Extended Coverage Sprinklers

Welcome ASPE

Wally Barker
Sprinkler Systems 101
MATERIALS OF CONSTRUCTION

The components that make up a sprinkler head are:
- Frame or casting
- Deflector
- Fusible element or frangible bulb
- Pip Cap
- Pintle Screw
- Belleville Spring

Viking Sprinklers utilize low zinc content brass to provide a more resilient frame or casting. This low zinc content protects the sprinkler from de-zincification.

The Belleville Spring seals the water way of the sprinkler. This metal to metal sealing mechanism allows the waterway to clear even when no pressure is on the inlet of the sprinkler head.
# Laboratory Approvals

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<td>UL &amp; c-UL (ULC)</td>
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<td>FM</td>
<td>FM Requirements</td>
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<td>(NFPA = minimum)</td>
</tr>
<tr>
<td>LPC</td>
<td>LPC Standard</td>
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<td>VDS</td>
<td>VDS Standard</td>
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<td>NYC &amp; LA</td>
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</tbody>
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Types of Sprinkler Heads

Control Mode – Standard Response and Quick Response

Standard Coverage
  Upright
  Pendent
  Sidewall

Extended Coverage
  Upright
  Pendent
  Sidewall

Control Mode Special Application
  Large Drop Sprinkler

Suppression
  ESFR – upright and Pendent

Residential
Control Mode Sprinklers

Control Mode Sprinklers are separated in the following Categories:

Standard Coverage - Standard Response

Standard Coverage - Quick Response

Extended Coverage – Standard Response

Extended Coverage – Quick Response

Dry Barrel – Standard Response/Quick Response

Storage – Standard/Quick Response
Sprinkler Head Identification
Sprinkler Model or SIN Number

The Model or SIN (Sprinkler Identification) Number is a number assigned to a sprinkler head. The number is stamped on the sprinkler deflector as a means of identifying the sprinkler.

<table>
<thead>
<tr>
<th>MICROMATIC® Model M Glass Bulb Sprinkler</th>
<th>Model Number (SIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V12 V01 - V114 STANDARD RESPONSE</td>
<td></td>
</tr>
<tr>
<td>UPRIGHT</td>
<td>VK100</td>
</tr>
<tr>
<td></td>
<td>VK200</td>
</tr>
<tr>
<td></td>
<td>VK200</td>
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<tr>
<td></td>
<td>VK001</td>
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<td></td>
<td>VK002</td>
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<tr>
<td></td>
<td>VK001</td>
</tr>
<tr>
<td></td>
<td>VK145</td>
</tr>
<tr>
<td></td>
<td>VK122</td>
</tr>
<tr>
<td>PENDENT</td>
<td>VK102</td>
</tr>
<tr>
<td></td>
<td>VK202</td>
</tr>
<tr>
<td></td>
<td>VK202</td>
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<tr>
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<td>VK003</td>
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<tr>
<td></td>
<td>VK004</td>
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<tr>
<td></td>
<td>VK004</td>
</tr>
<tr>
<td></td>
<td>VK202</td>
</tr>
</tbody>
</table>
TEMPERATURE RATINGS
FOR GLASS BULB HEADS
<table>
<thead>
<tr>
<th>Temperature</th>
<th>Color</th>
<th>Max Ceiling Temp</th>
</tr>
</thead>
<tbody>
<tr>
<td>155°F</td>
<td>Red</td>
<td>100°F (38°C)</td>
</tr>
<tr>
<td>175°F</td>
<td>Yellow</td>
<td>150°F (65°C)</td>
</tr>
<tr>
<td>200 or 212°F</td>
<td>Green</td>
<td>225°F (107°C)</td>
</tr>
<tr>
<td>286°F</td>
<td>Blue</td>
<td>300°F (149°C)</td>
</tr>
<tr>
<td>360°F</td>
<td>Mauve</td>
<td>465°F (240°C)</td>
</tr>
<tr>
<td>500°F</td>
<td>Black</td>
<td></td>
</tr>
</tbody>
</table>

**Standard Response Elements – 5 mm bulb**
### Fire Sprinkler Temperatures and Colors

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Color</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>155°F (68°C)</td>
<td>Red</td>
<td>Ordinary</td>
</tr>
<tr>
<td>175°F (79°C)</td>
<td>Yellow</td>
<td>Intermediate</td>
</tr>
<tr>
<td>200 or 212°F (93 or 100°C)</td>
<td>Green</td>
<td>High</td>
</tr>
<tr>
<td>286°F (141°C)</td>
<td>Blue</td>
<td>Max Ceiling</td>
</tr>
</tbody>
</table>

- **Ordinary**: Red
- **Intermediate**: Yellow
- **High**: Blue

**Max Ceiling Temperatures**:
- Ordinary: 100°F (38°C)
- Intermediate: 150°F (65°C)
- High: 225°F (107°C)

*Fast Response Elements – 3 mm bulb*
K Factors

K factors are known as the coefficient of discharge. The larger the K factor in number, the more water it can discharge at a given pressure. There are (3) current thread sizes used for sprinkler heads, $\frac{1}{2}''$, $\frac{3}{4}''$, and 1'' threads.

Do not just match the thread size when replacing a sprinkler head. Identify what orientation, K factor, and temperature prior to replacing a sprinkler.
Why Larger K Factors?

• Develop larger water droplets that penetrate the fire plume

• Discharges same water density at lower pressures

• Lower starting pressures may save the designer a pipe size in their calculations, which will lower the cost of the system installation.
## NOMINAL K FACTORS - NFPA13 and Factory Mutual
### What is a sprinkler “K- Factor”

<table>
<thead>
<tr>
<th>K</th>
<th>% of 5.6</th>
<th>Thread</th>
<th>K</th>
<th>% of 5.6</th>
<th>Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.4</td>
<td>25%</td>
<td>½”</td>
<td>14.0</td>
<td>250%</td>
<td>¾”</td>
</tr>
<tr>
<td>1.9</td>
<td>33.3%</td>
<td>½”</td>
<td>16.8</td>
<td>300%</td>
<td>¾”</td>
</tr>
<tr>
<td>2.8</td>
<td>50%</td>
<td>½”</td>
<td>19.6</td>
<td>350%</td>
<td>1”</td>
</tr>
<tr>
<td>4.2</td>
<td>75%</td>
<td>½”</td>
<td>22.4</td>
<td>400%</td>
<td>1”</td>
</tr>
<tr>
<td>Baseline</td>
<td>100%</td>
<td>½”</td>
<td>25.2</td>
<td>450%</td>
<td>1”</td>
</tr>
<tr>
<td>8.0</td>
<td>140%</td>
<td>¾”</td>
<td>28.0</td>
<td>500%</td>
<td>1”</td>
</tr>
<tr>
<td>11.2</td>
<td>200%</td>
<td>¾”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sprinkler Sensitivity

Thermal Response Requirements
SPRINKLER SENSITIVITY

• STANDARD RESPONSE
  – 3 Min. 51 Sec. Room Fire Test
  – 100 Sec. Plunge Test

• QUICK RESPONSE
  – 75 Sec. Room Fire Test
  – 14 Sec. Plunge Test

• RESIDENTIAL
  – Special Fire Test
  – 14 Sec. Plunge
Plunge Oven
Response Time Index - RTI

• **RTI** - measures the speed of response of the heat sensitive element

• Traditionally Fast Response Sprinklers have a thermal element with an RTI of 50 (meters-seconds)\(^{1/2}\) or less. ESFR’s must have a thermal element with an RTI of 36 (meters-seconds)\(^{1/2}\) or less

• Standard Response Sprinklers have a thermal element with an RTI of 80 (meters-seconds)\(^{1/2}\) or more.

Strut – 110 m-s\(^{1/2}\)

Glass Bulb (5mm) - 105 m-s\(^{1/2}\)
Fusible Link – 26 m-s\(^{1/2}\)

Glass Bulb (3mm) - 36 m-s\(^{1/2}\)
Glass Bulb (2.5mm) - 22 m-s\(^{1/2}\)
Heat Fin - 26 m-s\(^{1/2}\)
**MINIMUM SPRINKLER FLOW**

\[ Q = \text{Area} \times \text{Density} \]

\[ Q = K \times \sqrt{P} \]

\[ P = \left(\frac{Q}{K}\right)^2 \]

\[ K = \frac{Q}{\sqrt{P}} \]

- \( Q \) = Water Flow
- \( K \) = Coefficient of Discharge
- \( P \) = Pressure
**Sprinkler Spacing**
Determining Area/Sprinkler

Along branch lines:
1. Determine distance between sprinklers (or to wall/obstruction)
2. Choose largest - twice distance to wall or distance to next sprinkler. This dimension will be defined as $S$.

Between branch lines:
1. Determine distance to adjacent branch line (or to wall/obstruction).
2. Choose largest - twice distance to wall or distance to adjacent line. This dimension will be defined as $L$.

\[
\text{Area/Sprinkler} = S \times L
\]
Sprinkler Spacing
Determining Area/Sprinkler

Extended Coverage or Residential

Must use one of the Listed coverage areas

The actual area protected per sprinkler must fit within the Listed design coverage area
## Sprinkler Spacing
### Determining Area/Sprinkler

#### Extended Coverage or Residential

**Example:**

19 x 10 room  
Use 20 x 20

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### Design Basics

**5.2 (75) K-factor**  
VK436, Part No. 12166  
Tech Data Pace Sprinkler 140  
* Listed with beam ceilings up to 14"  

<table>
<thead>
<tr>
<th>Area</th>
<th>K-factor</th>
<th>12 x 12</th>
<th>14 x 14</th>
<th>16 x 16</th>
<th>18 x 18</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>(75)</td>
<td>(3,7x3,7)</td>
<td>(3,7x3,7)</td>
<td>(4,9x4,9)</td>
<td>(5,5x5,5)</td>
</tr>
<tr>
<td>12 x 12</td>
<td>12 (3,7x3,7)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
</tr>
<tr>
<td>14 x 14</td>
<td>14 (3,7x3,7)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
</tr>
<tr>
<td>16 x 16</td>
<td>16 (4,9x4,9)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
<td>14 (53,0)</td>
</tr>
<tr>
<td>18 x 18</td>
<td>18 (5,5x5,5)</td>
<td>17 (64,4)</td>
<td>17 (64,4)</td>
<td>17 (64,4)</td>
<td>17 (64,4)</td>
</tr>
</tbody>
</table>

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### 5.5 (79) K-factor
VK432, Part No. 10050  
Tech Data Pace Sprinkler 141a  
* Continually listed by UL since 1997  

<table>
<thead>
<tr>
<th>Area</th>
<th>K-factor</th>
<th>12 x 12</th>
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<th>16 x 16</th>
<th>18 x 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(79)</td>
<td>(3,7x3,7)</td>
<td>(4,9x4,9)</td>
<td>(5,5x5,5)</td>
<td>20 x 20</td>
</tr>
<tr>
<td>12 x 12</td>
<td>12 (3,7x3,7)</td>
<td>16 (60,6)</td>
<td>19 (79,5)</td>
<td>21 (79,5)</td>
<td>21 (79,5)</td>
</tr>
<tr>
<td>14 x 14</td>
<td>14 (4,9x4,9)</td>
<td>19 (79,5)</td>
<td>21 (79,5)</td>
<td>21 (79,5)</td>
<td>21 (79,5)</td>
</tr>
<tr>
<td>16 x 16</td>
<td>16 (5,5x5,5)</td>
<td>21 (79,5)</td>
<td>22 (83,3)</td>
<td>22 (83,3)</td>
<td>22 (83,3)</td>
</tr>
<tr>
<td>18 x 18</td>
<td>18 (6x6)</td>
<td>24 (90,8)</td>
<td>24 (90,8)</td>
<td>24 (90,8)</td>
<td>24 (90,8)</td>
</tr>
</tbody>
</table>

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### 7.4 (87) K-factor
VK458, Part No. 13230  
Tech Data Pace Sprinkler 140w  
* Larger K-Factor provides lowest starting pressure in NFPA 13 applications (0.1 density)  

<table>
<thead>
<tr>
<th>Area</th>
<th>K-factor</th>
<th>12 x 12</th>
<th>14 x 14</th>
<th>16 x 16</th>
<th>18 x 18</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(87)</td>
<td>(3,7x3,7)</td>
<td>(4,9x4,9)</td>
<td>(5,5x5,5)</td>
<td>20 x 20</td>
</tr>
<tr>
<td>12 x 12</td>
<td>12 (3,7x3,7)</td>
<td>20 (75,7)</td>
<td>20 (75,7)</td>
<td>20 (75,7)</td>
<td>20 (75,7)</td>
</tr>
<tr>
<td>14 x 14</td>
<td>14 (4,9x4,9)</td>
<td>20 (75,7)</td>
<td>20 (75,7)</td>
<td>20 (75,7)</td>
<td>20 (75,7)</td>
</tr>
<tr>
<td>16 x 16</td>
<td>16 (5,5x5,5)</td>
<td>22 (83,3)</td>
<td>23 (87,1)</td>
<td>23 (87,1)</td>
<td>23 (87,1)</td>
</tr>
<tr>
<td>18 x 18</td>
<td>18 (6x6)</td>
<td>24 (90,8)</td>
<td>24 (90,8)</td>
<td>24 (90,8)</td>
<td>24 (90,8)</td>
</tr>
</tbody>
</table>

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*Floors shown for 55°F/13°C; test data page for floors at 75°F/24°C.

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*Floors shown for 55°F/13°C; test data page for floors at 75°F/24°C.
Sprinkler Spacing
Determining Area/Sprinkler
Extended Coverage or Residential

Example:

16 x 18 room
Use 18 x 18
Determining Design Area
Determining Size

Starts with the chart in NFPA 13

FIGURE 11.2.3.1.5 Density/Area Curves.
Determining Size
Extended Coverage

Must use Greater of...

Coverage of five sprinklers or area required by occupancy

Example 1:
Light Hazard w/ 20x20 Sprinklers
400sf x 5 sprinklers = 2000sf
LH = 1500 sf
Use 2000sf

Example 2:
Light Hazard w/ 14x14 Sprinklers
196sf x 5 sprinklers = 980sf
LH = 1500 sf
Use 1500sf
Determining Size
Quick Response Sprinklers

When using Quick Response…

You can reduce the design area based on ceiling height

(Remember: NFPA 13 limits the minimum size to 900sf)
Design Calculations
Calculating End Head Flow (Q)

Q = Area x Density

Example: .15 density with 120sf coverage per sprinkler

.15 x 120 = **18gpm minimum @** end head
Calculating Pressure (P) at the End Head

\[ P = (Q \div K)^2 \]

- \( Q \) = Flow of end head
- \( K \) = K Factor of Sprinkler

Example:

\[ Q = 18 \text{gpm} \]
\[ K = 5.6 \]

So… \((18 \div 5.6)^2 = 10.3\text{psi Minimum}\)
Orifice Sizes

Orifice Sizes are Represented by a “K Factor”

The K Factor is derived by the following formula:

\[
K = 29.83 \, CD^2
\]

Basically, the larger the K, the larger the orifice.
## Starting Pressure Comparison for Different Orifice Sprinklers

<table>
<thead>
<tr>
<th>K Factor</th>
<th>Flow Rate</th>
<th>Starting Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6</td>
<td>26 gpm</td>
<td>21.55 psi</td>
</tr>
<tr>
<td>8.0</td>
<td>26 gpm</td>
<td>10.56 psi</td>
</tr>
<tr>
<td>11.2</td>
<td>26 gpm (29.63 gpm)</td>
<td>5.11 psi (min 7 psi)</td>
</tr>
<tr>
<td>16.8</td>
<td>26 gpm (44.44 gpm)</td>
<td>2.39 psi (min 7 psi)</td>
</tr>
</tbody>
</table>

.20 gpm per sq. ft x 130 sq. ft. = 26 gpm
Standard Coverage Sprinklers
Pendent or Upright

Minimum operating pressure is 7 psi. Flow rate per sprinkler is determined by area x density or minimum pressure multiplied by square root of minimum pressure (which ever is greater)
Standard Coverage Sprinklers

Pendent and Upright
Standard Coverage Sprinklers
Pendent or Upright

Standard Spray Sprinkler Spacing (Area of Coverage)
Light Hazard (as defined by NFPA 13) : 225 sq. ft. max
Ordinary Hazard (as defined by NFPA 13) : 130 sq. ft. max
Extra Hazard (as defined by NFPA 13) : 100 sq. ft. max

(Note: areas given for hydraulically calculated systems)
Classification of Occupancies

Upright and pendent spray sprinklers shall be permitted in all occupancy hazard classifications and building construction types.

5.1* Classification of Occupancies.

5.1.1 Occupancy classifications for this standard shall relate to sprinkler design, installation, and water supply requirements only.

5.1.2 Occupancy classifications shall not be intended to be a general classification of occupancy hazards.

5.2* Light Hazard Occupancies.

Light hazard occupancies shall be defined as occupancies or portions of other occupancies where the quantity and/or combustibility of contents is low and fires with relatively low rates of heat release are expected.

EXAMPLES: Churches, Clubs, Hospitals, Museums, Offices, Restaurant Seating Areas
NFPA 13 limits maximum area of coverage for Light Hazard to 225 sq. ft. per sprinkler

Standard Coverage Sprinklers

*Plan View
Density prescribed for Light Hazard is .10 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 225 sq. ft. is determined by area x density = Q

Example: .10 gpm per sq. ft. x 225 sq. ft. = 22.5 gpm
Classification of Occupancies

Upright and pendent spray sprinklers shall be permitted in all occupancy hazard classifications and building construction types.

5.1* Classification of Occupancies.
   5.1.1 Occupancy classifications for this standard shall relate to sprinkler design, installation, and water supply requirements only.
   5.1.2 Occupancy classifications shall not be intended to be a general classification of occupancy hazards.

5.3.1* Ordinary Hazard (Group 1).
Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8’-0”, and fires with moderate rates of heat release are expected.

   Examples: Restaurant Service Areas, Bakeries, Automobile Parking and Showrooms, Laundries

5.3.2* Ordinary Hazard (Group 2). Ordinary hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are moderate to high, stockpiles do not exceed 12’, and fires with moderate to high rates of heat release are expected.

   Examples: Dry Cleaners, Horse Stables, Machine Shops, Library Stack Rooms, Mercantile, Confectionary Products, Casino area.
NFPA 13 limits maximum area of coverage for Ordinary Hazard to 130 sq. ft. per sprinkler

*Plan View

Standard Coverage Sprinklers
Density prescribed for Ordinary Hazard 1 is .15 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 130 sq. ft. is determined by area x density = Q

Example: .15 gpm per sq. ft. x 130 sq. ft. = 19.5 gpm
Density prescribed for Ordinary Hazard 2 is .20 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 130 sq. ft. is determined by area x density = Q
Example: .20 gpm per sq. ft. x 130 sq. ft. = 26 gpm
Classification of Occupancies

Upright and pendent spray sprinklers shall be permitted in all occupancy hazard classifications and building construction types.

5.1* Classification of Occupancies.

5.1.1 Occupancy classifications for this standard shall relate to sprinkler design, installation, and water supply requirements only.

5.1.2 Occupancy classifications shall not be intended to be a general classification of occupancy hazards.

5.4.1* Extra Hazard (Group 1). Extra hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with high rates of heat release but with little or no combustible or flammable liquids.

Examples: Combustible Hydraulic Fluid Use Areas, Metal Extruding, Saw Mills, Upholstering with Plastic Foams, Rubber Reclaiming

5.4.2* Extra Hazard (Group 2). Extra hazard (Group 2) occupancies shall be defined as occupancies or portions of other occupancies with moderate to substantial amounts of flammable or combustible liquids or occupancies where shielding of combustibles is extensive.

Examples: Flammable Liquids Spraying, Open Oil Quenching, Plastics Processing, Solvent Cleaning, Varnish and Paint Dipping
NFPA 13 limits maximum area of coverage for Extra Hazard to 100 sq. ft. per sprinkler.

Standard Coverage Sprinklers

*Plan View

10’-0” (3,04m)

10’-0” (3,04m)

10’-0” (3,04m)

10’-0” (3,04m)
Density prescribed for Extra Hazard 1 is .30 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 100 sq. ft. is
Determined by area x density = Q
Example: .30 gpm per sq. ft. x 100 sq. ft. = 30 gpm
Density prescribed for Extra Hazard 2 is .40 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 100 sq. ft. is determined by area x density = Q

Example: .40 gpm per sq. ft. x 100 sq. ft. = 40 gpm
Standard Coverage Sprinklers
Sidewall
Standard Coverage Sprinklers

Sidewall

Standard Spray Sprinkler Spacing (Area of Coverage)

Light Hazard (as defined by NFPA 13) : 196 sq. ft. max
(18,2 sq. m)

Ordinary Hazard (as defined by NFPA 13) : 100 sq. ft. max
(9,29 sq. m)

(Note: Must be listed for Ordinary Hazard)
SIDEWALL SPRINKLER DISTRIBUTION

Must meet Average Distribution Requirements over the 100 ft\(^2\) (9,3 m\(^2\)) area between two sprinklers spaced 10 ft. (3,05 m) apart for standard 1/2” (15 mm) orifice sprinklers: 0.05 gpm/ft\(^2\) (0.034 L/s/m\(^2\)) or 0.07 gpm/ft\(^2\) (0.048 L/s/m\(^2\)) for large orifice sprinklers 17/32” (20 mm): And still provide 3.5% against wall in which sprinklers are installed, for both 1/2” and L/O.
Density prescribed for Light Hazard is .10 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 196 sq. ft. is
Determined by area x density = Q
Example: .10 gpm per sq. ft. x 196 sq. ft. = 19.6 gpm
Density prescribed for Ordinary Hazard Group 1 is .15 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 100 sq. ft. is determined by area x density = Q

Example: .15 gpm per sq. ft. x 100 sq. ft. = 15 gpm
Density prescribed for Ordinary Hazard Group 2 is .20 gpm per sq. ft.

Minimum flow rate for sprinklers spaced 100 sq. ft. is determined by area x density = Q

Example: .20 gpm per sq. ft. x 100 sq. ft. = 20 gpm
Extended Coverage Sprinklers
Pendent and Upright
Extended Coverage Sprinklers

-Light, Ordinary & Extra Hazard Occupancies.
SPRINKLER DISTRIBUTION

• EXTENDED COVERAGE

– FLOOR AREA PLUS WET THE WALL 30” (762 mm) ABOVE THE FINISHED FLOOR

Model M ECOH-ELO Pendent VK534

Model M ECOH-ELO Upright VK532

Model M ECLH-ELO Pendent VK608

ECOH-K14
ECLH-ELO Pendant

Spacing and Minimum Flow Rate
Extended Coverage Sprinklers
Have maximum coverage areas of 400 sq. ft. as mandated by NFPA 13. Spacing is in increments of 2’-0” intervals, example: 12’x12’, 14’x14’ 16’x16’, 18’x18’, 20’x20’
Light Hazard – 16’ x 16’ spacing (reduces number of Sprinklers)

256 sq. ft. x .10 gpm per sq. ft. = 25.6 gpm

Extended Coverage Sprinklers
Light Hazard – 18’ x 18’ spacing (reduces number of Sprinklers)

324 sq. ft. x .10 gpm per sq. ft. = 32.4 gpm

Extended Coverage Sprinklers
Light Hazard – 20’ x 20’ spacing (reduces number of Sprinklers)

400 sq. ft. x .10 gpm per sq. ft. = 40 gpm

Extended Coverage Sprinklers
## Extended Coverage Spacing

**ECLH Sprinkler Minimum Design**

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Area of coverage</th>
<th>Light Hazard Density</th>
<th>Minimum water flow</th>
<th>* % Fewer Sprinklers</th>
</tr>
</thead>
<tbody>
<tr>
<td>16’x16’</td>
<td>256 ft²</td>
<td>.10 gpm/sq ft.</td>
<td>19.6 gpm</td>
<td>13%</td>
</tr>
<tr>
<td>18’x18’</td>
<td>324 ft²</td>
<td>.10 gpm/sq ft.</td>
<td>32.4 gpm</td>
<td>30%</td>
</tr>
<tr>
<td>20’x20’</td>
<td>400 ft²</td>
<td>.10 gpm/sq ft.</td>
<td>40 gpm</td>
<td>44%</td>
</tr>
</tbody>
</table>

*Based on a 225 sq. ft. coverage area for standard coverage upright and pendent*
ECOH-ELO Upright & Pendent

Spacing and Minimum Flow Rate
(Ordinary Hazard Group 1)
Ord. Hazard Group 1 – 12’ x 12’ spacing (reduces number of Sprinklers)

144 sq. ft. x .15 gpm per sq. ft. = 21.6 gpm

Extended Coverage Sprinklers
Ord. Hazard Group 1 – 14’ x 14’ spacing (reduces number of Sprinklers)

196 sq. ft. x .15 gpm per sq. ft. = 29.4 gpm

Extended Coverage Sprinklers
Ord. Hazard Group 1 – 16’ x 16’ spacing (reduces number of Sprinklers)

256 sq. ft. x .15 gpm per sq. ft. = 38.4 gpm

Extended Coverage Sprinklers
Ord. Hazard Group I – 18’ x 18’ spacing (reduces number of Sprinklers)

324 sq. ft. x .15 gpm per sq. ft. = 48.6 gpm

Extended Coverage Sprinklers
Ord. Hazard Group I – 20’ x 20’ spacing (reduces number of Sprinklers)

400 sq. ft. x .15 gpm per sq. ft. = 60 gpm

Extended Coverage Sprinklers
## ECOH Sprinkler Minimum Design

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Area of coverage</th>
<th>OH. I Density</th>
<th>Minimum water flow</th>
<th>* % Fewer Sprinklers</th>
</tr>
</thead>
<tbody>
<tr>
<td>12’x12</td>
<td>144 ft²</td>
<td>.15 gpm/sq ft.</td>
<td>21.6 gpm</td>
<td>10%</td>
</tr>
<tr>
<td>14’x14’</td>
<td>196 ft²</td>
<td>.15 gpm/sq ft.</td>
<td>29.4 gpm</td>
<td>35%</td>
</tr>
<tr>
<td>16’x16’</td>
<td>256 ft²</td>
<td>.15 gpm/sq ft.</td>
<td>38.4 gpm</td>
<td>50%</td>
</tr>
<tr>
<td>18’x18’</td>
<td>324 ft²</td>
<td>.15 gpm/sq ft.</td>
<td>48.6 gpm</td>
<td>60%</td>
</tr>
<tr>
<td>20’x20’</td>
<td>400 ft²</td>
<td>.15 gpm/sq ft.</td>
<td>60 gpm</td>
<td>66%</td>
</tr>
</tbody>
</table>

*Based on a 130 sq. ft. coverage area for standard coverage upright and pendent*
ECOH-ELO Upright & Pendant

Spacing and Minimum Flow Rate
(Ordinary Hazard Group 2)
Ord. Hazard Group 2 – 12’ x 12’ spacing (reduces number of Sprinklers)

144 sq. ft. x .20 gpm per sq. ft. = 28.8 gpm

Extended Coverage Sprinklers
Ord. Hazard Group 2 – 14’ x 14’ spacing (reduces number of Sprinklers)

196 sq. ft. x .20 gpm per sq. ft. = 39.2 gpm

Extended Coverage Sprinklers
Ord. Hazard Group 2 – 16’ x 16’ spacing (reduces number of Sprinklers)

256 sq. ft. x .20 gpm per sq. ft. = 51.2 gpm

Extended Coverage Sprinklers
Ord. Hazard Group 2 – 18’ x 18’ spacing (reduces number of Sprinklers)

324 sq. ft. x .20 gpm per sq. ft. = 64.8 gpm

Extended Coverage Sprinklers
Ord. Hazard Group 2 – 20’ x 20’ spacing (reduces number of Sprinklers)

400 sq. ft. x .20 gpm per sq. ft. = 80 gpm

Extended Coverage Sprinklers
### ECOH Sprinkler Minimum Design

<table>
<thead>
<tr>
<th>Spacing</th>
<th>Area of coverage</th>
<th>OH II Density</th>
<th>Minimum water flow</th>
<th>* % Fewer Sprinklers</th>
</tr>
</thead>
<tbody>
<tr>
<td>12’x12</td>
<td>144 ft²</td>
<td>.20 gpm/sq ft.</td>
<td>28.8 gpm</td>
<td>10%</td>
</tr>
<tr>
<td>14’x14’</td>
<td>196 ft²</td>
<td>.20 gpm/sq ft.</td>
<td>39.2 gpm</td>
<td>35%</td>
</tr>
<tr>
<td>16’x16’</td>
<td>256 ft²</td>
<td>.20 gpm/sq ft.</td>
<td>51.2 gpm</td>
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</tr>
<tr>
<td>18’x18’</td>
<td>324 ft²</td>
<td>.20 gpm/sq ft.</td>
<td>64.8 gpm</td>
<td>60%</td>
</tr>
<tr>
<td>20’x20’</td>
<td>400 ft²</td>
<td>.20 gpm/sq ft.</td>
<td>80 gpm</td>
<td>66%</td>
</tr>
</tbody>
</table>

*Based on a 130 sq. ft. coverage area for standard coverage upright and pendent*
EC Sidewall vs. Standard

• EC has larger protection areas
• EC has flatter distribution
• Require greater separation from obstructions
• Need to be designed and installed per listing
Extended Coverage Sidewall Spacing

- *Per NFPA 13: Unobstructed, flat*

  - Max. area of coverage = 400 ft² (Lt. & Ord.)
  - Light Hazard 28’ max. between sprinklers
  - Ordinary Hazard 24’ max. between sprinklers
Extended Coverage
Horizontal Sidewall

• New Patented “Stream Shaper” Design
QR ECLH Sidewall

- Coverage's 14 x 26', 16 x 24', 18 x 20', 18 x 22'
- UL Listed & FM Approved
- Recessed & Domed Concealed
EC Head Example (VK572)  
(Garage Head)

- Specifically listed for concrete tee construction
- SR 20’ x 20’
- OH listed
Extended Coverage
Advantages
(= $ saved)

• Less Sprinkler Heads
• Less Pipe / Fittings
• Less Installation Labor
• Maximum Use of Available Water Supply
Thank you.