

Reliable FM Global

Protecting ASRS Using the Latest Guidance in FM Global Property Loss Prevention Data Sheet 8-34

Fire Sprinkler International May 2022

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Wes Baker, FM Global

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(*) How can we improve these images?

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Product:	Status:	Quantity:	Each:	Total:
<p>Titleist Pro V1 Golf Ball SKU: 11509434 Golf Ball Model: #1.04 Color: White Golf Ball Quantity: 12-Ball Pack</p>	In Stock	1	\$49.99	\$49.99
<p>Titleist Pro V1 Golf Ball SKU: 11509430 Golf Ball Model: #1.04 Color: Yellow Golf Ball Quantity: 12-Ball Pack</p>	In Stock	1	\$49.99	\$49.99
<p>Sun Mountain Mens Zephyr Lightweight Short Sleeve Golf Pullover SKU: 11512960 Color: White Size: L</p>	In Stock	1	\$32.99	\$32.99
<p>Callaway Mens Tour Authentic Golf Gloves SKU: 11308990 Worn on Hand: Left Style: Regular Color: White Size: Medium/Large</p>	In Stock	1	\$17.99	\$17.99

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Delivery Method:
 Delivery quotes below are for in-stock items only. If your item ships from the manufacturer or is back-ordered, please see its shipping quote next to the item below.

- Delivery By End of Year**
FREE - Via Standard Shipping
- Delivery By Tuesday, June 7**
 \$9.99 - Via Guaranteed Ground Shipping
- Delivery By Wednesday, June 1**
 \$14.99 - Via 2nd Day Shipping
- Delivery By Tuesday, May 31**
 \$24.99 - Via Next Business Day Shipping


8


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? Automatic Storage and Retrieval Systems

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Reliable What Is An ASRS? 




Warehouse Storage Individual Pallet Load

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Reliable What Is An ASRS? 

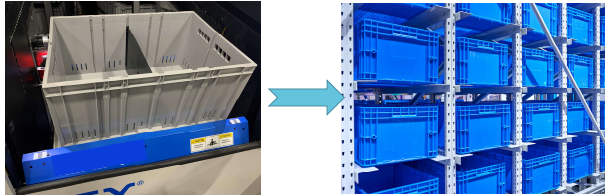


Individual Container Load Individual Pallet Load

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Reliable What Is An ASRS? 



Individual Container Load Mini-Load ASRS

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Reliable What Is An ASRS? 

Basically
rack storage

Efficient storage for individual items


Dense storage w/
minimal aisles




Mini-Load ASRS


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Reliable What Is An ASRS? 




Storage on Angle Irons




Mini-Load ASRS


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Reliable What Is An ASRS? 




Storage on Metal Slats

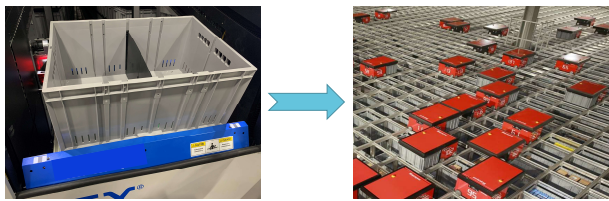


Mini-Load ASRS

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Reliable What Is An ASRS? 



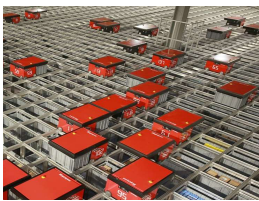
Individual Container Load Top-Loading ASRS

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Reliable What Is An ASRS? 

Basically
solid-piled storage
Efficient storage for
individual items
Dense storage w/
no aisles



Top-Loading ASRS

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Research on
ASRS Arrangements

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Reliable Research Testing



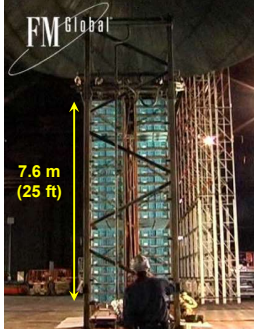
Mini-Load ASRS



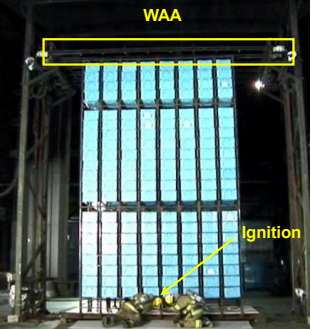
Non-Solid Walled Container

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Looking down longitudinal flue




Looking at rack face

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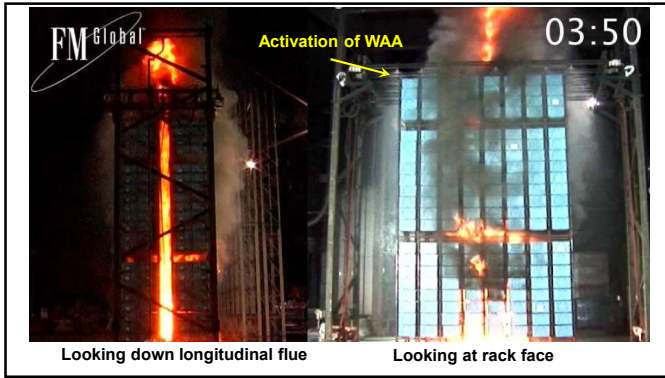


Looking down longitudinal flue



Looking at rack face

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Reliable
Research Testing


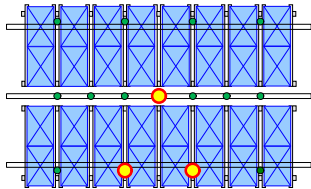
In-Rack Sprinkler Full-Scale Fire Test:

- Open-top plastic vented container
- QR K160 (K11.2) @ 230 L/min (60 gpm)
- 0.6 m (2 ft) spacing in longitudinal flue
- 1.2 m (4 ft) spacing at rack face
- Face ignition, mid-bay

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Reliable Research Testing


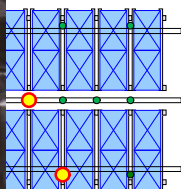



Fire did not spread above in-rack sprinklers

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Fire did not spread above in-rack sprinklers

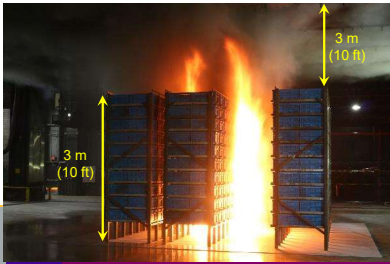
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Reliable Research Testing

Ceiling Sprinkler Full-Scale Fire Test:

- Storage height limited to 3 m (10 ft)
- Clearance limited to 3 m (10 ft)



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Reliable Research Testing

Ceiling Sprinkler Full-Scale Fire Test:

- Storage height limited to 3 m (10 ft)

QR (K200 (K14.0), QR Pendent @ 3 m (10 ft) 5.2 bar (75 psi)

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Configuration

- Area: 19 m² (200 ft²)
- Height: 5.5 m (18 ft)
- Ceiling: 12.2 m (40 ft)

Ignition

- Base of storage
- Beneath 3 robots
- Under-1 sprinkler

Sprinkler Protection

- K200 (K14.0), QR Pendent
- 5.2 bar = 49 mm/min (75 psi = 1.2 gpm/ft²)
- Applied for at least 30 minutes

Top-Loading w/ Solid-Walled Containers

1st Sprinkler Operates
2nd Sprinkler Operates

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Fire extinguished by reactivated monitor nozzles flowing 760 L/min (200 gpm) each

+ 30 min

- Fire appears extinguished
- Sprinklers turned off
- Evidence of deep-seated fire observed
- Monitor nozzles applied in combination with ceiling sprinklers

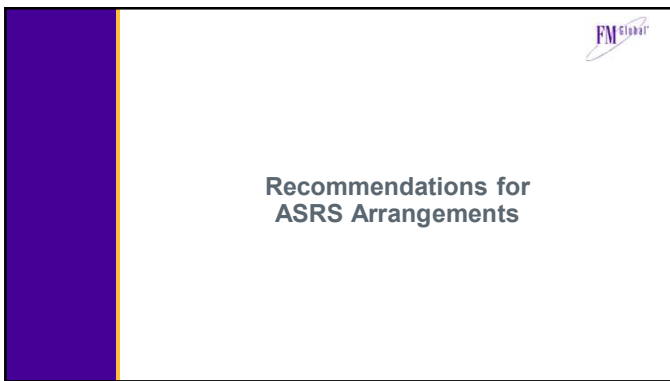
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Reliable Recommendations for ASRS

Top-Loading ASRS

The ceiling-level sprinkler design takes into account:

- All sprinklers located directly over the Subdivided Storage Area
- As well as all sprinklers located in the adjacent aisles

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Determine ceiling design
- Hose demand is 1,900 L/min (500 gpm)

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Determine ceiling design
- Hose demand is 1,900 L/min (500 gpm)
- Duration is 4 hours

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Determine ceiling design
- Hose demand is 1,900 L/min (500 gpm)
- Duration is 4 hours
- Determine what is needed to assist local fire services with final extinguishment

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Determine ceiling design
- Hose demand is 1,900 L/min (500 gpm)
- Duration is 4 hours
- Determine what is needed to assist local fire services with final extinguishment

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Potential Options for Final Extinguishment:
 - Perimeter Mezzanines
 - Pre-Incident Plan with Local Fire Services (Data Sheet 10-1)
 - Small Hose Connection Stations
 - Limited Footprint Size of Storage Array
 - Vertical Barriers
 - Monitor Nozzles and Infrared Cameras (solid-walled containers)

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Potential Options for Final Extinguishment:
 - Perimeter Mezzanines

With **maximum ceiling height of 7.6 m (25 ft)** all but perimeter mezzanines can be avoided

- Coming soon, same with **maximum ceiling height of 9.1 m (30 ft)**

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Reliable Recommendations for ASRS

Top-Loading ASRS

- Potential Options for Final Extinguishment:
 - Perimeter Mezzanines

Coming soon, Approval Standard for **noncombustible** **soff walls** **containers**



With **maximum ceiling height of 7.6 m (25 ft)** all but perimeter mezzanines can be avoided

- Coming soon, same with **maximum ceiling height of 9.1 m (30 ft)**

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Thank You!

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