

## Model ESFR-17 16.8 K-factor Dry Type Pendent Sprinklers Early Suppression, Fast Response

### General Description

TYCO Model ESFR-17 Dry Type Pendent Sprinklers are Early Suppression, Fast Response (ESFR) sprinklers having a nominal K-factor of 16.8. They are suppression mode sprinklers that are especially advantageous as a means of eliminating in-rack sprinklers when protecting high-piled box-in-box refrigerated storage areas.

The Model ESFR-17 Dry Type Pendent Sprinkler is FM Approved and has successfully undergone full-scale fire testing at FM Global, when used in conformance with applicable FM Global Property Loss Prevention Data Sheets.

The Model ESFR-17 Dry Type Sprinkler consists of an ESFR sprinkler permanently secured to a sprinkler drop featuring an inlet with both grooved and threaded connections. The drop between the inlet and sprinkler remains dry until the sprinkler operates, allowing for a pendent sprinkler installation on a wet pipe sprinkler system where the dry drop and sprinkler are located in an area subjected to freezing temperatures.

The Model ESFR-17 Dry Type Sprinklers are primarily used for ceiling only sprinkler protection, for example no need for in-rack sprinklers, and used to protect solid piled, palletized, and rack storage that is subject to freezing temperatures. The water supply is provided

from a wet pipe system located outside of the refrigerated storage area. The Model ESFR-17 Dry Type Sprinklers feature all of the same design criteria as 16.8 K-factor ESFR Pendent Sprinklers, and substantially lowers the end head pressure requirement as compared to the 14.0 K-factor ESFR Dry Type Pendent Sprinklers.

Combining a 16.8 K-factor with a dry-type sprinkler design, the Model ESFR-17 Dry Type Sprinkler provides the system designer with features that offer flexibility when sizing system piping, as well as possibly reducing or eliminating the need for a system fire pump when protecting high-piled box-in-box refrigerated storage areas.

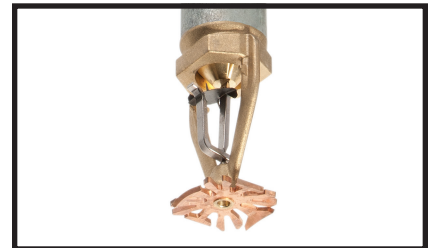
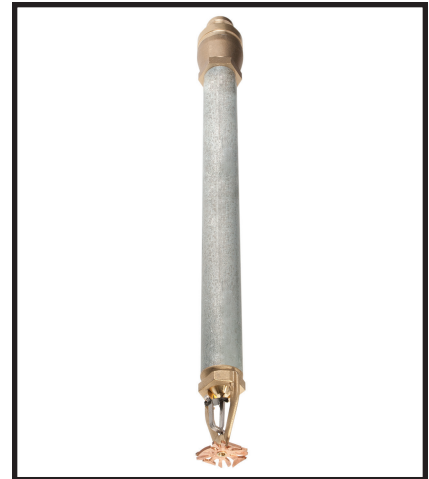
The ESFR-17 Dry Type Sprinkler also includes two Insulating Seal Assemblies that help seal the clearance space around the sprinkler casing. The seal assemblies are intended to slow the exchange of air between the heated area and the protected area to help prevent humidity and temperature differential in the area around the sprinkler. Condensation on the sprinkler and subsequent ice buildup on or around the sprinkler can occur that might damage the sprinkler or prevent proper operation in a fire situation.

To install the Insulating Seal Assemblies, follow the installation instructions in this data sheet. The Insulating Seal Assemblies are recommended to be installed on smooth, flat, and clean surfaces. If it is expected that environmental conditions may result in excessive condensation, additional sealing of the assembly is recommended.

There are specific situations, such as corrugated surfaces where alternate methods to seal the clearance hole are recommended.

#### NOTICE

The Model ESFR-17 Dry Type Pendent 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.

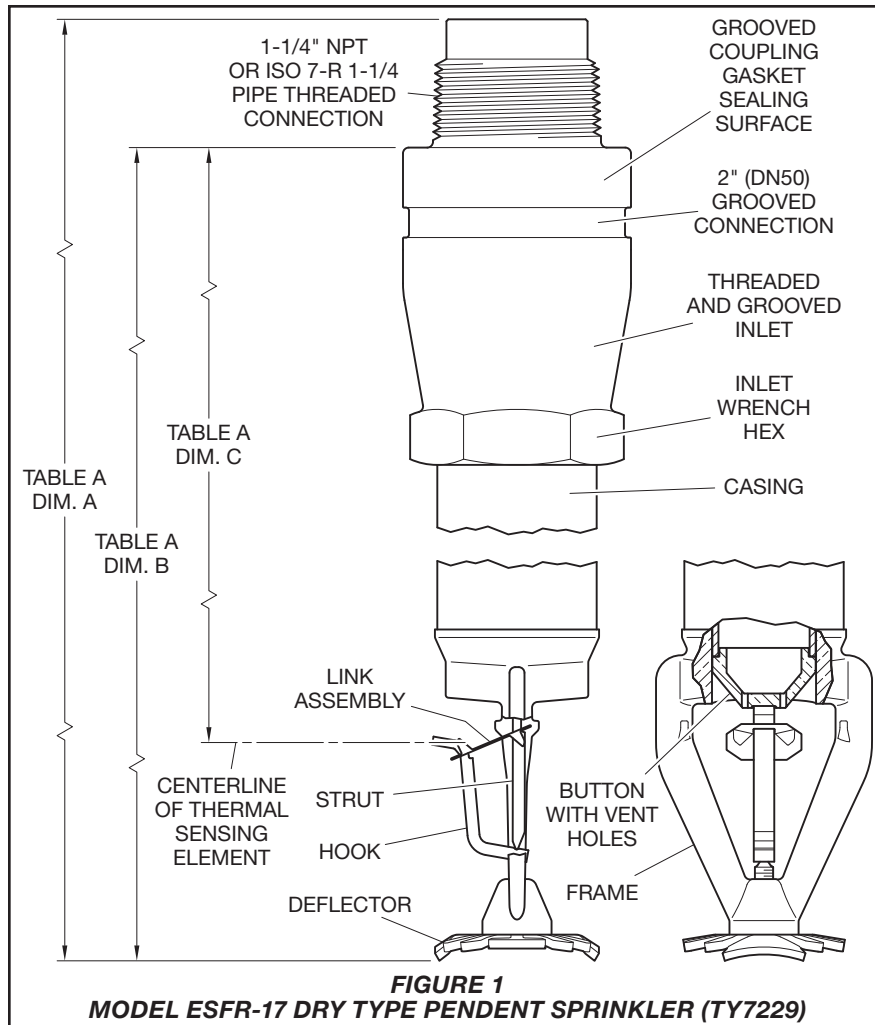
### Sprinkler Identification Number (SIN)

See Table B for sprinkler identification number.

#### 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.



DIM.	36 in. (914 mm) Sprinkler	30 in. (762 mm) Sprinkler	23 in. (584 mm) Sprinkler
A	37.5 in. (952,5 mm)	31.3 in. (795 mm)	24.3 in. (617 mm)
B	36.2 in. (919,5 mm)	30.0 in. (762 mm)	23.0 in. (584 mm)
C	33.9 in. (861 mm)	27.7 in. (704 mm)	20.7 in. (526 mm)

**TABLE A**  
**SPRINKLER LENGTHS**

Item	Description
Sprinkler Identification Number (SIN)	TY7229
K-factor, gpm/psi <sup>1/2</sup> (Lpm/bar <sup>1/2</sup> )	16.8 gpm/psi <sup>1/2</sup> (241,9 Lpm/bar <sup>1/2</sup> )
Thread Size	1 1/4 in. NPT or ISO 7-R 1 1/4
Sprinkler Orientation	Pendent
Maximum Working Pressure, psi (bar)	175 psi (12 bar)

**TABLE B**  
**MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER**  
**TECHNICAL DATA**

## Technical Data

### Approvals

UL Listed  
FM Approved  
(See Table D for specific details on Laboratory listings and approvals.)

### Grooved Connection

2 in. Standard Cut Grooved per Technical Data Sheet TFP1898

### Finish

See Physical Characteristics

### Physical Characteristics

Threaded and Grooved Inlet . . . . . Bronze  
Casing . . . . . Galvanized Steel Pipe  
Frame . . . . . Brass  
Deflector . . . . . Bronze  
Hook . . . . . MONEL  
Strut . . . . . MONEL  
Link Assembly . . . . . Solder, Nickel

### Additional Technical Data

See Table B for additional technical data.

## Operation

The casing between the inlet and the sprinkler remains dry until the sprinkler operates. The fusible link assembly is comprised of two link halves that are joined together by a thin layer of solder. When the rated temperature is reached, the solder melts and the two link halves separate, activating the sprinkler and allowing water to flow through the casing and to the activated sprinkler.

## Design Criteria

The following general guidelines and Table C, provide the key design criteria for the TYCO Model ESFR-17 Dry Type Pendent Sprinklers.

In all cases, the appropriate NFPA installation standard, or other applicable standard, must be referenced to ensure applicability and to obtain complete installation guidelines. The general guidelines in this technical data sheet are not intended to provide complete installation criteria. See Table C for additional information.

In addition to this technical data sheet, the following data sheets describe other TYCO ESFR Sprinklers:

- **TFP312**  
Model ESFR-25 (TY9226)  
K=25.2 Pendent Sprinkler
- **TFP313**  
Model ESFR-22 (TY8226)  
K=22.4 Pendent Sprinkler

Storage Type	NFPA	FM Global
Sprinkler Type	ESFR	Storage
Response Type	FR	QR
System Type	Wet	Wet
Temperature Rating °F (°C) <sup>1</sup>	165°F (74°C) <sup>1</sup> 212°F (100°C)	165°F (74°C) <sup>1</sup>
Open Frame (i.e., no solid shelves) Single, Double, Multiple-Row, or Portable Rack Storage of Class I-IV and Group A or B Plastics	Refer to NFPA 13	Refer to FM 2-0 and 8-9
Solid Pile or Palletized Storage of Class I-IV and Group A or B Plastics	Refer to NFPA 13	Refer to FM 2-0 and 8-9
Idle Pallet Storage	Refer to NFPA 13	Refer to FM 2-0, 8-9, and 8-24
Rubber Tire Storage	Refer to NFPA 13	Refer to FM 2-0 and 8-3
Roll Paper Storage (Refer to the Standard)	Refer to NFPA 13	Refer to FM 8-21
Flammable/Ignitable Liquid Storage (Refer to the Standard)	Refer to NFPA 30	Refer to FM 7-29
Aerosol Storage (Refer to the Standard)	Refer to NFPA 30B	Refer to FM 7-31
Automotive Components in Portable Racks (Control mode only; refer to the Standard)	N/A	N/A
<b>Notes:</b> 1. See Table D for specific details on Laboratory Listings and Approvals N/A – Not Applicable		
<b>TABLE C</b> <b>MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER</b> <b>COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW</b>		

Sprinkler Type	Temperature Rating	Laboratory Listings and Approvals
Pendent K=16.8 (TY7229)	165°F (74°C)	1, 2
	212°F (100°C)	1
<b>Notes:</b> 1. UL Listed 2. FM Approved		
<b>TABLE D</b> <b>LABORATORY LISTINGS AND APPROVALS</b>		

- **TFP315**  
Model ESFR-17 (TY7226)  
K=16.8 Pendent Sprinkler
- **TFP316**  
Model ESFR-17 (TY7126)  
K=16.8 Upright Sprinkler
- **TFP317**  
Model ESFR-17 (TY7223)  
K=16.8 Pendent Sprinkler

- **TFP318**  
Model ESFR-1 (TY6226)  
K=14.0 Pendent Sprinkler
- **TFP319**  
Model ESFR-14 (TY6236)  
K=14.0 Pendent Sprinkler

**Ceiling Construction**  
Unobstructed or non-combustible obstructed construction, such as

smooth ceiling, bar joists, beam and girder.

**Ceiling Slope**  
Maximum 2 in. rise for 12 in. run (16.7%)

**Maximum Coverage Area**  
100 ft<sup>2</sup> (9,3 m<sup>2</sup>)

In some cases, the installation standards permit a greater coverage area.

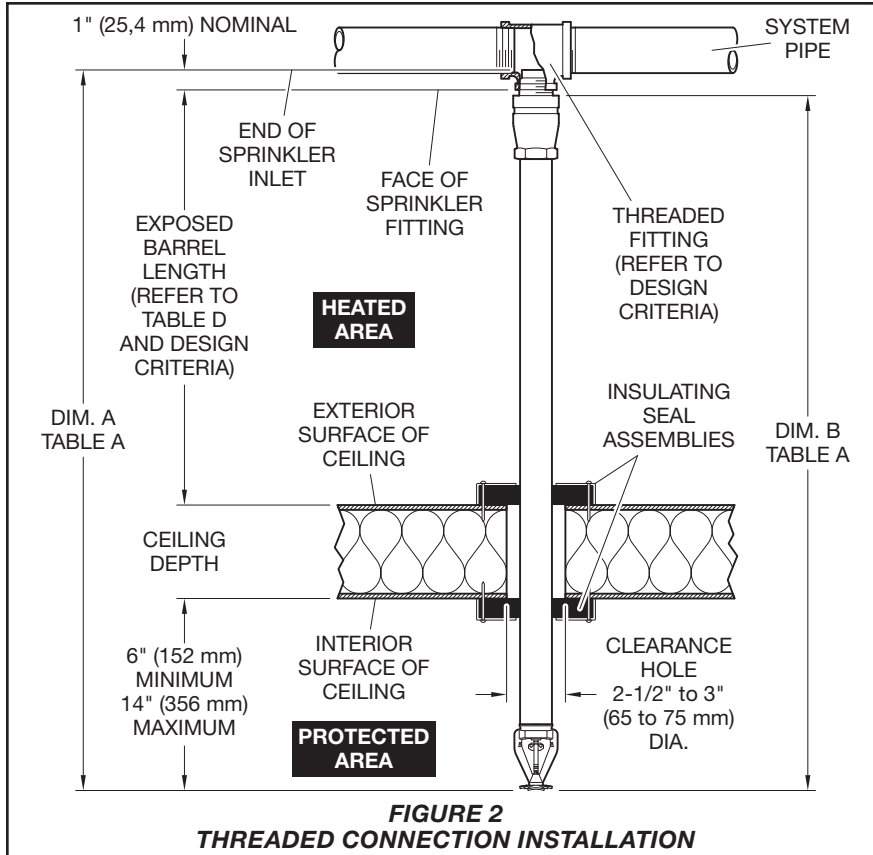
**Minimum Coverage Area**  
64 ft<sup>2</sup> (5,8 m<sup>2</sup>)

**Maximum Spacing**  
12 ft (3,7 m) for ceiling heights up to 30 ft (9,1 m)

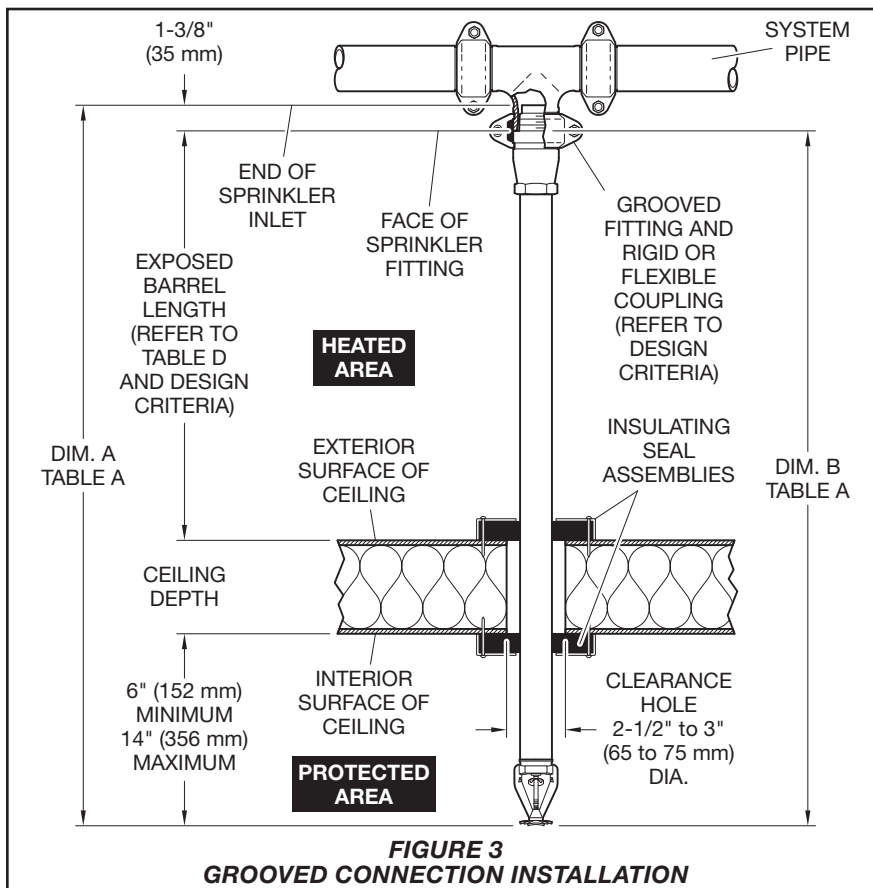
10 ft (3,1 m) for ceiling heights greater than 30 ft (9,1 m)

**Minimum Spacing**  
8 ft (2,4 m)

**Minimum Clearance to Commodity**  
36 in. (914 mm)



**FIGURE 2**  
**THREADED CONNECTION INSTALLATION**



**FIGURE 3**  
**GROOVED CONNECTION INSTALLATION**

Ambient Temp. of Protected Area <sup>(a)</sup>	Exposed Barrel Ambient Temperature <sup>(b)(c)</sup>		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length Inches (mm)		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (101,6)	0	0
10°F (-12°C)	8 (203)	1 (25,4)	0
0°F (-18°C)	12 (305)	3 (76)	0
-10°F (-23°C)	14 (356)	4 (101,6)	1 (25,4)
-20°F (-29°C)	14 (356)	6 (152)	3 (76)
-30°F (-34°C)	16 (406)	8 (203)	4 (101,6)
-40°F (-40°C)	18 (457)	8 (203)	4 (101,6)
-50°F (-46°C)	20 (508)	10 (254)	6 (152)
-60°F (-51°C)	20 (508)	10 (254)	6 (152)

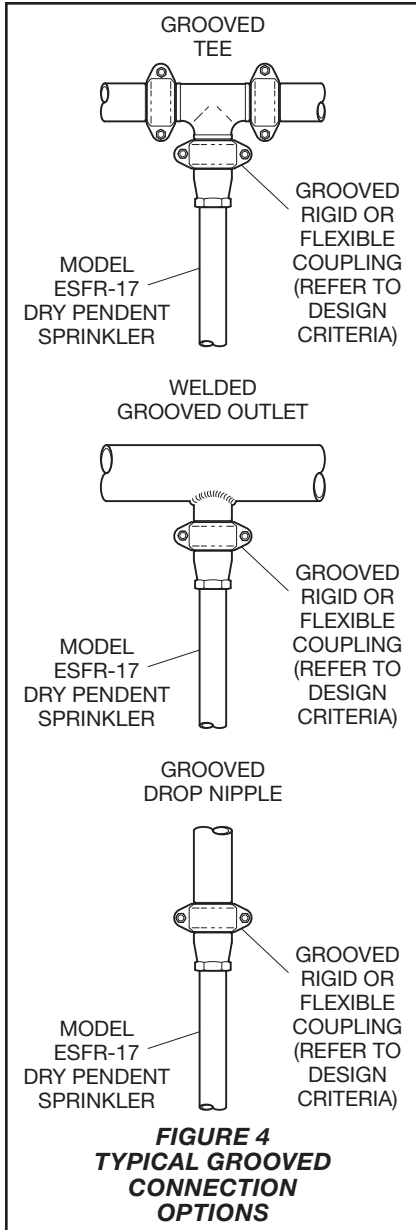
- Notes:**
- a. The area below the ceiling is referred to as the protected area. Ambient temperature is the temperature at the discharge end of the sprinkler. For protected area temperatures that range between the listed temperatures, use the next cooler temperature.
  - b. Lengths are inclusive of wind velocities up to 30 mph (48,3 km/h) and assume a minimum 40°F (4°C) in heated area.
  - c. Minimum exposed barrel length when Insulating Seal Assembly is installed on exterior surface of ceiling:
    - Threaded Fitting Installation  
5 in. (125 mm), see Figure 2
    - Grooved Fitting Installation  
4 1/2 in. (114 mm), see Figure 3

**TABLE E**  
**MINIMUM EXPOSED BARREL LENGTH REQUIRED PER AMBIENT TEMPERATURE**

**NFPA**  
**Deflector-to-Ceiling Distance**  
6 to 14 in. (152 to 356 mm)

**FM Global**  
**Centerline of Thermal Sensing Element-to-Ceiling Distance**  
Refer to FM Global 2-0 for Storage Sprinklers.

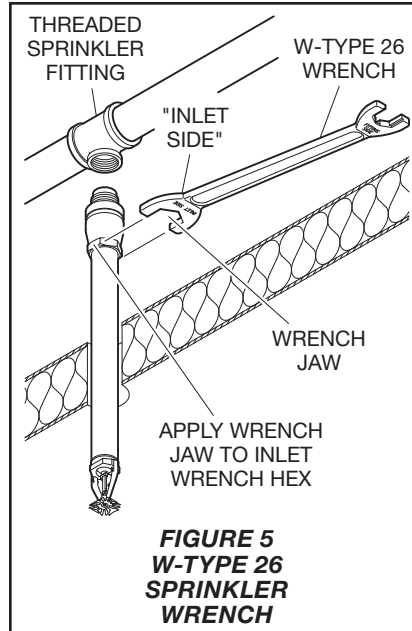
**Sprinkler Threaded Fittings**  
1 1/4 in. NPT Model ESFR-17 Dry Type Sprinklers are to be installed in the 1 1/4 in. NPT outlet or run of the following fittings:



- 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 Model ESFR-17 Dry Type Sprinkler into elbow fittings. The inlet of the sprinkler can contact the interior of the elbow and result in damage to the assembly, resulting in leakage.

The Model ESFR-17 Dry Type Sprinkler can also be installed in the 1 1/4 in. NPT outlet of a GRINNELL Figure 730 Mechanical Tee.



#### Sprinkler Grooved Connection

The Model ESFR-17 Dry Type Sprinklers can be installed in typical grooved connection scenarios illustrated in Figure 4.

For flexible couplings, use of the 2 in. Figure 705 GRINNELL Flexible Couplings with "C" Shape Pre-Lubricated Grade "A" EPDM Gasket (Refer to TFP1820) is recommended.

For rigid couplings, use of the 2 in., Figure 577 GRINNELL G-FIRE Grooved Rigid Coupling with "C" Shape Pre-Lubricated Grade "A" EPDM Gasket (Refer to TFP1854) is recommended.

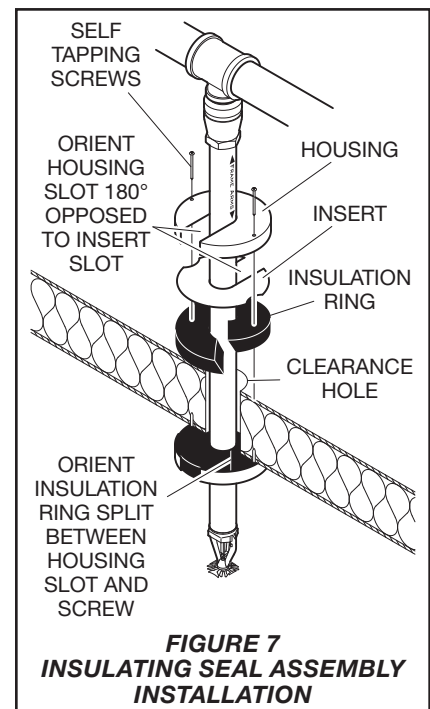
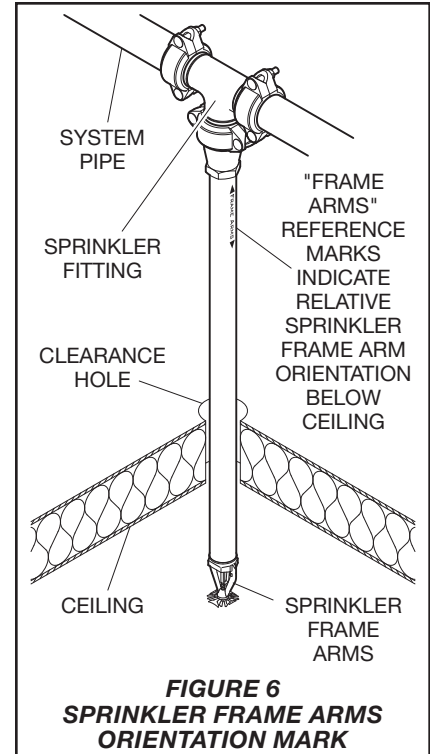
When using tees, use of the Figure 219 GRINNELL Grooved Ductile Iron Cast Fittings (Refer to TFP1810) is recommended.

#### NOTICE

*Do not install Model ESFR-17 Dry Type Sprinkler into any other type fitting connection without first consulting TFP Technical Services. Failure to use the appropriate fitting may result in insufficient engagement of the inlet pipe threads with consequent leakage.*

#### Exposure Length

When using Model ESFR-17 Dry Type Sprinklers to protect areas subject to freezing temperatures, use Figures 2 and 3, and Table E to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connection pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the exterior surface of the structure or insulation that is exposed to the heated area.



Do not attempt to add additional insulation around the barrel in the heated area as a method to minimize condensation. This will reduce the calculated exposure length.

#### **Clearance Space**

In accordance with NFPA 13, when protecting insulated freezer structures with dry type sprinklers, the clearance hole around the sprinkler barrel of the Dry Type Sprinkler and the clearance hole must be sealed. Sealing is accomplished by use of the Insulating Seal Assemblies, see Figure 7. Failure to use the Insulating Seal Assemblies will increase the potential for the formation of condensation on the sprinkler and subsequent ice build-up on or around the sprinkler can occur that might damage the dry type sprinkler and/or prevent proper operation in a fire situation.

#### **FM Global 2-0**

Consult FM Global and/or FM Global guidelines for allowable vertical distance from ceiling to centerline of thermal sensing element.

## **Installation**

TYCO Model ESFR-17 Early Suppression, Fast Response 16.8K Pendent Sprinklers must be installed in accordance with this section.

#### **General Instructions**

Avoid damage to the fusible Link Assembly during installation by using only the Casing to handle the sprinkler and by using the appropriate sprinkler wrench. Do not apply pressure to the fusible Link Assembly. Failure to do so can lead to an unstable link assembly and premature activation of the sprinkler. Damaged sprinklers must be replaced.

Model ESFR-17 Dry Type Sprinklers must only be installed in fittings/connections that meet the requirements of the Design Criteria section. See the Design Criteria section for other important requirements regarding piping design, exposure length, and the sealing of the clearance space around the sprinkler casing.

If a sprinkler using a threaded connection (vs. grooved connection) requires replacement, remove the sprinkler using only the W-Type 26 Sprinkler Wrench. Fully engage the wrench on the inlet wrench hex, see Figure 5. Replace with the new sprinkler following the installation instructions in this section.

#### **Threaded Connection Instructions**

A leak-tight 1 1/4 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 45 to 65

lb-ft (61 to 88 N-m). Higher levels of torque can distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.

**Note:** *Install the Model ESFR-17 Dry Type Pendent Sprinkler in the pendent position (see Figure 5) by carefully raising the pendent sprinkler through the clearance hole. The deflector of the pendent sprinkler is to be parallel to the ceiling.*

**Step 1.** Apply a non-hardening pipe thread sealant such as TEFLON to the male 1 1/4 in. NPT inlet threads.

**Step 2.** Wrench-tighten the Model ESFR-17 Dry Type Sprinkler using only the W-Type 26 Sprinkler Wrench and by fully engaging the wrench on the inlet wrench hex, see Figure 5. For reference, the "FRAME ARMS" marking can be used to align the frame arms with the System Pipe as shown in Figure 6.

**Step 3.** After installation, inspect the Link Assembly of each Model ESFR-17 Dry Type Sprinkler for damage. In particular, verify that the Link Assembly and Hook are positioned as illustrated in Figure 1, and that the Link Assembly is not bent, creased, or forced out of normal position in any way. Replace damaged sprinklers.

**Step 4.** Install the insulation rings of the Insulating Seal Assemblies by slipping the insulation rings around the sprinkler casing as shown in Figure 7. Place the inserts over the insulation rings by sliding the inserts around the casing. Place the housings over the Inserts and insulation rings ensuring that the slot on the housings are 180 degrees to the inserts slot. Ensure that the Insulating Seal Assemblies are snug against the refrigerated storage ceiling. Secure the Insulating Seal Assemblies to the ceiling using two self-tapping screws per assembly.

#### **Grooved Connection Instructions**

The following instructions are based on using the 2 in. Figure 705 Grooved Flexible Coupling or the 2 in. Figure 577 Grooved Rigid Coupling.

**Step 1.** Inspect the exterior groove and the end connection of the mating grooved connection and sprinkler to verify all burrs, loose debris, dirt, chips, paint and other foreign materials such as grease are removed. Sealing surfaces must be free from sharp edges, projections, indentations, and/or other defects.

**Step 2.** Verify that the coupling and gasket grade are correct for the application intended. Refer to Technical Data Sheet TFP1895 for additional gasket information. The sealing edges and the outer surfaces of the gasket should be covered with a fine layer of

lubricant. To prevent deterioration of the gasket material, a silicone lubricant should be used to prevent freezing of the lubricant.

**Step 3.** Install the Model ESFR-17 Dry Type Pendent Sprinkler in the pendent position (see Figures 4 and 7) by carefully raising the pendent sprinkler through the clearance hole. The deflector of the pendent sprinkler is to be parallel to the ceiling. Also, ensure that the "FRAME ARMS" markings on the sprinkler casing are aligned with the System Pipe, see Figure 6.

**Step 4.** Install the gasket by placing it over the sealing portion of the grooved inlet connection so that the gasket lip does not extend beyond the end of the groove sealing surface. Bring end of the grooved inlet together with end of grooved fitting ensuring vertical and horizontal alignment. Slide the gasket over both sealing surfaces.

**Step 5.** With one bolt and nut removed, separate the coupling housings and place over the gasket. Verify that the coupling housings are over the gasket and that the coupling housing keys are fully engaged into the grooves.

**Step 6.** Insert the bolt and nut into the coupling and finger tighten both nuts. Verify that the bolt heads are fully recessed in the housing.

The 2 in. Figure 705 Grooved Flexible Coupling Housing bolt pads must be in metal-to-metal contact. For Flexible Coupling deflection data, refer to Technical Data Sheet TFP1820.

The 2 in. Figure 577 Grooved Rigid Coupling has an intended gap of up to 1/16 of an inch at each pad to allow for positive rigid gripping onto the pipe. The patented tongue and groove design provides protection to the back of the gasket during installation.

**Step 7.** Alternate between both sides of the coupling when tightening the bolts. Torque bolts to 30 lb-ft (41 N-m).

**Step 8.** Install the insulation rings of the Insulating Seal Assemblies by slipping the insulation rings around the sprinkler casing as shown in Figure 7. Place the inserts over the insulation rings by sliding the inserts around the casing. Place the housings over the Inserts and insulation rings ensuring that the slot on the housings is 180 degrees to the inserts slot. Ensure that the Insulating Seal Assemblies are snug against the refrigerated storage ceiling. Secure the Insulating Seal Assemblies to the ceiling using two self-tapping screws per assembly.

## Care and Maintenance

TYCO Model ESFR-17 Early Suppression, Fast Response 16.8K Pendent Sprinklers 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 from the proper authorities and notify all personnel who may be affected by this action.

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 or overheated sprinklers must be replaced.

A Vent Hole is provided in the Link Assembly Button (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; such as an improper installation or an ice plug. Close the fire protection system control valve and drain the system before removing the sprinkler.

When replacing a sprinkler, remove and discard the old Insulating Seal Assemblies, and replace as shown in Figure 7.

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.

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 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).

### Sprinkler Assemblies

Specify: Model ESFR-17 Dry Type Early Suppression, Fast Response 16.8K Pendent Sprinklers (TY7229) with two (2) Insulating Sealing Assemblies, P/N (specify):

**36 in. Sprinkler**  
165°F (74°C) ..... 61-441-1-360  
212°F (100°C) ..... 61-442-1-360

**30 in. Sprinkler**  
165°F (74°C) ..... 61-441-1-300  
212°F (100°C) ..... 61-442-1-300

**23 in. Sprinkler**  
165°F (74°C) ..... 61-441-1-230  
212°F (100°C) ..... 61-442-1-230

### Special Order Sprinkler Assemblies with ISO 7-1 Thread Connections

Specify: Model ESFR-17 Dry Type Early Suppression, Fast Response 16.8K Pendent Sprinkler (TY7229) with ISO 7-1 thread connection and two (2) Insulating Sealing Assemblies, (specify temperature rating), P/N (specify):

**36 in. Sprinkler**  
165°F (74°C) ..... I-61-441-1-360  
212°F (100°C) ..... I-61-442-1-360

**30 in. Sprinkler**  
165°F (74°C) ..... I-61-441-1-300  
212°F (100°C) ..... I-61-442-1-300

**23 in. Sprinkler**  
165°F (74°C) ..... I-61-441-1-230  
212°F (100°C) ..... I-61-442-1-230

### Sprinkler Wrench

Specify: W-Type 26 Sprinkler Wrench, P/N 56-341-1-001

### Insulating Seal Assembly Kit

Each Insulating Seal Assembly kit consists of one (1) Insulation Ring, one (1) Insert, one (1) Housing, and two (2) Screws.

Specify: Insulating Sealing Assembly, P/N 91-106-1-500

