



## TECHNICAL DATA

## 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](http://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 addition of a larger K-Factor allows protection of higher hazard commodities at greater ceiling heights with lower end-head pressures. K28.0 ESFR sprinklers can:

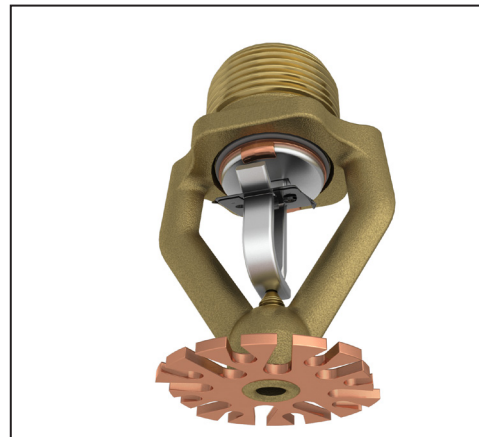
- Eliminate the use of in-rack sprinklers when protecting high-piled storage of certain specified materials up to 43 ft. (13.1 m) with ceilings up to 48 ft. (14.6 m)\*
- Reduce or eliminate the need for a system fire pump.
- Provide flexibility when sizing system piping.

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".

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 non-expanded plastic commodities\*.

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



### 2. LISTINGS AND APPROVALS

**UL Listed:** Category VNVH (Listed as a Specific Application



ESFR Sprinkler)

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

### 3. TECHNICAL DATA

#### Specifications:

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

Thread size: 1" NPT for Sprinkler 19591, 25 mm BSPT for Sprinkler 19592

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)

Covered by one or more of the following patents: US5,829,532; US6,059,044; US6,336,509; US6,502,643; US6,868,917; AU722593; GB2336777

#### Material Standards:

Frame Casting: Brass UNS-C84400

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 black acrylic paint.

**Ordering Information:** (Also refer to the current Viking price list.)

Order ESFR Pendent Sprinkler VK514 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to sprinkler base part number.

Finish Suffix: Brass = A

Temperature Suffix: 165 °F (74 °C) = C, 205 °F (96 °C) = E

For example, Sprinkler VK514 with 1" NPT threads, Brass finish, and 165 °F (74 °C) temperature rating = Part No. 19591AC.

**Accessories:** (Also refer to the Viking website.)

#### Sprinkler Wrench:

Part No. 13635W/B (double-ended wrench - Use Side B ONLY.)

**Sprinkler Cabinet:** Six-head capacity: Part No. 01731A

**TABLE 1**  
**SPRINKLER GENERAL INFORMATION**

Item	Description
Sprinkler Identification Number (SIN)	VK514
K-factor, gpm/psi <sup>1/2</sup> (lpm/bar <sup>1/2</sup> )	28.0 (404)
Thread Size	1" NPT (25 mm)
Sprinkler Orientation	Pendent
Maximum Working Pressure	175 psi (12 bar)



**WARNING:** Cancer and Reproductive Harm-  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)



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### AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>2</sup>	Frame Paint Color
Ordinary	165 °F (74 °C)	100 °F (38 °C)	None
Intermediate	205 °F (96 °C)	150 °F (65 °C)	White

**Sprinkler Finish:** Brass

#### Footnotes

<sup>1</sup> The sprinkler temperature rating is stamped on the deflector.

<sup>2</sup> Based on NFPA-13. Other limits may apply, depending on fire loading, sprinkler location, and other requirements of the Authority Having Jurisdiction. Refer to specific installation standards.

## 4. INSTALLATION

### ⚠ WARNING

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 or FM Global Loss Prevention Data Sheets. System design must be based on ESFR design guidelines described in the latest edition of the 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.

- A. 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.  
**NOTE: Wet pipe systems must be provided with adequate heat.**
- B. 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.
- C. 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.
- D. Use **ONLY** sprinkler wrench 13635W/B (shown in Figure 1) for installing VK514! With the sprinkler contained in the protective cap, install the sprinkler onto the piping by applying the sprinkler wrench to the sprinkler wrench flats only, while taking care not to damage the sprinkler operating parts.
  - DO NOT use any other type of wrench, as this could damage the unit.
  - DO NOT use the sprinkler deflector or fusible element to start or thread the sprinkler into a fitting.
  - Hand tight plus 1 to 1-1/2 turns with wrench. Over tightening may distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.
- E. 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.
- F. After installation and testing and repairing of all leaks, remove the protective caps from the sprinklers. Do NOT use any type of tool to remove the cap. Remove the cap by hand: turn it slightly and pull it off the sprinkler. When removing caps, use care to prevent dislodging or damaging sprinkler fusible element. **THE CAPS MUST BE REMOVED FROM SPRINKLERS BEFORE PLACING THE SYSTEM IN SERVICE!**

## 5. 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.



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### 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.

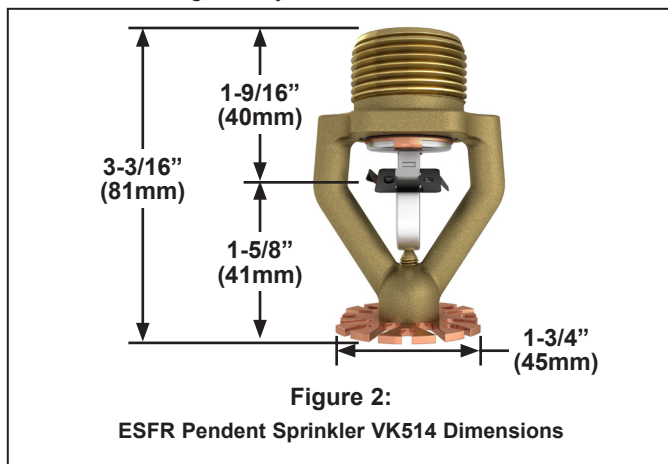
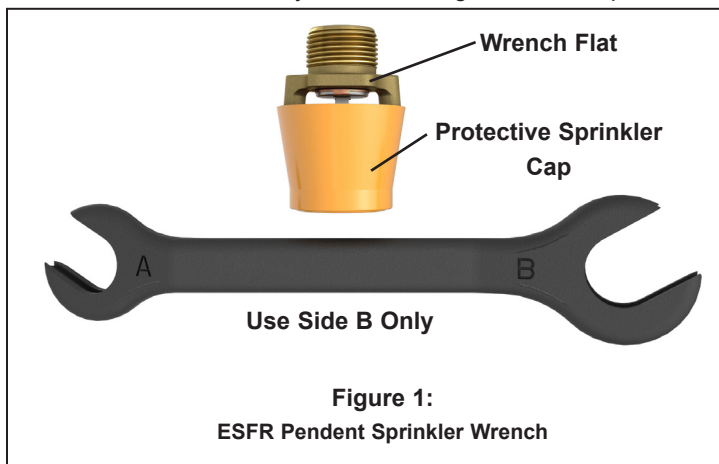
- A. The sprinklers must be inspected on a regular basis for corrosion, mechanical damage, obstructions, paint, etc. The frequency of inspections may vary due to corrosive atmosphere, water supplies, and activity around the device.
- B. Sprinklers that have been painted or mechanically damaged must be 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.
  1. Remove the system from service, drain all water, and relieve all pressure on the piping.
  2. 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.
  3. Place the system back in service and secure all valves. Check the replaced sprinklers and repair all leaks.
- E. 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.

### 7. 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.

### 8. GUARANTEE

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





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Approval Chart 1 (UL) ESFR Pendent Sprinkler VK514 Maximum 175 PSI (12 bar) WWP							KEY
Base Part Number <sup>1</sup>	SIN	Thread Size	Nominal K-Factor		Overall Length		Listings and Approvals <sup>3,4</sup> (Refer also to Design Criteria.)
			U.S.	metric <sup>2</sup>	Inches	mm	UL <sup>5</sup>
19591	VK514	1" NPT	28.0	404	3-3/16	81	A1
19592	VK514	25 mm BSPT	28.0	404	3-3/16	81	A1
Approved Temperature Ratings A - 165 °F (74 °C) and 205 °F (96 °C)					Approved Finish 1 - Brass		
<b>Footnotes</b>							
<sup>1</sup> Base part number shown. For complete part number, refer to the price list. <sup>2</sup> 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. <sup>3</sup> This chart shows listings and approvals available at the time of printing. Other approvals may be in process. <sup>4</sup> Refer to the latest standards of NFPA 13. <sup>5</sup> Listed by Underwriters Laboratories Inc. for use in the U.S. as a Specific Application ESFR Sprinkler (refer to the deflector position requirements).							

TABLE 2 COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK514 ESFR PENDENT SPRINKLERS	
Storage Type	NFPA
Sprinkler Type	ESFR
Response Type	ESFR
System Type	Wet Pipe system only
Temperature Rating(s) °F (°C)	165 °F (74 °C) and 205 (96 °C)
Open Frame Single, Double, Multiple-Row, or Portable Rack Storage of Class I-IV and Group A or B Plastics	Refer to NFPA 13.
Solid Pile or Palletized Storage of Class I-IV and Group A or B Plastics	Refer to NFPA 13.
Idle Pallet Storage	Refer to NFPA 13.
Rubber Tire Storage	Refer to NFPA 13.
Rolled Paper Storage (Refer to the standard.)	Refer to NFPA 13.
Flammable Liquid Storage (Refer to the standard.)	Refer to NFPA 30.
Aerosol Storage (Refer to the standard.)	Refer to NFPA 30B
Automotive Components in Portable Racks (Control mode only, refer to the standard.)	Refer to NFPA 13.
<b>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.</b>	



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**TABLE 3:  
COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK514  
SPECIFIC APPLICATION LISTING - UL**

Description	Specification, UL
Sprinkler Type	ESFR
Temperature Rating	165 °F (74 °C) and 205 (96 °C)
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 <sup>2</sup> (9.3 m <sup>2</sup> )
Minimum Area of Coverage	64 ft <sup>2</sup> (5.9 m <sup>2</sup> )
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	48 ft. (14.6 m)
Maximum Storage Height	43 ft. (13.1 m)
Storage Arrangement	Single- and double-row rack storage (no open top containers or solid shelves) and palletized and solid pile storage (no open top containers or solid shelves).
Commodity	Class I-IV commodities encapsulated or nonencapsulated and cartoned, unexpanded Group A plastics.
Sprinkler System Design	NFPA 13 for ESFR Sprinklers based upon 35 psi (2.4 bar) design pressure 166 gpm (628.4 lpm) with 12 sprinkler remote area
Obstruction Criteria	Refer to NFPA 13 Chapter 8.
Minimum Aisle Width	6 ft. (1.8 m)
Hose Stream Allowance and Water Supply Duration	250 gpm (946 lpm) for 60 minutes or as determined by the approval
* The maximum coverage area must not exceed 100 ft <sup>2</sup> (9.29 m <sup>2</sup> ).	