

## Series DS-1 Dry-Type Sprinklers 5.6K Pendent, Upright, and Horizontal Sidewall Quick Response, Standard Coverage

### General Description

TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are decorative glass bulb automatic sprinklers designed for commercial use. Dry-type sprinklers are typically used where:

- pendent sprinklers are required on dry pipe systems that are exposed to freezing temperatures for example, sprinkler drops from unheated portions of buildings
- sprinklers and/or a portion of the connecting piping are exposed to freezing temperatures; for example, sprinkler drops from wet systems into freezers, sprinkler sprigs from wet systems into unheated attics, or horizontal piping extensions through a wall to protect an unheated area such as loading docks, overhangs, and building exteriors
- sprinklers are used on systems that are seasonally drained to avoid freezing for example, vacation areas

#### NOTICE

The Series DS-1 Dry-Type 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

#### 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.

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.

The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.

### Sprinkler Identification Numbers (SINs)

#### 3/4 in. NPT:

- TY3935 – Pendent
- TY3735 – Horizontal Sidewall

#### 1 in. NPT:

- TY3235 – Pendent
- TY3135 – Upright
- TY3335 – Horizontal Sidewall

### Technical Data

#### Approvals

UL and C-UL Listed  
FM Approved  
NYC Approved under MEA 352-01-E

Previous New York City Approval and MEA certification numbers apply to product as shown in this data sheet. In accordance with Section BC 3502 of the Construction Code, current NYC Approvals for use in the City of New York apply to all products that contain UL or FM Approvals and Listings; therefore, not all products currently Approved for use in the City of New York will carry an actual MEA Certification number.  
See Tables A and B.

#### Maximum Working Pressure

175 psi (12,1 bar)

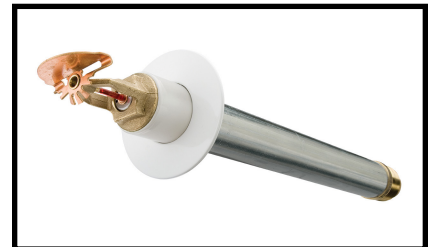
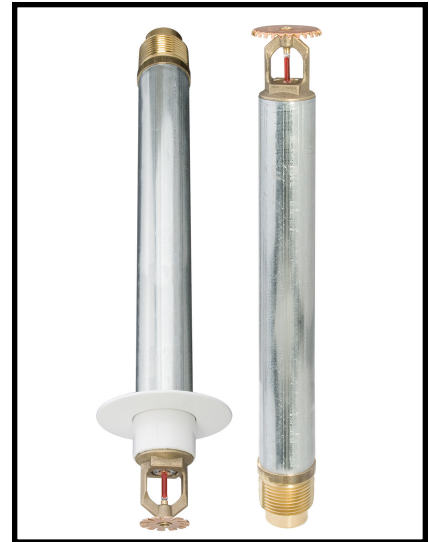
#### Inlet Thread Connections

3/4 in. NPT

1 in. NPT or ISO 7-R 1

#### Discharge Coefficient

K=5.6 gpm/psi<sup>1/2</sup> (80,6 lpm/bar<sup>1/2</sup>)



#### Temperature Ratings

See Tables A and B

#### Finishes

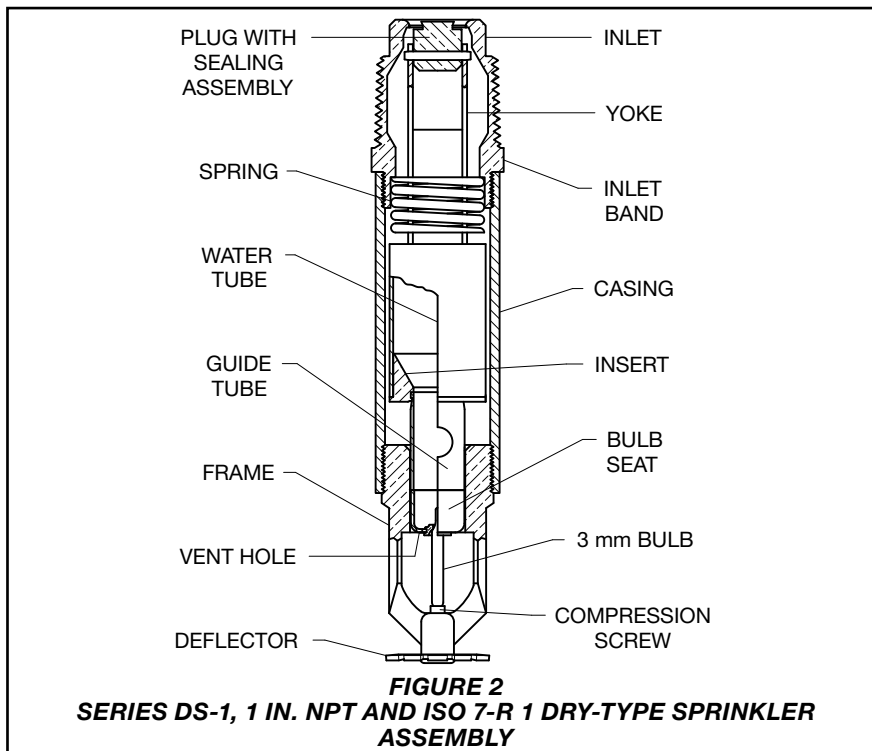
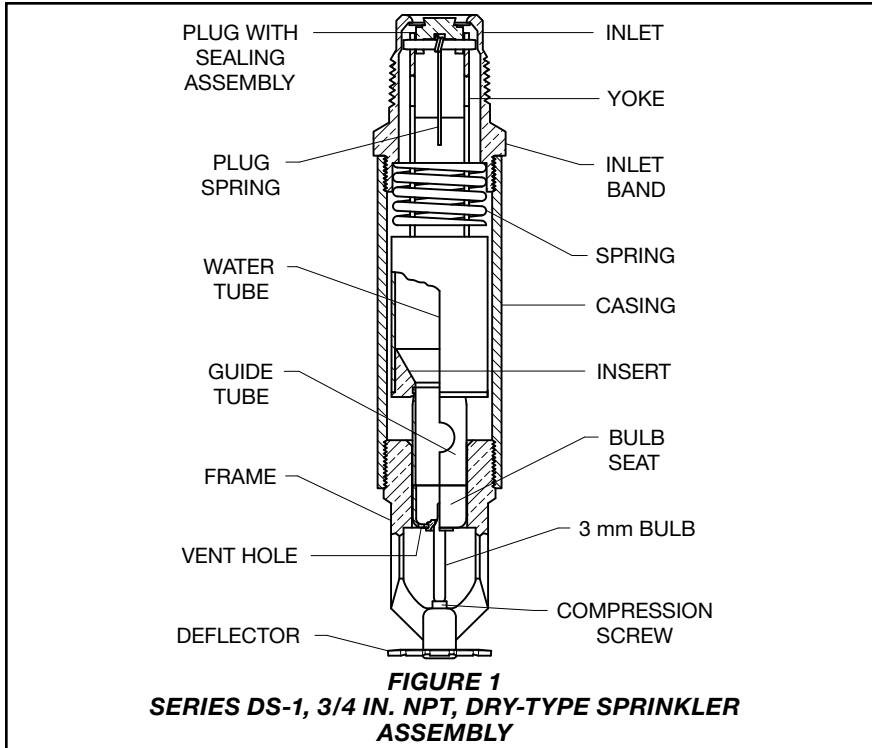
Sprinkler: Natural Brass, Chrome Plated, or Signal White

Escutcheon: Signal White, Chrome Plated, or Brass Plated

#### Physical Characteristics

Inlet	.....	Copper
Plug	.....	Copper
Yoke	.....	Stainless Steel
Casing	.....	Galvanized Carbon Steel
Insert	.....	Bronze
Bulb Seat	.....	Stainless Steel
Bulb	.....	Glass
Compression Screw	.....	Bronze
Deflector	.....	Bronze
Frame	.....	Bronze
Guide Tube	.....	Stainless Steel
Water Tube	.....	Stainless Steel
Spring	.....	Stainless Steel
Plug Spring*	.....	Stainless Steel
Sealing Assembly	.....	Beryllium Nickel w/TEFLON
Escutcheon	.....	Carbon Steel or Stainless Steel

\* For 3/4 in. NPT only



## Operation

When the TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are in service, water is prevented from entering the assembly by the Plug with Sealing Assembly in the Inlet of the Sprinkler. See Figures 1 and 2.

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass Bulb, and the Bulb Seat is released.

The compressed Spring is then able to expand and push the Water Tube as well as the Guide Tube outward. This action simultaneously pulls inward on the Yoke, withdrawing the Plug with Sealing Assembly from the Inlet and allowing the sprinkler to activate and flow water.

## Design Criteria

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are intended for use in fire sprinkler systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency; for example, UL Listing is based on NFPA 13 requirements.

### Sprinkler Fittings

Install the 3/4 or 1 in. NPT Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 in. NPT outlet or run of the following fittings:

- malleable or ductile iron threaded tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150)
- cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125)

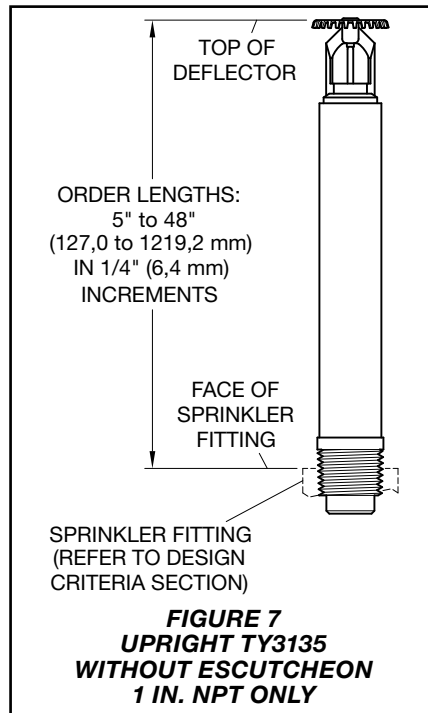
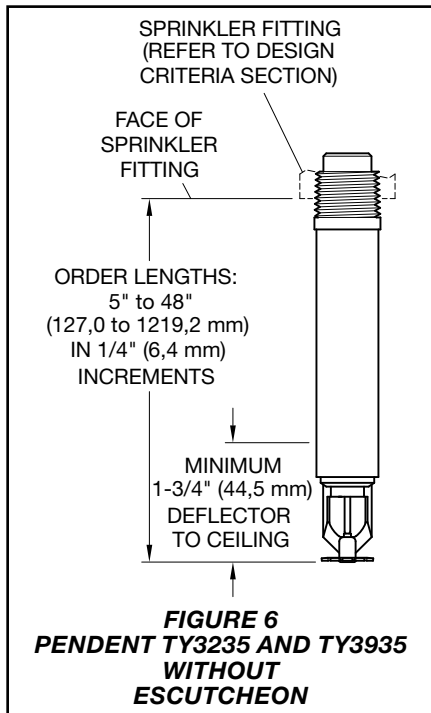
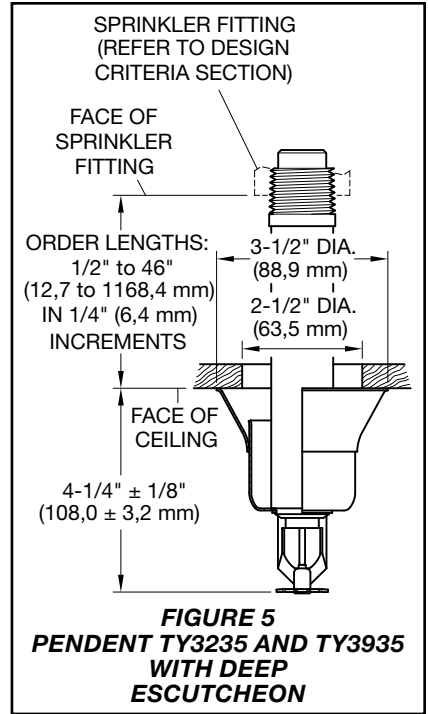
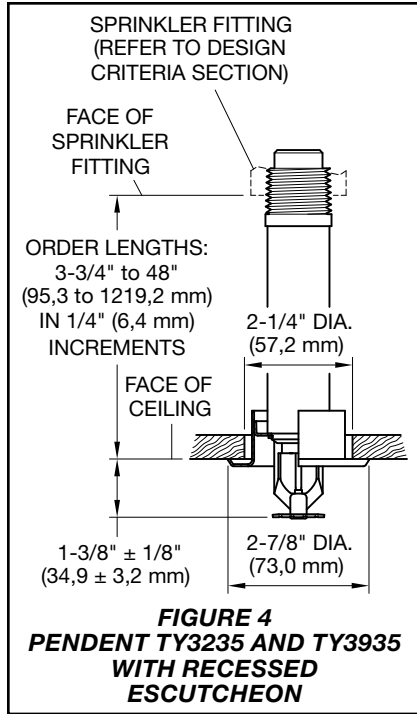
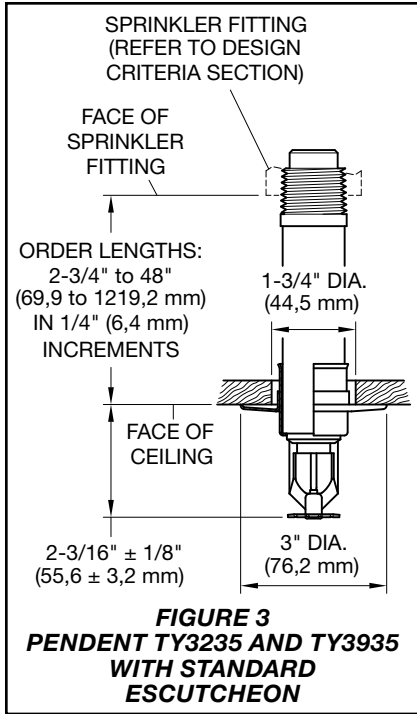
Do not install the DS-1 Sprinklers into an elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow, potentially damaging the Inlet seal.

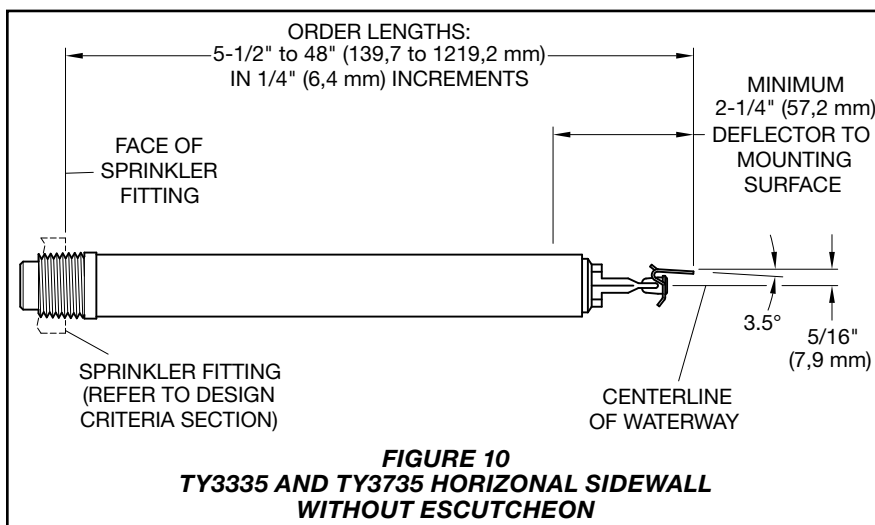
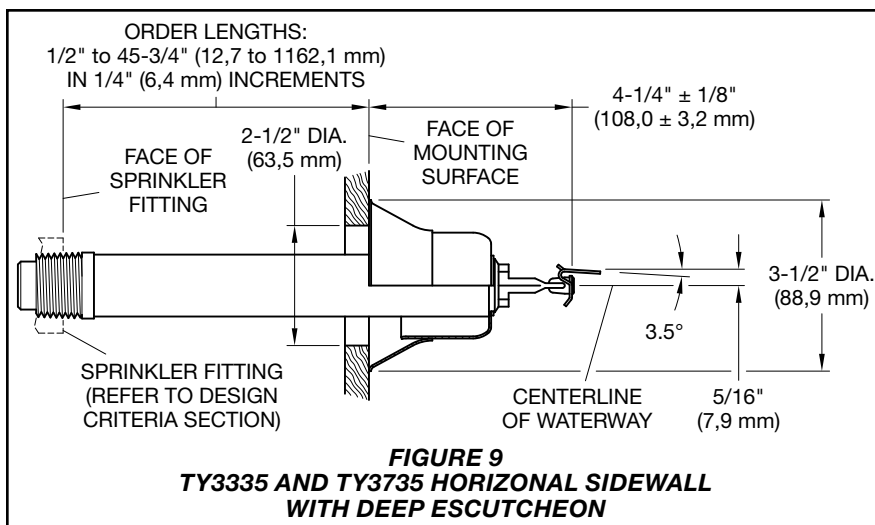
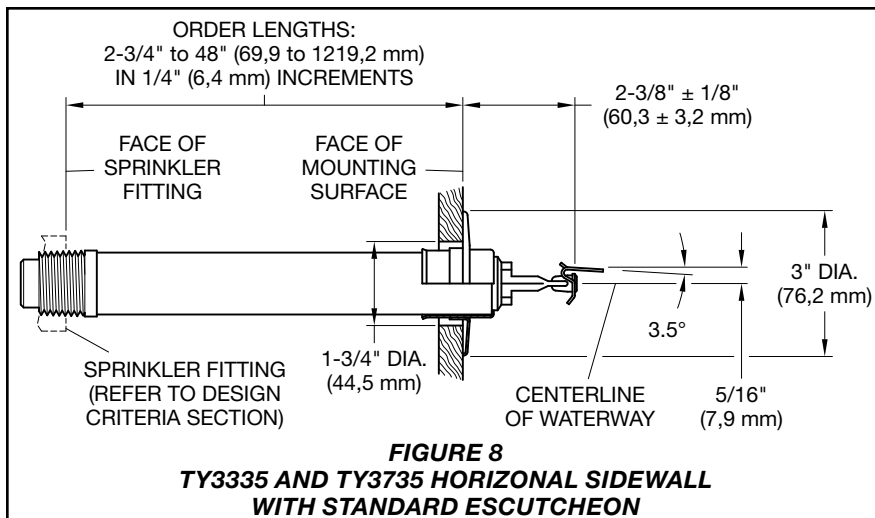
The unused outlet of the threaded tee is plugged as shown in Figure 13.

You can also install the Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 in. NPT outlet of a GRINNELL Figure 730 Mechanical Tee. However, the use of the Figure 730 Tee for this arrangement is limited to wet pipe systems.

		3/4 in. NPT								
		TY3935 Pendent with Recessed Escutcheon (Figure 4)			TY3935 Pendent with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6)			TY3735 Horizontal Sidewall with Top of Deflector-to-Ceiling Distance of 4 to 12 in. (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	Bulb Color Code	Finish								
		Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester
135°F (57°C)	Orange	1, 2			1, 2			1*, 2*		
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue									
<b>Notes:</b> 1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.) 2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.) * Light and Ordinary Hazard occupancies only										
<b>TABLE A</b> <b>3/4 IN. NPT SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS</b> <b>LABORATORY LISTINGS AND APPROVALS</b>										

		1 in. NPT (and ISO 7-R 1)														
		TY3235 Pendent with Recessed Escutcheon (Figure 4)			TY3235 Pendent with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6) TY3135 Upright without Escutcheon <sup>5</sup> (Figure 7)			TY3335 Horizontal Sidewall with Top of Deflector-to-Ceiling Distance of 4 to 12 in. (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)								
Temperature Rating	Bulb Color Code	Finish														
		Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester						
135°F (57°C)	Orange	1, 2, 3, 4			1, 2, 4			1, 2, 3, 4			1, 2, 4		1*, 2*, 3**, 4		1*, 2*, 4	
155°F (68°C)	Red															
175°F (79°C)	Yellow															
200°F (93°C)	Green															
286°F (141°C)	Blue															
<b>Notes:</b> 1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.) 2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.) 3. Approved by Factory Mutual Research Corporation (maximum order length of 48 in.) 4. Approved by the City of New York under MEA 352-01-E 5. The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only * Light and Ordinary Hazard occupancies only ** Light Hazard occupancies only																
<b>TABLE B</b> <b>1 IN. NPT (AND ISO 7-R 1) SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS</b> <b>LABORATORY LISTINGS AND APPROVALS</b>																





The configuration shown in Figure 12 is only applicable for wet pipe systems where the sprinkler fitting and water-filled pipe above the sprinkler fitting are not subject to freezing and where the length of the Dry-Type Sprinkler has the minimum exposure length depicted in Figure 11. See the Exposure Length section.

For wet pipe system installations of the 1 in. NPT Series DS-1 Dry-Type Sprinklers connected to CPVC piping, use only the following TYCO CPVC fittings:

- 1 in. x 1 in. NPT Female Adapter (P/N 80145)
- 1 in. x 1 in. x 1 in. NPT Sprinkler Head Adapter Tee (P/N 80249)

For wet pipe system installations of the the 3/4 in. NPT Series DS-1 Sprinklers connected to CPVC piping, use in the 3/4 in. x 3/4 in. NPT Female Adapter (P/N 80142).

For dry pipe system installations, use only the side outlet of maximum 2 1/2 in. reducing tee when locating the Series DS-1 Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 13 to assure complete water drainage from above the Series DS-1 Dry-Type Sprinklers and the branch line. Failure to do so may result in pipe freezing and water damage.

**NOTICE**

*Do not install the Series DS-1 Dry-Type Sprinkler into any other type fitting. Failure to use the appropriate fitting may result in one of the following:*

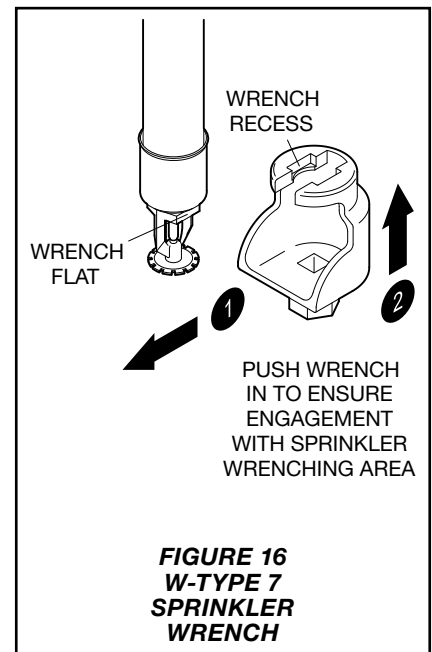
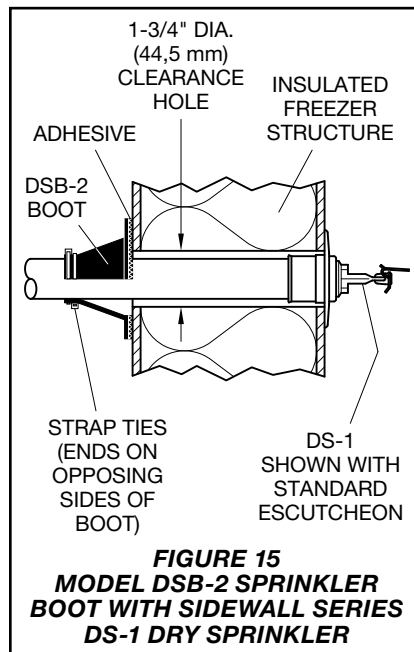
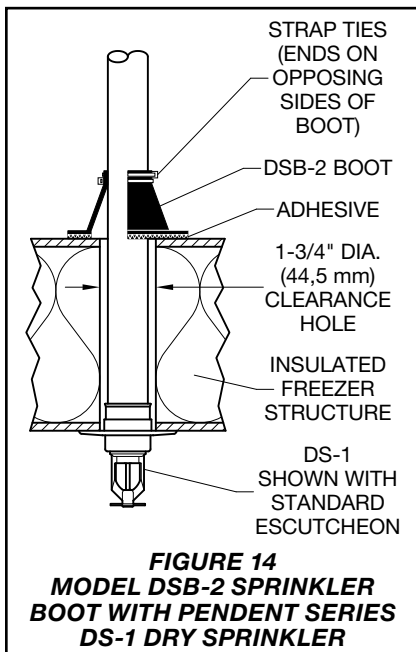
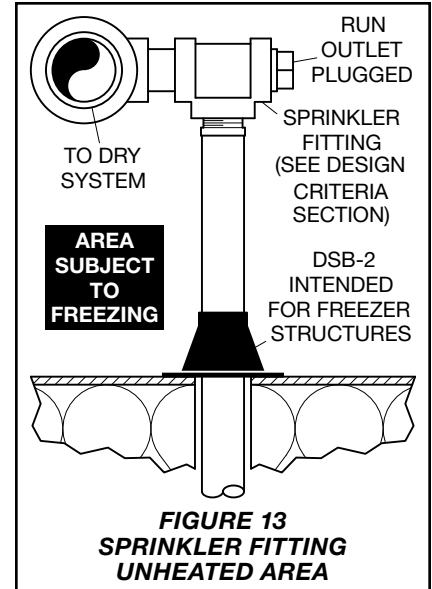
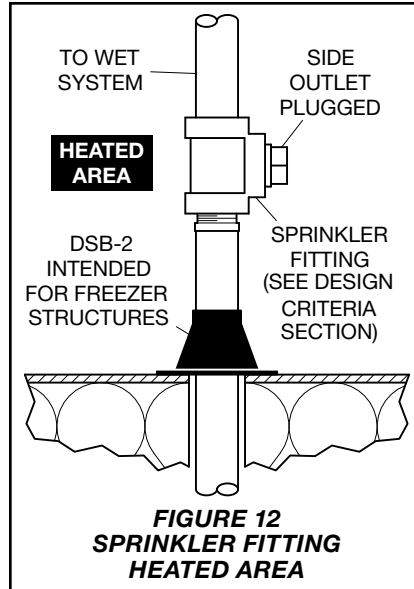
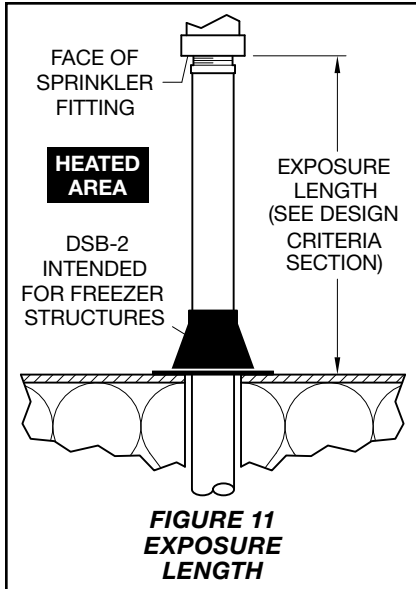
- *failure of the sprinkler to operate properly due to formation of ice over the inlet Plug or binding of the Inlet Plug*
- *insufficient engagement of the Inlet pipe threads with consequent leakage*

**Drainage**

In accordance with the minimum requirements of the NATIONAL FIRE PROTECTION ASSOCIATION for dry pipe sprinkler systems, branch, cross, and feed-main piping connected to Dry Sprinklers and subject to freezing temperatures must be pitched for proper drainage.

**Exposure Length**

When using Dry Sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use



Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area <sup>1</sup>		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length <sup>2</sup> , in. (mm)		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (305)	3 (75)	0
-10°F (-23°C)	14 (355)	4 (100)	1 (25)
-20°F (-29°C)	14 (355)	6 (150)	3 (75)
-30°F (-34°C)	16 (405)	8 (200)	4 (100)
-40°F (-40°C)	18 (455)	8 (200)	4 (100)
-50°F (-46°C)	20 (510)	10 (255)	6 (150)
-60°F (-51°C)	20 (510)	10 (255)	6 (150)

**Notes:**  
 1. For protected area temperatures that occur between values listed above, use the next cooler temperature.  
 2. These lengths are inclusive of wind velocities up to 30 mph (18,6 kph).

**TABLE C**  
**EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS**  
**MINIMUM RECOMMENDED LENGTHS**

Table C to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. See Figure 11 for an example.

**Clearance Space**

In accordance with NFPA 13, when connecting an area subject to freezing and an area containing a wet pipe sprinkler system, the clearance space around the sprinkler barrel of Dry-Type Sprinklers must be sealed. Due to temperature differences between two areas, the potential for the formation of condensation in the sprinkler and subsequent ice build-up is increased. If this condensation is not controlled, ice

build-up can occur that might damage the dry-type sprinkler and/or prevent proper operation in a fire situation.

Use of the Model DSB-2 Dry Sprinkler Boot, described in Technical Data Sheet TFP591 and shown in Figures 14 and 15, can provide the recommended seal.

**Installation**

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage must be installed in accordance with this section.

**General Instructions**

The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that

meet the requirements of the Design Criteria section. See the Design Criteria section for other important requirements regarding piping design and sealing of the clearance space around the Sprinkler Casing.

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) for the 135°F (57°C) rating to 1/8 in. (3,2 mm) for the 286°F (141°C) rating.

- A leak-tight 3/4 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 10 to 20 lb-ft (13,4 to 26,8 N·m).
- A leak-tight 1 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 20 to 30 lb-ft (26,8 to 40,2 N·m).

Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in an Escutcheon Plate by under or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

**Step 1.** Install pendent sprinklers only in the pendent position, and install upright sprinklers only in the upright position. The deflector of a pendent or upright sprinkler must be parallel to the ceiling.

Install horizontal sidewall sprinklers in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. Ensure the word "TOP" on the Deflector faces the ceiling.

**Step 2.** With a non-hardening pipe-thread sealant such as TEFLON tape applied to the Inlet threads, hand-tighten the sprinkler into the sprinkler fitting.

**Step 3.** Wrench-tighten the sprinkler using either:

- a pipe wrench on the Inlet Band or the Casing, see Figures 1 and 2
- the W-Type 7 Sprinkler Wrench on the Wrench Flat, see Figure 16

Apply the Wrench Recess of the W-Type 7 Sprinkler Wrench to the Wrench Flat.

**Note:** If sprinkler removal becomes necessary, remove the sprinkler using the same wrenching method noted above. Sprinkler removal is easier when a non-hardening sealant was used and torque guidelines were followed. After removal, inspect the sprinkler for damage.

**Step 4.** After installing the ceiling or wall and applying a ceiling finish, slide on the outer piece of the escutcheon until it comes in contact with the ceiling or wall. Do not lift the ceiling panel out of its normal position.

When using the Deep Escutcheon, hold the outer piece in contact with the mounting surface (ceiling or wall). Then rotate the inner piece approximately 1/4 turn with respect to the outer piece, to hold the Deep Escutcheon firmly together.

## Care and Maintenance

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage 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, obtain permission to shut down the affected fire protection systems from the proper authorities and notify all personnel who may be affected by this action.

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

A Vent Hole is provided in the Bulb Seat (see Figures 1 and 2) to indicate if the Dry-Type Sprinkler is remaining dry. Evidence of leakage from the Vent Hole indicates potential leakage past the Inlet seal and the need to remove the sprinkler to determine the cause of leakage for example, an improper installation or an ice plug. Close the fire protection system control valve and drain the system before removing the sprinkler.

Sprinklers which 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. See the Installation Section.

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, such as NFPA 25, in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

## Limited Warranty

For warranty terms and conditions, visit [www.tyco-fire.com](http://www.tyco-fire.com).

## Ordering Procedure

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

### DS-1 Dry-Type Sprinklers

When ordering TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage, specify the following information:

- SIN:
  - Pendent – TY3935 or TY3235
  - Sidewall – TY3735 or TY3335
  - Upright – TY3135
- 5.6 K-factor
- Deflector Style:
  - Upright, Pendent, or Horizontal Sidewall
- Quick Response, Standard Coverage, Dry-Type Sprinkler

- Order Length:  
Dry-Type Sprinklers are furnished based upon Order Length as measured per Figures 3 through 10. After taking the measurement, round it to the nearest 1/4 in. increment.

- Inlet Connections:  
3/4 in. NPT, 1 in. NPT, or ISO 7-R 1
- Temperature Rating
- Sprinkler Finish
- Escutcheon Style and Finish, as applicable
- Part Number (P/N) from Table D

The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only.

Part Numbers are for 3/4 in. and 1 in. NPT standard order sprinklers. Orders for all other sprinkler assemblies must be accompanied by a complete description. Refer to the Price List for a complete listing of Part Numbers.

### Replacement Escutcheons

Order replacement escutcheons separately.

**Note:** Style 10 Recessed Escutcheons are shipped as assemblies comprised of closure ring and mounting plate. The included mounting plate is not used for Dry Type Sprinkler applications, discard accordingly.

Specify: (specify type), (specify) finish, P/N (specify):

#### Recessed (Style 10)

Brass Plated . . . . .	56-701-2-010
Signal White (RAL9003) . . . . .	56-701-4-010
Chrome Plated . . . . .	56-701-9-010

#### Standard (Push-On)

White Color . . . . .	91-106-0-007
Brass Plated . . . . .	91-106-2-007
Chrome Plated . . . . .	91-106-9-007

#### Deep

Brass Plated . . . . .	91-107-2-010
White . . . . .	91-107-4-007
Chrome Plated . . . . .	91-107-9-007

### Sprinkler Wrench

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

### Sprinkler Boot

Specify: Model DSB-2 Dry Sprinkler Boot, P/N 63-000-0-002

This Part Number includes one (1) Boot, two (2) Strap Ties, and 1/3 oz of Adhesive (a sufficient quantity for installing one boot).



P/N\* 60 - XXX - X - XXX

		SIN
01	Pendent with Standard Escutcheon (3/4 in. NPT)	TY3935 (Figure 3)
02	Pendent with Deep Escutcheon (3/4 in. NPT)	TY3935 (Figure 5)
03	Pendent with Recessed Escutcheon (3/4 in. NPT)	TY3935 (Figure 4)
04	Pendent without Escutcheon (3/4 in. NPT)	TY3935 (Figure 6)

05	Sidewall with Standard Escutcheon (3/4 in. NPT)	TY3735 (Figure 8)
06	Sidewall with Deep Escutcheon (3/4 in. NPT)	TY3735 (Figure 9)
07	Sidewall without Escutcheon (3/4 in. NPT)	TY3735 (Figure 10)

36	Pendent with Standard Escutcheon (1 in. NPT)	TY3235 (Figure 3)
33	Pendent with Deep Escutcheon (1 in. NPT)	TY3235 (Figure 5)
37	Pendent with Recessed Escutcheon (1 in. NPT)	TY3235 (Figure 4)
32	Pendent without Escutcheon (1 in. NPT)	TY3235 (Figure 6)

34	Sidewall with Standard Escutcheon (1 in. NPT)	TY3335 (Figure 8)
43	Sidewall with Deep Escutcheon (1 in. NPT)	TY3335 (Figure 9)
44	Sidewall without Escutcheon (1 in. NPT)	TY3335 (Figure 10)

38	Upright without Escutcheon (1 in. NPT)	TY3135 (Figure 7)
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	SPRINKLER FINISH	ESCUTCHEON FINISH <sup>1</sup>
0	CHROME PLATED	SIGNAL WHITE (RAL9003)
1	NATURAL BRASS	SIGNAL WHITE (RAL9003)
2	NATURAL BRASS	BRASS PLATED
4	SIGNAL WHITE (RAL9003)	SIGNAL WHITE (RAL9003)
8	CHROME PLATED	STAINLESS STEEL
9	CHROME PLATED	CHROME PLATED

	TEMPERATURE RATINGS
0	135°F (57°C)
1	155°F (68°C)
2	175°F (79°C)
3	200°F (93°C)
4	286°F (141°C)

	SAMPLE ORDER LENGTHS <sup>2</sup>
055	5.50 in.
082	8.25 in.
180	18.00 in.
187	18.75 in.
372	37.25 in.
480	48.00 in.

**Notes:**

- Escutcheon Finish applies to sprinklers provided with escutcheons.
- Dry-Type Sprinklers are furnished based upon "Order Length" as measured per Figures 3 through 10, as applicable, and for each individual sprinkler where it is to be installed. After the measurement is taken, round it to the nearest 1/4 in. increment.

\* Use Prefix "I" for ISO 7-R 1 Connection (for example, I-60-360-4-055).

**TABLE D**  
**SERIES DS-1 DRY-TYPE SPRINKLERS**  
**PART NUMBER SELECTION**

