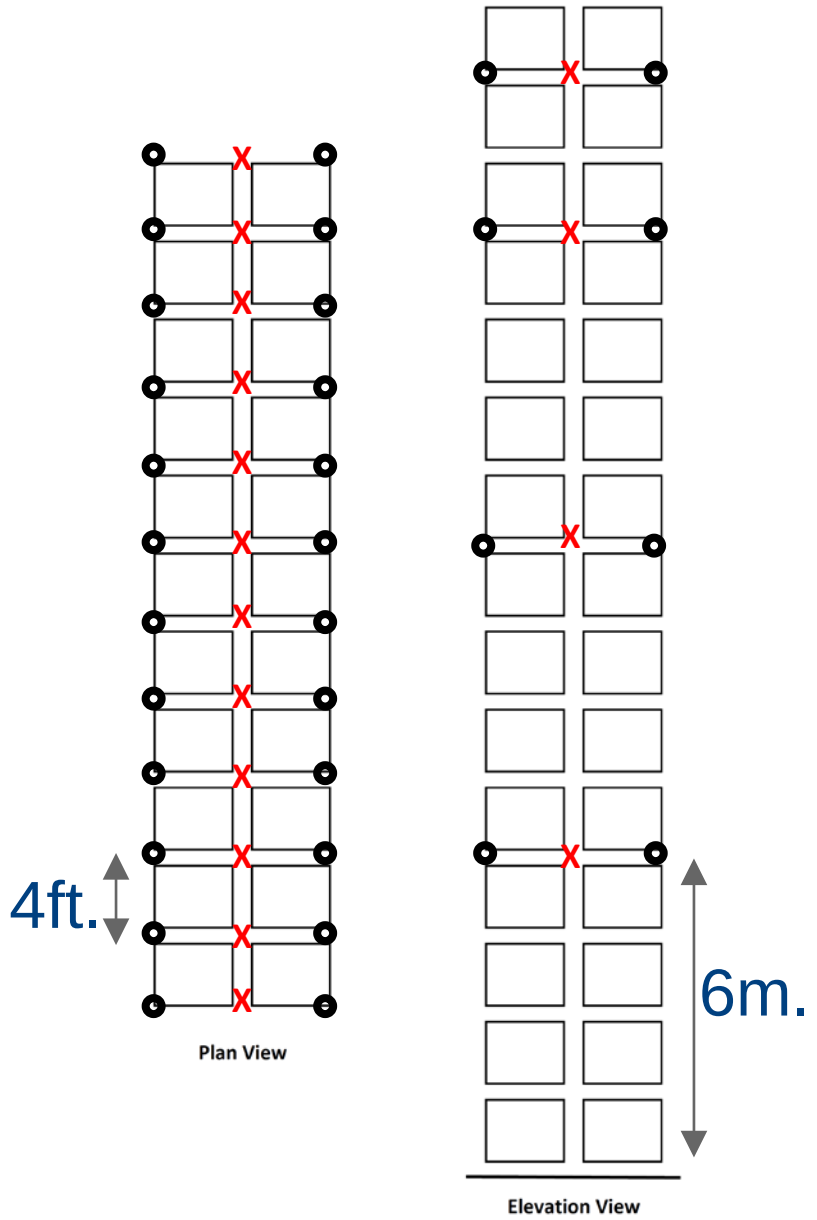


Current Guidance

Hypothetical Warehouse

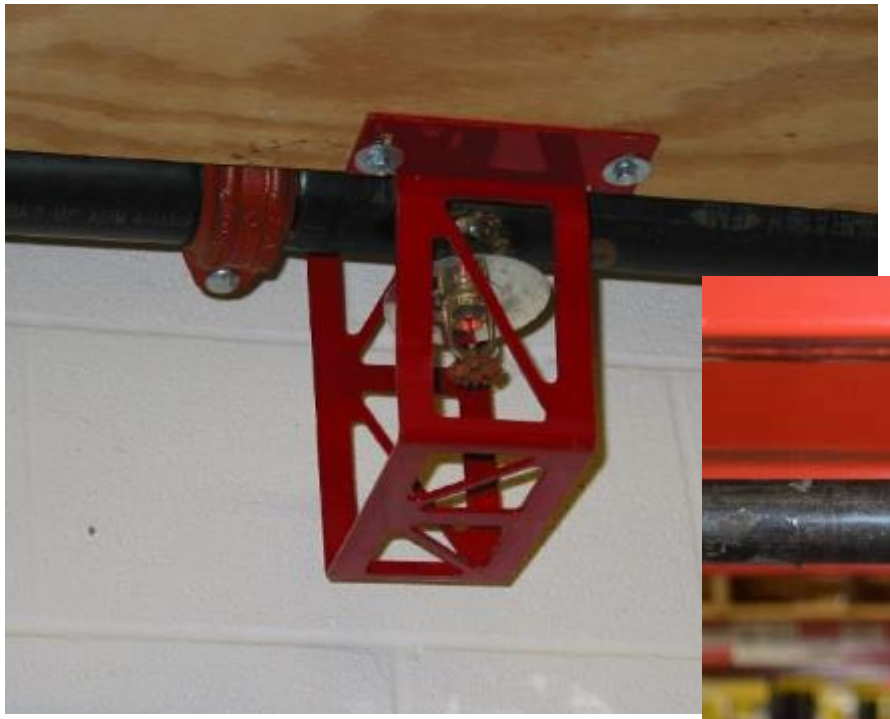
Option 2 IRAS Design:

- Longitudinal and face
- K5.6, 74°C, QR
- 110 L/min
- 4 levels of IRAS



Why is there resistance to install IRAS?

Why Resistance?



Vulnerable to Impact

Why Resistance?

High Cost of In-Rack Sprinklers

Recent IRAS Testing

Research and Testing

Goal of the new IRAS test program:

- Maximize vertical increments
- Increase storage height above in-racks
- Independent ceiling and in-rack sprinkler designs
- Modular design

Which will result in:

- Less IRAS needed
- Reduce likelihood of in-rack sprinkler damage
- Reduce cost of in-rack sprinkler installations

New protection guidance for IRAS

New Options

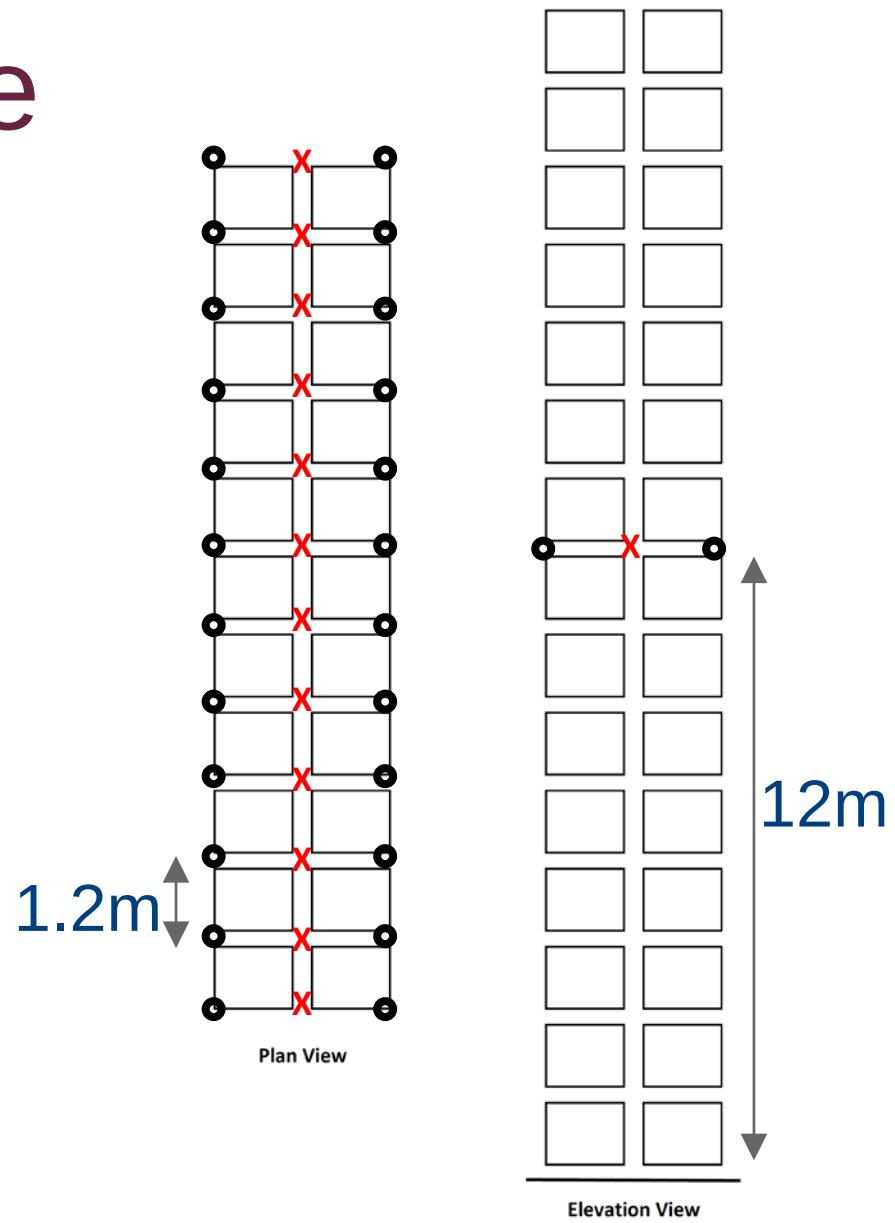
Maximum Vertical Spacing m	Commodity	Minimum Flow (L/min)	# of Sprinklers	K Factor
9	CUP and Less	250	6	> K14 (200)
	CEP	380	6	> K14 (200)
	UUP/UEP	455	10 (5 + 5)	> K22 (320)
12	CUP and less	455	6	> K22 (320)

Current Guidance

Hypothetical Warehouse

New IRAS Design:

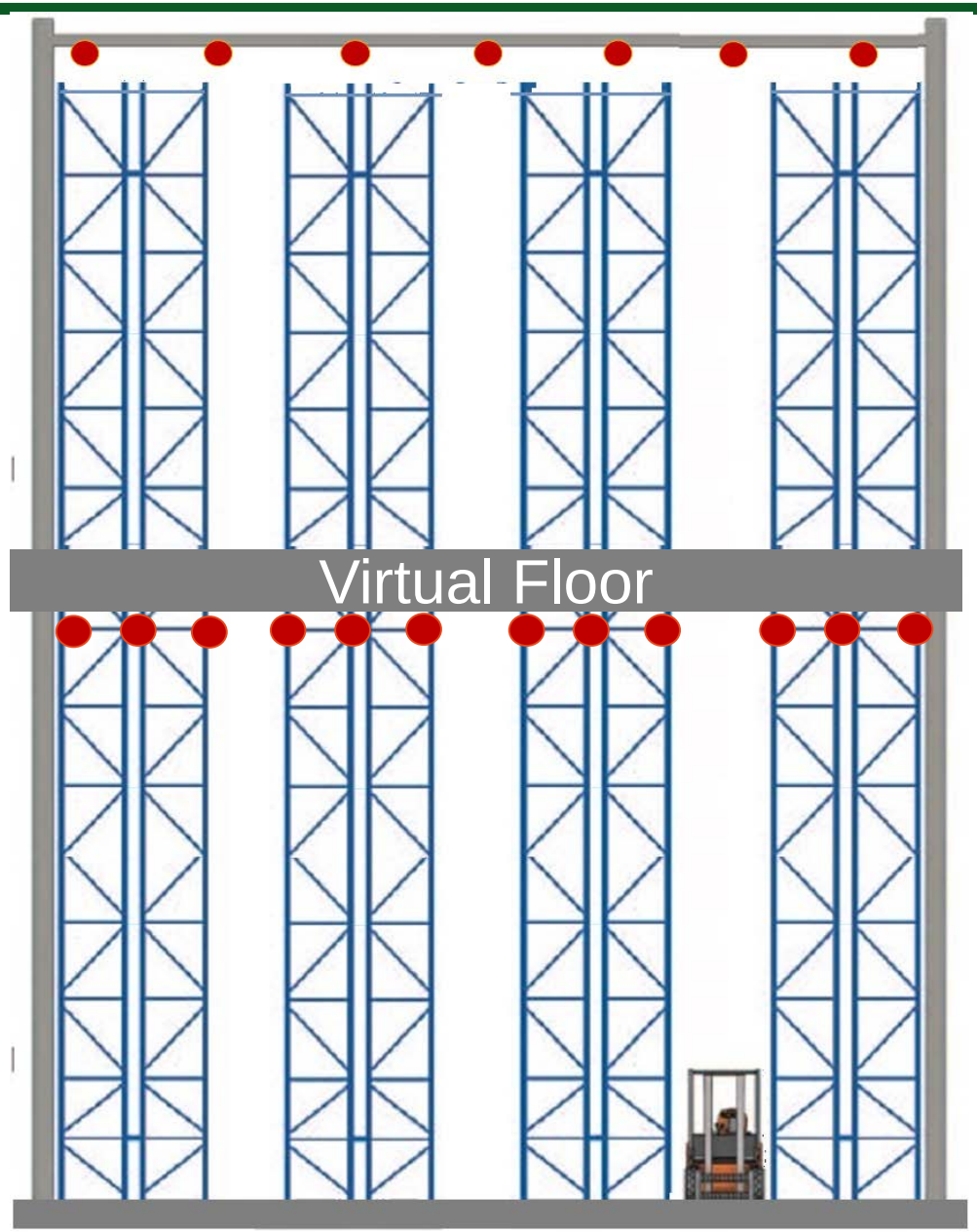
- Longitudinal and face
- K25.2,74°C, QR
- 450 L/min
- 1 level of IRAS



Key Benefits

- Cost
  - 25-40% savings
- Performance
  - Fire suppression
  - Taller higher hazard storage
  - Reduced water demand
- Fewer Sprinklers in the Rack

Summary



- Unlimited Storage Height
- Virtual Floor Concept
- Independence of In-Rack and Ceiling
- Maximized Storage Above Topmost In-Racks
- Unlimited storage heights
- Water flow < ceiling

What's Next?

- FM Global Data Sheet 8-9 *Storage Protection*
  - Released in July 2015

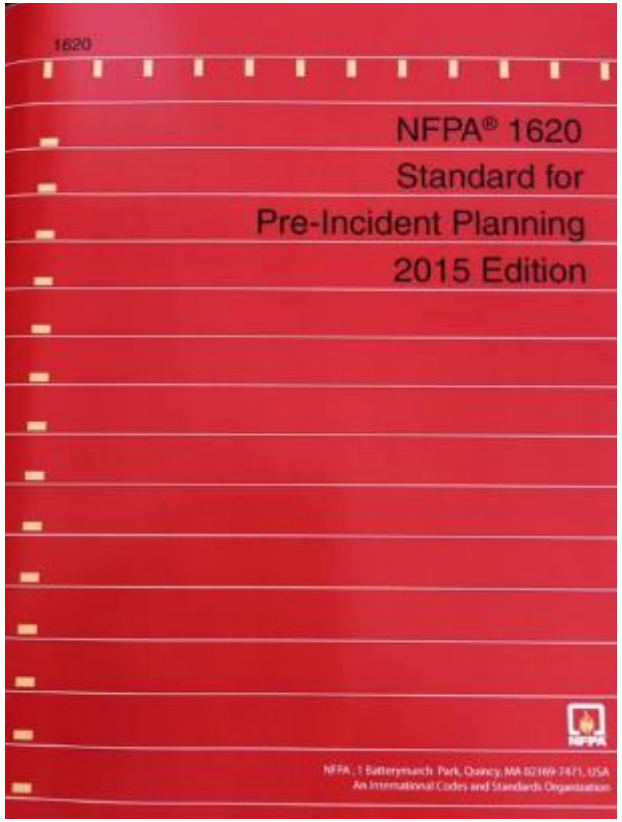
- NFPA 13
  - Plan to submit Public Input next cycle

AS 2118.1

Warehouse Fires & Pre-Fire Planning

- Agenda
  - Warehouse Fire Protection
  - New In-Rack Sprinkler Protection Option
  - NFPA 1620 and FM Global Data Sheet 10-1
  - AS 2118.1

Warehouse Fires & Pre-Fire Planning



- NFPA 1620
  - Standard for Pre-Incident Planning
- AS 3745
  - Emergency plans & Procedures
- WHS Regulations

Warehouse Fires & Pre-Fire Planning

- “Recommendation”
  - Identify Target Warehouse Locations
  - Adopt AS 3745 as required by WHS Legislation
  - Develop Co-operative Partnership:
    - Warehouse Owner/Operators
    - Property Insurance Carriers/Risk Consultants