

8-5.3 Schedule for Ordinary Hazard Occupancies.

8-5.3.1 Branch lines shall not exceed eight sprinklers on either side of a cross main.

Exception: Where more than eight sprinklers on a branch line are necessary, lines shall be permitted to be increased to nine sprinklers by making the two end lengths 1 in. (25.4 mm) and 1¹/₄ in. (33 mm), respectively, and the sizes thereafter standard. Ten sprinklers shall be permitted to be placed on a branch line, making the two end lengths 1 in. (25.4 mm) and 1¹/₄ in. (33 mm), respectively, and feeding the tenth sprinkler by a 2¹/₂-in. (64-mm) pipe.

8-5.3.2 Pipe sizes shall be in accordance with Table 8-5.3.2(a).

Exception: Where the distance between sprinklers on the branch line exceeds 12 ft (3.7 m) or the distance between the branch lines exceeds 12 ft (3.7 m), the number of sprinklers for a given pipe size shall be in accordance with Table 8-5.3.2(b).

Table 8-5.3.2(a) Ordinary Hazard Pipe Schedule

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1 ¹ / ₄ in.	3 sprinklers	1 ¹ / ₄ in.	3 sprinklers
1 ¹ / ₂ in.	5 sprinklers	1 ¹ / ₂ in.	5 sprinklers
2 in.	10 sprinklers	2 in.	12 sprinklers
2 ¹ / ₂ in.	20 sprinklers	2 ¹ / ₂ in.	25 sprinklers
3 in.	40 sprinklers	3 in.	45 sprinklers
3 ¹ / ₂ in.	65 sprinklers	3 ¹ / ₂ in.	75 sprinklers
4 in.	100 sprinklers	4 in.	115 sprinklers
5 in.	160 sprinklers	5 in.	180 sprinklers
6 in.	275 sprinklers	6 in.	300 sprinklers
8 in.	See Section 5-2	8 in.	See Section 5-2

For SI units, 1 in. = 25.4 mm.

Table 8-5.3.2(b) Number of Sprinklers — Greater than 12-ft (3.7-m) Separations

Steel		Copper	
2 ¹ / ₂ in.	15 sprinklers	2 ¹ / ₂ in.	20 sprinklers
3 in.	30 sprinklers	3 in.	35 sprinklers
3 ¹ / ₂ in.	60 sprinklers	3 ¹ / ₂ in.	65 sprinklers

For SI units, 1 in. = 25.4 mm.

Note: For other pipe and tube sizes, see Table 8-5.3.2(a).

8-5.3.3 Where sprinklers are installed above and below ceilings and such sprinklers are supplied from a common set of

branch lines or separate branch lines supplied by a common cross main, such branch lines shall not exceed eight sprinklers above and eight sprinklers below any ceiling on either side of the cross main. Pipe sizing up to and including 3 in. (76 mm) shall be as shown in Table 8-5.3.3 [see Figures 8-5.2.3(a), (b), and (c)] utilizing the greatest number of sprinklers to be found on any two adjacent levels.

Exception: Branch lines and cross mains supplying sprinklers installed entirely above or entirely below ceilings shall be sized in accordance with Tables 8-5.3.2(a) or (b).

Table 8-5.3.3 Number of Sprinklers above and below a Ceiling

Steel		Copper	
1 in.	2 sprinklers	1 in.	2 sprinklers
1 ¹ / ₄ in.	4 sprinklers	1 ¹ / ₄ in.	4 sprinklers
1 ¹ / ₂ in.	7 sprinklers	1 ¹ / ₂ in.	7 sprinklers
2 in.	15 sprinklers	2 in.	18 sprinklers
2 ¹ / ₂ in.	30 sprinklers	2 ¹ / ₂ in.	40 sprinklers
3 in.	60 sprinklers	3 in.	65 sprinklers

For SI units, 1 in. = 25.4 mm.

8-5.3.3.1* Where the total number of sprinklers above and below a ceiling exceeds the number specified in Table 8-5.3.3 for 3-in. (76-mm) pipe, the pipe supplying such sprinklers shall be increased to 3¹/₂ in. (89 mm) and sized thereafter according to the schedule shown in Table 8-5.2.2 or Table 8-5.3.2(a) for the number of sprinklers above or below a ceiling, whichever is larger.

Exception: Where the distance between the sprinklers protecting the occupied area exceeds 12 ft (3.7 m) or the distance between the branch lines exceeds 12 ft (3.7 m), the branch lines shall be sized in accordance with either Table 8-5.3.2(b), taking into consideration the sprinklers protecting the occupied area only, or 8-5.3.3, whichever requires the greater size of pipe.

8-5.4* Extra hazard occupancies shall be hydraulically calculated.

Exception: For existing systems, see A-8-5.4.

8-6 Deluge Systems. Open sprinkler and deluge systems shall be hydraulically calculated according to applicable standards.

8-7* Exposure Systems. Exposure sprinklers shall be hydraulically calculated using Table 8-7 and a relative classification of exposures guide number.

8-8 In-Rack Sprinklers.

8-8.1 Pipes to in-rack sprinklers shall be sized by hydraulic calculations.

8-8.2 Water demand of sprinklers installed in racks shall be added to ceiling sprinkler water demand over the same protected area at the point of connection. The demand shall be balanced to the higher pressure.

Table 8-7 Exposure Protection

Section A — Window Sprinklers					
Guide Number	Level of Window Sprinkler	Window Sprinkler Orifice Size	Discharge Coefficient (K-factor)	Flow Rate (Q) (gpm)	Application Rate Over 25 ft of Window Area (gpm/ft ²)
1.50 or less	Top 2 levels	$\frac{3}{8}$ in. (9.5 mm)	2.8	7.4	0.30
	Next lower 2 levels	$\frac{5}{16}$ in. (7.9 mm)	1.9	5.0	0.20
	Next lower 2 levels	$\frac{1}{4}$ in. (6.4 mm)	1.4	3.7	0.15
1.51–2.20	Top 2 levels	$\frac{1}{2}$ in. (12.7 mm)	5.6	14.8	0.59
	Next lower 2 levels	$\frac{7}{16}$ in. (11.1 mm)	4.2	11.1	0.44
	Next lower 2 levels	$\frac{3}{8}$ in. (9.5 mm)	2.8	7.4	0.30
2.21–13.15	Top 2 levels	$\frac{5}{8}$ in. (15.9 mm)	11.2	29.6	1.18
	Next lower 2 levels	$\frac{17}{32}$ in. (13.5 mm)	8.0	21.2	0.85
	Next lower 2 levels	$\frac{1}{2}$ in. (12.7 mm)	5.6	14.8	0.59
Section B — Cornice Sprinklers					
Guide Number	Cornice Sprinkler Orifice Size		Application Rate per Lineal Foot (gpm)		
1.50 or less	$\frac{3}{8}$ in. (9.5 mm)		0.75		
1.51–2.20	$\frac{1}{2}$ in. (12.7 mm)		1.50		
2.21–13.15	$\frac{5}{8}$ in. (15.9 mm)		3.00		

For SI units, 1 in. = 25.4 mm; 1 gpm = 3.785 L/min; 1 gpm/ft² = 40.76 mm/min.

Chapter 9 Water Supplies

9-1 General.

9-1.1 Number of Supplies. Every automatic sprinkler system shall have at least one automatic water supply.

9-1.2 Capacity. Water supplies shall be capable of providing the required flow and pressure for the required duration as specified in Chapter 7.

9-1.3 Size of Fire Mains. No pipe smaller than 6 in. (152.4 mm) in diameter shall be installed as a private service main.

Exception: For mains that do not supply hydrants, sizes smaller than 6 in. (152.4 mm) shall be permitted to be used subject to the following restrictions:

(a) The main supplies only automatic sprinkler systems, open sprinkler systems, water spray fixed systems, foam systems, or Class II standpipe systems.

(b) Hydraulic calculations show that the main will supply the total demand at the appropriate pressure. Systems that are not hydraulically calculated shall have a main at least as large as the riser.

9-1.4 Underground Supply Pipe. For pipe schedule systems, the underground supply pipe shall be at least as large as the system riser.

9-1.5 Water Supply Treatment. In areas with water supplies known to have contributed to microbiologically influenced corrosion (MIC) of sprinkler system piping, water supplies shall be tested and appropriately treated prior to filling or testing of metallic piping systems.

9-1.6 Arrangement.

9-1.6.1 Connection Between Underground and Aboveground Piping. The connection between the system piping and underground piping shall be made with a suitable transition piece and shall be properly strapped or fastened by approved devices. The transition piece shall be protected against possible damage from corrosive agents, solvent attack, or mechanical damage.

9-1.6.2* Connection Passing Through or Under Foundation Walls. When system piping pierces a foundation wall below grade or is located under the foundation wall, clearance shall be provided to prevent breakage of the piping due to building settlement.

9-1.7* Meters. Where meters are required by other authorities, they shall be listed.

9-1.8* Connection from Waterworks System. Where connections are made from public waterworks systems, it might be