TECHNICAL DATA

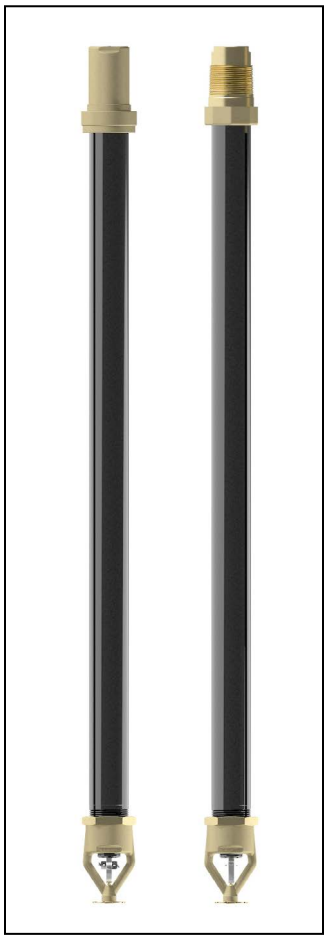
ESFR DRY PENDENT SPRINKLER VK502 (K14.0)

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com

1. DESCRIPTION

Viking Early Suppression Fast Response (ESFR) Dry Pendent Sprinkler VK502 is a fast response fusible element type sprinkler designed for use in storage areas subject to freezing and supplied from a **wet system only**, in an adjacent heated area. With a 14.0 (202 metric*) nominal K-factor and special deflector, this sprinkler produces large, high-momentum water droplets in a hemispheric pattern below the deflector. This permits penetration of the fire plume and direct wetting of the burning fuel surface while cooling the atmosphere early in the development of a high-challenge fire.

The dry ESFR sprinkler consists of a fusible element style ESFR sprinkler permanently secured to a special supply nipple. The sprinkler assembly features a sealed brass inlet that's grooved or threaded. Also included with the ESFR dry sprinkler are two insulating boot assemblies (optional) to help seal the clearance space around the dry sprinkler barrel. When properly installed, the seal decreases the potential for leakage of air through the opening in the ceiling and consequent formation of condensate around the sprinkler connection on the system piping. In freezer installations, condensation can lead to ice build-up, which could inhibit sprinkler operation or cause premature sprinkler operation. The dry sprinkler boot assembly is intended to slow the exchange of air between the inside and outside of the freezer (or any dry sprinkler installation) to help prevent humidity and temperature differential in the area around the sprinkler. The rubber seal is designed with a material that will not drip when exposed to open flame. This protects the deflector from acquiring material that would impede its water distribution characteristics.



ESFR Sprinkler VK502 (Grooved and Threaded)

NOTICE

Viking recommends use of the included insulating boot assemblies in accordance with the installation instructions in this technical data page. Insulating boot assemblies (optional) shall be installed on smooth, flat, and clean surfaces. There are specific situations, such as corrugated ceiling panels, where alternative penetration sealing methods are utilized. For additional information contact Viking Technical Services.

2. LISTINGS AND APPROVALS

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

FM APPROVED **FM Approved: Class 2008**

CE **CE CPR**: EAD 100002-00-1106 March 2016, Declaration of Performance DOP_VK502.

Refer to the Approval Chart and Design Criteria for FM Approval requirements that must be followed.

⚠ WARNING

ESFR Dry sprinklers can ONLY be installed in Wet systems! Not for installation in dry or preaction systems.

3. TECHNICAL DATA

Specifications:

Available since 2012.
Tube diameter: 1-11/16" (43.86 mm)
Minimum Operating Pressure: Refer to NFPA 13 or FM Loss Prevention Data Sheets 8-9.
Maximum Working Pressure: 175 psi (12 bar).
Factory tested hydrostatically to 500 psi (34.5 bar).
Connections: 2" grooved (refer to Figures 2 and 3) or
1½" NPT or BSP Threaded (refer to Figures 4 and 5)
Nominal K-factor: 14.0 U.S. (202 metric)
Deflector Diameter: 1-13/32" (35.7 mm)
Overall Length: 18-5/8" (473 mm), 24-5/8" (625 mm), 30-5/8 (778 mm), 36-5/8" (930 mm)

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Insulating Boot Assemblies (2 ea): The boot consists of a rubber foam seal covered with a two-piece ring fastened to the ceiling or deck with two screws.
Outside Diameter: 6” (152 mm)
Depth: 1” (25 mm)

Material Standards:

Sprinkler Frame Casting: Brass UNS-C84400
Deflector: Phosphor Bronze UNS-C51000
Seat: Brass UNS-C36000
Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Polytetrafluoroethelyne (PTFE) Tape
Spring Base: Brass UNS-C31400 or UNS-C31600
Back-Up Nut: Brass UNS-C36000
Compression Screw: Stainless Steel UNS-S31603
Trigger and Support: Stainless Steel UNS-S31600
Fusible Element Assembly: Beryllium Nickel, coated with polyurethane
Tube: ERW Steel Tube ASTM A-513, Brass UNS-C36000
Orifice: Brass UNS-C36000
Inlet Casting : Brass UNS-C84400
Support (Internal): Brass UNS-C36000
Barrel: Steel Tube ASTM A-513, Electrodeposited Epoxy Base finish, Brass UNS-C36000

Boot Assemblies:

Seal: ASTM D1056 2A0/1 4015-EL EPDM-Butyl-PE Foam Rubber OR ASTM D1056 2A1 Neoprene/EPDM/SBR OR ASTM D1056 2C1 Neoprene/EPDM
Over Seal Ring and Under Seal Ring: Cold Rolled Steel
Finish: White Paint
#10 Screws: Stainless Steel

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Ordering Instructions (Refer to Table 1)
1. Choose a sprinkler size (brass is the only available finish) to determine the base part number then,
2. add the suffix for the desired temperature rating.

NOTE: Sprinkler assemblies include 2 insulating boots (unless noted below).

EXAMPLE

18710AC = VK502 at 30⅝" with a 165 °F (74 °C) temperature rating. This sprinkler is to be installed into an area with a maximum ambient temperature of 100 °F (38 °C) meaning if the area will experience temperatures above the maximum ambient rating, you shall use a higher temperature-rated sprinkler

Accessories: Sprinkler cabinet (part no. 01725A) (Also refer to the Viking website.)
Replacement Insulating Boot Assemblies:
Part No. 22089M/W (includes 1 boot assembly and harware)

NOTE: These sprinklers do not require custom wrenches. For grooved sprinklers, use an open-ended wrench applied on the hex portion of the grooved coupling. For threaded sprinkers, use an open-ended wrench applied on the inlet housing.

TABLE 1: BASE PART NUMNBER

1. Available Part Numbers and Styles

Base Part Number	Nominal Length (L)	Connection Style	Connection Size
18702A	18⅝"	Grooved	2"
19908A*	18⅝"		
18706A	24⅝"		
19909A*	24⅝"		
18710A	30⅝"		
19910A*	30⅝"		
18176A	36⅝"		
19895A*	36⅝"		
18703A	18⅝"	NPT Threaded	1½"
18707A	24⅝"		
18711A	30⅝"		
18177A	36⅝"		
18704A	18⅝"	BSP Threaded	
18708A	24⅝"		
18712A	30⅝"		
19901A*	36⅝"		
18178A	36⅝"		

* Does not include insulating boot.

TABLE 2: TEMPERATURE RATINGS

2. Available Temperature Ratings

Suffix	Temperature Classification	Nominal Temperature Rating	Maximum Ambient Ceiling Temperature	Frame Paint Color
C	Ordinary	165 °F (74 °C)	100 °F (38 °C)	None

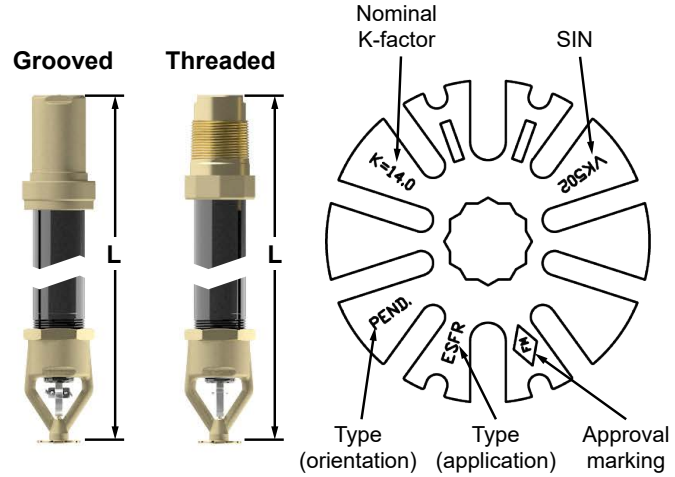

Figure 1: Sprinkler Dimensions and Markings

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4. INSTALLATION

Sprinklers must be handled with care. They must be stored in a cool, dry place in their original shipping container. Never install sprinklers that have been dropped or damaged in any way. Such sprinklers should be destroyed immediately.

NOTICE

Wet pipe systems must be provided with adequate heat.

Viking ESFR Dry Sprinklers are to be installed into the 2" grooved or 1½" threaded run of malleable, ductile iron tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150), or cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125), even at branch line ends.

- **DO NOT** install the dry sprinkler into a threaded elbow, coupling, or any other fitting that could interfere with thread penetration. Such installation would damage the brass seal.
- **NEVER** try to modify dry sprinklers. They are manufactured for specific dimensions and must NOT be modified.

1. The sprinklers must be installed after the piping is in place to prevent mechanical damage. Before installing, be sure to have the appropriate sprinkler model and style, with the correct orifice size, temperature rating, and response characteristics.
2. For grooved sprinklers, with the sprinkler contained in the plastic protective shield, apply a lube such as Gruvlok Xtreme™. For threaded sprinklers, apply a small amount of pipe-joint compound or tape to the external threads of the barrel only, while taking care not to allow a build-up of compound or tape over the brass inlet and seal.
3. **For grooved sprinklers, DO NOT use a wrench, as it will damage the unit. Install the coupling according to the manufacturer's instructions. To install threaded sprinklers, use an open-ended wrench applied to the sprinkler inlet housing. With the sprinkler contained in the protective shield, install the sprinkler onto the piping, while taking care not to damage the sprinkler.**
   - DO NOT use any other type of wrench on the threaded sprinkler, as this could damage the unit.
   - DO NOT use the sprinkler deflector or fusible element to start or thread the a sprinkler into a fitting.
   - Higher levels of torque may distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.
4. Clean the contact surfaces of the dry sprinkler insulating boot assemblies and the surfaces are recommended to be smooth and flat.
5. Refer to Figures 1 and 3. Install the dry sprinkler boot assemblies around the dry sprinkler barrel and to the freezer until the seals rest flush against the top of the freezer.
6. Assemble the rings onto the seals, hold in place, and tighten the screws through the holes provided in the assemblies to secure the insulating ring to the top of the freezer. NOTE: A #29 drill is required for a pilot hole in metallic ceilings.
7. After installation, the entire sprinkler system must be tested. The test must be conducted to comply with the Installation Standards. Make sure the sprinkler has been properly tightened. If a thread leak occurs, normally the unit must be removed, new pipe-joint compound or tape applied, and then reinstalled. This is due to the fact that when the joint seal is damaged, the sealing compound or tape is washed out of the joint. Air testing the sprinkler piping prior to testing with water may be considered in areas where leakage during testing must be prevented. Refer to the appropriate technical data and the AHJ prior to air testing the sprinkler piping. Immediately replace any damaged units, using the designated wrench only.
8. After installation and testing and repairing of all leaks, remove the protective shields from the sprinklers by hand. Do NOT use any type of tool to remove the shield. When removing shields, use care to prevent damaging sprinkler fusible element. THE SHIELDS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!
9. System design must be based on ESFR design guidelines described in the latest National Fire Protection Association standards, FM loss prevention data sheets, and the Authorities Having Jurisdiction. All requirements of recognized ESFR storage sprinkler system design standards apply to systems utilizing Viking ESFR Dry Pendent Sprinklers.

⚠ WARNING

Viking sprinklers are manufactured and tested to meet rigid design requirements of the approving agency. The sprinklers are designed to be installed in accordance with recognized installation standards. System design must be based on ESFR design guidelines described in the latest edition of Viking technical data, applicable FM Global Loss Prevention Data Sheets, the latest NFPA Standards, the Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards whenever applicable. Deviation from the standards or any alteration to the sprinkler after it leaves the factory including, but not limited to: painting, plating, coating, or modification, may render the sprinkler inoperative and will automatically nullify the approval and any guarantee made by The Viking Corporation.

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5. OPERATION

During fire conditions, the heat-sensitive fusible element assembly disengages, releasing the internal parts to open the waterway. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to suppress the fire.

6. INSPECTIONS, TESTS AND MAINTENANCE

NOTICE

The owner is responsible for maintaining the fire protection system and devices in proper operating condition. For minimum maintenance and inspection requirements, refer to the NFPA standard that describes care and maintenance of sprinkler systems. In addition, the Authorities Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed.

1. The sprinklers must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. The frequency of inspections may vary due to corrosive atmosphere, water supplies, and activity around the device.
2. Sprinklers that have been painted or mechanically damaged must be replaced immediately. Sprinklers showing signs of corrosion shall be tested and/or replaced immediately as required. Installation standards require sprinklers to be tested and, if necessary, replaced after a specified term of service. For Viking ESFR Dry Pendent Sprinklers, refer to the Installation Standards (e.g., NFPA 25) and the Authorities Having Jurisdiction for the specified period of time after which testing and/or replacement is required. Sprinklers that have operated cannot be reassembled or reused, but must be replaced. When replacing sprinklers, use only new sprinklers.
3. The sprinkler discharge pattern is critical for proper fire protection. Therefore, nothing should be hung from, attached to, or otherwise obstruct the discharge pattern. All obstructions must be immediately removed or, if necessary, additional sprinklers installed.
4. When replacing existing sprinklers, the system must be removed from service. Refer to the appropriate system description and/or valve instructions. Prior to removing the system from service, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected area.
   a. Remove the system from service, drain all water, and relieve all pressure on the piping.
   b. Remove the ESFR dry sprinkler insulating boot assemblies.
   c. Using the designated wrench, remove the old sprinkler and install the new unit. Care must be taken to ensure that the replacement sprinkler is the proper model and style, with the correct orifice size, temperature rating, and response characteristics.
   d. Install new ESFR dry sprinkler boot assemblies.
   e. Place the system back in service and secure all valves. Check the replaced sprinklers and repair all leaks.
5. Sprinkler systems that have been subject to a fire must be returned to service as soon as possible. The entire system must be inspected for damage and repaired or replaced as necessary. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced. Refer to the Authorities Having Jurisdiction for minimum replacement requirements.

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7. APPROVAL DESIGN REQUIREMENTS

Approval Chart
ESFR Dry Pendent Sprinkler VK502
Maximum 175 PSI (12 bar) WWP

KEY: A1X ← Temperature, Finish, Escutcheon (if applicable)

Base Part Number[1]				SIN	Connections	Nominal K-Factor		Approval [2,3] (Refer also to Design Criteria.)	
								FM	CE
18702	18706	18710	18176	VK502	2” Grooved	14.0	202	A1	A1
19908	19909	19910	19895	VK502	2” Grooved w/o boot	14.0	202	A1	A1
18703	18707	18711	18177	VK502	1½” NPT Threaded	14.0	202	A1	A1
18704	18708	18712	18178	VK502	1½” BSP Threaded	14.0	202	A1	A1
--	--	--	19901	VK502	1½” BSP Threaded w/o boot	14.0	202	A1	A1

Approved Temperature Rating	Approved Finish
A - 165 °F (74 °C)	1- Brass

Footnotes

[1] Base part number shown. For complete part number, refer to the price list.

[2] This chart shows listings and approvals available at the time of printing. Other approvals may be in process.

[3] Refer to the latest standards of NFPA 13.

FM Approval Requirements:

1. Sprinkler VK502 is FM Approved as a quick response pendent Storage sprinkler as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheets 2-0 and 8-9).
2. Approved storage sprinklers are also FM Approved for use as non-storage sprinklers as indicated in the FM Approval Guide. For specific application and installation requirements, reference the latest applicable FM Loss Prevention Data Sheets (including Data Sheet 2-0).

FM Global Loss Prevention Data Sheets contain guidelines relating to, but not limited to: minimum water supply requirements, hydraulic design, ceiling slope and obstructions, minimum and maximum allowable spacing, and deflector distance below the ceiling.

NOTICE: The FM installation guidelines may differ from NFPA criteria.

8. AVAILABILITY

The Viking Model VK502 Sprinkler is available through a network of domestic and international distributors. See The Viking Corporation web site for the closest distributor or contact The Viking Corporation.

9. GUARANTEE

For details of warranty, refer to Viking’s current list price schedule or contact Viking directly.

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TABLE 4:
COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK502 AS PER NFPA CRITERIA

Description	40 ft. (12.2 m) Ceilings
Sprinkler Type	ESFR
Temperature Rating	165 ºF (74 ºC)
Response Type	ESFR
Sprinkler Position	Pendent, frame arms aligned with pipe, deflectors parallel with ceiling or roof
System Type	Wet Pipe System only
Maximum Area of Coverage	100 ft^2 (9,3 m^2)
Minimum Area of Coverage	64 ft^2 (5,9 m^2)
Maximum Ceiling Slope	2 in 12
Maximum Spacing	10 ft. spacing (3,0 m)
Minimum Spacing	8 ft. spacing (2,4 m)
Deflector Distance from Walls	Minimum of 4 in. (102 mm) from walls but no more than 1/2 the allowable distance permitted between sprinklers
Deflector to Top of Storage	Minimum of 36 in. (914 mm)
Deflector to Ceiling Distance	For all building heights: 6–14 in. (152–356 mm).
Maximum Ceiling Height	40 ft. (12,2 m)
Maximum Storage Height	35 ft. (10,7 m)
Clearance Opening Diameter	Refer to Figure 2. Note that the dry sprinkler boot must seat and seal against the smooth surface of the top of the freezer in order to close the air gap.
Sprinkler Fitting	Install into the 2” grooved or 1-1/2” threaded run of malleable, ductile iron tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150), or cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125) only.
Maximum Distance Between Sprinklers	For buildings over 30 ft (9.1 m) high, spacing between sprinklers and/or branch lines must be from 8 to 10 ft (2.4 to 3.1 m)**.
	For building heights up to 30 ft (9.1 m), the spacing allowed between sprinklers and/or branch lines is 8 to 12 ft (2.4 to 3.7 m), provided the area covered per sprinkler does not exceed the maximum 100 ft^2 (9.3 m^2) allowed*.

*Refer to the Installation Standards for permissible deviations from the maximum sprinkler spacing rules above, to eliminate obstructions created by trusses and bar joists when using ESFR sprinklers.

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TABLE 5:
COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK502 SPECIFIC APPLICATION LISTING - FM

Description	40 ft. (12.2 m) Ceilings
Sprinkler Type	ESFR
Temperature Rating	165 ºF (74 ºC)
Response Type	ESFR
Sprinkler Position	Pendent, frame arms aligned with pipe, deflectors parallel with ceiling or roof
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Maximum Distance Between Sprinklers	For buildings over 30 ft (9.1 m) high, spacing between sprinklers and/or branch lines must be from 8 to 10 ft (2.4 to 3.1 m)**.
	For building heights up to 30 ft (9.1 m), the spacing allowed between sprinklers and/or branch lines is 8 to 12 ft (2.4 to 3.7 m), provided the area covered per sprinkler does not exceed the maximum 100 ft^2 (9.3 m^2) allowed*.

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OPTIONAL ALTERNATIVE PENETRATION SEAL METHODS

NOTE: Actual conditions may vary.

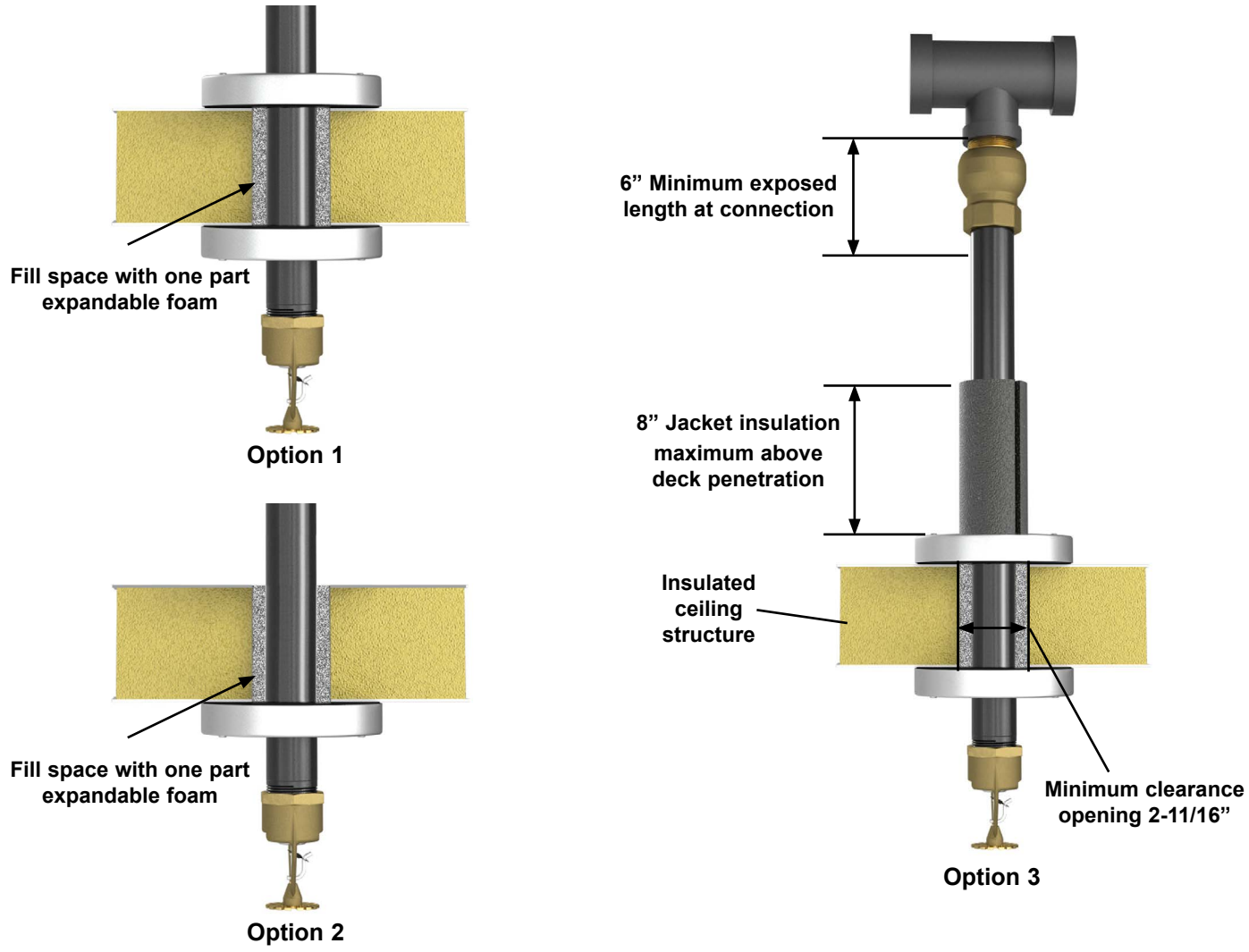

Figure 2A

NOTICE

Specific situations and conditions may exist that require alternative sealing methods. A few of these methods are shown above as Options 1–3. Additional sealing methods may also be utilized; the material(s) used must not break down, drip, over-spray, or otherwise interfere with or impede the operation of the sprinkler—especially during fire conditions.

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INSTALLATION CHARTS FOR MAXIMUM DEFLECTOR CLEARANCE

Table 6: NFPA Exposed Barrel Lengths For Dry Sprinklers

Ambient Temperature of the Protected Area at the discharge end of the Sprinkler	Exposed Barrel Ambient Temperature		
	40 °F (4 °C)	50 °F (10 °C)	60 °F (16 °C)
	Minimum Exposed Barrel Lengths (based on ambient temperaures above)		
	Inches (mm)	Inches (mm)	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 (300)	3 (75)	0
-10 °F (-23 °C)	14 (350)	4 (100)	1 (25)
-20 °F (-29 °C)	14 (350)	6 (150)	3 (75)
-30 °F (-34 °C)	16 (400)	8 (200)	4 (100)
-40 °F (-40 °C)	18 (450)	8 (200)	4 (100)
-50 °F (-46 °C)	20 (500)	10 (250)	6 (150)
-60 °F (-51 °C)	20 (500)	10 (250)	6 (150)

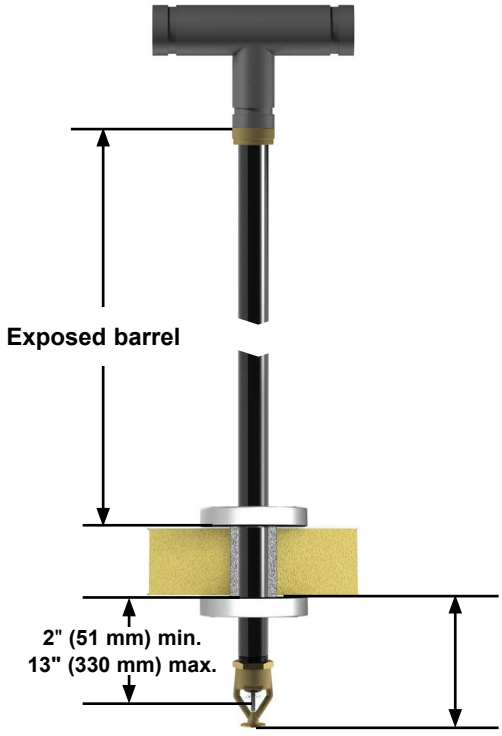

Figure 3: Minumum Exposed Barrel Length

Replaces Form No. F_042012 Rev 01
(Added CE approval in all approval sections.)