

Series DS-2 Dry-Type Sprinklers 11.2K Pendent Extended Coverage, Light and Ordinary Hazard

General Description

TYCO Series DS-2 Dry-Type Sprinklers, 11.2K Pendent, Extended Coverage, Light and Ordinary Hazard (ECLH/ ECOH) 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)

NOTICE

Series DS-2 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 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.

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.

Series DS-2 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.

Sprinkler Identification Number (SIN)

TY5238

Technical Data

Approvals

UL and C-UL Listed
NYC Approved under MEA 173-02-E

See Table A.

(These Approvals apply to the service condition indicated in the Design Criteria section.)

Maximum Working Pressure

175 psi (12,1 bar)

Inlet Thread Connections

1 in. NPT or
ISO 7-R 1

Discharge Coefficient

See Table D

Temperature Ratings

See Table A

Finishes

Sprinkler: See Table E
Escutcheon: See Table E

Physical Characteristics

Inlet	Copper
Yoke	Stainless Steel
Casing	Galvanized Carbon Steel
Insert	Bronze
Bulb Seat	Bronze
Bulb	Glass
Compression Screw	Bronze
Deflector	Bronze
Frame	Bronze
Guide Tube	Stainless Steel
Water Tube	Stainless Steel
Spring	Stainless Steel
Plug	Copper Gasketed Spring
Plate Seal	Beryllium Nickel w/TEFLON
Pin	Stainless Steel
Button Spring	Stainless Steel
Escutcheon	Carbon Steel



Operation

When TYCO Series DS-2 Dry-Type Sprinklers, 11.2K Pendent, Extended Coverage, Light and Ordinary Hazard are in service, water is prevented from entering the assembly by the Plug with Gasketed Spring Plate Seal (see 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 Gasketed Spring Plate Seal from the Inlet allowing the sprinkler to activate and flow water.

Temperature Rating	Bulb Color Code	TY5238			TY5238		
		with Flush Escutcheon (Figure 2)			with Recessed Escutcheon (Figure 3)		
		with Extended Escutcheon (Figure 4)					
		without Escutcheon (Figure 5)					
SPRINKLER FINISH							
		Natural Brass	Chromed Plated	Polyester**	Natural Brass	Chrome Plated	Polyester**
135°F (57°C)	Orange	1, 2, 3			1, 2, 3		
155°F (68°C)	Red						
175°F (79°C)	Yellow						
200°F (93°C)	Green						
286°F (141°C)*	Blue						

Notes:
1. UL Listed (maximum order length of 48 in.)
2. C-UL Listed (maximum order length of 48 in.)
3. Approved by the City of New York under MEA 173-02-E
* 286 °F (141 °C) temperature rating applies to installations in Ordinary Hazard Occupancies only.
** Frame and deflector only

TABLE A
SERIES DS-2 ECLH/ECOH DRY-TYPE PENDENT SPRINKLERS
LABORATORY LISTINGS AND APPROVALS

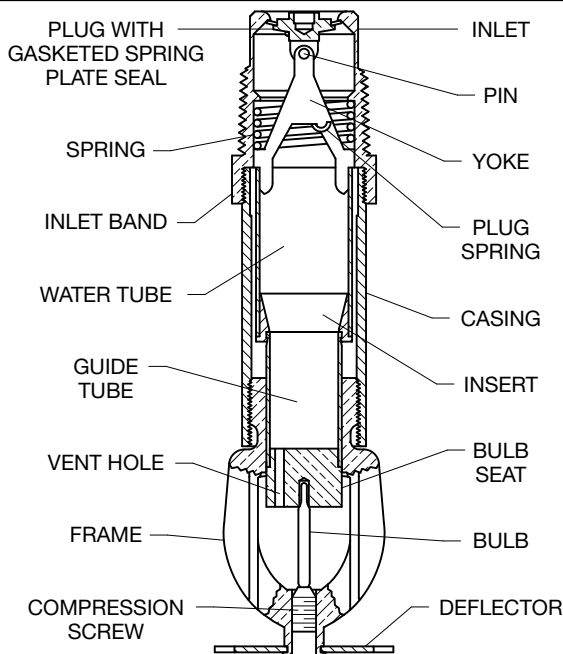


FIGURE 1
SERIES DS-2 ECLH/ECOH DRY-TYPE PENDENT SPRINKLER ASSEMBLY

Design Criteria

UL and C-UL Listing Requirements

TYCO Series DS-2 Dry-Type Sprinklers, 11.2K Pendent, Extended Coverage, Light and Ordinary Hazard are intended for use in fire sprinkler systems designed in accordance with the extended coverage installation rules recognized by the applicable Listing agency (for example, UL Listing is based on NFPA 13 requirements). See Table B for coverage and flow rate criteria.

Response Rating	Coverage Area ⁽⁴⁾ , ft x ft (m x m)	Minimum Flow ⁽¹⁾ Light Hazard ⁽²⁾ , (0.10 gpm/ft ²) gpm (Lpm)	Minimum Flow ⁽¹⁾ Ordinary Hazard Group I ⁽³⁾ , (0.15 gpm/ft ²) gpm (Lpm)	Minimum Flow ⁽¹⁾ Ordinary Hazard Group II ⁽³⁾ , (0.20 gpm/ft ²) gpm (Lpm)	Escutcheon Type
Quick	16 x 16 (4,9 x 4,9)	30 (114)	—	—	Flush, Recessed, Extended
Quick	18 x 18 (5,5 x 5,5)	33 (125)	—	—	Flush, Extended
Standard ⁵	20 x 20 (6,1 x 6,1)	40 (151)	—	—	Flush, Recessed, Extended
Quick	14 x 14 (4,3 x 4,3)	—	30 (148)	39 (148)	Flush, Recessed, Extended
Standard	16 x 16 (4,9 x 4,9)	—	39 (148)	51 (193)	Flush, Recessed, Extended

Notes:

1. Requirement is based on minimum flow in gpm from each sprinkler. The required residual pressure is to be based on the use of a K-factor derived from Table D.
2. Light Hazard Occupancies are limited to a type of unobstructed construction consisting of flat, smooth ceilings.
3. Ordinary Hazard Occupancies may have either "combustible or non-combustible, unobstructed ceiling construction" or "noncombustible obstructed ceiling construction."
4. Minimum spacing between sprinklers is 12.5 ft (3,8 m).
5. For retrofit applications of projects installed prior to the NFPA Quick Response / Light Hazard requirement

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

UL and C-UL Specific Application Listing Requirements for Installation Under Concrete Tees

TYCO Series DS-2 Dry-Type Pendent Sprinklers (TY5238) have a UL and C-UL Specific Application Listing for use under concrete tees when installed as follows:

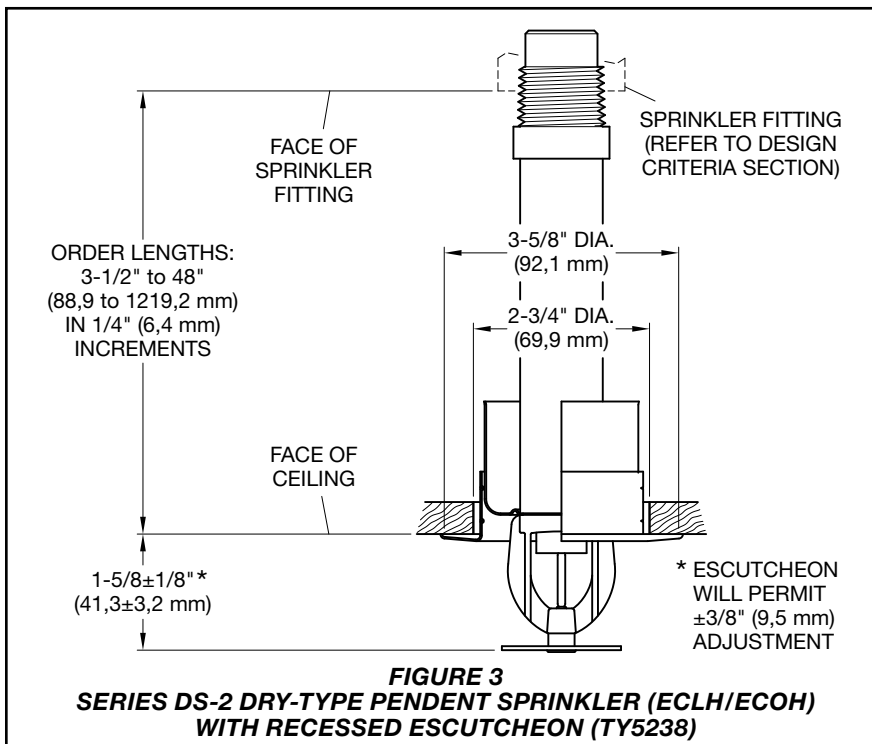
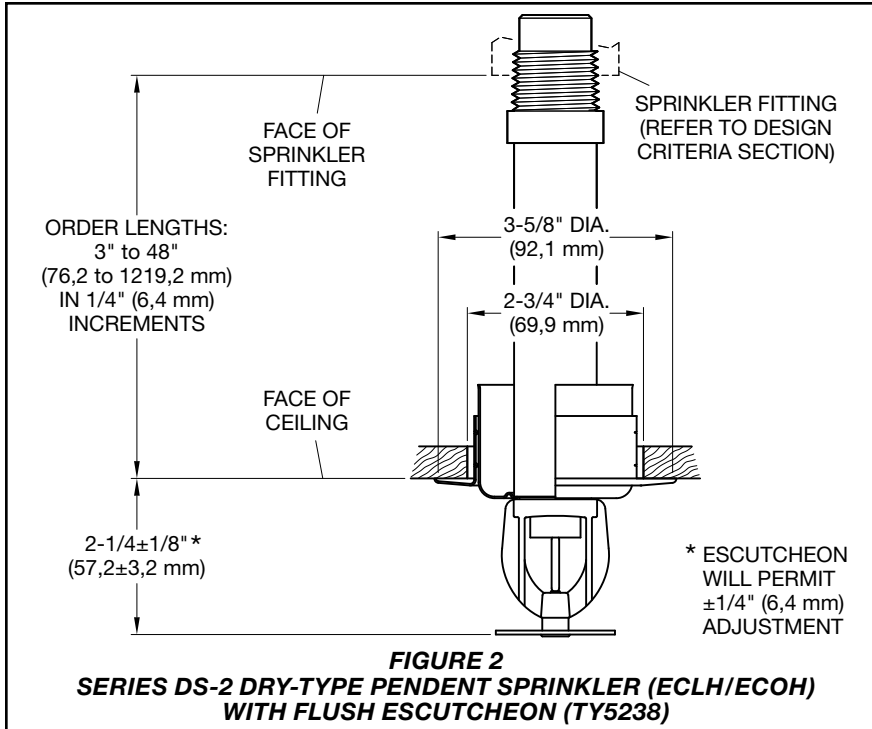
- Stems of the concrete tee construction must be spaced at less than 7.5 feet (2,3 m) on center but more than 3 ft (0,9 m) on center. The depth of the concrete tees must not exceed 30 in. (762 mm). The maximum permitted concrete tee length is 32 ft (9,8 m). However, where the concrete tee length exceeds 32 ft (9,8 m), non-combustible baffles, equal in height to the depth of the tees, can be installed to ensure that the space between the tees does not exceed 32 ft (9,8 m) in length.
- Sprinkler deflectors are to be located in a horizontal plane at or above 1 in. (25,4 mm) below the bottom of the concrete tee stems.
- When sprinkler deflectors are located higher than a horizontal plane 1 in. (25,4 mm) beneath the bottom of the concrete tee stems, obstruction to sprinkler discharge criteria requirements of NFPA 13 for extended coverage upright sprinklers applies.

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⁾ , Inches (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).

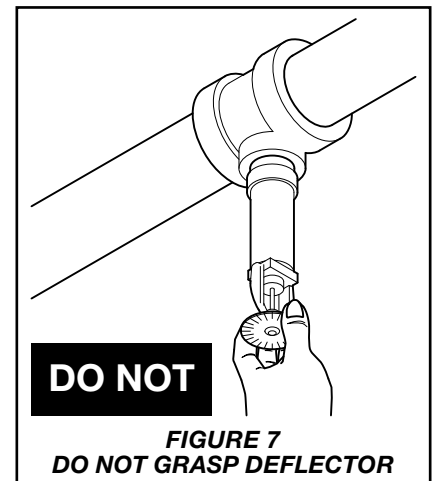
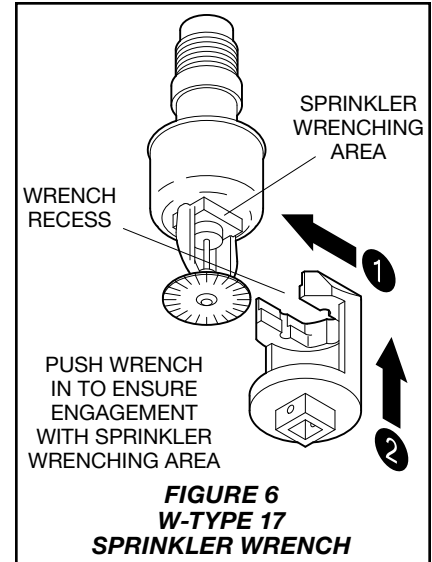
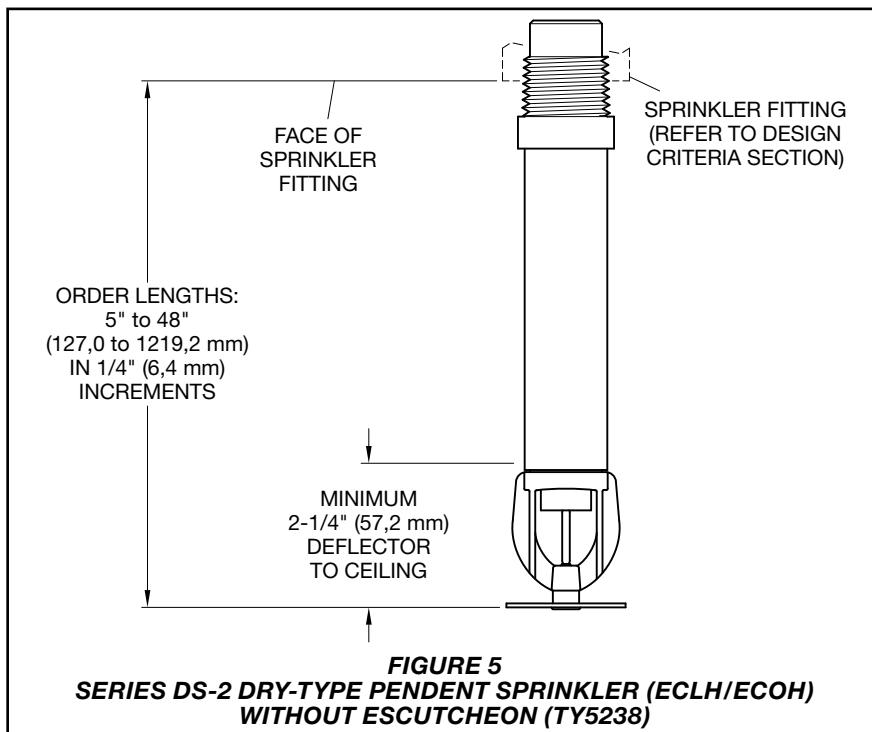
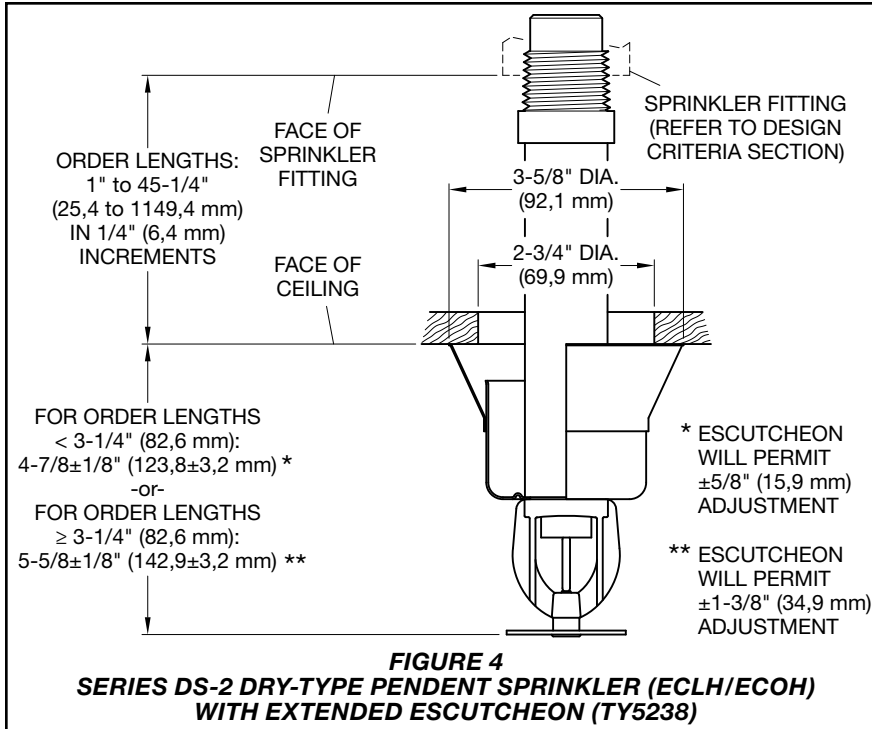
TABLE C
EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS
MINIMUM RECOMMENDED LENGTHS

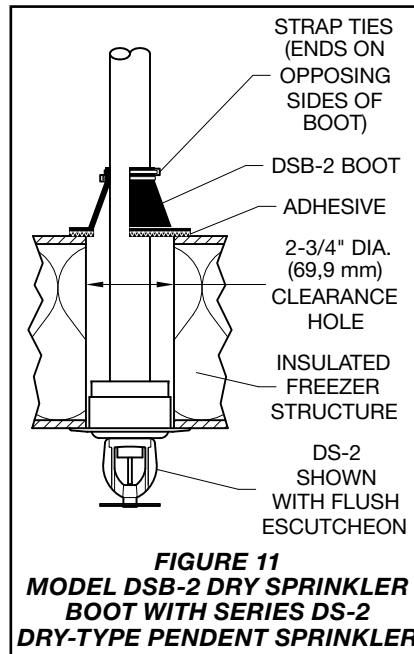
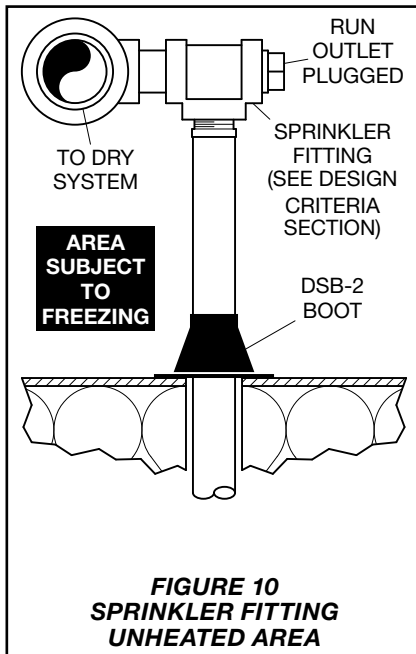
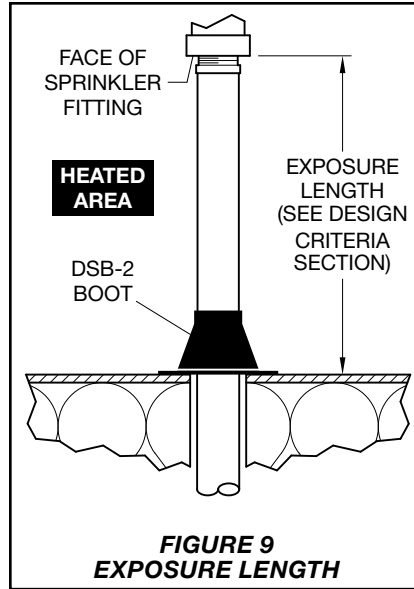
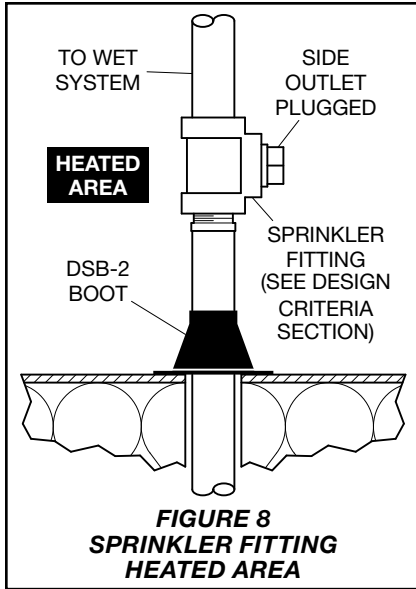


K-factor LENGTH, Inches (mm)	K-factor, gpm/psi^{1/2} (Lpm/bar^{1/2})
2-1/2 to 6-1/4 (63 mm to 159 mm)	11.2 (161,3)
6-1/2 to 10-1/2 (165 mm to 267 mm)	11.1 (159,8)
10-3/4 to 14-3/4 (273 mm to 375 mm)	11.0 (158,4)
15 to 18-3/4 (381 mm to 476 mm)	10.9 (157,0)
19 to 23 (483 mm to 584 mm)	10.8 (155,5)
23-1/4 to 26-3/4 (591 mm to 679 mm)	10.7 (154,1)
27-1/4 to 31-1/4 (692 mm to 794 mm)	10.6 (152,6)
31-1/2 to 35-1/4 (800 mm to 895 mm)	10.5 (151,2)
35-1/2 to 39-1/2 (902 mm to 1003 mm)	10.4 (149,8)
39-3/4 to 43-1/2 (1010 mm to 1105 mm)	10.3 (148,3)
43-3/4 to 48 (1111 mm to 1219 mm)	10.2 (146,9)

- Notes:**
K-factor Length is determined as follows:
- **Flush:** Order Length from Figure 2 plus 1/2 in. (12,7 mm)
 - **Recessed:** Order Length from Figure 3 plus 1/4 in. (6,3 mm)
 - **Extended:** Order Length from Figure 4 plus 3-1/4 in. (82,6 mm)
 - **Without Escutcheon:** Order Length from Figure 5 minus 2-1/4 in. (57,2 mm)

TABLE D
DISCHARGE COEFFICIENTS





Sprinkler Fittings

Install 1 in. NPT Series DS-2 Dry-Type Sprinklers in the 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 Series DS-2 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 10.

You can also install Series DS-2 Dry-Type Sprinklers in the 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 8 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 9. See the Exposure Length section.

For wet pipe system installations of 1 in. NPT Series DS-2 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 dry pipe system installations, use only the side outlet of maximum 2 1/2 in. reducing tee when locating Series DS-2 Dry-Type Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 9 to assure complete water drainage from above Series DS-2 Dry-Type Sprinklers and the branchline. Failure to do so may result in pipe freezing and water damage.

NOTICE

Do not install Series DS-2 Dry-Type Sprinklers 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. See Figure 9 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 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 Figure 11, can provide the recommended seal.

Installation

TYCO Series DS-2 Dry-Type Sprinklers, 11.2K Pendent, Extended Coverage, Light and Ordinary Hazard must be installed in accordance with this section.

General Instructions

Series DS-2 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. With reference to Figure 7, do not grasp the sprinkler by the deflector. Failure to follow this instruction may impair performance of the device.

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 360°F (182°C) rating.

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 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.

Note: *Install pendent sprinklers only in the pendent position. The deflector of a pendent sprinkler must be parallel to the ceiling.*

Step 1. With a non-hardening pipe-thread sealant such as TEFLON applied to the Inlet threads, hand-tighten the sprinkler into the sprinkler fitting. Do not grasp the sprinkler by the deflector, see Figure 7.

Step 2. Wrench-tighten the sprinkler using either:

- a pipe wrench on the Inlet Band or the Casing, see Figure 1
- a W-Type 17 Sprinkler Wrench on the wrench flat (see Figure 6); apply the wrench recess of the W-Type 17 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 3. After installing the ceiling and applying a ceiling finish, slide on the outer piece of the Escutcheon until it comes in contact with the ceiling. 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-2 Dry-Type Sprinklers, 11.2K Pendent, Extended Coverage, Light and Ordinary 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, 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 (see 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.

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.

P/N* 61 - XXX - X - XXX

		SIN	SPRINKLER FINISH	ESCUTCHEON FINISH(1)
40	Pendent with Flush Escutcheon	TY5238 (Figure 2)	0 CHROME PLATED	SIGNAL WHITE (RAL9003) POLYESTER
41	Pendent with Recessed Escutcheon	TY5238 (Figure 3)	1 NATURAL BRASS	SIGNAL WHITE (RAL9003) POLYESTER
42	Pendent with Extended Escutcheon	TY5238 (Figure 4)	4 SIGNAL WHITE (RAL9003) POLYESTER	SIGNAL WHITE (RAL9003) POLYESTER
43	Pendent without Escutcheon	TY5238 (Figure 5)	5 NATURAL BRASS	BRASS PLATED
			9 CHROME PLATED	CHROME PLATED

Notes:

- Escutcheon Finish applies to sprinklers with escutcheons.
- 286°F (141°C) temperature rating applies to non-recessed sprinkler assemblies.
- Dry-Type Sprinklers are furnished based upon "Order Length" as measured per Figures 2 to 5, 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-61-431-1-372).

TEMPERATURE RATING(2)		ORDER LENGTH(3)	
0	135°F (57°C)	055	5.50 in.
1	155°F (68°C)	082	8.25 in.
2	175°F (79°C)	180	18.00 in.
3	200°F (93°C)	187	18.75 in.
4	286°F (141°C)	372	37.25 in.
		480	48.00 in.

TABLE E
SERIES DS-2 EXTENDED COVERAGE DRY-TYPE SPRINKLERS
PART NUMBER SELECTION

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, including description and Part Number (P/N).

Dry-Type Sprinkler

When ordering Series DS-2 Dry-Type Sprinklers, 11.2K Pendent, Extended Coverage, Light and Ordinary Hazard, specify the following information:

- SIN TY5238

- Order Length: Dry-Type Sprinklers are furnished based upon Order Length as measured from the face of the ceiling to the face of the sprinkler fitting, see Figures 2 to 5. After the measurement is taken, round it to the nearest 1/4 in. increment.
- Inlet Connections: 1 In. NPT (Standard)
- ISO 7-R 1 (For information on ISO Inlet Thread Connections, contact your Johnson Controls Sales Representative.)
- Temperature Rating
- Sprinkler Finish
- Escutcheon Type and Finish, as applicable
- Part Number from Table E

Replacement Escutcheons

Order replacement escutcheons separately.

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

Flush and Recessed

Brass Plated	854922
Chrome Plated	854912
White Color	854902

Deep

Brass Plated	854822
Chrome Plated	854812
White Color	854802

Sprinkler Wrench

Specify W-Type 17 Sprinkler Wrench, P/N 56-010-4-118

Sprinkler Boot

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

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



TFP540 Change History Appendix

ISSUE DATE	NOTES
09-21	Added Replacement Escutcheons to Ordering Procedure.
02-20	Corrected Design Criteria section to change Coverage and Flow Rate Criteria reference to Table B, formerly Table C.
11-19	Removed consulting Technical Services Department statement from Sprinkler Fittings subsection Notice.
08-18	Updated Tyco® branding and document format; Added Johnson Controls copyright; Added disclaimer stating specifications and information subject to change without notice; Added reference to Regulatory and Health Warning Technical Data Sheet TFP2300.
09-14	Clarified Listed or Approved sprinklers having 286°F (141°C) Temperature Rating limited to Ordinary Hazard Occupancies installations only as noted in Table A.
07-14	Corrected Table E Part Number Selection, Escutcheon Finish Code 1 to Signal White (RAL9003), formerly shown as Brass .
03-14	Updated Coverage and Flow Rate Criteria in Table B: Removed Standard Response 18 x 18 Coverage Area; Added Standard Response 20 x 20 Coverage Area; Changed 14 x 14 Coverage Area to Quick Response, formerly Standard Response.
06-13	Clarified Sprinkler with Extended Escutcheon order length specification to lengths greater than 3-1/4" (82.6 mm), formerly lengths equaling 3-1/4" (82.6 mm); Updated and standardized RAL color finishes.
05-11	Clarified NYC Approved; Updated minimum order and exposed barrel lengths; Improved Design Criteria section; Updated patent information.
12-07	Added Model DSB-2 Dry Sprinkler Boot; Added NFPA 13 requirements for use of DSB-2; Added illustrations providing guidance on alternative piping connections to dry type sprinklers for freeze protection or system drainage; Added Natural Brass sprinkler with Brass plate escutcheon finish option.
09-04	Added UL and C-UL installation criteria for sprinklers located beneath concrete tee construction.
07-04	Clarified sprinkler is not to be installed by grasping the deflector.
04-04	Added reference to Installer Warning data sheet TFP700; Added NYC Approved; Added guidance on use of compatible CPVC fittings.
01-03	Added new Tyco Fire & Building Products masthead.
02-02	New Technical Data Sheet describes Series DS-2 Dry Type Extended Coverage Pendent Sprinklers.