



## TECHNICAL DATA

### FREEDOM® RESIDENTIAL UPRIGHT LEAD FREE SPRINKLER VK4670 (K4.9)

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 Freedom® Residential Upright Lead Free\* Sprinkler VK4670 is a small, thermosensitive, glass-bulb residential sprinkler available in several different finishes and temperature ratings to meet varying design requirements. The orifice design, with a K-Factor of 4.9 (70.6 metric†), allows efficient use of available water supplies for the hydraulically designed fire-protection system. The glass bulb operating element and special deflector characteristics meet the challenges of residential sprinkler standards.

\* Lead content complies with the definition of 'Lead Free' established in the Reduction of Lead in Drinking Water Act (S.3874) endorsed by AWWA's Water Utility Council, and California Assembly Bill #1953.

#### 2. LISTINGS AND APPROVALS



**UL Listed (C-UL-US-EU):** Category VKKW

**UL Classified to:** NSF/ANSI Standard 61, Drinking Water System Components and NSF 372 (MH48034). Refer to the Approval Chart Design Criteria for C-UL-US-EU Listing requirements that must be followed.



#### 3. TECHNICAL DATA

##### Specifications:

Minimum Operating Pressure: Refer to the Approval Chart.

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

Thread size: 1/2" (15 mm) NPT

Nominal K-Factor: 4.9 U.S. (70.6 metric†)

†Metric K-factor measurement shown is in Bar. When pressure is measured in kPa, divide the metric K-factor shown by 10.0.

Glass-bulb fluid temperature rated to -65 °F (-55 °C)

Overall Length: 2-1/4" (58 mm)

##### Material Standards:

Frame Casting: Brass UNS-C89833

Deflector: Brass UNS-C23000 or Bronze UNS-C22000

Bulb: Glass, nominal 3 mm diameter

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Polytetrafluoroethylene (PTFE) Tape

Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

Compression Screw: Brass UNS-C36000

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

**Sprinkler:** Base Part No. 19442

Order Lead Freed Sprinkler VK4670 by first adding the appropriate suffix for the sprinkler finish and then the appropriate suffix for the temperature rating to the sprinkler base part number.

Finish Suffix: Brass = A, Chrome = F, White Polyester = M-/W, and Black Polyester = M-/B

Temperature Suffix: 155 °F (68 °C) = B, 175 °F (79 °C) = D

For example, sprinkler VK4670 with a Brass finish and a 155 °F (68 °C) temperature rating = Part No. 19442AB.

##### 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. Standard Wrench: Part No. 10896W/B (available since 2000)

##### Sprinkler Cabinets:

A. Six-head capacity: Part No. 01724A (available since 1971)

B. Twelve-head capacity: Part No. 01725A (available since 1971)

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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**4. INSTALLATION**

Refer to appropriate NFPA Installation Standards.

**5. OPERATION**

During fire conditions, the heat-sensitive liquid in the glass bulb expands, causing the glass to shatter, releasing the pip cap and sealing spring assembly. Water flowing through the sprinkler orifice strikes the sprinkler deflector, forming a uniform spray pattern to extinguish or control the fire.

**6. INSPECTIONS, TESTS AND MAINTENANCE**

Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

The Viking Freedom® Residential Upright Lead Free Sprinkler VK4670 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.

**TABLE 1: AVAILABLE SPRINKLER TEMPERATURE RATINGS AND FINISHES**

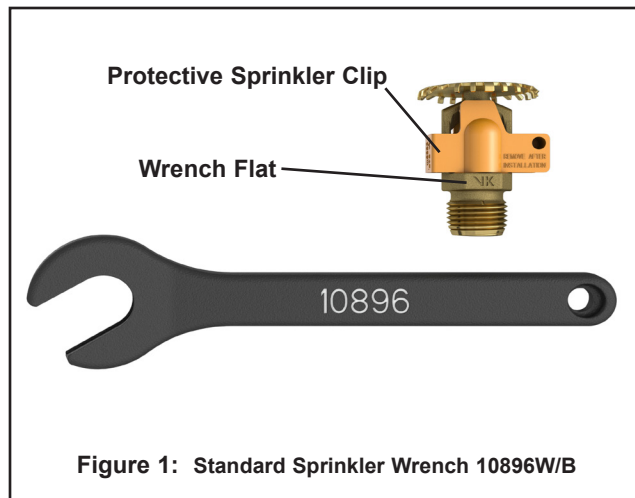
Sprinkler Temperature Classification	Sprinkler Nominal Temperature Rating <sup>1</sup>	Maximum Ambient Ceiling Temperature <sup>2</sup>	Bulb Color
Ordinary	155 °F (68 °C)	100 °F (38 °C)	Red
Intermediate	175 °F (79 °C)	150 °F (65 °C)	Yellow

**Sprinkler Finishes:** Brass, Chrome, White Polyester, and Black Polyester

**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.



**Figure 1: Standard Sprinkler Wrench 10896W/B**



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### Approval Chart Viking VK4670, 4.9 K-Factor Residential Upright Sprinkler

For systems designed to NFPA 13D or NFPA 13R. For systems designed to NFPA 13, refer to the design criteria. For Ceiling types refer to NFPA 13, 13R or 13D 2013 Editions

Sprinkler Base Part Number <sup>1</sup>	SIN	NPT Thread Size		Nominal K-Factor		Maximum Water Working Pressure	Overall Length			
		Inches	mm	U.S.	metric <sup>2</sup>		Inches	mm		
19442	VK4670	1/2	15	4.9	70.6	175 psi (12 bar)	2-1/4	58		
Max. Coverage Area <sup>4</sup> Ft. X Ft. (m X m)	Ordinary Temp Rating (155 °F/68 °C)		Intermediate Temp Rating (175 °F/79 °C)		Deflector to Ceiling	Installation Type	Listings and Approvals <sup>3</sup>			Minimum Spacing Ft. (m)
	Flow <sup>4</sup> GPM (L/min)	Pressure <sup>4</sup> PSI (bar)	Flow <sup>4</sup> GPM (L/min)	Pressure <sup>4</sup> PSI (bar)				NYC	NSF <sup>8</sup>	
12 X 12 (3.7 X 3.7)	14	8.16 (0.56)	14	8.16 (0.56)	3 - 5 inches	Upright	See Foot-note 7.	See Foot-note 6.	See Foot-note 7.	9 (2.74)
14 X 14 (4.3 X 4.3)	14	8.16 (0.56)	14	8.16 (0.56)						
16 X 16 (4.9 X 4.9)	16	10.66 (0.73)	16	10.66 (0.73)						
12 X 12 (3.7 X 3.7)	15	9.37 (0.65)	15	9.37 (0.65)	5 - 10 inches					
14 X 14 (4.3 X 4.3)	15	9.37 (0.65)	15	9.37 (0.65)						
16 X 16 (4.9 X 4.9)	18	13.49 (0.93)	18	13.49 (0.93)						
12 X 12 (3.7 X 3.7)	15	9.37 (0.65)	--	--	1 to 3 inches below 14 inch beams					
14 X 14 (4.3 X 4.3)	15	9.37 (0.65)	--	--						
16 X 16 (4.9 X 4.9)	18	13.49 (0.93)	--	--						

#### Footnotes

<sup>1</sup> Part number shown is the base part number. For complete part number, refer to Viking's current price schedule.

<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 the listings and approvals available at the time of printing. Other approvals may be in process. Check with the manufacturer for any additional approvals. Refer also to Design Criteria.

<sup>4</sup> For areas of coverage smaller than shown, use the "Flow" and "Pressure" for the next larger area listed. Flows and pressures listed are per sprinkler. The distance from sprinklers to walls shall not exceed one-half the sprinkler spacing indicated for the minimum "Flow" and "Pressure" used.

<sup>5</sup> Listed by Underwriter's Laboratories, Inc. for use in the U.S., Canada, and European Union.

<sup>6</sup> Meets New York City requirements, effective July 1, 2008.

<sup>7</sup> Approved Finishes are: Brass, Chrome, White Polyester, and Black Polyester<sup>9</sup>

<sup>8</sup> UL Classified to: NSF/ANSI Standard 61, Drinking Water System Components and NSF 372 (MH48034).

<sup>9</sup> Other paint colors are available on request with the same C-UL-US-EU listings as the standard finish colors.



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#### DESIGN CRITERIA

(Also refer to the Approval Chart.)

##### UL Listing Requirements (C-UL-US-EU):

When using Viking Freedom® Residential Upright Lead Free Sprinkler VK4670 for systems designed to NFPA 13D or NFPA 13R, apply the listed areas of coverage and minimum water supply requirements shown in the Approval Chart.

For systems designed to NFPA 13: The number of design sprinklers is to be the four contiguous most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in the Approval Chart for NFPA 13D and NFPA13R applications for each listed area of coverage, **or**
- Calculated based on a minimum discharge of 0.1 gpm/sq. ft. over the "design area" in accordance with sections 8.5.2.1 or 8.6.2.1 of NFPA 13.
- Minimum distance between residential sprinklers: 9 ft. (2.74 m).

#### BEAM CEILING GUIDELINES

C-UL-US-EU Listed for installation in residential occupancies with beam ceilings (with horizontal ceilings only).  
Refer to the Approval Chart for sprinkler areas of coverage and hydraulic design.

**Sprinkler Location:** Locate sprinklers on the underside of the beams (not in the bays or pockets formed by the beams). Refer to Figure 2. The vertical distance from the sprinkler deflector to the bottom of the primary beam must be between 1" and 3" (25 to 76 mm). The horizontal distance from the centerline of the sprinkler to the primary beam cannot be more than 2" (51 mm) (Figure 2).

**Beam Position:** Directly attached to the underside of a combustible or non-combustible smooth ceiling of any height.

##### Beam Size and Shape (Cross section):

- Depth: Maximum 14" (356 mm) for primary beams. Secondary beam depth cannot be greater than the primary beam.
- Width: Unlimited.
- Beam Shape: Rectangular to circular.

**Beam Types:** Combustible or non-combustible, solid surface, solid or hollow core.

##### Beam Spacing:

- A. For primary beams, the distance from the wall to the center of the nearest primary beam must be at least 3'-4" (1.0 m), and not more than one-half the listed sprinkler spacing. **Note:** Sprinklers may not be required to be located in the first beam nearest the wall. Center-to-center distance between primary beams is to be a maximum of 16 ft (4.9 m). Refer to Figure 3A.
- B. When beam pockets created by the primary beams exceed 20 ft (6.1 m) in length, secondary beams are required as follows (also refer to Figure 3B):
  1. Secondary beam depth must be equal to primary beam depth.
  2. Secondary beams must be placed so that the bays formed by the primary beams do not exceed 20 ft (6.1 m) in length.
- C. When primary beam spans do not exceed 20 ft (6.1 m), secondary beams (not required) may have any distance from wall to nearest secondary beam and any distance center to center between secondary beams. Refer to Figure 3C.

##### Also:

When primary beam spans exceed 20ft (6.1m) an alternate protection scheme for the compartment would be to calculate all the sprinklers in the compartment. Refer to Figure 5.

- More stringent design requirement.
- Secondary beams or baffles would not be required for a compartment space design.
- The minimum required discharge from each sprinkler would utilize flow rates given in the Approval Chart for NFPA 13D and NFPA13R applications

**Lintels:** Must be present over doorways exiting the compartment. Lintel height must be at least 8" (203 mm), or at least the depth of the primary beams, whichever is greater.

**Beam and Soffit Arrangements:** If a soffit is installed, beams may be arranged within the soffit. The cross section of the soffit may be any size, provided it does not create an obstruction to water distribution per the obstruction rules of NFPA 13 for residential sprinklers. Where there is a soffit, beam spacing from the wall is to be measured from the face of the soffit rather than the wall. Refer to Figure 3D. **NOTE:** The sprinkler area of coverage is to be measured from the wall.

##### Definitions:

- Primary beams: The main beams that run primarily in one direction.
- Secondary beams: The beams that run perpendicular to the main beams.

**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to pages RES1-17 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest edition of Viking technical data, the appropriate standards of NFPA and any other similar Authorities Having Jurisdiction, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable. Final approval and acceptance of all residential sprinkler installations must be obtained from the Authorities Having Jurisdiction.**



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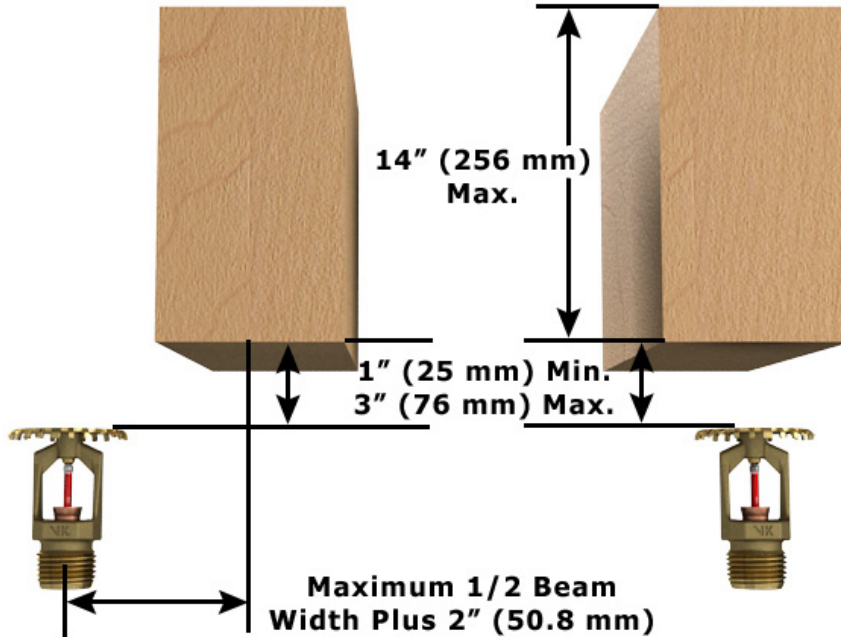


Figure 2: Sprinkler Positioning Under Primary Beams

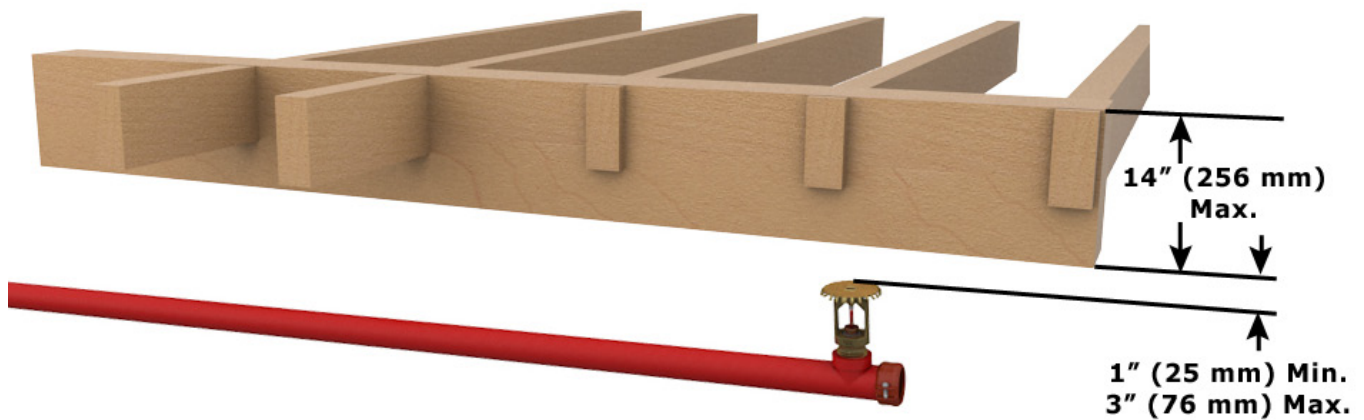


Figure 3: Sprinkler Positioning Under Primary Beams

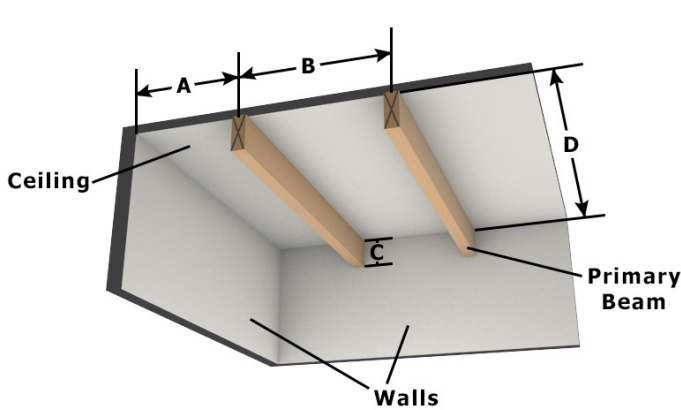


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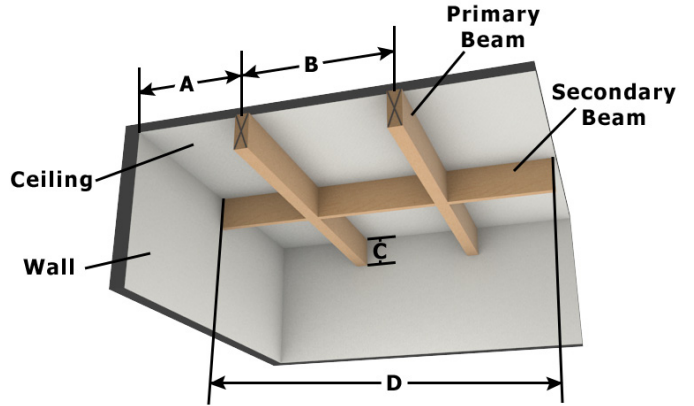
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All dimensions are measured to wall faces and to centerlines of beams.

- A = Distance from wall to nearest primary beam:  
Minimum: 3 ft 4 in (1.0 m).  
Maximum: No more than 1/2 listed sprinkler spacing.
- B = Spacing between primary beams: 16 ft (4.9 m) maximum
- C = Beam depth: 14" (356 mm) maximum
- D = Beam span: 20 ft (6.1 m) maximum

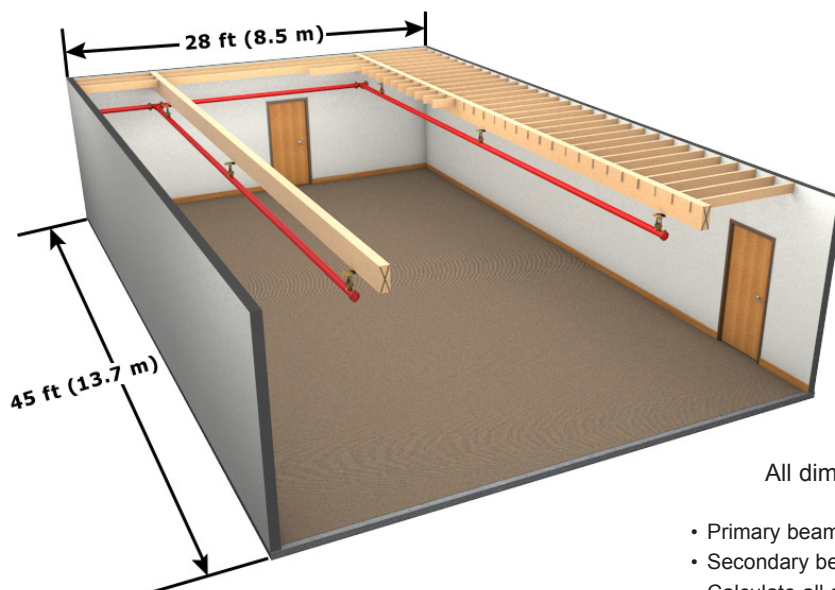
**Figure 4A: Primary Beam Spans up to 20 ft (6.1 m)**



All dimensions are measured to wall faces and to centerlines of beams.

- A = Distance from wall to nearest primary beam:  
Minimum: 3 ft 4 in (1.0 m).  
Maximum: No more than 1/2 listed sprinkler spacing.
- B = Spacing between primary beams: 16 ft (4.9 m) maximum
- C = Beam depth: 14" (356 mm) maximum
- D = 20 ft (6.1 m) maximum for secondary beams that are to be equal in depth for primary beams and that are required so that primary beam pockets do not exceed 20 ft (6.1 m).

**Figure 4B: Primary Beam Spans over 20 ft (6.1 m)**



**EXAMPLE**

All dimensions are measured to wall faces and to centerlines of beams.

- Primary beam spans exceeding 20 ft (6.1 m)
- Secondary beams or baffles not required
- Calculate all sprinklers in compartment  
(Above example 6 sprinklers)

**Figure 5: Alternate Entire Compartment Protection Scheme Example**