

Extended Coverage Sprinklers

Welcome ASPE

Wally Barker

VIKING

Worldwide Fire Protection



Sprinkler Systems 101

Worldwide Fire Protection

MATERIALS OF CONSTRUCTION

The components that make up a sprinkler head are:

Frame or casting

Deflector

Fusible element or frangible bulb

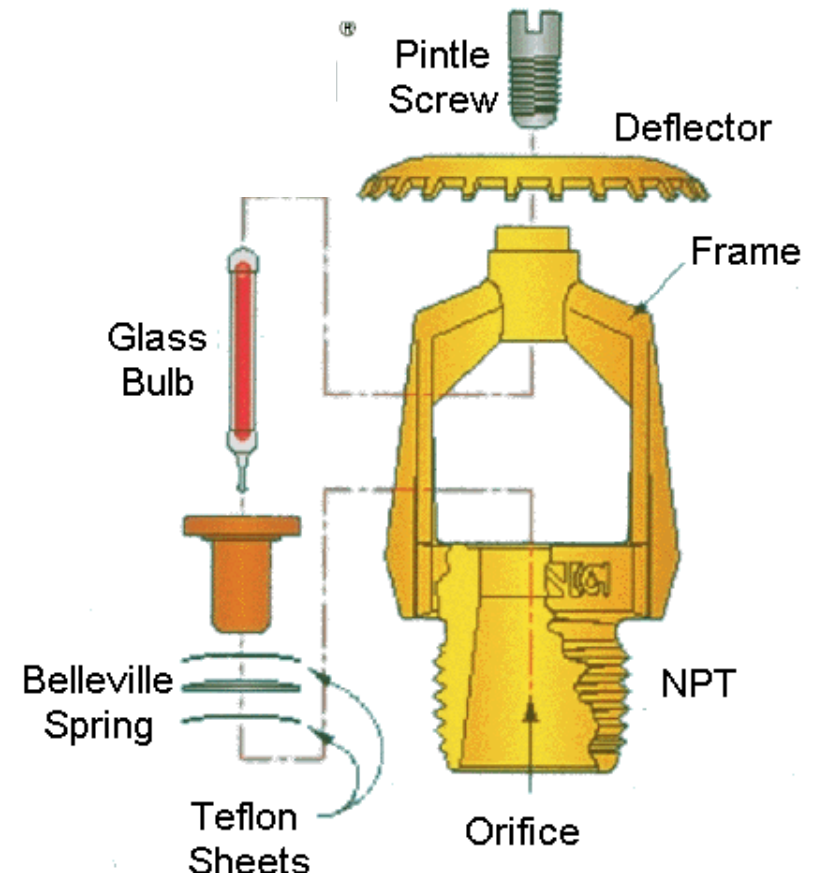
Pip Cap

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

AGENCY

UL & c-UL (ULC)

FM

LPC

VDS

NYC & LA

STANDARD

NFPA & UL Requirements

FM Requirements

(NFPA = minimum)

LPC Standard

VDS Standard

Specific City approvals

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

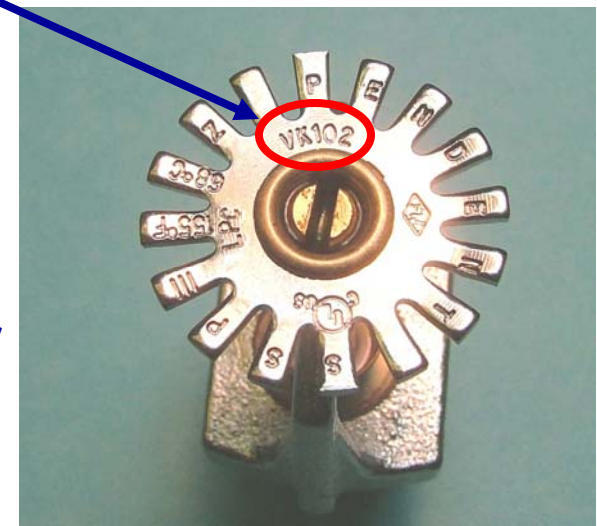
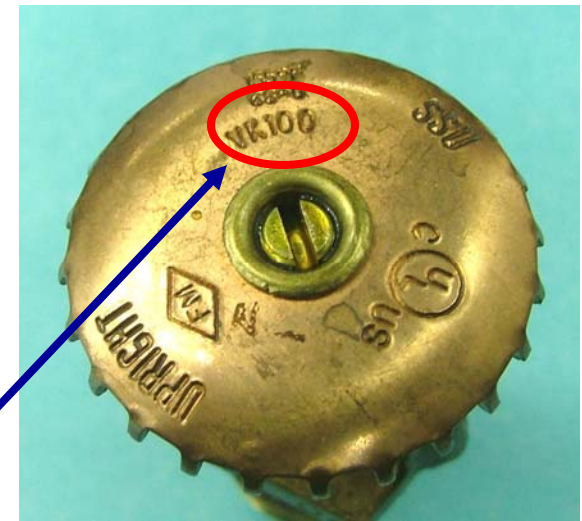
Dry Barrel – Standard Response/Quick Response

Storage – Standard/Quick Response

Sprinkler Head Identification

Sprinkler Model or SIN Number

MICROMATIC® Model M Glass Bulb Sprinkler V12 V01 - V11 ⁴ STANDARD RESPONSE			Model Number (SIN)
UPRIGHT 	BSP BSP BSP		VK100 VK200 VK200 VK001 VK002 VK145 VK200
PENDENT 	BSP BSP		VK102 VK202 VK202 VK003 VK004 VK004 VK202



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.

TEMPERATURE RATINGS FOR GLASS BULB HEADS



155°F (68°C) Red Ordinary	175°F (79°C) Yellow Intermediate	200or212°F (93or100°C) Green Intermediate	286°F (141°C) Blue High	360°F (182°C) Mauve Extra High	500°F (260°C) Black Ultra High
Max Ceil Temp 100°F (38°C)	Max Ceiling Temp 150°F (65°C)	Max Ceiling Temp 150°F (65°C)	Max Ceil Temp 225°F (107°C)	Max Ceil Temp 300°F (149°C)	Max Ceil Temp 465°F (240°C)

Standard Response Elements – 5 mm bulb



155°F
(68°C)
Red

Ordinary

Max Ceil
Temp
100°F
(38°C)



175°F
(79°C)
Yellow

Intermediate

Max Ceiling
Temp
150°F
(65°C)



200or212°F
(93or100°C)
Green



286°F
(141°C)
Blue

High

Max Ceil
Temp
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.

Calculating (K) Orifice Sizes

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”

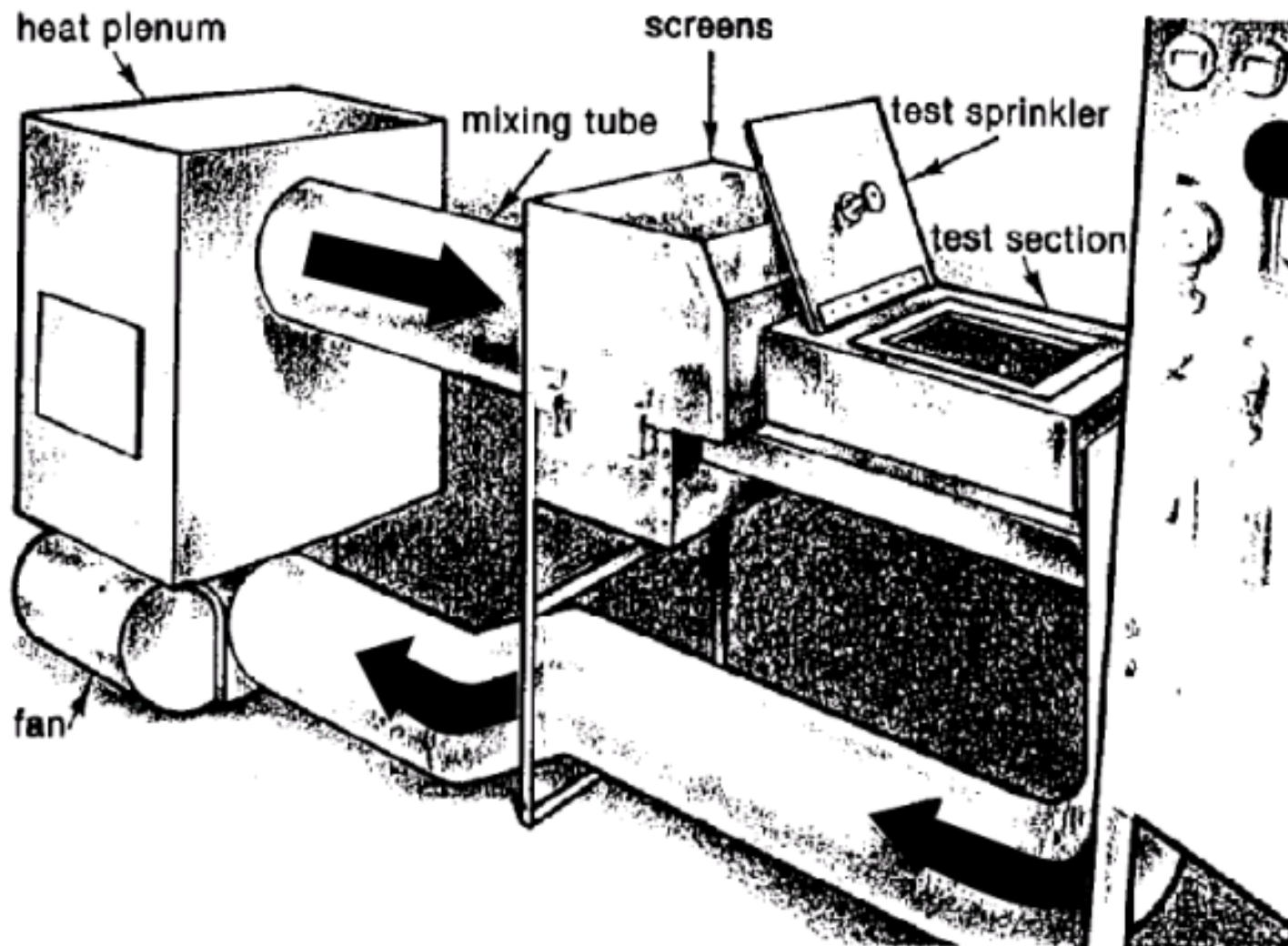
<u>K</u>	<u>% of 5.6</u>	Thread	<u>K</u>	<u>% of 5.6</u>	Thread
1.4	25%	1/2”	14.0	250%	3/4”
1.9	33.3%	1/2”	16.8	300%	3/4”
2.8	50%	1/2”	19.6	350%	1”
4.2	75%	1/2”	22.4	400%	1”
Baseline					
<u>5.6</u>	100%	1/2”	25.2	450%	1”
8.0	140%	3/4”	28.0	500%	1”
11.2	200%	3/4”			

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 = Water Flow
K = Coefficient of
Discharge
P = Pressure

$$Q = \text{Area} \times \text{Density}$$

$$Q = K \times \sqrt{P}$$

$$P = (Q/K)^2$$

$$K = Q/\sqrt{P}$$

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

7.4 (107) K-factor



VK458, Part No. 13230
Tech Data Page Sprinkler 140w

- Larger K-Factor provides lowest starting pressure in NFPA 13 applications (0.1 density)

12 x 12 (3,7x3,7)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
14 x 14 (4,3x4,3)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
16 x 16 (4,9x4,9)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
18 x 18 (5,5x5,5)	22 (83,3)	8.8 (0,61)	23' (87,1)	9.7 (0,67)
20 x 20 (6,1x6,1)	24 (90,8)	10.5 (0,72)	24' (90,8)	10.5 (0,72)

¹ Flows shown for 155°F/68°C; see data page for flows at 175°F/79°C

Sprinkler Spacing

Determining Area/Sprinkler

Extended Coverage or Residential

Example:

19 x 10 room
Use 20 x 20

5.2 (75) K-factor



VK436, Part No. 12166
Tech Data Page Sprinkler 140j
• Listed with beam ceilings up to 14"

12 x 12 ² (3,7x3,7)	14 (53,0)	7.2 (0,50)	14 (53,0)	7.2 (0,50)
14 x 14 ² (4,3x4,3)	14 (53,0)	7.2 (0,50)	14 (53,0)	7.2 (0,50)
16 x 16 ² (4,9x4,9)	14 (53,0)	7.2 (0,50)	14 (53,0)	7.2 (0,50)
18 x 18 ² (5,5x5,5)	17 (64,4)	10.7 (0,74)	18' (68,1)	12.0 (0,83)
20 x 20 (6,1x6,1)	20 (75,7)	14.8 (1,02)	20' (75,7)	14.8 (1,02)

¹ Flows shown for 155°F/68°C; 175°F/79°C available at 21 (79,5) / 16.3 (112,4).
² Also listed for 4/12 slopes at 17 (64,4) / 10.7 (73,7).

5.5 (79) K-factor



VK432, Part No. 10050
Tech Data Page Sprinkler 141a
• Continually listed by UL since 1997

12 x 12 (3,7x3,7)	16 (60,6)	8.5 (0,58)	21 (79,5)	14.6 (1,01)
14 x 14 (4,3x4,3)	19 (71,9)	11.9 (0,82)	21 (79,5)	14.6 (1,01)
16 x 16 (4,9x4,9)	19 (71,9)	11.9 (0,82)	21 (79,5)	14.6 (1,01)
18 x 18 (5,5x5,5)	21 (79,5)	14.6 (1,01)	22 (83,3)	16.0 (1,10)
20 x 20 (6,1x6,1)	24 (90,8)	19.0 (1,31)	28 (106,0)	25.9 (1,79)

7.4 (107) K-factor



VK458, Part No. 13230
Tech Data Page Sprinkler 140w
• Larger K-Factor provides lowest starting pressure in NFPA 13 applications (0.1 density)

12 x 12 (3,7x3,7)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
14 x 14 (4,3x4,3)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
16 x 16 (4,9x4,9)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
18 x 18 (5,5x5,5)	22 (83,3)	8.8 (0,61)	23' (87,1)	9.7 (0,67)
20 x 20 (6,1x6,1)	24 (90,8)	10.5 (0,72)	24' (90,8)	10.5 (0,72)

¹ Flows shown for 155°F/68°C; see data page for flows at 175°F/79°C

Sprinkler Spacing

Determining Area/Sprinkler

Extended Coverage or Residential

Example:

16 x 18 room
Use 18 x 18

5.2 (75) K-factor



VK436, Part No. 12166
Tech Data Page Sprinkler 140j
• Listed with beam ceilings up to 14"

12 x 12 ² (3,7x3,7)	14 (53,0)	7.2 (0,50)	14 (53,0)	7.2 (0,50)
14 x 14 ² (4,3x4,3)	14 (53,0)	7.2 (0,50)	14 (53,0)	7.2 (0,50)
16 x 16 ² (4,9x4,9)	14 (53,0)	7.2 (0,50)	14 (53,0)	7.2 (0,50)
18 x 18 ² (5,5x5,5)	17 (64,4)	10.7 (0,74)	18' (68,1)	12.0 (0,83)
20 x 20 (6,1x6,1)	20 (75,7)	14.8 (1,02)	20' (75,7)	14.8 (1,02)

¹ Flows shown for 155°F/68°C; 175°F/79°C available at 21 (79,5) / 16.3 (112,4).
² Also listed for 4/12 slopes at 17 (64,4) / 10.7 (73,7).

5.5 (79) K-factor



VK432, Part No. 10050
Tech Data Page Sprinkler 141a
• Continually listed by UL since 1997

12 x 12 (3,7x3,7)	16 (60,6)	8.5 (0,58)	21 (79,5)	14.6 (1,01)
14 x 14 (4,3x4,3)	19 (71,9)	11.9 (0,82)	21 (79,5)	14.6 (1,01)
16 x 16 (4,9x4,9)	19 (71,9)	11.9 (0,82)	21 (79,5)	14.6 (1,01)
18 x 18 (5,5x5,5)	21 (79,5)	14.6 (1,01)	22 (83,3)	16.0 (1,10)
20 x 20 (6,1x6,1)	24 (90,8)	19.0 (1,31)	28 (106,0)	25.9 (1,79)

7.4 (107) K-factor



VK458, Part No. 13230
Tech Data Page Sprinkler 140w
• Larger K-Factor provides lowest starting pressure in NFPA 13 applications (0.1 density)

12 x 12 (3,7x3,7)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
14 x 14 (4,3x4,3)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
16 x 16 (4,9x4,9)	20 (75,7)	7.3 (0,50)	20' (75,7)	7.3 (0,50)
18 x 18 (5,5x5,5)	22 (83,3)	8.8 (0,61)	23' (87,1)	9.7 (0,67)
20 x 20 (6,1x6,1)	24 (90,8)	10.5 (0,72)	24' (90,8)	10.5 (0,72)

¹ Flows shown for 155°F/68°C; see data page for flows at 175°F/79°C

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Determining Design Area

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Determining Size

Starts with the chart
in NFPA 13

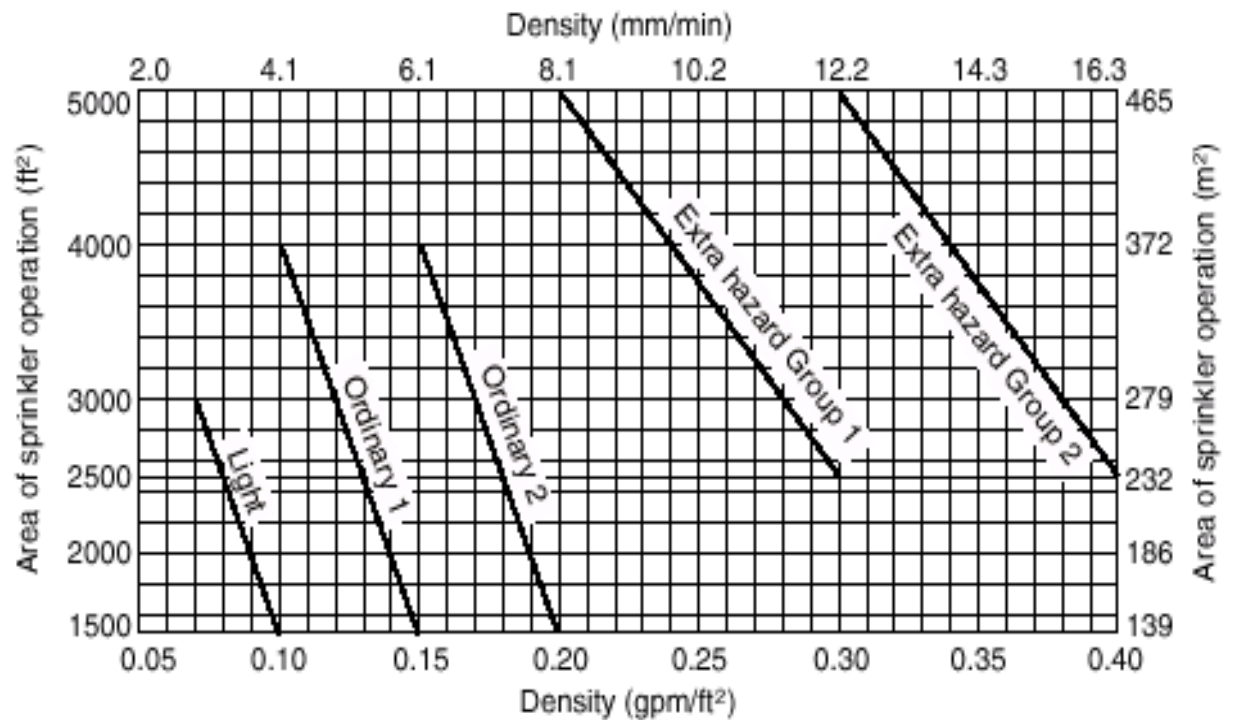


FIGURE 11.2.3.1.5 Density/Area Curves.

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

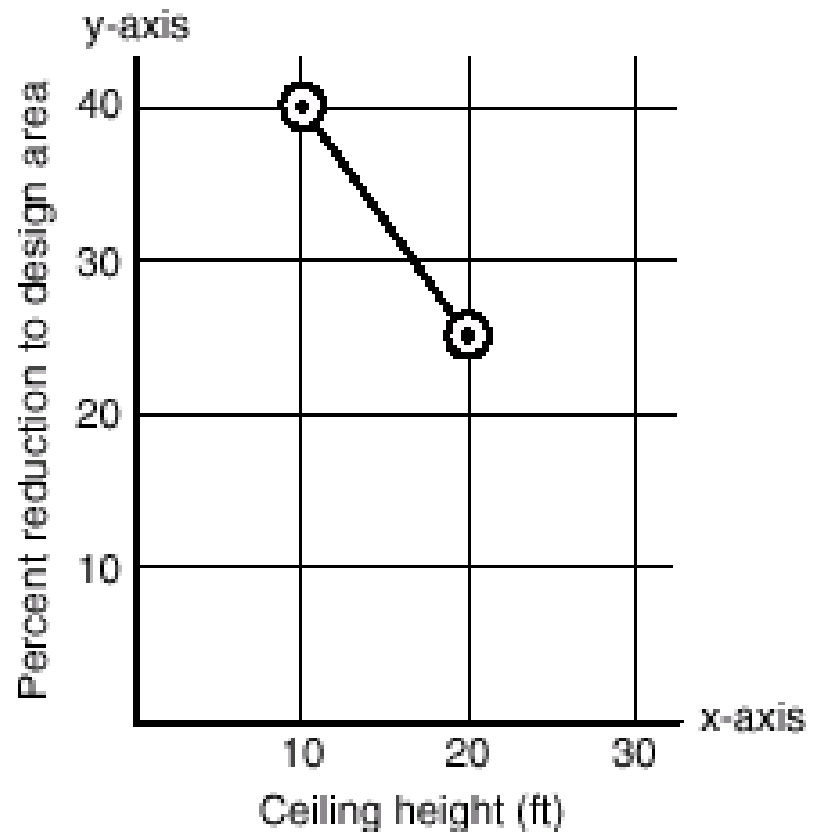
LH = 1500 sf

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)

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Design Calculations

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Calculating End Head Flow (Q)

$$Q = \text{Area} \times \text{Density}$$

Example: .15 density with 120sf coverage per sprinkler

$$.15 \times 120 = \mathbf{18\text{gpm minimum}} \text{ @ end head}$$

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... $(18 \div 5.6)^2 = 10.3\text{psi Minimum}$

Calculating (K) 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



K Factor	Flow Rate	Starting Pressure
5.6	26 gpm	21.55 psi
8.0	26 gpm	10.56 psi
11.2	26 gpm (29.63 gpm)	5.11 psi (min 7 psi)
16.8	26 gpm (44.44 gpm)	2.39 psi (min 7 psi)



.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.

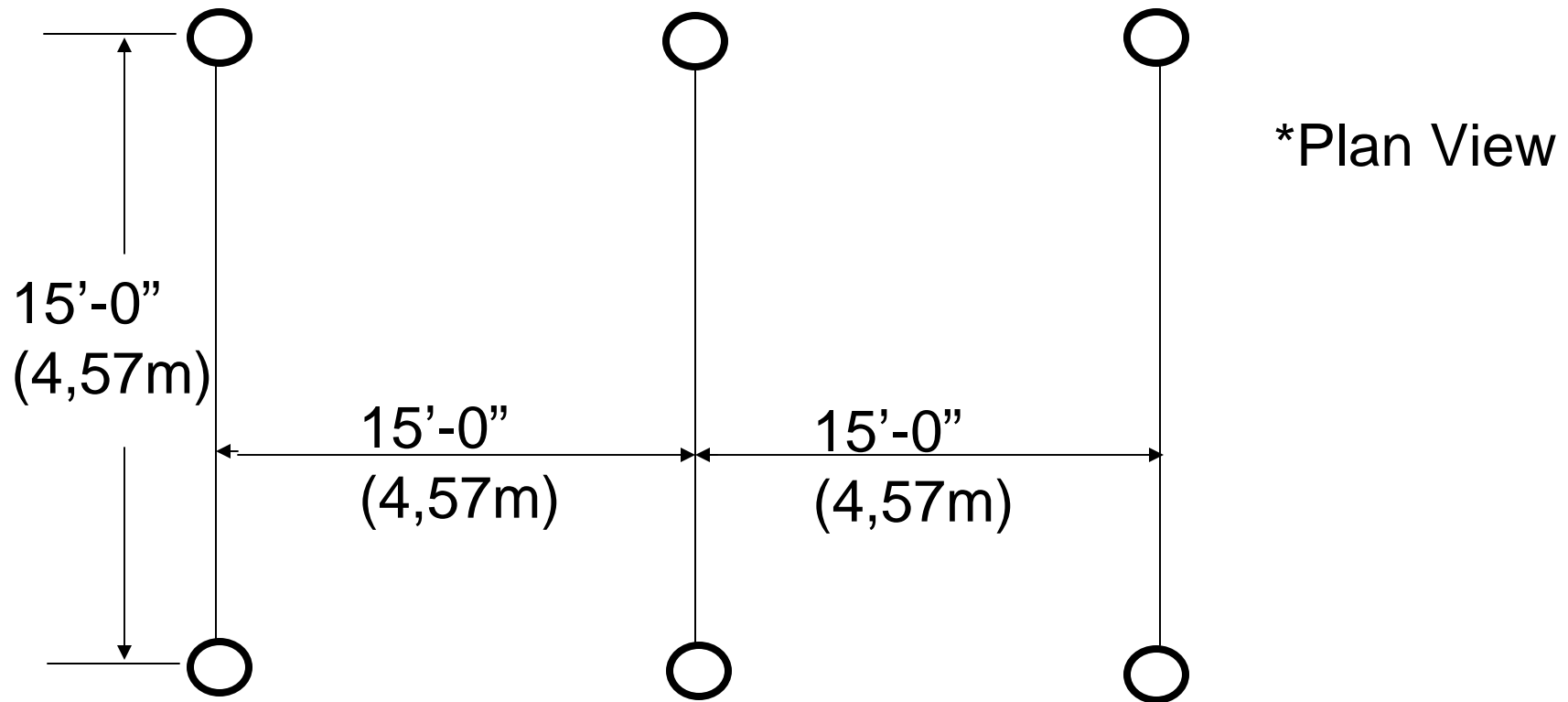
5.1.2 Occupancy classifications shall not be intended to be a general classification of occupancy hazards.

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.

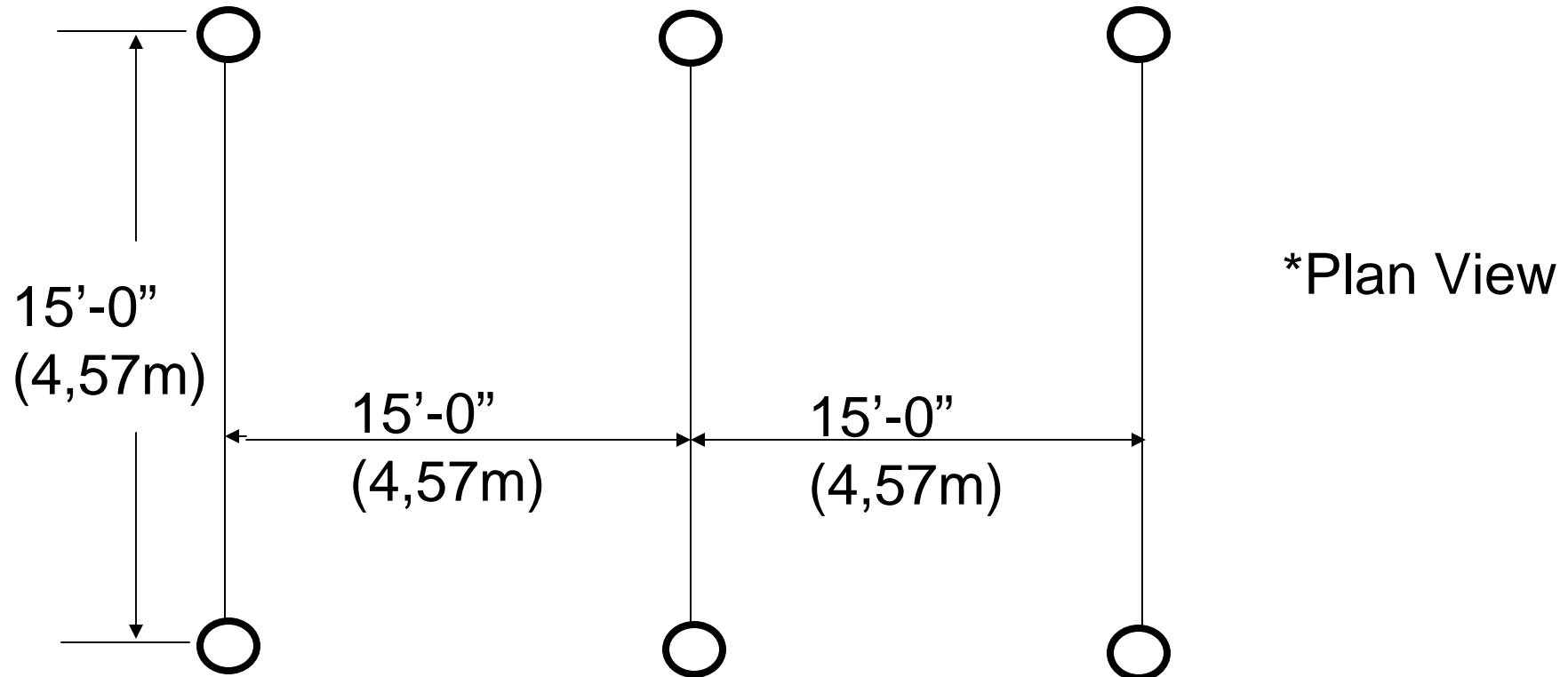
EXAMPLES: Churches, Clubs, Hospitals, Museums, Offices, Restaurant Seating Areas

NFPA 13 limits maximum area of coverage for Light Hazard to 225 sq. ft. per sprinkler



Standard Coverage Sprinklers

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).

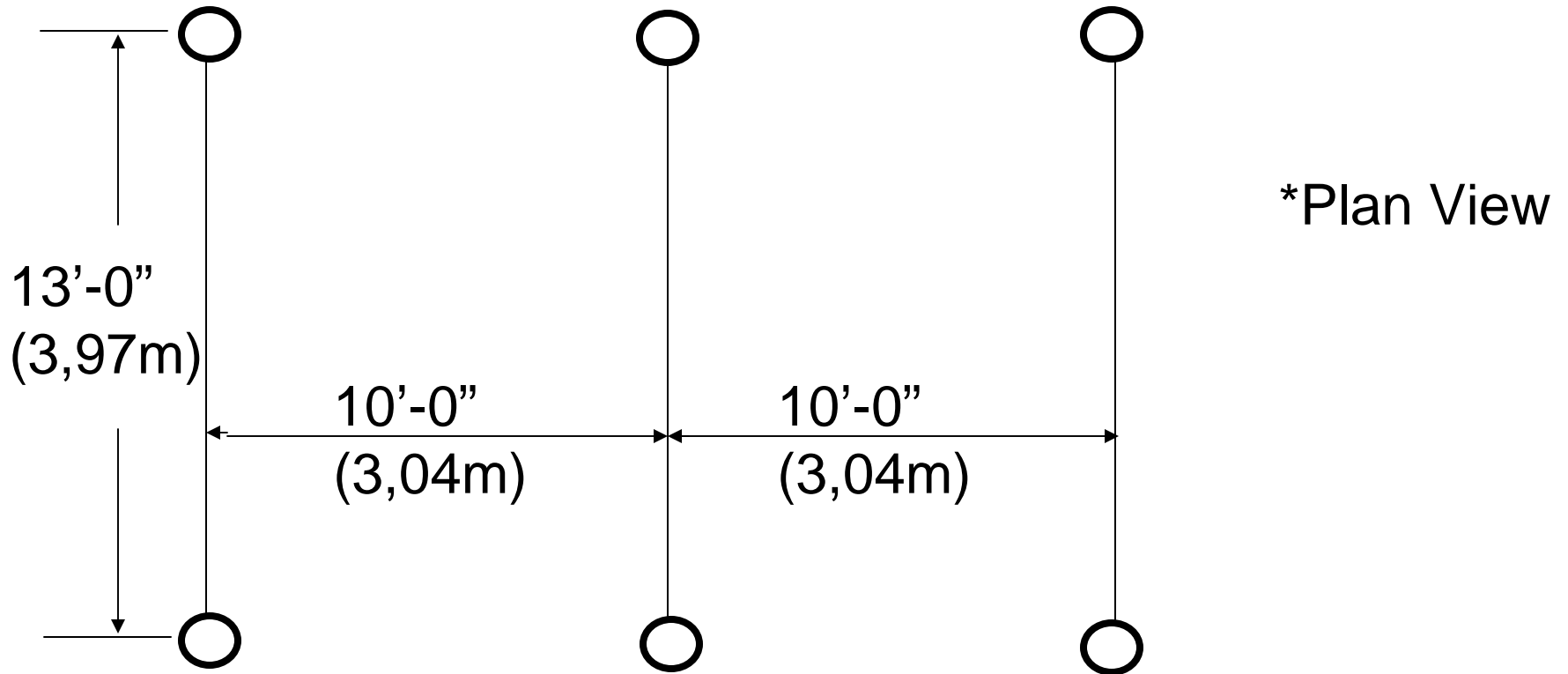
Ordinary hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where combustibility is low, quantity of combustibles is moderate, stockpiles of combustibles do not exceed 8'-0", and fires with moderate rates of heat release are expected.

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.

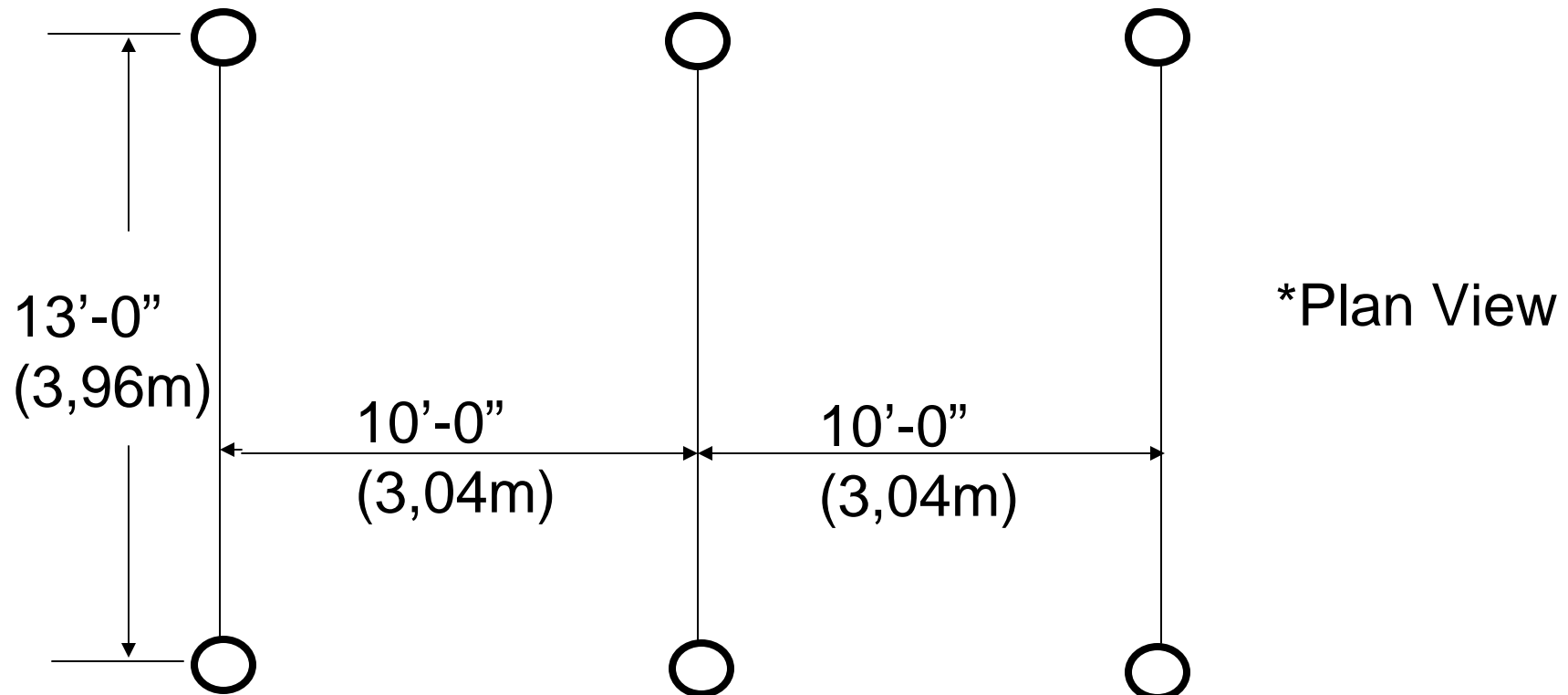
Examples: Dry Cleaners, Horse Stables, Machine Shops, Library Stack Rooms, Mercantile, Confectionary Products, Casino area.

NFPA 13 limits maximum area of coverage for Ordinary Hazard to 130 sq. ft. per sprinkler



Standard Coverage Sprinklers

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

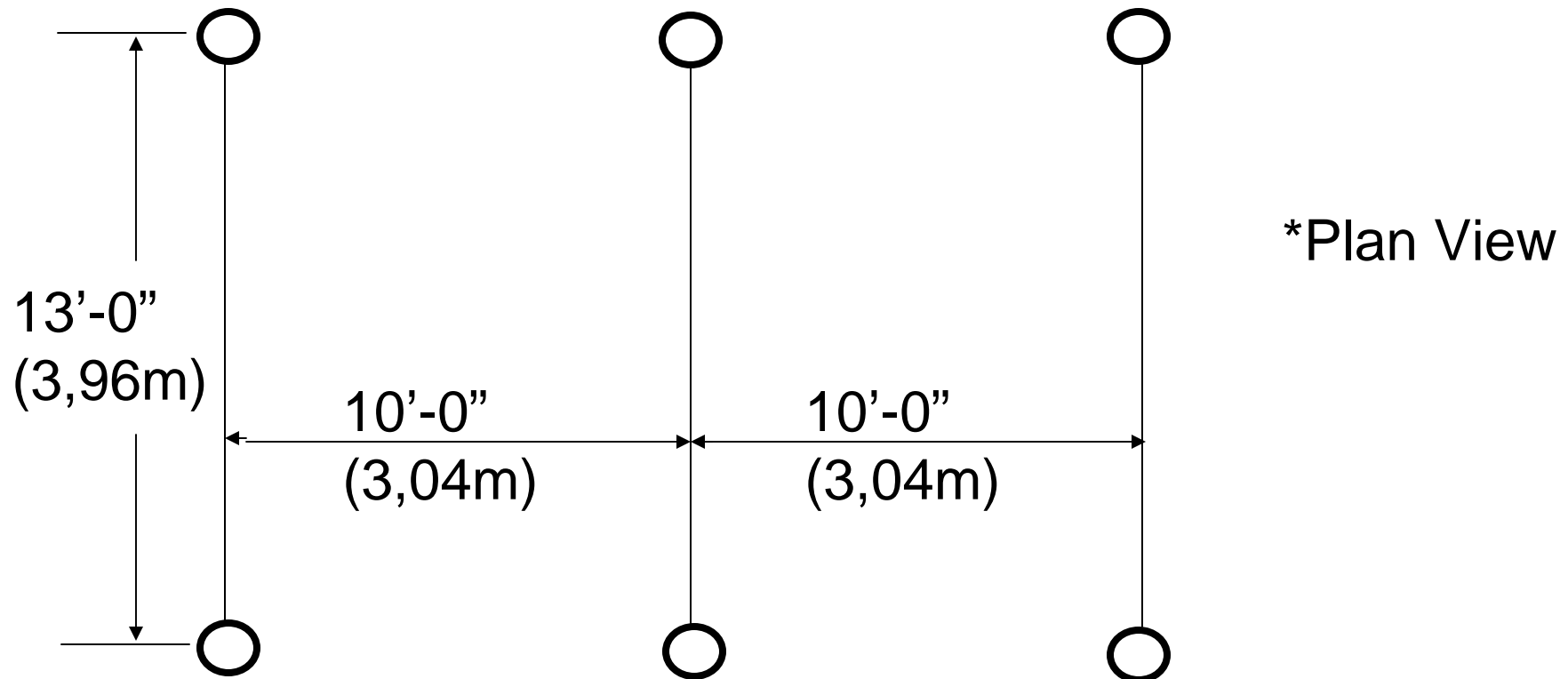


Minimum flow rate for sprinklers spaced 130 sq. ft. is

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.

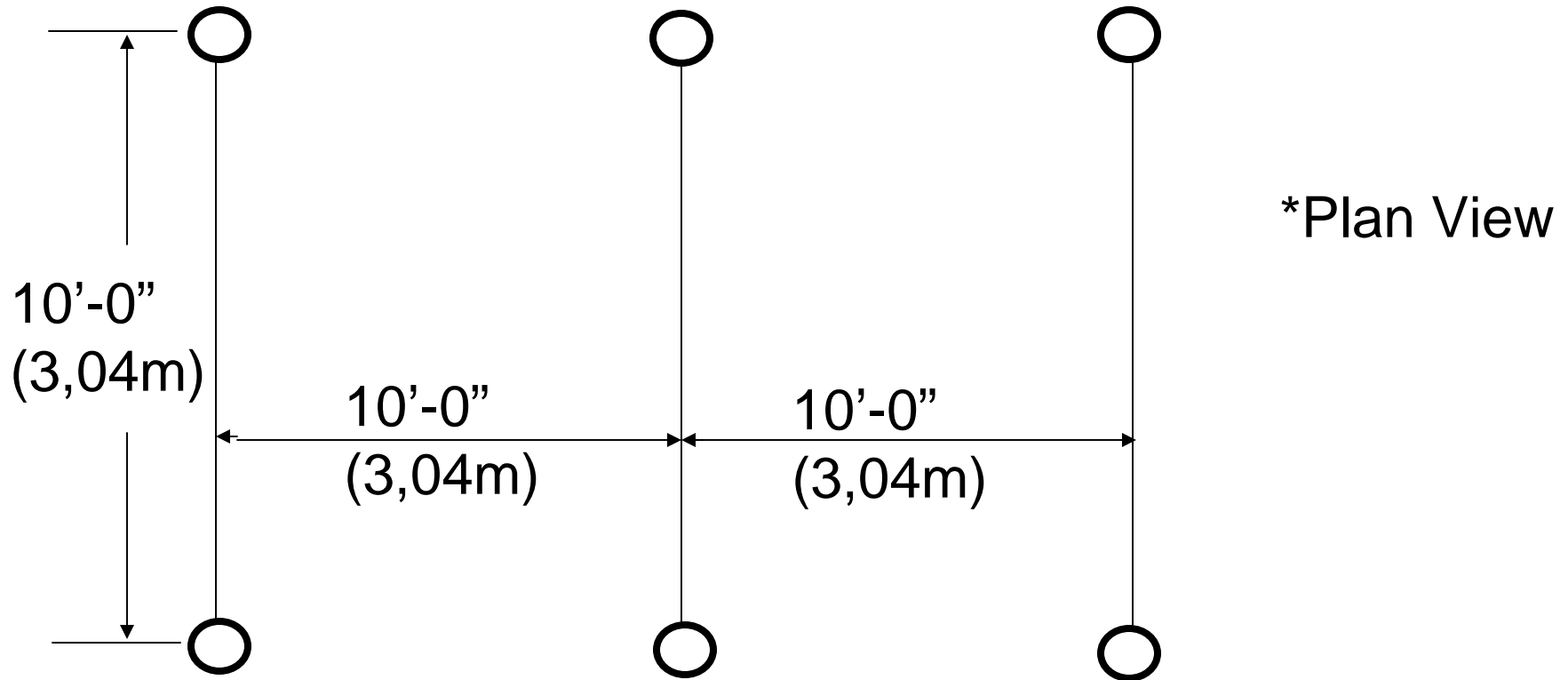
5.4.1* Extra Hazard (Group 1). Extra hazard (Group 1) occupancies shall be defined as occupancies or portions of other occupancies where the quantity and combustibility of contents are very high and dust, lint, or other materials are present, introducing the probability of rapidly developing fires with 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.

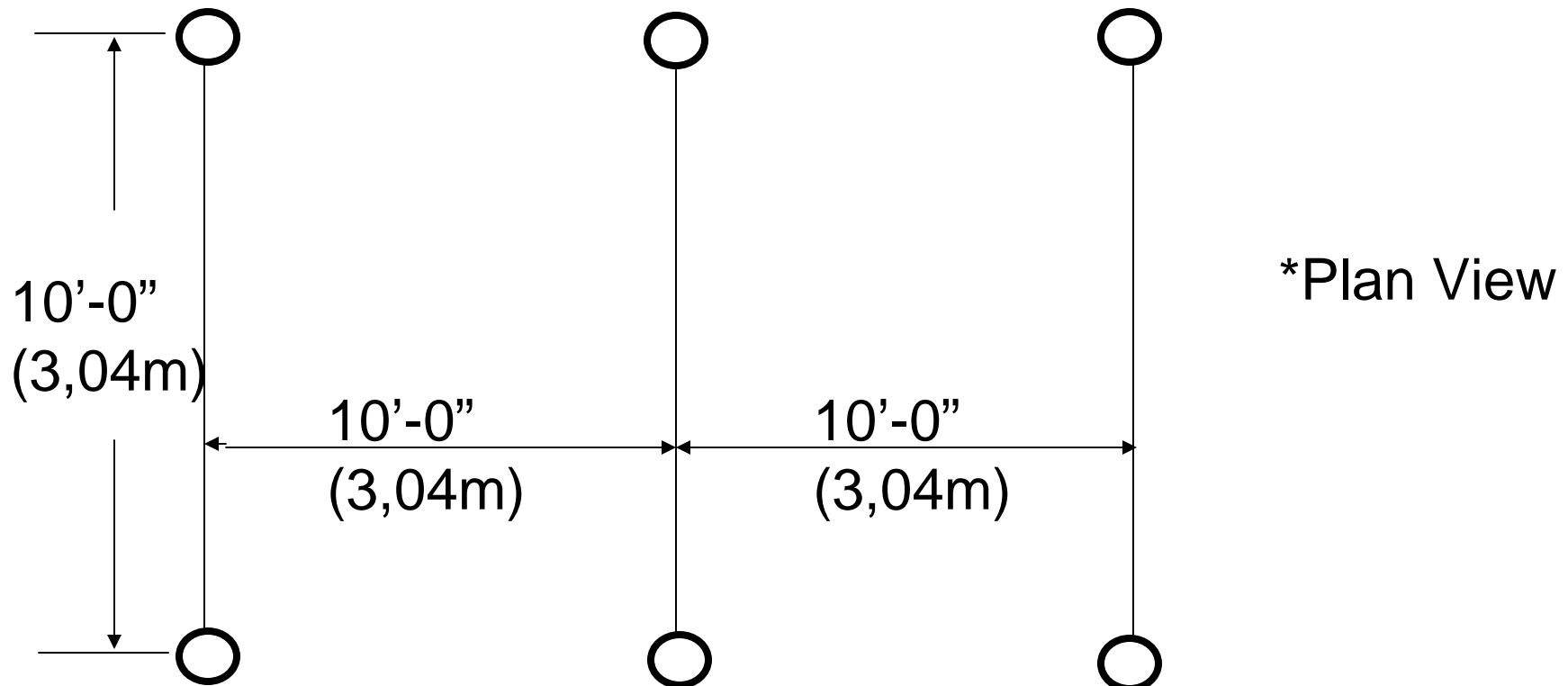
Examples: Flammable Liquids Spraying, Open Oil Quenching, Plastics Processing, Solvent Cleaning, Varnish and Paint Dipping

NFPA 13 limits maximum area of coverage for Extra Hazard to 100 sq. ft. per sprinkler



Standard Coverage Sprinklers

Density prescribed for Extra Hazard 1 is .30 gpm per sq. ft.

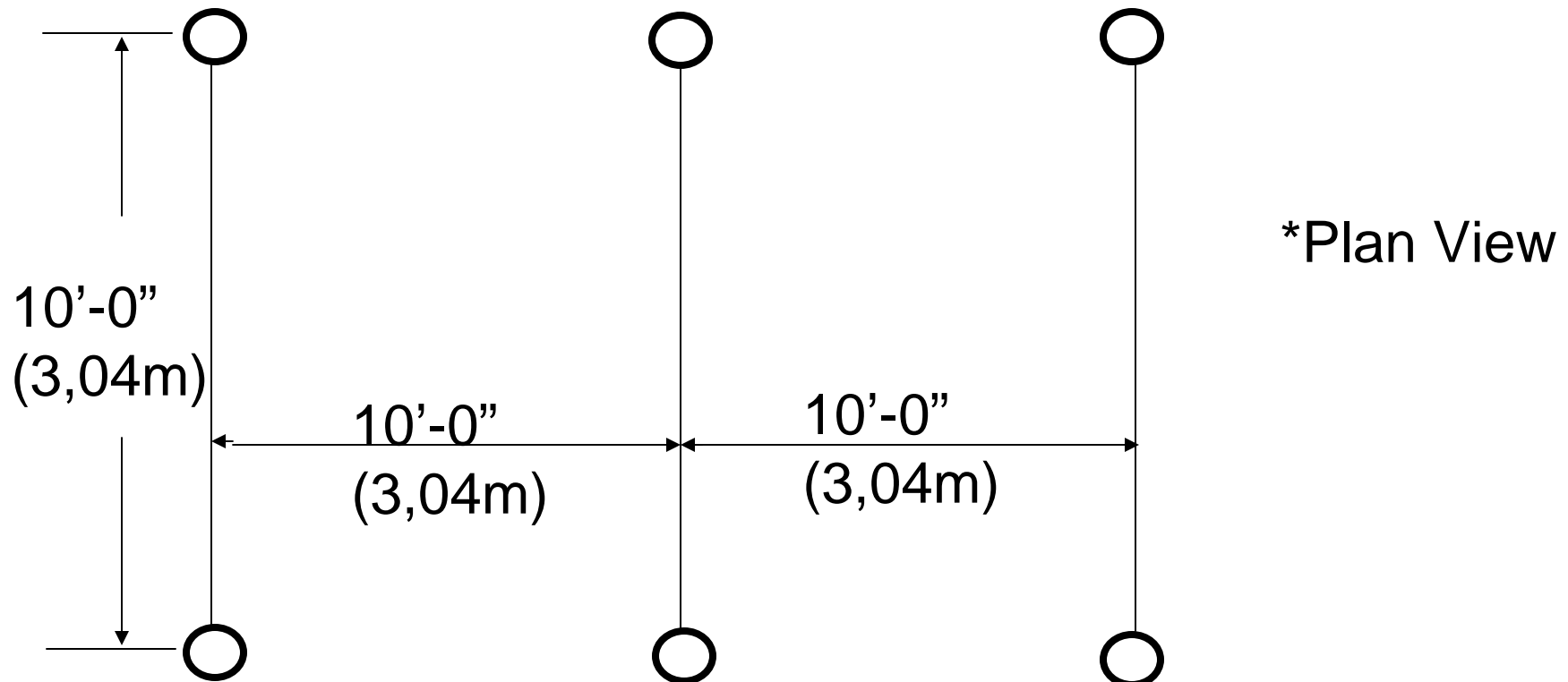


Minimum flow rate for sprinklers spaced 100 sq. ft. is

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.



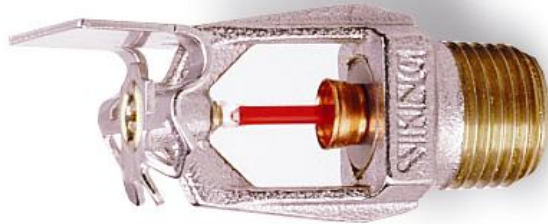
Minimum flow rate for sprinklers spaced 100 sq. ft. is

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

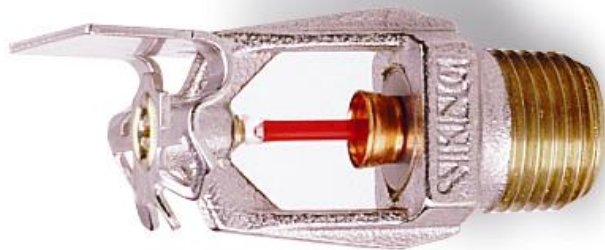
Sidewall

Standard Spray Sprinkler Spacing (Area of Coverage)

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

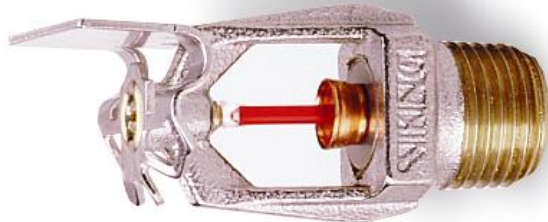
Ordinary Hazard (as defined by NFPA 13) : 100 sq. ft. max

(Note: Must be listed for Ordinary Hazard) (9,29 sq. m)



SIDEWALL SPRINKLER DISTRIBUTION

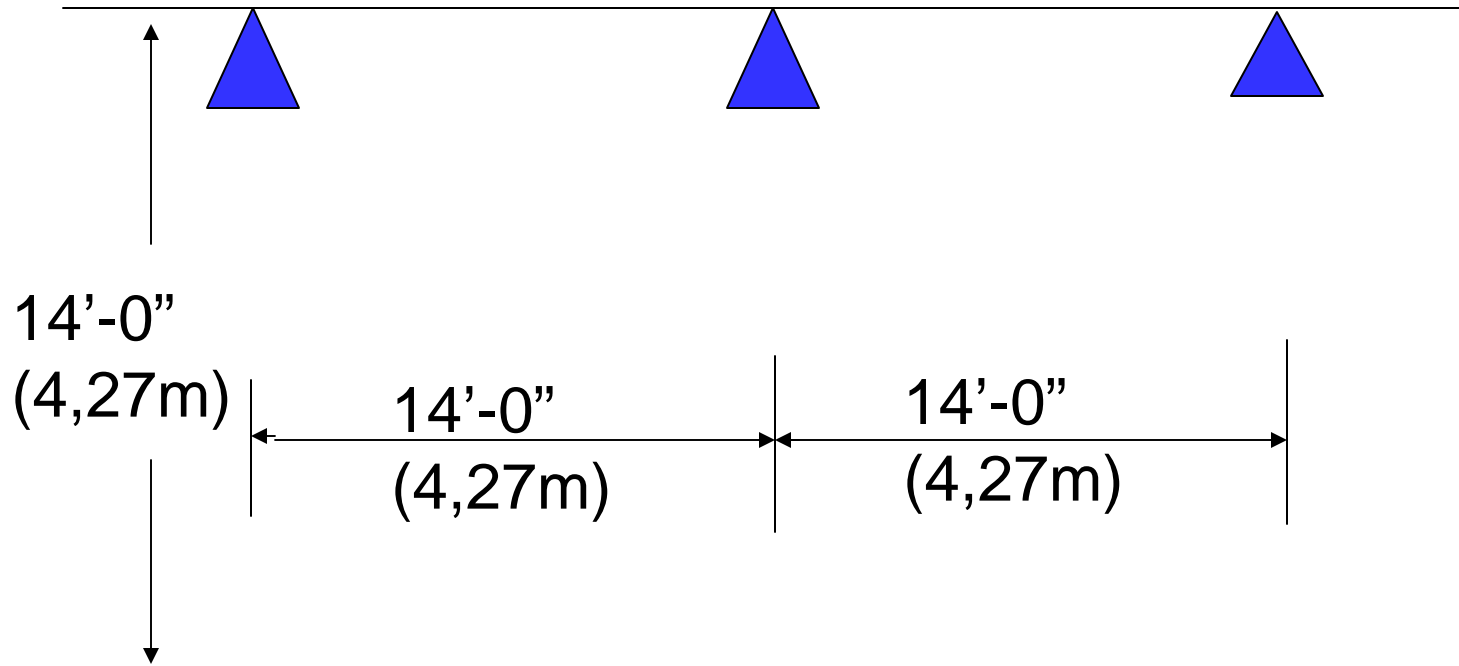
Must meet Average Distribution Requirements over the 100 ft² (9,3 m²) area between two sprinklers spaced 10 ft. (3,05 m) apart for standard 1/2" (15 mm) orifice sprinklers: 0.05 gpm/ft² (0.034 L/s/m²) or 0.07gpm/ft² (0.048 L/s/m²) for large orifice sprinklers 17/32" (20 mm) : And still provide 3.5% against wall in which sprinklers are installed, for both 1/2" and L/O.



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



*Plan View



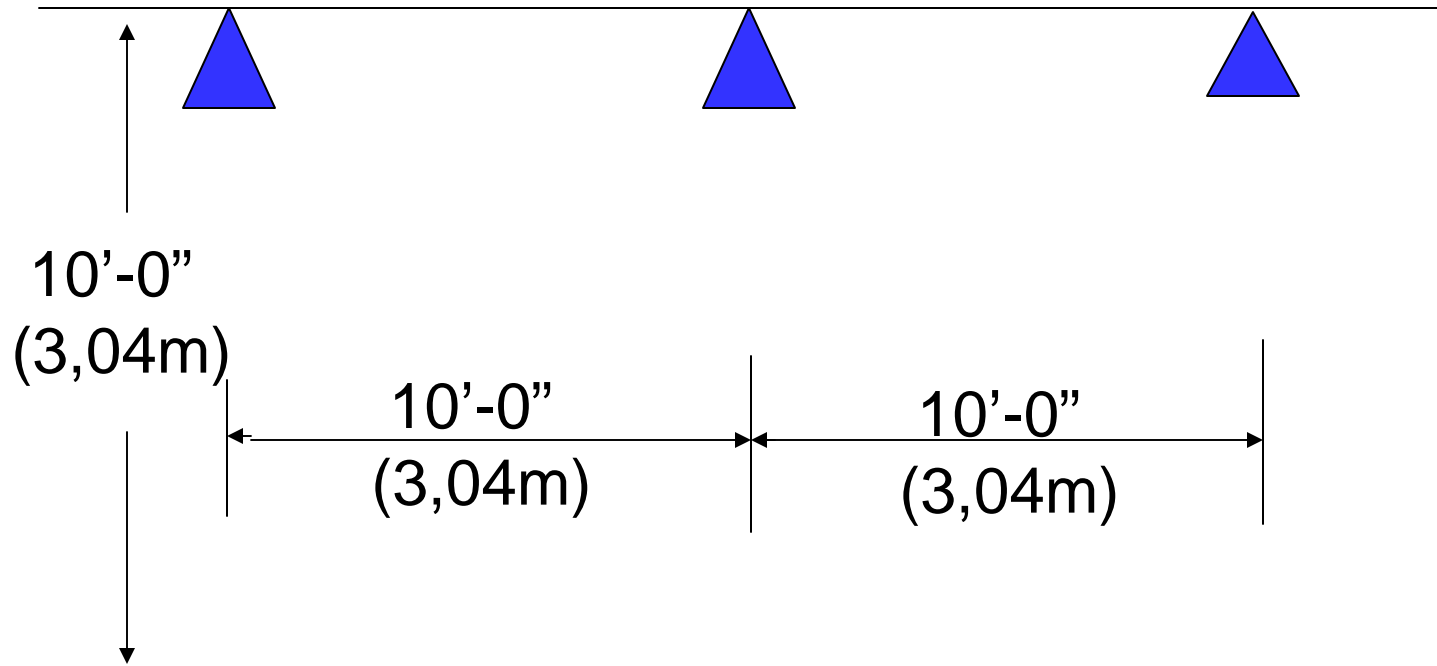
Minimum flow rate for sprinklers spaced 196 sq. ft. is
Determined by area x density = Q

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.



*Plan View



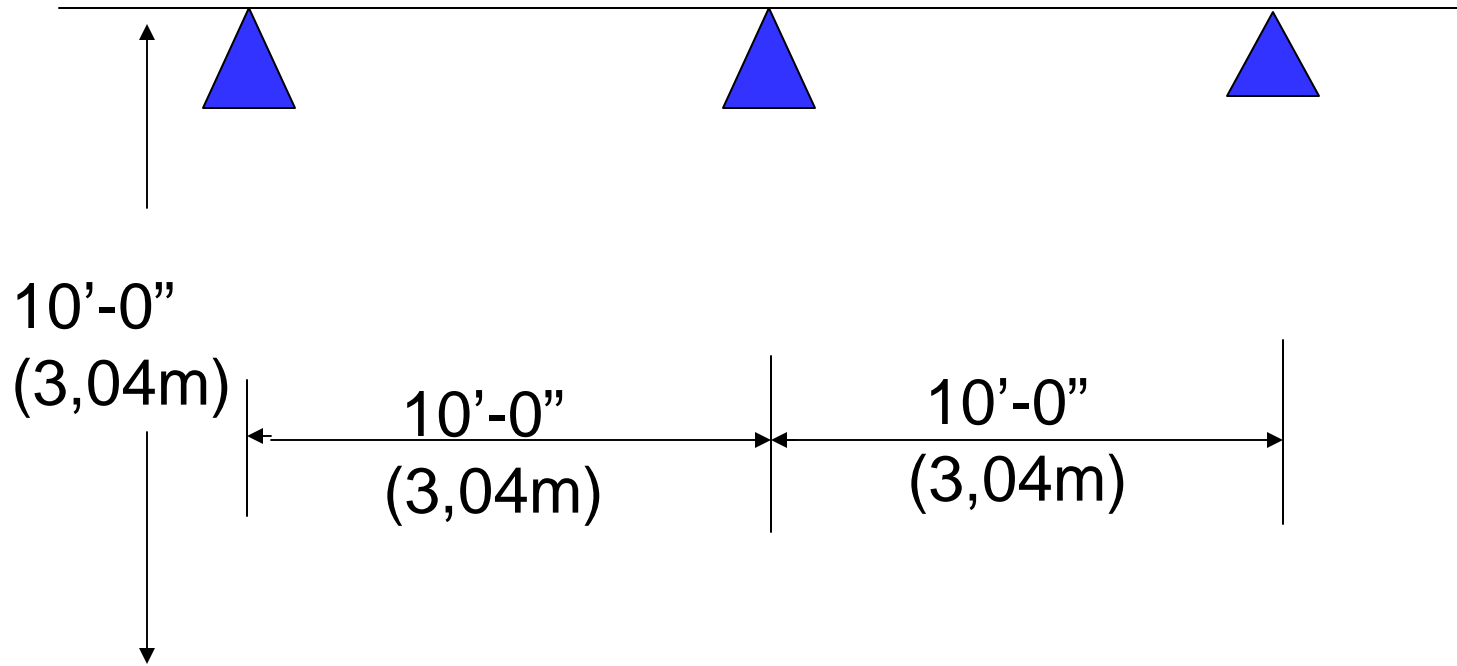
Minimum flow rate for sprinklers spaced 100 sq. ft. is
Determined by area x density = Q

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.



*Plan View



Minimum flow rate for sprinklers spaced 100 sq. ft. is
Determined by $\text{area} \times \text{density} = Q$

Example: $.20 \text{ gpm per sq. ft.} \times 100 \text{ sq. ft.} = 20 \text{ gpm}$

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 Pendant
VK534**



**Model M ECOH-
ELO Upright
VK532**



**Model M ECLH-
ELO Pendant
VK608**



ECOH-K14

ECLH-ELO Pendent

Spacing and Minimum Flow Rate



Extended Coverage Sprinklers

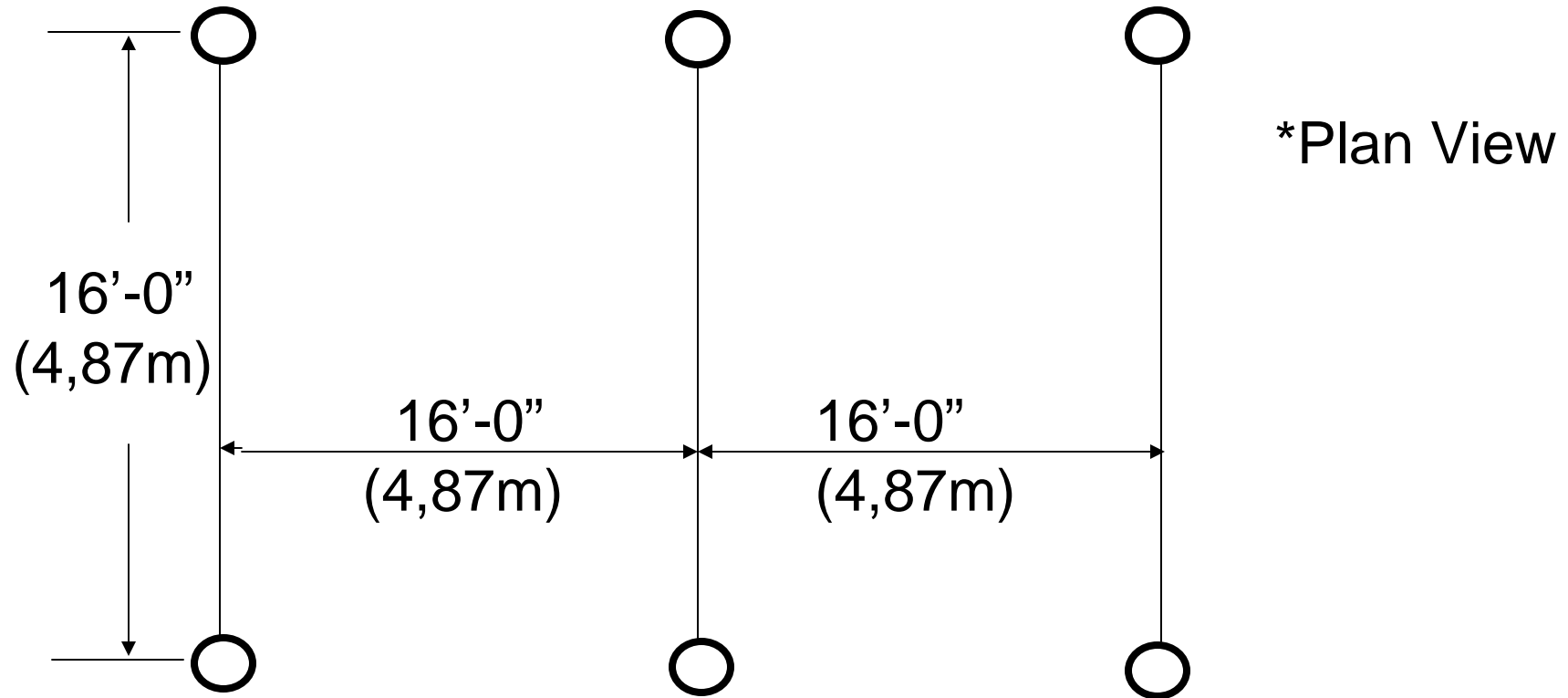
Have maximum coverage areas of 400 sq. ft. as mandated by NFPA 13. Spacing is in increments of 2'-0" intervals, example: 12'x12', 14'x14', 16'x16', 18'x18', 20'x20'



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Worldwide Fire Protection

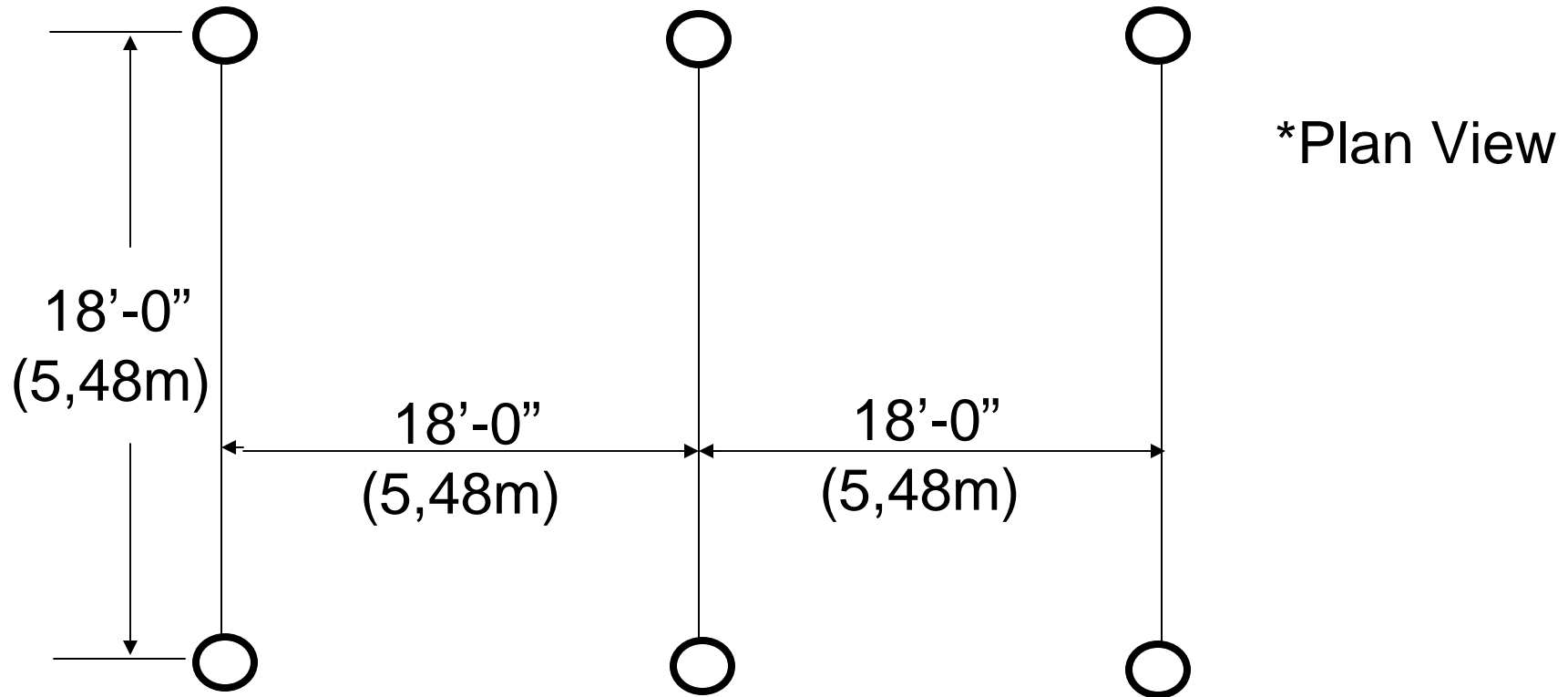
Light Hazard – 16' x 16' spacing (reduces number of Sprinklers)



$$256 \text{ sq. ft.} \times .10 \text{ gpm per sq. ft.} = 25.6 \text{ gpm}$$

Extended Coverage Sprinklers

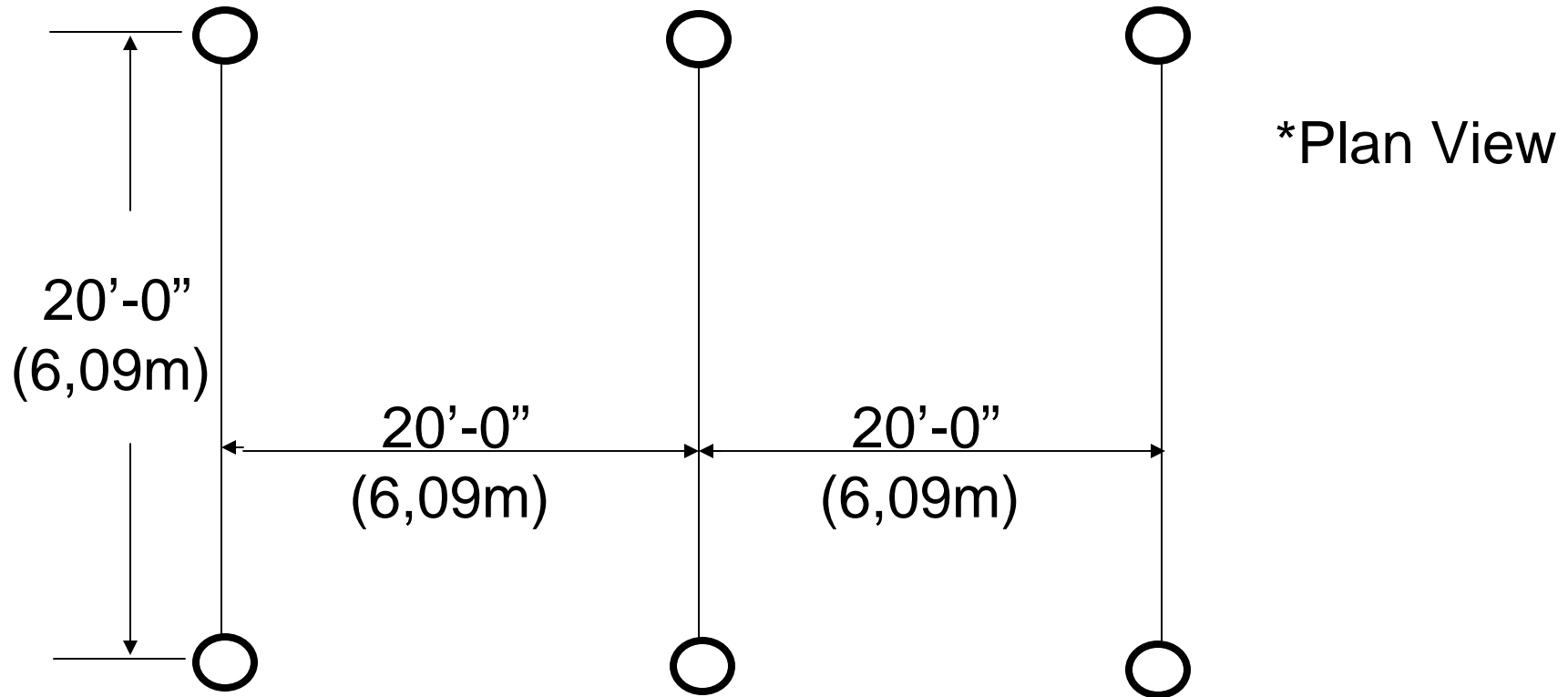
Light Hazard – 18' x 18' spacing (reduces number of Sprinklers)



$$324 \text{ sq. ft.} \times .10 \text{ gpm per sq. ft.} = 32.4 \text{ gpm}$$

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

Spacing	Area of coverage	Light Hazard Density	Minimum water flow	* % Fewer Sprinklers
16'x16'	256 ft ²	.10 gpm/sq ft.	19.6 gpm	13%
18'x18'	324 ft ²	.10 gpm/sq ft.	32.4 gpm	30%
20'x20'	400 ft ²	.10 gpm/sq ft.	40 gpm	44%

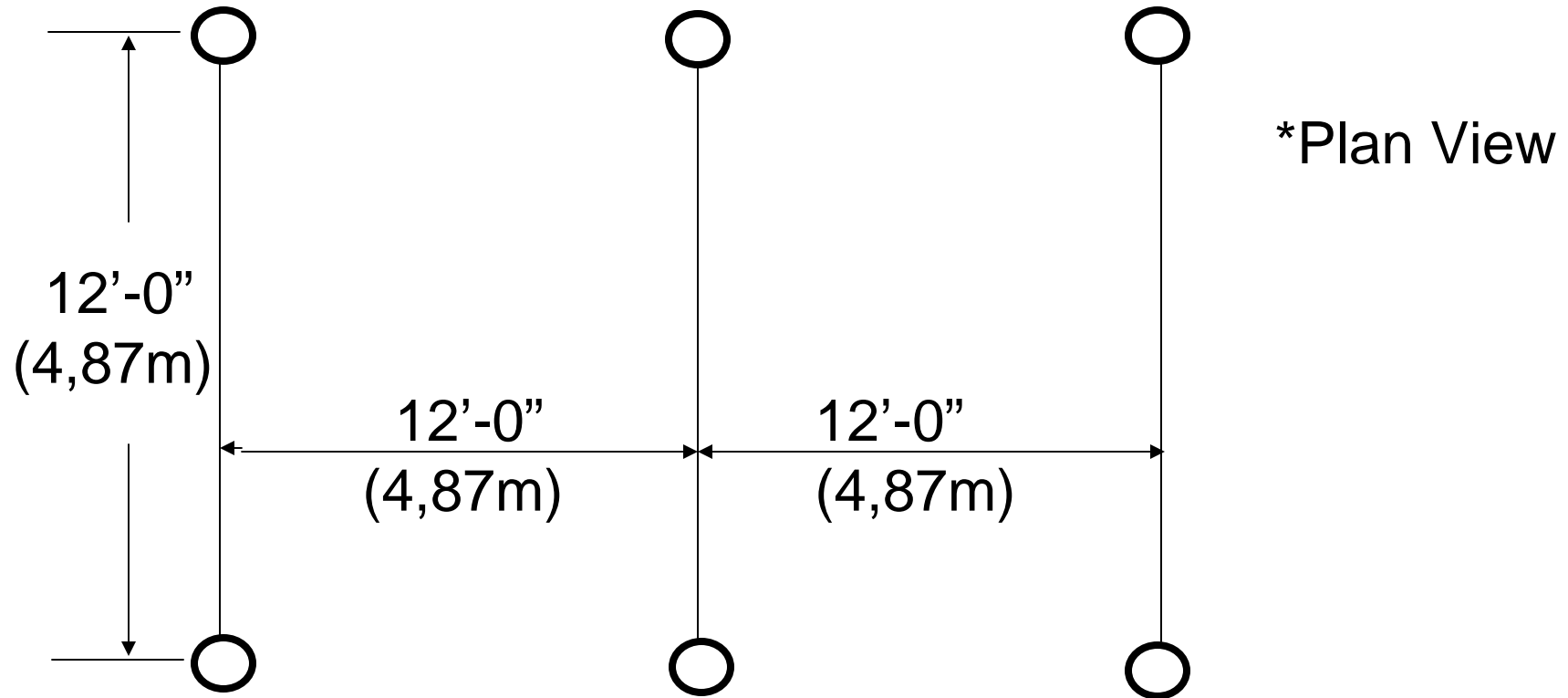
*Based on a 225 sq. ft. coverage area for standard coverage upright and pendent

ECO-H-ELO Upright & Pendent

Spacing and Minimum Flow Rate (Ordinary Hazard Group 1)



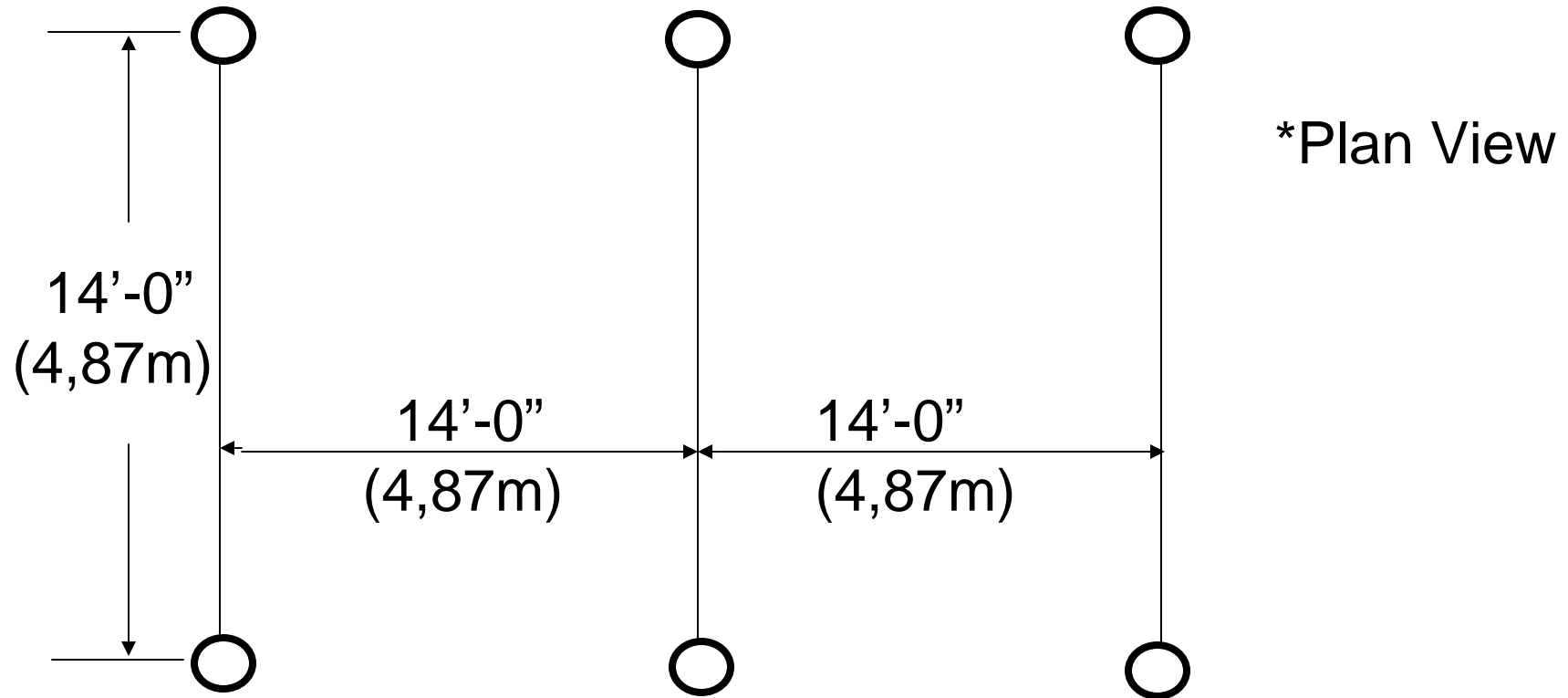
Ord. Hazard Group 1 – 12' x 12' spacing (reduces number of Sprinklers)



$$144 \text{ sq. ft.} \times .15 \text{ gpm per sq. ft.} = 21.6 \text{ gpm}$$

Extended Coverage Sprinklers

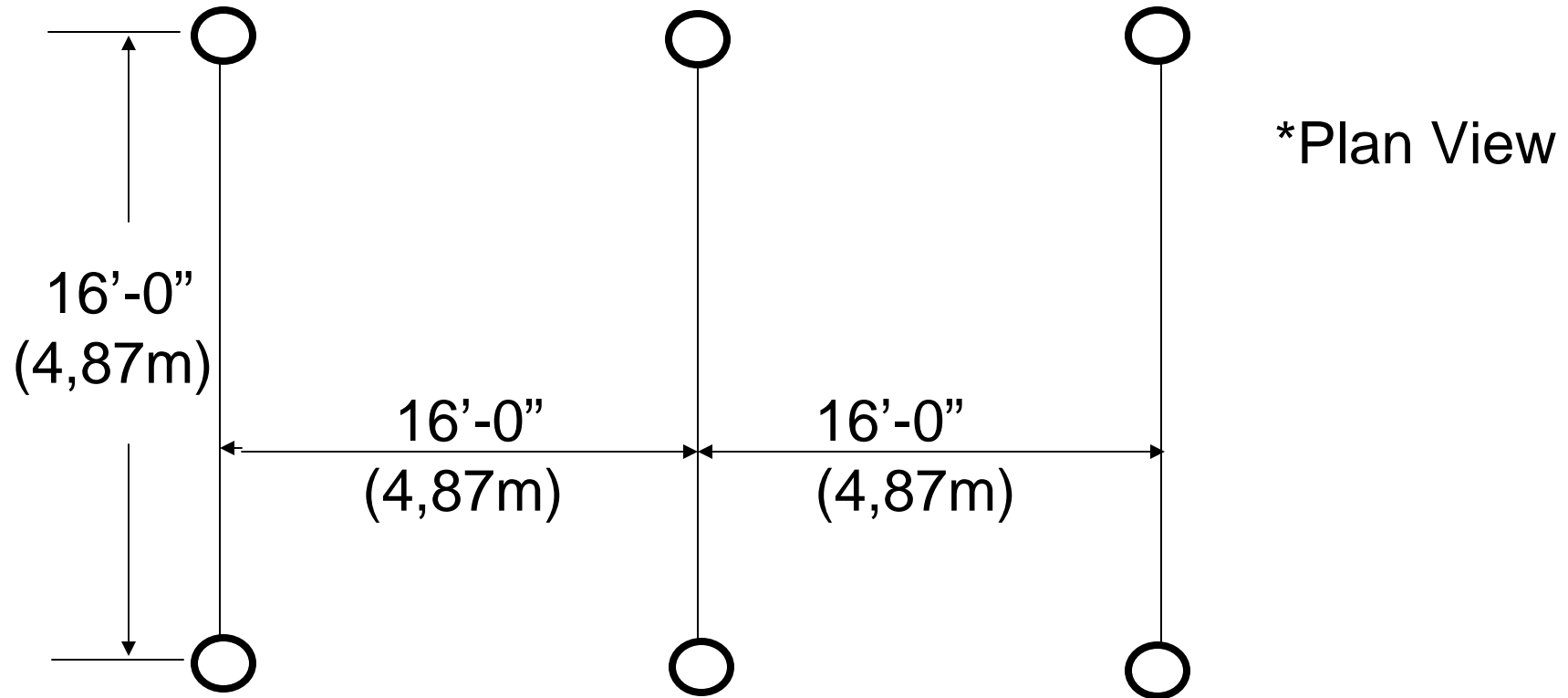
Ord. Hazard Group 1 – 14' x 14' spacing (reduces number of Sprinklers)



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

Extended Coverage Sprinklers

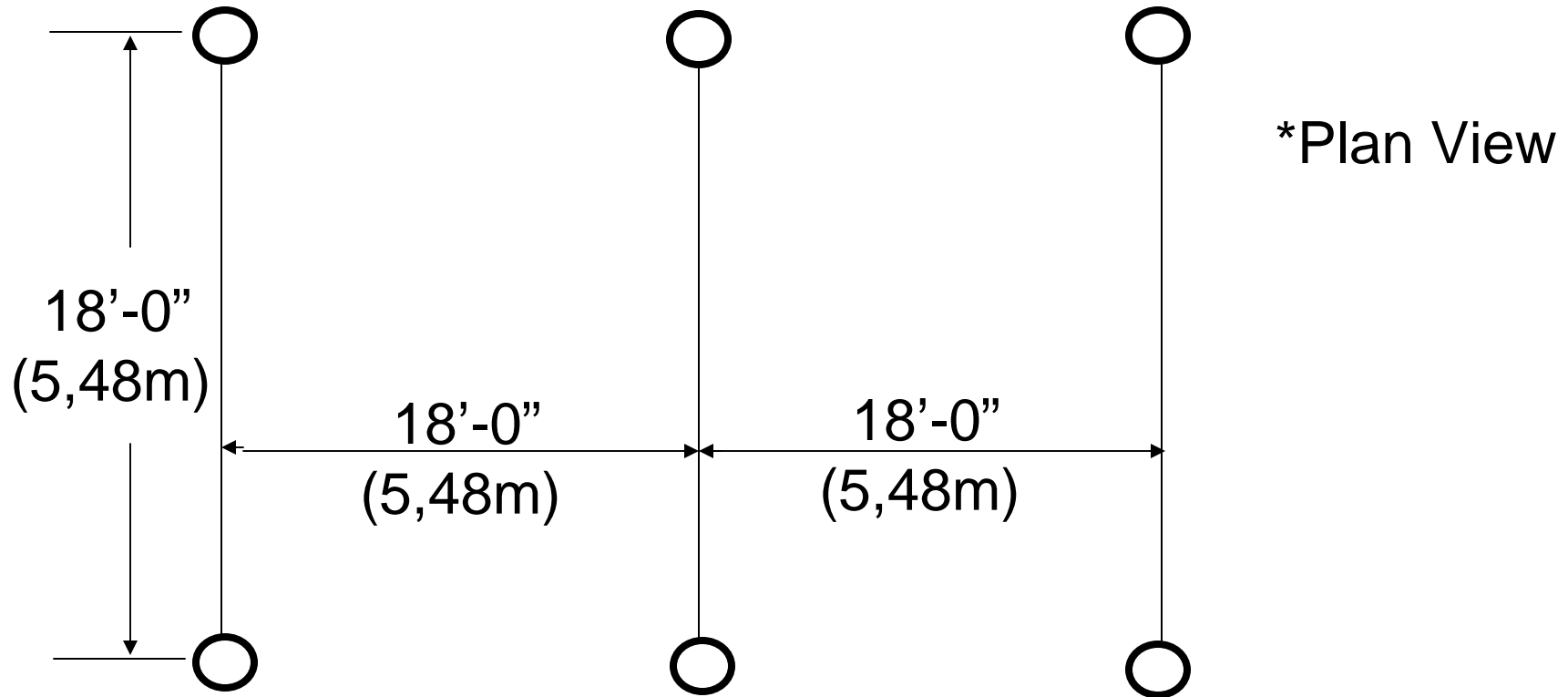
Ord. Hazard Group 1 – 16' x 16' spacing (reduces number of Sprinklers)



$$256 \text{ sq. ft.} \times .15 \text{ gpm per sq. ft.} = 38.4 \text{ gpm}$$

Extended Coverage Sprinklers

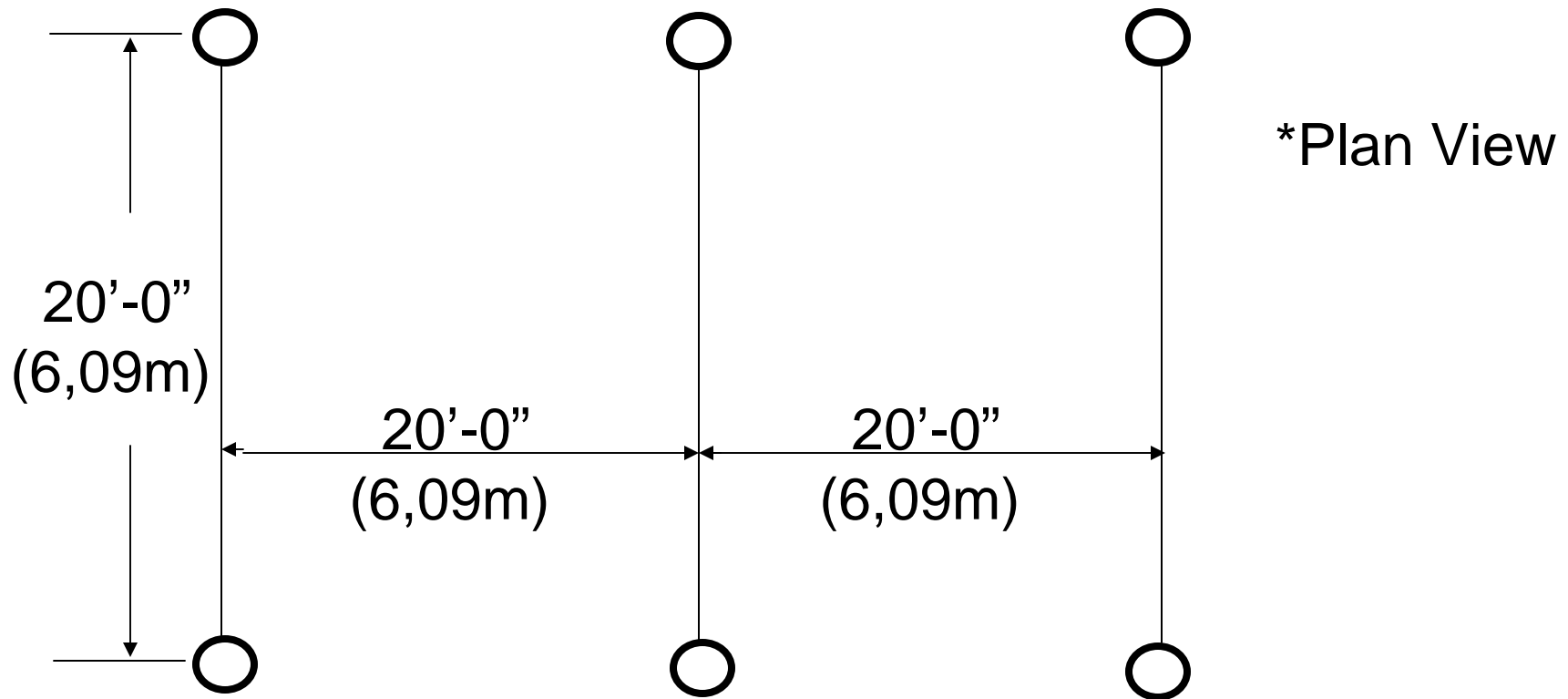
Ord. Hazard Group I – 18' x 18' spacing (reduces number of Sprinklers)



$$324 \text{ sq. ft.} \times .15 \text{ gpm per sq. ft.} = 48.6 \text{ gpm}$$

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

Spacing	Area of coverage	OH. I Density	Minimum water flow	* % Fewer Sprinklers
12'x12	144 ft ²	.15 gpm/sq ft.	21.6 gpm	10%
14'x14'	196 ft ²	.15 gpm/sq ft.	29.4 gpm	35%
16'x16'	256 ft ²	.15 gpm/sq ft.	38.4 gpm	50%
18'x18'	324 ft ²	.15 gpm/sq ft.	48.6 gpm	60%
20'x20'	400 ft ²	.15 gpm/sq ft.	60 gpm	66%

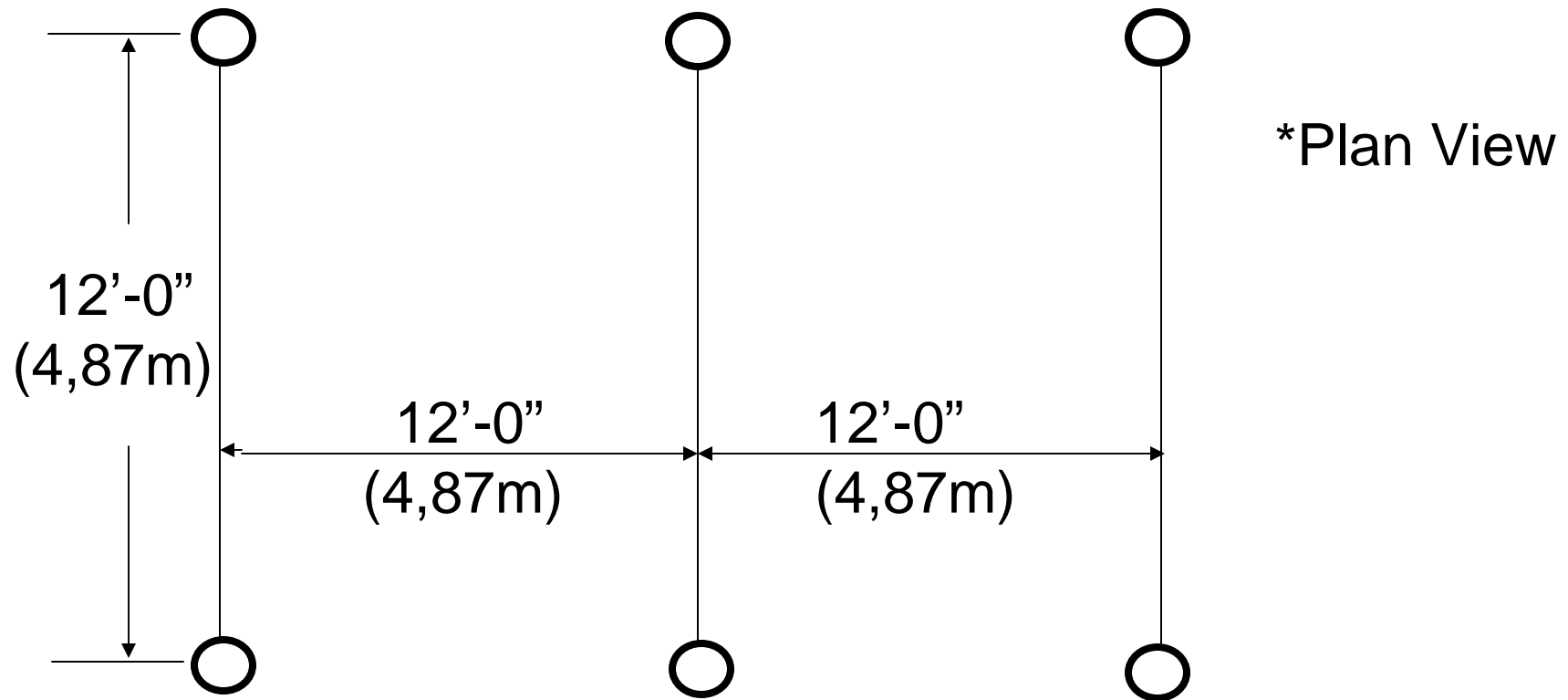
*Based on a 130 sq. ft. coverage area for standard coverage upright and pendent

ECOH-ELO Upright & Pendent

Spacing and Minimum Flow Rate (Ordinary Hazard Group 2)



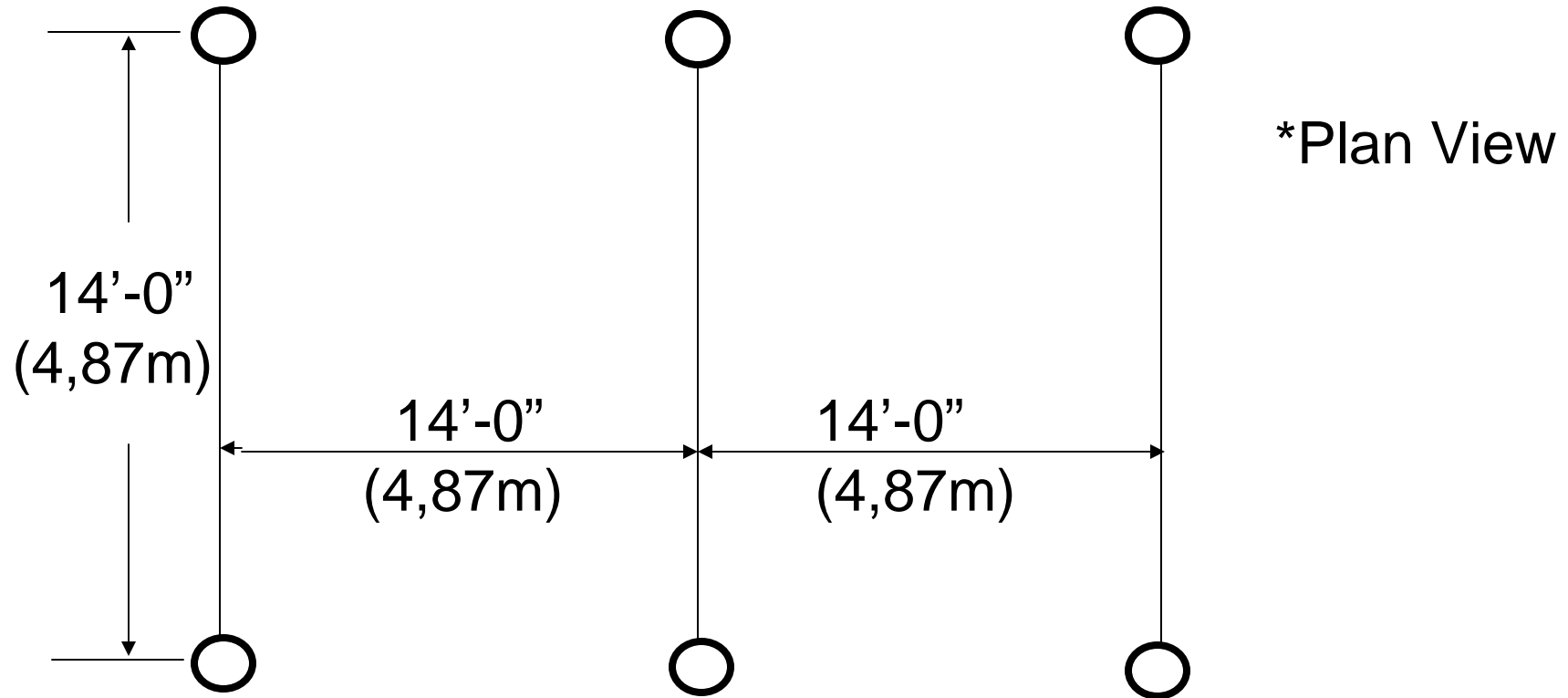
Ord. Hazard Group 2 – 12' x 12' spacing (reduces number of Sprinklers)



$$144 \text{ sq. ft.} \times .20 \text{ gpm per sq. ft.} = 28.8 \text{ gpm}$$

Extended Coverage Sprinklers

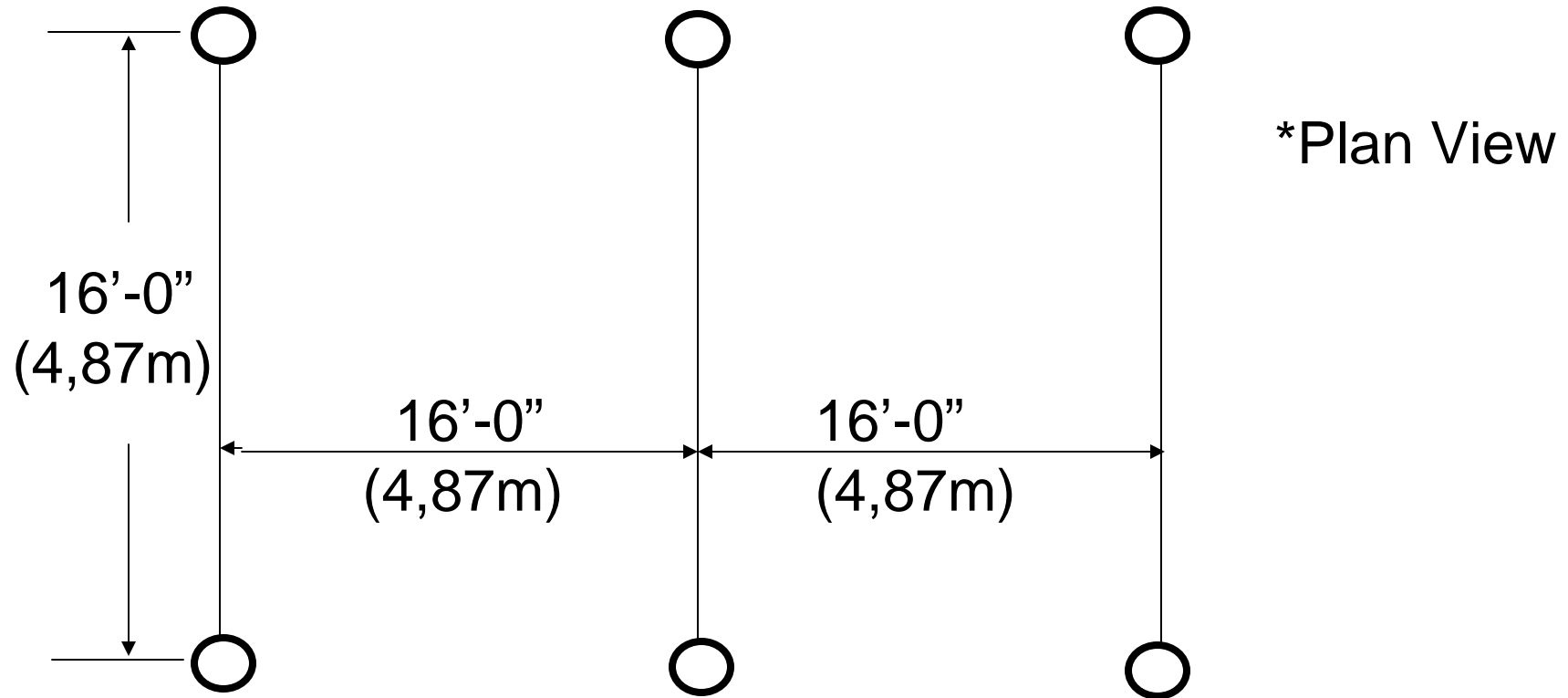
Ord. Hazard Group 2 – 14' x 14' spacing (reduces number of Sprinklers)



$$196 \text{ sq. ft.} \times .20 \text{ gpm per sq. ft.} = 39.2 \text{ gpm}$$

Extended Coverage Sprinklers

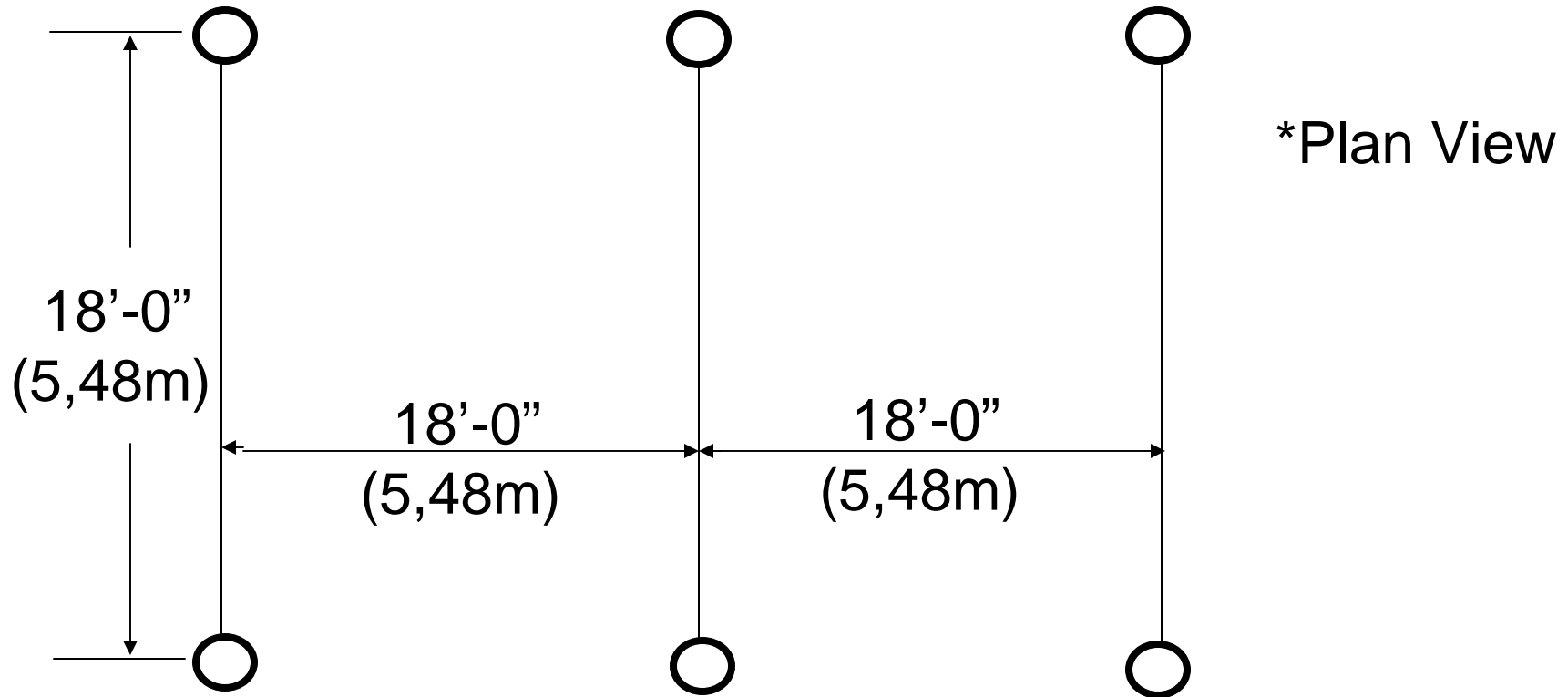
Ord. Hazard Group 2 – 16' x 16' spacing (reduces number of Sprinklers)



$$256 \text{ sq. ft.} \times .20 \text{ gpm per sq. ft.} = 51.2 \text{ gpm}$$

Extended Coverage Sprinklers

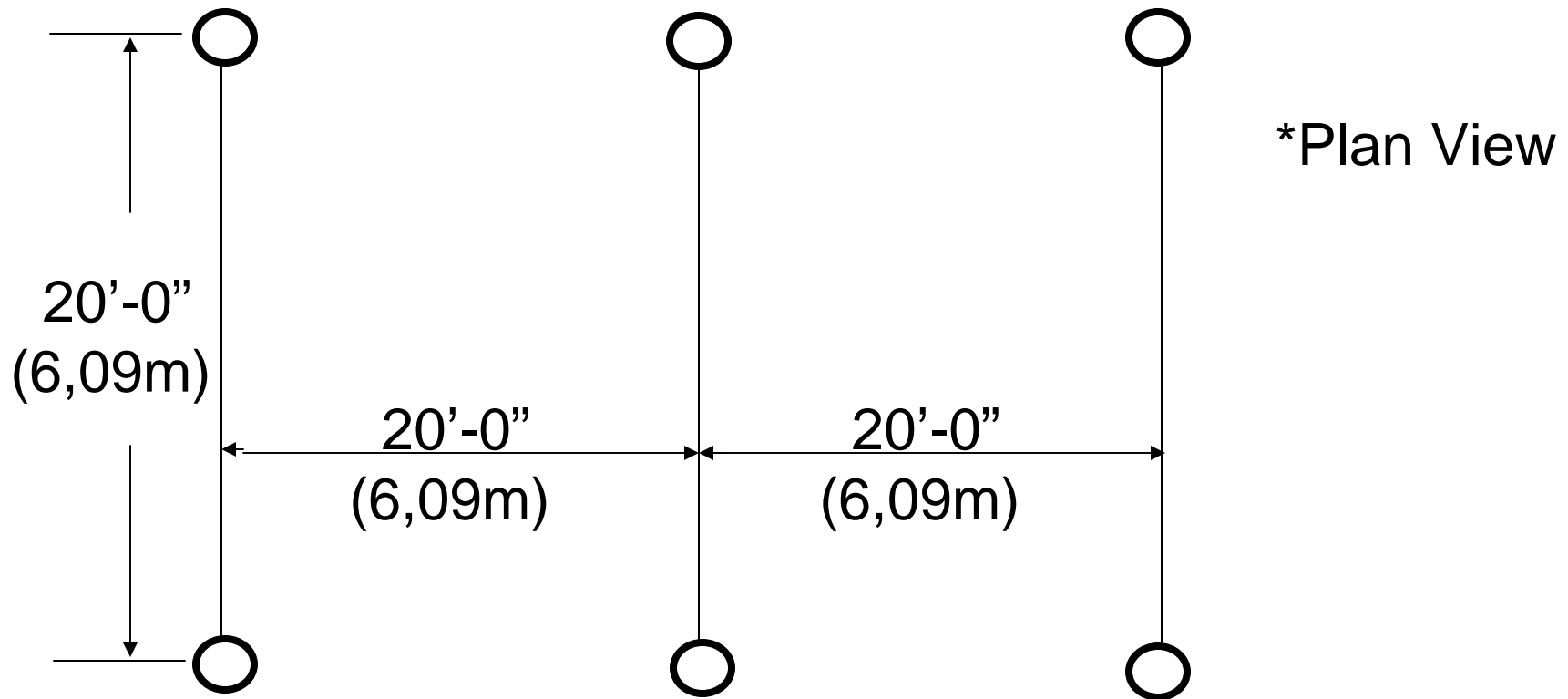
Ord. Hazard Group 2 – 18' x 18' spacing (reduces number of Sprinklers)



$$324 \text{ sq. ft.} \times .20 \text{ gpm per sq. ft.} = 64.8 \text{ gpm}$$

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

Spacing	Area of coverage	OH II Density	Minimum water flow	* % Fewer Sprinklers
12'x12	144 ft ²	.20 gpm/sq ft.	28.8 gpm	10%
14'x14'	196 ft ²	.20 gpm/sq ft.	39.2 gpm	35%
16'x16'	256 ft ²	.20 gpm/sq ft.	51.2 gpm	50%
18'x18'	324 ft ²	.20 gpm/sq ft.	64.8 gpm	60%
20'x20'	400 ft ²	.20 gpm/sq ft.	80 gpm	66%

*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

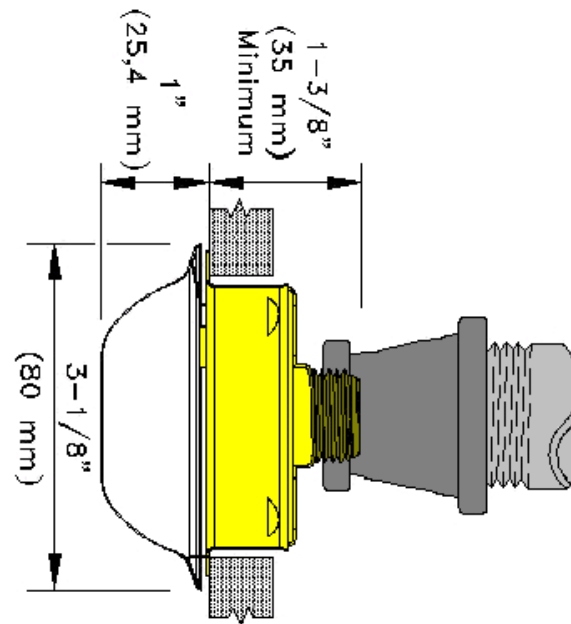
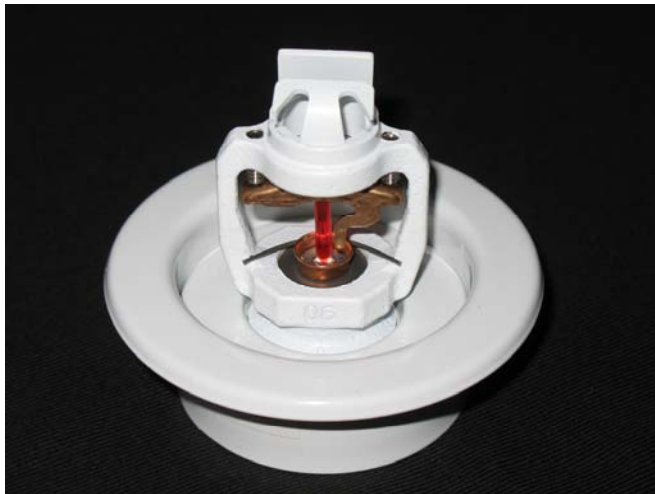
Extended Coverage Horizontal Sidewall

- 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

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Thank you.