

Five Special Sprinkler's

Date: 9-16-22
Speaker: Bryan Berkley



Special Sprinkler

5 Sprinklers that Solve Design Problems



Special Sprinkler

Learning Outcomes

- 1. Explain the advantages of using attic sprinklers over standard spray sprinkler designs
- 2. Discuss the challenges of combustible interstitial space fires and how to provide protection
- 3. Explain the necessity of using institutional sprinklers
- 4. Describe how using window sprinklers allows for architectural freedom in building design.
- 5. Detail the challenges of ever increasing storage heights and the sprinklers that address them.
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Special Sprinkler

What is a Special Sprinkler

1. Intended for specific hazards or construction features.
2. Evaluated and listed for performance under the following conditions:
 - a) Fire tests related to the intended hazard
 - b) Distribution of the spray pattern with respect to wetting of floors and wall.
 - c) Distribution of the spray pattern with respect to obstructions.
 - d) Evaluation of the thermal sensitivity of the sprinkler
 - e) Performance under horizontal or sloped ceilings
 - f) Area of design
 - g) Allowable clearance to ceilings

Special Sprinkler

Special Sprinkler Characteristics

1. Typical K-Factors.
2. Typical Temperature Ratings.
3. The protection area of coverage shall not exceed 400 ft² (37 m²) for light hazard and ordinary hazard occupancies.
4. The protection area of coverage shall not exceed 196 ft² (18 m²) for extra hazard and high-piled storage occupancies.

Special Sprinkler

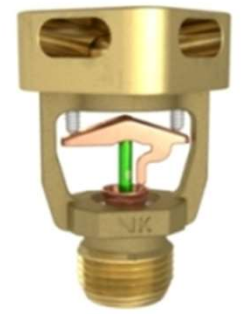
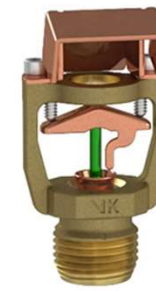
Special Sprinklers



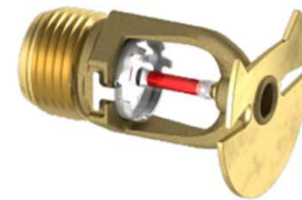
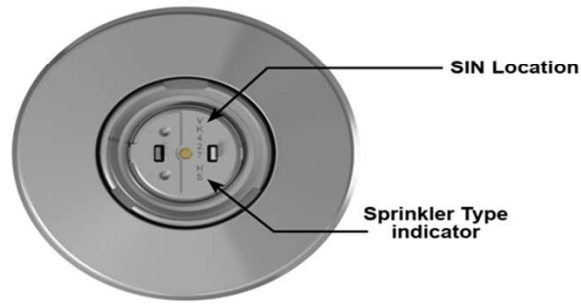
Combustible Interstitial Space Sprinklers



Attic Sprinklers



Institutional Sprinklers



Window Sprinklers



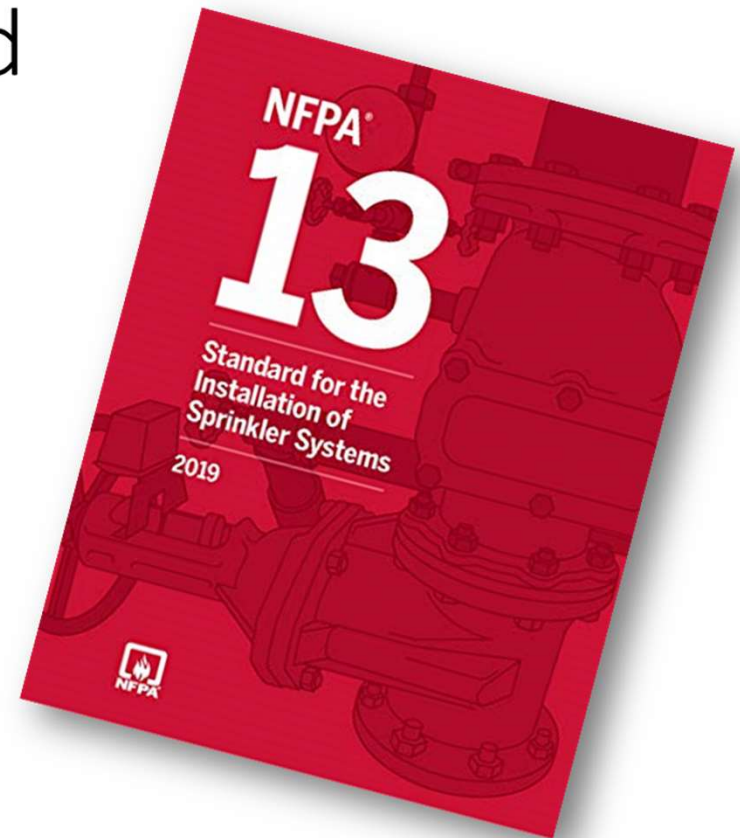
Special Sprinkler

What is a Combustible Concealed Space



Special Sprinkler

When is Protection Required



Special Sprinkler

The Fire Challenge



Special Sprinkler

What are Combustible Interstitial Space Sprinklers?



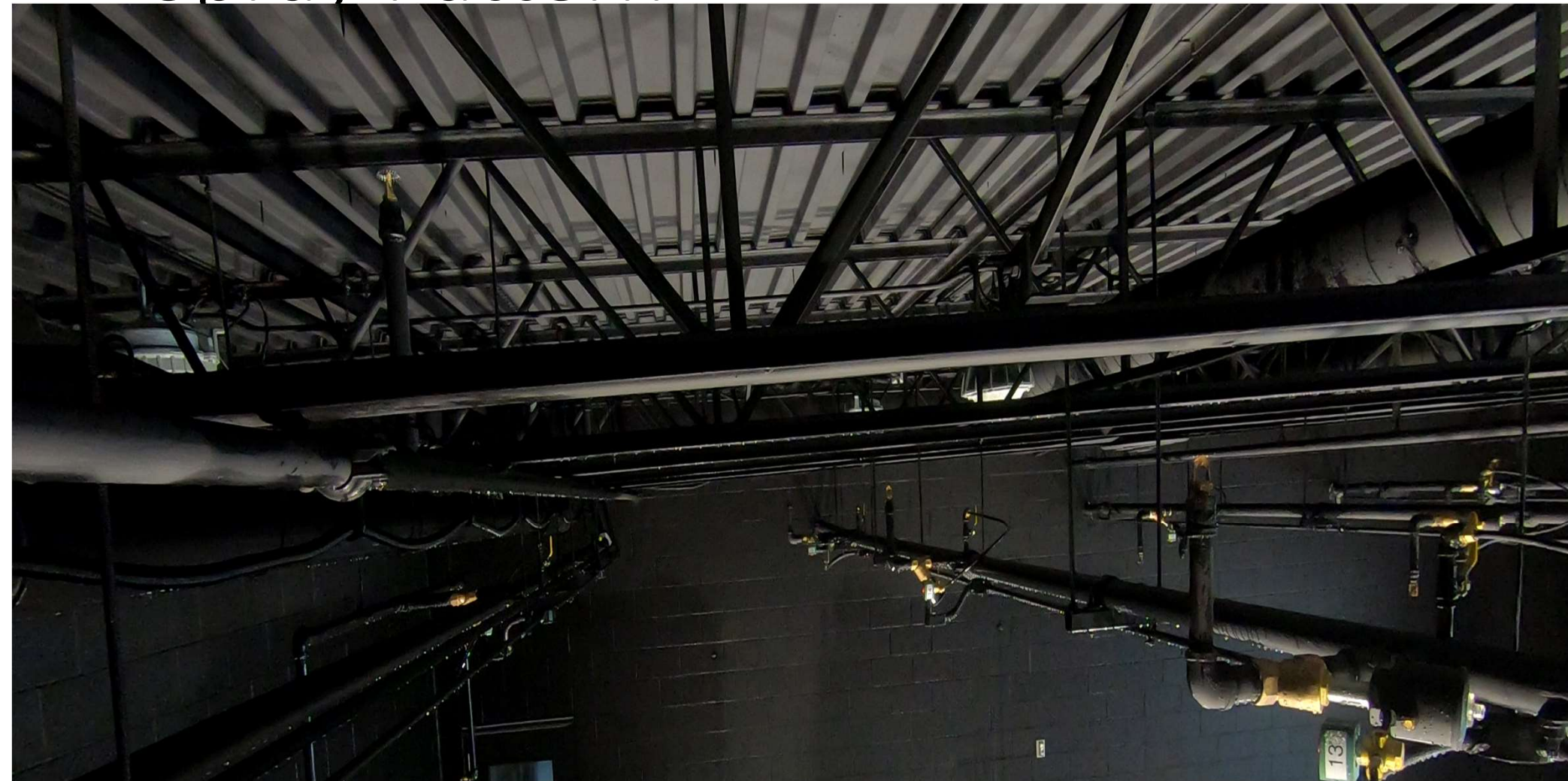
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What are Combustible Interstitial Space Sprinklers?



Special Sprinkler

Spray Pattern



Special Sprinkler

Draft Curtains



Special Sprinkler

Open Truss Construction



Special Sprinkler

Open Truss Construction



Special Sprinkler

Attic Sprinklers



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What is the Fire Challenge in an Attic Space?



Special Sprinkler

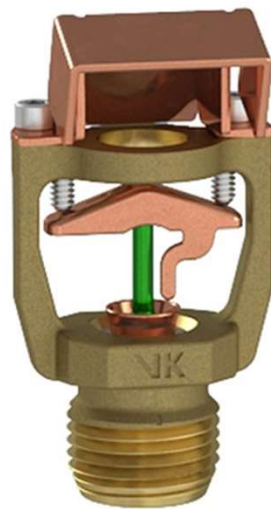


Special Sprinkler

Attic Sprinklers



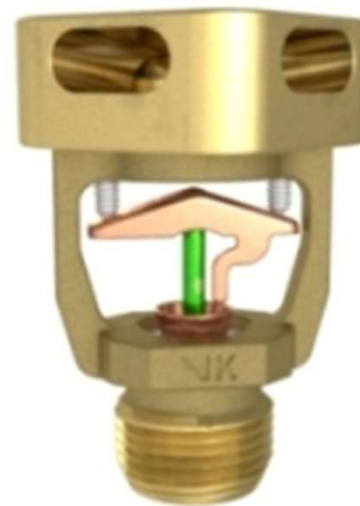
Back-to-Back



Single Direction



Eave Protection

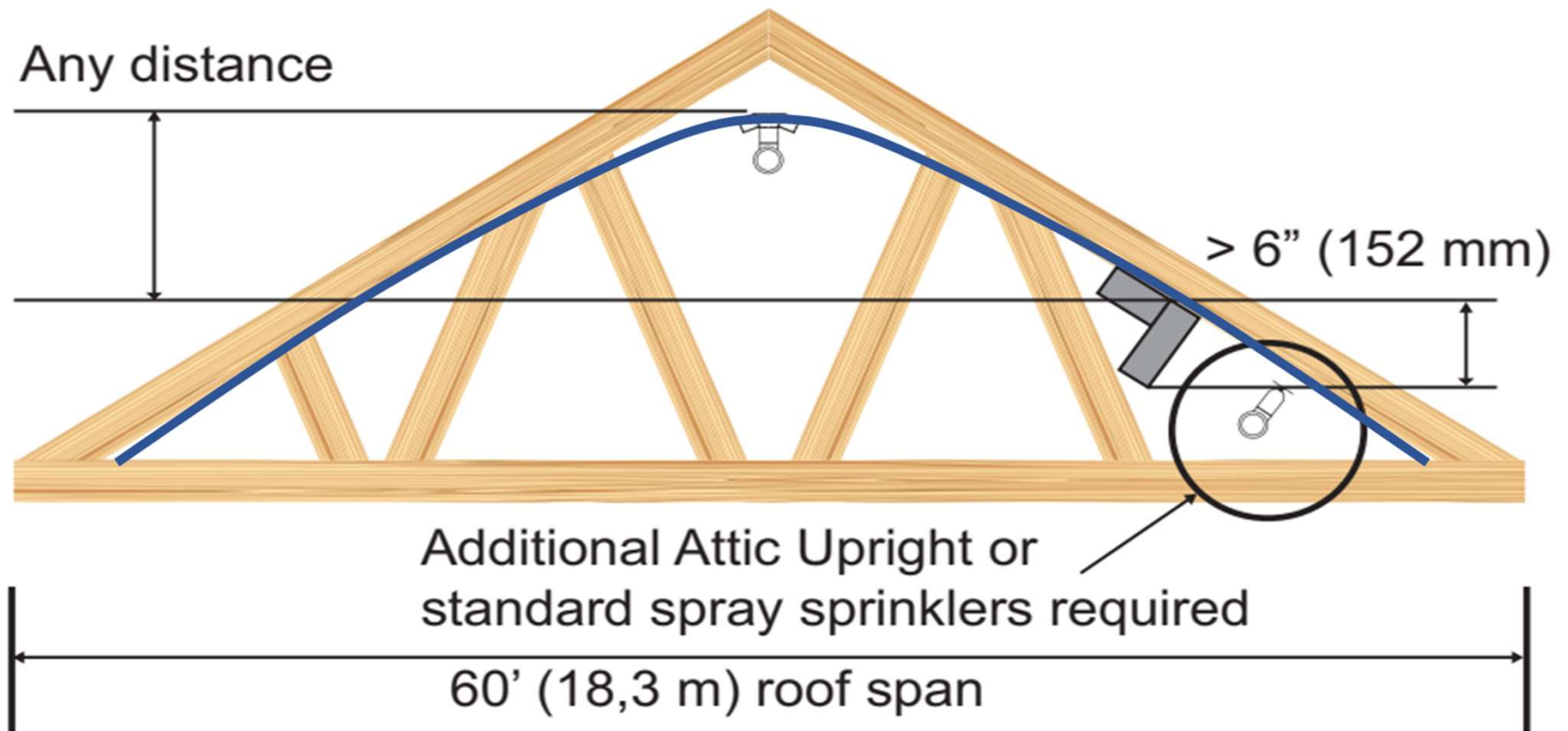


HIP



Attic Upright

Special Sprinkler



Special Sprinkler



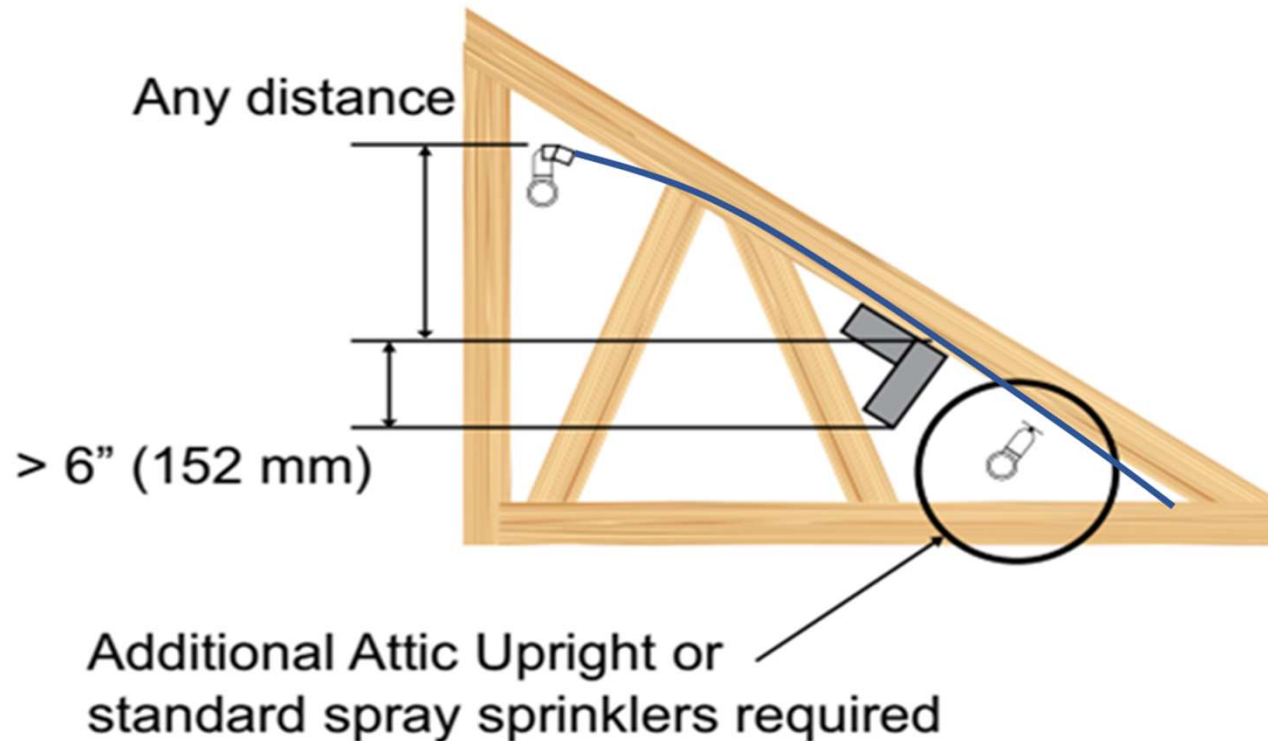
Special Sprinkler

Back-to-Back Attic Sprinkler Deflector Angles

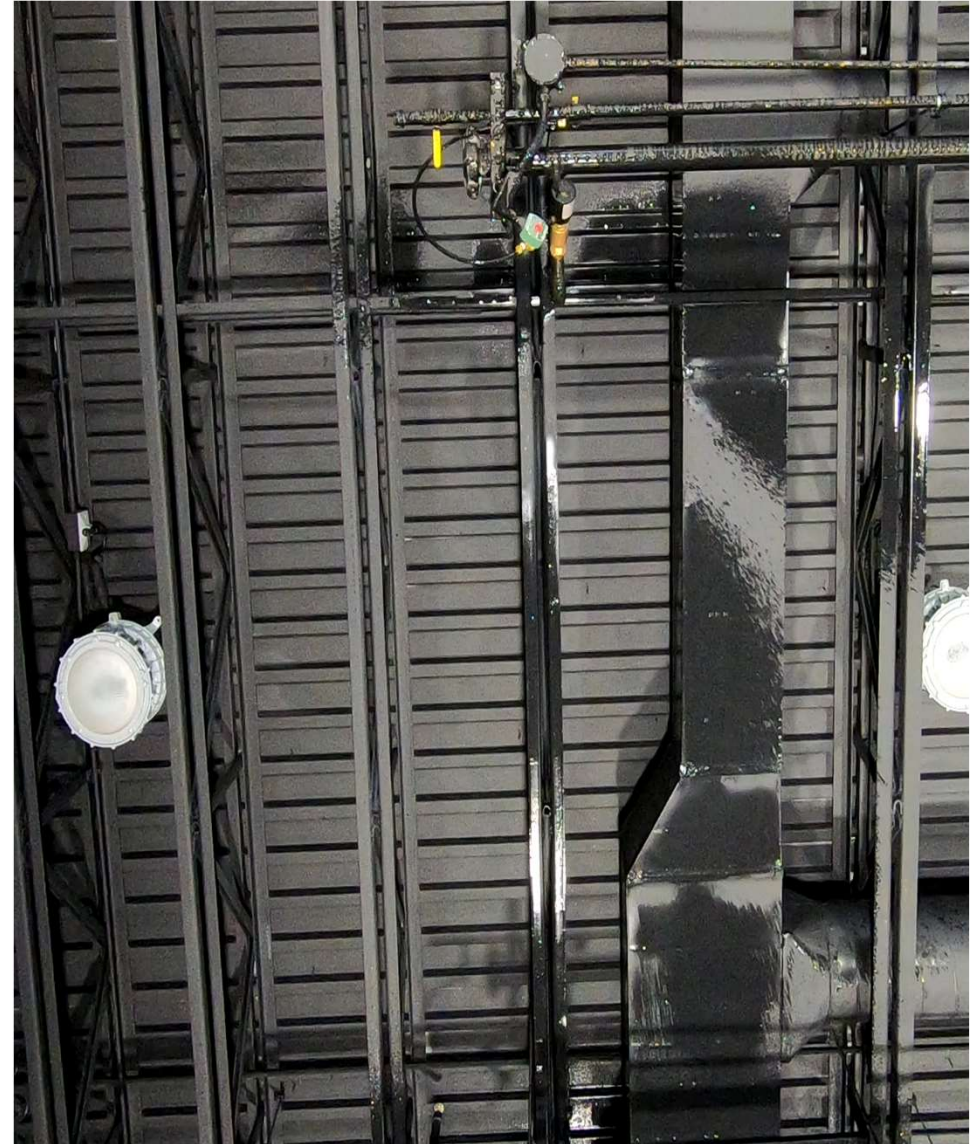
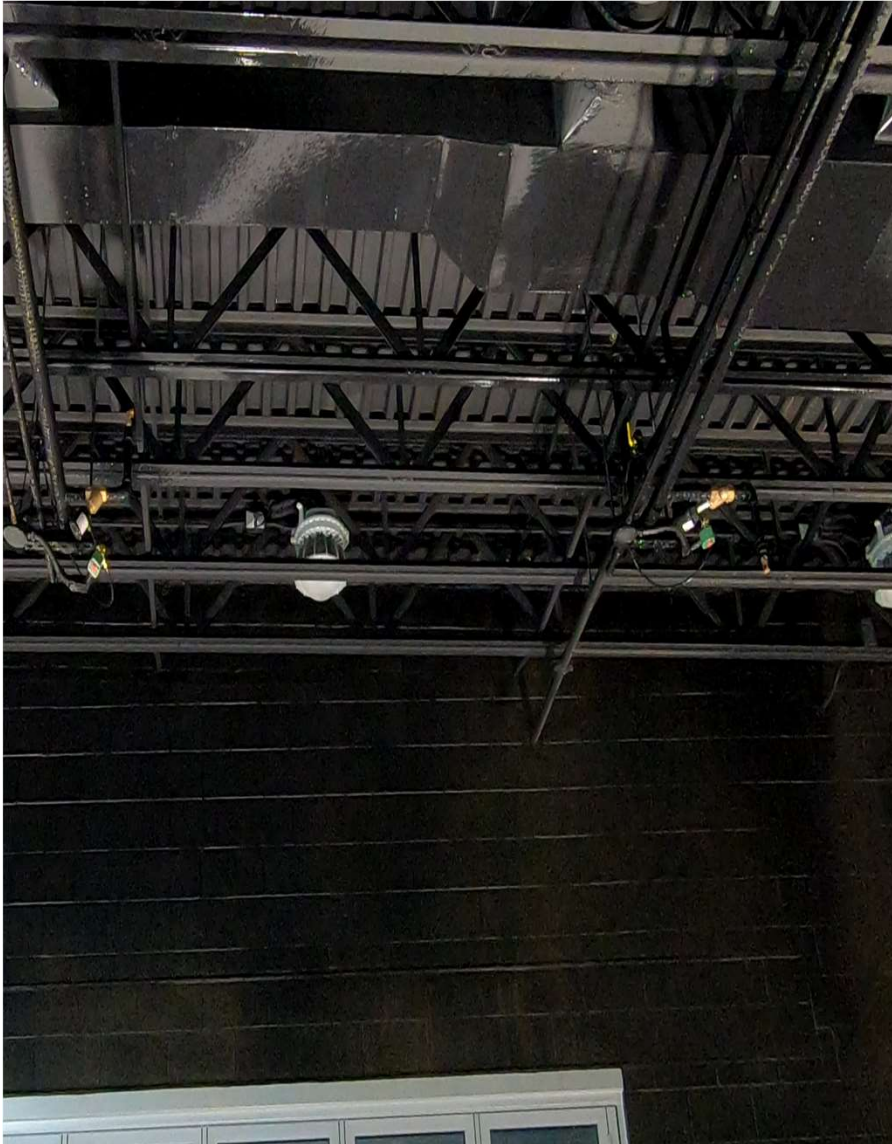


Special Sprinkler

Single Directional Attic Sprinklers



Special Sprinkler

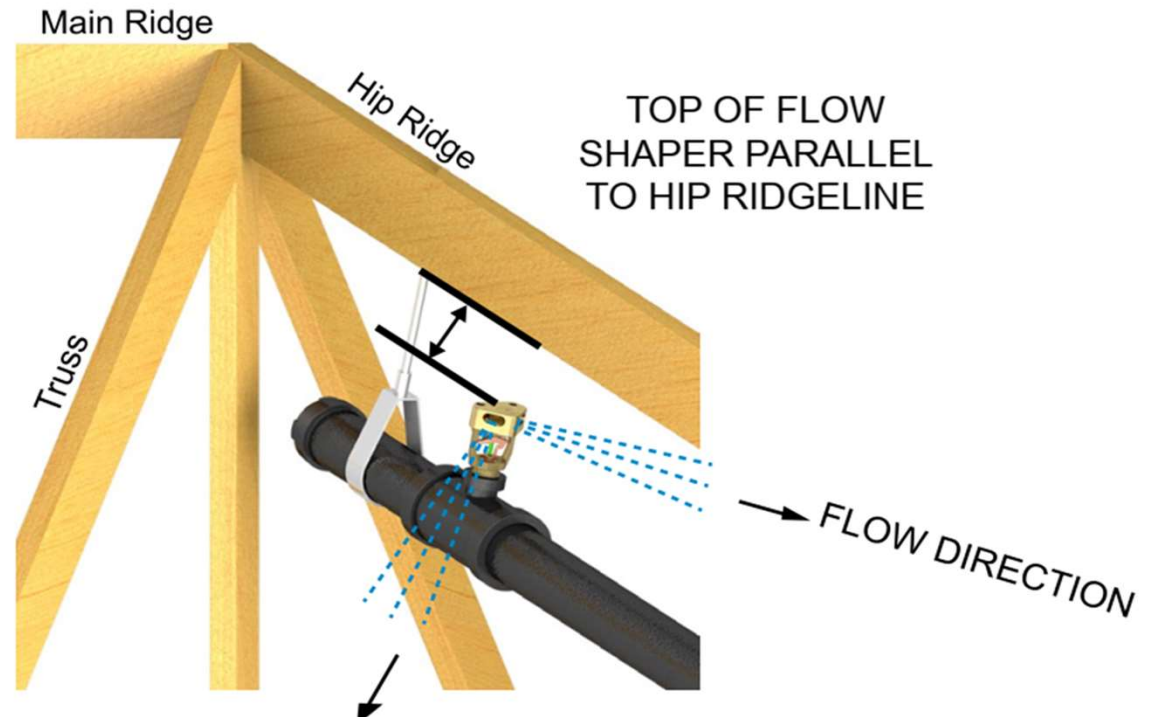


Special Sprinkler



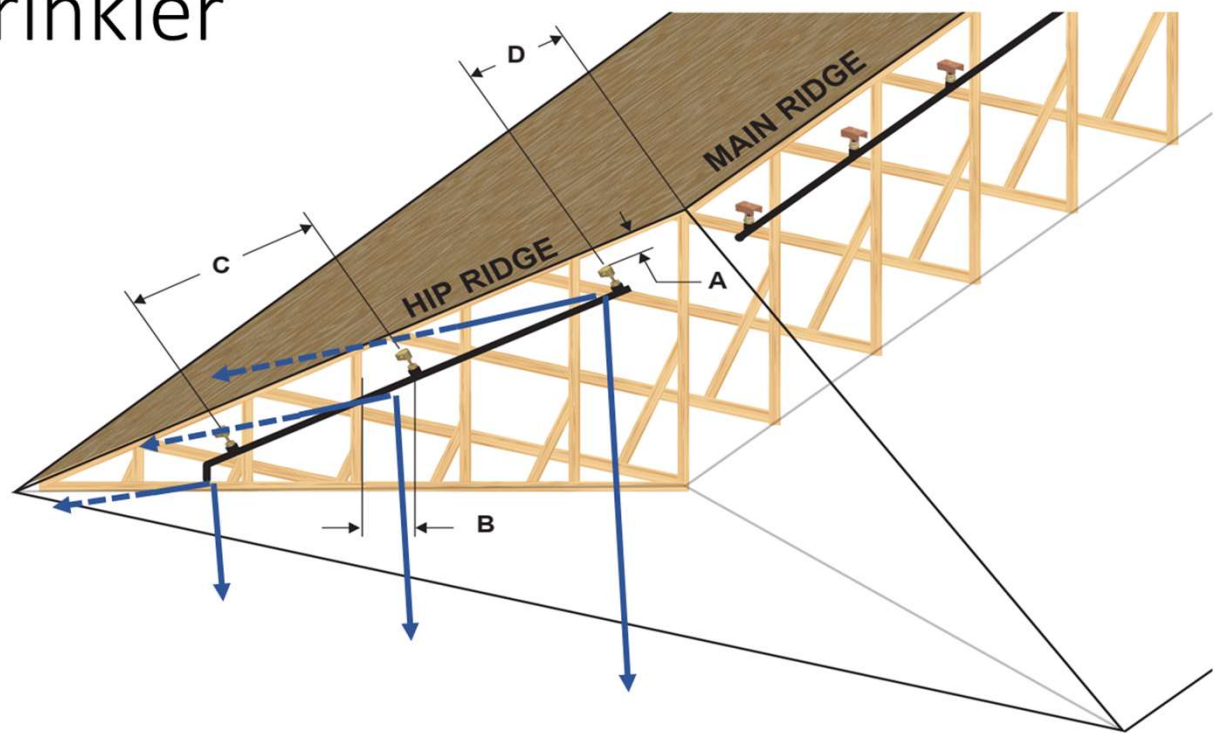
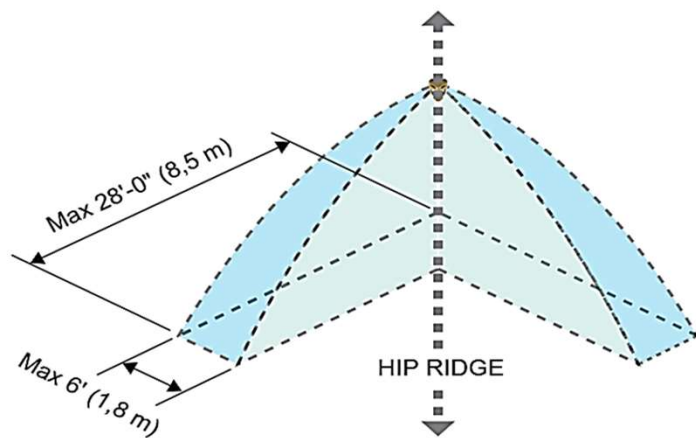
Special Sprinkler

HIP Ridge Attic Sprinkler

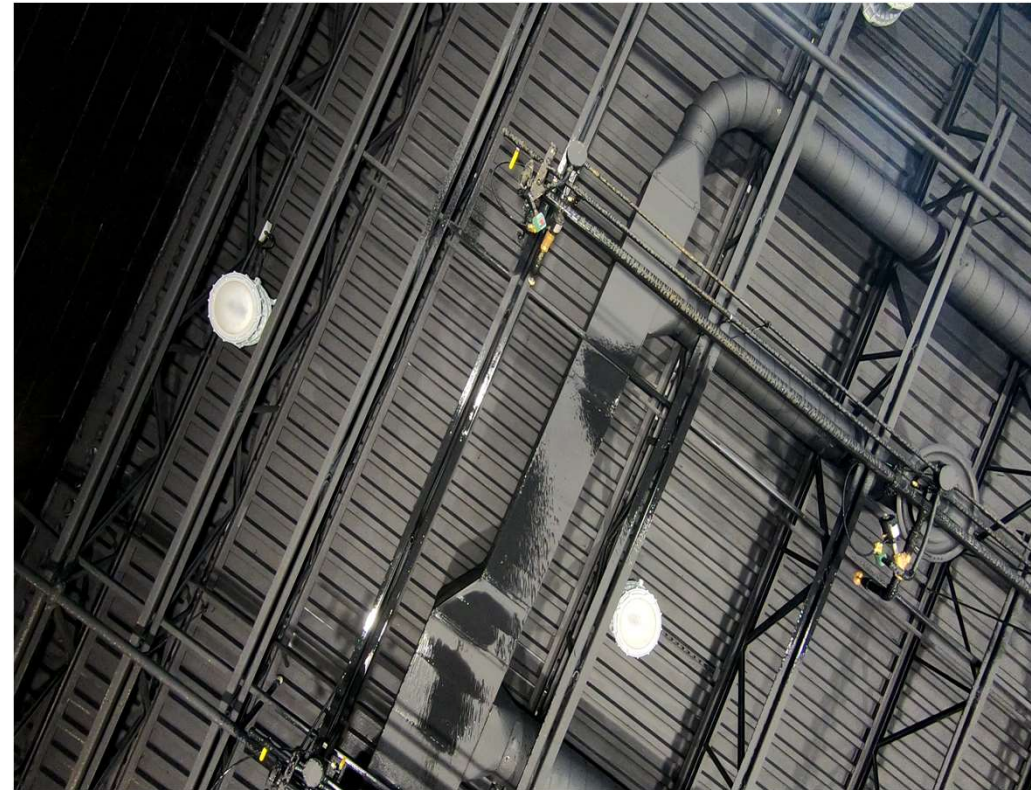


Special Sprinkler

HIP Ridge Attic Sprinkler



Special Sprinkler



Special Sprinkler



SD

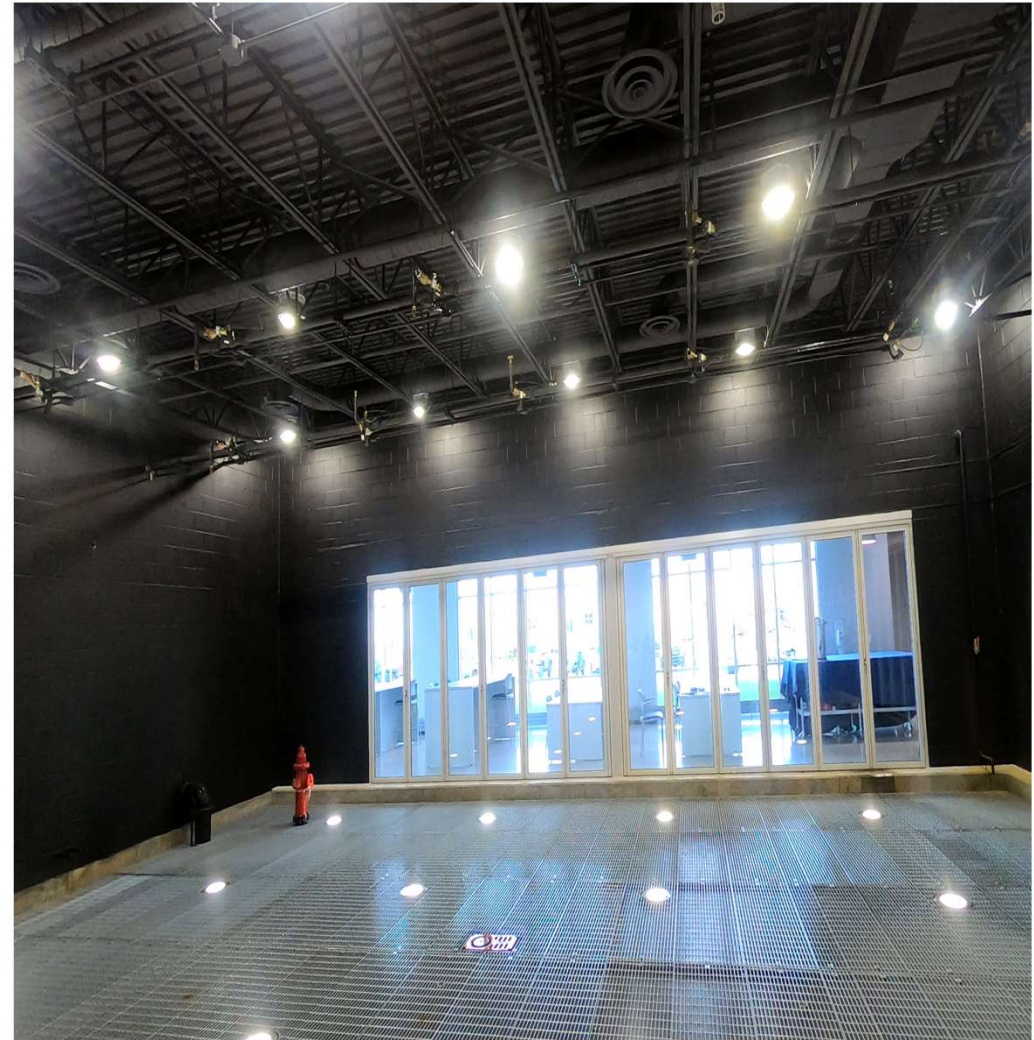
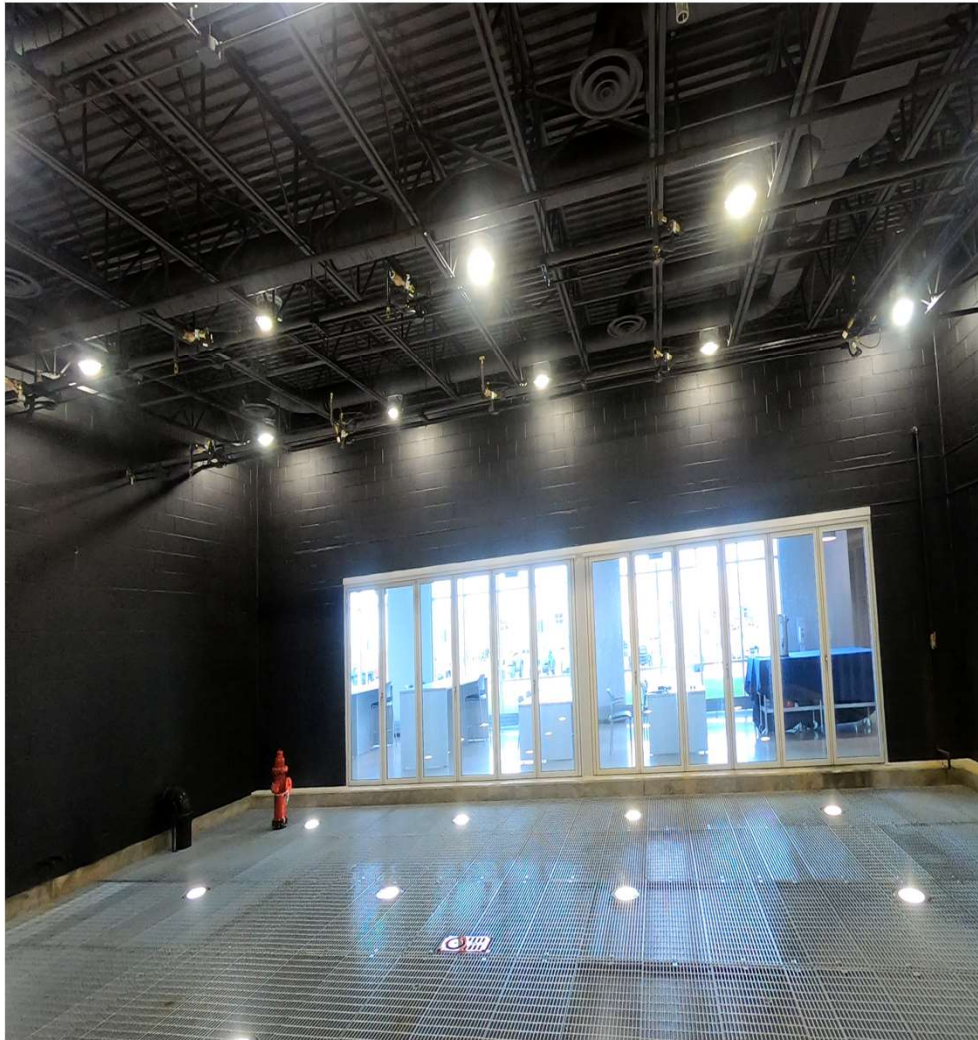
EP

SD

EP



Special Sprinkler Eave Protection & Single Directional



Special Sprinkler



Special Sprinkler

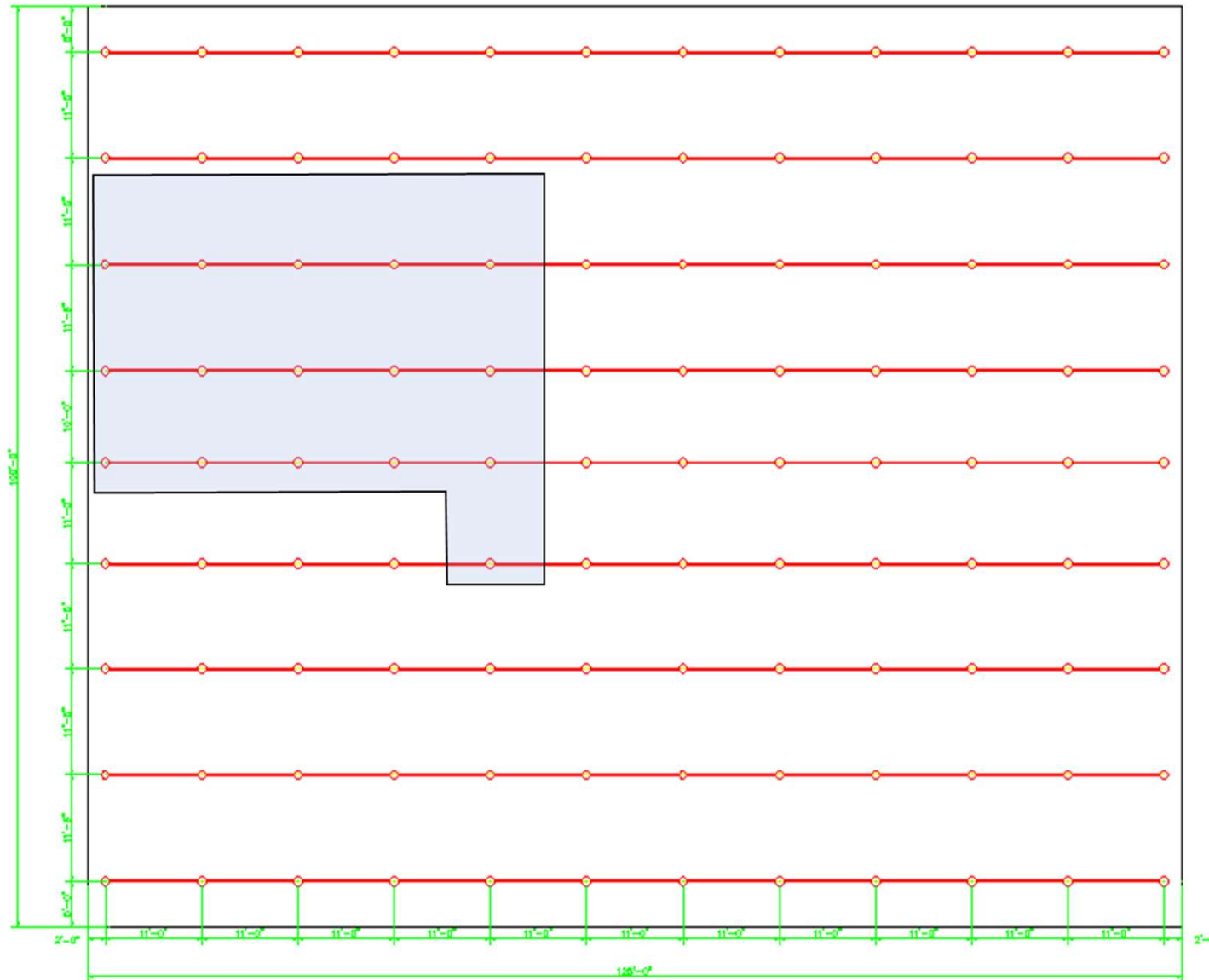
- 100 ft. Span, Gable Style Roof
- 2 ½ :12 Pitch

Row of sprinklers required within 12" Horizontally and between 1" and 12" down from the bottom of the top chord member

Additional sprinklers as required

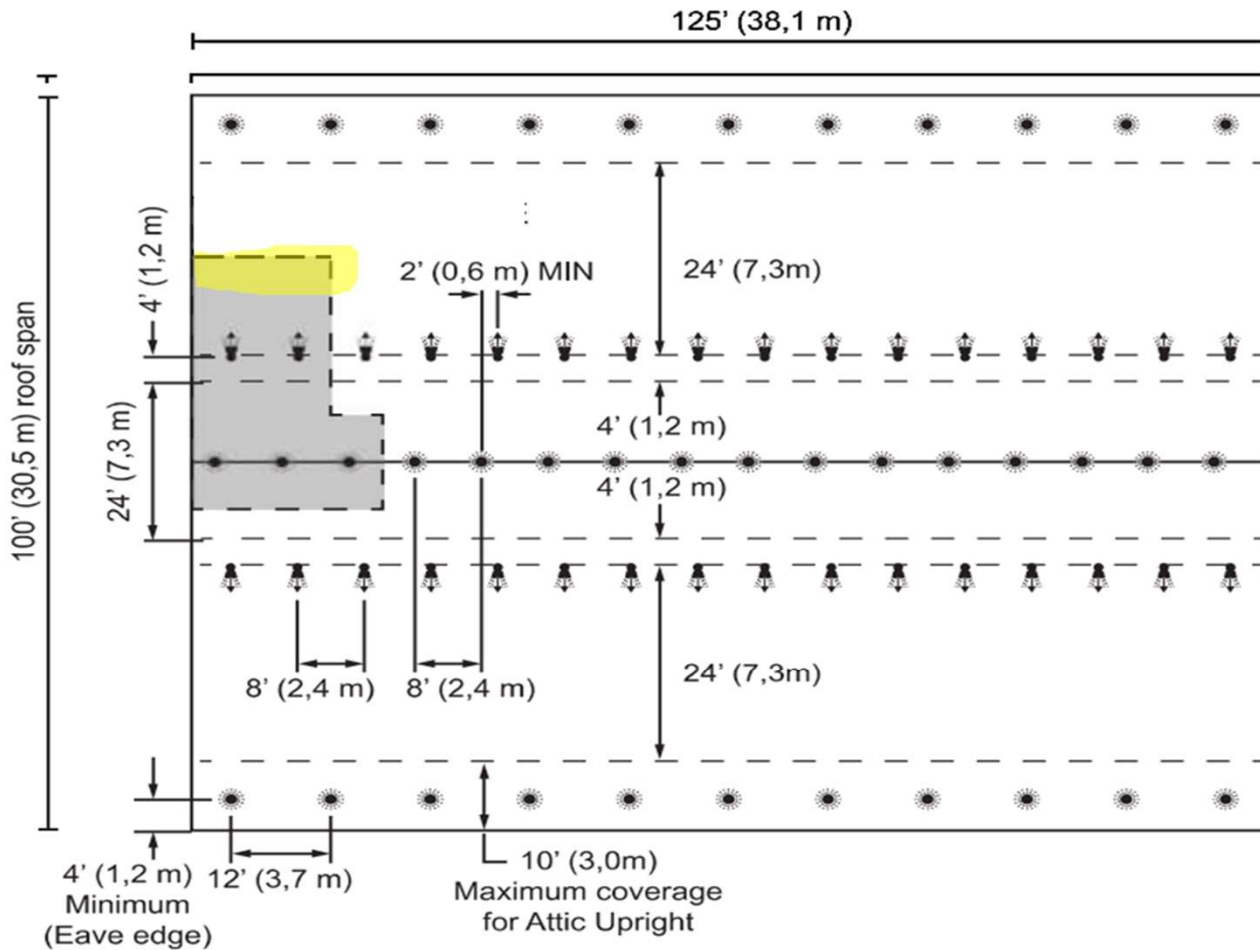
100 ft

Special Sprinkler



Design area: 1,950 sq. ft.
Design sprinklers: 16 @ 14.8 gpm
Design flow: 237 gpm

Special Sprinkler



Design area: Ridge

Design sprinklers: 5 @ 20 gpm

Design flow: 100 gpm

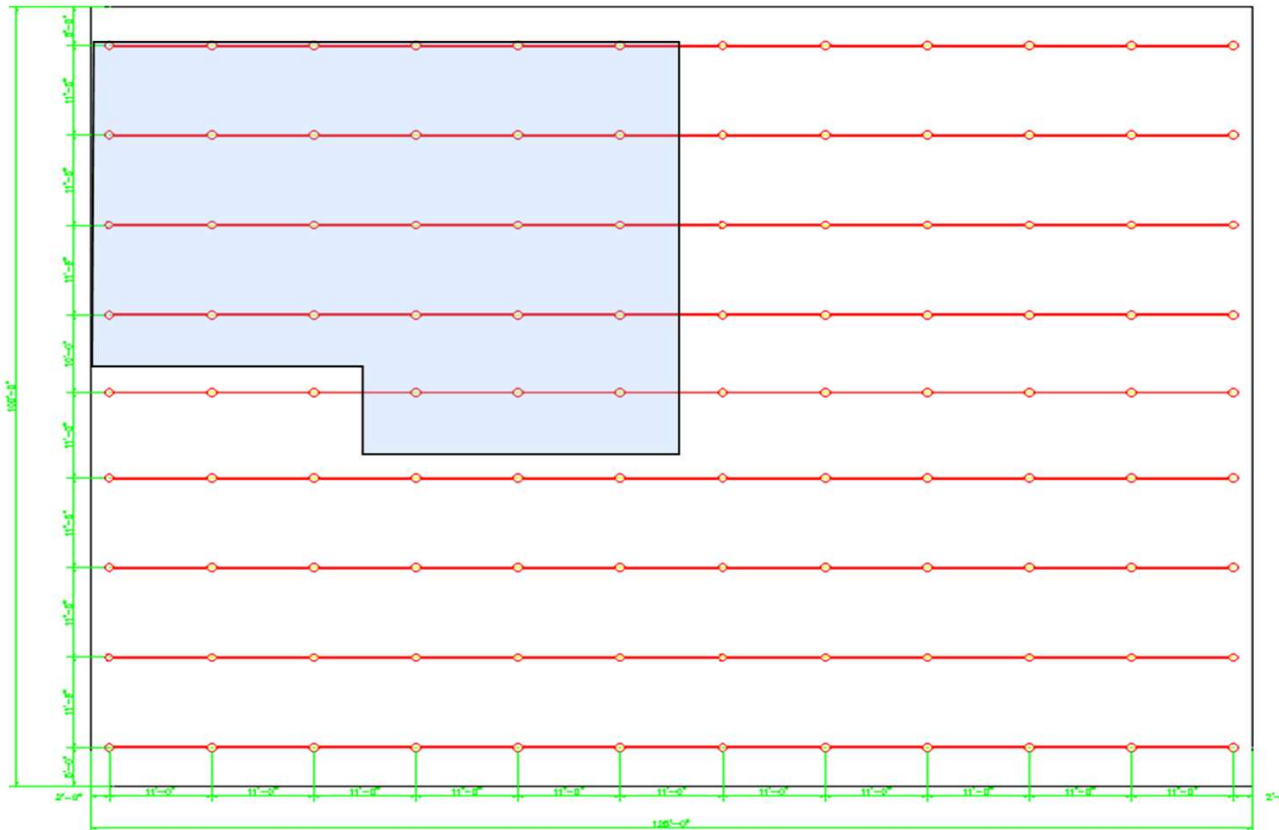
Ridge

Design area: Ridge & Slope

Design sprinklers: 3 @ 20 gpm
2 @ 23 gpm

Design flow: 106 gpm

Special Sprinkler

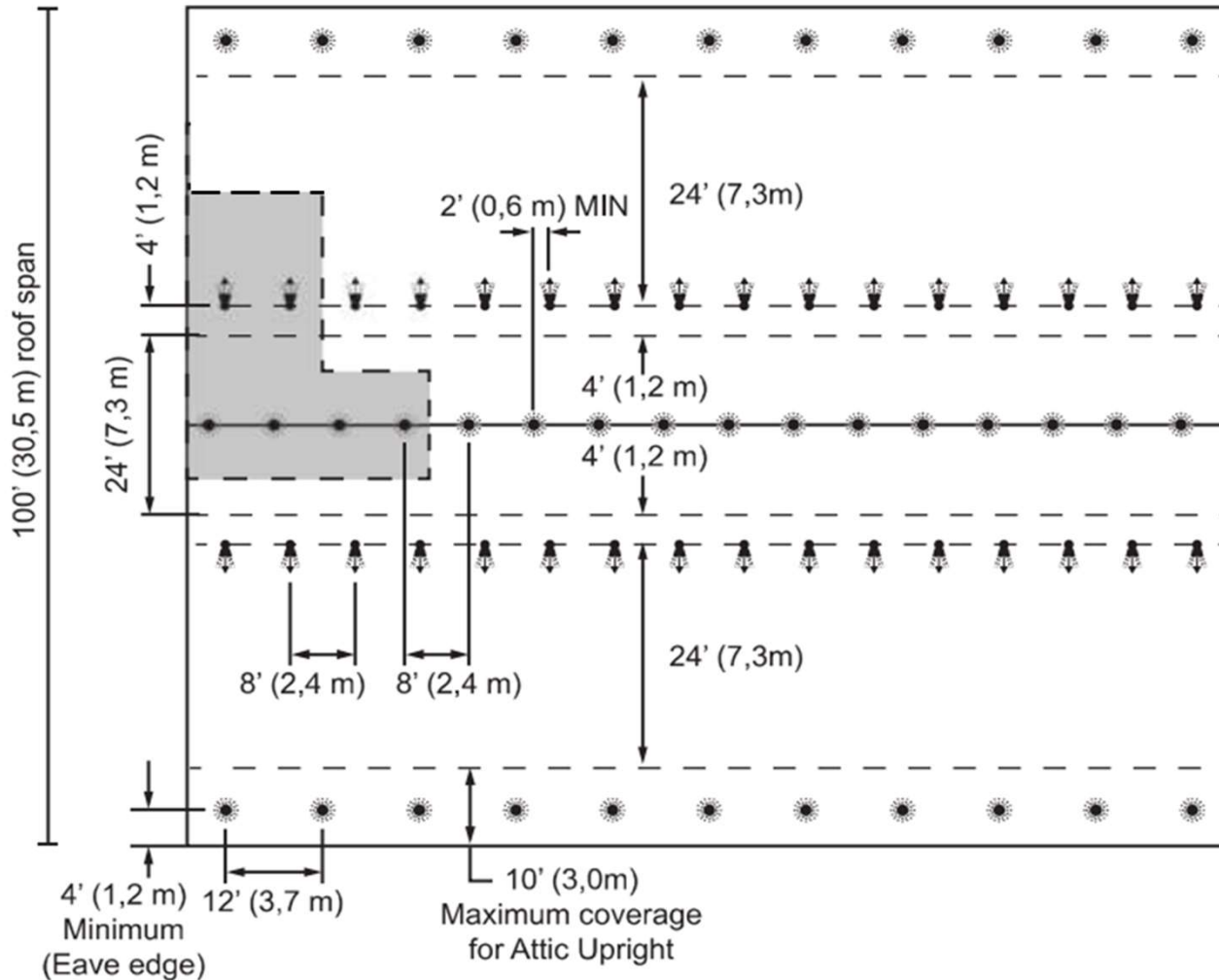


Design area: 2,535 sq. ft.

Design sprinklers: 21 @ 14.8 gpm

Design flow: 311.1 gpm

Special Sprinkler



Design area: Ridge

Design sprinklers: 6 @ 20 gpm

Design flow: 120 gpm

Ridge

Design area: Ridge & Slope

Design sprinklers: 4 @ 20 gpm

2 @ 23 gpm

Design flow: 126 gpm

Special Sprinkler

- **Standard Spray Sprinklers (NFPA 13)**

- Wet System
- Design Area: 1950 sq.ft.
- Sprinklers/Flow per: 16/14.8gpm
- Total Demand: 238gpm

- **Dry System**

- Design Area: 2535 sq.ft.
- Sprinklers/Flow per: 21/14.8gpm
- Total Demand: 311gpm

Attic Sprinklers

Wet System

Design Area: Ridge

Sprinklers/Flow per: 5/20gpm

Total Demand: 100 gpm & 106gpm

Dry System

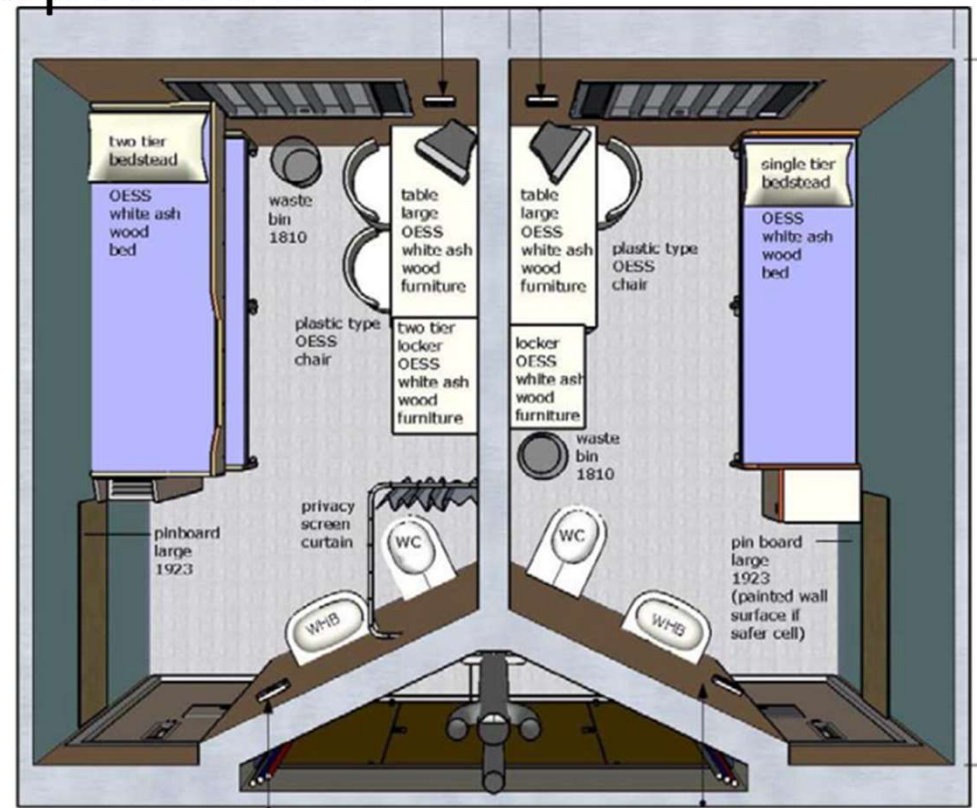
Design Area: Ridge

Sprinklers/Flow per: 6/20gpm

Total Demand: 120 gpm & 126gpm

Special Sprinkler

What is an Institutional Sprinkler?



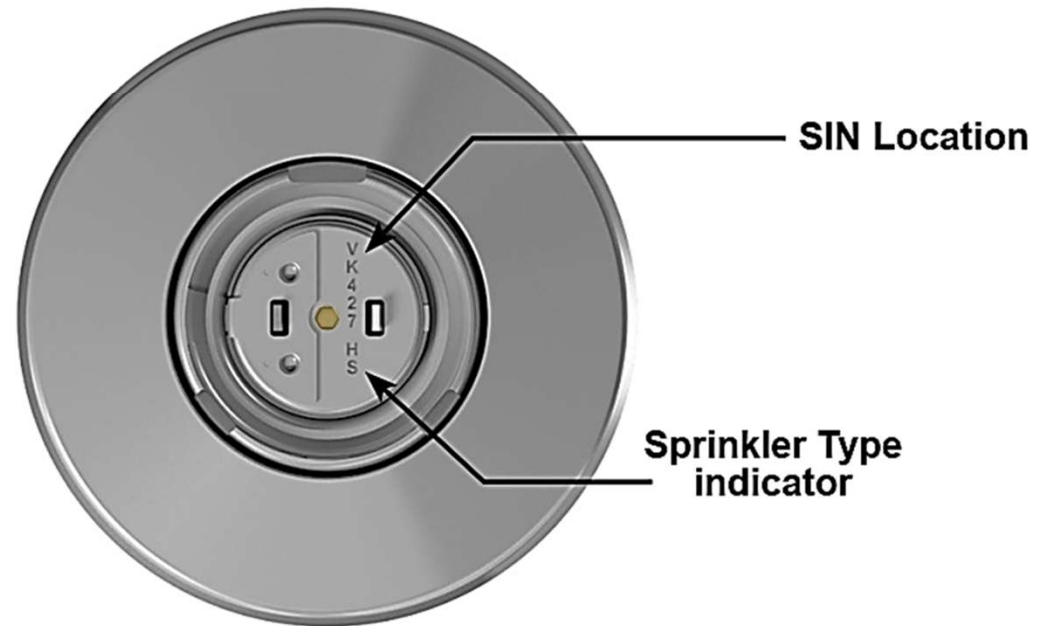
Special Sprinkler

Why Institutional Sprinklers?



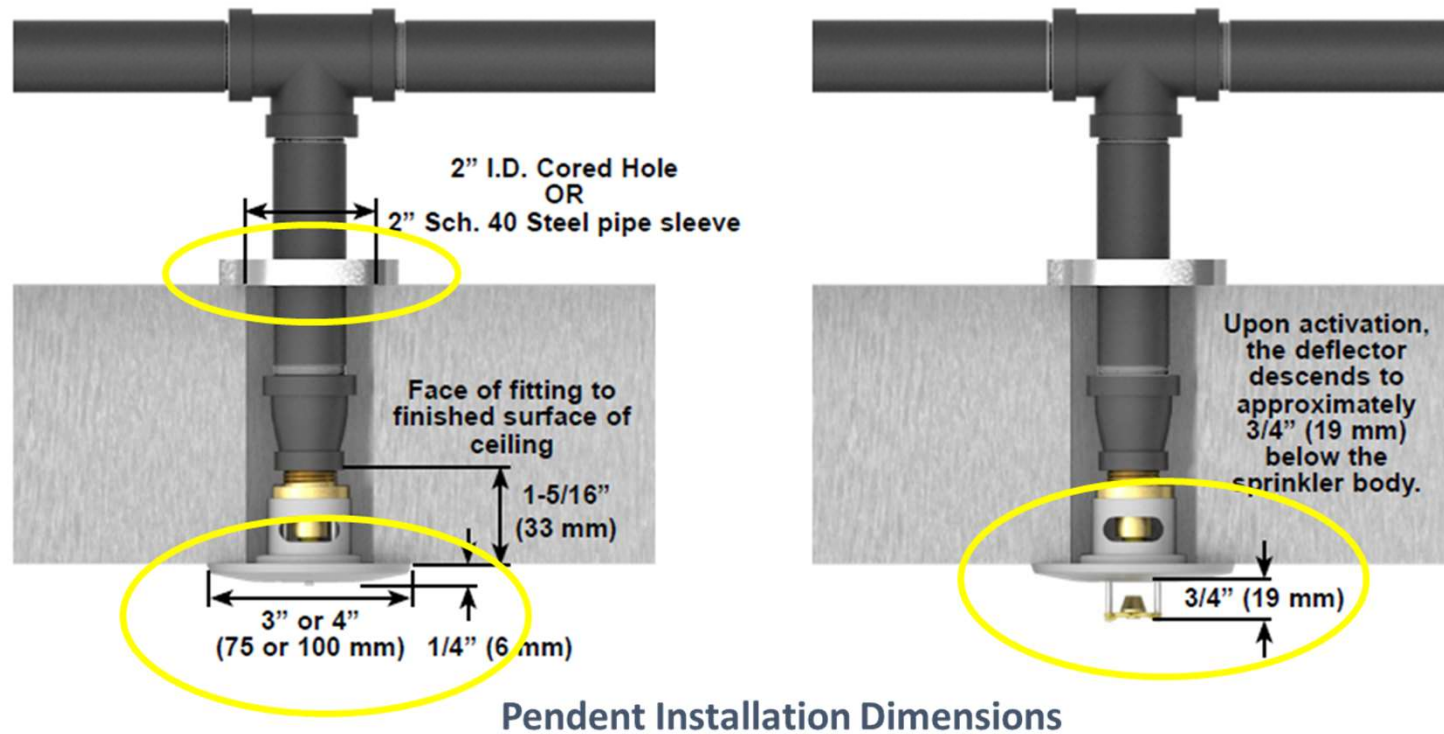
Special Sprinkler

Institutional Sprinklers



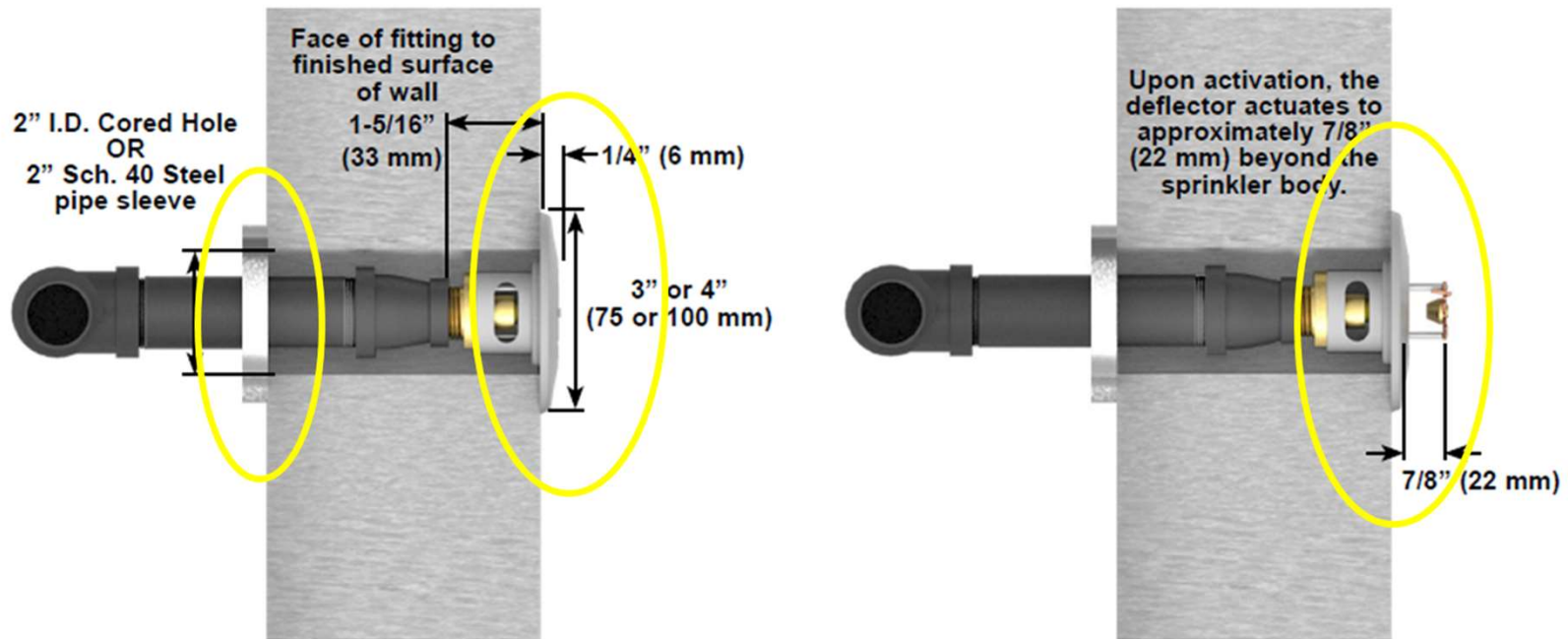
Special Sprinkler

Institutional Sprinklers - Installation



Special Sprinkler

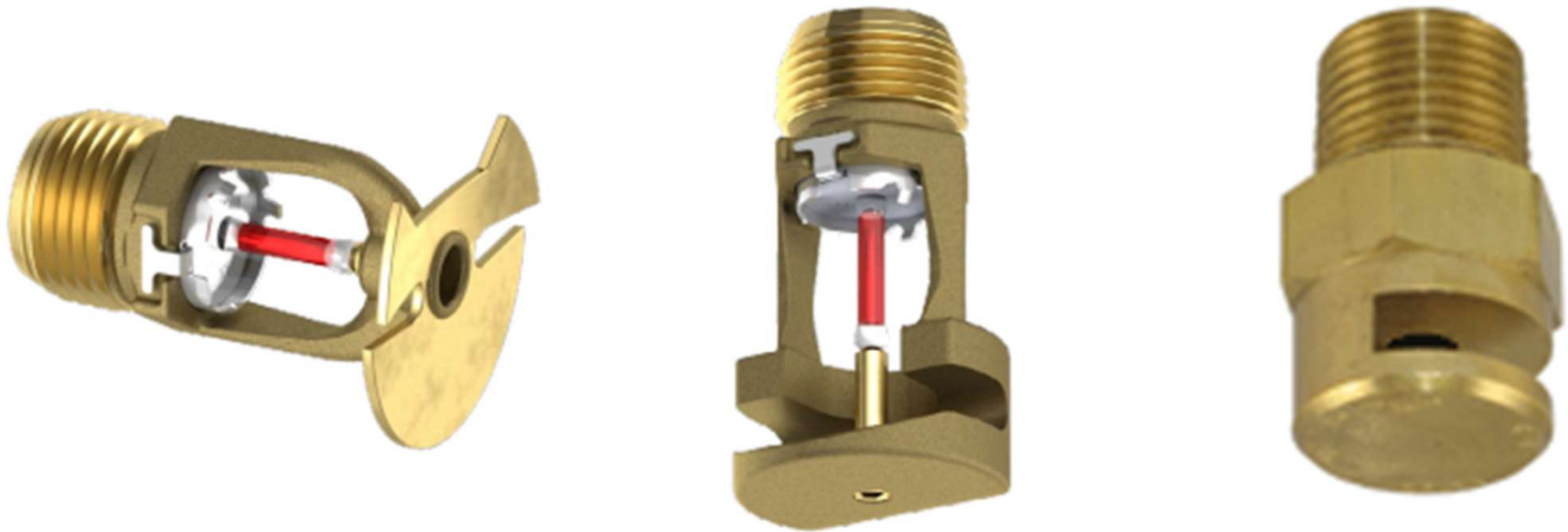
Institutional Sprinklers - Installation



Sidewall Installation Dimensions

Special Sprinkler

Window Sprinklers



Special Sprinkler

Why Window Sprinklers?



INTERNATIONAL
CODE
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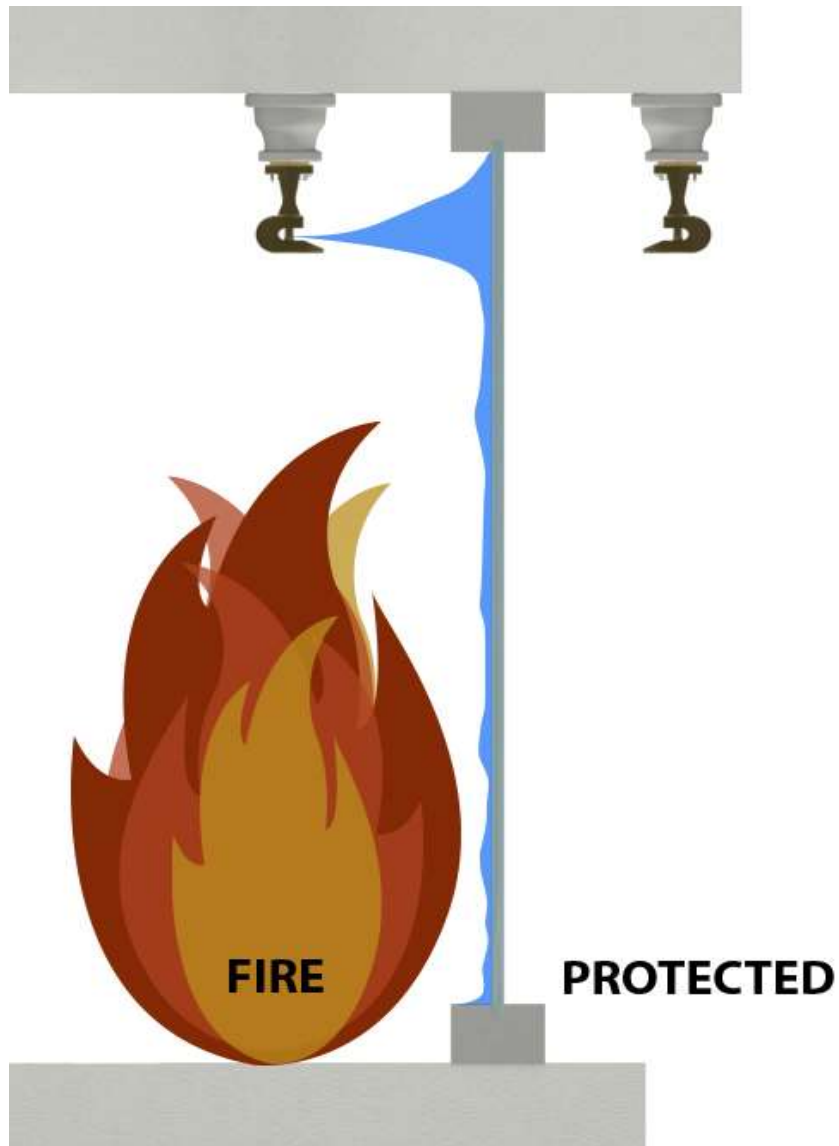


Special Sprinkler

Where Window Sprinklers?



Special Sprinkler

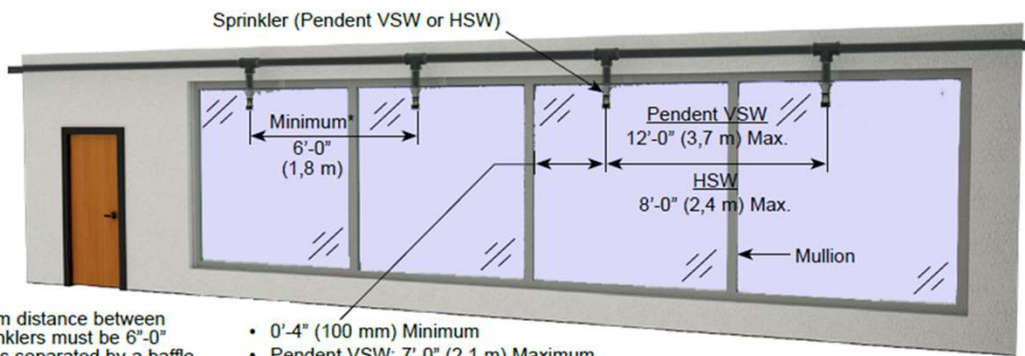


Special Sprinkler

Window and Glass Requirements

- Glass
- Glass size
- Glass frames
- Horizontal mullions
- Operability
- Openings and penetrations

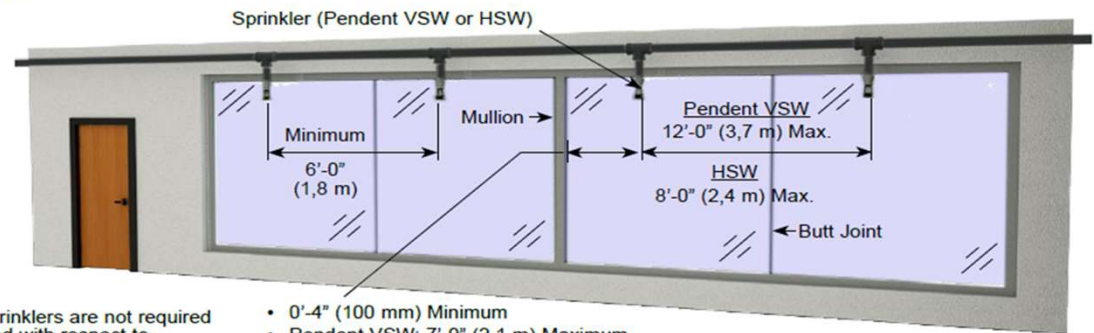
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*The minimum distance between Window Sprinklers must be 6'-0" (1,8 m) unless separated by a baffle or mullion of adequate depth to act as a baffle.

- 0'-4" (100 mm) Minimum
- Pendent VSW: 7'-0" (2,1 m) Maximum
- HSW: 5'-0" (1,5 m) Maximum

Figure 4A: Multiple Windows Separated by Mullions



Window Sprinklers are not required to be located with respect to horizontal or vertical butt joints.

- 0'-4" (100 mm) Minimum
- Pendent VSW: 7'-0" (2,1 m) Maximum
- HSW: 5'-0" (1,5 m) Maximum

Figure 4B: Multiple Windows Separated by Butt Joints

Special Sprinkler

Figure 5A: Vertical Sidewall Pendent

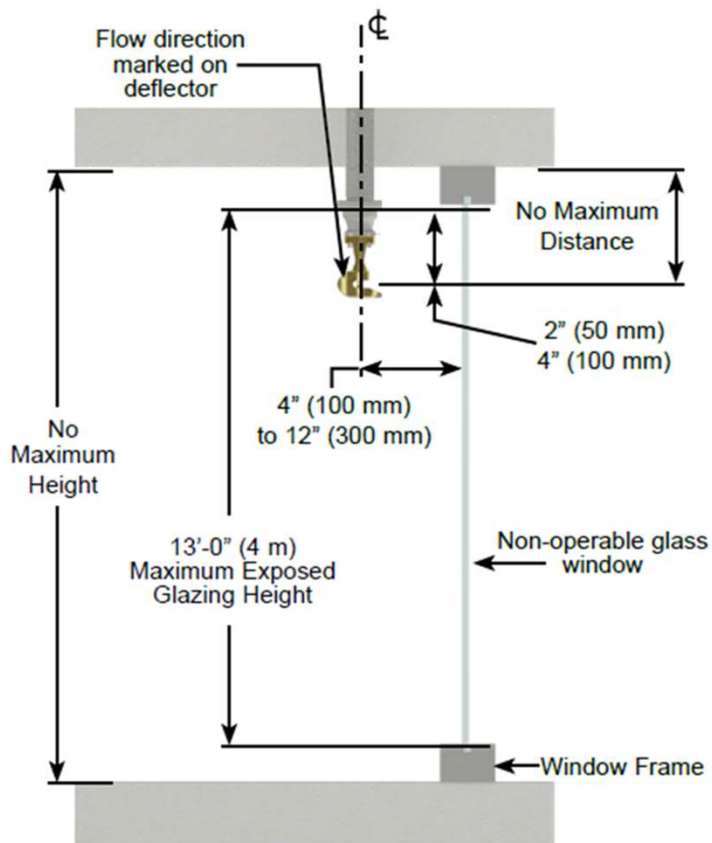
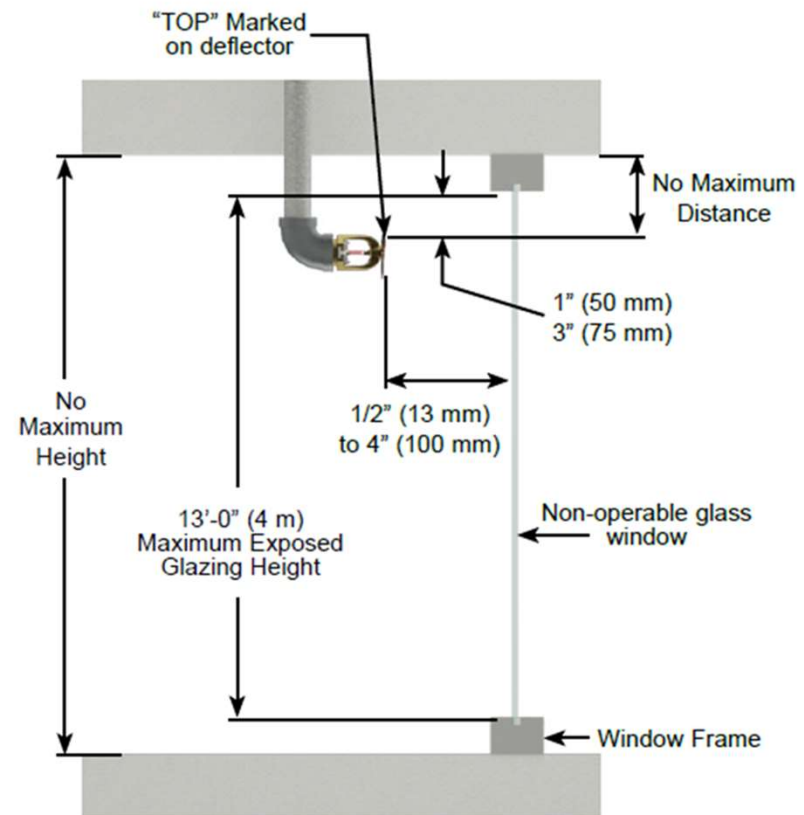


Figure 5B: Horizontal Sidewall



Special Sprinkler



Special Sprinkler

The Big K's

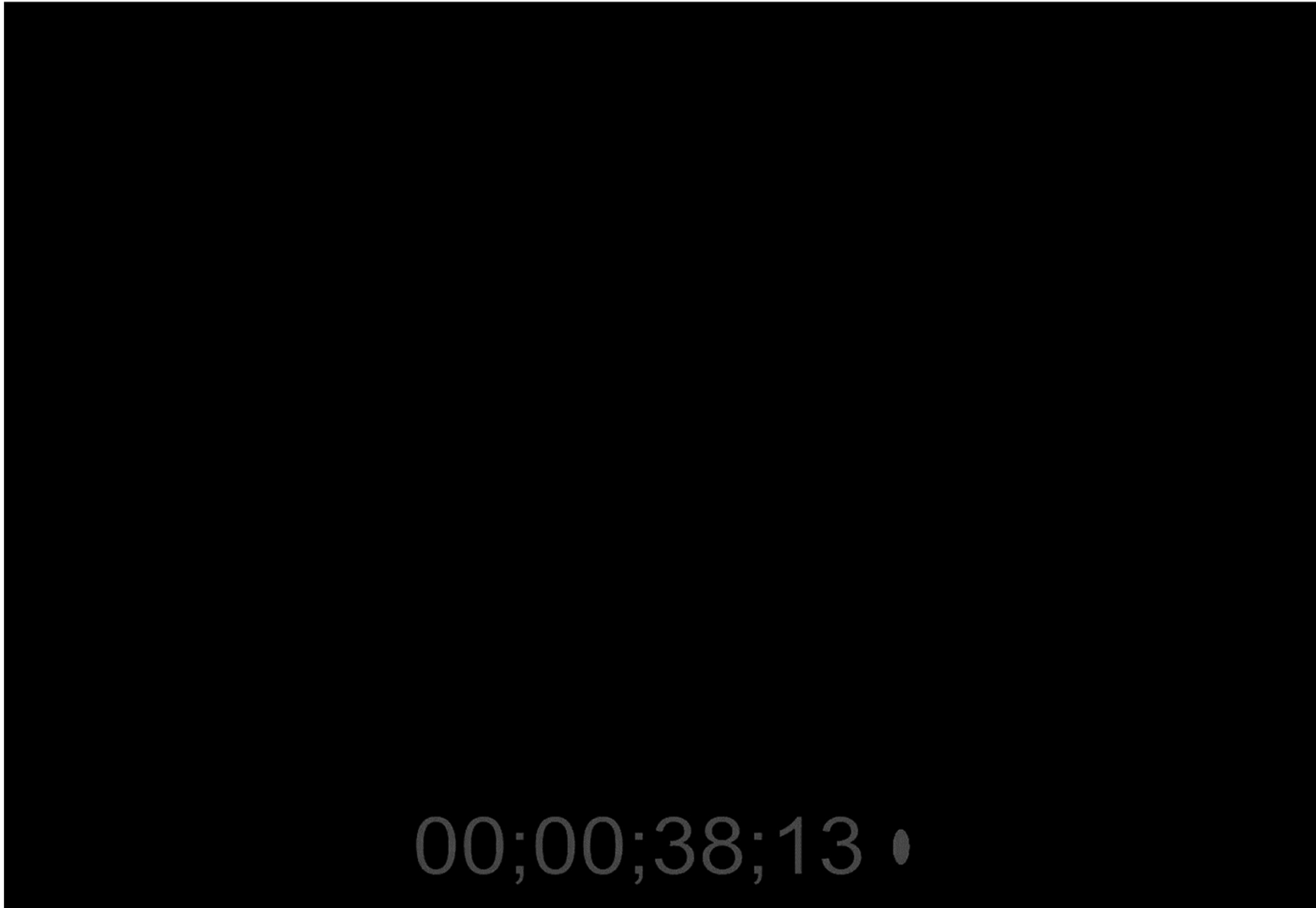


K28.0



K33.6

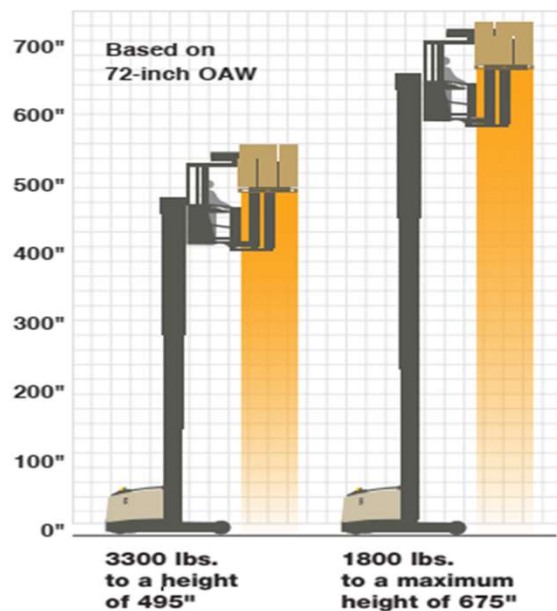
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More Height
675"

With operators and loads up to 675" or six stories in the air, stability is key. Crown's MonoLift mast does the job so your operators can focus on theirs.

56.25 ft

More Capacity at Height

Lift more weight to greater heights than ever before with the TSP Series. Imagine the throughput gains and flexibility in your warehouse when you have fewer capacity constraints—slotting heavier loads nearly anywhere in your operation.

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Table 23.6.1 ESFR Protection of Rack Storage of Group A Plastic Commodities

Storage Arrangement	Commodity	Maximum Storage Height		Maximum Ceiling/ Roof Height		Nominal K-Factor	Orientation	Minimum Operating Pressure	
		ft	m	ft	m			psi	bar
Single-, double-, and multiple-row racks (no open-top containers)	Cartoned nonexpanded	30	9.1	35	11	14 (200)	Upright/pendent	75	5.2
						16.8 (240)	Upright/pendent	52	3.6
						22.4 (320)	Pendent	35	2.4
						25.2 (360)	Pendent	20	1.4
				16.8 (240)	Pendent	52	3.6		
				22.4 (320)	Pendent*	40	2.7		
				25.2 (360)	Pendent*	25	1.7		
				14 (200)	Pendent*	NA	NA		
		45	14	16.8 (240)	Pendent*	NA	NA		
				22.4 (320)	Pendent	40	2.7		
				25.2 (360)	Pendent	40	2.7		
				16.8 (240)	Pendent	52	3.6		
		35	11	40	12	25.2 (360)	Pendent	25	1.7
						14 (200)	Pendent*	NA	NA
				45	14	16.8 (240)	Pendent*	NA	NA
						22.4 (320)	Pendent	40	2.7
25.2 (360)	Pendent					40	2.7		
14 (200)	Pendent*					NA	NA		
40	12			45	14	16.8 (240)	Pendent*	NA	NA
						22.4 (320)	Pendent	40	2.7
		25.2 (360)	Pendent			40	2.7		
		14 (200)	Pendent*			NA	NA		

Special Sprinkler

- **1) Add a level or levels of in-rack sprinklers to maintain your ceiling design with ESFR sprinklers.**
- **2) Add a false ceiling or lower the ceiling.**
- **Neither of these ideas appeal to the builder or the owner.**

Special Sprinkler



Special Sprinkler

Table 17b. Quick Response, 160°F (70°C) Nominally Rated, Standard-Coverage pendent Storage Sprinkler
Ceiling Only Designs for Ceiling Heights Over 40ft (12.0m)

Storage Arrangement	Commodity	Maximum Storage Height ft (m)	Maximum Ceiling Height ft (m)	Ceiling Sprinkler K-Factor	Maximum Vertical Distance from Ceiling to Sprinkler's Thermal Element, in. (mm)	Minimum Aisle Width ft (m)	Sprinkler System Design			Ceiling Sprinkler System Demand gpm (L/min)
							Ceiling Sprinkler System No. of AS @ psi (bar)	Hose Demand, gpm (L/min)	System Duration min	
Solid-Piled, Palletized, Bin-Box, Shelf, and Open-Frame Racks*	Class 1, 2, 3, 4 and Cartoned Unexpanded Plastics	45 (13.7)	50 (15.2)	22.4 (320)	13 (325)	6 (1.8)	10@63 (4.3)	250 (950)	60	1778 (6756)
				25.2 (360)	13 (325)	6 (1.8)	10@50 (3.5)			1782 (6772)
					17 (425)	6 (1.8)	10@75 (5.2)			2182 (8260)
				28.0** (400)**	13 (325)	6 (1.8)	10@40 (2.8)			1771 (6704)
		50 (15.2)	55 (16.8)	33.6 (480)	17 (425)	6 (1.8)	9@55 (3.8)			2242 (8467)
				28.0 (400)	13 (325)	8 (2.4)	9@80 (5.5)			2254 (8532)
				33.6 (480)	17 (425)	6 (1.8)	9@55 (3.8)			2242 (8467)

* See the definition of Open-Frame Rack Storage in Appendix A to confirm that any multiple-row racks being protected in accordance with this table meet the requirements to be considered open-frame

** The design of 10 AS @ 40 psi (2.8 bar) can be reduced to 9 AS @ 40 psi (2.8 bar) when the water supply can also provide a minimum pressure of 80 psi (5.5 bar) from the most remote 4 sprinklers (2 sprinklers on 2 lines)

1594 (6034)

Special Sprinkler

Learning Outcomes

- 1. Explain the advantages of using attic sprinklers over standard spray sprinkler designs
- 2. Discuss the challenges of combustible interstitial space fires and how to provide protection
- 3. Explain the necessity of using institutional sprinklers
- 4. Describe how using window sprinklers allows for architectural freedom in building design.
- 5. Detail the challenges of ever increasing storage heights and the sprinklers that address them.
-

Special Sprinkler

Thank You

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