Technical Services
800-381-9312
+1-401-781-8220
www.tyco-fire.com

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

General Description

The TYCO Model ESFR-17 Dry Type Pendent Sprinklers (TY7229) are "Early Suppression Fast Response 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 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 (i.e., 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.

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.

Combining a 16.8 K-factor with a dry type sprinkler design, the Model ESFR-17 Dry Type Sprinklers 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 to seal the top and the bottom of the clearance space where the sprinkler drop protrudes through the cold storage ceiling.

NOTICE

The Model ESFR-17 Dry Type Pendent Sprinklers (TY7229) 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 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. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Sprinkler Identification Number (SIN)

TY7229

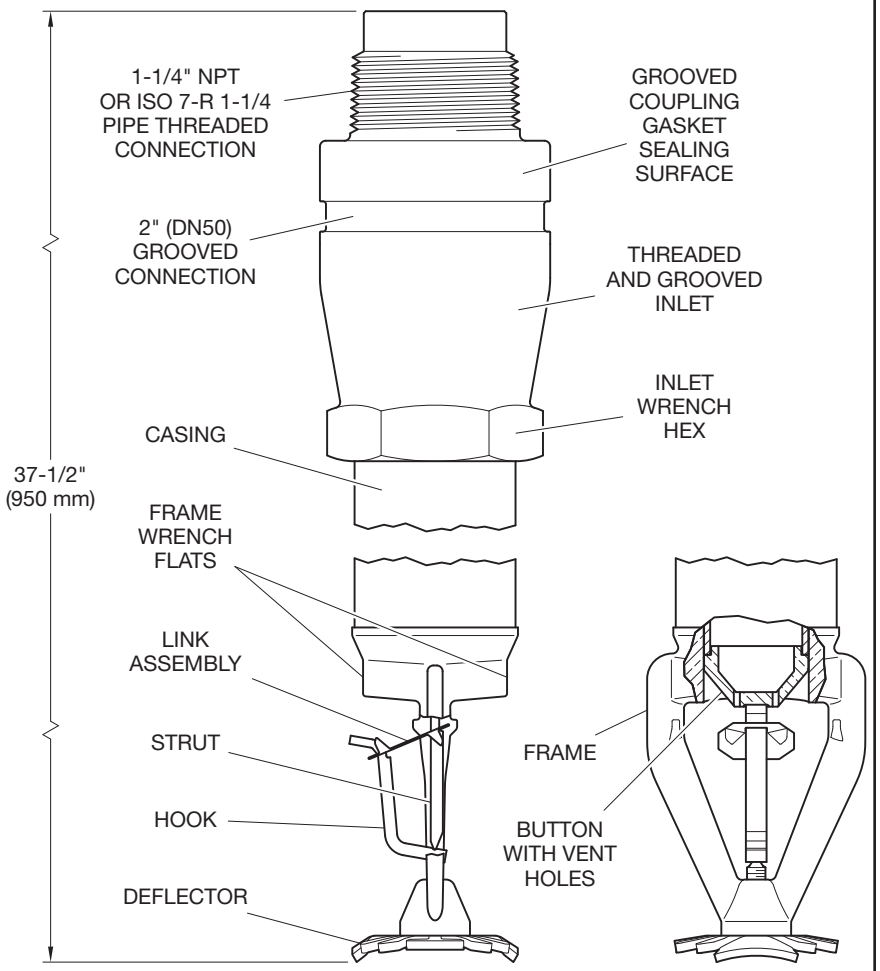

FIGURE 1
MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER (TY7229)

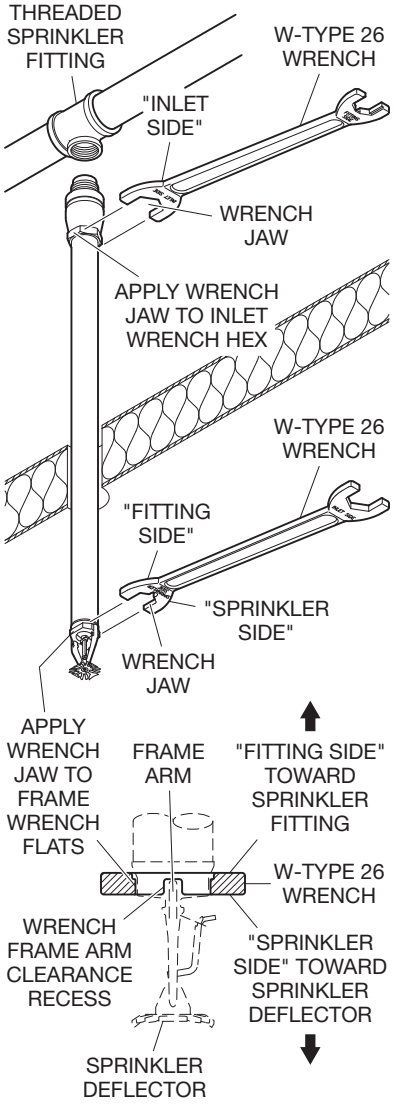

FIGURE 2
W-TYPE 26 SPRINKLER WRENCH

Technical Data

Approvals
UL Listed

Maximum Working Pressure
175 psi (12,1 bar)

Pipe Thread Connections
1-1/4 inch NPT
ISO 7-R 1-1/4

Grooved Connection
2 inch standard cut grooved per Technical Data Sheet TFP1898

Discharge Coefficient
K = 16.8 GPM/psi$^{1/2}$
(241,9 LPM/bar$^{1/2}$)

Temperature Ratings
165°F (74°C)
214°F (101°C)

Finish
Refer to 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

Design Criteria

The following general guidelines and Table A, provide the key design criteria for the TYCO Model ESFR-17 Dry Type Pendent Sprinklers (TY7229).

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 data sheet are not intended to provide complete installation criteria.

System Type
Wet pipe system only

Ceiling Construction
Unobstructed or non-combustible obstructed construction; for example, smooth ceiling, bar joists, beam and girder, etc.

Ceiling Slope
Maximum 2 inch rise for 12 inch run (16.7%)

Maximum Coverage Area
100 ft^2 (9,3 m^2)

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

Minimum Coverage Area
64 ft^2 (5,8 m^2)

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

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

Minimum Spacing
8 feet (2,4 m)

Minimum Clearance to Commodity
36 inches (914 mm)

Deflector-to-Ceiling Distance
6 to 14 inches (152 to 356 mm)

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

- Malleable or ductile iron threaded tee fitting 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 inch 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 7.

For flexible couplings, use of the 2 Inch Figure 705 GRINNELL Flexible Couplings with “C” Shape Pre-Lubricated Grade “A” EPDM Gasket (Technical Data Sheet 110) is recommended.

For rigid couplings, use of the 2 Inch, Figure 577 GRINNELL G-FIRE Grooved Rigid Coupling with “C” Shape Pre-Lubricated Grade “A” EPDM Gasket (Technical Data Sheet TFP1854) is recommended.

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

NOTICE

Do not install Model ESFR-17 Dry Type Sprinkler into any other type fitting connection without first consulting the Technical Services Department. 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 3 and 4 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 Section 8.4.9.2 of the 2010 edition of 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 (Figure 6). 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.

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.

Storage Type	NFPA
Open Frame (that is, 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, Chapters 16 and 17.
Solid Pile or Palletized Storage of Class I-IV and Group A or B Plastics	Refer to NFPA 13, Chapters 14 and 15.
Idle Pallet Storage	Refer to NFPA 13, Chapter 12.
Rubber Tire Storage	Refer to NFPA 13, Chapter 18.
Rolled Paper Storage	Refer to NFPA 13, Chapter 19.
Flammable Liquid Storage	Refer to NFPA 30.
Aerosol Storage	Refer to 30B.

TABLE A
MODEL ESFR-17 DRY TYPE PENDENT SPRINKLERS
COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW

Installation

The TYCO Model ESFR-17 Dry Type Pendent Sprinklers (TY7229) 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 (that is, do not apply pressure to the fusible Link Assembly), and by using the appropriate sprinkler wrench. 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. Refer to 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 (Figure 2). Replace with the new sprinkler following the installation instructions in this section.

Threaded Connection Instructions
A leak-tight 1-1/4 inch NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 45 to 65 ft.-lbs. (61 to 88 Nm). Higher levels of torque can distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.

Step 1. Apply a non-hardening pipe-thread sealant such as TEFLON to the Male 1-1/4 inch NPT Inlet threads.

Step 2. Install the Model ESFR-17 Dry Type Pendent Sprinkler in the pendent position (Figure 3) by carefully raising the pendent sprinkler through the clearance hole. The deflector of the pendent sprinkler is to be parallel to the ceiling.

Step 3. Wrench-tighten the Model ESFR-17 Dry Type Sprinkler using only the W-Type 26 Sprinkler Wrench (Figure 2) and by fully engaging the wrench on the inlet wrench hex (Figure 2). For reference, the FRAME ARMS marking can be used to align with the frame arms with the System Pipe as shown in Figure 5.

Step 4. 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 5. Install the Insulation Rings of the Insulating Seal Assemblies by slipping the Insulation Rings around the sprinkler casing as shown in Figure 6. 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 Inch Figure 705 Grooved Flexible Coupling or the 2 Inch 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 (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 5).

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 Inch 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 G110.

The 2 Inch 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 ft.-lbs (41 Nm).

Step 8. Install the Insulation Rings of the Insulating Seal Assemblies by slipping the Insulation Rings around the sprinkler casing as shown in Figure 6. 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

The TYCO Model ESFR-17 Dry Type Pendent Sprinklers (TY7229) 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 (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.

When replacing a sprinkler, remove and discard the old Insulating Seal Assemblies and replace as shown in Figure 6.

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 (e.g., NFPA 25), in addition to the standards of any authorities having jurisdiction. Contact the installing contractor or sprinkler manufacturer regarding 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.

Temperature[a] At Sprinkler Located In Protected Area	Minimum Exposed Barrel Length, Inches (mm)[b]
40°F (4°C)	5 (125)[c]
30°F (-1°C)	5 (125)[c]
20°F (-7°C)	5 (125)[c]
10°F (-12°C)	8 (200)
0°F (-18°C)	12 (305)
-10°F (-23°C)	14 (355)
-20°F (-29°C)	14 (355)
-30°F (-34°C)	16 (405)
-40°F (-40°C)	18 (455)
-50°F (-46°C)	20 (510)
-60°F (-51°C)	20 (510)

(a) For Potected Area temperatures between values listed, use 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 5" (125 mm) clearance required for Sprinkler Inlet and proper installation of Insulating Seal Assembly.

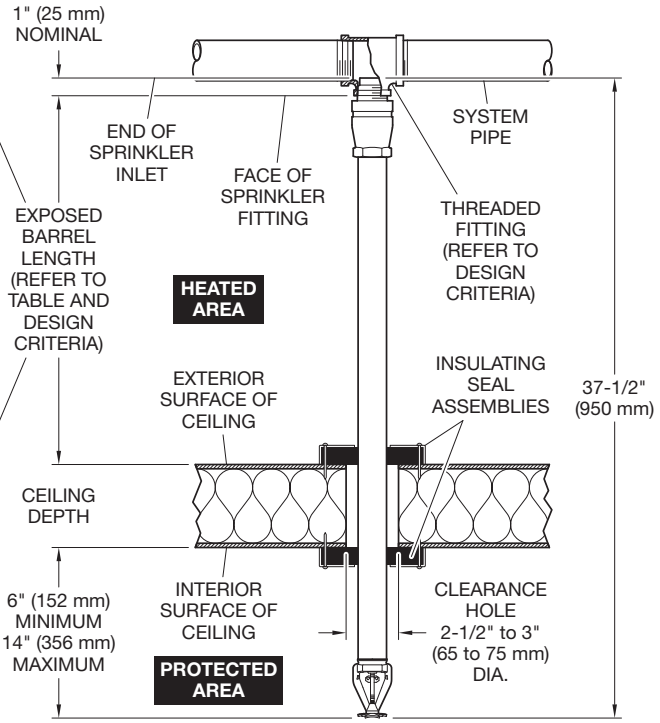

FIGURE 3
MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER - THREADED FITTING

Temperature[a] At Sprinkler Located In Protected Area	Minimum Exposed Barrel Length, Inches (mm)[b]
40°F (4°C)	5 (125)[c]
30°F (-1°C)	5 (125)[c]
20°F (-7°C)	5 (125)[c]
10°F (-12°C)	8 (200)
0°F (-18°C)	12 (305)
-10°F (-23°C)	14 (355)
-20°F (-29°C)	14 (355)
-30°F (-34°C)	16 (405)
-40°F (-40°C)	18 (455)
-50°F (-46°C)	20 (510)
-60°F (-51°C)	20 (510)

(a) For Potected Area temperatures between values listed, use 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 5" (125 mm) clearance required for Sprinkler Inlet and proper installation of Insulating Seal Assembly.

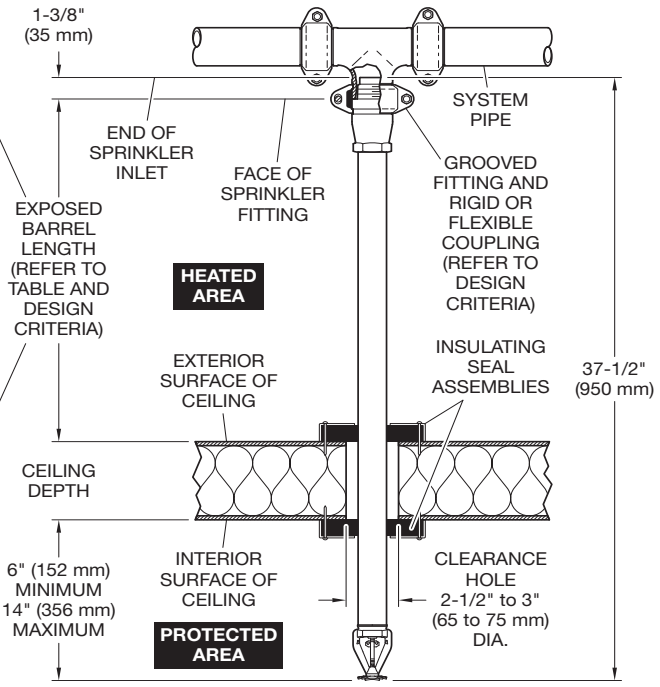

FIGURE 4
MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER - GROOVED CONNECTION

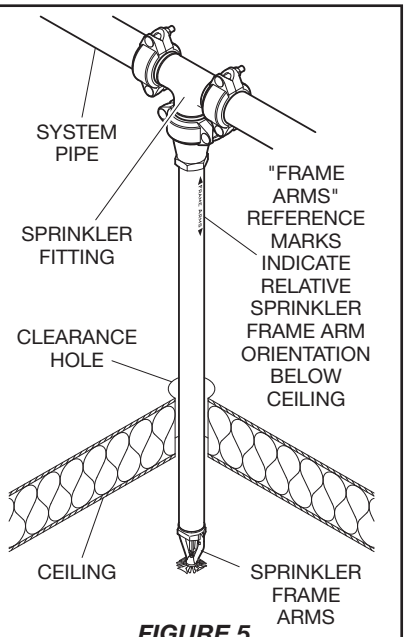

FIGURE 5
MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER - ORIENTATION MARK

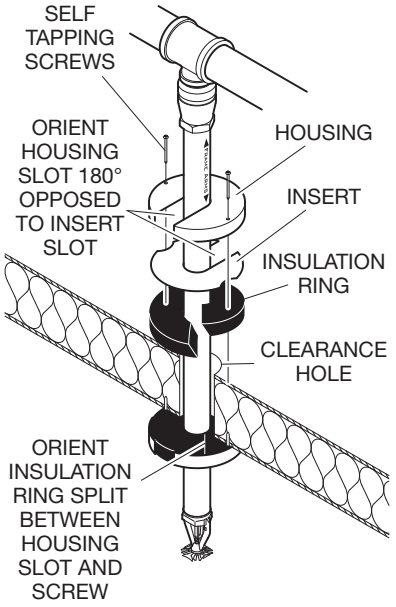

FIGURE 6
INSULATING SEAL ASSEMBLY INSTALLATION

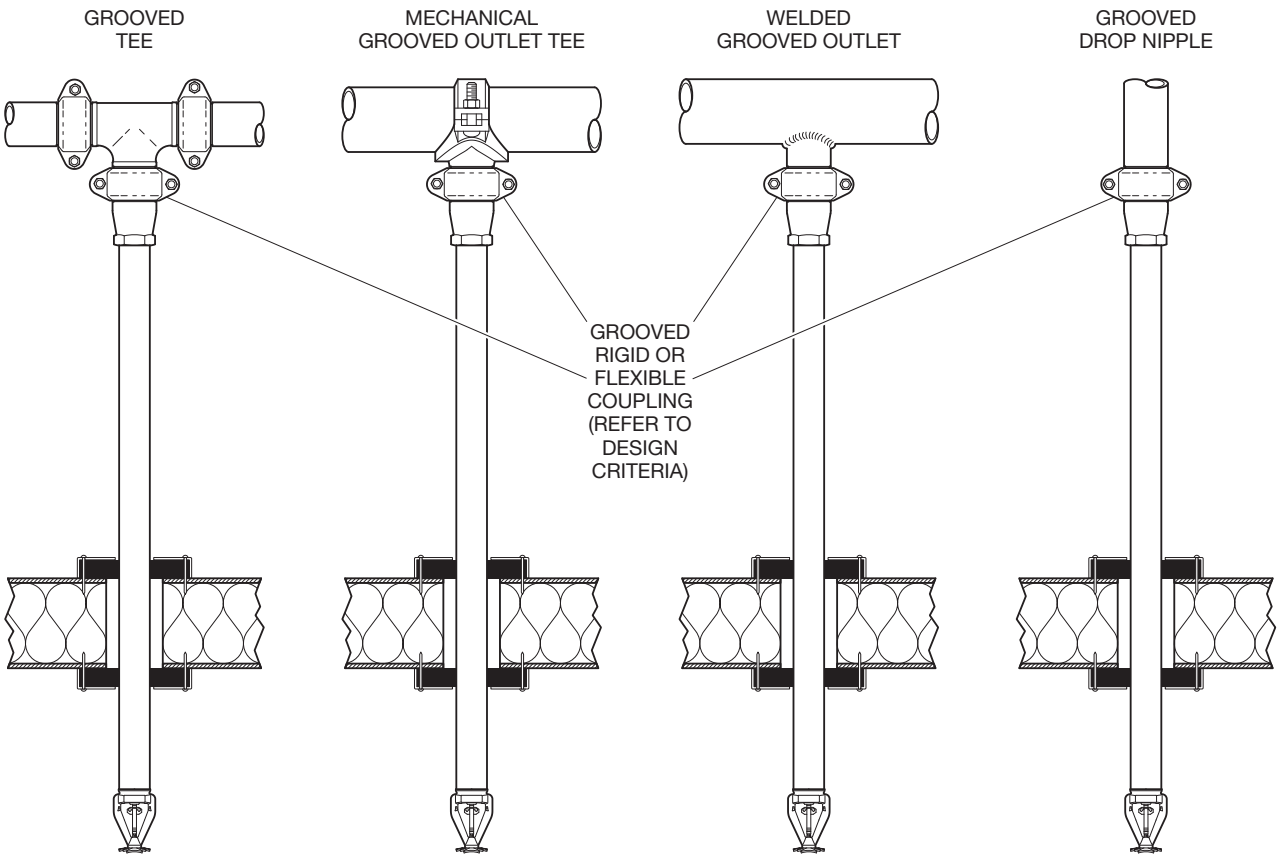

FIGURE 7
MODEL ESFR-17 DRY TYPE PENDENT SPRINKLER
TYPICAL GROOVED CONNECTION SCENARIOS

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: ESFR-17 (TY7229), K=16.8, Dry Type Pendent Sprinkler with two (2) Insulating Sealing Assemblies, P/N (specify).

165°F (74°C) . . . . . P/N 614411360
214°F (101°C) . . . . . P/N 614421360

Special-Order Sprinkler Assemblies with ISO 7/1 Thread Connections
Specify: ESFR-17 (TY7229), K=16.8, Dry Pendent Sprinkler with thread connection per ISO 7/1, (specify) temperature rating, and two (2) Insulating Sealing Assemblies, P/N (specify).

165°F (74°C) . . . . . P/N I614411360
214°F (101°C) . . . . . P/N I614421360

Sprinkler Wrench
Specify: W-Type 26 Sprinkler Wrench, P/N 563411001.

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 911061500.