1. DESCRIPTION
The Viking Attic Upright VK696 is a specific application concealed space sprinkler that provides superior fire protection in combustible and non-combustible sloped attic spaces when used in conjunction with Viking’s model V-BB (Back to Back) and V-SD (Single Directional) specific application sprinklers. Installed in the upright position, with the deflector parallel to the roof, the Attic Upright used in combination with the model V-BB increases the allowable span from 60' to 80' (18.3 m to 24.4 m).

Viking Attic Upright sprinklers can be installed with either steel or CPVC piping, and allow the use of CPVC to feed the protected space below the attic (CPVC allowed on wet pipe systems only). They are available in brass or with corrosion-resistant Electroless Nickel PTFE (ENT) coatings where salt water and other corrosive elements are a consideration. Viking Attic Upright sprinklers are cULus Listed with specific application guidelines for use as special sprinklers as defined by the National Fire Protection Association (NFPA), and are listed for specific pitch range 4:12 to 12:12.

2. LISTINGS AND APPROVALS

cULus Listed: Category VNIV
Refer to the Approval Chart on page 3.

3. TECHNICAL DATA
Specifications:
- Minimum Operating Pressure: 7 psi (0.5 bar)
- Rated to 175 psi (12 bar) water working pressure
- Factory tested hydrostatically to 500 psi (34.5 bar)
- Thread size: 1/2" (15 mm) NPT
- Nominal K-Factor: 4.2 U.S. (57 metric*)
  * 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.
- Glass-bulb fluid temperature rated to -65 °F (-55 °C)
- Overall Length: 2-1/4" (57 mm)
- Covered by the following U.S. Patent No.: 8,083,002 owned by Tyco.

Material Standards:
- Frame Casting: Brass UNS-C84400
- Deflector: Brass UNS-C26000
- Bulb: Glass, nominal 3 mm diameter
- Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with PTFE Tape
- Screw: Brass UNS-C36000
- Pip Cap and Insert Assembly: Copper UNS-C11000 and Stainless Steel UNS-S30400

Ordering Information: (Also refer to the current Viking price list.)
To order the Attic Sprinkler, add 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, ENT = JN
- Temperature Suffix: E = 200 °F (93.3 °C)
Available Finishes And Temperature Ratings:
Refer to Table 1.

Accessories: (Also refer to the Viking website.)
- Sprinkler Wrench:
  - Standard Wrench: Part No. 21475M/B
- Sprinkler Cabinets:
  - A. Six-head capacity: Part No. 01724A
  - B. Twelve-head capacity: Part No. 01725A
4. INSTALLATION
Refer to appropriate NFPA Installation Standards.
NOTE: Precedence for allowing 4.2K sprinklers to be used on dry pipe systems utilizing corrosion-resistant or internally galvanized steel pipe is based on paragraph 8.3.4.4 of NFPA 13 (2013 edition).

5. OPERATION
During a fire condition, 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 deflector, forming a uniform spray pattern to extinguish or control the fire, and protect the piping in the interstitial space.

6. INSPECTIONS, TESTS AND MAINTENANCE
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

7. AVAILABILITY
The Viking Attic Upright Specific Application 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.

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

<table>
<thead>
<tr>
<th>Sprinkler Temperature Classification</th>
<th>Sprinkler Nominal Temperature Rating$^1$</th>
<th>Maximum Ambient Ceiling Temperature$^2$</th>
<th>Bulb Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate</td>
<td>200 °F (93.3 °C)</td>
<td>150 °F (65°C)</td>
<td>Green</td>
</tr>
</tbody>
</table>

Sprinkler Finishes: Brass, ENT$^3$

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.

$^3$ cULus Listed as corrosion resistant.

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**Figure 1:** Standard Sprinkler Wrench

**Figure 2:** Sprinkler Dimensions

(Dimensions are approximate)
**APPROVAL CHART**

Attic Upright Specific Application Sprinkler VK696

For Combustible and Non-Combustible Sloped Attic Spaces

<table>
<thead>
<tr>
<th>Part Number1</th>
<th>SIN</th>
<th>Maximum Pressure</th>
<th>Thread Size</th>
<th>Nominal K-Factor</th>
<th>Overall Length</th>
<th>Listings and Approvals3</th>
</tr>
</thead>
<tbody>
<tr>
<td>19538</td>
<td>VK696</td>
<td>175 psi</td>
<td>1/2&quot;</td>
<td>15 mm</td>
<td>4.2</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NPT</td>
<td>BSP</td>
<td>inches</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>U.S.</td>
<td>metric</td>
<td></td>
<td>cULUs4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>FM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>LPCB</td>
</tr>
</tbody>
</table>

Approved Temperature Rating

A - 200 °F (93.3 °C)

Approved Finish

1 - Brass, 2 - ENT5

1 Also refer to Viking’s current price schedule.

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 table shows the listings and approvals available at the time of printing. Other approvals may be in process.

4 Listed by Underwriters Laboratories Inc. for use in the United States and Canada.

5 cULus Listed as corrosion resistant.

**DESIGN CRITERIA - UL**

(Also refer to Approval Chart 1)

Allowable Roof Span, Flow, Pressure and Slope for Specific Application Sprinkler Protecting Attics

<table>
<thead>
<tr>
<th>Sprinkler Base Part Number</th>
<th>SIN</th>
<th>Thread Size</th>
<th>Nominal K-Factor</th>
<th>Allowable Roof Span2</th>
<th>Minimum Flow</th>
<th>Minimum Pressure</th>
<th>Pitch1</th>
<th>Dry Pipe System Maximum Water Delivery Time (in seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>19538</td>
<td>VK696</td>
<td>1/2&quot;</td>
<td>15 mm</td>
<td>4.2</td>
<td>10 (3.1) x 12 (3.6)</td>
<td>Minimum 7 psi (0.48 Bar) Minimum 0.10 gpm/ft2 (4.1 mm/min.) Design Density</td>
<td>4:12 to 12:12</td>
<td>60 seconds (All System Sizes)</td>
</tr>
</tbody>
</table>

GPM | LPM | PSI | BAR |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4:12</td>
<td>12:12</td>
<td>60 seconds</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Precedence for allowing 4.2K sprinklers to be used on dry pipe systems utilizing corrosion-resistant or internally galvanized steel pipe is based on paragraph 8.3.4.4 of NFPA 13 (2013 edition).

1 Pitch and slope indicate the incline of a roof, expressed as a proportion of the vertical to the horizontal.

2 The Attic Upright is measured along the slope maximum 10 ft (3.1 m) perpendicular to slope by maximum 12 ft (3.6 m) parallel to slope.

**IMPORTANT:** Always refer to Bulletin Form No. F_091699 - Care and Handling of Sprinklers. Also refer to Form No. F_080614 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, FM Global, LPCB, APSAD, VdS or other similar organizations, and also with the provisions of governmental codes, ordinances, and standards, whenever applicable.
ADDITIONAL DESIGN CRITERIA - UL Chart 2
(Also refer to DESIGN CRITERIA Chart 1)
Allowable roof span, flow, pressure and slope for attic protection using Viking V-SD Sprinklers

Design Criteria: Flow and Pressures refer to Design Chart 1.

System Type:
Wet systems and dry systems.

Antifreeze Systems:
Use only listed antifreeze in accordance with the applicable NFPA standard as follows:

Option 1: Use any listed antifreeze in accordance with the manufacturer’s installation instructions.

Option 2: For a Light Hazard Unoccupied attic
1. System Volume ≤200 gal (764 L)
2. Use freezemaster™ antifreeze (refer to Manufacturer’s documentation)
3. Viking Attic Sprinklers (V-BB, V-HIP, V-SD, VK696, VK697)
4. Calculate the number of sprinklers in the hydraulically remote area in accordance with wet system criteria.*

* NOTE: For systems greater than 40 Gal (151 L), pipe sizing shall be determined using both the Darcy-Weisbach and Hazen-Williams approved hydraulic calculations. Because of the density of freezemaster™ antifreeze, the K-factor must be adjusted, and the friction loss must be considered in the system design.

Piping Types:
Steel (wet and dry) CPVC (wet systems only).

Occupancy Classification: Light hazard only.

Viking Attic Upright Sprinkler Spacing

Maximum Coverage Area:
120 ft² (11,2 m²)

Minimum Spacing:
7'-0" (2,1 m) from Attic Upright Sprinklers, V-BB Sprinklers, V-SD Sprinklers, and Standard Spray Sprinklers, when measured along the peak/ridge direction.
26'-0" (7,9 m) from Viking V-BB and V-SD Sprinklers when measured down the slope.

Maximum Spacing:
10'-0" (3,1 m) when measured perpendicular to the slope.
12'-0" (3,7 m) when measured parallel to the slope.

Additional Spacing Considerations:
If there is more than one row of Attic Upright Sprinklers, they must be staggered as shown in Figure 3.
Attic Upright Sprinklers can provide up to 10'-0" (3,1 m) coverage at the eave(s) beyond the maximum allowable roof spans for the V-BB and V-SD Sprinklers by installing a row of Attic Uprights. Refer to Figure 4 and 5 for installation criteria in these situations.

Deflector Position:
Deflector located 1"– 3" (26 - 77 mm) below the bottom of the top chord or bottom of solid wood rafter for all roof pitches as per the listing from 4:12 – 12:12, with a maximum top chord or solid wood rafter depth of 12" (305 mm).

Use of UL Listed CPVC Blazemaster Piping (Wet Systems Only):
Can be used to supply the sprinklers protecting the floor below the combustible concealed space when covered with 6" (153 mm) of non-combustible insulation over the horizontal or vertical piping, and extending 12" (305 mm) on both sides of the center line of the piping. If the piping is located in the joist, the width of the joist channel must be entirely covered to 6" above the top of the piping. The area above the piping must be protected with the Viking Model V-BB’s, V-SD’s, or the Attic Upright Sprinklers.
Listed CPVC Blazemaster piping may also be used exposed to provide wet system, vertical or angled, sprigs to Attic Upright Sprinklers where:
• The exposed portion of an angled sprig is a maximum length of 3'-0" (0,9 m), with the sprig being supported adjacent to the Attic Upright Sprinkler, and vertical restraint is provided on the horizontal pipe runs with CPVC hangers.

Continues on next page.
Continued from previous page.

- Maximum exposed length on a sprig of 10'-0" (3,1 m), with a maximum lateral distance for the Attic Upright Sprinkler of 12" (305 mm) off of the centerline of the sprig. Sprig must also be supported at the swing joint to the Attic Upright Sprinkler. Minimum 6" (153 mm) deep of non-combustible insulation extending 12" (305 mm) on each side of the pipe centerline for the CPVC branchline feeding the Attic Upright Sprinklers.
- If the CPVC branchline is installed inside the ceiling joist, the joist channel must be covered or filled with a minimum of 6" (153 mm) deep non-combustible insulation on top of the branchline feeding the Attic Upright Sprinkler sprigs.
- Additional non-combustible insulation can be added to reduce the exposed length of the sprigs being used with the Attic Upright Sprinklers.
- Installed with a minimum lateral distance of 18" (458 mm) from any device that produces and releases heat, i.e Attic furnace, Kitchen or Bathroom Exhaust fan, Flue Vents, Heat Lamps, and other such devices.

**NOTICE**

Insulation requirements are provided solely for Fire Protection purposes and not for freeze protection.

**NOTICE**

Non-combustible insulation being used needs to be verified for chemical compatibility with the CPVC piping at www.lubrizol.com

**Obstruction Criteria:**
Refer to Figures 6 and 7.
Refer to Sections 8.8.5.2.1.3 and 8.8.5.2.1.7 of NFPA 13, 2013 for requirements if installed on greater than 2-1/2" diameter piping.

**Hydraulic Requirements:**

**Minimum Design pressure:**
7 psi

**Minimum design density:**
0.10 gpm/sq. ft.

For individual areas requiring more than four Attic Upright Sprinklers, the maximum area of the attic protected by Attic Upright Sprinklers is 3,000 ft² (279 m²) in any single area. In order to be considered a single area, the areas protected by the Attic Upright Sprinklers must be separated by a minimum of 15'-0" (4.6 m), having that separation being protected by V-BB or V-SD sprinklers.

The design area shall include the most hydraulically demanding sprinklers, and in certain cases may require more than one set of calculations to verify the systems design.

Refer to the Technical Data Sheets for the Model V-BB (Form No. F_042915) and V-SD (Form No. F_043015) Specific Application Attic Sprinklers for more information regarding hydraulic requirements of Attic Upright Sprinklers.

<table>
<thead>
<tr>
<th>V-BB (Back to Back)</th>
<th>V-SD (Single Directional)</th>
<th>Attic Upright</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Side</td>
<td>Top Side</td>
<td>Top Side</td>
</tr>
</tbody>
</table>

![Sprinkler Type Legend](image)

**Figure 3: Sprinkler Type Legend**
When the total number of Attic Upright Sprinklers at the hip is greater than 4:

**Wet Systems:** Calculate the most demanding 5 model V-BB Sprinklers, add the most demanding 2 Attic Upright Sprinklers, then calculate the most demanding region up to 1500 ft² (137 m²) that uses Attic Upright Sprinklers (example: Region 1 at right). Use the most demanding calculation.

**Dry Systems:** Calculate the most demanding 7 model V-BB sprinklers, add the most demanding 2 Attic Upright Sprinklers, then calculate the most demanding region up to 1950 ft² (181 m²) that uses Attic Upright Sprinklers (example: Region 1 at right). Use the most demanding calculation.

Refer to Figures 4 and 5 below. For attics having a span of 60 - 80 ft. (18.3 - 24.4 m), only the 8.0K model V-BB sprinklers combined with Attic Upright Sprinklers can be used. For attics with a span of over 80’ (24.4 m), Standard Spray Sprinklers must be used. In an attic using single ridge construction, 8.0K model V-BB sprinklers must be used to protect the center portion. Attic Upright sprinklers should be used to cover up to 10 feet (3,1 m) at the eaves beyond the maximum 60 ft. (18,3) span covered by the model V-BB Sprinklers. Refer to the Technical Data Sheets for the model V-BB and V-SD sprinklers for more information.
Refer to Figure 6 below. Requirements: X ≥ 3Y or 3Z, X ≤ 24" (610 mm); Use the larger dimension Y or Z.

<table>
<thead>
<tr>
<th>Horizontal Distance (X)</th>
<th>Minimum Vertical Distance Below Deflector (W)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤6&quot; (≤152 mm)</td>
<td>3&quot; (77 mm)</td>
</tr>
<tr>
<td>&gt;6&quot; - 9&quot; (&gt;152 - 229 mm)</td>
<td>4&quot; (102 mm)</td>
</tr>
<tr>
<td>&gt;9&quot; - 12&quot; (&gt;229 - 305 mm)</td>
<td>6&quot; (89 mm)</td>
</tr>
<tr>
<td>&gt;12&quot; - 15&quot; (&gt;305 - 381 mm)</td>
<td>8&quot; (204 mm)</td>
</tr>
<tr>
<td>&gt;15&quot; - 18&quot; (&gt;381 - 458 mm)</td>
<td>9-1/2&quot; (242 mm)</td>
</tr>
<tr>
<td>&gt;18&quot; - 24&quot; (&gt;458 - 610 mm)</td>
<td>12-1/2&quot; (318 mm)</td>
</tr>
<tr>
<td>&gt;24&quot; - 30&quot; (&gt;610 - 762 mm)</td>
<td>15-1/2&quot; (394 mm)</td>
</tr>
<tr>
<td>&gt;30&quot; (762 mm)</td>
<td>18&quot; (458 mm)</td>
</tr>
</tbody>
</table>

Figure 6: Attic Upright Obstruction Criteria 1

Figure 7: Attic Upright Obstruction Criteria 2