



TYCO ESFR-K34 VS. ESFR-28

NFPA 13-2019 vs nuevos criterio FM Global 8-9

NFPA 13 v 2019 ESFR Tipo de mercadería 1-4, PLASTICOS – ALTURA

Table 23.5.1 ESFR Sprinkler Protection of Rack Storage of **Class I Through Class IV** 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 rack (no open-top containers)	Class I, II, III, or IV, encapsulated or nonencapsulated			45	14	22.4 (320)	Pendent	40	2.8		
						25.2 (360)	Pendent	40	2.8		
				35	10.7	40	12	16.8 (240)	Pendent	52	3.6
								22.4 (320)	Pendent	40	2.8
		40	12	45	14	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	2.8		
						25.2 (360)	Pendent	40	2.8		
						16.8 (240)	Pendent*	NA	NA		
		40	12	45	14	22.4 (320)	Pendent	40	2.8		
						25.2 (360)	Pendent	40	2.8		

*In-rack sprinklers required. See Chapter 25.

NA: Not applicable.

NFPA 13-2019 vs nuevos criterio FM Global 8-9

NFPA 13 v 2019 ESFR Tipo de mercadería 1-4, PLASTICOS – ALTURA

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					14 (200)	Pendent*	NA	NA
						16.8 (240)	Pendent*	NA	NA
		40	12	45	14	22.4 (320)	Pendent	40	2.7
						25.2 (360)	Pendent	40	2.7

NFPA 13-2019 vs nuevos criterio FM Global 8-9

■ Ficha técnica de prevención de siniestros de FM Global 8-9

■ **Julio de 2019:** aumenta la altura de techo. Se incluyen criterios para protección con rociadores solo a nivel de techo para alturas de techo hasta:

- 15 m (50 ft)
 - ESFR K22.4 (K320),
 - ESFR K25.2 (K360)
 - ESFR K28.0 (K400)
- 16,5 m (55 ft).
 - ESFR con K28.0 (K400)

■ **Enero de 2020:** se amplia la disponibilidad de rociadores para 16.5 m (55pies)

- 15 m (50 ft)
 - ESFR K22.4 (K320),
 - ESFR K25.2 (K360)
 - ESFR K28.0 (K400)
 - **ESFR K33.6 (K480)**
- 16,5 m (55 ft).
 - ESFR con K28.0 (K400)
 - **ESFR con K33.6 (K480)**

NFPA 13-2019 vs nuevos criterio FM Global 8-9

■ Ficha técnica de prevención de siniestros de FM Global 8-9 Enero de 2020

Table 17b. Quick-Response, 160°F (70°C) Nominally Rated, Standard-Coverage **Pendent Storage Sprinkler Ceiling-Only Designs** for Ceiling Heights Over 45 ft (13.7 m)

Storage Arrangement	Commodity	Max. Storage Height, ft (m)	Max. Ceiling Height, ft (m)	Ceiling Sprinkler K-Factor	Max. Vertical Distance from Ceiling to Sprinkler's Thermal Element, In. (mm)	Min. Aisle Width, ft (m)	Sprinkler System Design		
							Ceiling Sprinkler System, No. of AS @ psi (bar)	Hose Demand, gpm (L/min)	System Duration, min
Solid-Piled, Palletized, Bin-Box, Shelf, Single-Row Racks, and Double-Row 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
				25.2 (360)	13 (325)	6 (1.8)	10 @ 50 (3.5)		
					17 (425)	6 (1.8)	10 @ 75 (5.2)		
				28.0* (400*)	13 (325)	6 (1.8)	10 @ 40 (2.8)		
				33.6 (480)	17 (425)	6 (1.8)	9 @ 55 (3.8)		
		50 (15.2)	55 (16.8)	28.0 (400)	13 (325)	8 (2.4)	9 @ 80 (5.5)		
				33.6 (480)	17 (425)	6 (1.8)	9 @ 55 (3.8)		

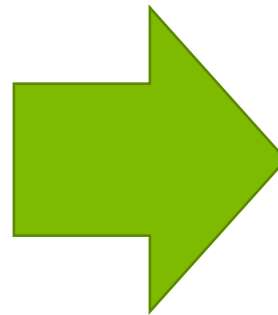
* The design of 10 AS @ 40 psi (2.8 bar) can be reduced to 9 AS @ 40 psi (2.8 bar) when the water supply can also provide a minimum pressure of 80 psi (5.5 bar) from the most remote 4 sprinklers (2 sprinklers on 2 lines).

NFPA 13-2019 vs nuevos criterio FM Global 8-9

NFPA 13
2019

Mercadería clase I a IV
Plástico no expandido en
cajas de cartón

Altura de techo: 14 m
Altura de mercadería: 12 m
ESFR K22- K25



FM Global 8-9
Enero 2020

Mercadería clase I a IV
Plástico no expandido en en
cajas de cartón

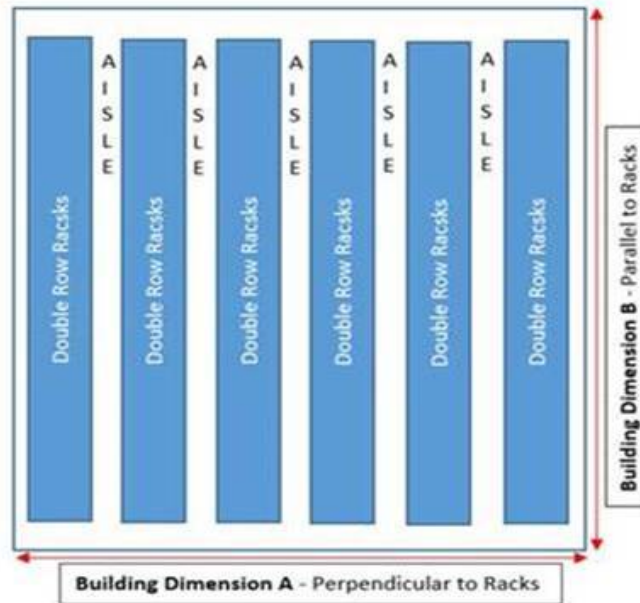
Altura de techo: 15.2 m
Altura de mercadería: 13 m
ESFR K22 – K25 – 28 – 34

Altura de techo: 16.8 m
Altura de mercadería: 15.2 m
ESFR K28 - K34

Tyco *ESFR-34* vs *ESFR-28*

Capacidad de almacenamiento

- Comparativa usando ESFR-K28 VS Tyco ESFR-K34
- Parámetros de diseño FM:
 - Ficha técnica de prevención de siniestros de FM Global 8-9. Ficha de diseño



Hipotesis de trabajo:

- El calculo solo cambia la dimensión de construcción A (perpendicular a los bastidores)
- La dimensión de construcción B no se modifica

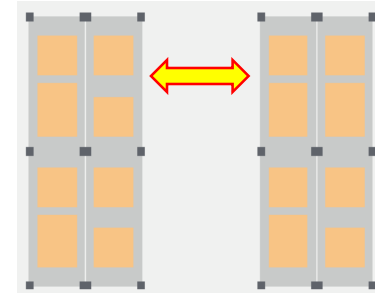
Tyco ESFR-34 vs ESFR-28

Escenario

- Deposito: 61 m x 61 m (200' x 200')

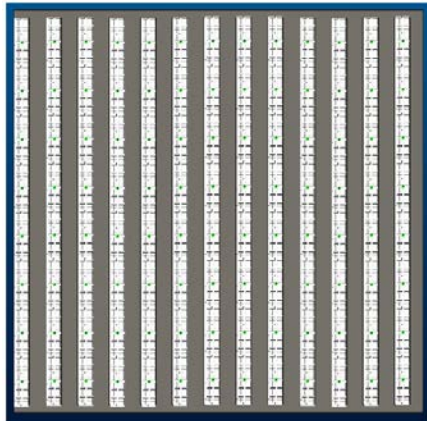
Hipotesis

- 1.22 m (4') libres al final de cada pasillo
- Maximo número de racks doble fila ajustados al ancho



ESFR-K28
15.24 m / 16.76 m / 2.44 m
55' ceiling / 50' commodity / 8' aisles

13 Racks Doble Fila
10 Niveles



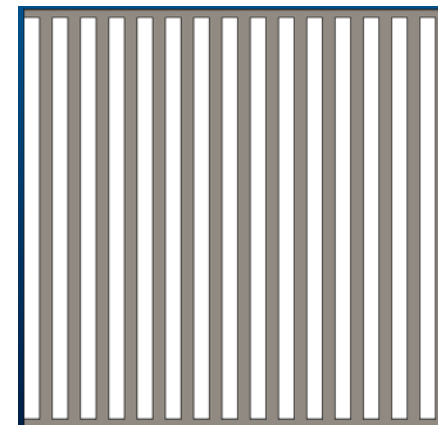
Número Total Pallets – 12,480

FM Approval



Tyco ESFR-34
15.24 m / 16.76 m / 1.83 m
55' ceiling / 50' commodity / 6' aisles

15 Racks Doble Fila
10 Niveles



Número Total Pallets – 14,400

**Incremento en el número de pallets – 1,920
15.4%**

Tyco ESFR-K34 vs ESFR-K28

FM Approval
Techo 16.76 m (55')

Tyco ESFR-34 pasillo 1.83 m (6') vs ESFR-K28 pasillo 2.44 m (8")

Dimension A (m - ft)	% Incremento en cantidad de Pallets usando Tyco ESFR-34
15 – 50	33.3%
30 – 100	16.7%
46 – 150	10.0%
61 – 200	15.4%
76 – 250	12.5%
91 – 300	15.8%
107 – 350	13.0%
122 – 400	15.4%
137 – 450	13.8%
152 – 500	15.6%
183 – 600	12.8%
213 – 700	15.6%
244 – 800	13.5%
274 – 900	15.5%
305 - 1000	13.8%

Tyco ESFR-K34 vs ESFR-K28

■ Potencia de la bomba

■ Comparativa usando ESFR-K28 VS Tyco ESFR-K34

Storage Arrangement	Commodity	Max. Storage Height, ft (m)	Max. Ceiling Height, ft (m)	Ceiling Sprinkler K-Factor	Max. Vertical Distance from Ceiling to Sprinkler's Thermal Element, In. (mm)	Min. Aisle Width, ft (m)	Sprinkler System Design		
							Ceiling Sprinkler System, No. of AS @ psi (bar)	Hose Demand, gpm (L/min)	System Duration, min
Solid-Piled, Palletized, Bin-Box, Shelf, Single-Row Racks, and Double-Row Racks	Class 1, 2, 3, 4 and Cartoned Unexpanded Plastics	50 (15.2)	55 (16.8)	28.0 (400)	13 (325)	8 (2.4)	9 @ 80 (5.5)		
				33.6 (480)	17 (425)	6 (1.8)	9 @ 55 (3.8)		

■ Hipótesis de trabajo

- Perdida de carga de la instalación general: 100 psi
- No se considera suministro de mangueras
- Todos los rociadores funcionando a la presión mínima
- No se aplica factor de seguridad

Tyco ESFR-K34 vs ESFR-K28

■ Potencia de la bomba

■ Caudal $Q = n^{\circ} \text{ spk} \times K \times \sqrt{p}$

P. Bomba = P spk + Perdida instalación

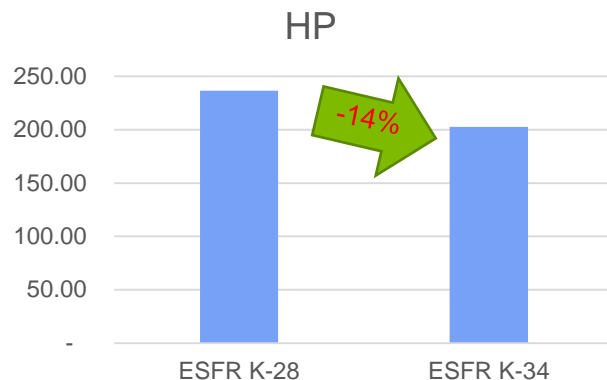
■ P Potencia en HP = $(Q \times P) / 1714$

ESFR K=28

P. bomba = 100 psi + 80 = 180 psi

$Q = 9 \times 28 \sqrt{80} = 9 \times 250.4 \text{ gpm} = 2254 \text{ gpm}$

$P = (2254 \times 180 \text{ psi}) / 1714 = 237 \text{ HP}$



ESFR K=34

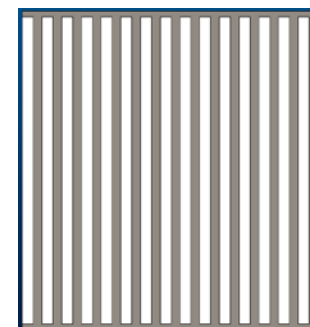
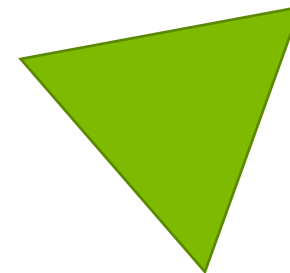
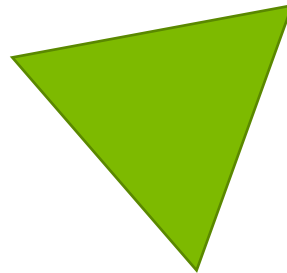
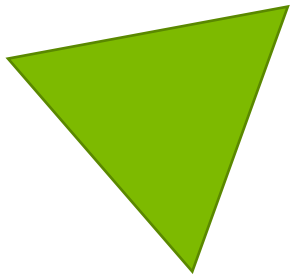
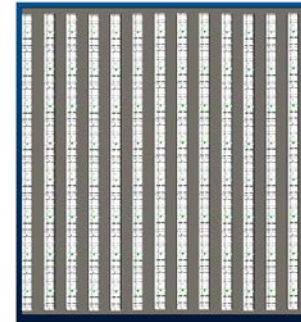
Presión requerida = 100 psi + 55 = 155 psi

$Q = 9 \times 33.6 \text{ Raiz}(55) = 9 \times 249.2 \text{ gpm} = 2243$

$P = (2243 \times 155 \text{ psi}) / 1714 = 203 \text{ HP}$

Tyco ESFR-K34 vs ESFR-K28

■ Ventajas



■ Menor potencia de bomba

Menor presión en la tubería

Mas almacenamiento

Tyco ESFR-K34 vs ESFR-K28

Desde la perspectiva de materiales de instalación

Escenario

- Deposito: 61 m x 61 m (200' x 200')
- Altura: 16.76m / 45.24 m (55' / 50')
- Instalación en Grilla
- La misma bomba

K-28		
Part	Size	Qty
Sprinklers		
ESFR-28		420
Branchline		
Pipe	4"	3800
Weldolet	1"	400
Coupling	4"	240
Elbows	4"	40
Hangers	4"	266
Cross Main		
Pipe	8"	190
Tee	8"x8"x4"	20
Tee	4"x4"x4"	20
Nipple	4"	30
Hangers	8"	13
Feed Main		
Pipe	8"	110
Elbows	8"x8"	2
Hangers	8"	8
Valve, Pump, Tank		
Valve (Butterfly)	8"	1
Valve (Check)	8"	1
Pump	2500 GPM @100psi	1
Tank	300,000 gal	1

K-34		
Part	Size	Qty
Sprinklers		
ESFR-34		420
Branchline		
Pipe	3"	3800
Weldolet	1.25"	400
Coupling	3"	240
Elbows	3"	40
Hangers	3"	266
Cross Main		
Pipe	8"	190
Tee	8"x8"x3"	20
Tee	4"x4"x3"	20
Nipple	3"	30
Hangers	8"	13
Feed Main		
Pipe	8"	110
Elbows	8"x8"	2
Hangers	8"	8
Valve, Pump, Tank		
Valve (Butterfly)	8"	1
Valve (Check)	8"	1
Pump	2500 GPM @100psi	1
Tank	300,000 gal	1

Tyco ESFR-K34 vs ESFR-K28

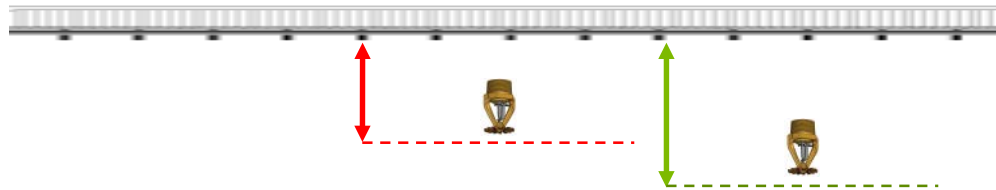
Desde la perspectiva de materiales de instalación

Tubería	ESFR K-34	Cantidad	ESFR K-28
	3'	1200 m / 3800"	4'
Coupling	3'	240	4'
Elbows	3'	40	4'
Tee	8'x 8'x 3'	20	8'x 8'x 4'
Tee	4'x 4'x 3'	20	4'x 4'x 4'
Niple	3'	30	4'



Tyco ESFR-K34 vs ESFR-K28

■ Flexibilidad de instalación



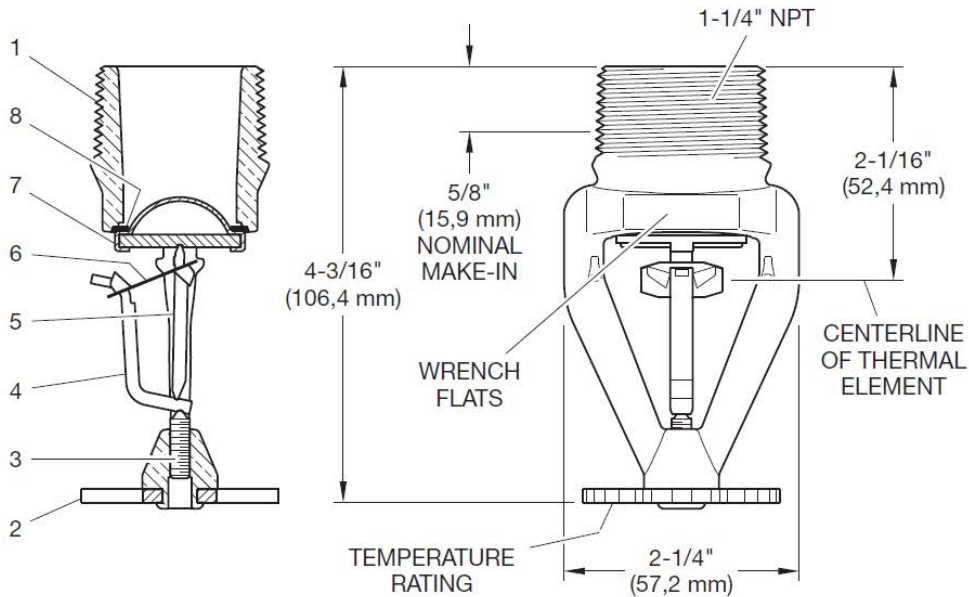
Distancia al techo	ESFR K-28	ESFR K-34
Máximo	325 mm (13")	432 mm (17")

Tyco ESFR-K34 vs ESFR-K28

Item	Description
Sprinkler Identification Number (SIN)	TY9286
K-factor, gpm/psi ^{1/2} (lpm/bar ^{1/2})	33.6 gpm/psi ^{1/2} (480 lpm/bar ^{1/2})
Thread Size	1 1/4 in. NPT or ISO 7-R 1 1/4
Sprinkler Orientation	Pendent
Maximum Working Pressure, psi (bar)	175 psi (12,1 bar)

Components:

- 1 - Frame
- 2 - Deflector
- 3 - Compression Screw
- 4 - Hook
- 5 - Strut
- 6 - Link
- Assembly
- 7 - Button
- Assembly
- 8 - Sealing Assembly



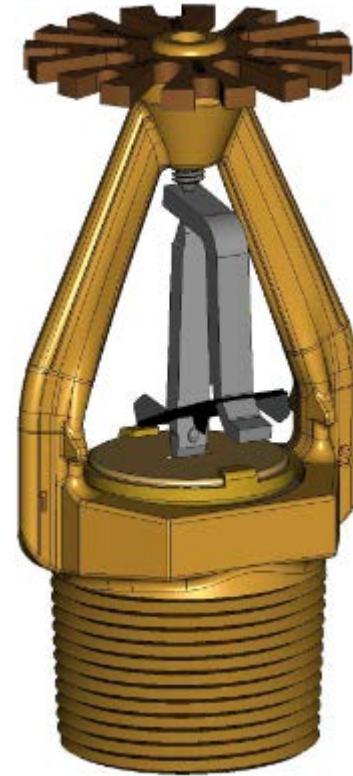
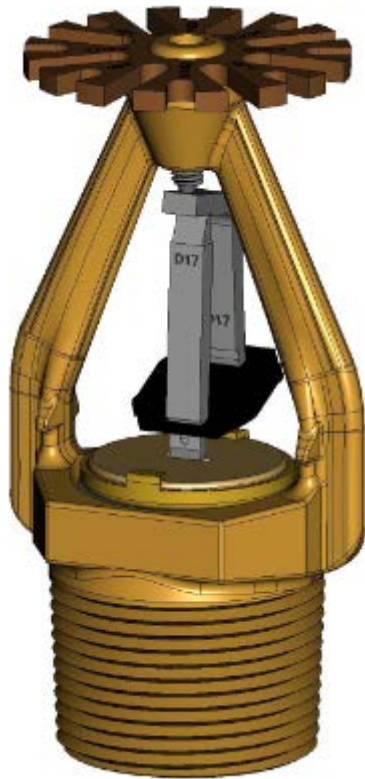
Tyco ESFR-K34 vs ESFR-K28

Description	Specification
Sprinkler Type	QR Storage (ESFR)
Temperature Rating °F (°C)	165°F (74°C) and 212°F (100°C)
Response Type	QR
Sprinkler Position	Pendent, frame arms aligned with pipe, deflectors parallel to floor
System Type	Wet
Maximum Area of Coverage	100 ft ² (9,3 m ²)
Minimum Area of Coverage	64 ft ² (5,9 m ²)
Maximum Slope Ceiling	Up to 10°
Maximum Spacing	For buildings up to 30 ft (9,1 m): 12 ft (3,7 m) For buildings over 30 ft (9,1 m): 10 ft (3,0 m)
Minimum Spacing	8 ft (2,4 m)

Tyco ESFR-K34 vs ESFR-K28

Deflector Distance from Walls	Minimum of 4 in. (100 mm) from walls but no more than 1/2 the allowable distance permitted between sprinklers
Deflector to Top of Storage	Minimum of 36 in. (914 mm)
Centerline of Thermal Sensing Element to Ceiling Distance	Min. Distance: Refer to FM 2-0, Section 2.2 Max. Distance: 17 in. (432 mm)
Maximum Ceiling Height	55 ft (16,8 m)
Maximum Storage Height	50 ft (15,2 m)
Storage Arrangement	Palletized, solid piled, open frame; single row or double row
Commodity	Class I - IV, Cartoned unexpanded plastic
Sprinkler System Design	Total of 9 operating sprinklers (3 sprinklers on the most remote 3 lines) with a minimum pressure of 55 psi (3.8 bar) available at the most remote sprinkler
Obstruction Criteria	Refer to FM 2-0 Section 2.2
Minimum Aisle Width	6 ft (1,8 m)
Hose Stream Allowance and Water Supply Duration	250 gpm for 60 minutes (950 lpm for 60 minutes)

Tyco ESFR-K34 vs ESFR-K28



Tyco ESFR-K34 vs ESFR-K28

Tyco Fire Products LP

1467 Elmwood Ave, Cranston, Rhode Island 02910, USA

☑ Automatic Sprinkler Systems ☑ Sprinklers ☑ Non-Storage / Special Protection / Storage Sprinklers ☑ Storage Sprinklers ☑ K33.6 (K480 metric) Ceiling ☑ K33.6 (K480 metric) Pendant

Product	Class of Work	Listing Country	Sprinkler Category	K	Type	Response	Element	NPT (in.)	Finish	Temp. Rating (°F)	Temp. Rating (°C)	Certification Type
TY9286	2037-Automatic Sprinkler, K33.6	United States of America	Storage	33.6	Pendent	QR - Quick Response	Fusible	1 1/4	Brass	165, 212	74, 100	FM Approved

Tyco Fire Products LP

1467 Elmwood Ave, Cranston, Rhode Island 02910, USA

☑ Automatic Sprinkler Systems ☑ Sprinklers ☑ Control / Residential / Suppression Mode Sprinklers ☑ Suppression Mode ☑ K33.6 (K480 metric) Suppression Mode (ESFR) ☑ K33.6 (K480 metric) ESFR Pendent (Class 2037)

Product	Class of Work	Listing Country	Sprinkler Category	K	Type	Response	Element	NPT (in.)	Finish	Temp. Rating (°F)	Temp. Rating (°C)	Certification Type
TY9286	2037-Automatic Sprinkler, K33.6	United States of America	Suppression Mode	33.6	Pendent	ESFR - Early Suppression Fast Response	Fusible	1 1/4	Brass	165, 212	74, 100	FM Approved

¿Preguntas?



