





**3. Hydraulic Design:**

**Solid-Piled, Palletized, Shelf or Bin-Box and Open-Frame Racks:** Base the sprinkler system design for this automatic sprinkler using a minimum pressure of 15 psi (1.0 bar) for ceiling heights up to 30 ft (9.0 m) high and a minimum pressure of 30 psi (2.1 bar) for ceiling heights over 30 ft (9.0 m) and up to 40 ft (12.0 m) high. Base the pressure required over a minimum operating area of 1,200 ft<sup>2</sup> (110 m<sup>2</sup>) with an allowance of 250 gpm (950 L/min) for manual extinguishment and a minimum duration of 60 minutes.

**Storage Racks Equipped With Solid Shelves:** Base the design of the ceiling sprinkler system as outlined above for open-frame racks, however base the need for, as well as the design of, in-rack sprinkler protection the same as what is required for K16.8 (K240) CMSA sprinklers.

**Commodity Hazards Other Than Class 1 through 4 and Cartoned Plastics:** The Victaulic V4601 K25.2 (K360) pendent sprinkler can be used to protect any commodity hazard that can be protected by the K16.8 (K240) upright CMSA sprinkler. Base the design for the K25.2 (K360) pendent sprinkler using the same design required for the K16.8 (K240) sprinkler, however base the required pressure using the following chart:

<b>Design Pressure of K16.8 (K240) Sprinkler, psi (bar)</b>	<b>Corresponding Design Pressure of K25.2 (K360) Sprinkler, psi (bar)</b>
15 (1.0)	7 (0.5)
20 (1.4) or 22 (1.5)	10 (0.7)
35 (2.4)	15 (1.0)

**Shape of Operating Area:** Base the shape of the operating area on a 1.2 shape factor for ceiling slopes up to 5° or a 1.4 shape factor for ceiling slopes up to 10°. **Note that this sprinkler is not permitted in buildings having a ceiling slope over 10° unless the ceiling sprinkler is supplemented with in-rack sprinkler protection.**

**Base the number of sprinklers in the Operating Area parallel to the branchline based on the following equation:**

$$\text{No. of AS in Operating Area Parallel to Branchline} = (\text{Shape Factor} / \text{On-Line AS Spacing}) \times (\text{Operating Area})^{0.5}$$

**Round this equation to the nearest whole number using standard rounding methods (i.e. round down if the resulting fraction is 0.49 or less and round up if the resulting fraction is 0.50 or greater).**

4. **System Type:** Wet-pipe sprinkler systems or pre-action sprinkler systems, whose sprinkler protection design can be based on the equivalent of a wet-pipe system, are acceptable.
5. **Sprinkler Spacing:** The minimum linear spacing distance between sprinklers is 8 ft (2.4 m); the maximum linear spacing distance between sprinklers is 12 ft (3.6 m) for ceilings up to 30 ft (9.0 m) high and 10 ft (3.0 m) for ceilings over 30 ft (9.0 m) and up to 40 ft (123.0 m) high. The minimum and maximum area of coverage per sprinkler is 80 ft<sup>2</sup> (7.4 m<sup>2</sup>) and 100 ft<sup>2</sup> (9.0 m<sup>2</sup>), respectively.
6. **Sprinkler Location from Walls:** Locate the automatic sprinkler with respect to walls, measured perpendicular to the wall, as follows:  
Minimum Horizontal Distance: 4 in. (100 mm)  
Maximum Horizontal Distance unless indicated otherwise in either the occupancy-specific data sheet or the Approval Guide:
  - (a) Wall Angle Greater Than 90°: 5 ft (1.5 m)
  - (b) Wall Angle Equal to or Less Than 90°: 7 ft (2.1 m)
7. **Sprinkler Location from Ceilings:** Locate the centerline of the thermal sensing element of the automatic sprinkler with respect to the vertical distance below ceilings as follows:  
Minimum Vertical Distance: 2 in. (50 mm) for smooth ceilings or 4 in. (100 mm) for non-smooth ceilings.  
Maximum Vertical Distance: 18 in. (450 mm) for ceiling heights up to 30 ft (9.0 m) or 12 in. (300 mm) for ceiling heights over 30 ft (9.0 m) high.
8. **Obstructions:** Use the obstruction guidelines outlined in Data Sheet 2-2 for this sprinkler, except that an individual object up to a maximum width of 1.25 in. (31 mm) can be tolerated less than 12 in. (300 mm) horizontally away from the sprinkler as long as the object is located at least 16 in. (400 mm) vertically below the sprinkler.

All other design details should be in accordance with Data Sheet 8-9. All other installation details, such as smoke/heat vents, airflow velocities, etc. should be in accordance with Data Sheet 2-2.

## SUPPORT FOR RECOMMENDATIONS

The Victaulic V4601 pendent CMSA automatic sprinkler has successfully undergone full-scale fire testing for the protection of commodity hazards up to and including cartoned expanded plastics in buildings with ceiling heights not exceeding 40 ft (12.0 m) high. Acceptable storage arrangements include solid-piled, palletized shelf, bin-box and open-frame racks. Portable racks are also acceptable as long as they meet the guidelines that define them as open-frame racks.