

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

### General Description

TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Standard Response (5 mm Bulb) and Standard Coverage, are decorative glass bulb automatic sprinklers 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 may be 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 unheated areas of a building such as loading docks, overhangs, and building exteriors
- sprinklers are used on systems that are seasonably drained to avoid freezing; for example, vacation resort areas

#### NOTICE

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, in addition to

#### IMPORTANT

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.

the standards of any other Authorities Having Jurisdiction. Failure to do so may impair the performance of these devices.

Owners are responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or sprinkler manufacturer should be contacted with any questions.

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

### Model/Sprinkler Identification Numbers (SINs)

TY3255 - Pendent  
TY3155 - Upright  
TY3355 - Horizontal Sidewall

### Technical Data

#### Approvals

UL and C-UL Listed  
FM Approved  
LPCB Approved: Ref No. 094a/11  
CE Certified: EN 122.59-1  
NYC Approved under MEA 352-01-E

Refer to Table A.

#### Maximum Working Pressure

175 psi (12,1 bar)

#### Inlet Thread Connections

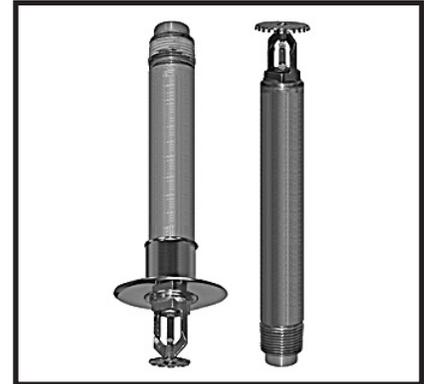
1-inch NPT (Standard Order)  
ISO 7-1R1

#### Discharge Coefficient

$K = 5.6 \text{ GPM/psi}^{1/2}$   
(80,6 LPM/bar<sup>1/2</sup>)

#### Temperature Ratings

Refer to Table A.



#### Finishes

Sprinkler: Natural Brass, Chrome Plated, White Polyester  
Escutcheon: White Coated, Chrome Plated, 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  
Sealing Assembly . . . . . Beryllium Nickel w/Teflon\*  
Escutcheon . . . . . Carbon Steel

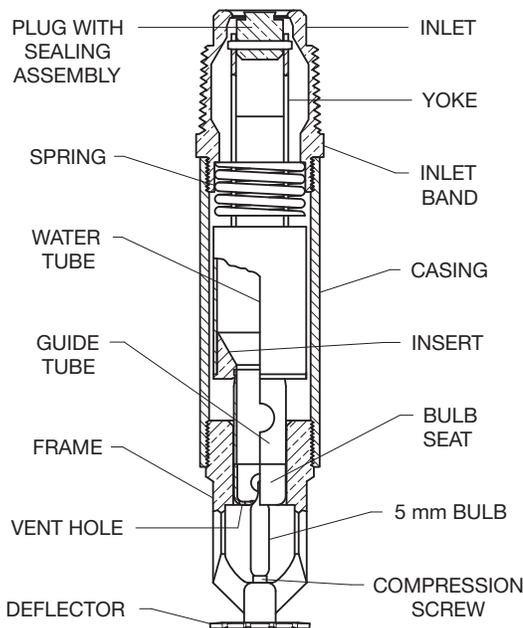
\*DuPont Registered Trademark

| Temperature Rating | Bulb Color Code | TY3255 Pendent  |               |                 | TY3255 Pendent  |               |                 | TY3355 Horizontal Sidewall   |               |                 |            |  |  |                   |  |  |              |  |  |
|--------------------|-----------------|---|---------------|-----------------|---|---------------|-----------------|--|---------------|-----------------|------------|--|--|-------------------|--|--|--------------|--|--|
|                    |                 | with Standard Recessed Escutcheon (Figure 3)<br>with Wide Flange Recessed Escutcheon (Figure 4) |               |                 | with Standard Escutcheon (Figure 5)<br>with Deep Escutcheon (Figure 6)<br>without Escutcheon (Figure 7) |               |                 | with top of Deflector-to-Ceiling distance of 4 to 12 inches (100 to 300 mm)<br>with Standard Escutcheon (Figure 9)<br>with Deep Escutcheon (Figure 10)<br>without Escutcheon (Figure 13) |               |                 |            |  |  |                   |  |  |              |  |  |
|                    |                 | SPRINKLER 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, 5  |               |                 | 1, 2, 5   |               |                 | 1, 2, 3, 4, 5  |               |                 | 1, 2, 4, 5 |  |  | 1*, 2*, 3**, 4, 5 |  |  | 1*, 2*, 4, 5 |  |  |
| 155°F (68°C)       | Red             |   |               |                 |   |               |                 |  |               |                 |            |  |  |                   |  |  |              |  |  |
| 175°F (79°C)       | Yellow          |   |               |                 |   |               |                 |  |               |                 |            |  |  |                   |  |  |              |  |  |
| 200°F (93°C)       | Green           |   |               |                 |   |               |                 |  |               |                 |            |  |  |                   |  |  |              |  |  |
| 286°F (141°C)      | Blue            | N/A   |               |                 | 4, 5  |               |                 |  |               |                 |            |  |  |                   |  |  |              |  |  |
| 360°F (182°C)      | Mauve           | N/A   |               |                 | N/A   |               |                 | 1*, 2*, 5  |               |                 | N/A        |  |  |                   |  |  |              |  |  |

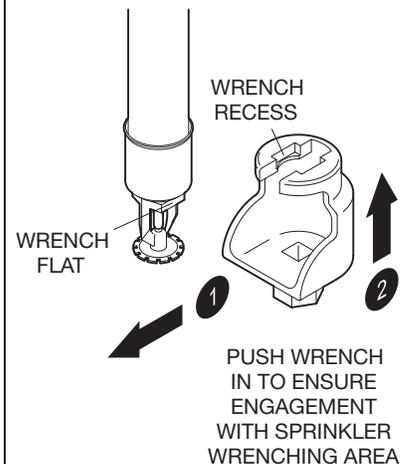
**Notes**

1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 inches)
  2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 inches)
  3. Approved by Factory Mutual Research Corporation (maximum order length of 48 inches)
  4. Loss Prevention Certification Board and CE conformity apply to these temperature ratings only
  5. Approved by the City of New York under MEA 352-01-E
    - \* Light and Ordinary Hazard Occupancies Only
    - \*\* Light Hazard Occupancies Only
- N/A - Not Available

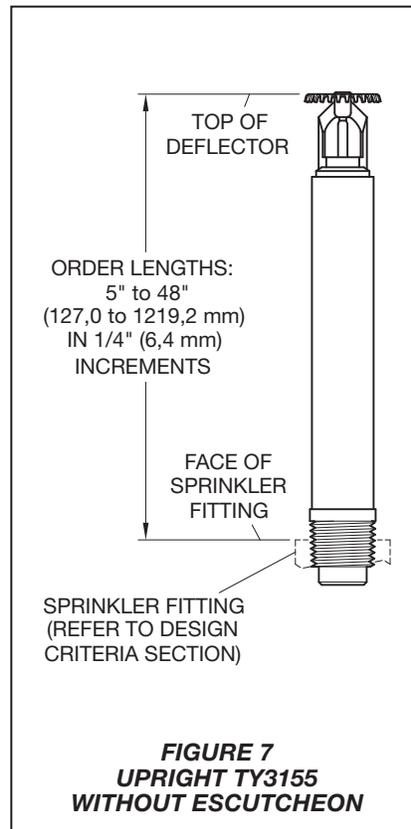
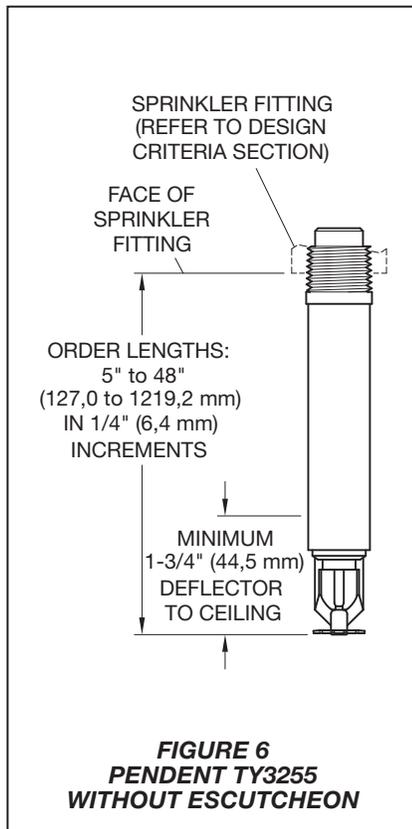
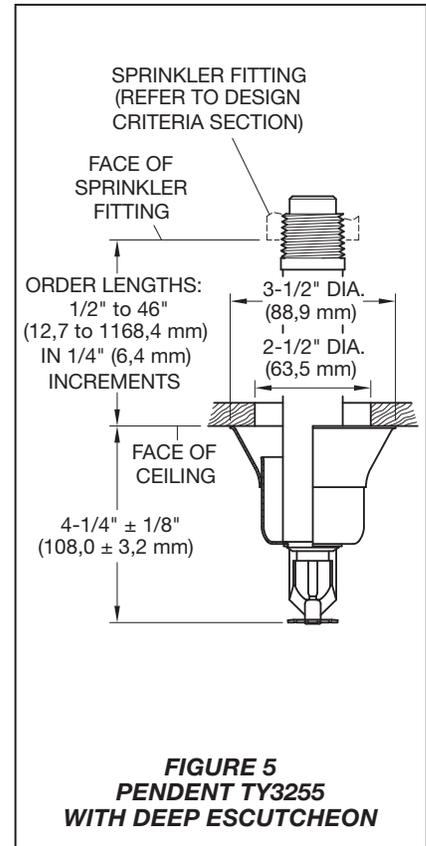
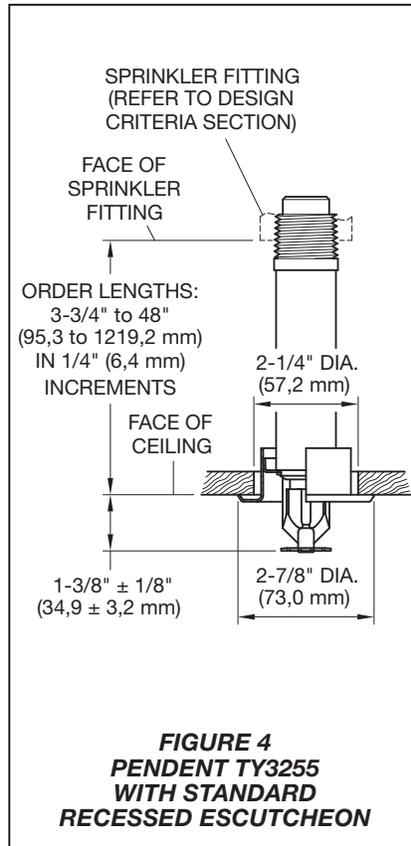
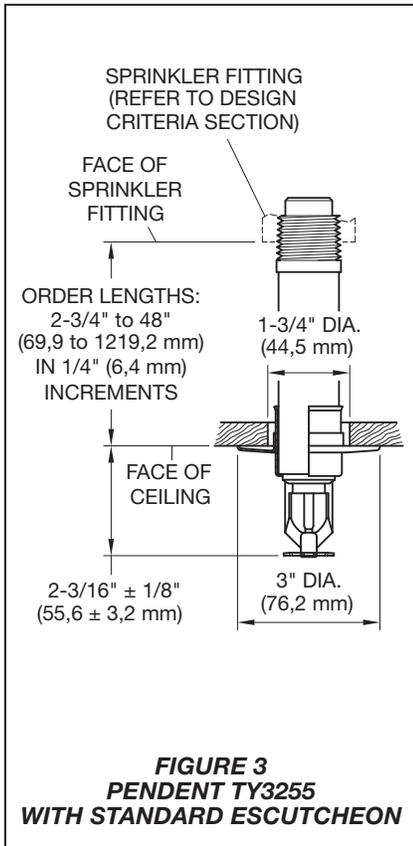
**TABLE A**  
**SERIES DS-1 STANDARD RESPONSE, STANDARD COVERAGE, DRY-TYPE SPRINKLERS**  
**— LABORATORY LISTINGS AND APPROVALS —**

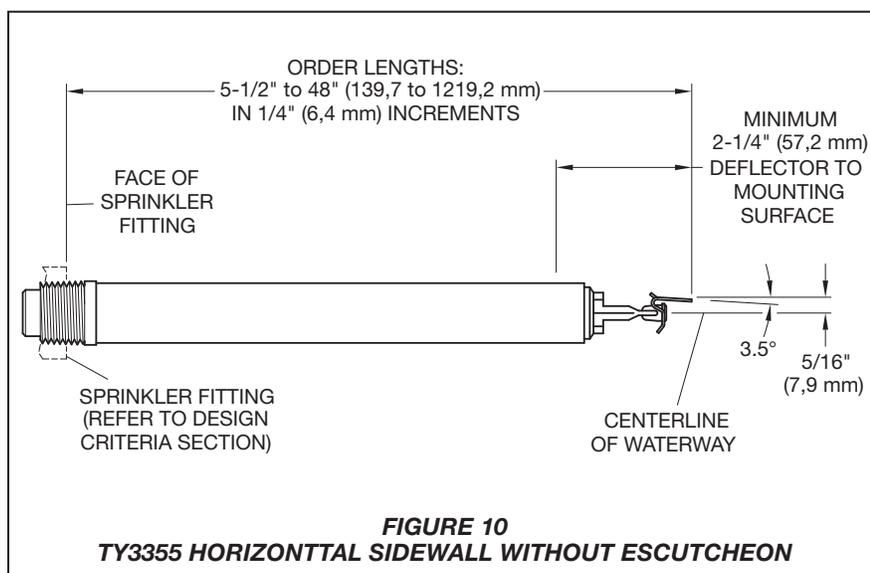
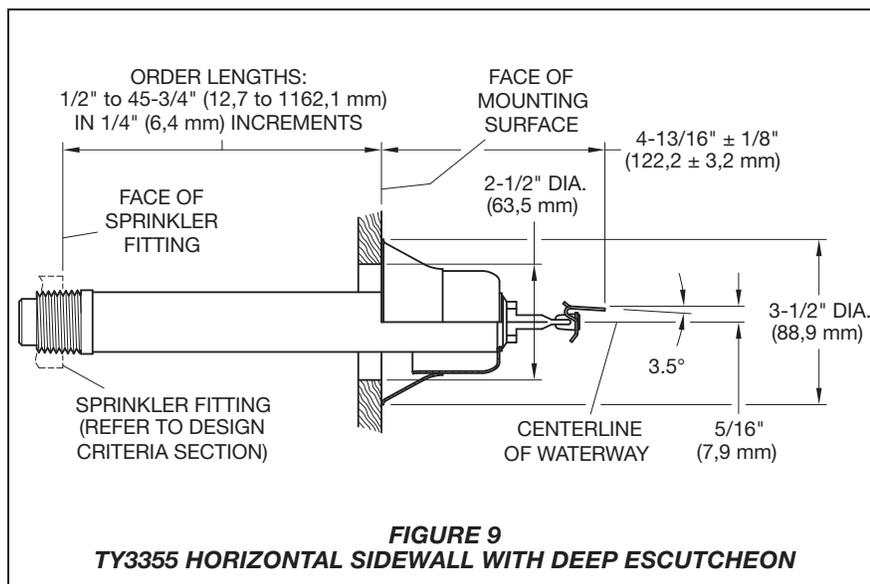
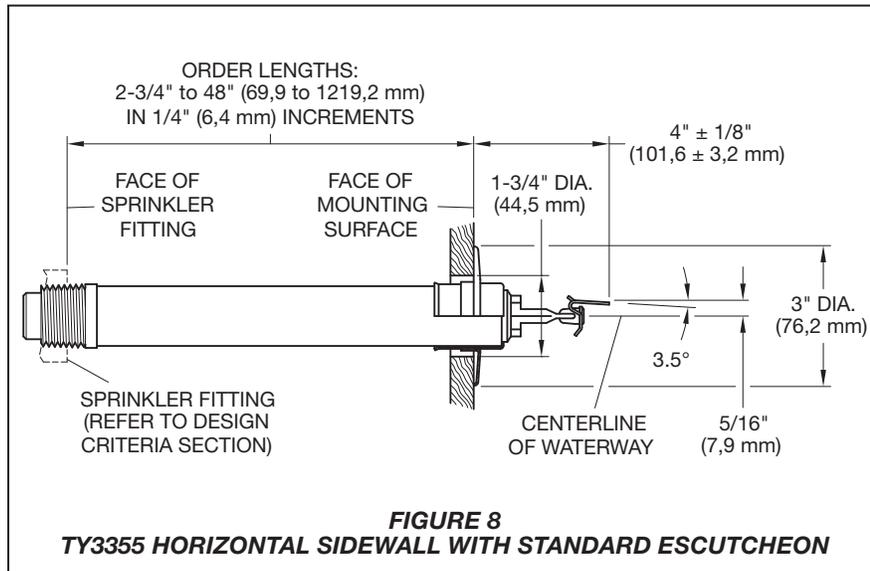


**FIGURE 1**  
**SERIES DS-1 STANDARD RESPONSE DRY-TYPE SPRINKLERS**  
**— ASSEMBLY —**



**FIGURE 2**  
**W-TYPE 7 SPRINKLER WRENCH**





## Operation

When TYCO Series DS-1 Dry-Type Sprinklers are in service, water is prevented from entering the assembly by the Plug with Sealing Assembly (Figure 1) in the Inlet of the Sprinkler.

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, allowing the sprinkler to activate and flow water.

## Design Criteria

TYCO Series DS-1 Dry-Type Sprinklers 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. For more information on LPCB Approval, contact TYCO Fire Suppression & Building Products at the following office:

Kopersteden 1  
7547 TJ Enschede  
The Netherlands  
Tel: +31-(0)53-428-4444  
Fax: +31-(0)53-428-3377

### Sprinkler Fittings

Install 1-inch NPT Series DS-1 Dry-Type Sprinklers are to be installed in the 1-inch 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 Series DS-1 Dry-Type Sprinklers into elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow.

The unused outlet of the threaded tee is plugged as shown in Figure 12.

You can also install Series DS-1 Dry-Type Sprinklers in the 1-inch 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.

| 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, Inches (mm) <sup>2</sup> |             |             |
| 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**

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

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

The configuration shown in Figure 13 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. Refer to the Exposure Length section.

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

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

For dry pipe system installations, use only the side outlet of maximum 2-1/2-inch reducing tee when locating Series DS-1 Dry-Type Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 12 to assure complete water drainage from above 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 Series DS-1 Dry-Type Sprinklers into any other type fitting without first consulting the Technical Services Department. 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**

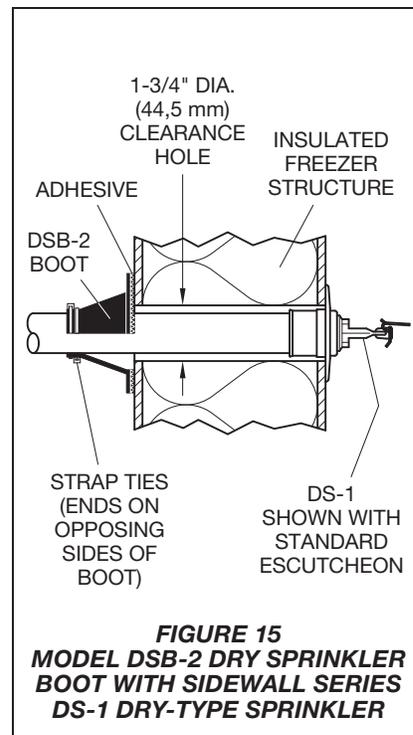
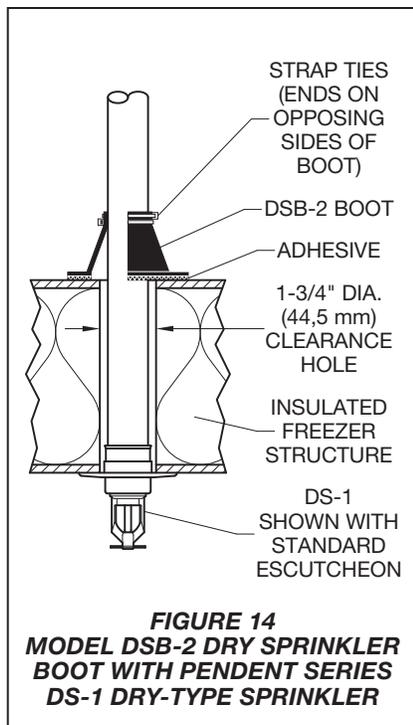
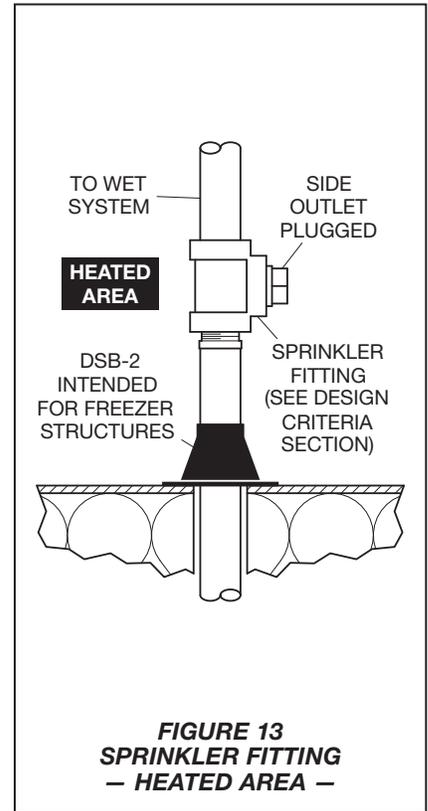
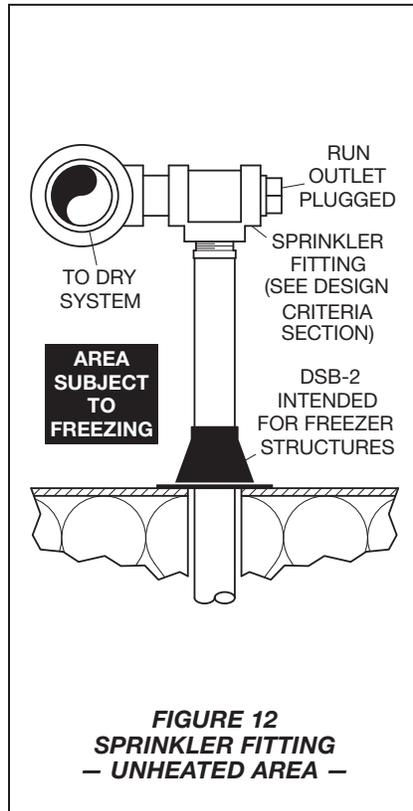
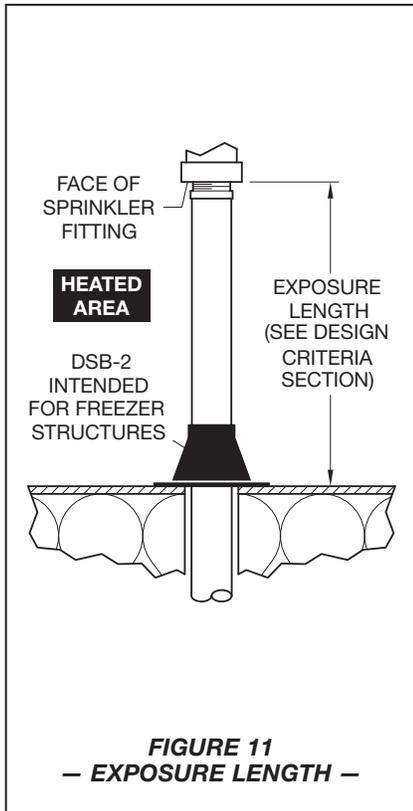
When using Dry Sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use Table B to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. Refer to Figure 11 for an example.

For protected area temperatures between those given above, the minimum recommended length from the face of the fitting to the outside of the protected area may be determined by interpolating between the indicated values.

**Clearance Space**

In accordance with Section 8.4.9.2 of the 2010 edition of 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

TYCO Series DS-1 Dry-Type Sprinklers must be installed in accordance with the following instructions.

### NOTICE

*Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section. Refer to 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 inch (1,6 mm) for the 135°F (57°C) rating to 1/8 inch (3,2 mm) for the 360°F (182°C) rating.

Obtain a leak-tight 1-inch NPT sprinkler joint by applying a minimum-to-maximum torque of 20 to 30 ft. lbs. (26,8 to 40,2 Nm). Higher levels of torque may 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.

1. Install pendent sprinklers only in the pendent position; install upright sprinklers only in the upright position. The deflector of a pendent or upright sprinkler is to 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.

2. With a non-hardening pipe-thread sealant such as Teflon<sup>®</sup> applied to the Inlet threads, hand-tighten the sprinkler fitting into the sprinkler fitting.
3. Wrench-tighten the sprinkler using either:
  - a pipe wrench on the Inlet Band or the Casing (Figure 1).
  - the W-Type 7 Sprinkler Wrench on the Wrench Flat (Figure 2).

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.*

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/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

TYCO Series DS-1 Dry-Type Sprinklers must be maintained and serviced in accordance with the following instructions.

### NOTICE

*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, may delay the time to sprinkler operation in a fire situation.

A Vent Hole is provided in the Bulb Seat (Figure 1) to indicate if the Dry 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.

Exercise care to avoid damage before, during, and after installation. Never paint, plate, coat, or otherwise alter automatic sprinklers after they leave the factory.

Never repaint factory-painted Cover Plates. When necessary, replace cover plates with factory-painted units. Non-factory applied paint can adversely delay or prevent sprinkler operation in the event of a fire.

Replace sprinklers that:

- were damaged by dropping, striking, wrench twisting, wrench slippage, or the like.
- were modified or over-heated.
- have cracked bulbs or have lost liquid from the bulbs. Refer to the Installation Section in this data sheet.
- are leaking or exhibiting visible signs of corrosion.

Responsibility lies with owners 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 (for example, NFPA 25), in addition to the standards of any other Authorities Having Jurisdiction. The installing contractor or sprinkler manufacturer should be contacted relative to 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**

Products manufactured by Tyco Fire Suppression and Building Products (TFSBP) are warranted solely to the original Buyer against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire twelve (12) months from installation or eighteen (18) months from delivery, whichever occurs first. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFSBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFSBP to be defective shall be either repaired or replaced, at TFSBP's sole option. TFSBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFSBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFSBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFSBP was informed about the possibility of such damages, and in no event shall TFSBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

## **Ordering Procedure**

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

### **Dry Sprinklers**

When ordering 5.6 K-Factor Series DS-1, Standard Response, Standard Coverage (5 mm Bulb), Dry-Type Automatic Sprinklers, specify the following information:

- Model/SIN  
Pendent TY3255, Upright TY3155, or Horizontall Sidewall TY3355
- Deflector Style
- Order Length  
Dry-Type Sprinklers are furnished based upon Order Length as measured per Figures 3 through 10, as applicable. After the measurement is taken, round it to the nearest 1/4 inch increment.
- Inlet Connections  
1-inch NPT or ISO 7-R1
- Temperature Rating
- Sprinkler Finish
- Escutcheon Style and Finish, as applicable
- Part Number from Table B. Part numbers are for 1-inch NPT standard order sprinklers. Orders for all other sprinkler assemblies must be accompanied by a complete description.

### **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 Boot, two Strap Ties, and 1/3 oz. of Adhesive (a sufficient quantity for installing one boot).

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

|    |  | MODEL/SIN         |
|----|--|-------------------|
| 96 | Pendent with Standard Escutcheon (1" NPT)          | TY3255 (Figure 3) |
| 93 | Pendent with Deep Escutcheon (1" NPT)              | TY3255 (Figure 5) |
| 97 | Pendent with Standard Recessed Escutcheon (1" NPT) | TY3255 (Figure 4) |
| 92 | Pendent without Escutcheon (1" NPT)                | TY3255 (Figure 6) |

|    |  |                    |
|----|--|--------------------|
| 94 | Sidewall with Standard Escutcheon (1" NPT) | TY3355 (Figure 8)  |
| 53 | Sidewall with Deep Escutcheon (1" NPT)     | TY3355 (Figure 9)  |
| 54 | Sidewall without Escutcheon (1" NPT)       | TY3355 (Figure 10) |

|    |                                     |                   |
|----|-------------------------------------|-------------------|
| 98 | Upright without Escutcheon (1" NPT) | TY3155 (Figure 7) |
|----|-------------------------------------|-------------------|

|   | SPRINKLER FINISH | ESCUTCHEON FINISH (1) |
|---|------------------|-----------------------|
| 1 | NATURAL BRASS    | WHITE                 |
| 4 | WHITE POLYESTER  | WHITE                 |
| 9 | CHROME PLATED    | CHROME                |
| 0 | CHROME PLATED    | WHITE                 |
| 2 | NATURAL BRASS    | BRASS PLATED          |

|   | TEMPERATURE RATING (2) |
|---|------------------------|
| 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)          |
| 5 | 360°F (182°C)          |

|     | ORDER LENGTH (3) |
|-----|------------------|
| 055 | 5.50"            |
| 082 | 8.25"            |
| 180 | 18.00"           |
| 187 | 18.75"           |
| 372 | 37.25"           |
| 480 | 48.00"           |

**Notes**

- \* Use Prefix "I" for ISO 7-R1 Connection; for example, I-60-961-1-180).
- 1. Escutcheon Finish applies to sprinklers provided with escutcheons.
- 2. 286°F (141°C) and 360°F (182°C) temperature ratings apply to non-recessed sprinkler assemblies.
- 3. 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 inch increment.

**TABLE C**  
**SERIES DS-1 STANDARD RESPONSE, STANDARD COVERAGE, DRY-TYPE SPRINKLERS**  
**— PART NUMBER SELECTION —**

