



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

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*.

*Refer the Approval Charts and Design Criteria on pages 124c-e for cULus Listing and FM Approval requirements that must be followed.

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



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. 096e/07

NOTE: Other International approval certificates are available upon request.

Refer to Approval Chart 1 and Design Criteria on pages 124c-d for cULus Listing requirements, and refer to Approval Chart 2 and Design Criteria on page 124e for 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 BSP for Sprinkler 12200

Nominal K-Factor: 25.2 U.S. (363 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" (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.

Viking Technical Data may be found on
The Viking Corporation's Web site at
<http://www.vikinggroupinc.com>.
The Web site may include a more recent
edition of this Technical Data Page.



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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 (°F/°C): 165°/74° = C, 205°/96° = E

For example, Sprinkler VK510 with 1" NPT threads, Brass finish, and 165 °F/74 °C temperature rating = Part No. 12080AC.

Available Finishes And Temperature Ratings: Refer to Table 1.

Accessories: (Also refer to the "Sprinkler Accessories" section of the Viking data book.)

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.

B. Part No. 12143W/B (no longer available)

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 10285W/B or 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 50 ft. lbs. of torque (hand tight, plus approximately two full turns with the wrench) to install these sprinklers. Higher levels of torque may distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.

TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES

Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating ¹	Maximum Ambient Ceiling Temperature ²	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

¹ The sprinkler temperature rating is stamped on the deflector.

² 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.

	TECHNICAL DATA	ESFR PENDENT SPRINKLER VK510 (K25.2)
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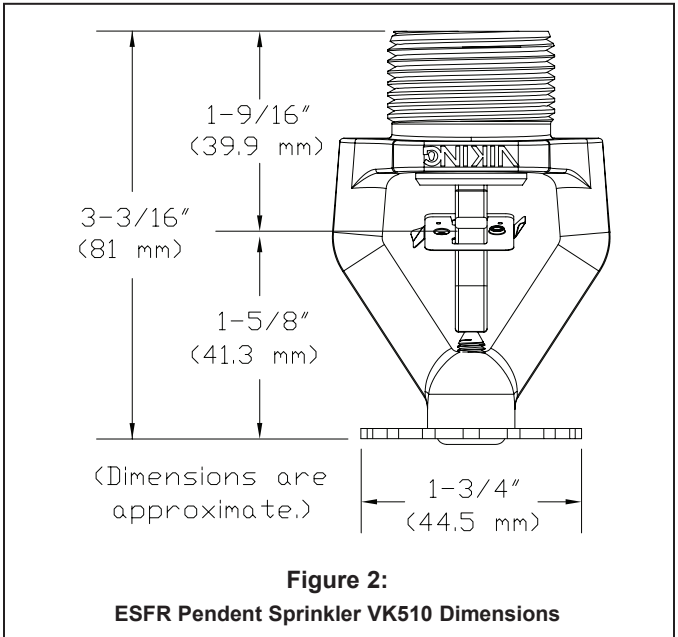
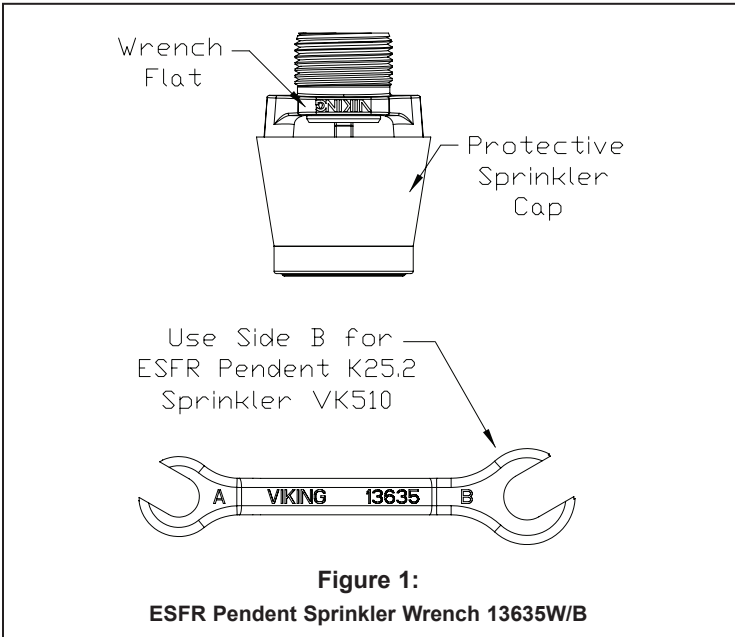
Approval Chart 1 (UL) ESRF Pendent Sprinkler VK510 Maximum 175 PSI (12 bar) WWP	<table border="0"> <tr> <td style="font-size: small;">Temperature</td> <td style="text-align: center;">KEY</td> </tr> <tr> <td style="font-size: small;">Finish</td> <td></td> </tr> <tr> <td style="font-size: small;">A1X ← Escutcheon (if applicable)</td> <td></td> </tr> </table>	Temperature	KEY	Finish		A1X ← Escutcheon (if applicable)	
Temperature	KEY						
Finish							
A1X ← Escutcheon (if applicable)							

Base Part Number ¹	SIN	Thread Size	Nominal K-Factor		Overall Length		Listings and Approvals ^{3,4} (Refer also to Design Criteria on page 124d.)					
			U.S.	metric ²	Inches	mm	cULus ⁵	NYC	VdS	LPCB	CE	⚙
12080	VK510	1" NPT	25.2	363	3-3/16	81	A1	See Footnote 6.	A1	A1	--	--
12200	VK510	25 mm BSP	25.2	363	3-3/16	81	A1	See Footnote 6.	A1	A1	--	--

Approved Temperature Ratings A - 165 °F (74 °C) and 205 °F (96 °C) ⁷	Approved Finish 1 - Brass
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Footnotes

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, LPCB Loss Prevention Standards, and the latest VdS standards.
⁵ Listed by Underwriters Laboratories Inc. for use in the U.S. and Canada as a Specific Application ESRF Sprinkler (refer to the deflector position requirements on page 124d).
⁶ Meets New York City requirements, effective July 1, 2008.
⁷ For the antifreeze application, intermediate temperature rated sprinklers are intended for installation in close proximity to heat sources only, as referenced in NFPA 13.





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DESIGN CRITERIA - UL

(also applies for the ESFR Cold Storage System)

(Also refer to Approval Chart 1 on page 124c.)

cULus Listing Requirements:

ESFR Pendent Sprinkler VK510 is cULus Listed as indicated in Approval Chart 1 for installation in accordance with the latest appropriate NFPA standards (including NFPA 13) for ESFR Pendent K25.2 (363 bar) Sprinklers, for:

- Protecting rack storage of certain specified materials up to 40 ft (12.2 m) high in buildings with 45 ft (13.7 m) high ceilings with NO in-rack sprinklers.
- Exception to NFPA 13 sprinkler installation rules for ESFR Pendent K25.2 Sprinklers:*
 - cULus Listing Requirement for Buildings up to 40 ft. (12.2 m) High:** Locate the deflector between 6" and 18" (152 and 457 mm) below the ceiling.
 - cULus Listing Requirement for Buildings Between 40 ft. (12.2 m) and 45 ft. (13.7 m) High:** Locate the deflector between 6" and 14" (152 and 356 mm) below the ceiling.
- The minimum area of coverage allowed per sprinkler is 64 ft² (5.8 m²) per NFPA 13.

Maximum Roof or Ceiling Slope: 2 in 12 (167 mm/m or 9.5 degrees).

Sprinkler Position: Approved for use only in the pendent position. Align the deflector parallel with the ceiling or roof.

System Type: Wet systems only.

Deflector Distance from Walls: At least 4" (102 mm) from walls, and no more than one-half the allowable distance permitted between sprinklers.

Clearance from Deflector to Top of Storage: At least 36" (914 mm).

Maximum Distance Between Sprinklers: The maximum area of coverage allowed per sprinkler is 100 ft² (9.3 m²)**.

- 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 ft² (9.3 m²) 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.

Note: If the ceiling is beam and girder or panel construction, locate sprinklers in the bays rather than under the beams.

ESFR Cold Storage System

Viking ESFR Sprinkler VK510 is also cULus Listed for use with a maximum 50% by volume factory premix propylene glycol and water antifreeze solution. This Listing is based on full-scale fire testing at Underwriter's Laboratories. The following limitations of system design and application shall apply:

Storage Arrangements: Solid-piled, or open rack (single, double, multiple, or portable), palletized storage (pallets limited to wood), with no open-top containers or solid shelves.

Commodity Classification: Limited to Class II or less.

Maximum Storage/Ceiling Heights and minimum pressure requirements:

- Storage height up to 35 ft. (10.7 m) with ceiling height up to 40 ft. (12.2 m) with a minimum system design pressure of 40 PSI (2.76 Bar).
- OR:**
- Storage height up to 40 ft. (12.2 m) with ceiling height up to 45 ft-3 in. (13.8 m) with a minimum system design pressure of 60 PSI (4.14 Bar).

Maximum System Volume of the Antifreeze Water Solution: Limited to 1,100 gallons (4 163 liters).

Minimum Temperature: -21 °F (-29.4 °C).

Maximum Percentage by Volume of Propylene Glycol: 50% mixed with water for antifreeze solution.

- Where the minimum temperature in the area being protected is 8 °F (-13.3 °C) or above, 35% percent by volume of propylene glycol factory premixed with water must be used. Viking requires Firefighter Eliminator C premix 35% propylene glycol/water mixture with a freeze temperature rating (freeze point) of 2.4 °F (-16.4 °C).

OR:

- Where the minimum temperature in the area being protected is between 8 °F (-13.3 °C) and -21 °F (-29.4 °C), the percentage by volume of propylene glycol must be 50%, factory premixed with water for antifreeze solution. Viking requires Firefighter Eliminator F type 50% propylene glycol/water mixture, with a freeze temperature rating (freeze point) of -26 °F (-32.2 °C).

Refer to data page 45a-j "Viking ESFR Cold Storage System" in the Freezer Storage section of the Viking data book.

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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Approval Chart 2 (FM) ESFR Pendent Sprinkler VK510 Maximum 175 PSI (12 bar) WWP

KEY	
Temperature	→
Finish	↓
A1X ← Escutcheon (if applicable)	←

Base Part Number ¹	SIN	Thread Size	Nominal K-Factor		Overall Length		FM Approvals ^{3,4} (Refer also to Design Criteria below.)
			U.S.	metric ²	Inches	mm	
12080	VK510	1" NPT	25.2	363	3-3/16	81	A1
12200	VK510	25 mm BSP	25.2	363	3-3/16	81	A1
Approved Temperature Ratings A - 165 °F (74 °C) and 205 °F (96 °C)						Approved Finish 1 - Brass	

Footnotes

- 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 the FM Approvals available at the time of printing. Other approvals may be in process.
- ⁴ FM Approved as a quick response pendent **Non-Storage** sprinkler and also FM Approved as a quick response pendent **Storage** sprinkler. Refer to Design Criteria below.

DESIGN CRITERIA - FM

(Also refer to Approval Chart 2 above.)

FM Approval Requirements:

- Sprinkler VK510 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).
- Sprinkler VK510 is also FM Approved as a quick response pendent **Non-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 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.

NOTE: The FM installation guidelines may differ from cULus and/or NFPA criteria.

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 applicable FM Global Loss Prevention Data Sheets, including 2-0 and 8-9, applicable standards of NFPA, and any other Authorities Having Jurisdiction, and also with provisions of governmental codes, ordinances, and standards whenever applicable.



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- 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 ejector spring and 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 spring assemblies 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.