



Series TY-FRB – 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard)

General Description

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) are decorative 3 mm glass bulb type spray sprinklers designed for use in hydraulically calculated sprinkler systems in light hazard, commercial occupancies such as churches, restaurant seating areas, hotels, educational facilities, offices, etc. With their coverage up to 16 ft (4,9 m) wide by 24 ft (7,3 m) long, they are designed for installation along a wall or the side of a beam and just beneath a smooth ceiling. Horizontal sidewall (HSW) sprinklers are commonly used instead of pendent or upright sprinklers due to aesthetics or building construction considerations, where piping across the ceiling is not desirable.

The fast response thermal sensitivity rating of the Series TY-FRB, 3 mm bulb type sprinklers provides for a quick response extended coverage (QREC) rating for many of the coverage areas detailed in Tables B and C.

The recessed version of the Series TY-FRB Extended Coverage Horizontal Sidewall Sprinkler utilizes either a two-piece Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) Recessed Escutcheon with 1/2 in. (12,7 mm) of recessed adjustment or up to 3/4 in. (19,1 mm) of total adjustment from the flush side-

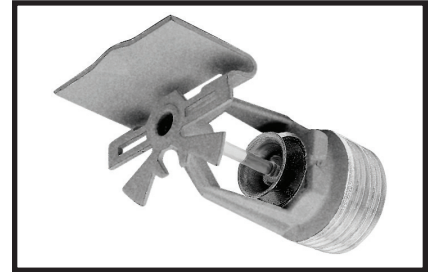
wall position, or a two-piece Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) Recessed Escutcheon with 1/4 in. (6,4 mm) of recessed adjustment or up to 1/2 in. (12,7 mm) of total adjustment from the flush sidewall position. The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe lengths to the sprinklers must be cut.

Corrosion resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond that which would otherwise be obtained when exposed to corrosive atmospheres. Although corrosion resistant coated sprinklers have passed the standard corrosion tests of the applicable approval agencies, 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 sprinklers will be exposed.

NOTICE

The Series TY-FRB Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (NFPA), 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 product manufacturer with any questions.



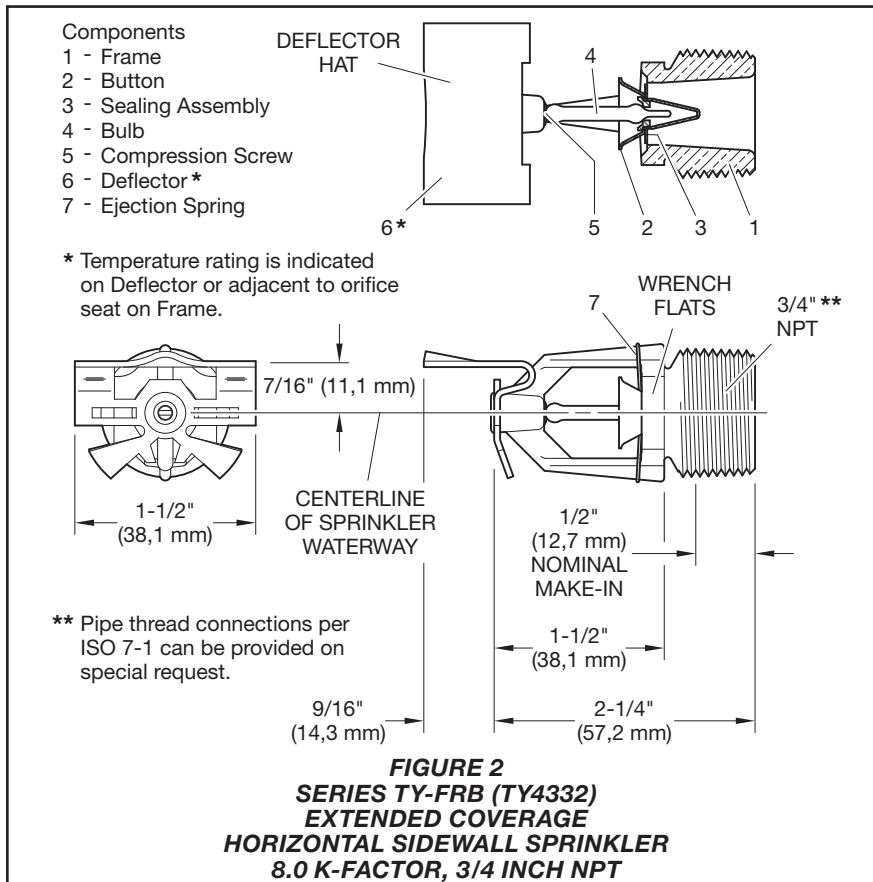
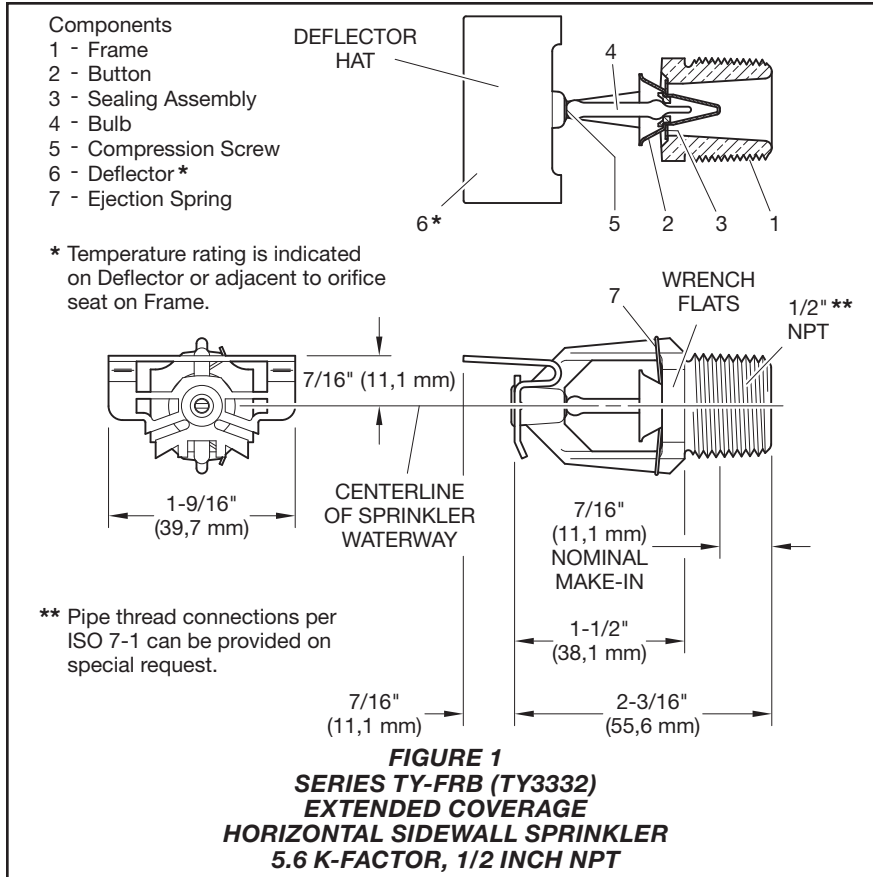
Sprinkler Identification Numbers (SINs)

TY3332...EC HSW, 5.6K, 1/2 in. NPT
TY4332...EC HSW, 8.0K, 3/4 in. NPT

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
 FM and NYC Approved

(Refer to Table A for complete approval information including corrosion resistant status, as well as the Design Criteria section pertaining to special design considerations.)

Maximum Working Pressure

Refer to Table B.

Discharge Coefficient

K=5.6 gpm/psi^{1/2} (80,6 lpm/bar^{1/2})
 K=8.0 gpm/psi^{1/2} (115,2 lpm/bar^{1/2})

Temperature Ratings

Refer to Table A.

Finishes

Sprinkler: Refer to Table E.

Recessed Escutcheon: White Coated,
 Chrome Plated, or Brass Plated

Physical Characteristics

Frame	Bronze
Button	Brass/Copper
Button	Brass/Copper
Sealing Assembly ..	Beryllium Nickel w/TEFLON
Bulb	Glass
Compression Screw ..	Bronze
Deflector	Copper

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.

Design Criteria

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) must be installed and utilized in Light Hazard Occupancies, under smooth ceilings as outlined in the applicable installation standard recognized by the Approval Agency (e.g., UL recognizes NFPA 13, and FM recognize the FM Loss Prevention Data Sheets). Only the Style 10, 20, 30, or 40 Recessed Escutcheon, as applicable, is to be used for recessed installations.

K-FACTOR	SPRINKLER TYPE	TEMPERATURE RATING	BULB LIQUID COLOR	SPRINKLER FINISH ⁽⁵⁾		
				NATURAL BRASS	CHROME PLATED	POLYESTER ^c
5.6 1/2 in. NPT	EC HSW (TY3332)	135°F (57°C)	Orange		1, 2, 3, 4	
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
5.6 1/2 in. NPT	RECESSED EC HSW ^a (TY3332)	135°F (57°C)	Orange		1, 2, 4	
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
5.6 1/2 in. NPT	RECESSED EC HSW ^b (TY3332)	135°F (57°C)	Orange		1, 2, 3, 4	
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
8.0 3/4 in. NPT	EC HSW (TY4332)	135°F (57°C)	Orange		1, 2, 3, 4	
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
8.0 3/4 in. NPT	RECESSED EC HSW ^a (TY4332)	135°F (57°C)	Orange		1, 2, 4	
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
8.0 3/4 in. NPT	RECESSED EC HSW ^b (TY4332)	135°F (57°C)	Orange		1, 2, 3, 4	
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			

Notes:

1. Listed by Underwriters Laboratories, Inc. (UL) per Table C
2. Listed by Underwriters Laboratories, Inc. for use in Canada per Table C
3. Approved by Factory Mutual Research Corporation (FM) per Table D
4. Approved by the City of New York under MEA 354-01-E
5. Where Polyester Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed corrosion-resistant sprinklers.
- a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable
- b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable
- c. Frame and deflector only

TABLE A
LABORATORY LISTINGS AND APPROVALS
(Refer to the Design Criteria Section)

K-FACTOR	SPRINKLER TYPE	SPRINKLER FINISH		
		NATURAL BRASS	CHROME PLATED	POLYESTER
5.6 1/2 in. NPT	EC HSW (TY3332)		250 PSI (17, 2 BAR) OR 175 PSI (12,1 BAR)	
	RECESSED EC HSW (TY3332)			
8.0 3/4 in. NPT	EC HSW (TY4332)		(SEE NOTE 1)	
	RECESSED EC HSW (TY4332)			

Notes:

1. The maximum working pressure of 250 psi (17,2 bar) only applies to the Listing by Underwriters Laboratories, Inc. (UL); the Listing by Underwriters Laboratories, Inc. for use in Canada (C-UL); and, the Approval by the City of New York.

TABLE B
MAXIMUM WORKING PRESSURE

5.6K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY3332)						
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⁾, Inches (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 12 (100 to 300)	135, 155, 175	10 (3,1)
Quick	16 x 18 (4,9 x 5,5)	29 (110)	26.8 (1,85)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)
Quick	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)	4 to 6 (100 to 150)	135	10 (3,1)
Quick	16 x 22 (4,9 x 6,7)	35 (133)	39.1 (2,70)	4 to 6 (100 to 150)	135	10 (3,1)
Standard	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)	4 to 6 (100 to 150)	155	10 (3,1)
Standard	16 x 22 (4,9 x 6,7)	35 (133)	39.1 (2,70)	4 to 6 (100 to 150)	155, 175	10 (3,1)
8.0K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY4332)						
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⁾, Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing⁽⁴⁾, ft (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	10.6 (0,73)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 18 (4,9 x 5,5)	29 (110)	13.1 (0,90)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 20 (4,9 x 6,1)	32 (121)	16.0 (1,10)	4 to 6 (100 to 150)	135	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 20 (4,9 x 6,1)	33 (125)	17.0 (1,17)	4 to 12 (100 to 300)	135	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 22 (4,9 x 6,7)	35 (133)	19.1 (1,32)	4 to 6 (100 to 150)	135	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 22 (4,9 x 6,7)	36 (136)	20.3 (1,59)	4 to 12 (100 to 300)	135	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 24 (4,9 x 7,3)	39 (148)	23.8 (1,64)	4 to 6 (100 to 150)	135	10 (3,1)/13 (4,0) ⁽⁵⁾
Quick	16 x 24 (4,9 x 7,3)	40 (151)	25.0 (1,72)	4 to 12 (100 to 300)	135	10 (3,1)/13 (4,0) ⁽⁵⁾
Standard	16 x 20 (4,9 x 6,1)	32 (121)	16.0 (1,10)	4 to 6 (100 to 150)	155	10 (3,1)/13 (4,0) ⁽⁵⁾
Standard	16 x 20 (4,9 x 6,1)	33 (125)	17.0 (1,17)	4 to 12 (100 to 300)	155	10 (3,1)/13 (4,0) ⁽⁵⁾
Standard	16 x 22 (4,9 x 6,7)	35 (133)	19.1 (1,32)	4 to 6 (100 to 150)	155, 175	10 (3,1)/13 (4,0) ⁽⁵⁾
Standard	16 x 22 (4,9 x 6,7)	36 (136)	20.3 (1,59)	4 to 12 (100 to 300)	155, 175	10 (3,1)/13 (4,0) ⁽⁵⁾
Standard	16 x 24 (4,9 x 7,3)	39 (148)	23.8 (1,64)	4 to 6 (100 to 150)	155, 175	10 (3,1)/13 (4,0) ⁽⁵⁾
Standard	16 x 24 (4,9 x 7,3)	40 (151)	25.0 (1,72)	4 to 12 (100 to 300)	155, 175	10 (3,1)/13 (4,0) ⁽⁵⁾

Notes:

1. Backwall (where sprinkler is located) by sidewall (length of throw)
2. Requirement is based on minimum flow in gpm from each sprinkler. The indicated residual pressures are based on the nominal K-factor.
3. The centerline of the sprinkler waterway is located 7/16 in. (11,1 mm) below the deflector (Ref. Figures 1 and 2).
4. Minimum spacing is for lateral distance between sprinklers located along a single wall, otherwise adjacent sprinklers (i.e., sidewall sprinklers on an adjacent wall, on an opposite wall, or pendent sprinklers) must be located outside of the maximum listed protection area of the extended coverage sidewall sprinkler being utilized.
5. Minimum spacing is 13 ft (4,0 m) when design pressure exceeds 175 psi (12,1 bar), otherwise the minimum spacing is 10 ft (3 m).

TABLE C
UL AND C-UL LISTING COVERAGE AND FLOW RATE CRITERIA

5.6K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY3332)

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⁾, Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing⁽⁴⁾, ft (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	22 (1,51)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 18 (4,9 x 5,5)	30 (114)	29 (2,00)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 20 (4,9 x 6,1)	33 (125)	35 (2,41)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Standard	16 x 16 (4,9 x 4,9)	26 (98)	22 (1,51)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 20 (4,9 x 6,1)	30 (114)	29 (2,00)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 22 (4,9 x 6,7)	33 (125)	35 (2,41)	4 to 12 (100 to 300))	175	10 (3,1)

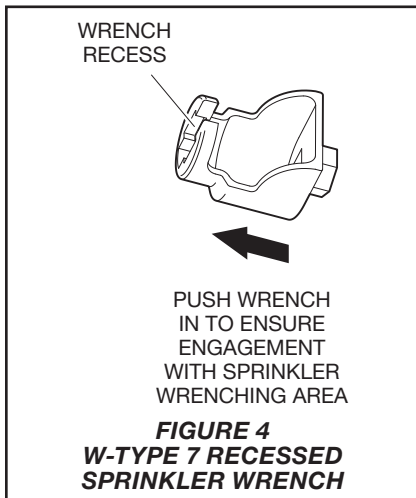
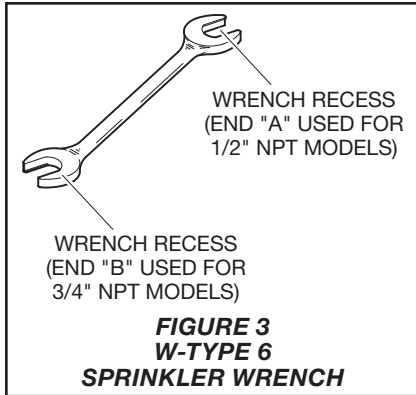
8.0K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY4332)

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⁾, Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing⁽⁴⁾, ft (m)
Quick	16 x 16 (4,9 x 4,9)	32 (121)	16 (1,10)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 18 (4,9 x 5,5)	36 (136)	20 (1,38)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 20 (4,9 x 6,1)	40 (151)	25 (1,72)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 22 (4,9 x 6,7)	44 (167)	30 (2,06)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 24 (4,9 x 6,7)	48 (182)	36 (2,48)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Standard	16 x 16 (4,9 x 4,9)	32 (121)	16 (1,10)	4 to 12 (100 to 300))	175	10 (3,1)
Standard	16 x 18 (4,9 x 5,5)	36 (136)	20 (1,38)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 20 (4,9 x 6,1)	40 (151)	25 (1,72)	4 to 12 (100 to 300))	175	10 (3,1)
Standard	16 x 22 (4,9 x 6,7)	44 (167)	30 (2,06)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 24 (4,9 x 6,7)	48 (182)	36 (2,48)	4 to 12 (100 to 300)	175	10 (3,1)

Notes:

1. Backwall (where sprinkler is located) by sidewall (length of throw)
2. Requirement is based on maintaining both minimum flow and minimum residual pressure.
3. The centerline of the sprinkler waterway is located 7/16 in. (11,1 mm) below the deflector (Ref. Figures 1 and 2).
4. Minimum spacing is for lateral distance between sprinklers located along a single wall, otherwise adjacent sprinklers (i.e., sidewall sprinklers on an adjacent wall, on an opposite wall, or pendent sprinklers) must be located outside of the maximum listed protection area of the extended coverage sidewall sprinkler being utilized.

TABLE D
FM COVERAGE AND FLOW RATE CRITERIA



Installation

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) must be installed in accordance with this section.

Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm).

A leak tight 1/2 inch NPT sprinkler joint should be obtained with a torque of 7 to 14 lb-ft (9,5 to 19,0 N·m). A leak tight 3/4 in. NPT sprinkler joint should be obtained with a torque of 10 to 20 lb-ft (13,4 to 26,8 N·m). Higher levels of torque may distort the sprinkler inlet and cause leakage or impairment of the sprinkler.

Do not attempt to make-up for insufficient adjustment in the escutcheon plate by under- or over-tightening the sprinkler. Readjust the position of the sprinkler fitting to suit.

Series TY-FRB EC Sidewall Sprinkler

The Series TY-FRB EC Sidewall Sprinklers must be installed in accordance with the following instructions:

Step 1. Horizontal sidewall sprinklers are to be installed with their center-line perpendicular to the back wall and parallel to the ceiling. The word “TOP” on the deflector is to face towards the ceiling.

Step 2. With pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting.

Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Ref. Figure 3). With reference to Figures 1 and 2, the W-Type 6 Sprinkler Wrench is to be applied to the sprinkler wrench flats.

Series TY-FRB Recessed EC Sidewall Sprinkler

The Series TY-FRB Recessed EC Sidewall Sprinklers must be installed in accordance with the following instructions:

Step 1. Horizontal sidewall sprinklers are to be installed with their center-line perpendicular to the back wall and parallel to the ceiling. The word “TOP” on the deflector is to face towards the ceiling.

Step 2. After installing the Style 10, 20, 30, or 40 Mounting Plate, as applicable, over the sprinkler threads and with pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting.

Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Ref. Figure 4). With reference to Figure 1 or 2, the W-Type 7 Recessed Sprinkler Wrench is to be applied to the sprinkler wrench flats.

Step 4. After the wall has been installed or the finish coat has been applied, slide on the Style 10, 20, 30, or 40. Closure over the Series TY-FRB Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the wall.

Care and Maintenance

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) must be maintained and serviced in accordance with this section. Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, per-

mission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

The owner must assure that the sprinklers are not used for hanging of any objects; otherwise, non-operation in the event of a fire or inadvertent operation may result.

Absence of an escutcheon, which is used to cover a clearance hole, may delay the time to sprinkler operation in a fire situation.

Sprinklers that are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. (Refer to Installation Section.)

Frequent visual inspections are recommended to be initially performed for corrosion resistant coated sprinklers, after the installation has been completed, to verify the integrity of the corrosion resistant coating. Thereafter, annual inspections per NFPA 25 should suffice; however, instead of inspecting from the floor level, a random sampling of close-up visual inspections should be made, so as to better determine the exact sprinkler condition and the long term integrity of the corrosion resistant coating, as it may be affected by the corrosive conditions present.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions. It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

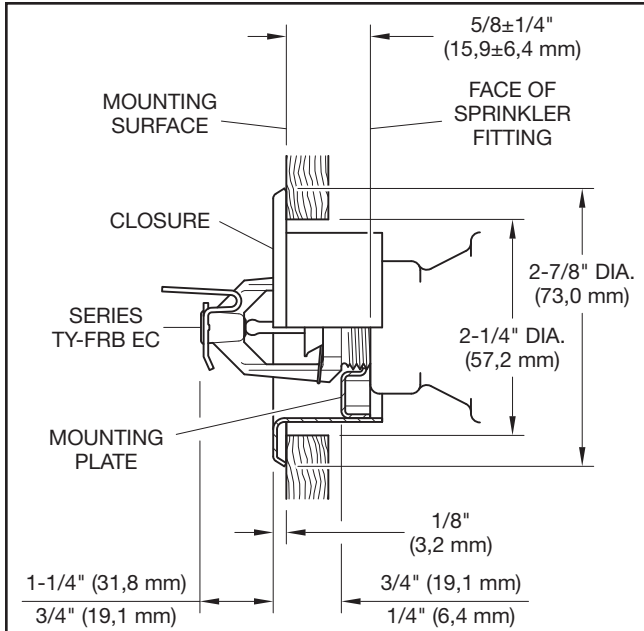


FIGURE 5
SERIES TY-FRB RECESSED EC SIDEWALL
SPRINKLER ASSEMBLY WITH TWO-PIECE
3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
5.6 K-FACOTR, 1/2 INCH NPT

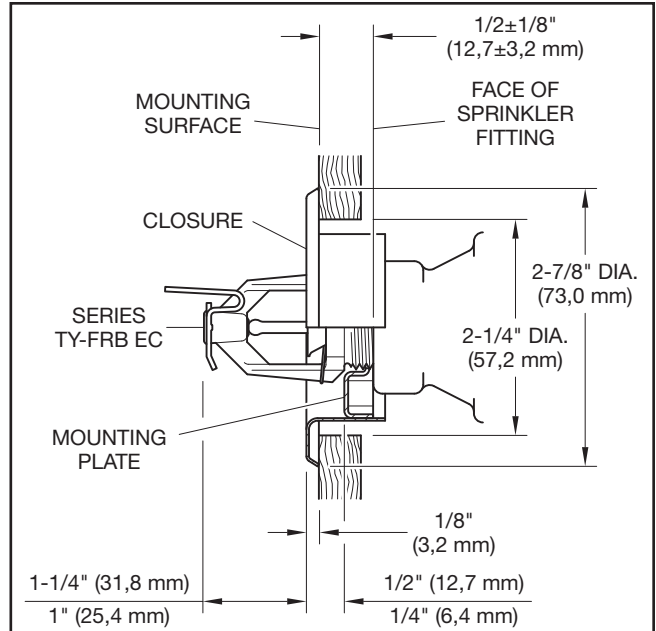


FIGURE 6
SERIES TY-FRB RECESSED EC SIDEWALL
SPRINKLER ASSEMBLY WITH TWO-PIECE
1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 INCH NPT

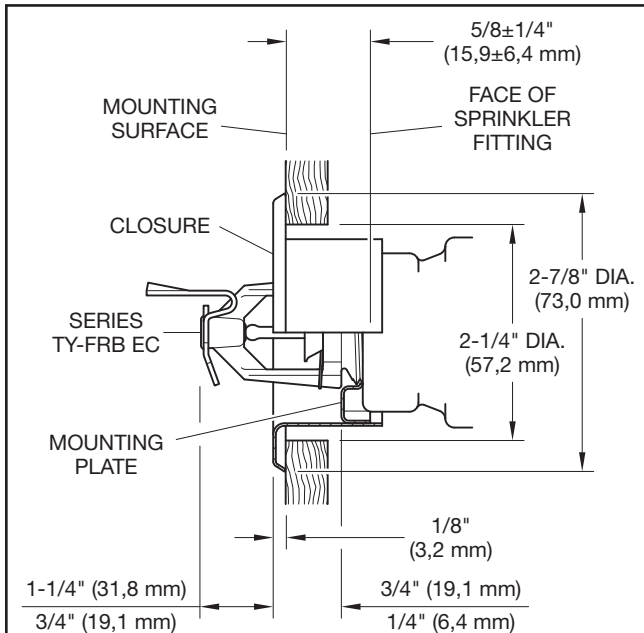


FIGURE 7
SERIES TY-FRB RECESSED EC SIDEWALL
SPRINKLER ASSEMBLY WITH TWO-PIECE
3/4 INCH TOTAL ADJUSTMENT
STYLE 40 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 INCH NPT

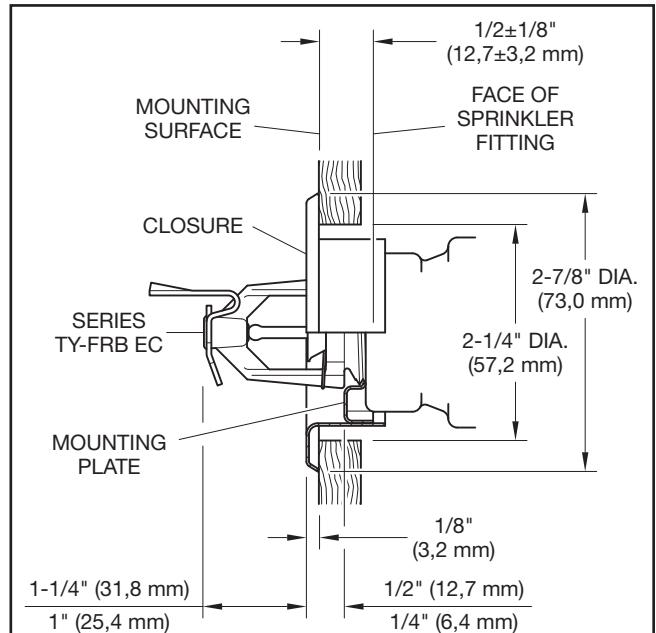
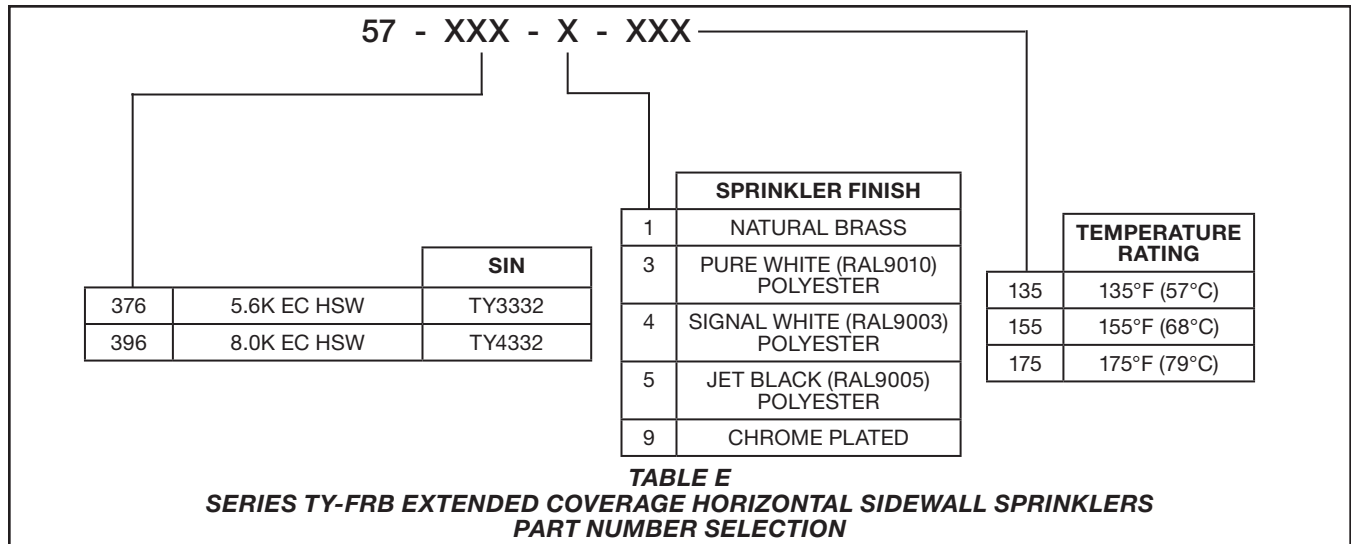


FIGURE 8
SERIES TY-FRB RECESSED EC SIDEWALL
SPRINKLER ASSEMBLY WITH TWO-PIECE
1/2 INCH TOTAL ADJUSTMENT
STYLE 30 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 INCH NPT



Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and Part Number (P/N).

Sprinkler Assembly with NPT Thread Connections

Specify: Series TY-FRB, (specify SIN), Extended Coverage Horizontal Side-wall Sprinkler, K=(specify), (specify) temperature rating, (specify) finish, P/N (specify from Table E)

Recessed Escutcheon

Specify: Style (10, 20, 30, or 40) Recessed Escutcheon with (specify*) finish, P/N (specify*)

* Refer to Technical Data Sheet TFP770

Sprinkler Wrench

Specify: W-Type 6 Sprinkler Wrench, P/N 56-000-6-387

Specify: W-Type 7 Sprinkler Wrench, P/N 56-850-4-001