



Extended Coverage Sprinklers

tyco
Fire Protection Products

//Agenda

//Why Extended Coverage

//History

//Extended Coverage Products

//Concept of Extended Coverage Sprinklers

//Summary



WHY EXTENDED COVERAGE?

// Hazard / Occupancy Classification

Hazard / Occupancy Classification - NFPA 13: Chapter 5, 2007 Ed.

- Light (Offices, churches, hospitals, educational...13: A5.2)
- Ordinary 1 (Laundries, bakeries, electronic plants...13: A5.3)
- Ordinary 2 (Barns, cereal mills, dry cleaners, distilleries...13: A5.4)
- Extra Hazard Group 1 (Plywood manufact., saw mills, die casting...13: A5.5)
- Extra Hazard Group 2 (Flamm. liquids spraying, plastics processing...13: A5.6)
- High-Piled Storage (Storage occupancies)

- Special Occupancy Hazard (Not covered by NFPA 13, i.e., flammable liquid storage)

//Standard Spray Sprinkler Spacing Limitations

Table 8.6.2.2.1(a) Protection Areas and Maximum Spacing (Standard Spray Upright/Standard Spray Pendent) for Light Hazard

Construction Type	System Type	Protection Area		Spacing (maximum)	
		ft ²	m ²	ft	m
Noncombustible obstructed and unobstructed and combustible unobstructed with members 3 ft (0.91 m) or more on center	Pipe schedule	200	18.6	15	4.6
Noncombustible obstructed and unobstructed and combustible unobstructed with members 3 ft (0.91 m) or more on center	Hydraulically calculated	225	20.9	15	4.6
Combustible obstructed with members 3 ft (0.91 m) or more on center	All	168	15.6	15	4.6
Combustible obstructed or unobstructed with members less than 3 ft (0.91 m) on center	All	130	12.1	15	4.6
Combustible concealed space under a pitched roof having combustible wood joist or wood truss construction with members less than 3 ft (0.91 m) on center with slopes having a pitch of 4 in 12 or greater	All	120	11.1	15	4.6
				parallel to the slope 10 perpendicular to the slope*	parallel to the slope 3.05 perpendicular to the slope*

*Where the dimension perpendicular to the slope exceeds 8 ft (2.4 m), the minimum pressure shall be 20 psi (1.4 bar).

//Standard Spray Sprinkler Spacing Limitations

**Table 8.6.2.2.1(b) Protection Areas and Maximum Spacing
(Standard Spray Upright/Standard Spray Pendent) for
Ordinary Hazard**

Construction Type	System Type	Protection Area		Spacing (maximum)	
		ft ²	m ²	ft	m
All	All	130	12.1	15	4.6

//Standard Spray Sprinkler Spacing Limitations

**Table 8.6.2.2.1(c) Protection Areas and Maximum Spacing
(Standard Spray Upright/Standard Spray Pendent) for Extra
Hazard**

Construction Type	System Type	Protection Area		Spacing (maximum)	
		ft ²	m ²	ft	m
All	Pipe schedule	90	8.4	12	3.7
				[In buildings with storage bays 25 ft (7.6 m) wide, 12 ft 6 in. (3.8 m) shall be permitted.]	
All	Hydraulically calculated with density ≥ 0.25	100	9.3	12	3.7
				[In buildings with storage bays 25 ft (7.6 m) wide, 12 ft 6 in. (3.8 m) shall be permitted.]	
All	Hydraulically calculated with density < 0.25	130	12.1	15	4.6

//Standard Spray Sprinkler Spacing Limitations

**Table 8.6.2.2.1(d) Protection Areas and Maximum Spacing
(Standard Spray Upright/Standard Spray Pendent) for
High-Piled Storage**

Construction Type	System Type	Protection Area		Spacing (maximum)	
		ft ²	m ²	ft	m
All	Hydraulically calculated with density ≥0.25	100	9.3	12	3.7
				[In buildings with storage bays 25 ft (7.6 m) wide, 12 ft 6 in. (3.8 m) shall be permitted.]	
All	Hydraulically calculated with density <0.25	130	12.1	15	4.6

//Standard Spray Sprinkler Spacing Limitations

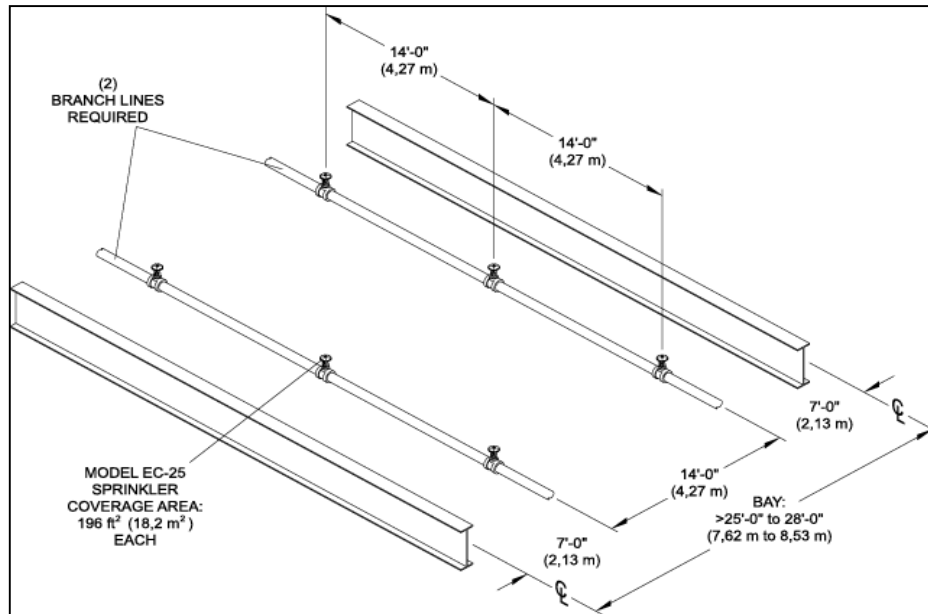
Table 8.7.2.2.1 Protection Areas and Maximum Spacing (Standard Sidewall Spray Sprinkler)

	Light Hazard		Ordinary Hazard	
	Combustible Finish	Noncombustible or Limited-Combustible Finish	Combustible Finish	Noncombustible or Limited-Combustible Finish
Maximum distance along the wall (<i>S</i>)	14 ft (4.2m)	14 ft (4.2m)	10 ft (3m)	10 ft (3m)
Maximum room width (<i>L</i>)	12 ft (3.7m)	14 ft (4.2m)	10 ft (3m)	10 ft (3m)
Maximum protection area	120 ft ² (11.2m ²)	196 ft ² (18.2m ²)	80 ft ² (7.4m ²)	100 ft ² (9.3m ²)

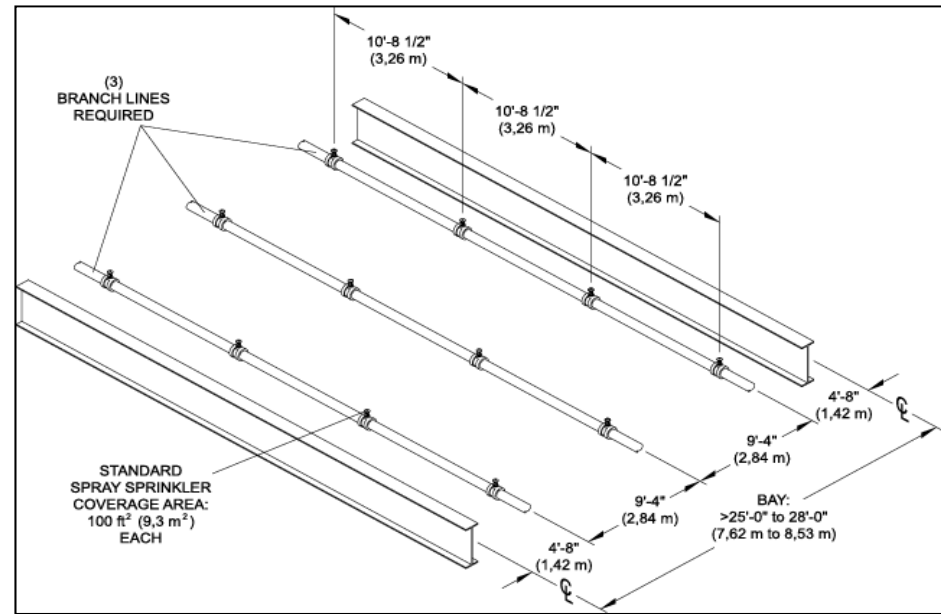
For SI units, 1 ft = 0.3048 m; 1 ft² = 0.0929 m².

//EC Sprinkler Spacing Benefits

EC-25 – 2 Branch Lines



Std. Spray – 3 Branch Lines





HISTORY

// EC Sprinkler Development



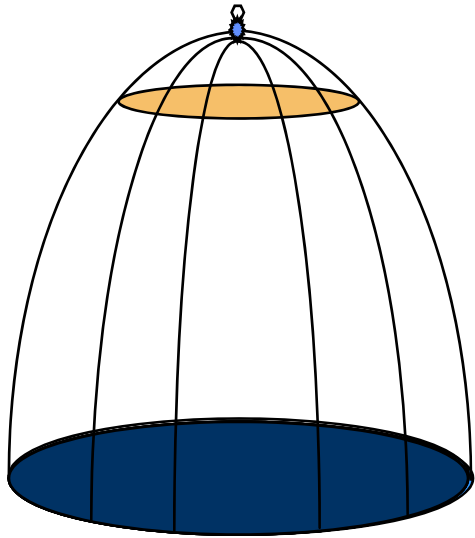
//What's Density?

// The amount of water discharged out of a sprinkler over a given period of time and a given area.

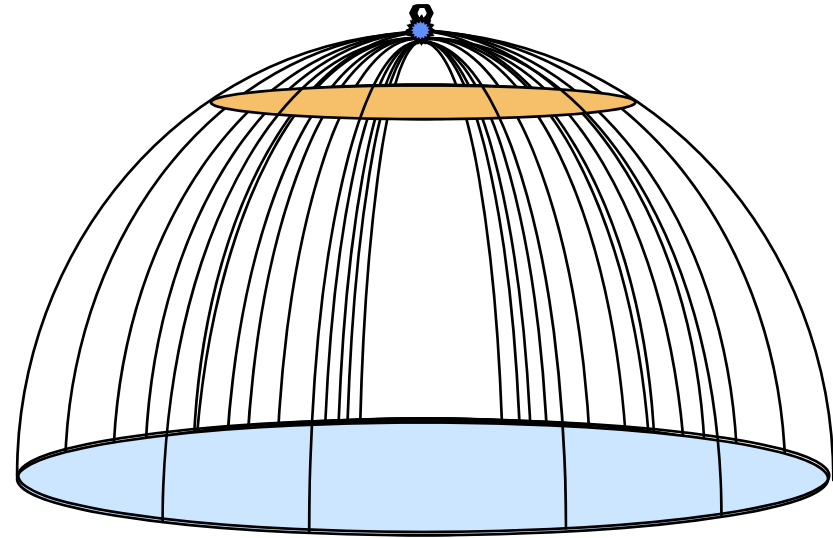
// It is typically expressed as “Gallons Per Minute”(gpm) (mm/min) over “Square Footage” (Sq. Ft.) (m^2)

// Therefore: 0.15gpm/1500sq.ft (6.1 mm/min / 139 m^2) is stating that the system must be designed and the pipe sized to discharge a minimum of 15% of a gallon (L/min / m^2) per minute over any 1500 square feet (139 m^2) of the building.

// Sprinklers Spray Patterns



Standard Spray

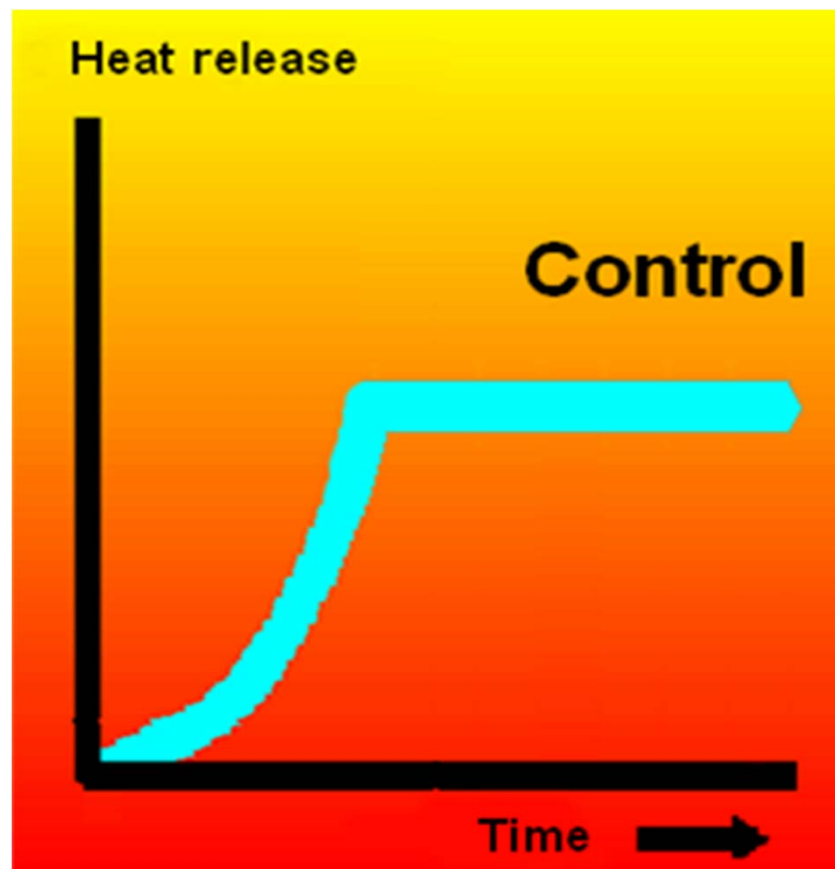


Extended Coverage



EXTENDED COVERAGE PRODUCTS

// Defining Performance Objectives

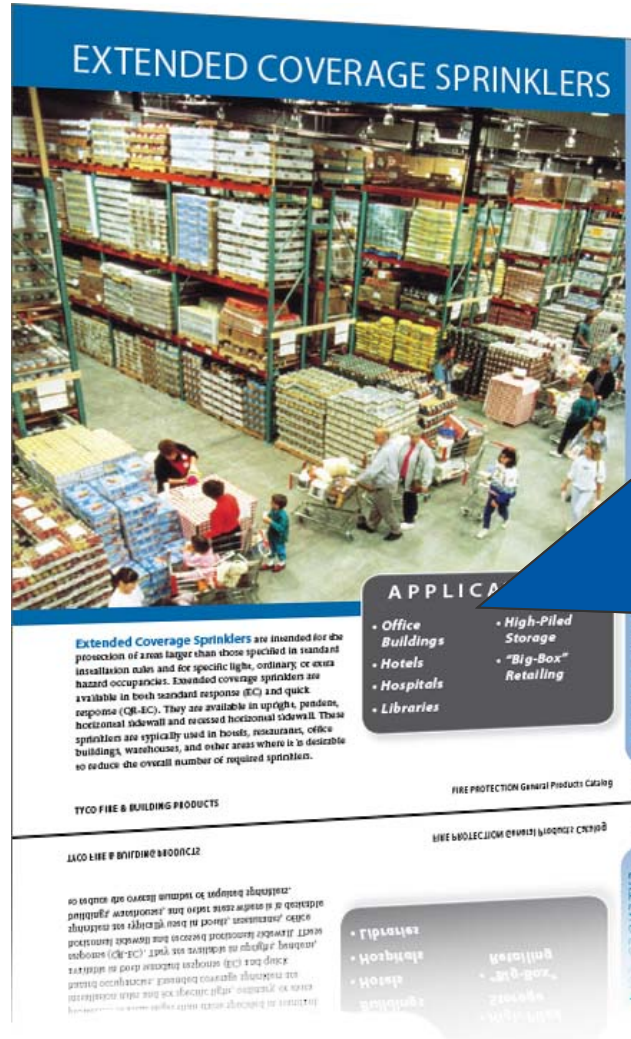


// Defining Performance Objectives

- **Sprinkler Types:**

- Control Mode Density Area (CMDA)
- Control Mode Extended Coverage (CMEC)
- Control Mode Specific Application (CMSA)

//Extended Coverage Sprinkler Applications



APPLICATIONS:

- Office Buildings
- Hotels
- Hospitals
- Libraries
- High-Piled Storage
- "Big-Box" Retailing

// Area of Use – Extended Coverage Sprinklers

// Unobstructed construction consisting of flat, smooth ceilings with a slope not exceeding a pitch of 2" per foot (9.46°).

// Unobstructed or noncombustible obstructed construction, where specifically listed for such use.

// Within trusses or bar joists having web members not greater than 1" (25.4 mm) max. dimension or where trusses are spaced greater than 7-1/2' (2.3 m) on center and where the ceiling slope does not exceed a pitch 2" per foot.

// Under smooth, flat ceilings that have slopes not exceeding a pitch of 4" per foot (18.43°).where specifically listed for such use.

// Hazard / Occupancy Classification

Hazard / Occupancy Classification = NFPA 13: Chapter 5, 2007 Ed.

- Light (Offices, churches, hospitals, educational...13: A5.2)
- Ordinary 1 (Laundries, bakeries, electronic plants...13: A5.3)
- Ordinary 2 (Barns, cereal mills, dry cleaners, distilleries...13: A5.4)
- Extra Hazard Group 1 (Plywood manufact., saw mills, die casting...13: A5.5)
- Extra Hazard Group 2 (Flamm. liquids spraying, plastics processing...13: A5.6)

- Special Occupancy Hazard (Not covered by NFPA 13, i.e., flammable liquid storage)
- Commodity Classification (Storage occupancies, i.e., high-piled storage)

// Area / Density Curves (NFPA 13, 2007)

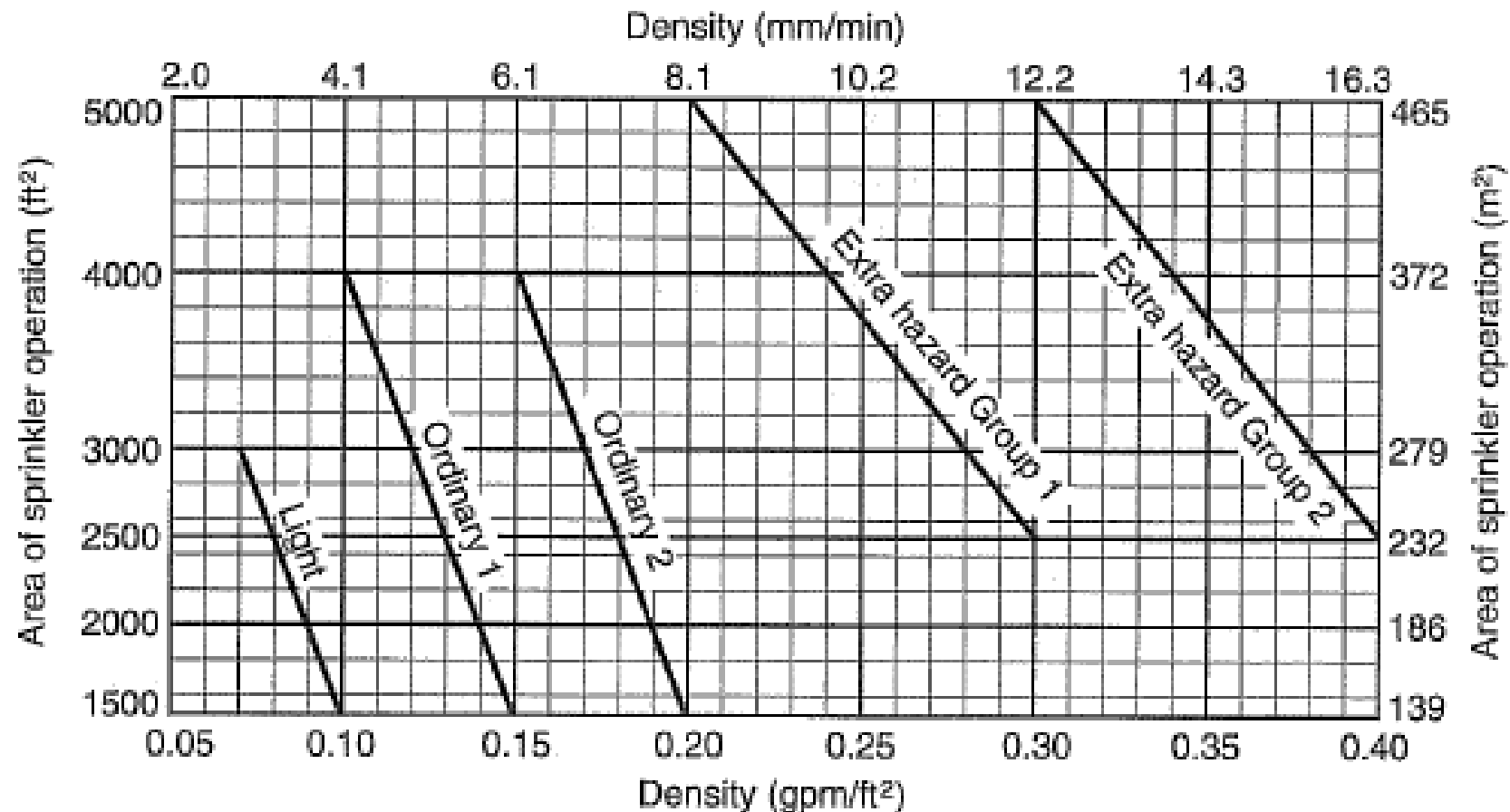
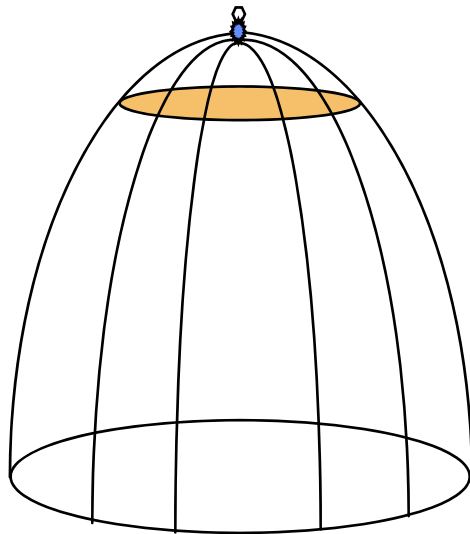
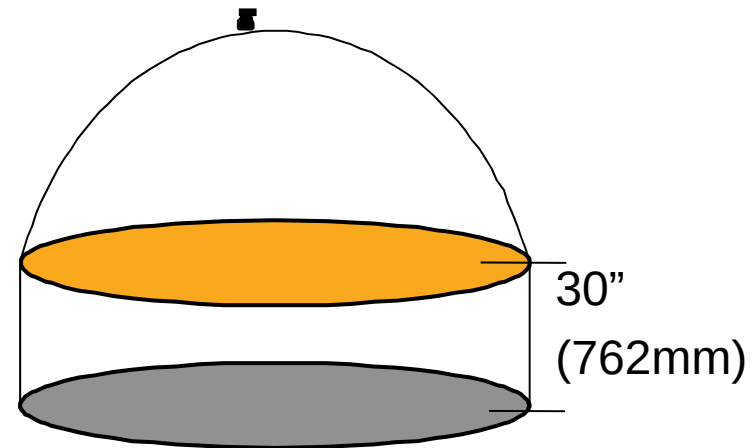


FIGURE 11.2.3.1.1 Density/Area Curves.

// Sprinklers Spray Patterns

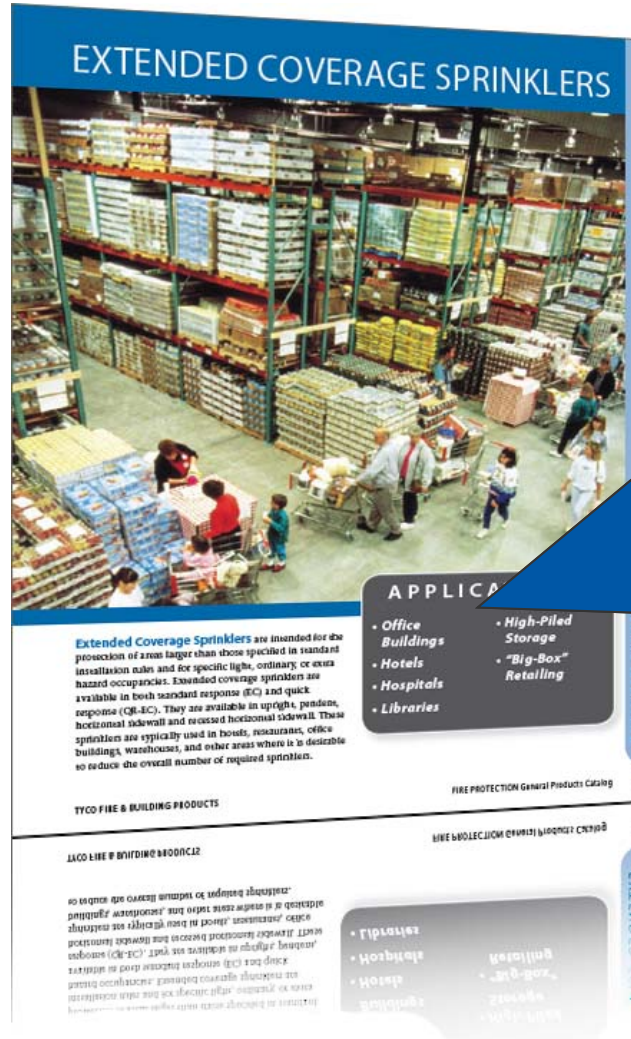


Standard Spray



Extended Coverage

//Extended Coverage Sprinklers Product Line



APPLICATIONS:

- Office Buildings
- Hotels
- Hospitals
- Libraries
- High-Piled Storage
- "Big-Box" Retailing

// Model EC-5

EC-5

Pendent & Recessed Pendent

- Light hazard
- 3 mm bulb
- Coverage up to
20' x 20' (6,1 m x 6,1 m)

K FACTOR	K=5.6 (80,6)
THREAD SIZE	1/2" NPT
ESCUTCHEON	Style 50
ESCUTCHEON FINISH	White Coated, Chrome Plated, Brass Plated
SPRINKLER FINISH	Natural Brass, Chrome Plated, White Polyester
SIN	TY3232
TECH DATA	TFP228



DESCRIPTION	AREA	GPM	PSI
TY3232 (K=5.6) PENDENT	16 x 16	26	21.6
	18 x 18	33	34.7
	20 x 20	40	51.0

1 ft. = 0.3048 m
 1 ft² = 0.093 m²
 1 gpm = 3.785 lpm
 1 psi = 0.06895 bar
 1 gpm/ft² = 40.74 mm/min

TABLE D
FLOW CRITERIA FOR UL AND C-UL LISTING
OF SERIES EC-5 SPRINKLERS

// Model EC-5

Horizontal Sidewall & Recessed Horizontal Sidewall

- Light hazard
- 3 mm bulb
- Coverage up to
16' x 24' (4,9 m x 7,3 m)

K FACTOR	K=5.6 (80,6)
THREAD SIZE	1/2" NPT
ESCUTCHEON	Style 50
ESCUTCHEON FINISH	White Coated, Chrome Plated, Brass Plated
SPRINKLER FINISH	Natural Brass, Chrome Plated, White Polyester
SIN	TY3302
TECH DATA	TFP298



// Model EC-5

5.6 K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY3302) AND RECESSED HORIZONTAL SIDEWALL SPRINKLER (TY3302)

Response Rating	Coverage Area ⁽¹⁾ , Ft. x Ft. (m x m)	Minimum Flow ⁽²⁾ , GPM (LPM)	Minimum Pressure ⁽²⁾ , PSI (BAR)	Deflector-To-Ceiling Distance ⁽³⁾ , In. (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing ⁽⁴⁾ , Ft. (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,48)	4 to 18 (100 to 450)	135, 155 (57,68°C)	8 (2,4)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,48)	4 to 12 (100 to 300)	200 (93°C)	8 (2,4)
Quick	16 x 18 (4,9 x 5,5)	29 (110)	26.8 (1,85)	4 to 18 (100 to 450)	135, 155 (57,68°C)	8 (2,4)
Quick	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)	4 to 18 (100 to 450)	135, 155 (57,68°C)	8 (2,4)
Standard	16 x 18 (4,9 x 5,5)	29 (110)	26.8 (1,85)	4 to 12 (100 to 300)	200 (93°C)	8 (2,4)
Standard	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)	4 to 12 (100 to 300)	200 (93°C)	8 (2,4)

5.6 K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY3302)

Quick	16 x 22 (4,9 x 6,7)	36 (136)	41.3 (2,85)	4 to 18 (100 to 450)	135 (57°C)	8 (2,4)
Standard	16 x 24 (4,9 x 7,3)	39 (148)	48.5 (3,34)	4 to 18 (100 to 450)	135 (57°C)	8 (2,4)

// Model EC-8

EC-8

Pendent & Recessed Pendent

- Light hazard
- 3 mm bulb
- Covers areas as large as 20' x 20' (6,1 m x 6,1 m)

K FACTOR	K=8.0 (115,2)
THREAD SIZE	3/4" NPT
ESCUTCHEON	Style 30 • Style 40
ESCUTCHEON FINISH	White Coated, Chrome Plated, Brass Plated
SPRINKLER FINISH	Natural Brass, Chrome Plated, White Polyester
SIN	TY4232
TECH DATA	TFP223



DESCRIPTION	AREA	GPM	PSI
TY4232 (K=8.0) PENDENT	16 x 16	26	10.6
	18 x 18	33	17.0
	20 x 20	40	25.0

1 ft. = 0.3048 m
 1 ft² = 0.093 m²
 1 gpm = 3.785 lpm
 1 psi = 0.06895 bar
 1 gpm/ft² = 40.74 mm/min

TABLE D
FLOW CRITERIA FOR UL AND C-UL LISTING
OF SERIES EC-8 SPRINKLERS

// Model EC-8

TY-FRB

Horizontal & Recessed Horizontal Sidewall

- Light hazard
- 3 mm bulb
- Two-piece escutcheon converts sidewall sprinklers into low profile sprinkler assemblies with coverage areas up to 16' x 22' (4,9 m x 6,7 m) for K=5.6 and 16' x 24' (4,9 m x 7,3 m) for K=8.0
- Provides $\frac{3}{4}$ " NPT (19,1 mm) of horizontal adjustment from the flush sidewall position

K FACTOR	K=5.6 (80,6) • K=8.0 (115,2)
THREAD SIZE	$\frac{1}{2}$ " NPT • $\frac{3}{4}$ " NPT
ESCUTCHEON	Style 10 • Style 20 Style 30 • Style 40
ESCUTCHEON FINISH	White Coated, Chrome Plated, Brass Plated
SPRINKLER FINISH	Natural Brass, White Polyester, Chrome Plated
SIN	TY3332, TY4332
TECH DATA	TFP296



// Model EC-11 & Model EC-14

EC-11 & EC-14

Upright, Pendent & Recessed Pendent

- Light hazard/Ordinary hazard
- 3 mm bulb
- Nominal K=11.2 designed for coverage applications of 14' x 14' (4,3 m x 4,3 m) up to 20' x 20' (6,1 m x 6,1 m)
- Nominal K=14.0 designed for coverage applications of 16' x 16' (4,9 m x 4,9 m) up to 20' x 20' (6,1 m x 6,1 m)
- Low profile glass bulb spray sprinklers

K FACTOR	K=11.2 (161,3), K=14.0 (201,6)
THREAD SIZE	3/4" NPT
ESCUTCHEON	Style 30 • Style 40 • Style 60
ESCUTCHEON FINISH	White Coated, Chrome Plated, Brass Plated
SPRINKLER FINISH	Natural Brass, Chrome Plated, White Polyester, Lead Coated
SIN	TY5137, TY5237, TY6137, TY6237
TECH DATA	TFP220



// Model EC-11 & Model EC-14

EC-11

Upright

- Light
- 3 mm
- Nom
- appl
- up to
- Nom
- appl
- up to
- Low

DESCRIPTION	AREA	m x m	LIGHT HAZARD 0.10 GPM/FT ²		GROUP I ORDINARY HAZARD 0.15 GPM/FT ²		GROUP II ORDINARY HAZARD 0.20 GPM/FT ²	
			GPM	PSI	GPM	PSI	GPM	PSI
TY5137 (K=11.2) UPRIGHT	14 x 14	4.2 x 4.2	—	—	30	7.2	39	12.1
	16 x 16	4.9 x 4.9	30	7.2	39	12.1	51	20.7
	18 x 18	5.5 x 5.5	33	8.7	49	19.1	65	33.7
	20 x 20	6.1 x 6.1	40	12.8	60	28.7	80	51.0
TY5237 (K=11.2) PENDENT	14 x 14	4.2 x 4.2	—	—	30	7.2	39	12.1
	16 x 16	4.9 x 4.9	30	7.2	39	12.1	51	20.7
	18 x 18	5.5 x 5.5	33	8.7	49	19.1	65	33.7
	20 x 20	6.1 x 6.1	40	12.8	60	28.7	80	51.0
TY6137 (K=14.0) UPRIGHT	14 x 14	4.2 x 4.2	N/A	N/A	—	—	—	—
	16 x 16	4.9 x 4.9	N/A	N/A	39	7.8	51	13.3
	18 x 18	5.5 x 5.5	N/A	N/A	49	12.3	65	21.6
	20 x 20	6.1 x 6.1	N/A	N/A	60	18.4	80	32.7
TY6237 (K=14.0) PENDENT	14 x 14	4.2 x 4.2	—	—	—	—	—	—
	16 x 16	4.9 x 4.9	37	7.0	39	7.8	51	13.3
	18 x 18	5.5 x 5.5	37	7.0	49	12.3	65	21.6
	20 x 20	6.1 x 6.1	40	8.2	60	18.4	80	32.7

1 ft. = 0.3048 m
 1 ft² = 0.093 m²
 1 gpm = 3.785 lpm
 1 psi = 0.06895 bar
 1 gpm/ft² = 40.74 mm/min

TABLE D
FLOW CRITERIA FOR UL AND C-UL LISTING OF SERIES EC-11 AND EC-14 SPRINKLERS

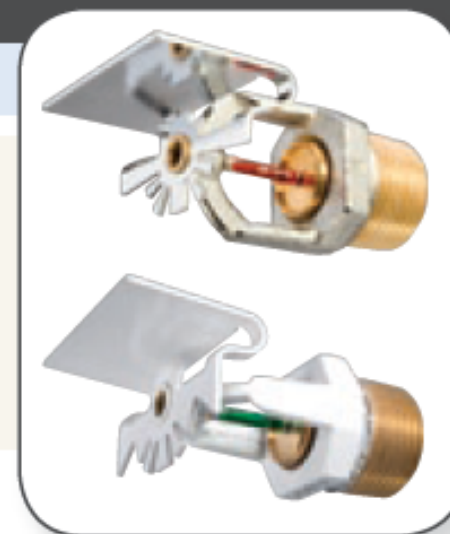
// Model SW 20 / SW-24

ELO SW-20/SW-24

Horizontal Sidewall

- Ordinary hazard
- 3 mm bulb
- Utilizes an Extra Large Orifice (ELO) that allows low water pressure requirements, while providing the flow required for extended coverage
- SW-20 Listed to a 16'-0" (4,9 m) wide and a 20'-0" (6,1 m) throw maximum coverage area
- SW-24 Listed to a 16'-0" (4,9 m) wide and a 24'-0" (7,3 m) throw maximum coverage area

K FACTOR	K=11.2 (161,3)
THREAD SIZE	3/4" NPT
SPRINKLER FINISH	Natural Brass, Chrome Plated, White Polyester
SIN	TY5332, TY5337
TECH DATA	TFP230



// Model SW 20 / SW-24

MODEL SW-24 ECOH HORIZONTAL SIDEWALL SPRINKLER (TY5337) OH Group 1 (0.15 gpm/sq.ft.)

Response Rating	Coverage Area ⁽¹⁾ , Ft. x Ft. (m x m)	Minimum Flow ⁽²⁾ , GPM (LPM)	Minimum Pressure ⁽²⁾ , PSI (BAR)	Deflector-To-Ceiling Distance ⁽³⁾ , In. (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing ⁽⁴⁾ , Ft. (m)
Standard	16 x 22 (4,9 x 6,7)	53 (200)	22.4 (1,54)	6 to 12 (150 to 300)	200	8 (2,4)
Standard	16 x 24 (4,9 x 7,3)	58 (220)	26.8 (1,85)	6 to 12 (150 to 300)	200	8 (2,4)

MODEL SW-24 ECOH HORIZONTAL SIDEWALL SPRINKLER (TY5337) OH Group 2 (0.20 gpm/sq.ft.)

Response Rating	Coverage Area ⁽¹⁾ , Ft. x Ft. (m x m)	Minimum Flow ⁽²⁾ , GPM (LPM)	Minimum Pressure ⁽²⁾ , PSI (BAR)	Deflector-To-Ceiling Distance ⁽³⁾ , In. (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing ⁽⁴⁾ , Ft. (m)
Standard	16 x 22 (4,9 x 6,7)	71 (269)	40.2 (2,77)	6 to 12 (150 to 300)	200	8 (2,4)
Standard	16 x 24 (4,9 x 7,3)	77 (291)	47,3 (3,26)	6 to 12 (150 to 300)	200	8 (2,4)
Standard	16 x 18 (4,9 x 5,5)	58 (220)	26.8 (1,85)	6 to 12 (150 to 300)	155, 200	8 (2,4)
Standard	16 x 20 (4,9 x 6,1)	64 (242)	32.7 (2,25)	6 to 12 (150 to 300)	155, 200	8 (2,4)

// Model SW 20 / SW-24

MODEL SW-20 ECOH HORIZONTAL SIDEWALL SPRINKLER (TY5332) OH Group 1 (0.15 gpm/sq.ft.)

Response Rating	Coverage Area ⁽¹⁾ , Ft. x Ft. (m x m)	Minimum Flow ⁽²⁾ , GPM (LPM)	Minimum Pressure ⁽²⁾ , PSI (BAR)	Deflector-To-Ceiling Distance ⁽³⁾ , In. (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing ⁽⁴⁾ , Ft. (m)
Standard	16 x 16 (4,9 x 4,9)	38 (144)	11.5 (0,79)	6 to 12 (150 to 300)	155, 200	8 (2,4)
Standard	16 x 18 (4,9 x 5,5)	43 (163)	14.7 (1,01)	6 to 12 (150 to 300)	155, 200	8 (2,4)
Standard	16 x 20 (4,9 x 6,1)	48 (182)	18.4 (1,27)	6 to 12 (150 to 300)	155, 200	8 (2,4)

MODEL SW-20 ECOH HORIZONTAL SIDEWALL SPRINKLER (TY5332) OH Group 2 (0.20 gpm/sq.ft.)

Response Rating	Coverage Area ⁽¹⁾ , Ft. x Ft. (m x m)	Minimum Flow ⁽²⁾ , GPM (LPM)	Minimum Pressure ⁽²⁾ , PSI (BAR)	Deflector-To-Ceiling Distance ⁽³⁾ , In. (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing ⁽⁴⁾ , Ft. (m)
Standard	16 x 16 (4,9 x 4,9)	51 (193)	20.7 (1,43)	6 to 12 (150 to 300)	155, 200	8 (2,4)
Standard	16 x 18 (4,9 x 5,5)	58 (220)	26.8 (1,85)	6 to 12 (150 to 300)	155, 200	8 (2,4)
Standard	16 x 20 (4,9 x 6,1)	64 (242)	32.7 (2,25)	6 to 12 (150 to 300)	155, 200	8 (2,4)

// Model CHEC

CHEC

Concealed Horizontal Extended Coverage Sidewall

- Light hazard
- 3 mm bulb
- Attractive concealed contour
- Coverage up to 16' x 22' (4,9 m x 6,7 m)
- Lowest flows & pressures allowed by NFPA 13
- 1/2" adjustment
- Push on / thread off option
- 12" maximum deflector distance from ceiling
- No "Slots" in cover plate

K FACTOR	K=8.0 (115,2)
THREAD SIZE	3/4" NPT
SPRINKLER FINISH	Bright White, Chrome Plated, Custom
SIN	TY4332
TECH DATA	TFP265



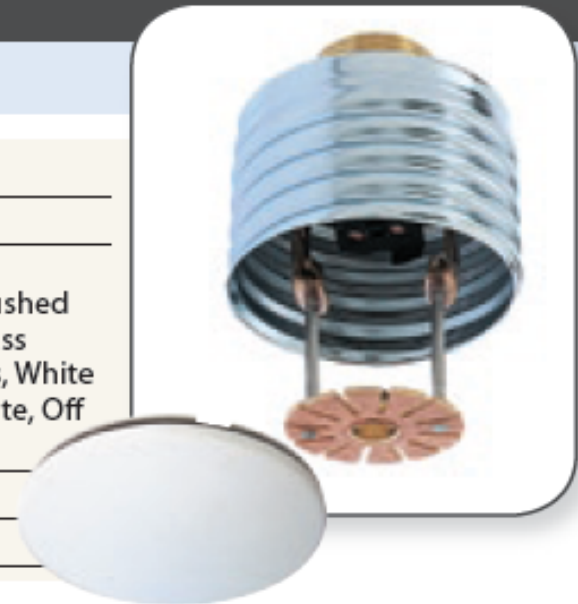
// Model ELOC

ELOC

Concealed Pendent

- Light hazard
- Covers 400 sq. ft. (37,2 m²) using less pressure than a standard 1/2" (12,7 mm) sprinkler at 225 sq. ft. (20,3 mm)
- Available with optional dust and air seal
- Concealed in an enclosed escutcheon plate with flat cover for use in those applications where aesthetics is a primary consideration

K FACTOR	K=11.2 (161,3)
THREAD SIZE	3/4" NPT
SPRINKLER FINISH	Cover Plate: Chrome Plated, Brushed Chrome Plated, Brass Plated, Bright Brass, White Painted, Bright White, Off White, Custom
SIN	TY5522
TECH DATA	TFP250



// Model RFII (Royal Flush II)

RFII (ROYAL FLUSH II)

Concealed Pendent

- Light hazard
- 3 mm bulb
- Maximum 18' x 18' (5,5 m x 5,5 m) QR Listing
- Concealed in an enclosed escutcheon plate with flat cover for use in those applications where aesthetics is a primary consideration
- Separable, two-piece design of the mounting cup and cover allows installation of the sprinklers and pressure testing of the fire protection system prior to installation of a suspended ceiling or application of the finish coating to a fixed ceiling

K FACTOR	K=5.6 (80.6)
THREAD SIZE	1/2" NPT
SPRINKLER FINISH	Cover Plate: Chrome Plated, Brass Plated, White Painted, Custom
SIN	TY3532
TECH DATA	TFP260

- Internally threaded closure with 1/2" (12,7 mm) of adjustment



// Model EC-25

EC-25

Upright

- All hazard
- Solder type
- Extended coverage area/density
- Deflector design allows maximum coverage area of 14' X 14' (4,3m X 4,3m)
- For use in high density applications such as "big box" retailing, extra hazard, and high-piled storage occupancies
- Minimum operating pressure of 7 psi (0,48 bar)

K FACTOR	K=25.2 (362,9)
THREAD SIZE	1" NPT or ISO 7-R1
SPRINKLER FINISH	Natural Brass
SIN	TY9128
TECH DATA	TFP213



// Model EC-25

Table 8 – EC-25 Operating Pressure at Various Spacings

EC-25 Spacing	Density				
	0.37 gpm/ft² (15,1 mm/min)	0.45 gpm/ft² (18,3 mm/min)	0.6 gpm/ft² (24,4 mm/min)	0.8 gpm/ft² (32,5 mm/min)	1.0 gpm/ft² (40,7 mm/min)
100 ft² (10'x10') 9, 29 m² (3,05 x 3,05 m)	7.0 psi (0,48 bar)	7.0 psi (0,48 bar)	7.0 psi (0,48 bar)	10.1 psi (0,70 bar)	15.8 psi (1,09 bar)
120 ft² (10'x12') 11, 15 m² (3,05 x 3,66 m)	7.0 psi (0,48 bar)	7.0 psi (0,48 bar)	8.2 psi (0,57 bar)	14.5 psi (1,00 bar)	22.7 psi (1,57 bar)
140 ft² (10'x14') 13, 01 m² (3,05 x 4,27 m)	7.0 psi (0,48 bar)	7.0 psi (0,48 bar)	11.1 psi (0,77 bar)	19.8 psi (1,37 bar)	30.9 psi (2,13 bar)
144 ft² (12'x12') 13, 38 m² (3,66 x 3,66 m)	7.0 psi (0,48 bar)	7.0 psi (0,48 bar)	11.8 psi (0,81 bar)	20.9 psi (1,44 bar)	32.7 psi (2,25 bar)
150 ft² (12'x12'-6") 13, 94 m² (3,66 x 3,81 m)	7.0 psi (0,48 bar)	7.2 psi (0,50 bar)	12.8 psi (0,88 bar)	22.7 psi (1,57 bar)	35.4 psi (2,44 bar)
168 ft² (12'x14') 15, 61 m² (3,66 x 4,27 m)	7.0 psi (0,48 bar)	9.0 psi (0,62 bar)	16.0 psi (1,10 bar)	28.4 psi (1,96 bar)	44.4 psi (3,06 bar)
182 ft² (13'x14') 16, 91 m² (3,96 x 4,27 m)	7.1 psi (0,49 bar)	10.6 psi (0,73 bar)	18.8 psi (1,30 bar)	33.4 psi (2,30 bar)	52.2 psi (3,60 bar)
196 ft² (14'x14') 18, 21 m² (4,27 x 4,27 m)	8.3 psi (0,57 bar)	12.3 psi (0,85 bar)	21.8 psi (1,50 bar)	38.7 psi (2,67 bar)	60.5 psi (4,17 bar)

// NFPA 13 2013 – New Chapter 21 -Alternative Sprinkler System Designs for Chapters 12 Through 20

Storage Arrangement	Commodity Class	Maximum Storage Height		Maximum Ceiling/Roof Height		K-Factor/ Orientation	Type of system	Number of Design Sprinklers	Minimum Operating Pressure	Maximum Coverage Area	Hose Stream Allowance	Water Supply Duration (hours)
		ft	m	ft	m							
Sprinkler Protection Criteria for Open-Frame Rack Storage	Class I Through Class IV, encapsulated and unencapsulated and Cartoned Unexpanded Plastics	20	6.1	30	9.1	25.2 (360) Upright/ Pendent	Wet	6	30 psi (2.1 bar)	12ft x 12ft (3.6m x 3.6m) 144 ft ² (13.4 m ²)	250 gpm (950 L/ min)	1
		20	6.1	30	9.1	25.2 (360) Upright/ Pendent	Wet	6	30 psi (2.1 bar)	14ft x 14ft (4.2m x 4.2m) 196 ft ² (18.2 m ²)	250 gpm (950 L/ min)	1
		25	7.6	30	9.1	25.2 (360) Upright/ Pendent	Wet	6	30 psi (2.1 bar)	12ft x 12ft (3.6m x 3.6m) 144 ft ² (13.4 m ²)	250 gpm (950 L/ min)	1
		25	7.6	30	9.1	25.2 (360) Upright/ Pendent	Wet	6	30 psi (2.1 bar)	14ft x 14ft (4.2m x 4.2m) 196 ft ² (18.2 m ²)	250 gpm (950 L/ min)	1
		25	7.6	35	11	25.2 (360) Upright/ Pendent	Wet	8	40 psi (2.6 bar)	12ft x 12ft (3.6m x 3.6m) 144 ft ² (13.4 m ²)	250 gpm (950 L/ min)	1
		25	7.6	35	11	25.2 (360) Upright	Wet	8	40 psi (2.6 bar)	14ft x 14ft (4.2m x 4.2m) 196 ft ² (18.2 m ²)	500 (1800 L/ min)	1.5
		30	9.1	35	11	25.2 (360) Upright/ Pendent	Wet	8	40 psi (2.6 bar)	12ft x 12ft (3.6m x 3.6m) 144 ft ² (13.4 m ²)	250 gpm (950 L/ min)	1
		30	9.1	35	11	25.2 (360) Upright	Wet	8	40 psi (2.6 bar)	14ft x 14ft (4.2m x 4.2m) 196 ft ² (18.2 m ²)	500 (1800 L/ min)	1.5
		30	9.1	35	11	25.2 (360) Upright	Wet	8	40 psi (2.6 bar)	14ft x 14ft (4.2m x 4.2m) 196 ft ² (18.2 m ²)	500 (1800 L/ min)	1.5

Table 21.3.1 Sprinkler Protection Criteria for Open-Frame Rack Storage of Class I Through Class IV and Cartoned Unexpanded Plastic Commodities.

SPECIAL

// Table 21.2 – K25.2 EC (280) Upright 8 sprinklers @ 40 psi (2.6 bar) = 8 x 159 gpm = 1272 (4815 L/min)

// Table 21.2 - Hose allowance is 250 gpm (946 L/min) for 60 minutes

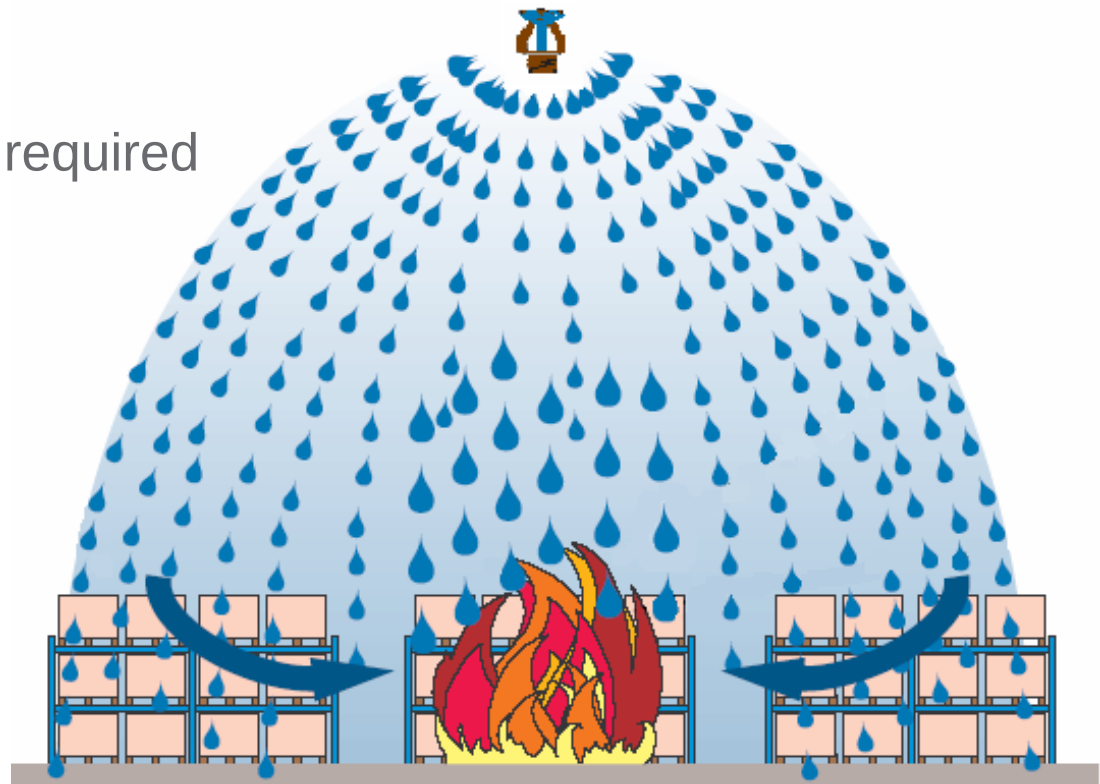
// K25.2 EC (280) @ 144 ft² (13.4 m²)

Sprinkler Demand GPM (LPM)	Hose Demand GPM (LPM)	Total Flow GPM (LPM)	Duration Minutes	Total Gallons (Liters)
1,275 (4,819)	250 (946)	1,525 (5,769)	60	91,500 (346,140)

// High Piled Storage Fires

// A high challenge fire can have an upward draft equivalent to 30 – 35 mph (50 – 56 km/h)

// Large flow rates might be required for some high challenge applications



// Retail Fire Research Coalition



 **TARGET**



 **THE HOME DEPOT**



 **WAL★MART**[®]
SUPERCENTER

// Retail Fire Research Coalition

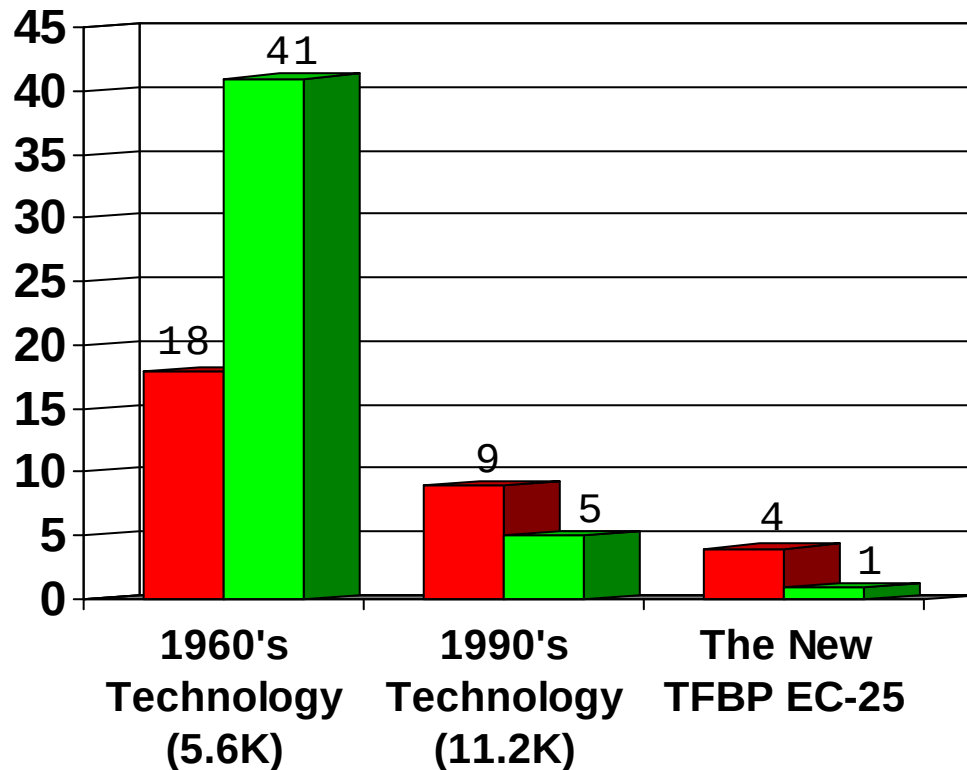
Target and like stores



A wet system designed to provide 0.55 gpm/ft² (22,4 mm/min) density over a 2000 ft² (185,8 m²) area for the first four sprinkler operations, and 0.45 gpm/ft² (18,3 mm/min) density over a 2000 ft² (185,8 m²) area, without the use of in-rack sprinklers shall be permitted when the following are met:

- a. EC-25 sprinklers listed for storage occupancies shall be provided.
- b. Storage height shall not exceed 15 ft (4,57 m).
- c. Ceiling height shall not exceed 20 ft - 6 in (6,25 m).
- d. Shelving structure shall not exceed 48 in (1,22 m) aggregate depth or 12 ft (3,66 m) in height.
- e. Shelving shall be permitted to be made of solid particleboard.
- g. A minimum aisle space of 3 ft (0,91 m) shall be maintained.
- h. Rack length shall be a maximum of 70 ft (21,34 m).

// Extended Coverage Sprinklers for Extra Hazard & Storage Occupancies



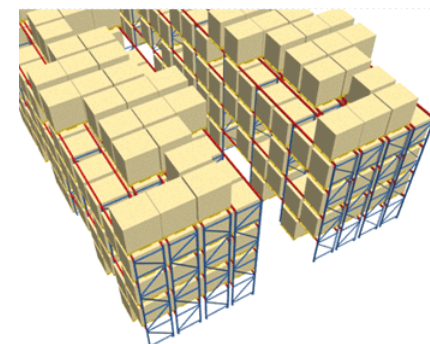
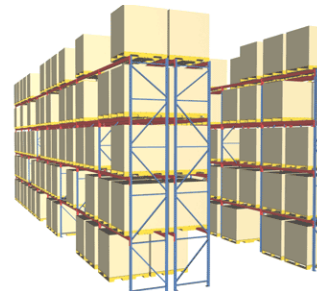
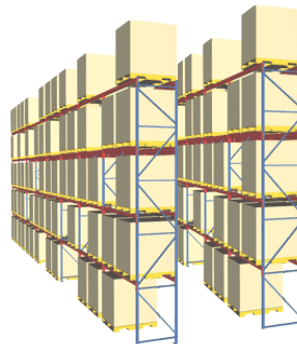
6,1 m (20') high storage of Class II commodity
in a 9,14 m (30') high building



**# OPEN
SPRINKLERS**
**PALLETS
CONSUMED**

- Traditional Sprinklers limited to 100 ft² EC-25 can cover up to 196 ft²
- Big Box Industry committed to using this sprinkler (Wal-Mart, Best Buy, Target, Office Depot, Sam's Club Bed, Bath & Beyond, Costco & Home Depot)

// Enhanced Protection Extended Coverage (EPEC)



STORAGE CATEGORY	MAXIMUM STORAGE HEIGHT, m			
	ORDINARY HAZARD III/10		ORDINARY HAZARD III/12.5	
	Free Standing or Block Stacking (Note 1)	All Other Storage Methods (Note 2)	Free Standing or Block Storage (Notes 1 & 3)	All Other Storage Methods (Notes 2 & 3)
I	4,0	3,5	4,5	4,0
II	3,0	2,6	4,0	3,5
III	2,1	1,7	3,1	2,6
IV (Note 4)	1,2	1,2	1,5	1,5

NOTES

1. Free standing and block stacking ST1 only.
2. All other storage methods ST2 to ST6.
3. Storage areas to the heights specified shall not exceed 4 m² in plan area. See TB222.3.2.
4. Not including exposed expanded plastic.



CONCEPT OF EXTENDED COVERAGE SPRINKLERS

// Common Misconceptions about Extended Coverage Sprinklers

// Extended Coverage Sprinkler Head requires higher Flowrate & Pressure Head, thus bigger Pump/Motor

- **True:** Residue Pressure and Flow of 1 Single Head is higher than Standard Sprinkler
- **False:** Area of Operation and Density are the same for a given hazard group. Since lesser EC Sprinklers are required, the flowrate is almost the same!

Extended Coverage Sprinkler Head requires bigger Water Tank

- **True and False:** Depending on the designed area coverage per EC sprinkler. Example: 5.4m x 5.4m coverage will have the almost same amount of water required while 6.1m x 6.1m coverage needs approximately 20% more water (due to NFPA's min 5 Sprinkler Head Calculation requirement).

// Concept of Extended Coverage Sprinkler

// Example

Occupancy: Carpark
Density: 6.1mm/min

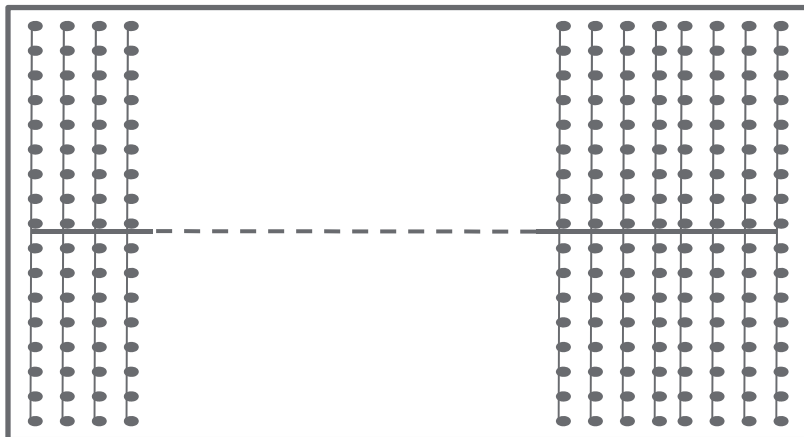
Size: 100m x 50m
Area of Operation: 139m²

Hazard Grp: OH1

Standard Sprinkler

- K-factor: 80 (5.6)
- Sprinkler Spacing: 3m
- Sprinklers/branch: 17
- Branch Spacing: 4m
- No. of Branches: 25

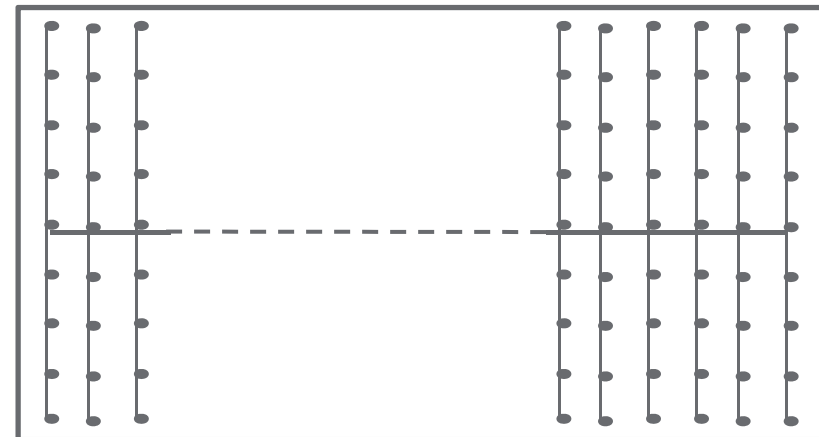
Total No. of Sprinklers: 425



Extended Coverage Sprinkler

- K-factor: 160 (11.2)
- Sprinkler Spacing: 5.4m
- Sprinklers/branch: 9
- Branch Spacing: 5.4m
- No. of Branches: 17

No. of Sprinklers: 153



64% LESS SPRINKLERS

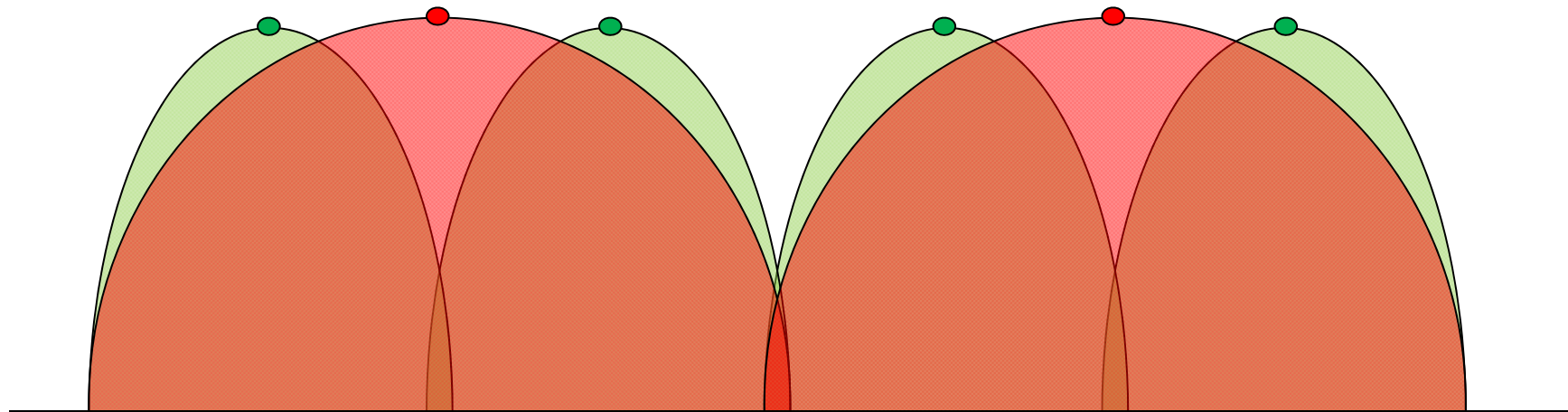
// Concept of Extended Coverage Sprinkler

// Example

Occupancy: Carpark
Density: 6.1mm/min

Size: 100m x 50m
Area of Operation: 139m²

Hazard Grp: OH1
Require Flow: 847.9 l/min



Standard Sprinkler

- K-factor: 80 (5.6)
- Min. Residue Press: 0.78 bar
- Min. Flow per Spk: 70.6 l/min

Calc Pressure: 1.97 bars

Calc Flow: 1005.7 l/min (ok)

Extended Coverage Sprinkler

- K-factor: 160 (11.2)
- Min. Residue Press: 1.32 bars
- Min. Flow per Spk: 185.4 l/min

Calc Pressure: 2.13 bars

Calc Flow: 989.4 l/min (ok)

//Hydraulic Calculation (k80 Spk)

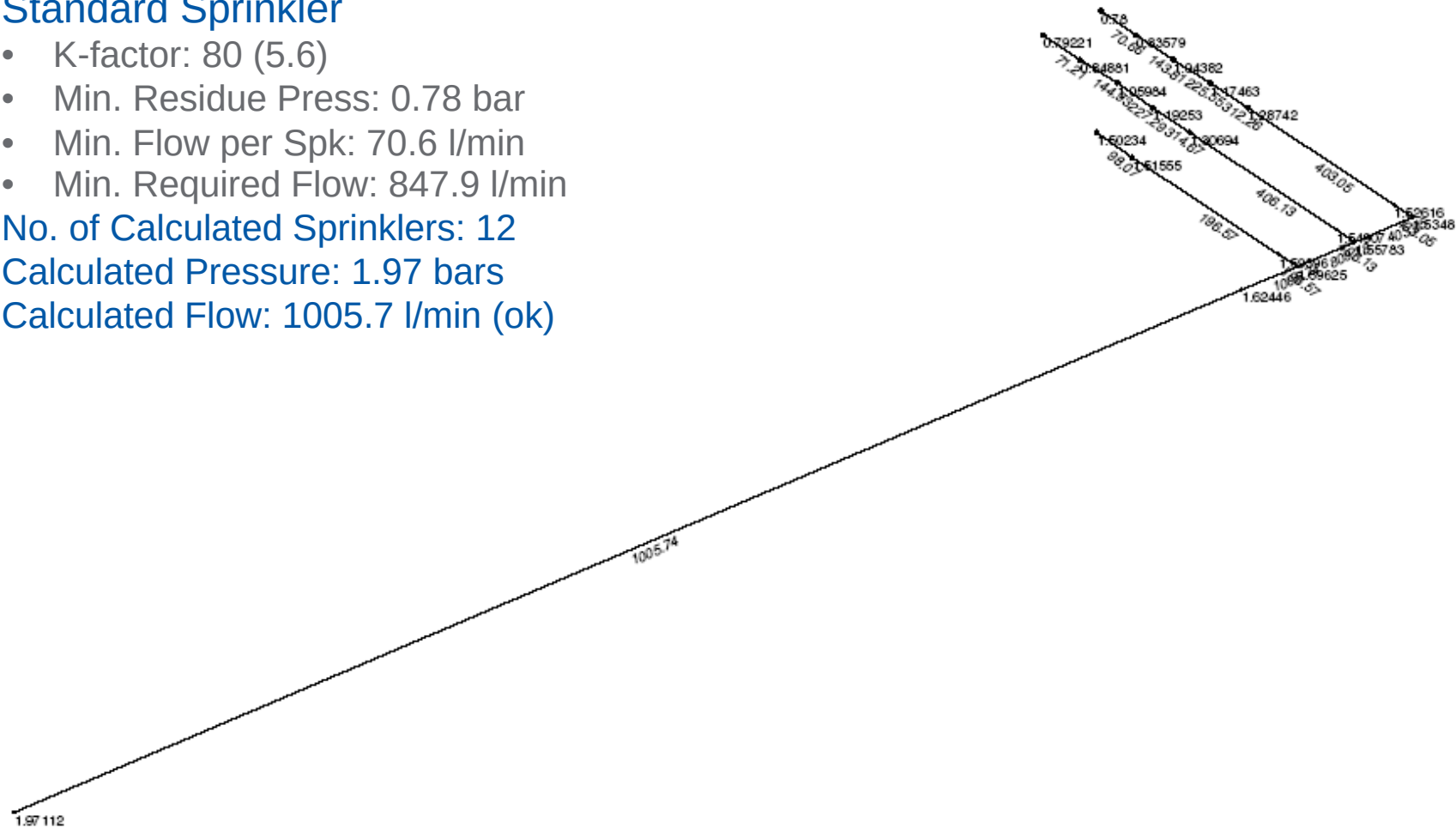
Standard Sprinkler

- K-factor: 80 (5.6)
- Min. Residue Press: 0.78 bar
- Min. Flow per Spk: 70.6 l/min
- Min. Required Flow: 847.9 l/min

No. of Calculated Sprinklers: 12

Calculated Pressure: 1.97 bars

Calculated Flow: 1005.7 l/min (ok)



// Hydraulic Calculation (k160 Spk)

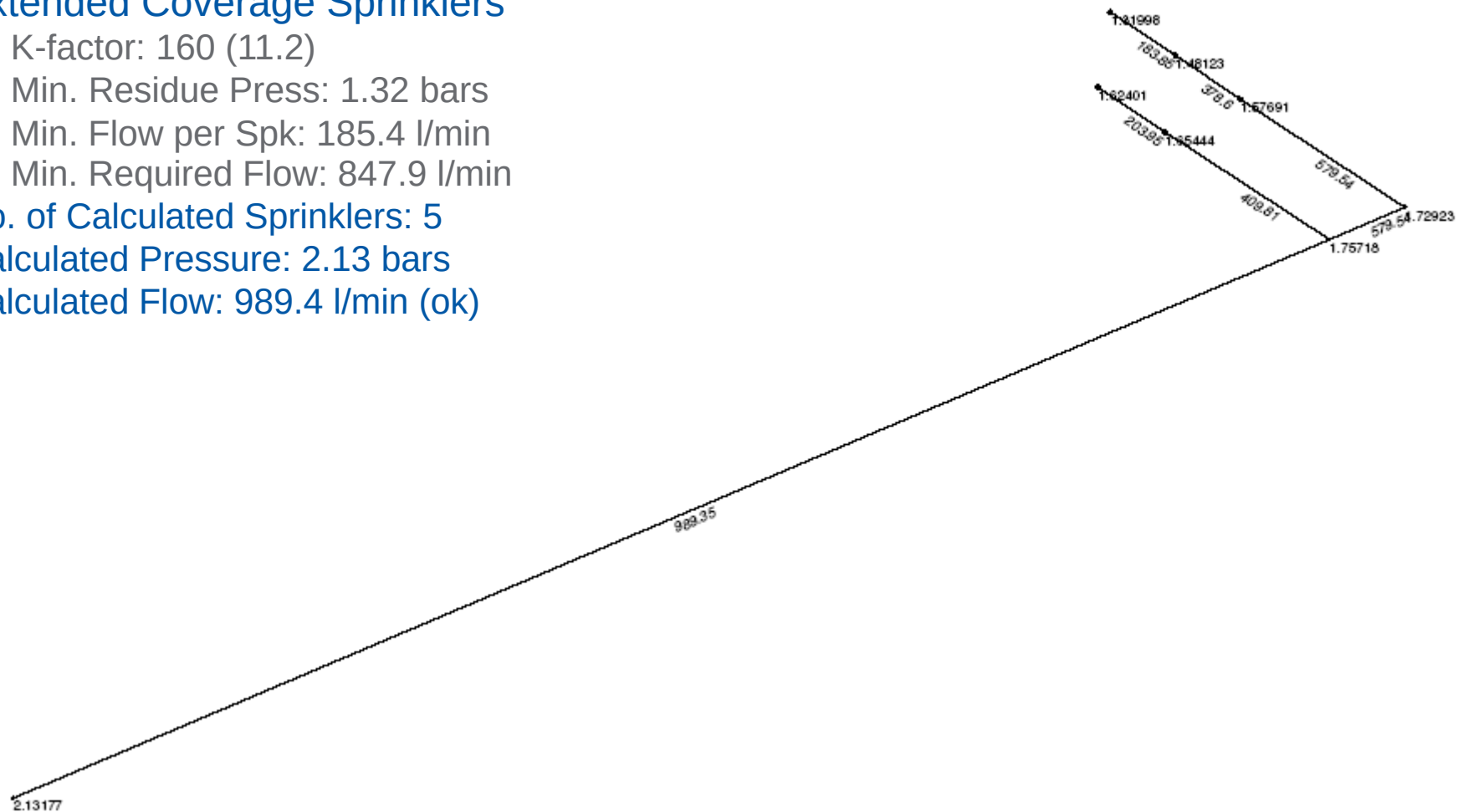
Extended Coverage Sprinklers

- K-factor: 160 (11.2)
- Min. Residue Press: 1.32 bars
- Min. Flow per Spk: 185.4 l/min
- Min. Required Flow: 847.9 l/min

No. of Calculated Sprinklers: 5

Calculated Pressure: 2.13 bars

Calculated Flow: 989.4 l/min (ok)



// COST COMPARISON – EC vs. Standard Coverage (Higher Labor)

Range Pipe	Rate (Labor + Pipe)	Using k5.6 (k80) Spk Head (metre length)		Using k11.2 (k160) Sprinkler Head		Remarks
25mm	USD 25	12	USD 300		USD 0	
32mm	USD 28	6	USD 168	10.8	USD 302	
40mm	USD 32	6	USD 192		USD 0	
50mm	USD 36	24	USD 864	10.8	USD 389	
65mm	USD 40		USD 0	27	USD 1,080	
		USD 1,524		USD 1,771		USD 247.2 or 16.2% MORE expensive
65mm	USD 40	4	USD 160		USD 0	
80mm	USD 46	4	USD 184	5.4	USD 248	
100mm	USD 56	90	USD 5,040	92.6	USD 5,186	
		USD 5,384		USD 5,434		USD 50 or 0.9% MORE expensive
Sprinkler Head	Qty	425		153		USD 195.5 or 13.1% MORE expensive
	Rate	USD 3.50	USD 1,487.50	USD 11.00	USD 1,683.00	
Nos. of Range		25		17		
For 2 Floors		USD 89,943.00		USD 72,972.00		USD 16971 or 18.9% SAVING

// COST COMPARISON – EC vs. Standard Coverage (Reduced Labor by 1/2)

Range Pipe	Rate (Labor + Pipe)	Using k5.6 (k80) Sprinkler Head (metre)		Using k11.2 (k160) Sprinkler Head		Remarks
25mm	USD 13	12	USD 150		USD 0	
32mm	USD 14	6	USD 84	12	USD 168	
40mm	USD 16	6	USD 96		USD 0	
50mm	USD 18	24	USD 432	12	USD 216	
65mm	USD 20		USD 0	24	USD 480	
		USD 762		USD 864		USD 102 or 13.4% MORE expensive

Distribution & Main Pipes						
65mm	USD 20	4	USD 80		USD 0	
80mm	USD 23	4	USD 92	6	USD 138	
100mm	USD 28	90	USD 2,520	92	USD 2,576	
		USD 2,692		USD 2,714		USD 22 or 0.8% MORE expensive

Sprinkler Head	Qty	425		153		USD 195.5 or 13.1% MORE expensive
	Rate	USD 3.50	USD 1,487.50	USD 11.00	USD 1,683.00	

Nos. of Range		25		17		
For 2 Floors		USD 46,459.00		USD 38,170.00		USD 8289 or 17.8% SAVING

// COST COMPARISON – EC vs. Standard Coverage (Reduced Labor by 1/4)

Range Pipe	Rate (Labor + Pipe)	Using k5.6 (k80) Sprinkler Head (metre)		Using k11.2 (k160) Sprinkler Head		Remarks
25mm	USD 6	12	USD 72		USD 0	
32mm	USD 7	6	USD 42	12	USD 84	
40mm	USD 8	6	USD 48		USD 0	
50mm	USD 9	24	USD 216	12	USD 108	
65mm	USD 10		USD 0	24	USD 240	
		USD 378		USD 432		USD 54 or 14.3% MORE expensive

Distribution & Main Pipes						
65mm	USD 10	4	USD 40		USD 0	
80mm	USD 12	4	USD 48	6	USD 72	
100mm	USD 14	90	USD 1,260	92	USD 1,288	
		USD 1,348		USD 1,360		USD 12 or 0.9% MORE expensive

Sprinkler Head	Qty	425		153		USD 195.5 or 13.1% MORE expensive
	Rate	USD 3.50	USD 1,487.50	USD 11.00	USD 1,683.00	

Nos. of Range		25		17		
For 2 Floors		USD 24,571.00		USD 20,774.00		USD 3797 or 15.5% SAVING

// Summary

// EC sprinklers typically reduce the required number of branch lines and sprinklers compared to standard spray sprinklers.

// All of Tyco's Light Hazard and Ordinary Hazard EC sprinklers:

- Have an expanding coverage area as the pressure increases.
- Must be hydraulically designed to the largest even, even dimension.
- Must be listed for the hazard to be protected.

// The EC-25 sprinklers:

- Do not have an expanding coverage area as the pressure increases.
- Can be hydraulically designed in accordance with the S x L rule.
- Are intended to be used in higher hazard areas that require a discharge density of 0.25gpm/sq.ft. (10,2 mm/min) or more.



THANK YOU

// APPENDIX



// Key Terms – Obstructed Construction

// Panel construction and other construction where beams, trusses, or other members impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire.

// Examples:

- Beam and Girder Construction –
 - noncombustible & combustible roof or floor decks supported by wood beams of 4" or greater nominal thickness or concrete or steel beams spaced 3 - 7.5 ft
- Concrete Tee Construction
 - Solid concrete members with stems (legs) having a nominal thickness less than the nominal height.
- Composite Wood Joist Construction –
 - Composite wood joists may vary in depth up to 48", may be spaced up to 48", and may span up to 60'



// Key Terms – Obstructed Construction

// Wood joist Construction

- Solid wood members spaced up to 3' on centers & spanning up to 40', supporting a floor or roof deck
- Construction where beams, trusses, or other members impede heat flow or water distribution



// Panel Construction

- Ceiling panels formed by members capable of trapping heat to aid the operation of sprinklers & limited to a min. of 300 sq. ft.
- Beams spaced more than 7.5 ft apart & framed into girders qualify for panel construction.



// Key Terms – Unobstructed Construction

// Construction where beams, trusses, or other members do not impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire.

// Unobstructed construction has horizontal structural members that are not solid, where the openings are at least 70 % of the cross-section area and the depth of the member does not exceed the least dimension of the openings, or all construction types where the spacing of structural members exceeds 7.5 ft on center

// Key Terms – Unobstructed Construction

// Bar Joist Construction

- Construction employing joists consisting of steel truss shaped members.
- Wood truss-shaped members, which consist of wood top and bottom chord members not exceeding 4" in depth with steel tube or bar webs, are also defined as bar joists.
- Bar joists include noncombustible or combustible roof or floor decks on bar joist construction.



// Open-Grid Ceilings

- Ceilings in which the openings are 1/4" or larger in the least dimension, the thickness of the ceiling material does not exceed the least dimension of the openings, and the openings constitute at least 70 % of the ceiling area.



// Key Terms – Unobstructed Construction

// Smooth Ceiling Construction

- Flat slab, pan-type reinforced concrete
- Continuous smooth bays formed by wood, concrete, or steel beams spaced more than 7.5 ft on centers —beams supported by columns, girders, or trusses
- Smooth roof or floor decks supported directly on girders or trusses spaced more than 7.5 ft on center
- Smooth monolithic ceilings of at least 3/4" of plaster on metal lath or a combination of materials of equivalent fire-resistive rating attached to the underside of wood joists, wood trusses, and bar joists or Smooth monolithic ceilings with fire resistance less than that specified and attached to the underside of wood joists, wood trusses, and bar joists
- Open-web-type steel beams, regardless of spacing
- Smooth shell-type roofs, such as folded plates, hyperbolic paraboloids, saddles, domes & long barrel shells
- Suspended ceilings of combustible or noncombustible construction



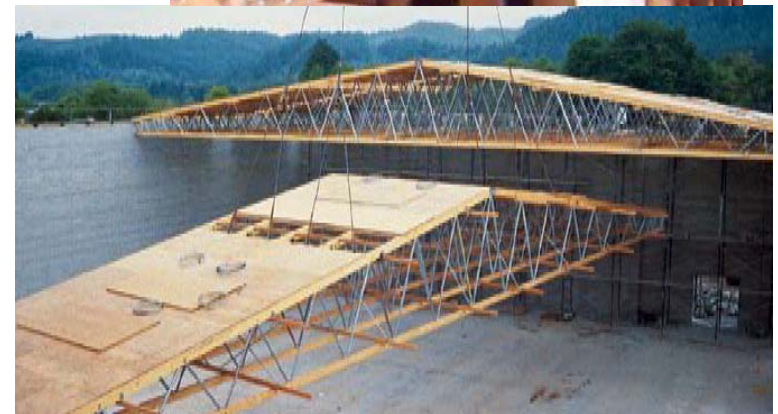
// Key Terms – Unobstructed Construction

// Standard Mill Construction.

- Standard mill construction refers to heavy timber construction as defined in NFPA 220, Standard on Types of Building Construction.

// Wood Truss Construction.

- Parallel or pitched wood chord members connected by open wood members (webbing) supporting a roof or floor deck.
- Trusses with steel webbing, similar to bar joist construction, having top and bottom wood chords exceeding 4" in depth should also be considered wood truss construction.



// EC-25 Extended Coverage Area Density Sprinkler for Extra Hazard & Storage Occupancies

SIN: TY9128

Approvals: UL, C-UL, FM & NYC

Max. Working Pressure: 175 psi

K-factor: 25.2

Temperature Rating: 165°F & 214°F

Finish: Brass

Data Sheet #: TFP 213



Competitive Comparison

Globe: None

Reliable: [N252 EC](#) (Pend)

Victaulic: None

Viking: None