

# SPECIFIC APPLICATION ESFR PENDENT SPRINKLER VK514 (K28.0)

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 Specific Application Early Suppression Fast Response (ESFR) Pendent Sprinkler VK514 incorporates the capability to suppress specific high-challenge fires. The larger K-Factor allows protection of higher hazard commodities at greater ceiling heights with lower end-head pressures. K28.0 sprinklers can:

- · Provide flexibility of fire protection designs.
- Eliminate the use of in-rack sprinklers when protecting high piled storage of certain specified materials up to:

UL (Refer to Table 4): 43 ft. (13,1 m) with ceilings up to 48 ft. (14,6 m)\*

FM (Refer to Table 5): 50 ft. (15,2 m) with ceilings up to 55 ft. (16,76 m)\*

45 ft. (13,5 m) with ceilings up to 50 ft. (15,2 m)\*

Viking VK514 ESFR Pendent Sprinklers are primarily intended to protect the following types of storage, which tend to produce severe-challenge fires: palletized and solid pile storage and single, double, and portable open rack storage (no open-top containers or solid shelves). The VK514 is listed to utilize a minimum aisle width of 6'-0" (UL - 43' storage or FM - 45' storage) or 8'-0" (FM - 50' storage). Viking ESFR Pendent VK514 Sprinklers provide protection of most common storage materials, including:

- Encapsulated or unencapsulated Class I, II, III, and IV commodities\*.
- UL Listed for protection of cartoned nonexpanded\*\* Group A plastic commodities\*.
- FM Approved for protection of cartoned unexpanded\*\* plastic commodities.\*
- \* Refer the Approval Chart and Commodity Selection and Design Criteria Overview for Listing and Approval requirements that must be followed.
- \*\*The terms "nonexpanded" and "unexpanded" are equivalent.

## 2. LISTINGS AND APPROVALS\*

(Սև) UL Listed: Category VNWH (Listed as a Specific Application ESFR Sprinkler)

FM Approved: Class 2035

**CE CPR**: EAD 100002-00-1106 March 2016, Declaration of Performance DOP\_VK514.

\* Refer the Approval Chart and Commodity Selection and Design Criteria Overview for Listing and Approval requirements that must be followed.

### 3. PATENT INFORMATION

Please refer to PATVK.COM for all appropriate patents and patent information pertaining to the Model VK514 ESFR Sprinkler.

#### 4. TECHNICAL DATA

Specifications:

Maximum Working Pressure: 175 psi (12 bar). Factory tested hydrostatically to 500 psi (34.5 bar).

Thread size: 1" NPT or 25 mm BSPT (Refer to Table 2)

Nominal K-factor: 28.0 U.S. (404 metric\*)

\* Metric K-factor measurement shown is in bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Overall Length: 3-3/16" (81 mm) Deflector Diameter: 1-3/4" (45 mm) Material Standards: (See Figure 1)

Frame Casting: Brass UNS-C84400 or CW602N Deflector: Phosphor Bronze UNS-C51000

Seat: Copper UNS-C11000 and Stainless Steel UNS-S30400

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE tape

Compression Screw: Stainless Steel UNS-S31603 Trigger and Support: Stainless Steel UNS-S31600

Fusible Element Assembly: Beryllium Nickel coated with a black epoxy, polyurethane (FM only), or acrylic paint.



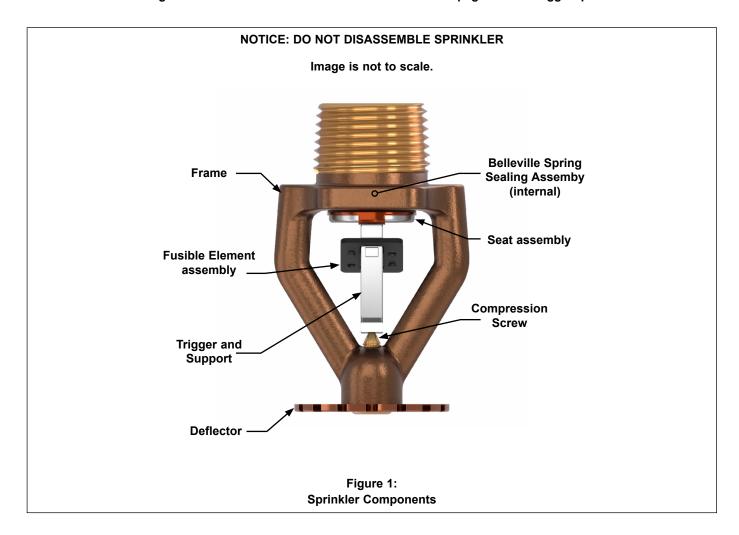
# TABLE 1 SPRINKLER GENERAL INFORMATION Item Description Sprinkler Identification Number (SIN) K-factor, gpm/psi½ (Ipm/bar½) 28.0 (404) Thread Size 1" NPT (25 mm) Sprinkler Orientation Pendent Maximum Working Pressure 175 psi (12 bar)





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## **Ordering Instructions**

- 1. Choose a sprinkler base part number with the required thread size and listing or approval (refer to the approval chart).
- 2. Add the suffix for the desired finish.
- 3. Add the suffix for the desired temperature rating.

**EXAMPLE**: 22894AC = VK514 with brass finish and 165 °F (74 °C) nominal temperature rating. This sprinkler is to be installed into an area with a maximum ambient temperature of 100 °F (38 °C).

**NOTE**: The "TQ" suffix for the part numbers below indicates a special protective cap (Figure 2-B) intended for use with InstaSeal® fittings. When ordering sprinklers with TQ suffixes in combination with InstaSeal® fittings, refer to Form No. F\_021223 for installation instructions.

Sprinkler Base Part Number				
Part Number	Thread Size			
22894	1" NPT			
22894XX-TQ*	1" NPT			
22958	25 mm BSPT			
22958XX-TQ*	25 mm BSPT			

Finish				
Description	Suffix			
Brass	Α			

Temperature Ratings					
Temperature Rating	Fusible Element Paint Color	Maximum Ambient Ceiling Temperature	Suffix		
165 °F (74 °C)	Black	100 °F (38 °C)	С		
205 °F (96 °C)1	White	150 °F (66 °C)	Е		

<sup>&</sup>lt;sup>1</sup> The entire 205°F (96°C) fusible element is painted white.

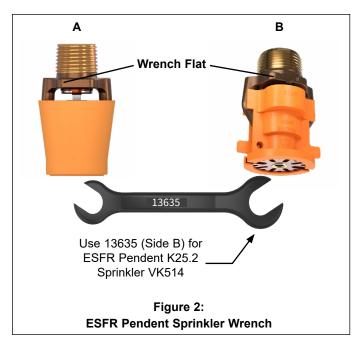
<sup>\*</sup> Where "XX" is shown in the base part number, enter the desired suffixes for Finish and Temperature Rating (EXAMPLE: 22894AE-TQ)

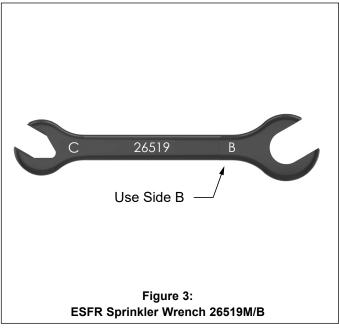
Accessories
Sprinkler wrench: 13635W/B (Use Side B)
Sprinkler wrench: 26519M/B (Use Side B)
Sprinkler cabinet: 01731A

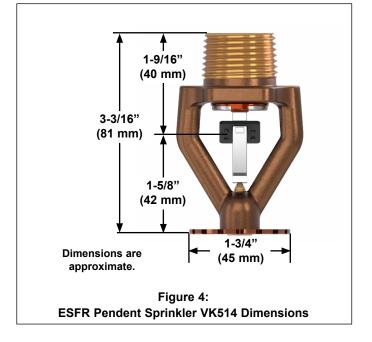


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#### 5. INSTALLATION

## **A** WARNINGS

Viking sprinklers are manufactured and tested to meet rigid requirements of the approving agencies. 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 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.

Installation by insufficiently qualified personnel poses the risk of fatal consequences.

• This sprinkler must be installed properly by qualified personnel familiar with safe practices and applicable and recognized design and installation standards issued, for example, by NFPA, FM, VdS, or LPCB, and trained how to properly perform the installation procedures.

A damaged or compromised sprinkler poses the risk of fatal consequences. Damaged or compromised sprinklers will not operate properly which could lead to loss of life.

- NEVER use a sprinkler that has been exposed to temperatures exceeding the maximum allowed ambient temperature.
- NEVER use a sprinkler with a loss of liquid from the glass bulb or damage to the fusible element. A small bubble should be visible within the glass bulb; rotate the sprinkler to a horizontal position while observing the bulb to see the bubble.
- NEVER use a sprinkler that has been dropped or damaged.
- ALWAYS protect the sprinkler from mechanical damage during storage, transport, and handling.
- NEVER use sprinklers that have been painted by anyone other than the manufacturer.
- ALWAYS protect sprinklers from being painted during installation or replacement in accordance with the installation standards.
- NEVER clean sprinklers with anything other than 7 psi or lower compressed air.
- NEVER apply soap, water, ammonia, adhesives, solvents or any other fluids on sprinklers.
- Destroy every damaged or compromised sprinkler.
- ALWAYS provide adequate heat to wet pipe systems.

#### NOTES:

- Use ONLY the designated sprinkler wrench. DO NOT use any other type of wrench; doing so may damage the sprinkler.
- Install the sprinklers AFTER the piping is installed. Installing sprinklers on loose pipe can lead to damage.
- The sprinkler is designed to be installed while the protective cap is in place.
- DO NOT use the sprinkler deflector or fusible link to start or thread the sprinkler into a fitting.
- If the sprinkler will be installed into an InstaSeal® IS-W2 fitting, refer to Form No. F 021223.



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#### 5.1 Installation Instructions

- 1. With the sprinkler contained in the plastic protective cap, apply a small amount of pipe-joint compound or tape to the male threads only, while taking care not to allow a build-up of compound in the sprinkler orifice.
- 2. With the sprinkler contained in the protective cap, install the sprinkler onto the piping by applying the sprinkler wrench to the sprinkler wrench flats.
- 3. Refer to section "5.2 After Sprinkler Installation".

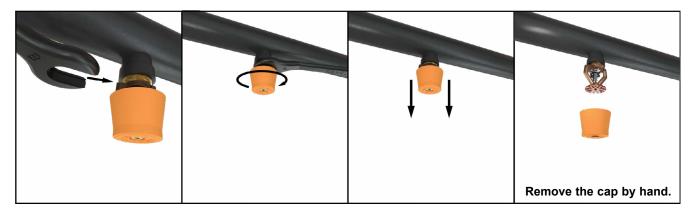


Figure 5: Sprinkler Installation

#### 5.2 After Sprinkler Installation

- 1. 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. Immediately replace any damaged units, using the special sprinkler wrench only.
- 2. After installation and testing and repairing of all leaks, remove the protective caps from the sprinklers.

NOTICE: When removing caps, use care to prevent dislodging or damaging sprinkler fusible element.

- · Do NOT use any type of tool to remove the cap.
- · Remove the cap by hand.
- THE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE.



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## 6. OPERATION

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

## 7. 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.

NOTE: Wet pipe systems must be provided with adequate heat.

- A. 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.
- B. 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 Specific Application ESFR Pendent Sprinklers, refer to the Installation Standards 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.
- C. 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.
- D. 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.
- E. Remove the system from service, drain all water, and relieve all pressure on the piping.
- F. Using the special sprinkler 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. A fully stocked spare sprinkler cabinet should be provided for this purpose.
- G. Place the system back in service and secure all valves. Check the replaced sprinklers and repair all leaks.
- H. 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.

## 8. AVAILABILITY

The Viking Model VK514 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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Approval Chart  ESFR Pendent Sprinkler VK514  Maximum 175 PSI (12 bar) WWP  Temperature KEY  Finish  AIX ← Escutcheon (if applicable)						\\L.			
Base Part Number <sup>1</sup>	SIN	Thread Size	Nominal K-Factor Overall Length		Listings and Approvals <sup>3,4</sup> (Refer also to Tables 3 and 4.)				
Number			U.S.	metric <sup>2</sup>	Inches	mm	UL⁵	FM <sup>6</sup>	CE
22894	VK514	1" NPT	28.0	404	3-3/16	81	A1	A1	A1
22894XX-TQ	VK514	1" NPT	28.0	404	3-3/16	81	A1	A1	A1
22958	VK514	25 mm BSPT	28.0	404	3-3/16	81	A1	A1	A1
22958XX-TQ	VK514	25 mm BSPT	28.0	404	3-3/16	81	A1	A1	A1
	Approved Temperature Ratings A - 165 °F (74 °C) and 205 °F (96 °C)			A 1 - Brass	pproved Finis	h			

#### **Footnotes**

- $\ensuremath{^{\text{1}}}$  Base part number shown. For complete part number, refer to the price list.
- 2. Metric K-Factor measurement shown is when pressure is measured in bar. When pressure is measured in kPa, divide the metric K-Factor shown by 10.0.
- 3. This chart shows listings and approvals available at the time of printing. Other approvals may be in process.
- 4. Refer to the latest standards of NFPA 13.
- 5. Listed by Underwriters Laboratories Inc. for use in the U.S. as a Specific Application ESFR Sprinkler (refer to the deflector position requirements).
- 6. FM Approved as a quick response pendent Storage sprinkler. Refer to Tables 3 & 5.

TABLE 3: COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK514 ESFR PENDENT SPRINKLERS				
Storage Type	FM			
Sprinkler Type	ESFR	Storage		
Response Type	ESFR	QR		
System Type	Wet Pipe system only	Wet Pipe system only		
Temperature Rating(s) °F (°C)	165 °F (74 °C) and 205 °F (96 °C)	165 °F (74 °C) and 205 °F (96 °C)		
Open Frame Single, Double, 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.		

IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Viking ESFR Pendent Sprinklers are to be installed in accordance with the latest edition of Viking technical data, the latest standards of NFPA, VdS, LPCB, and any other Authorities Having Jurisdiction, and also with provisions of governmental codes, ordinances, and standards whenever applicable.



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## TABLE 4: COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK514 SPECIFIC APPLICATION LISTING - UL Description 48 ft. (14.6 m) Ceilings Sprinkler Type **ESFR** 165 °F (74 °C) and 205 °F (96 °C) Temperature Rating Response Type **ESFR** Pendent, frame arms aligned with pipe, deflectors parallel with ceiling or roof Sprinkler Position System Type Wet Pipe System only Maximum Area of Coverage 100 ft2 (9,3 m2) Minimum Area of Coverage 64 ft2 (5,9 m2) Refer to NFPA 13. Maximum Ceiling Slope Maximum Spacing 10 ft. spacing (3,0 m) Minimum Spacing 8 ft. spacing (2,4 m) Minimum of 4 in. (102 mm) from walls but no more than 1/2 the allowable distance permitted between Deflector Distance from Walls sprinklers Deflector to Top of Storage Minimum of 36 in. (914 mm) For all building heights: 6-14 in. (152-356 mm). Deflector to Ceiling Distance Maximum Ceiling Height 48 ft. (14,6 m) Maximum Storage Height 43 ft. (13,1 m) Single- and double-row rack storage (no open top containers or solid shelves) and palletized and solid pile Storage Arrangement storage (no open top containers or solid shelves). Commodity Class I-IV commodities encapsulated or nonencapsulated and cartoned, nonexpanded Group A plastics. NFPA 13 for ESFR Sprinklers based upon 35 psi (2,4 bar) design pressure 166 gpm (628,4 lpm) with 12 Sprinkler System Design sprinkler remote area (4x3) **Obstruction Critera** Refer to NFPA 13 Chapter 8. Minimum Aisle Width 6 ft. (1,8 m) Hose Stream Allowance and 250 gpm (946 lpm) for 60 minutes Water Supply Duration \* The maximum coverage area must not exceed 100 ft<sup>2</sup> (9,29 m<sup>2</sup>). \*\*Does not include the protection of multiple-row racks.



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# TABLE 5: COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK514 SPECIFIC APPLICATION LISTING - FM

Description	50 Ft. (15,2 m) Ceilings	55 Ft. (16,76 m) Ceilings		
Sprinkler Type	QR Storage**	QR Storage**		
Temperature Rating	165 °F (74 °C) and 205 °F (96 °C)	165 °F (74 °C) and 205 °F (96 °C)		
Response Type	QR	QR		
Sprinkler Position	Pendent, frame arms aligned with pipe, deflectors parallel to floor.	Pendent, frame arms aligned with pipe, deflectors parallel to floor.		
System Type	Wet Pipe System only	Wet Pipe System only		
Maximum Area of Coverage*	100 ft² (9,29m²) Refer to FM 2-0, Table 17	100 ft² (9,29m²) Refer to FM 2-0, Table 17		
Minimum Area of Coverage	64 ft² (5,9 m²) Refer to FM 2-0, Table 17	64 ft² (5,9 m²) Refer to FM 2-0, Table 17		
Maximum Ceiling Slope	Up to 10° Refer to FM 2-0, Section 2.2.1.6	Up to 10° Refer to FM 2-0, Section 2.2.1.6		
Maximum Spacing	10 ft. (3,0 m)	10 ft. (3,0 m)		
Minimum Spacing	8 ft. (2,4 m)	8 ft. (2,4 m)		
Deflector Distance from Walls	Refer to FM 2-0, Section 2.2.3.3	Refer to FM 2-0, Section 2.2.3.3		
Deflector to Top of Storage	Minimum of 36 inches (914 mm) Refer to FM 2-0 Section 2.2.2.1 and FM 8-9, Section 2.2.6	Minimum of 36 inches (914 mm) Refer to FM 2-0 Section 2.2.2.1 and FM 8-9, Section 2.2.6		
Ceiling Sprinkler Installation Guidelines	As per FM 2-0 (DS 2-0), Installation Guidelines for Automatic Sprinklers with the following exception:  Vertical distance from underside of the ceiling to the centerline of the sprinkler's thermal element - no more than 13 inches (325 mm)	As per FM 2-0 (DS 2-0), Installation Guidelines for Automatic Sprinklers with the following exception: Vertical distance from underside of the ceiling to the centerline of the sprinkler's thermal element - no more than 13 inches (325 mm)		
Maximum Ceiling Height	50 ft. (15,2 m)	55 ft. (16,76 m)		
Maximum Storage Height	45 ft. (13,5 m)	50 ft. (15,2 m)		
Storage Arrangement	Solid-piled, palletized, shelf, bin-box, as well as single, double, and multi row racks that qualify as open-frame	Solid-piled, palletized, shelf, bin-box, as well as single- row and double-row racks that qualify as open-frame		
Storage Aisles Between Racks	Minimum 6 ft (1,8 m) wide	Minimum 8 ft (2,4 m) wide		
Commodity	Class 1-4 Cartoned unexpanded plastics	Class 1-4 Cartoned unexpanded plastics		
QR Storage Sprinkler based upon 10 @ 40 psi (2.8 bar) design pressure @177 gpm (670 Lpm) with 9 sprinkler remote area (3x3) on 3 branchlines and 1 sprinkler on 1 branchline.  Exception: a sprinkler design of 9 (3x3) @ 40 psi (2.8 bar) design pressure @177 gpm (670 Lpm) when the water supply can also provide a design of 4 (2x2) @ 80 psi (5.5 bar) design pressure @250 gpm (950 Lpm)		QR Storage Sprinkler based upon 9 @ 80 psi (5.5 bar) design pressure with 250 gpm (950 Lpm) with 9 sprinkler remote area (3x3) on 3 branchlines.		
Obstruction Criteria	Refer to FM 2-0 Section 2.2	Refer to FM 2-0 Section 2.2		
Hose Stream Allowance and Water Supply Duration	250 gpm (950 Lpm) for 60 minutes	250 gpm (950 Lpm) for 60 minutes		

<sup>\*</sup> The maximum coverage area must not exceed 100 ft<sup>2</sup> (9,29 m<sup>2</sup>).

<sup>\*\*</sup> Approved storage sprinklers are also FM Approved for use as non-storage sprinklers.