



## TECHNICAL DATA

## ESFR PENDENT SPRINKLER VK510 (K25.2)

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 Early Suppression Fast Response (ESFR) Pendent Sprinkler VK510 incorporates the capability to suppress specific high-challenge fires. The addition of a larger K-Factor allows ESFR performance at lower end-head pressures than ESFR K14 sprinklers. K25.2 ESFR sprinklers can:

- Eliminate the use of in-rack sprinklers when protecting high-piled storage of certain specified materials up to 40 ft. (12.2 m) with ceilings up to 45 ft. (13.7 m)\*
- Reduce or eliminate the need for a system fire pump.
- Provide flexibility when sizing system piping.

Viking VK510 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, multiple row, and portable open rack storage (no open-top containers or solid shelves).

Viking ESFR Pendent VK510 Sprinklers provide protection of most common storage materials, including:

- Encapsulated or unencapsulated Class I, II, III, and IV commodities\*
- cULus Listed for protection of cartoned unexpanded plastic commodities and FM Approved for protection of cartoned and uncartoned unexpanded plastic commodities\*.
- FM Approved for protection of exposed expanded polystyrene and exposed expanded polyurethane commodities\*.

In addition, some storage arrangements of rolled paper, flammable liquids, aerosols, and rubber tires may be protected by Viking ESFR Pendent Sprinkler VK510.



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

Item	Description
Sprinkler Identification Number (SIN)	VK510
K-factor, gpm/psi <sup>1/2</sup> (lpm/bar <sup>1/2</sup> )	25.2 (363)
Thread Size	1" NPT (25mm BSPT)
Sprinkler Orientation	Pendent
Maximum Working Pressure PSI (bar)	175 psi (12 bar)

### 2. LISTINGS AND APPROVALS

**cULus Listed:** Category VNWH (Listed as a Specific Application ESFR Sprinkler)

**FM Approved:** Class 2026

**VdS Approved:** Certificate G4040015

**LPCB Approved:** Ref. No. 096g/01

**CCCF Approved:** Approved by the China Certification Center for Fire Products (CCCF)

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

The 10280 VK510, ESFR Pendent Sprinkler Assembly conforms to the provision of CUAP11.03/03 standard.

CUAP11.03/03 approvals are provided by: FM Approvals Ltd. 1 Windsor Dials Windsor, Berkshire, UK. SL4 1 RS

Approval Certificate No. issued December 20, 2010.

**Note:** Other International approval certificates are available upon request.

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

### 3. TECHNICAL DATA

#### Specifications:

Minimum Operating Pressure: Refer to NFPA 13 or FM Global Loss Prevention Data Sheets.

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

Thread size: 1" NPT for Sprinkler 12080, 25 mm BSPT for Sprinkler 12200

Nominal K-factor: 25.2 U.S. (363 metric\*)



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\* 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" (44.5 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 Teflon 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 VK510 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 VK510 with 1" NPT threads, Brass finish, and 165 °F (74 °C) temperature rating = Part No. 12080AC.

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

### Sprinkler Wrenches:

A. Part No. 13635W/B (double-ended wrench - Use Side B. Side A is for use with K14.0 ESFR Pendent Sprinkler VK500)  
Available since 2006.

**Sprinkler Cabinet:** Six-head capacity: Part No. 01731A (available since 1971)

## 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 latest standards of Verband der Sachversicherer (VdS), Loss Prevention Council (LPCB), 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 ESFR Sprinkler VK510! 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.
  - DO NOT exceed 20-30 ft. lbs. of torque (hand tight plus 1 to 1-1/2 turns with the 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.



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**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.

### 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 ESFR 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.
- 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 VK510 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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SPRINKLER VK510 (K25.2)**

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**AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES**

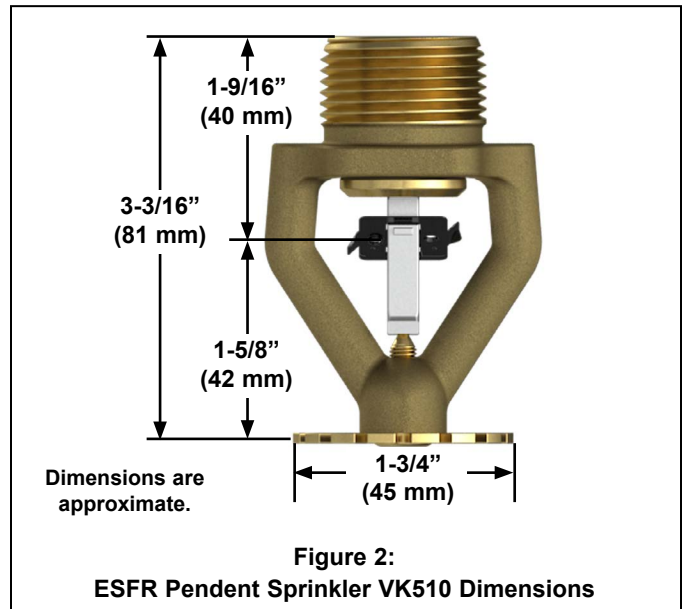
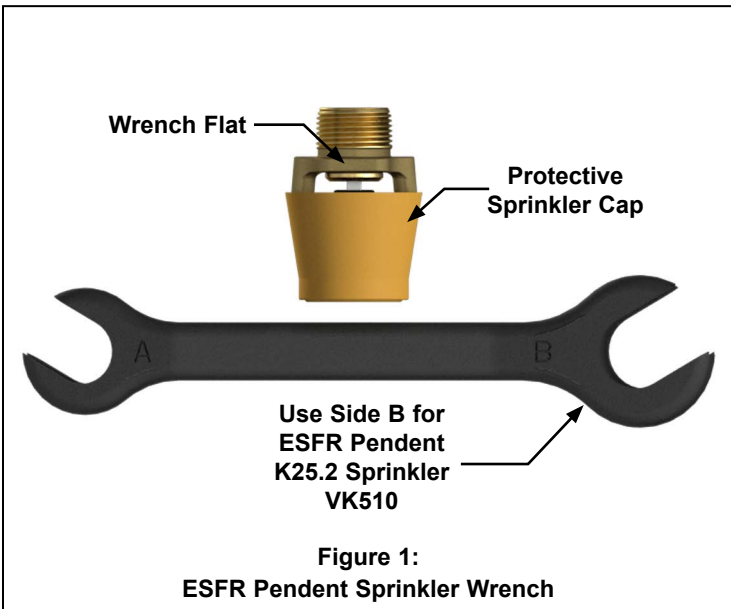
Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>2</sup>	Frame Paint Color
Ordinary	165 °F (74 °C)	100 °F (38 °C)	None
Intermediate	205 °F (96 °C)	150 °F (65 °C)	White

**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.





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<b>Approval Chart</b> ESFR Pendent Sprinkler VK510 Maximum 175 PSI (12 bar) WWP																			
<table border="1" style="border-collapse: collapse;"> <tr> <td style="text-align: center;">—</td> <td style="text-align: left;">Temperature</td> <td rowspan="3" style="text-align: center; vertical-align: middle;"><b>KEY</b></td> </tr> <tr> <td style="text-align: center;">—</td> <td style="text-align: left;">Finish</td> </tr> <tr> <td style="text-align: center;">A1X</td> <td style="text-align: left;">Escutcheon (if applicable)</td> </tr> </table>													—	Temperature	<b>KEY</b>	—	Finish	A1X	Escutcheon (if applicable)
—	Temperature	<b>KEY</b>																	
—	Finish																		
A1X	Escutcheon (if applicable)																		
Base Part Number <sup>1</sup>	SIN	Thread Size	Nominal K-Factor		Overall Length		Listings and Approvals <sup>3,4,7</sup> (Refer also to Tables 2 & 3.)												
			U.S.	metric <sup>2</sup>	Inches	mm	cULus <sup>5</sup>	NYC	VdS	LPCB	FM	(CCC)							
12080	VK510	1" NPT	25.2	363	3-3/16	81	A1	See Footnote 6.	A1	A1	A1	--							
12200	VK510	25 mm BSPT	25.2	363	3-3/16	81	A1	See Footnote 6.	A1	A1	A1	--							
19857	VK510	1" NPT	25.2	363	3-3/16	81	--	--	--	--	--	B1							
20373	VK510	25 mm BSPT	25.2	363	3-3/16	81	--	--	--	--	--	B1							
<b>Approved Temperature Ratings</b> A - 165 °F (74 °C) and 205 °F (96 °C) B - 165 °F (74 °C)							<b>Approved Finish</b> 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, FM Global Loss Prevention Data Sheets, LPCB Loss Prevention Standards, and the latest VdS standards. <sup>5</sup> Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada as a Specific Application ESFR Sprinkler (refer to the deflector position requirements on page 7). <sup>6</sup> Meets New York City requirements, effective July 1, 2008. <sup>7</sup> FM Approved as a quick response pendent Non-Storage sprinkler and also FM Approved as a quick response pendent Storage sprinkler. Refer to Tables 2 & 3.																			
<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, FM Global Loss Prevention Data Sheets including 2-0 and 8-9, 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 2**

**COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK510 ESFR PENDENT SPRINKLERS**

Storage Type	NFPA	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 (96 °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.	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.
Rolled Paper Storage (Refer to the standard.)	Refer to NFPA 13.	Refer to FM 8-21.
Flammable 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.)	Refer to NFPA 13.	N/A

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**TABLE 3:  
 COMMODITY SELECTION AND DESIGN CRITERIA OVERVIEW FOR MODEL VK510  
 SPECIFIC APPLICATION LISTING (UL) AND  
 ESFR, QUICK RESPONSE STORAGE, AND QUICK RESPONSE NON-STORAGE APPROVALS (FM)**

Description	Specification, UL	Specification, FM
Sprinkler Type	ESFR	QR Storage
Temperature Rating	165 °F (74 °C) and 205 (96 °C)	165 °F (74 °C) and 205 (96 °C)
Response Type	ESFR	QR
Sprinkler Position	Pendent, frame arms aligned with pipe, deflectors parallel with ceiling or roof	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 ft <sup>2</sup> (9.3 m <sup>2</sup> )	100 ft <sup>2</sup> Refer to FM 2-0, Table 17
Minimum Area of Coverage	64 ft <sup>2</sup> (5.9 m <sup>2</sup> )	64 ft <sup>2</sup> (5.9 m <sup>2</sup> ) Refer to FM 2-0, Table 17
Maximum Ceiling Slope	2 in 12	Up to 10° Refer to FM 2-0, Section 2.2.1.6
Maximum Spacing	10 ft. spacing (3.0 m)	Up to 30 ft.: 12 ft. (3.7 m) For building over 30 ft.: 10 ft. (3.0 m) Refer to FM 8-9, Section 2.3.3.3
Minimum Spacing	8 ft. spacing (2.4 m)	Refer to FM 8-9, Section 2.3.3.3
Deflector Distance from Walls	Minimum of 4 in. (102 mm) from walls but no more than 1/2 the allowable distance permitted between sprinklers	Refer to FM 2-0, Section 2.2.3.3
Deflector to Top of Storage	Minimum of 36 in. (914 mm)	Minimum of 36 inches (914 mm) Refer to FM 2-0 Section 2.2.2.1 and FM 8-9, Section 2.2.6
Deflector** to Ceiling Distance	Ceiling/roof heights up to 40 ft. (12.2 m): 6–18 in. (152–457 mm) Ceiling/roof heights of 40–45 ft. (12.2–13.7 m): 6–14 in. (152–356 mm)	Refer to FM 2-0
Maximum Ceiling Height	45 ft. (13.7 m)	45 ft. (13.7 m)
Maximum Storage Height	40 ft. (12.2 m)	40 ft. (12.2 m)
Storage Arrangement	Palletized, solid piled, open frame; single row, double row, or multiple row and portable rack arrangement	Refer to FM 8-9, Tables 2 through 11
Commodity	Class I-IV, Cartoned unexpanded plastic	Refer to FM 8-1 and 8-9
Sprinkler System Design	NFPA 13 for ESFR Sprinklers based upon 45 psi (3.1 bar) design pressure 169 gpm (640 lpm) with 12 sprinkler remote area	Refer to FM 8-9, Tables 2 through 11
Obstruction Criteria	Refer to NFPA 13 Chapter 8.	Refer to FM 2-0 Section 2.2
Minimum Aisle Width	3 ft.-6 in. (1.07 m)	Over 2 ft. (.61 m)
Hose Stream Allowance and Water Supply Duration	250 gpm (946 lpm) for 60 minutes or as determined by the approval	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>.

\*\* For FM, the measurement is from the centerline of the thermal sensing element to the ceiling.