

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

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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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 areas 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 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.

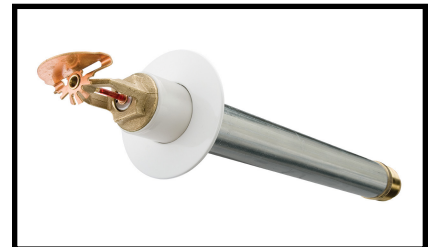
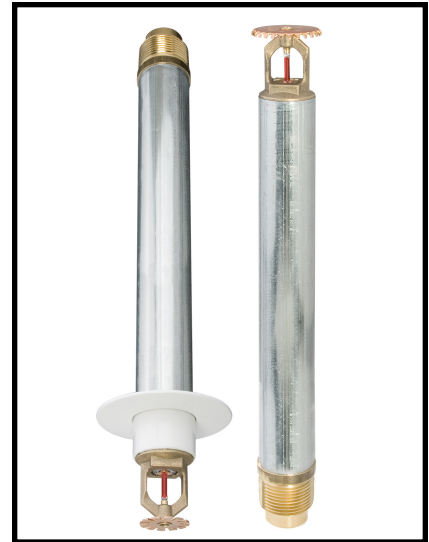
Sprinkler Identification Numbers (SINs)

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
LPCB Approved
CE Certified

Note: For Approvals details, 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

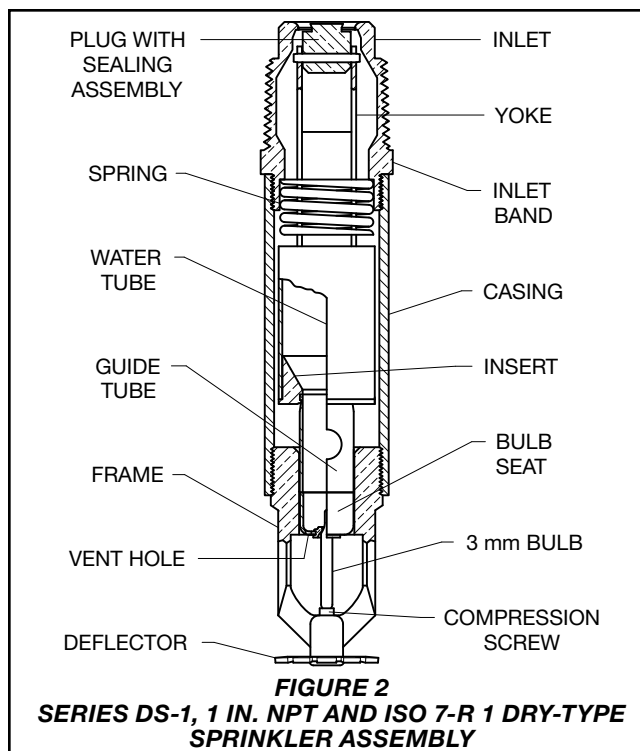
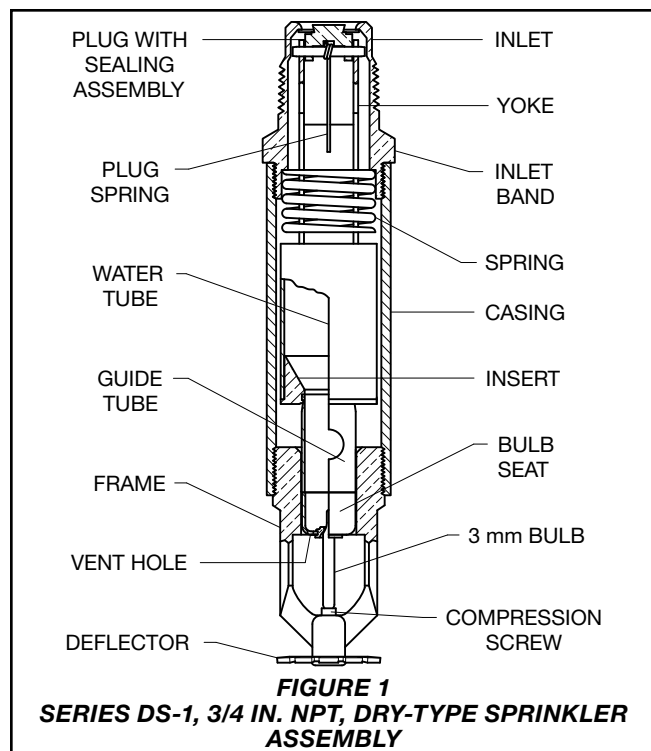
K=5.6 gpm/psi^{1/2} (80,6 Lpm/bar^{1/2})

Temperature Ratings

See Table A and Table B

Finishes

Sprinkler and Escutcheon see Table D



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 Figure 1 and Figure 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.

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 the following CPVC fittings:

- 1 in. x 1 in. NPT female adapter
- 1 in. x 1 in. x 1 in. NPT sprinkler head adapter tee

Note: For more information on specific CPVC fitting design and installation criteria, refer to CPVC manufacturer.

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.

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.

Temperature Rating	Bulb Liquid Color	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)		
		Finish								
		Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester
		155°F (68°C)	Red	1, 2			1, 2			1*, 2*
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue									
NOTES 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										
TABLE A 3/4 IN. NPT SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS LABORATORY LISTINGS AND APPROVALS										

Temperature Rating	Bulb Liquid Color	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)			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)			
		TY3135 Upright without Escutcheon ⁴ (Figure 7)									
		Finish									
Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester	Natural Brass	Chrome Plated	White Polyester			
155°F (68°C)	Red	1, 2, 3, 5, 6		1, 2, 5, 6		1, 2, 3, 5, 6		1, 2, 5, 6		1*, 2*, 3**, 5*, 6*	1*, 2*, 5*, 6*
175°F (79°C)	Yellow	1, 2, 3		1, 2		1, 2, 3		1, 2		1*, 2*, 3**	1*, 2*
200°F (93°C)	Green	1, 2, 3, 5, 6		1, 2, 5, 6		1, 2, 3, 5, 6		1, 2, 5, 6		1*, 2*, 3**, 5*, 6*	1*, 2*, 5*, 6*
286°F (141°C)	Blue	1, 2									
NOTES											
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.)						5. Loss Prevention Certification Board (LPCB)					
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.)						6. CE Certified					
3. Approved by Factory Mutual Research Corporation (maximum order length of 48 in.)						* Light and Ordinary Hazard occupancies only					
4. The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only						** Light Hazard occupancies only					
TABLE B											
1 IN. NPT (AND ISO 7-R 1) SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS											
LABORATORY LISTINGS AND APPROVALS											

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.

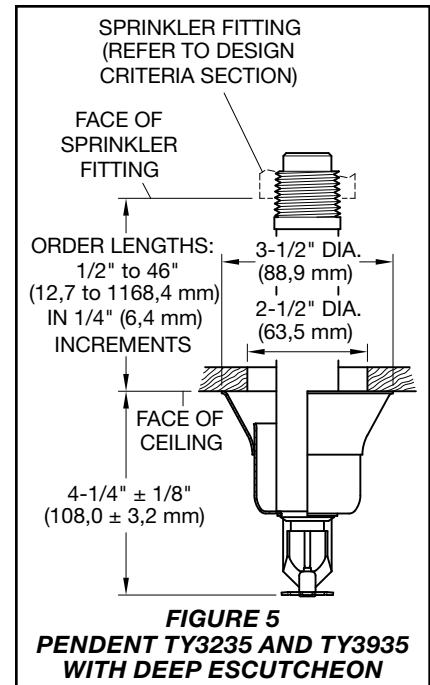
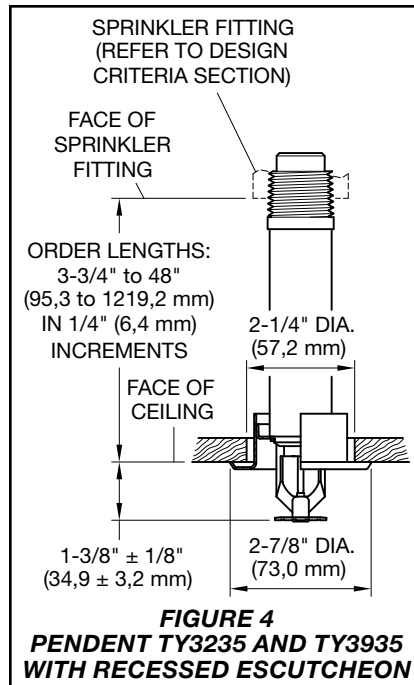
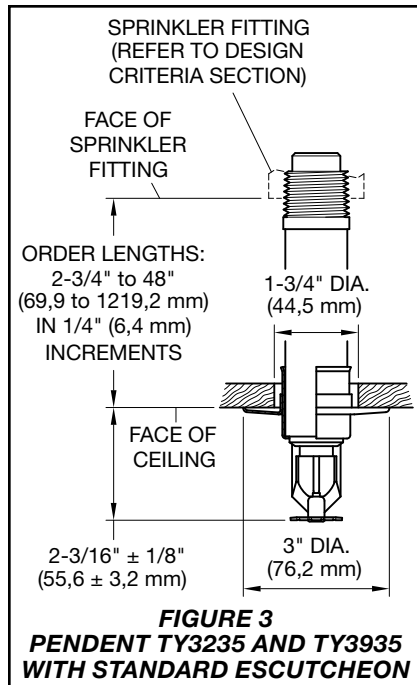
Exposure Length

When using dry sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use 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. For example, see Figure 11.

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 tem-



perature 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.

Model DSB-2 Dry Sprinkler Boot (Technical Data Sheet TFP591), as shown in Figure 14 and Figure 15, can provide the recommended seal.

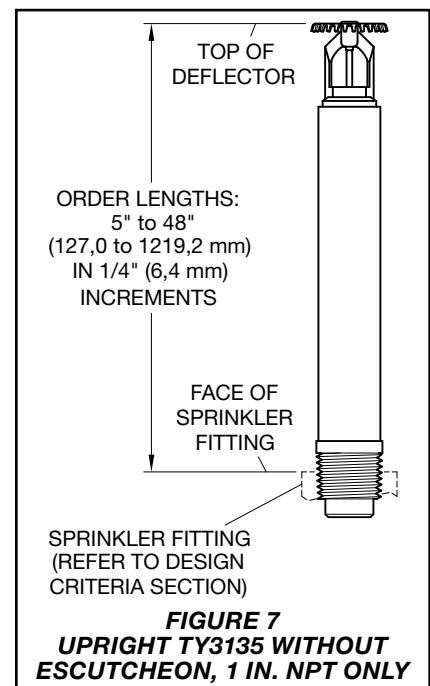
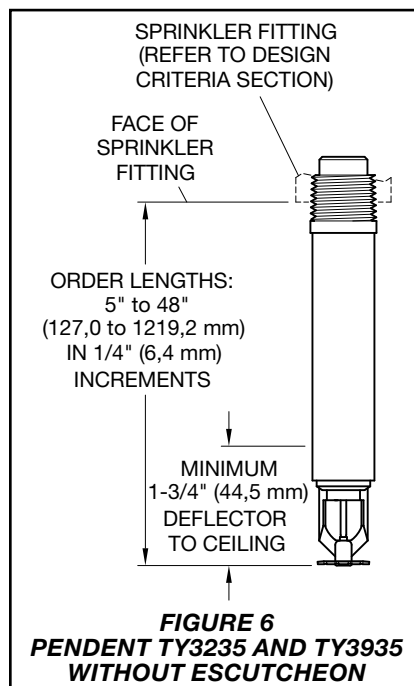
Installation

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.

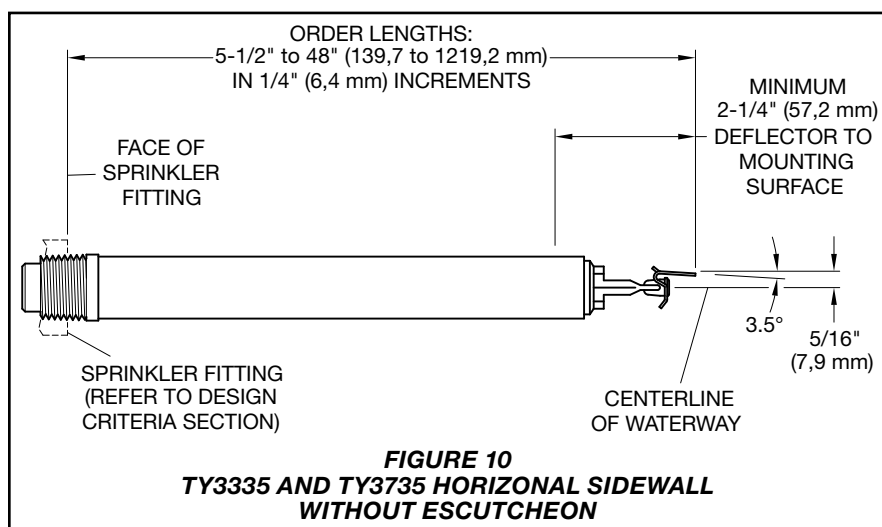
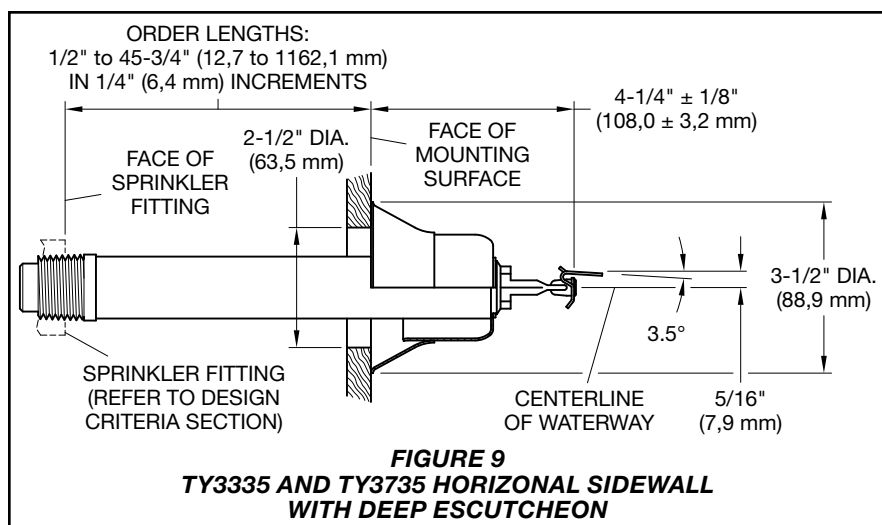
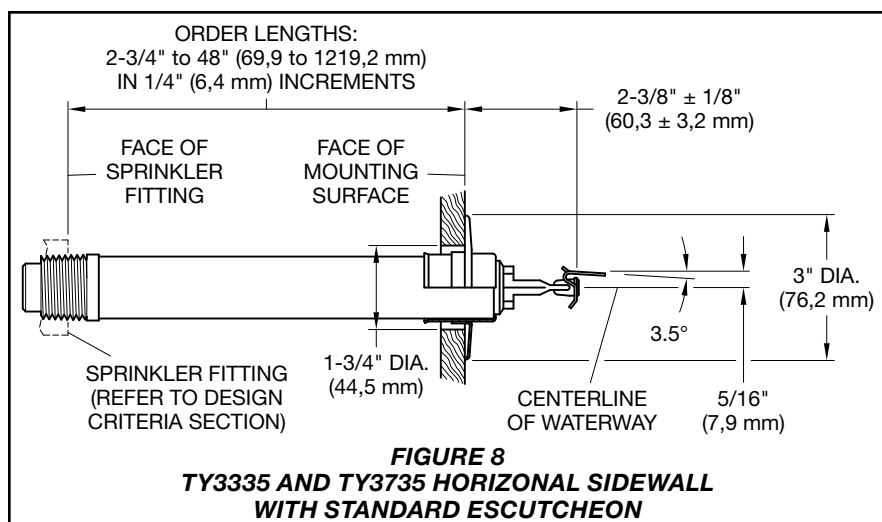
Do not install any bulb-type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm) for the 155°F (68°C) rating to 1/8 in. (3,2 mm) for the 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 ft-lb to 20 ft-lb (13,4 N·m 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 ft-lb to 30 ft-lb (26,8 N·m 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 of the following tools:

- Pipe wrench on the inlet band or the casing, see Figures 1 and 2
- 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.

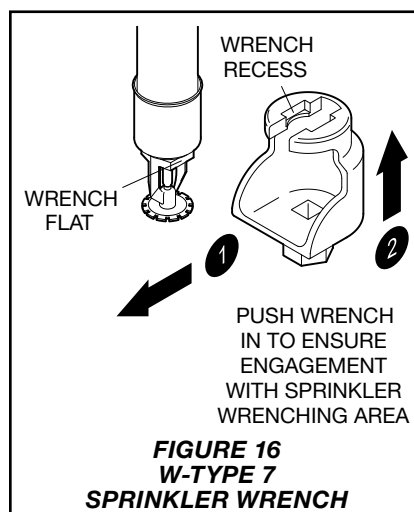
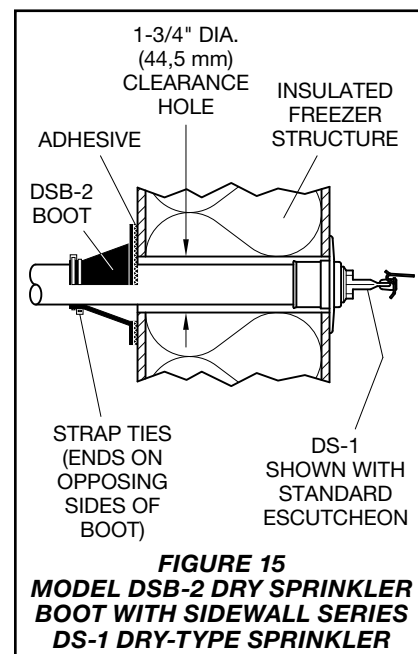
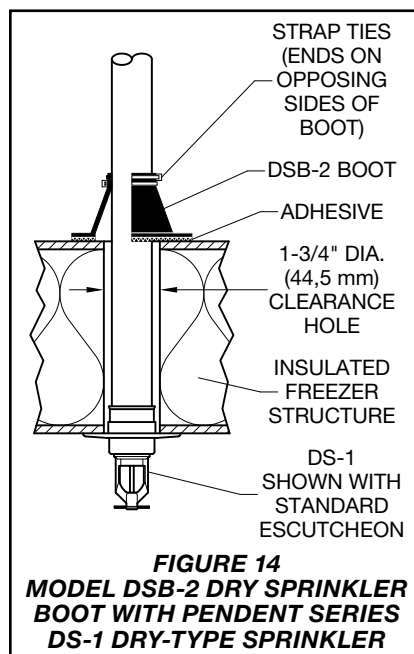
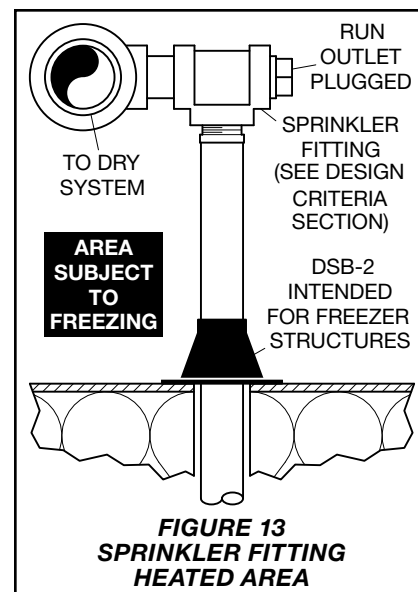
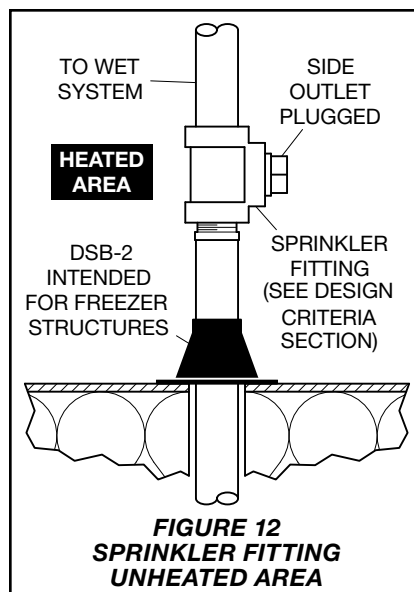
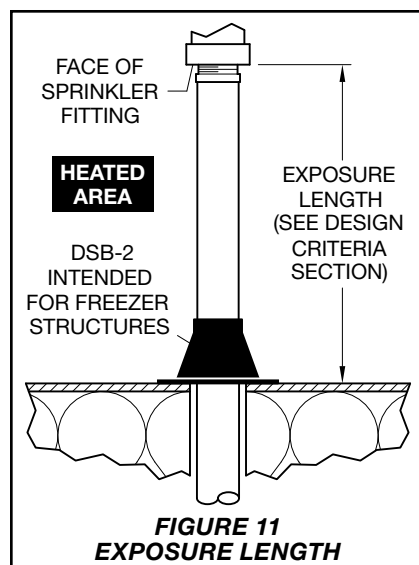
When using the deep escutcheon, hold the outer piece in contact with the mounting surface (ceiling or wall). Then rotate the inner piece approximately 1/4 turn with respect to the outer piece, to hold the deep escutcheon firmly together.

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area ⁽¹⁾		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length ⁽²⁾ , 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:

- 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 C
EXPOSED SPRINKLER BARRELS
IN WET PIPE SYSTEMS
MINIMUM RECOMMENDED LENGTHS



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.

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 according to 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

Model DSB-2 Dry Sprinkler Boot

Model DSB-2 Dry Sprinkler Boot includes one boot, two strap ties, and 1/3 oz of adhesive, quantity of adhesive is sufficient for one boot installation.

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

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)		
			Sprinkler Finish	Escutcheon Finish ¹
0	Chrome Plated	Signal White (RAL9003) Polyester		
1	Natural Brass	Signal White (RAL9003) Polyester		
2	Natural Brass	Brass Plated		
4	Signal White (RAL9003) Polyester	Signal White (RAL9003) Polyester		
8	Chrome Plated	Stainless Steel		
9	Chrome Plated	Chrome Plated		
			Temperature Rating	Temperature Rating
1	155°F (68°C)	3	200°F (93°C)	
2	175°F (79°C)	4	286°F (141°C)	
			Sample Order Length ²	
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