Introduction to Automatic Sprinklers

NFPA 13: 2019 Edition

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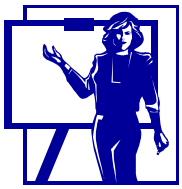
Housekeeping

- Polling
- Post-webinar assessment
- Ask questions
- Chat window



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3. Attendee must actively participate in classroom discussions via polling and chat
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Learning Records

If you need copies of your records from class
or the learning record policy
Please Contact Talya Pacheco
training@tycofp.com
401-781-8220 ex 0500
1467 Elmwood Avenue
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Objectives

- Identify components and recognize common fire protection industry terminology
- Classify the different types of sprinklers
- Differentiate between various sprinkler types/categories

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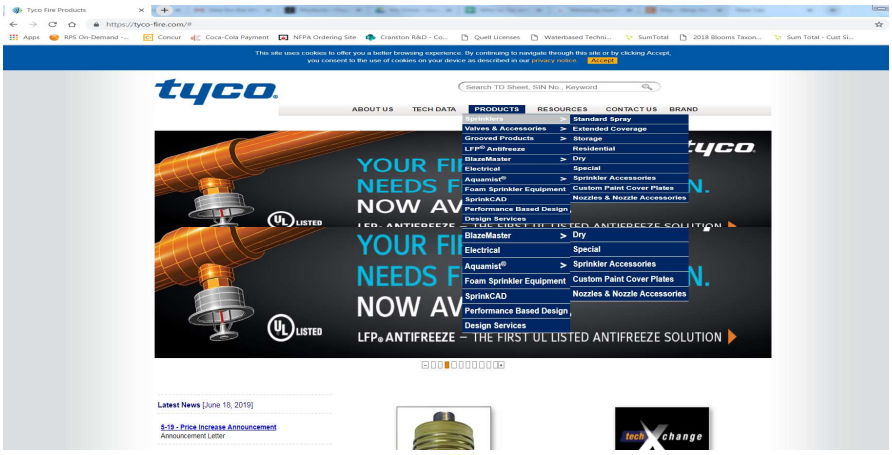
TFPP Website: Tyco-fire.com



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How does an Automatic Sprinkler Fight a Fire?

Three things must be present at the same time in order to produce fire:

- Some sort of **fuel** or combustible material
- Enough **heat** to raise the material to its ignition temperature
- Enough **oxygen** to sustain combustion

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Key Terms*

- **LH - Light Hazard**
  - quantity and/or combustibility of contents is low & fires with low heat release rates are expected.
- **OH - Ordinary Hazard**
  - Group I - combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8' (2.4m) & fires with moderate heat release rates are expected.
  - Group II - the quantity & combustibility of contents are moderate to high, stockpiles of contents with moderate heat release rates do not exceed 12' (3.66m) & stockpiles of contents with high heat release rates do not exceed 8' (2.4m).
- **EH - Extra Hazard**
  - Group I - The quantity and combustibility of contents is very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible or flammable liquids.
  - Group II - Moderate to substantial amounts of flammable or combustible liquids or occupancies where shielding of combustibles is extensive.

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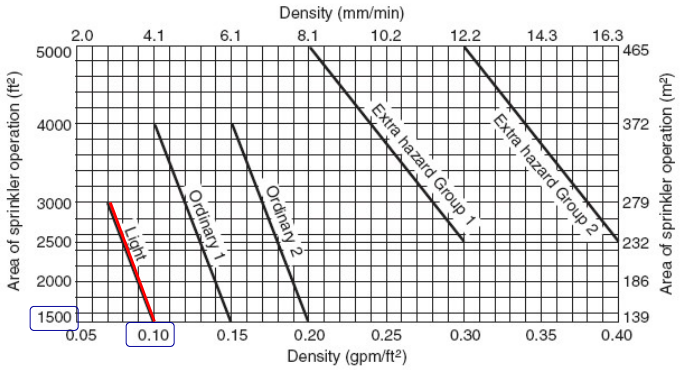
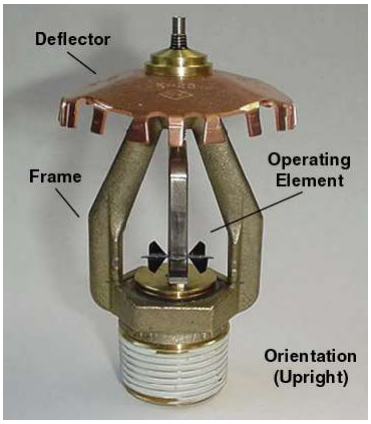
Design Discharge Density

Density / Area Method (19.3.3.1.1 (13:2019))

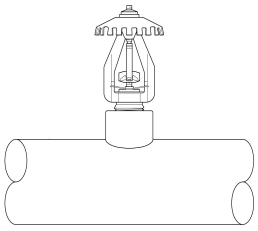


Automatic Sprinkler Components

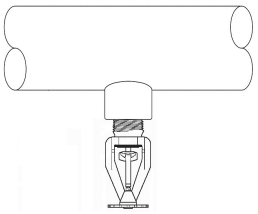
- Installation Orientation
- Deflector
- Frame & Orifice
- Operating Element



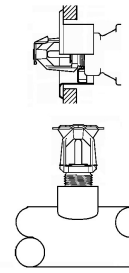
Sprinkler Styles / Orientation



Upright



Pendent



Sidewall

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Orifice & Thread Size

Nominal K-factor	K-factor Range	Nominal Orifice Size (in)	% of K-5.6 Discharge	Thread Size
1.4	1.3–1.5	.25	25	1/2" NPT
1.9	1.8–2.0	.33	33.3	1/2" NPT
2.8	2.6–2.9	.38	50	1/2" NPT
4.2	4.0–4.4	.48	75	1/2" NPT
5.6	5.3–5.8	.5	100	1/2" NPT
8	7.4–8.2	.53	140	3/4" NPT or 1/2" NPT
11.2	11.0–11.5	.64	200	3/4" NPT or 1/2" NPT
14	13.5–14.5	.7	250	3/4" NPT
16.8	16.0–17.6	.78	300	3/4" NPT
19.6	18.6–20.6	—	350	1" NPT
22.4	21.3–23.5	—	400	1" NPT
25.2	23.9–26.5	.95	450	1" NPT

$Q = K (\sqrt{P})$

Q = Flow (gpm)
K = K-factor (gpm/psi$^{1/2}$)
P = Pressure (psi)

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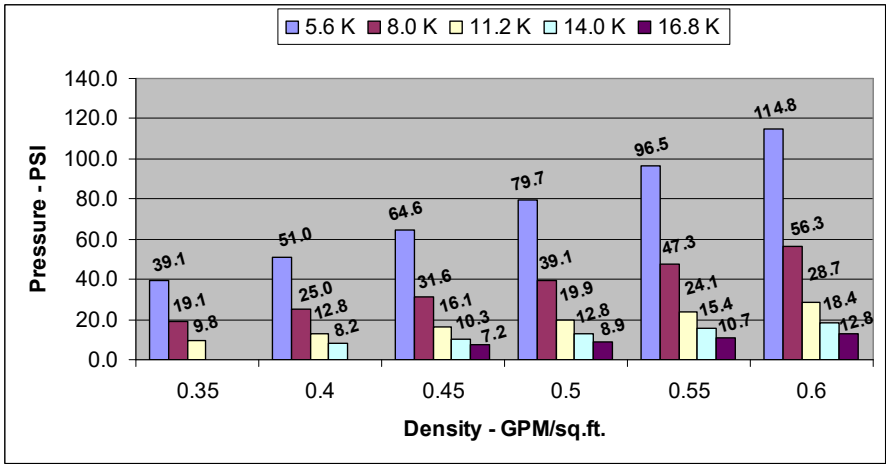
Pressure Comparison at 100 sq. ft. Spacing



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Operating Element

- Thermal sensitivity - A measure of the rapidity with which the thermal element operates as installed in a specific sprinkler or sprinkler assembly.
- One measure of thermal sensitivity is the response time index (RTI) as measured under standardized test conditions.
  - Fast Response Sprinklers have a thermal element with an RTI of 50 $(m\text{-}s)^{1/2}$ or less.
  - Special Response Sprinklers have an RTI of 50 $(m\text{-}s)^{1/2}$ to 80 $(m\text{-}s)^{1/2}$
  - Standard Response Sprinklers have a thermal element with an RTI of 80 $(m\text{-}s)^{1/2}$ or more.

Examples of RTI for various operating elements:

Center Strut – 125 $m\text{-}s^{1/2}$

Glass Bulb (5mm) - 105 $m\text{-}s^{1/2}$

Glass Bulb (4mm) - 65 $m\text{-}s^{1/2}$

Glass Bulb (3mm) - 36 $m\text{-}s^{1/2}$

Fusible Link – 26 $m\text{-}s^{1/2}$

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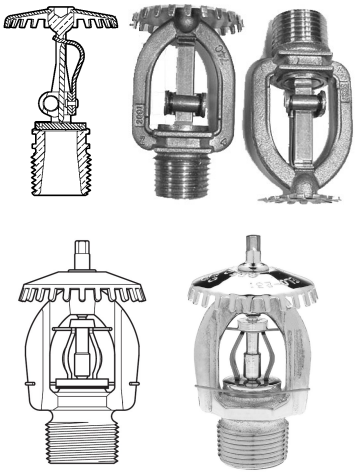
Center Strut Sprinkler

- **Operation (Pellet in a Horizontal Tube) -**
  - A copper tube sealed by two stainless steel balls holds a fusible alloy.
  - When the rated temperature is reached, the alloy melts, the balls are forced toward each other releasing the tension mechanism, allowing the sprinkler to operate.
- **Operation (Vertical Tube) -**
  - A fusible alloy is sealed into a bronze actuating rod (center strut) by a stainless steel ball.
  - When the alloy melts at its rated temperature, the ball is forced upward into the center strut, releasing the two ejectors and operating the sprinkler.
- **RTI of Center Strut – 125 m-s$^{1/2}$**



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Center Strut Upright Sprinkler

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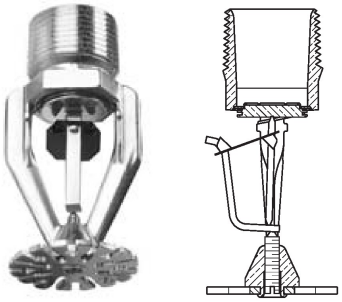
Fusible Link Sprinklers

- Operation:
  - The fusible link (heat collector) assembly is comprised of two halves that are joined together by a thin layer of solder.
  - When the rated temperature is reached, the solder melts and the two link halves separate, allowing the sprinkler to operate.
- RTI of Fusible Link – 26 m-s½



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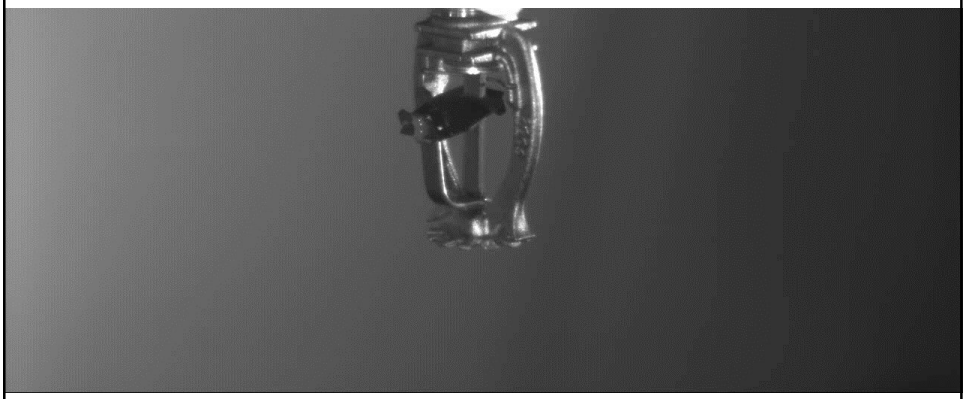
Fusible Link Pendent Sprinkler



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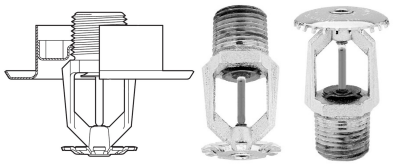
Glass Bulb Sprinklers

- **Operation -**
  - The glass Bulb contains a fluid which expands when exposed to heat.
  - When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb, allowing the sprinkler to activate and water to flow.
- **5mm Bulb (Glycerin Antifreeze)**
  - RTI of 5mm Glass Bulb – 105 m-s½
- **3mm Bulb (Tetrachloroethylene)**
  - RTI of 3mm Glass Bulb – 35 m-s½



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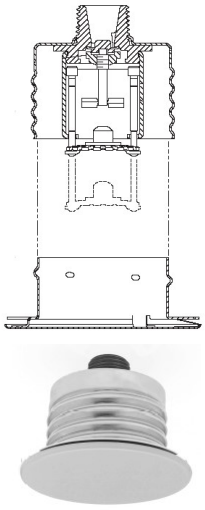
Concealed Sprinklers

- ***Operation*** **-**
  - A Cover Plate, which is normally soldered to the Retainer Ring at three points, falls away to expose the Sprinkler Assembly.
  - The sprinkler deflector may be fixed or supported by the Guide Pins that allow the deflector to drop down to its operational position.
  - When the rated temperature of the sprinkler is reached, the sprinkler activates allowing water to flow.



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Concealed Pendent Sprinkler

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How Decorative Escutcheons & Concealed Cover Plates Affect Sprinkler Sensitivity

- Recessed sprinklers:
  - Equivalent to pendent sprinklers having a similar thermal response sensitivity installed 8” (200 mm) below smooth unobstructed ceilings
- Concealed sprinklers:
  - Equivalent to pendent sprinklers having a similar thermal response sensitivity installed 12” (300 mm) below smooth unobstructed ceilings

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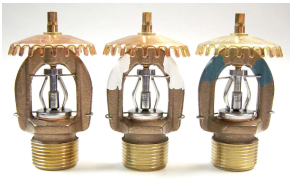
Temperature Rating

Maximum Ceiling Temperature		Temperature Rating		Temperature Classification	Color Code	Glass Bulb Colors
°F	°C	°F	°C			
100	38	135–170	57–77	Ordinary	Uncolored or black	Orange or red
150	66	175–225	79–107	Intermediate	White	Yellow or green
225	107	250–300	121–149	High	Blue	Blue
300	149	325–375	163–191	Extra high	Red	Purple
375	191	400–475	204–246	Very extra high	Green	Black
475	246	500–575	260–302	Ultra high	Orange	Black
625	329	650	343	Ultra high	Orange	Black



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Poll #1

Please answer the polling questions that pop up on your screen
Polling questions are considered participation and are required to earn CEUs

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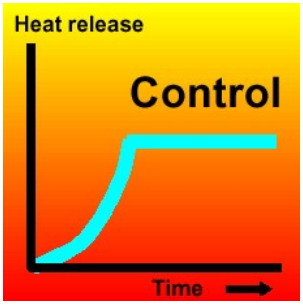
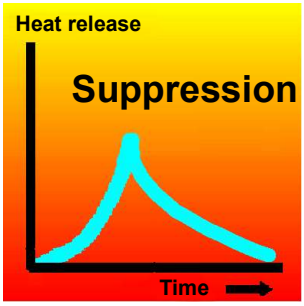
Control Mode vs. Suppression Mode Sprinklers





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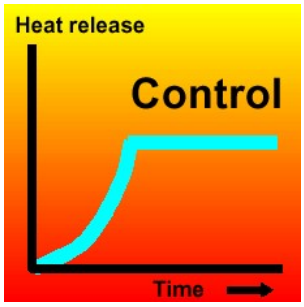
Control Mode Sprinklers



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Conventional (Old-Style) Sprinklers

- A sprinkler intended for installation in the upright or pendent position
- Directs from 40 - 60% of the total water initially discharged in the downward direction.
- When installed in the upright position, this discharge covers a 10’ (3m) diameter circle, 10’ (3m) below the sprinkler, when the sprinkler is discharging water at the rate of 15 gpm (57 lpm)

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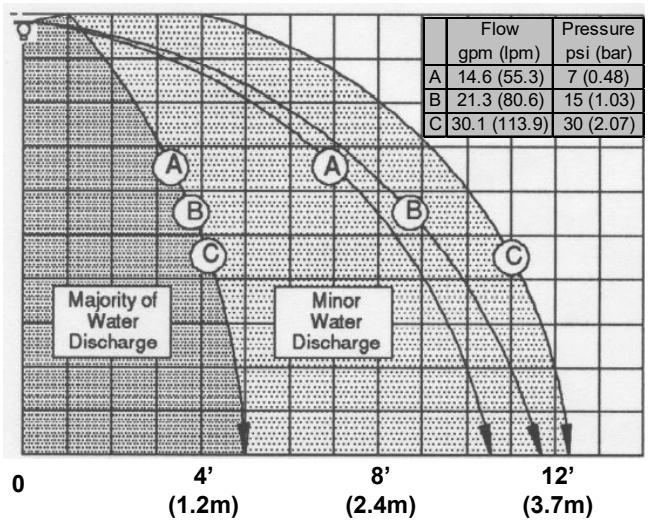
Conventional Sprinkler



	Flow gpm (lpm)	Pressure psi (bar)
A	14.6 (55.3)	7 (0.48)
B	21.3 (80.6)	15 (1.03)
C	30.1 (113.9)	30 (2.07)

10’ (3m)
8’ (2.4m)
6’ (1.8m)
4’ (1.2m)
2’ (0.6m)

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Spray Sprinklers (After 1950's)

- A sprinkler intended for installation in either the upright or pendent position respectively
- Designed to distribute water downward in an umbrella-shaped pattern.
- The discharge from a 5.6 (80) K-factor spray sprinkler covers a 16' (4.88m) diameter circle 4' (1.22m) below the sprinkler, when discharging at 15 gpm (57 lpm)

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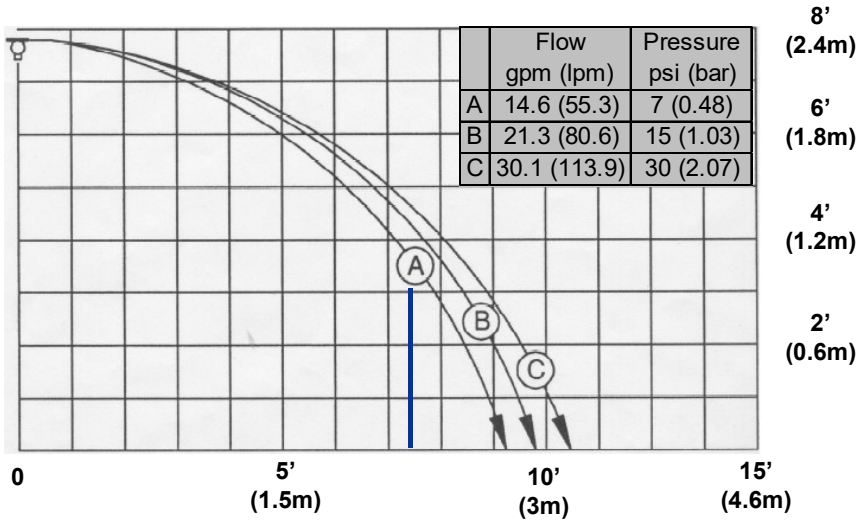
Standard Spray Upright & Pendent Sprinklers



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B	21.3 (80.6)	15 (1.03)
C	30.1 (113.9)	30 (2.07)

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Spray vs. Conventional Sprinkler

Spray Sprinkler

Conventional Sprinkler

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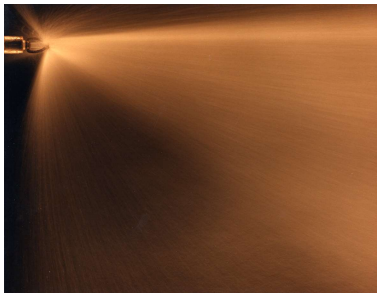
Water distribution characteristics: Standard Spray Sidewall Sprinklers

- A sprinkler with a deflector designed to discharge most of the water away from the nearby wall in a pattern resembling one-quarter of a sphere, with a small portion of the discharge directed at the wall behind the sprinkler.
- Horizontal Sidewall sprinklers are sidewall sprinklers mounted on a horizontal wall.
- Vertical Sidewall Sprinklers sidewall sprinkler are mounted on the top or bottom of a piping system.



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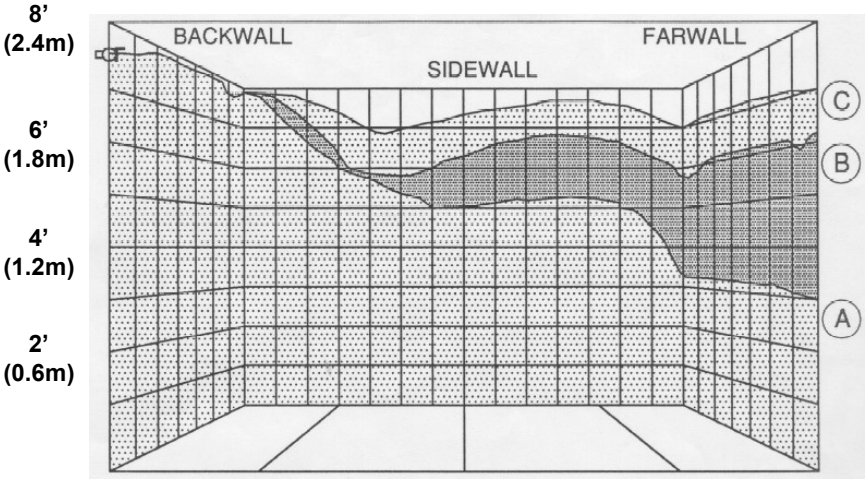
Standard Spray Sidewall Sprinklers



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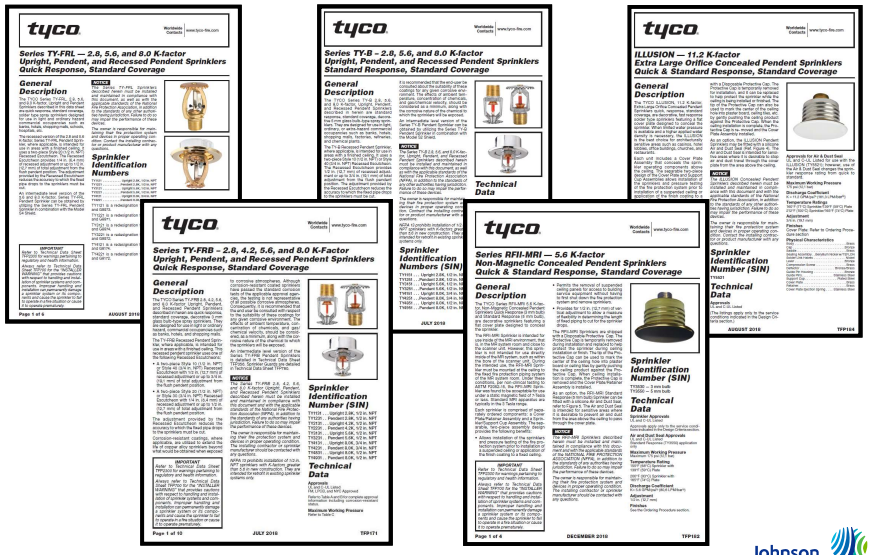
Standard Spray Sprinkler Data Sheets



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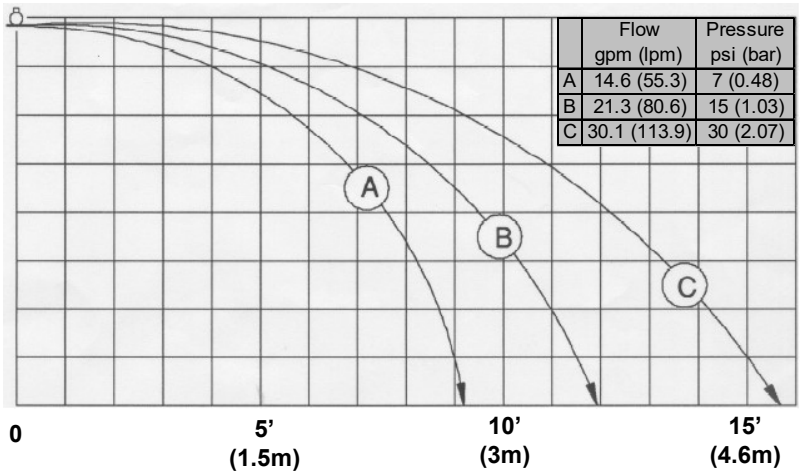
Extended Coverage Pendent Sprinklers



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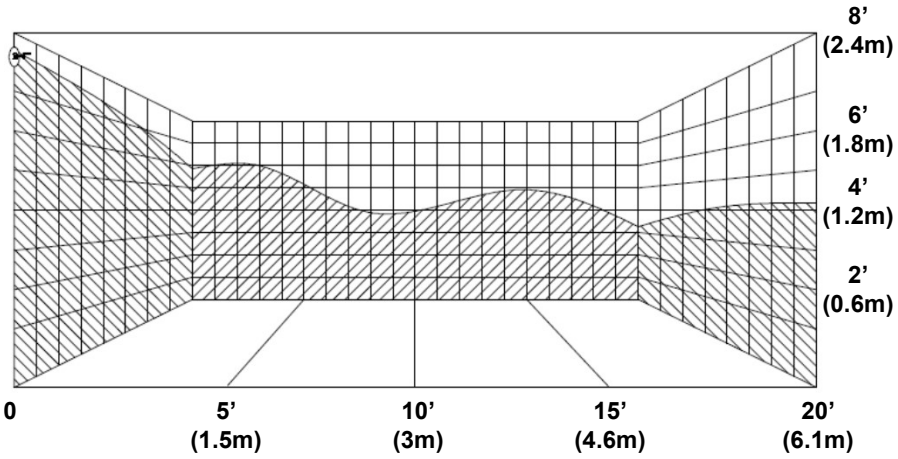
Extended Coverage Sidewall Sprinklers



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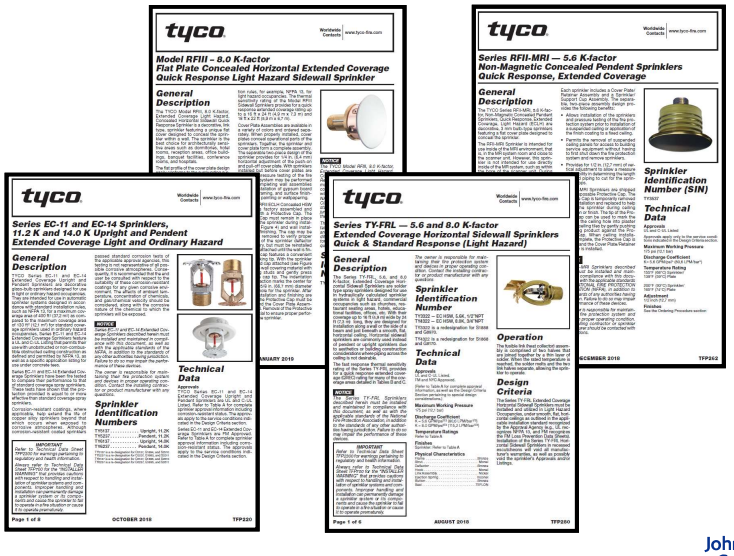
Extended Coverage Sprinkler Data Sheet



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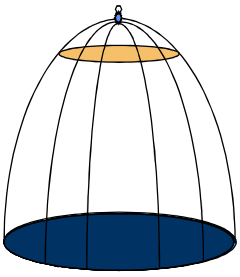
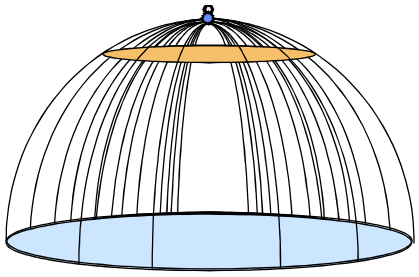
Sprinkler Spray Patterns



Standard Spray



Extended Coverage

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Residential Sprinklers

Residential Sprinkler:

- A type of fast-response sprinkler that has been specifically investigated for its ability to enhance survivability in the room of fire origin and is listed for use in the protection of dwelling units.

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Prevent Flashover

Pre-Flashover

Rollover

Post-Flashover

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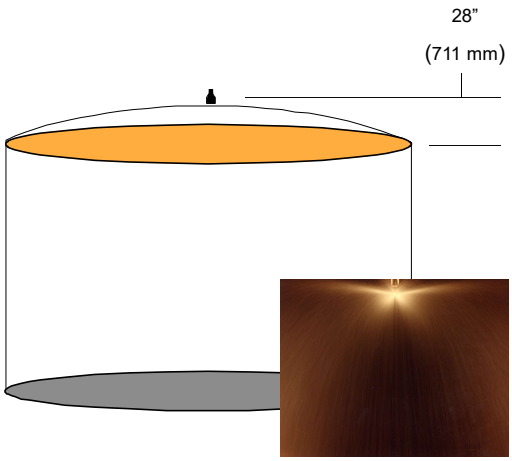
Water distribution characteristics: Residential Sprinklers

- The primary focus for residential sprinklers is life-safety.
- Give the occupants 10 minutes to evacuate the occupancy.
- High wall wetting is critical to sprinkler success.



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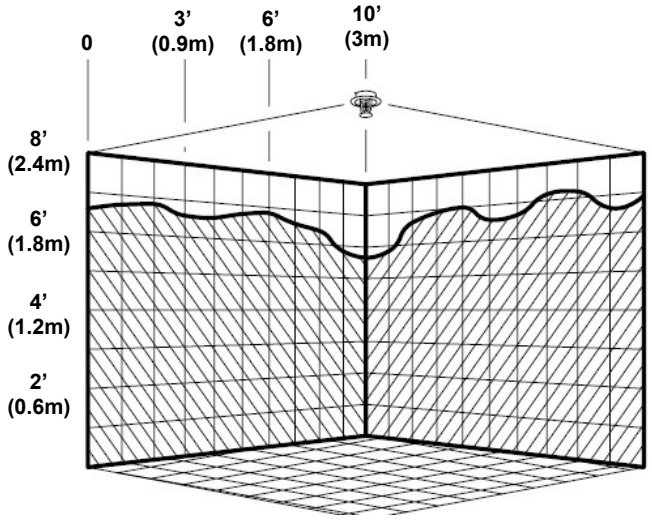
Residential Pendent Sprinklers



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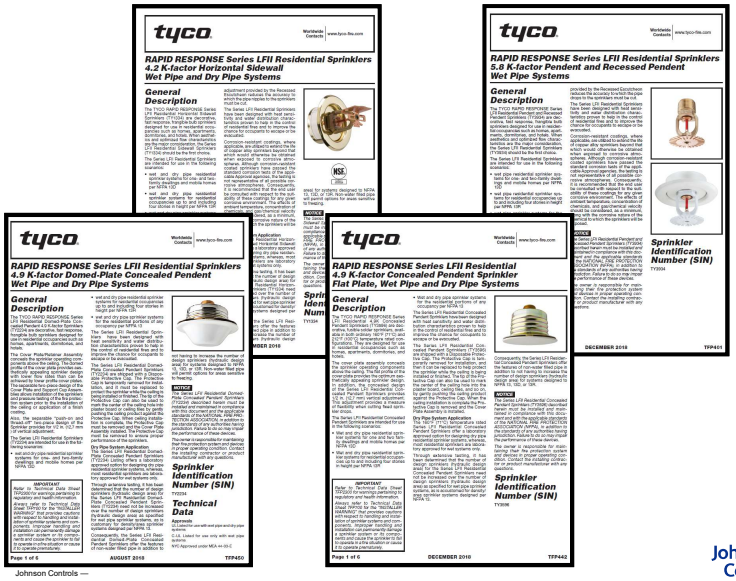
Residential Sprinkler Data Sheet



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Large Drop and Specific Application Control Mode Sprinklers

- **Large Drop Sprinkler.** A type of specific application control mode sprinkler that is capable of producing characteristic large water droplets and that is listed for its capability to provide fire control of specific high-challenge fire hazards.
- **Specific Application Control Mode Sprinkler For Storage Use.** A type of spray sprinkler listed at a minimum operating pressure or density with a specific number of operating sprinklers for a given protection scheme.
- **Design:**
  - Calculate a specific # of sprinklers at a specific pressure

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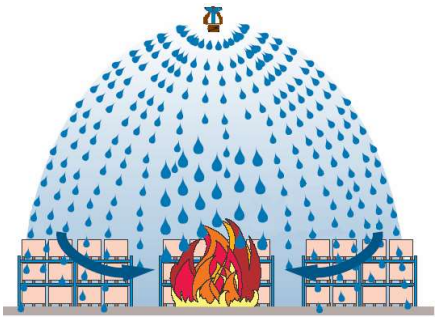
Large Drop and Specific Application Control Mode Sprinklers

- A high challenge fire can have an upward draft equivalent to 30 – 35 mph (50 – 56 km/h)
- The larger K-factors produce larger water droplets at lower pressures
- Large flow rates might be required for some high challenge applications



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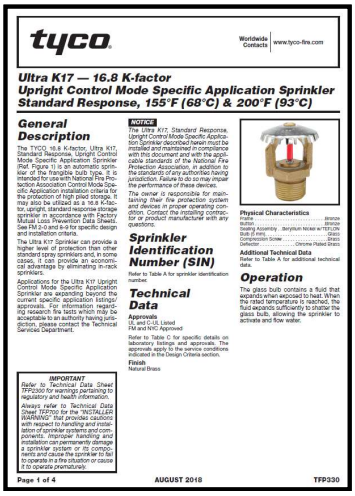
NFPA 13 (2019) CMSA Protection Table Example

Table 22.2 CMSA Sprinkler Design Criteria for Palletized and Solid-Piled Storage of Class I Through Class IV Commodities (Encapsulated and Nonencapsulated)

Configuration	Commodity Class	Maximum Storage Height ft	Maximum Storage Height m	Maximum Ceiling/ Roof Height ft	Maximum Ceiling/ Roof Height m	K-Factor/ Orientation	Type of System	Number of Design Sprinklers	Minimum Operating Pressure psi	Minimum Operating Pressure bar
Palletized	Class I or II	25	7.6	30	9.1	11.2 (160) Upright	Wet	15	25	1.7
							Dry	25	25	1.7
						16.8 (240) Upright	Wet	15	10	0.7
							Dry	25	15	1.0
						19.6 (280) Pendent	Wet	15	16	1.1
						25.2 (360) Pendent	Wet	15	10	0.7
				35	11	11.2 (160) Upright	Wet	15	25	1.7
							Dry	25	25	1.7
						16.8 (240) Upright	Wet	15	15	1.0
							Dry	25	15	1.0
				40	12	25.2 (360) Pendent	Wet	15	23	1.6
		30	9.1	35	11	19.6 (280) Pendent	Wet	15	25	1.7
				40	12	25.2 (360) Pendent	Wet	15	23	1.6
		35	11	40	12	19.6 (280) Pendent	Wet	15	30	2.1
						25.2 (360) Pendent	Wet	15	23	1.6

Johnson Controls

Control Mode Specific Application Data Sheets



tyco

Worldwide Contacts | www.tyco-fire.com

Ultra K17 — 16.8 K-factor Upright Control Mode Specific Application Sprinkler Standard Response, 155°F (68°C) & 200°F (93°C)

General Description

The TYCO 16.8 K-factor, Ultra K17, Standard Response, Upright Control Mode Specific Application Sprinkler (Ref. Figure 1) is an automatic sprinkler of the frangible bulb type. It is intended for use with National Fire Protection Association Control Mode Specific Application (CMSA) criteria for the protection of high piled storage. It may also be utilized as a 16.8 K-factor, upright, standard response storage sprinkler in accordance with Factory Mutual Loss Prevention Data Sheets. See FM 2-0 and 8-9 for specific design and installation criteria.

The Ultra K17 Sprinkler can provide a higher level of protection than other standard spray sprinklers and, in some cases, it can provide an economical advantage by eliminating in-rack sprinklers.

Applications for the Ultra K17 Upright Control Mode Specific Application Sprinkler are expanding beyond the current specific application listings/approvals. For information regarding research fire tests which may be acceptable to an authority having jurisdiction, please contact the Technical Services Department.

NOTICE

The Ultra K17, Standard Response, Upright Control Mode Specific Application Sprinkler described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Sprinkler Identification Number (SIN)

Refer to Table A for sprinkler identification number.

Technical Data

Approvals
UL and C-UL Listed
FM and NYC Approved

Refer to Table C for specific details on laboratory listings and approvals. The approvals apply for the service conditions indicated in the Design Criteria section.

Finish
Natural Brass

Physical Characteristics

Frame	Bronze
Button	Bronze
Sealing Assembly	Beryllium Nickel w/ TEFLON
Bulb (5 mm)	Glass
Compression Screw	Bronze
Deflector	Chrome Plated Brass

Additional Technical Data
Refer to Table A for additional technical data.

Operation

The glass bulb contains a fluid that is thermally responsive to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass bulb, allowing the sprinkler to activate and flow water.

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

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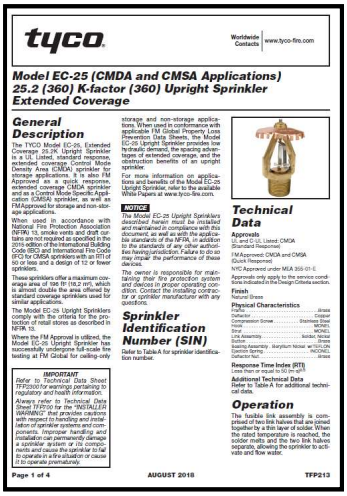

tyco

Worldwide Contacts | www.tyco-fire.com

Model EC-25 (CMDA and CMSA Applications) 25.2 (360) K-factor (360) Upright Sprinkler Extended Coverage

General Description

The TYCO Model EC-25, Extended Coverage 25.2K Upright Sprinkler is a UL Listed, standard response, extended coverage Control Mode Specific Application Area/Density sprinkler for storage applications. It is also FM Approved as a quick response, extended coverage CMDA sprinkler and as a Control Mode Specific Application (CMSA) sprinkler, as well as FM Approved for storage and non-storage applications.

When used in accordance with NFPA 13, smoke vents and draft curtains are not required as specified in the 2015 edition of the International Building Code (IBC) and International Fire Code (IFC) for CMSA sprinklers with an RTI of 50 or less and a design of 12 or fewer sprinklers.

These sprinklers offer a maximum coverage area of 196 ft² (18.2 m²), which is almost double the area offered by standard spray sprinklers used for similar applications.

The Model EC-25 Upright Sprinklers comply with the criteria for the protection of retail stores as described in NFPA 13.

Where the FM Approval is utilized, the Model EC-25 Upright Sprinkler has successfully undergone full-scale fire testing at FM Global for ceiling-only storage and non-storage applications. When used in conformance with applicable FM Global Property Loss Prevention Data Sheets, the Model EC-25 Upright Sprinkler provides low hydraulic demand, the spacing advantages of extended coverage, and the obstruction benefits of an upright sprinkler.

For more information on applications and benefits of the Model EC-25 Upright Sprinkler, refer to the available White Papers at www.tyco-fire.com.

NOTICE

The Model EC-25 Upright Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the FM Global, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or sprinkler manufacturer with any questions.

Sprinkler Identification Number (SIN)

Refer to Table A for sprinkler identification number.

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

Technical Data

Approvals
UL and C-UL Listed; CMDA (Quick Response)

FM Approved: CMDA and CMSA (Quick Response)

NYC Approved under MEA 305-01-E

Approvals only apply to the service conditions indicated in the Design Criteria section.

Finish
Natural Brass

Physical Characteristics

Deflector	Brass
Compression Screw	Stainless Steel
Frame	MONEL
Yoke	MONEL
Link Assembly	Solder, Brass
Button	Brass
Sealing Assembly	Beryllium Nickel w/ TEFLON
Bulb (5 mm)	Glass
Deflector Nut	Brass

Response Time Index (RTI)
Less than or equal to 50 (m·s)$^{0.5}$

Additional Technical Data
Refer to Table A for additional technical data.

Operation

The fusible link assembly is comprised of two links that are soldered together by a thin layer of solder. When the rated temperature is reached, the solder melts and the two link halves separate, allowing the sprinkler to activate and flow water.

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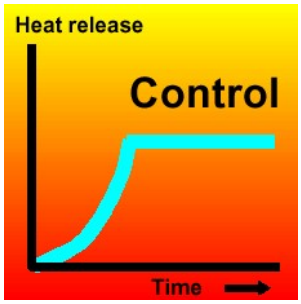
55 Johnson Controls —

Johnson Controls

Control Mode Sprinklers

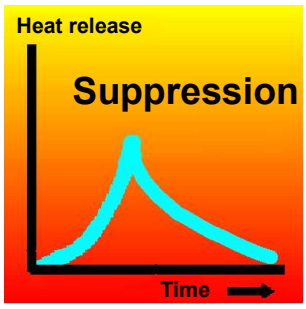
- Limiting the size of a fire by distribution of water to control the heat release rate and pre-wet adjacent combustibles, while controlling ceiling gas temperatures to avoid structural damage.
- Sprinkler Types:
  - Control Mode Density Area (CMDA)
    - Conventional / Old Style
    - Standard Spray / Standard Coverage
    - Standard Spray / Extended Coverage
  - Control Mode Specific Application (CMSA)
  - In-Rack (Intermediate Level)



56 Johnson Controls —

Johnson Controls

Suppression Mode (SM) Sprinklers

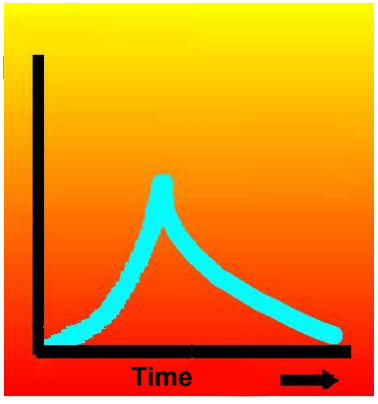


57 Johnson Controls —

Johnson Controls

Suppression Mode (SM) Sprinklers

- Vertical fire spread is reversed
- Sprinklers operate quickly, while heat release is small & reduce heat radiation
- High density water delivered direct to the base area of fire
- Fewer sprinklers operate, less water damage
- Design parameters much more critical
- Sprinkler Types:
  - Early Suppression Fast Response (ESFR)



58 Johnson Controls —

Johnson Controls

NFPA 13, 2019 Table of Contents

Johnson Controls

High Piled Storage

Johnson Controls

Suppression Mode Sprinklers

- Sprinkler Type:
  - 14.0 (200) K Up & Pend
  - 16.8 (240) K Up & Pend
  - 22.4 (326) K Pend
  - 25.2 (360) K Pend
- Max Area of Coverage:
  - 100 sq.ft. (9.3 m^2)
- Max Distance Between Sprinklers:
  - 12' (3.7m) – 30' (9.1m) Building
  - 10' (3.01m) – >30' (9.1m) Building
- Design:
  - Calculate a specific # of sprinklers at a specific pressure

Johnson Controls

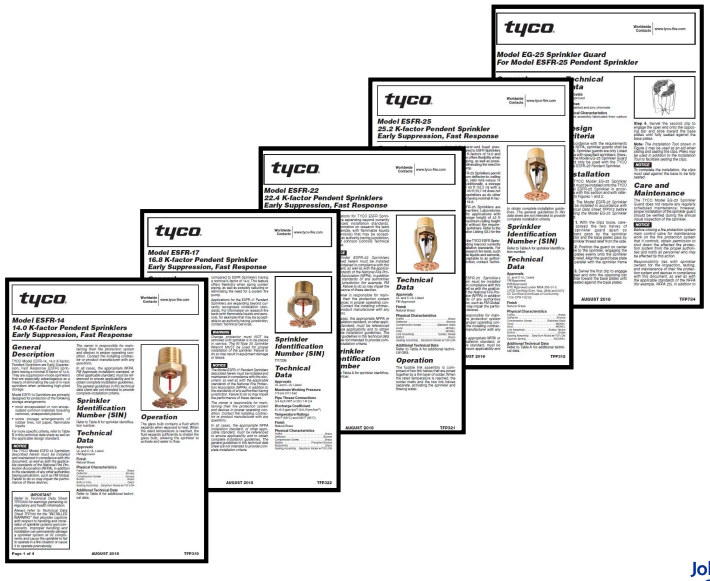
ESFR Sprinklers

Table 23.5.1 ESFR Sprinkler Protection of Rack Storage of Class I Through Class IV Commodities

Storage Arrangement	Commodity	Maximum Storage Height ft	Maximum Storage Height m	Minimum Ceiling/Roof Height ft	Minimum Ceiling/Roof Height m	Nominal K-Factor	Orientation	Minimum Operating Pressure psi	Minimum Operating Pressure bar
Single-row, double-row, and multiple-row racks (no open-top containers)	Class I, II, III, or IV, encapsulated or nonencapsulated	20	6.1	25	7.6	14 (200)	Upright/pendent	50	3.4
						16.8 (240)	Upright/pendent	35	2.4
						22.4 (320)	Pendent	25	1.7
						25.2 (360)	Pendent	15	1
				30	9.1	14 (200)	Upright/pendent	50	3.4
						16.8 (240)	Upright/pendent	35	2.4
						22.4 (320)	Pendent	25	1.7
						25.2 (360)	Pendent	15	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
				40	12	16.8 (240)	Pendent	52	3.6
						22.4 (320)	Pendent	40	2.8
						25.2 (360)	Pendent	25	1.7
				45	14	14 (200)	Pendent*	NA	NA
						16.8 (240)	Pendent*	NA	NA
						22.4 (320)	Pendent	40	2.8
						25.2 (360)	Pendent	40	2.8
		25	7.6	30	9.1	14 (200)	Upright/pendent	50	3.4
						16.8 (240)	Upright/pendent	35	2.4
						22.4 (320)	Pendent	25	1.7
						25.2 (360)	Pendent	15	1.0
				32	10	14 (200)	Upright/pendent	60	4.1
						16.8 (240)	Upright/pendent	42	2.9
				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
				40	12	16.8 (240)	Pendent	52	3.6
						22.4 (320)	Pendent	40	2.8
						25.2 (360)	Pendent	25	1.7
				45	14	14 (200)	Pendent*	NA	NA
						16.8 (240)	Pendent*	NA	NA
						22.4 (320)	Pendent	40	2.8
						25.2 (360)	Pendent	40	2.8

Johnson Controls

Early Suppression Fast Response (ESFR) Data Sheets



Poll #2

Please answer the polling questions that pop up on your screen
Polling questions are considered participation and are required to earn CEUs

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65 Johnson Controls —

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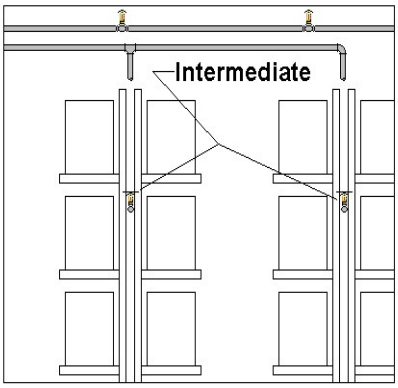
Intermediate Level Sprinkler/ In-Rack Storage Sprinklers

A sprinkler equipped with integral shields to protect its operating elements from the discharge of sprinklers installed at higher elevations.



66 Johnson Controls —

Johnson Controls

In-Rack Sprinklers Data Sheets

tyco

Series TY-B — 5.6 and 8.0 K-factor
Upright and Pendent Intermediate Level Sprinklers
Standard Response

General Description

Sprinkler Identification Numbers

Technical Data

AUGUST 2018 TFP351

tyco

Series TY-FRB — 5.6 K-factor
Upright and Pendent Intermediate Level Sprinklers
Quick Response

General Description

Sprinkler Identification Numbers

Technical Data

Operation

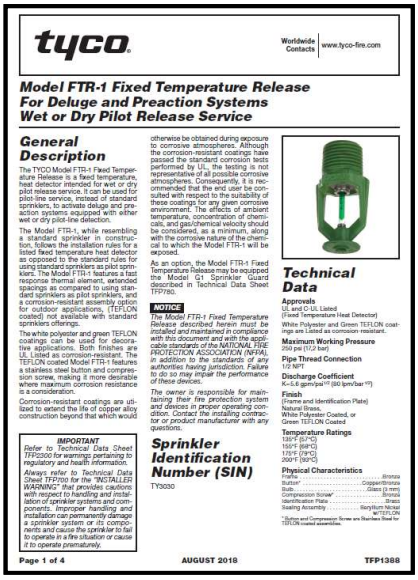
AUGUST 2018 TFP367

Johnson Controls

NFPA 13, 2019 Table of Contents

Johnson Controls

Pilot Line Detectors Data Sheets



tyco

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Model FTR-1 Fixed Temperature Release
For Deluge and Preaction Systems
Wet or Dry Pilot Release Service

General Description

The TYCO Model FTR-1 Fixed Temperature Release is a fixed temperature, heat detector intended for wet or dry pilot release service. It can be used for pilot-line service, instead of standard sprinklers, to activate deluge and preaction systems equipped with either wet or dry pilot-line detection.

The Model FTR-1, while resembling a standard sprinkler in construction, follows the installation rules for a listed fixed temperature heat detector as opposed to the standard rules for using standard sprinklers as pilot sprinklers. The Model FTR-1 features a fast response thermal element, extended spacings as compared to using standard sprinklers as pilot sprinklers, and a corrosion-resistant assembly option for outdoor applications, (TEFLON coated) not available with standard sprinklers offerings.

The white polyester and green TEFLON coatings can be used for decorative applications. Both finishes are UL Listed as corrosion-resistant. The TEFLON coated Model FTR-1 features a stainless steel button and compression screw, making it more desirable where maximum corrosion resistance is a consideration.

Corrosion-resistant coatings are utilized to extend the life of copper alloy construction beyond that which would otherwise be obtained during exposure to corrosive atmospheres. Although the corrosion-resistant coatings have passed the standard corrosion tests performed by UL, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity should be considered, as a minimum, along with the corrosive nature of the chemical to which the Model FTR-1 will be exposed.

As an option, the Model FTR-1 Fixed Temperature Release may be equipped the Model G1 Sprinkler Guard described in Technical Data Sheet TFP780.

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

NOTICE

The Model FTR-1 Fixed Temperature Release described herein must be installed and maintained in compliance with this document and with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.

Sprinkler Identification Number (SIN)

TY3030

Technical Data

Approvals
UL and C-UL Listed
(Fixed Temperature Heat Detector)
White Polyester and Green TEFLON coatings are Listed as corrosion-resistant.

Maximum Working Pressure
250 psi (17,2 bar)

Pipe Thread Connection
1/2 NPT

Discharge Coefficient
K=5.6 gpm/psi[1/2] (80 lpm/bar[1/2])

Finish
(Frame and Identification Plate)
Natural Brass,
White Polyester Coated, or
Green TEFLON Coated

Temperature Ratings
135°F (57°C)
155°F (68°C)
175°F (79°C)
200°F (93°C)

Physical Characteristics
Frame ..... Bronze
Button* ..... Copper/Bronze
Bulb ..... Glass (5 mm)
Compression Screw* ..... Bronze
Identification Plate ..... Brass
Sealing Assembly ..... Beryllium Nickel w/TEFLON

*Button and Compression Screw are Stainless Steel for TEFLON coated assemblies.

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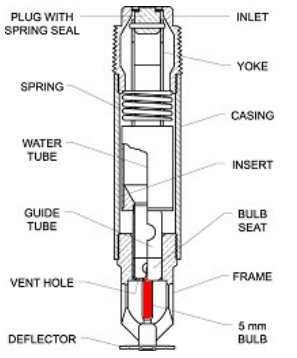
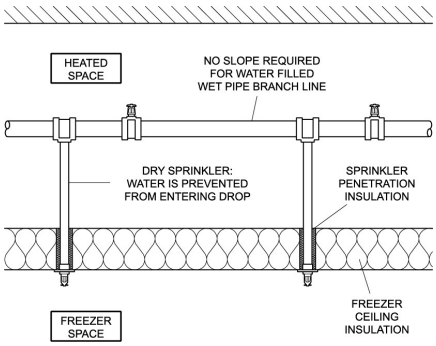
Johnson Controls

Dry Type Sprinklers

- A sprinkler secured in an extension nipple that has a seal at the inlet end to prevent water from entering the nipple until the sprinkler operates.





Wet Pipe Systems (Typically Freezers)

Johnson Controls

Determining the Minimum Dry Type Sprinkler Barrel Length

Table 15.3.1(a) Exposed Barrel Lengths for Dry Sprinklers (U.S. Customary Units)

Ambient Temperature Exposed to Discharge End of Sprinkler (°F)	Minimum Exposed Barrel Length when Exposed to 40°F (in.)	Minimum Exposed Barrel Length when Exposed to 50°F (in.)	Minimum Exposed Barrel Length when Exposed to 60°F (in.)
40	0	0	0
30	0	0	0
20	4	0	0
10	8	1	0
0	12	3	0
−10	14	4	1
−20	14	6	3
−30	16	8	4
−40	18	8	4
−50	20	10	6
−60	20	10	6

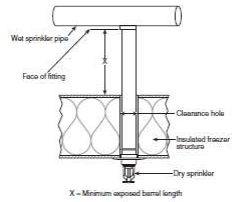


FIGURE A.15.3.1(b) Dry Pendent Sprinkler Through Ceiling or Top of Freezer.

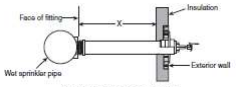


FIGURE A.15.3.1(a) Dry Sidewall Sprinkler Through Wall.

NFPA 13, 2019: *15.3.1

Dry Sprinklers (NFPA 13)

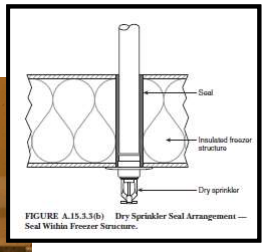


FIGURE A.15.3.3(b) Dry Sprinkler Seal Arrangement — Seal Within Freezer Structure.

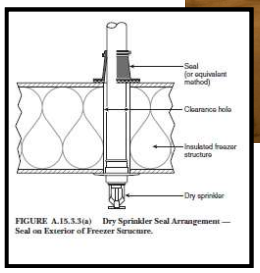


FIGURE A.15.3.3(a) Dry Sprinkler Seal Arrangement — Seal on Exterior of Freezer Structure.

NFPA 13 (2019): 15.3.3*

Specific Application Sprinklers

- NFPA 13 states:
  - "…Nothing in this standard is intended to restrict new technologies or alternate arrangements, provided the level of safety prescribed by this standard is not lowered…"
- Special sprinklers - A type of sprinkler that is intended for the protection of specific hazards or construction features and that has been evaluated and listed for performance under the following conditions:
  - Fire tests related to the intended hazard
  - Distribution of the spray pattern with respect to wetting of floors and walls
  - Distribution of the spray pattern with respect to obstructions
  - Evaluation of the thermal sensitivity of the sprinkler
  - Performance under horizontal or sloped ceilings
  - Area of design

73 Johnson Controls —

Johnson Controls

Institutional Sprinklers

- Institutional Sprinklers are designed for use in areas such as correctional, detention & mental health care facilities
- The unique features of these sprinklers provide a tamper resistant sprinkler design that helps eliminate the opportunity for individuals to injure themselves or others with the sprinkler components
- These sprinklers are designed so that a suspended load applied to the linkage mechanism will release the sprinkler

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Johnson Controls

High Pressure Sprinklers

- High Pressure Sprinklers – A type of sprinkler with a maximum rated service pressure greater than 175 psi (12,1 bar) used in applications that otherwise would require the use of a pressure control valve to reduce the static pressure to less than 175 psi (12,1 bar).
- One of the most common uses for High Pressure Sprinklers is in the protection of high-rise buildings.
- Limited to use in light & ordinary hazard occupancies.

TY-B & TY-FRB
Upright, Pendent, Rec. Pendent & Horizontal Sidewall (250 psi – 17 bar)

TY-FRB ECLH
Horizontal Sidewall (250 psi – 17 bar)

RF II
Standard Coverage Concealed Pendent (250 psi – 17 bar)

75 Johnson Controls —

Johnson Controls

Poll #3

Please answer the polling questions that pop up on your screen
Polling questions are considered participation and are required to earn CEUs

76 Johnson Controls Footer - Use 'Insert >Header & Footer' to modify this text and 'Apply to all'

Sprinkler Identification Before 2001.

- A Pintle is a protrusion (cylinder) extending from a sprinkler deflector indicating a non-standard orifice size
  - Sprinklers with a K-factor less than 5.6 (80) or greater than 8.0 (115) or an 8.0 (115) K-factor with a ½" NPT

UL Control Number		
	Commercial	Residential
Central	804A	66H3
Gem	458A	53G8
Reliable	701A	23S7
Star	722A	48S2
Viking	598A	24S3

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Johnson Controls

Modern Sprinkler Identification

- All sprinklers permanently marked with a one- or two-character manufacturer symbol, followed by three or four numbers
- Identifies a unique sprinkler identification for every:
  - Change in orifice size or shape,
  - Deflector characteristic,
  - Pressure rating
  - Thermal sensitivity

78 Johnson Controls —

Johnson Controls

Sprinkler Identification Numbers (SIN's)

- Every Manufacturer will have a unique prefix

TFP	-	TY	Reliable	-	R
CSC	-	C	Star	-	S
GEM	-	G	Victaulic	-	V
Globe	-	GL	Viking	-	VK

- Every Sprinkler type will have a unique identification number
- All Sprinkler Deflectors must be marked with SIN's by January 1, 2001

79 Johnson Controls —

Johnson Controls

The Tyco SIN System

K-factor	Style	Response	Hazard
1 - 2.8 (3/8)	1 - UP	1 - Strut	1 - Standard Spray
2 - 4.2 (7/16)	2 - Pend	2 - FR Link	2 - Extended Coverage LH
3 - 5.6 (1/2)	3 - HSW	3 - 3mm Bulb	3 - Storage
4 - 8.0 (17/32)	4 - VSW	4 - 2.5mm Bulb	4 - Residential
5 - 11.2 (5/8)	5 - Conc	5 - 5mm Bulb	5 - Dry (Standard Coverage)
6 - 14.0 (3/4)	6 - Conv	6 - Heat Fin	6 - ESFR
7 - 16.8	7 - Fact. Rec.	7 - 7mm/9mm Bulb	7 - Extended Coverage OH
8 - 19.6	8 - Retro. Up	8 - Special	8 - Extended Coverage EH/Storage
9 - 25.2	9 - Retro Pend	9 - Special	9 - Dry (Extended Coverage)
0 - 1.9 (1/4)	0 - Retro Fact. Rec.	0 - Special	0 - Special

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Johnson Controls

What is the SIN?

- ESFR Pendent
  - Fast Response Link
  - 25.2 (360) K-factor
- Standard Spray Upright
  - 5mm Bulb
  - 5.6 (80) K-factor
- Dry Pendent
  - 3mm Bulb
  - 5.6 (80) K-factor

Johnson Controls

Sprinkler Types Summary

- Control-Mode Sprinklers
  - Standard Coverage Spray Sprinklers
  - Extended Coverage Sprinklers
  - Control Mode Specific Application
  - In-Rack
- Life Safety Sprinklers
  - Residential Sprinklers
- Suppression-Mode Sprinklers
  - ESFR Sprinklers
- Pilot Line Detectors
  - Used for detection only
- Special Sprinklers
  - Window Sprinklers
  - Attic Sprinklers
  - Combustible Concealed Sprinklers

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Match the sprinkler type to the correct description

1. A Sprinkler where roughly half of the water spray is directed upward and half is directed downward	a. Extended Coverage Sprinkler
2. A sprinkler with an umbrella shaped pattern where most of the water spray is directed downward	b. Residential Sprinkler
3. A sprinkler with high wall wetting designed to enhance survivability	c. Spray Sprinkler
4. A sprinkler where the water spray pattern grows larger as the flow/pressure increases	d. Conventional Sprinkler

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Any Questions?

Johnson Controls
1467 Elmwood Ave.
Cranston, RI 02910
1 (401) 781-8220
Training@tycofp.com

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