



## TECHNICAL DATA

## FREEDOM® RESIDENTIAL PENDENT SPRINKLER VK436 (5.2 K-FACTOR)

The Viking Corporation, 210 N Industrial Park Road, Hastings MI 49058

Telephone: 269-945-9501 Technical Services 877-384-5464 Fax: 269-945-4495 Email: techsvcs@vikingcorp.com

### 1. PRODUCT DESCRIPTION

Viking Freedom® Residential Pendent Sprinkler VK436 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 5.2, allows efficient use of available water supplies for the hydraulically designed fire-protection system. The fast response type glass bulb and special deflector combine speed of operation and area of coverage to meet residential sprinkler standards while being aesthetically pleasing.

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.



### 2. LISTINGS AND APPROVALS

**cULus Listed:** Category VKKW

Refer to the Approval Chart on page 140l and Design Criteria on page 140n for cULus 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).

Testing: U.S.A. Patent No. 4,831,870

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

Nominal K-Factor: 5.2 U.S. (75 metric\*)

\*Metric K-factor measurement is shown 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)

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.

#### Material Standards:

Frame Casting: Brass UNS-C84400

Deflector: Brass UNS-C23000, Phosphor Bronze UNS-C51000, or Brass UNS-C26000

Bulb: Glass, nominal 3 mm diameter

Belleville Spring Sealing Assembly: Nickel Alloy, coated on both sides with Teflon Tape

Compression Screw: Brass UNS-C36000

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

#### Available Finishes And Temperature Ratings:

Refer to Table 1

**Ordering Instructions:** (Also refer to the current [Viking price list](#).)

**Sprinkler:** Base Part No. 12166

Order Sprinkler VK436 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-Enloy® = F, and White Polyester = M-/W

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

For example, sprinkler VK436 with a Brass finish and a 155 °F/68 °C temperature rating = Part No. 12166AB.

**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)

|   |                       |  |
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B. Wrench for coated and/or recessed sprinklers: Part No. 12144W/B\*\* (available since 2003)

**NOTE: RECESSED PENDENT SPRINKLERS WITH PROTECTIVE CAPS MUST USE WRENCH 12144W/B.**

\*\*A 1/2" ratchet is required (not available from Viking).

**Sprinkler Cabinets:**

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

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

**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**

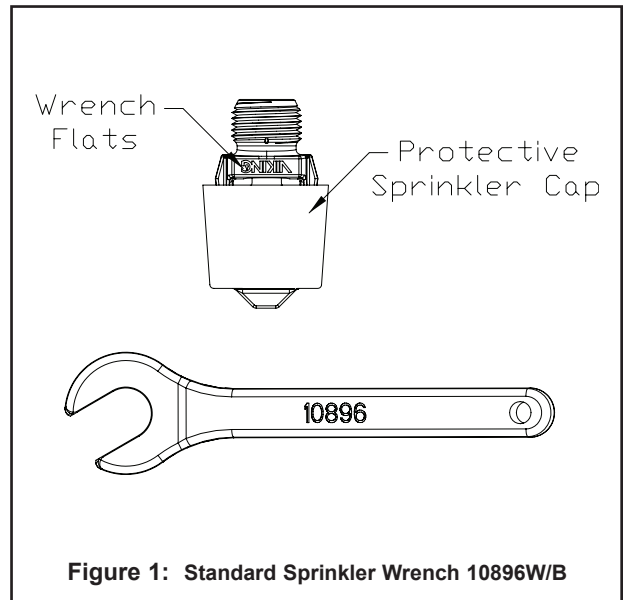
Refer to NFPA 25 for Inspection, Testing and Maintenance requirements.

**7. AVAILABILITY**

The Viking Model VK436 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**


| 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-Enloy® (patents pending), and White Polyester

**Footnotes**

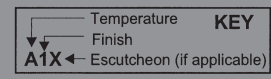
<sup>1</sup> The sprinkler temperature rating is stamped on the deflector.

<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.

|   |  |   |
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|  | <h2 style="margin: 0;">TECHNICAL DATA</h2> | <h3 style="margin: 0;">FREEDOM® RESIDENTIAL<br/>PENDENT SPRINKLER<br/>VK436 (5.2 K-FACTOR)</h3> |
|---|--|---|

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| Approval Chart  |   |  |    |                  |  |  |                        |                        |  |
|---|---|--|----|------------------|--|--|------------------------|------------------------|--|
| Residential Pendent Sprinkler VK436   |   |  |    |                  |  |  |                        |                        |  |
| For systems designed to NFPA 13D or NFPA 13R.   |   |  |    |                  |  |  |                        |                        |  |
| 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                     |  |
| 12166   | VK436                                     | 1/2  | 15 | 5.2              | 75   | 175 psi (12 bar)   | 2-1/4                  | 57                     |  |
| <b>Maximum Areas of Coverage<sup>4</sup></b>  |   | <b>Minimum Water Supply Requirements<sup>4</sup></b> |    |                  |  | <b>Listings and Approvals<sup>3</sup></b><br>(Refer also to Design Criteria on page 140n.) |                        |                        |  |
|   |   |  |    |                  |  | cULus <sup>5,6</sup>   | NYC <sup>8</sup>       | NSF <sup>9</sup>       |  |
| <b>Installed below smooth, flat, horizontal ceilings and horizontal ceilings with beams.</b><br><b>Includes ceilings with slopes up to and including 2/12 (9.5°).</b> |   |  |    |                  |  |  |                        |                        |  |
| 16 ft. x 16 ft. (4.9 m x 4.9 m)   | 14 gpm @ 7.2 psi (53 L/min @ 0.50 bar)    |  |    |                  | A1X  | A1X  | A1X                    |                        |  |
| 18 ft. x 18 ft. (5.5 m x 5.5 m)   | 17 gpm @ 10.7 psi (64.4 L/min @ 0.74 bar) |  |    |                  | A1X  | A1X  | A1X                    |                        |  |
| 20 ft. x 20 ft. (6.1 m x 6.1 m)   | 20 gpm @ 14.8 psi (75.7 L/min @ 1.02 bar) |  |    |                  | A1X  | A1X  | A1X                    |                        |  |
| <b>Installed below ceilings with slopes<sup>7</sup> up to and including a 4/12 (18.4°) pitch. Refer to Figure 7 on page 140p.</b>                                     |   |  |    |                  |  |  |                        |                        |  |
| <b>Maximum Areas of Coverage<sup>4,7</sup></b>  |   | <b>Minimum Water Supply Requirements<sup>4</sup></b> |    |                  |  | <b>UL</b>  | <b>NYC<sup>8</sup></b> | <b>NSF<sup>9</sup></b> |  |
| 18 ft. x 18 ft. (5.5 m x 5.5 m)   |   | 17 gpm @ 10.7 psi (64.4 L/min @ 0.74 bar)            |    |                  |  | A1X  | A1X                    | A1X                    |  |
| <b>Installed below ceilings with slopes<sup>7</sup> up to and including an 8/12 (33.7°) pitch. Refer to Figure 7 on page 140p.</b>                                    |   |  |    |                  |  |  |                        |                        |  |
| <b>Maximum Areas of Coverage<sup>4,7</sup></b>  |   | <b>Minimum Water Supply Requirements<sup>4</sup></b> |    |                  |  | <b>UL</b>  | <b>NYC<sup>8</sup></b> | <b>NSF<sup>9</sup></b> |  |
| 16 ft. x 16 ft. (4.9 m x 4.9 m)   |   | 14 gpm @ 7.2 psi (53 L/min @ 0.50 bar)               |    |                  |  | A1X  | A1X                    | A1X                    |  |
| 18 ft. x 18 ft. (5.5 m x 5.5 m)   |   | 18 gpm @ 12.0 psi (68.1 L/min @ 0.83 bar)            |    |                  |  | B1X  | B1X                    | B1X                    |  |
| 18 ft. x 18 ft. (5.5 m x 5.5 m)   |   | 21 gpm @ 16.3 psi (79.5 L/min @ 1.12 bar)            |    |                  |  | C1X  | C1X                    | C1X                    |  |
| 20 ft. x 20 ft. (6.1 m x 6.1 m)   |   | 20 gpm @ 14.8 psi (75.7 L/min @ 1.02 bar)            |    |                  |  | B1X  | B1X                    | B1X                    |  |
| 20 ft. x 20 ft. (6.1 m x 6.1 m)   |   | 21 gpm @ 16.3 psi (79.5 L/min @ 1.12 bar)            |    |                  |  | C1X  | C1X                    | C1X                    |  |
| <b>Approved Temperature Ratings</b>   |   | <b>Approved Finishes</b>                             |    |                  | <b>Approved Escutcheons</b>  |  |                        |                        |  |
| A - 155 °F (68 °C) and 175 °F (79 °C)<br>B - 155 °F (68 °C)<br>C - 175 °F (79 °C)   |   | 1 - Brass, Chrome-Enloy®, White, and Black           |    |                  | X - Standard surface-mounted escutcheons or the Microfast® Model F-1 Adjustable Escutcheon <sup>10</sup> , or recessed with the Micromatic® Model E-1 or E-2 Recessed Escutcheon |  |                        |                        |  |



**Footnotes**

- <sup>1</sup> Part number shown is the base part number. For complete part number, refer to current Viking price list schedule.
- <sup>2</sup> Metric K-factor shown is for use 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.
- <sup>4</sup> For areas of coverage smaller than shown, use the "Minimum Water Supply Requirement" for the next larger area listed. Flows and pressures listed are per sprinkler.
- <sup>5</sup> Listed by Underwriter's Laboratories for use in the U.S. and Canada.
- <sup>6</sup> Listings are for residential occupancies with smooth, flat, horizontal ceilings or horizontal ceilings with beams. Includes ceilings with slopes up to and including a 2/12 (9.5°) pitch. (For beam ceiling design criteria, refer to Beam Ceiling Guidelines and Figures 5A through 6D on pages 140o-p).
- <sup>7</sup> Areas under sloped ceilings must be measured along the ceiling slope. Actual floor coverage in the horizontal plane under sloped ceilings will be less than the listed area of coverage.
- <sup>8</sup> Accepted for use, City of New York Department of Buildings, MEA Number 89-92-E, Vol. 30.
- <sup>9</sup> Tested and Certified by NSF (National Sanitation Foundation) to NSF/ANSI Standard 61, Drinking Water System Components.
- <sup>10</sup> The Microfast® Model F-1 Adjustable Escutcheon is considered a surface-mounted escutcheon because it does not allow the fusible element of the sprinkler to be recessed behind the face of the wall or ceiling.



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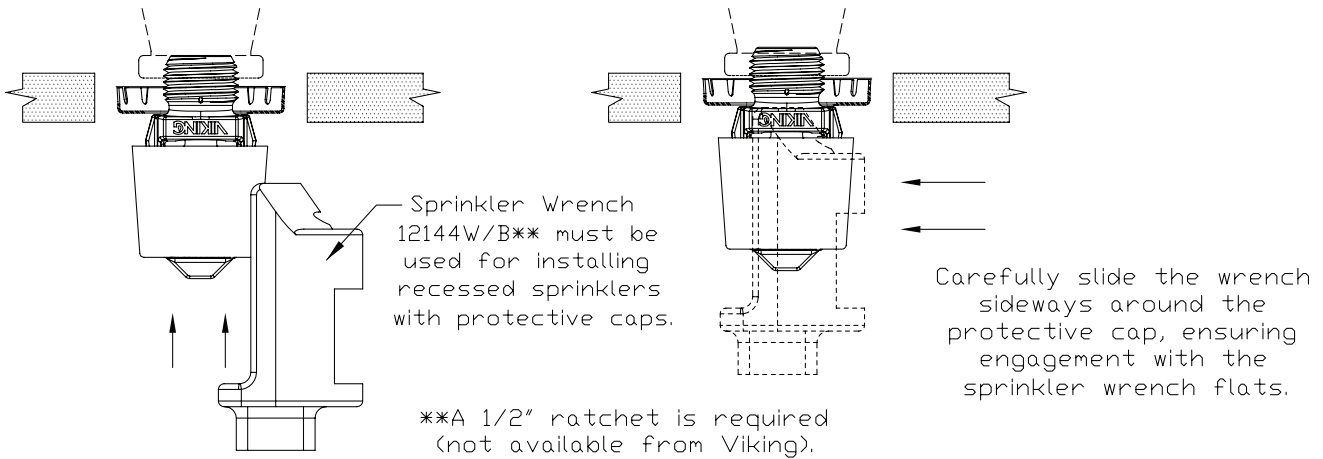


Figure 2: Wrench 12144W/B for installing Coated and/or Recessed Sprinkler VK436

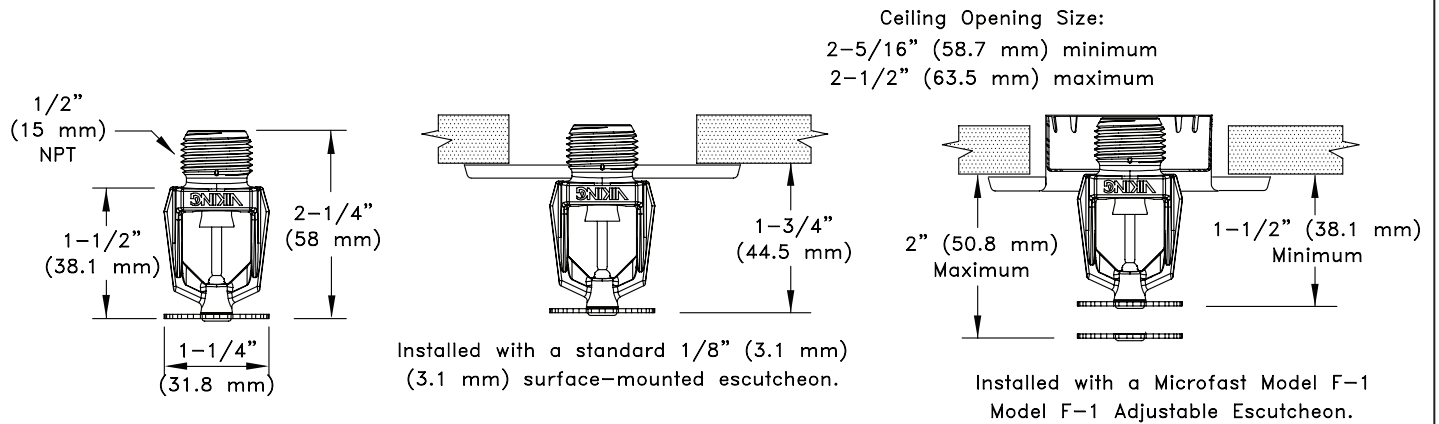


Figure 3: Sprinkler VK436 Dimensions with a Standard Escutcheon and the Model F-1 Adjustable Escutcheon

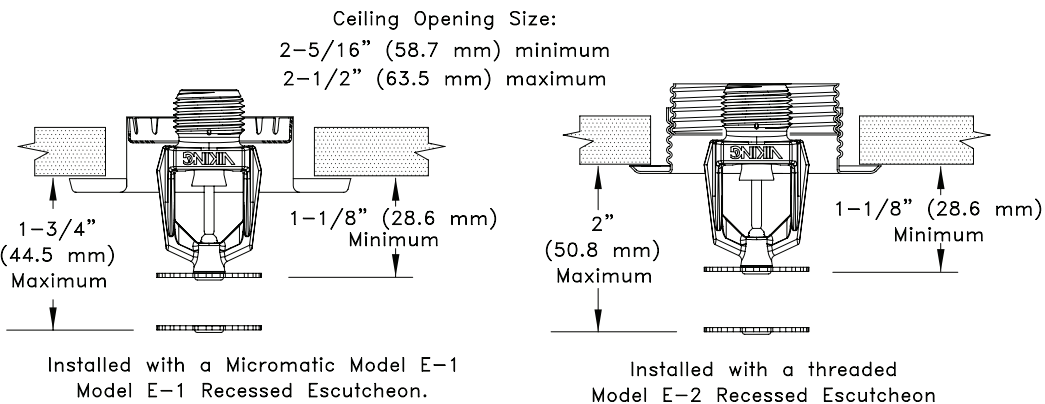


Figure 4: Sprinkler VK436 Dimensions with the Model E-1 and E-2 Recessed Escutcheons



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### DESIGN CRITERIA

(Also refer to the Approval Chart on page 140I.)

#### cULus Listing Requirements:

When using Viking Residential Pendent Sprinkler VK436 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 on page 140I.

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 on data page 140I for NFPA 13D and NFPA13R applications for each listed area of coverage, or
- A minimum discharge of 0.1 gpm/sq. ft. over the “design area” consisting of the four contiguous most hydraulically demanding sprinklers for the coverage areas being protected by the four sprinklers. NOTE: The AS = S x L method must be used to determine the sprinkler protection area of coverage per NFPA 13.
- Minimum distance between residential sprinklers: 8 ft. (2.4 m).

### BEAM CEILING GUIDELINES

cULus 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 Figures 5A and 5B. The vertical distance from the sprinkler deflector to the bottom of the primary beam must be between 1-1/8 and 1-3/4” (29 to 45 mm). The horizontal distance from the centerline of the sprinkler to the primary beam cannot be more than 2” (51 mm) (Figure 5A).

**NOTE:** Consult with a structural engineer before drilling beams to allow the installation of sprinkler drops. Where drilling is not permitted, sprinkler position requirements allow for the sprinkler drop to be placed adjacent to the primary beam.

**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 20'-0" (6.1 m). Refer to Figure 6A.
- B. When beam pockets created by the primary beams exceed 20'-0" (6.1 m) in length, secondary beams are required as follows (also refer to Figure 6B):
  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'-0" (6.1 m) in length.
- C. When primary beam spans do not exceed 20'-0" (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 6C.

**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 6D. **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.



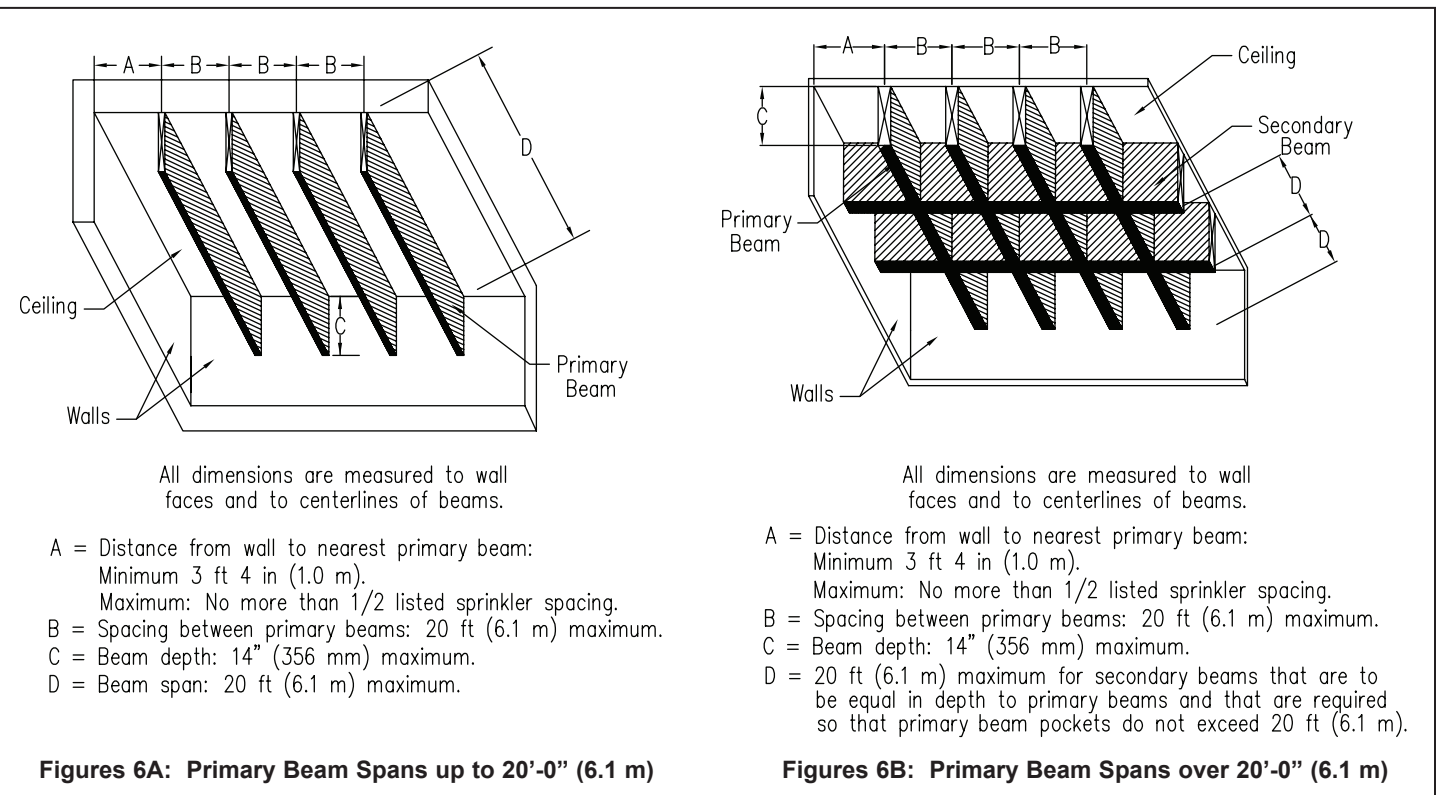
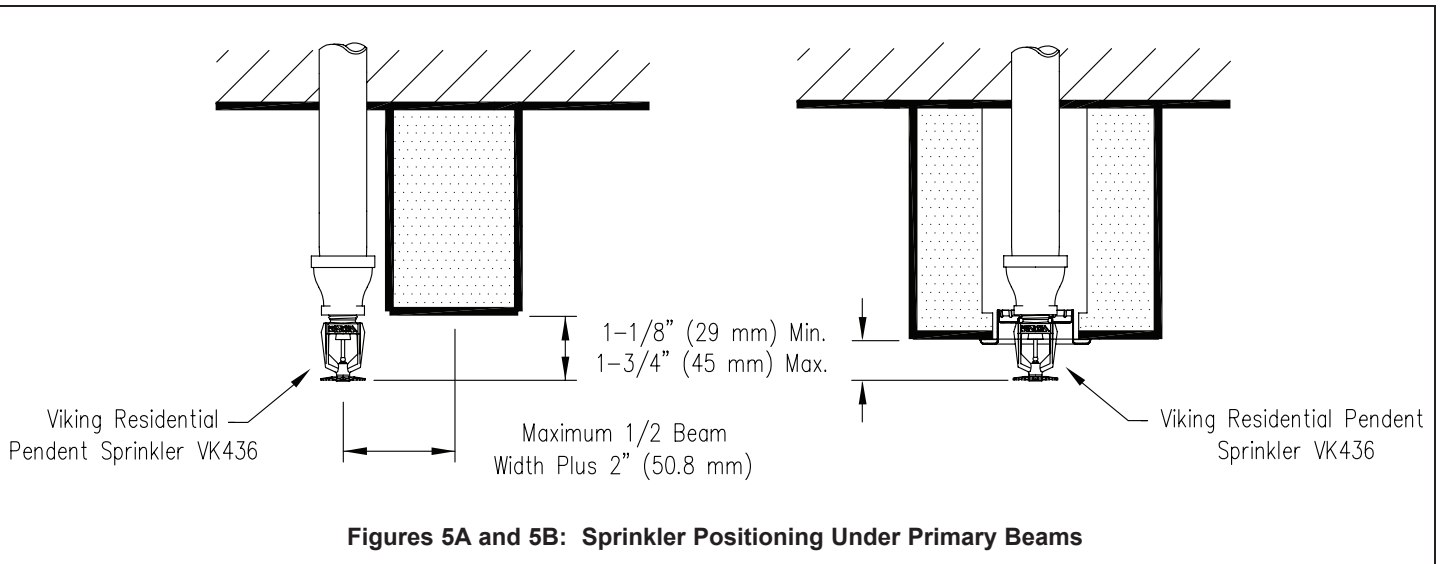
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**IMPORTANT: Always refer to Bulletin Form No. F\_091699 - Care and Handling of Sprinklers. Also refer to pages RES1-17 for general care, installation, and maintenance information. Viking sprinklers are to be installed in accordance with the latest 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.**



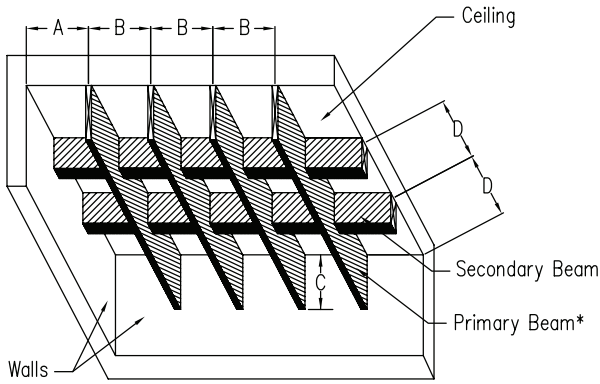


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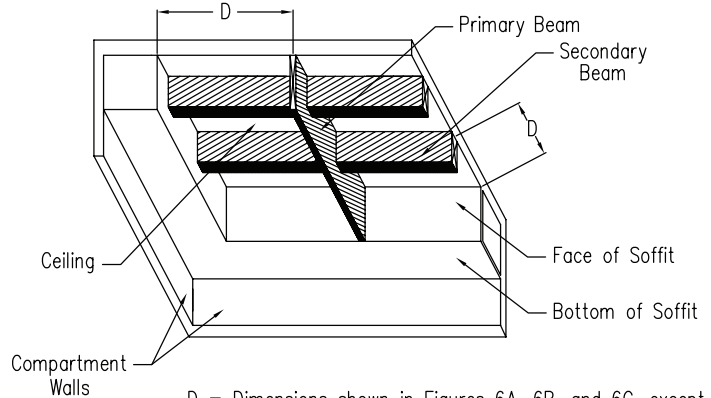
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All dimensions are measured to wall faces and to centerlines of beams.

- 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: 20 ft (6.1 m) maximum.
  - C = Beam depth: 14" (356 mm) maximum. Note: Secondary beam depth cannot be greater than the primary beam.
  - D = Any distance for secondary beams, unless primary beam spans exceed 20 ft (6.1 m).
- \* Refer to Figure 6B for primary beam spans exceeding 20 ft (6.1 m).

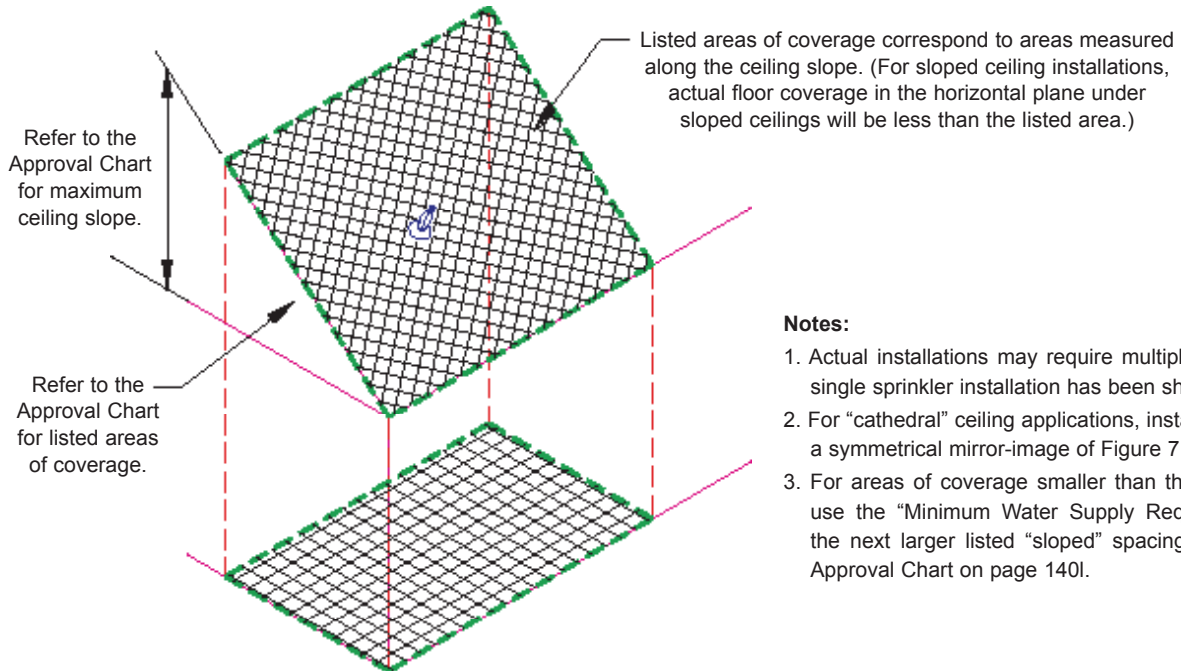
Figures 6C: Combination of Primary and Secondary Beams



D = Dimensions shown in Figures 6A, 6B, and 6C, except measurements are taken from the face of the soffit instead of from the wall surface.

NOTE: The sprinkler area of coverage is to be measured from the wall.

Figures 6D: Beam and Soffit Arrangements



Notes:

1. Actual installations may require multiple sprinklers. A single sprinkler installation has been shown for clarity.
2. For "cathedral" ceiling applications, install sprinklers in a symmetrical mirror-image of Figure 7.
3. For areas of coverage smaller than the listed areas, use the "Minimum Water Supply Requirements" for the next larger listed "sloped" spacing. Refer to the Approval Chart on page 140I.

Figure 7: Installation Instructions - Sloped Ceilings

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