

NFPA 13 (2019) - CHAPTER - 14 ESFR SPRINKLER

Table 14.2.8.2.1 Protection Areas and Maximum Spacing of ESFR Sprinklers

Construction Type	Ceiling/Roof Heights Up to 30 ft (9.1 m)			
	Protection Area		Spacing	
	ft ²	m ²	ft	m
Noncombustible unobstructed	100	9	12	3.7
Noncombustible obstructed	100	9	12	3.7
Combustible unobstructed	100	9	12	3.7
Combustible obstructed	100	9	12	3.7
Construction Type	Ceiling/Roof Heights Over 30 ft (9.1 m)			
	Protection Area		Spacing	
	ft ²	m ²	ft	m
Noncombustible unobstructed	100	9	10	3
Noncombustible obstructed	100	9	10	3
Combustible unobstructed	100	9	10	3
Combustible obstructed	100	9	10	3

Reference	Orientation	K-Factor	Deflector to Ceiling
14.2.10.1.1.	Pendent	K14 (200)	6"-14" (150-350mm)
14.2.10.1.2.	Pendent	K16.8(240)	6"-14" (150-350mm)
14.2.10.1.3.	Pendent	K22.4-25.2(320-360)	6"-18" (150-450mm)
14.2.10.1.4.	Upright	K14(200)	3"-12" (75-300mm)
14.2.10.1.5.	Upright	K16.8(240)	3"-12" (75-300mm)

Table 14.2.11.1.1 Obstructions to Discharge (ESFR Sprinklers)

Distance from Sprinkler to Side of Obstruction (A)	Max Above Bottom (B) [in. mm]
Less than 1 ft (300 mm)	0 (0)
1 ft (300 mm) to less than 1 ft 6 in. (450 mm)	1-1/2 (40)
1 ft 6 in. (450 mm) to less than 2 ft (600 mm)	3 (75)
2 ft (600 mm) to less than 2 ft 6 in. (750 mm)	5-1/2 (140)
2 ft 6 in. (750 mm) to less than 3 ft (900 mm)	8 (200)
3 ft (900 mm) to less than 3 ft 6 in. (1.1 m)	10 (250)
3 ft 6 in. (1.1 m) to less than 4 ft (1.2 m)	12 (300)
4 ft (1.2 m) to less than 4 ft 6 in. (1.4 m)	15 (375)
4 ft 6 in. (1.4 m) to less than 5 ft (1.5 m)	18 (450)
5 ft (1.5 m) to less than 5 ft 6 in. (1.7 m)	22 (550)
5 ft 6 in. (1.7 m) to less than 6 ft (1.8 m)	26 (650)
6 ft (1.8 m)	31(775)

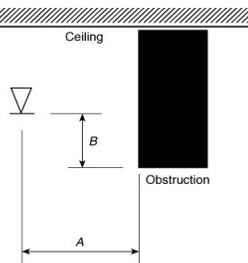


Figure 14.2.11.1.1

14.2.5 Draft Curtains.

14.2.5.1 Where ESFR sprinkler systems are installed adjacent to sprinkler systems with standard-response sprinklers, a draft curtain of noncombustible construction and at least 2 ft (600 mm) in depth shall be required to separate the two areas.

14.2.5.2 A clear aisle of at least 4 ft (1.2 m) centered below the draft curtain shall be maintained for separation.

14.2.8.2 Maximum Protection Area of Coverage.

14.2.8.2.2 Unless the requirements of 14.2.8.2.3 are met, the maximum area of coverage of any sprinkler shall not exceed 100 ft² (9.3 m²).

14.2.8.2.3* Deviations from the maximum sprinkler spacing shall be permitted to eliminate obstructions created by structural elements (such as trusses, bar joists, and wind bracing) by moving a sprinkler along the branch line a maximum of 1 ft (300 mm) from its allowable spacing, provided coverage for that sprinkler does not exceed 110 ft² (10 m²) per sprinkler where all of the following conditions are met:

(1) The average actual floor area protected by the moved sprinkler and the adjacent sprinklers shall not exceed 100 ft² (9 m²).

(2) Adjacent branch lines shall maintain the same pattern.

(3) In no case shall the distance between sprinklers exceed 12 ft (3.7 m).

14.2.8.2.4 Deviations from the maximum sprinkler spacing shall be permitted to eliminate obstructions created by structural elements (such as trusses, bar joists, and wind bracing) by moving a single branch line a maximum of 1 ft (300 mm) from its allowable spacing, provided coverage for the sprinklers on that branch line and the sprinklers on the branch line it is moving away from does not exceed 110 ft² per sprinkler where all of the following conditions are met:

(1) The average actual floor area protected by the sprinklers on the moved branch line and the sprinklers on the adjacent branch lines shall not exceed 100 ft² (9 m²) per sprinkler.

(2) In no case shall the distance between sprinklers exceed 12 ft (3.7 m).

(3) It shall not be permitted to move a branch line where there are moved sprinklers on a branch line that exceed the maximum sprinkler spacing.

14.2.8.3 Minimum Protection Area of Coverage.

The minimum allowable protection area of coverage for a sprinkler (A_v) shall not be less than 64 ft² (5.9 m²).

14.2.11.1.2 The requirements of 14.2.11.1.1 shall not apply where sprinklers are spaced on opposite sides of obstructions less than 24 in. (600 mm) wide, provided the distance from the centerline on the obstructions to the sprinklers does not exceed one-half the allowable distance between sprinklers.

14.2.11.1.3 Sprinklers with a special obstruction allowance shall be installed according to their listing.

14.2.11.2* Isolated Obstructions Below Elevation of Sprinklers.

Sprinklers shall be arranged with respect to obstructions in accordance with one of the following:

(1) Sprinklers shall be installed below isolated noncontinuous obstructions that restrict only one sprinkler and are located below the elevation of sprinklers such as light fixtures and unit heaters.

(2) Additional sprinklers shall not be required where the obstruction is 2 ft (600 mm) or less in width and the sprinkler is located horizontally 1 ft (300 mm) or greater from the nearest edge of the obstruction.

(3) Additional sprinklers shall not be required where sprinklers are positioned with respect to the bottom of obstructions in accordance with 14.2.11.1.

(4) Additional sprinklers shall not be required where the obstruction is 2 in. (50 mm) or less in width and is located a minimum of 2 ft (600 mm) below the elevation of the sprinkler deflector or is positioned a minimum of 1 ft (300 mm) horizontally from the sprinkler.

(5) Sprinklers with a special obstruction allowance shall be installed according to their listing.

14.2.11.3 Continuous Obstructions Below Sprinklers.

14.2.11.3.1 General Continuous Obstructions. Sprinklers shall be arranged with respect to obstructions in accordance with one of the following:

(1) Sprinklers shall be installed below continuous obstructions, or they shall be arranged to comply with Table 14.2.11.1.1 for horizontal obstructions entirely below the elevation of sprinklers that restrict sprinkler discharge pattern for two or more adjacent sprinklers such as ducts, lights, pipes, and conveyors.

(2) Additional sprinklers shall not be required where the obstruction is 2 in. (50 mm) or less in width and is located a minimum of 2 ft (600 mm) below the elevation of the sprinkler deflector or is positioned a minimum of 1 ft (300 mm) horizontally from the sprinkler.

(3) Additional sprinklers shall not be required where the obstruction is 1 ft or less in width and located a minimum of 1 ft horizontally from the sprinkler.

(4) Additional sprinklers shall not be required where the obstruction is 2 ft or less in width and located a minimum of 2 ft horizontally from the sprinkler.

(5) Ceiling sprinklers shall not be required to comply with Table 14.2.11.1.1 where a row of sprinklers is installed under the obstruction.

14.2.11.3.2 Bottom Chords of Bar Joists or Open Trusses.

ESFR sprinklers shall be positioned a minimum of 1 ft (300 mm) horizontally from the nearest edge to the bottom chord of a bar joist or open truss where the bottom chord does not exceed 1 ft (300 mm) in width.

14.2.11.3.2.1 The requirements of 14.2.11.3.2 shall not apply where upright sprinklers are located over the bottom chords of bar joists or open trusses that are 4 in. (100 mm) maximum in width.

14.2.11.3.3* For pipes, conduits, or groups of pipes and conduit to be considered individual, they shall be separated from the closest adjacent pipe, conduit, cable tray, or similar obstructions by a minimum of three times the width of the adjacent pipe, conduit, cable tray, or similar obstruction.

14.2.11.3.4 Open Gratings. Sprinklers installed under open gratings shall be of the intermediate level/rack storage type or otherwise shielded from the discharge of overhead sprinklers.

14.2.11.3.5 Overhead Doors. Quick-response spray sprinklers shall be permitted to be utilized under overhead doors.

14.2.11.3.6 Special Obstruction Allowance. sprinklers with a special obstruction allowance shall be installed according to their listing.

14.2.12 Clearance to Storage (Early Suppression Fast-Response Sprinklers). The clearance between the deflector and the top of storage shall be 36 in. (900 mm) or greater.

This does not cover all obstruction rules, for complete rules for obstruction please refer to the appropriate chapter referenced above