

FIGURE 8.11.5.3.4 Obstruction More Than 24 in. (610 mm) Below the Sprinkler (Large Drop Sprinkler).

8.11.5.3.4 Where the bottom of the obstruction is located 24 in. (610 mm) or more below the sprinkler deflectors, the following shall occur:

- (1) Sprinklers shall be positioned so that the obstruction is centered between adjacent sprinklers in accordance with Figure 8.11.5.3.4.
- (2) The obstruction width shall meet the following requirements:
 - (a) The obstruction shall be limited to a maximum width of 24 in. (610 mm) in accordance with Figure 8.11.5.3.4.
 - (b) Where the obstruction is greater than 24 in. (610 mm) wide, one or more lines of sprinklers shall be installed below the obstruction.
- (3) The obstruction extension shall meet the following requirements:
 - (a) The obstruction shall not extend more than 12 in. (305 mm) to either side of the midpoint between sprinklers in accordance with Figure 8.11.5.3.4.
 - (b) Where the extensions of the obstruction exceed 12 in. (305 mm), one or more lines of sprinklers shall be installed below the obstruction.
- (4) At least 18 in. (457 mm) clearance shall be maintained between the top of storage and the bottom of the obstruction in accordance with Figure 8.11.5.3.4.

8.11.5.3.5 In the special case of an obstruction running parallel to and directly below a branch line, the following shall occur:

- (1) The sprinkler shall be located at least 36 in. (914 mm) above the top of the obstruction in accordance with Figure 8.11.5.3.5.
- (2) The obstruction shall be limited to a maximum width of 12 in. (305 mm) in accordance with Figure 8.11.5.3.5.

- (3) The obstruction shall be limited to a maximum extension of 6 in. (152 mm) to either side of the centerline of the branch line in accordance with Figure 8.11.5.3.5.

8.11.6 Clearance to Storage (Large Drop Sprinklers). The clearance between the deflector and the top of storage shall be 36 in. (914 mm) or greater.

8.12 Early Suppression Fast-Response Sprinklers.

8.12.1 General. All requirements of Section 8.5 shall apply except as modified in Section 8.12.

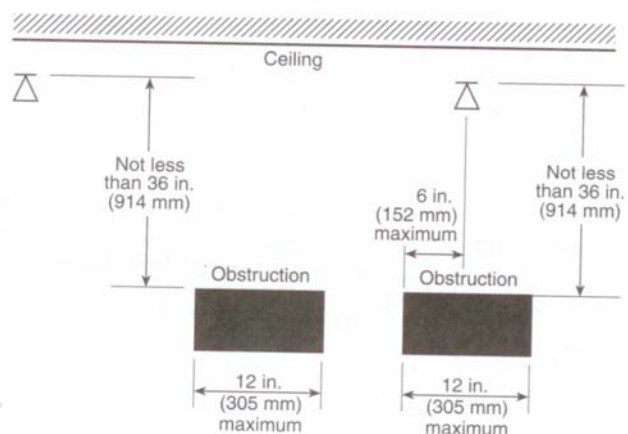


FIGURE 8.11.5.3.5 Obstruction More Than 36 in. (914 mm) Below the Sprinkler (Large Drop Sprinkler).

8.12.2 Protection Areas per Sprinkler (Early Suppression Fast-Response Sprinklers).

8.12.2.1 Determination of the Protection Area of Coverage. The protection area of coverage per sprinkler (A_s) shall be determined in accordance with 8.5.2.1.

8.12.2.2 Maximum Protection Area of Coverage.

8.12.2.2.1 The maximum allowable protection area of coverage for a sprinkler (A_s) shall be in accordance with the value indicated in Table 8.12.2.2.1.

8.12.2.2.2 Unless the requirements of 8.12.2.2.3 are met, the maximum area of coverage of any sprinkler shall not exceed 100 ft² (9.3 m²).

8.12.2.2.3* It shall be permitted to deviate from the maximum sprinkler spacing 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 (0.31 m) from its allowable spacing, provided coverage for that sprinkler does not exceed 110 ft² (10.2 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 (9.3 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).

8.12.2.2.4 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 (0.31 m) 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 (10.2 m²) 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 (9.3 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.

8.12.2.3 Minimum Protection Area of Coverage. The minimum allowable protection area of coverage for a sprinkler (A_s) shall not be less than 64 ft² (6 m²).

8.12.3 Sprinkler Spacing (Early Suppression Fast-Response Sprinklers).

8.12.3.1 Maximum Distance Between Sprinklers. The maximum distance between sprinklers shall be in accordance with the following:

- (1) Where the storage height is less than or equal to 25 ft (7.6 m) and the ceiling height is less than or equal to 30 ft (9.1 m), the distance between sprinklers shall be limited to not more than 12 ft (3.7 m) between sprinklers as shown in Table 8.12.2.2.1.
- (2) Unless the requirements of 8.12.3.1(3) or 8.12.3.1(4) are met, where the storage height exceeds 25 ft (7.6 m) and ceiling height exceeds 30 ft (9.1 m), the distance between sprinklers shall be limited to not more than 10 ft (3 m) between sprinklers.
- (3)*Regardless of the storage or ceiling height arrangement, it shall be permitted to deviate from the maximum sprinkler spacing to eliminate obstructions created by trusses and bar joists by moving a sprinkler along the branch line a maximum of 1 ft (0.31 m) from its allowable spacing, provided coverage for that sprinkler does not exceed 110 ft² (10.2 m²) where all of the following conditions are met:
 - (a) The average actual floor area protected by the moved sprinkler and the adjacent sprinklers shall not exceed 100 ft² (9.3 m²).
 - (b) Adjacent branch lines shall maintain the same pattern.
 - (c) In no case shall the distance between sprinklers exceed 12 ft (3.7 m).
- (4) Where branch lines are parallel to trusses and bar joists, it shall be permitted to deviate from the maximum sprinkler spacing to eliminate obstructions created by trusses and bar joists by moving a single branch line a maximum of 1 ft (0.31 m) 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 (10.2 m²) per sprinkler where all of the following conditions are met:
 - (a) 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 (9.3 m²) per sprinkler.
 - (b) In no case shall the distance between sprinklers exceed 12 ft (3.7 m).
 - (c) 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.

Table 8.12.2.2.1 Protection Areas and Maximum Spacing of ESFR Sprinklers

Construction Type	Ceiling/Roof Heights Up to 30 ft (9.1 m)				Ceiling/Roof Heights Over 30 ft (9.1 m)			
	Protection Area		Spacing		Protection Area		Spacing	
	ft ²	m ²	ft	m	ft ²	m ²	ft	m
Noncombustible unobstructed	100	9.3	12	3.7	100	9.3	10	3.1
Noncombustible obstructed	100	9.3	12	3.7	100	9.3	10	3.1
Combustible unobstructed	100	9.3	12	3.7	100	9.3	10	3.1
Combustible obstructed	N/A		N/A		N/A		N/A	

8.12.3.2 Maximum Distance from Walls. The distance from sprinklers to walls shall not exceed one-half of the allowable distance permitted between sprinklers as indicated in Table 8.12.2.2.1.

8.12.3.3 Minimum Distance from Walls. Sprinklers shall be located a minimum of 4 in. (102 mm) from a wall.

8.12.3.4 Minimum Distance Between Sprinklers. Sprinklers shall be spaced not less than 8 ft (2.4 m) on center.

8.12.4 Deflector Position (Early Suppression Fast-Response Sprinklers).

8.12.4.1 Distance Below Ceilings.

8.12.4.1.1 Pendent sprinklers with a nominal K-factor of 14 shall be positioned so that deflectors are a maximum 14 in. (356 mm) and a minimum 6 in. (152 mm) below the ceiling.

8.12.4.1.2 Pendent sprinklers with a nominal K-factor of 16.8 shall be positioned so that deflectors are a maximum 14 in. (356 mm) and a minimum 6 in. (152 mm) below the ceiling.

8.12.4.1.3 Pendent sprinklers with a nominal K-factor of 22.4 and 25.2 shall be positioned so that deflectors are a maximum 18 in. (457 mm) and a minimum 6 in. (152 mm) below the ceiling.

8.12.4.1.4 Upright sprinklers with a nominal K-factor of 14 shall be positioned so that the deflector is 3 in. to 12 in. (76 mm to 305 mm) below the ceiling.

8.12.4.1.5 Upright sprinklers with a nominal K-factor of 16.8 shall be positioned so that the deflector is 3 in. to 12 in. (76 mm to 305 mm) below the ceiling.

8.12.4.1.6 With obstructed construction, the branch lines shall be permitted to be installed across the beams, but sprinklers shall be located in the bays and not under the beams.

8.12.4.2 Deflector Orientation. Deflectors of sprinklers shall be aligned parallel to ceilings or roofs.

8.12.5 Obstructions to Sprinkler Discharge (Early Suppression Fast-Response Sprinklers).

8.12.5.1 Obstructions at or Near the Ceiling.

8.12.5.1.1 Sprinklers shall be arranged to comply with Table 8.12.5.1.1 and Figure 8.12.5.1.1 for obstructions at the ceiling, such as beams, ducts, lights, and top chords of trusses and bar joists.

8.12.5.1.2 The requirements of 8.12.5.1.1 shall not apply where sprinklers are spaced on opposite sides of obstructions less than 24 in. (610 mm) wide, provided the distance from the centerline on the obstructions to the sprinklers does not exceed one-half the allowable distance between sprinklers.

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

8.12.5.2* Isolated Obstructions Below the 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.

Table 8.12.5.1.1 Positioning of Sprinklers to Avoid Obstructions to Discharge (ESFR Sprinkler)

Distance from Sprinkler to Side of Obstruction (A)	Maximum Allowable Distance of Deflector Above Bottom of Obstruction (in.) (B)
Less than 1 ft	0
1 ft to less than 1 ft 6 in.	1½
1 ft 6 in. to less than 2 ft	3
2 ft to less than 2 ft 6 in.	5½
2 ft 6 in. to less than 3 ft	8
3 ft to less than 3 ft 6 in.	10
3 ft 6 in. to less than 4 ft	12
4 ft to less than 4 ft 6 in.	15
4 ft 6 in. to less than 5 ft	18
5 ft to less than 5 ft 6 in.	22
5 ft 6 in. to less than 6 ft	26
6 ft	31

For SI units, 1 in. = 25.4 mm; 1 ft = 0.3048 m.

Note: For (A) and (B), refer to Figure 8.12.5.1.1.

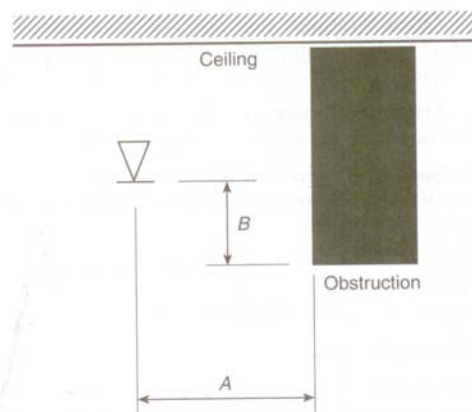


FIGURE 8.12.5.1.1 Positioning of Sprinklers to Avoid Obstructions to Discharge (ESFR Sprinkler).

- (2) Additional sprinklers shall not be required where the obstruction is 2 ft (0.6 m) or less in width and the sprinkler is located horizontally 1 ft (0.3 m) 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 8.12.5.1.
- (4) Additional sprinklers shall not be required where the obstruction is 2 in. (51 mm) or less in width and is located a minimum of 2 ft (0.6 m) below the elevation of the sprinkler deflector or is positioned a minimum of 1 ft (0.3 m) horizontally from the sprinkler.
- (5) Sprinklers with a special obstruction allowance shall be installed according to their listing.

8.12.5.3 Continuous Obstructions Below the Sprinklers.

8.12.5.3.1 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 8.12.5.1.1 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. (51 mm) or less in width and is located a minimum of 2 ft (0.6 m) below the elevation of the sprinkler deflector or is positioned a minimum of 1 ft (0.3 m) horizontally from the sprinkler.
- (3) Additional sprinklers shall not be required where the obstruction is 1 ft (0.3 m) or less in width and located a minimum of 1 ft (0.3 m) horizontally from the sprinkler.
- (4) Additional sprinklers shall not be required where the obstruction is 2 ft (0.6 m) or less in width and located a minimum of 2 ft (0.6 m) horizontally from the sprinkler.
- (5) Ceiling sprinklers shall not be required to comply with Table 8.12.5.1.1 where a row of sprinklers is installed under the obstruction.

8.12.5.3.2 Bottom Chords of Bar Joists or Open Trusses. ESFR sprinklers shall be positioned a minimum of 1 ft (0.3 m) horizontally from the nearest edge to any bottom chord of a bar joist or open truss.

8.12.5.3.3 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.

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

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

8.12.6 Clearance to Storage (Early Suppression Fast-Response Sprinklers). The clearance between the deflector and the top of storage shall be 36 in. (914 mm) or greater.

8.13 In-Rack Sprinklers.

8.13.1 System Size. The area protected by a single system of sprinklers in racks shall not exceed 40,000 ft² (3716 m²) of floor area occupied by the racks, including aisles, regardless of the number of levels of in-rack sprinklers.

8.13.2 Type of In-Rack Sprinklers.

8.13.2.1 Sprinklers in racks shall be ordinary-temperature standard-response or quick-response classification with a nominal K-factor of K-5.6 or 8.0 (80 or 115), pendent or upright.

8.13.2.2 Sprinklers with intermediate- and high-temperature ratings shall be used near heat sources as required by 8.3.2.

8.13.3 In-Rack Sprinkler Water Shields.

8.13.3.1 In-Rack Sprinkler Water Shields for Storage of Class I Through Class IV Commodities. Water shields shall be provided directly above in-rack sprinklers, or listed intermediate level/rack storage sprinklers shall be used where there is more than one level, if not shielded by horizontal barriers. (See Section C.3.)

8.13.3.2 In-Rack Sprinkler Water Shields for Plastic Storage. Where in-rack sprinklers are not shielded by horizontal barriers, water shields shall be provided above the sprinklers, or listed intermediate level/rack storage sprinklers shall be used.

8.13.4 Location, Position, and Spacing of In-Rack Sprinklers. See Chapter 12 through Chapter 20 as appropriate.

8.13.4.1 Minimum Distance Between In-Rack Sprinklers. In-rack sprinklers shall be permitted to be placed less than 6 ft (1.8 m) on center.

8.13.5 Obstructions to In-Rack Sprinkler Discharge. In-rack sprinklers shall not be required to meet the obstruction criteria and clearance from storage requirements of Section 8.5.

8.14 Pilot Line Detectors.

8.14.1 Pilot line detectors and related components including pipe and fittings shall be corrosion resistant when installed in areas exposed to weather or corrosive conditions.

8.14.2 Where subject to mechanical or physical damage, pilot line detectors and related detection system components shall be protected.

8.14.3 Where spray sprinklers are used as pilot line detectors, they shall be installed in accordance with Section 8.14 and the spacing and location rules of Section 8.6, except that the obstruction to water distribution rules for automatic sprinklers shall not be required to be followed.

8.14.3.1 Where located under a ceiling, pilot sprinklers shall be positioned in accordance with the requirements of Section 8.6.

8.14.4 The temperature rating of spray sprinklers utilized as pilot line detectors shall be selected in accordance with 8.3.2.

8.14.5 Maximum horizontal spacing for indoor locations shall not exceed 12 ft (3.7 m).

8.14.6 Pilot line detectors shall be permitted to be spaced more than 22 in. (559 mm) below a ceiling or deck where the maximum spacing between pilot line detectors is 10 ft (3 m) or less.

8.14.6.1 Other maximum horizontal spacing differing from those required in 8.14.5 shall be permitted where installed in accordance with their listing.

8.14.7 Pilot line detectors located outdoors, such as in open process structures, shall be spaced such that the elevation of a single level of pilot line detectors and between additional levels of pilot line detectors shall not exceed 17 ft (5.2 m).

8.14.8 The maximum distance between pilot line detectors installed outdoors shall not exceed 8 ft (2.5 m).

8.14.8.1 The horizontal distance between pilot line detectors installed outdoors on a given level shall be permitted to be increased to 10 ft (3 m) when all of the following conditions are met:

- (1) The elevation of the first level does not exceed 15 ft (4.6 m).
- (2) The distance between additional levels does not exceed 12 ft (3.7 m).
- (3) The pilot line actuators are staggered vertically.

8.14.8.2 Alternate vertical spacing of pilot line detectors differing from those required in 8.14.8.1 shall be permitted where installed in accordance with their listing.

8.14.9 Pilot line detectors located in open-sided buildings shall follow the indoor spacing rules.

8.14.9.1 A row of pilot line detectors spaced in accordance with the outdoor pilot line detector spacing rules shall be located along the open sides of open-sided buildings.

8.14.9.2 Pilot line detectors located under open gratings shall be spaced in accordance with the outdoor rules.

11.3.1.4 Where areas such as attics, basements, or other types of occupancies are outside of dwelling units but within the same structure, these areas shall be protected as a separate design basis in accordance with Section 11.1.

11.3.1.5 Hose stream allowance and water supply duration requirements shall be in accordance with those for light hazard occupancies in Table 11.2.3.1.2.

11.3.2 Exposure Protection.

11.3.2.1* Piping shall be hydraulically calculated in accordance with Section 22.4 to furnish a minimum of 7 psi (0.5 bar) at any sprinkler with all sprinklers facing the exposure operating.

11.3.2.2 Where the water supply feeds other fire protection systems, it shall be capable of furnishing total demand for such systems as well as the exposure system demand.

11.3.3 Water Curtains.

11.3.3.1 Sprinklers in a water curtain such as described in 8.15.4 or 8.15.16.2 shall be hydraulically designed to provide a discharge of 3 gpm per lineal foot (37 L/min per lineal meter) of water curtain, with no sprinklers discharging less than 15 gpm (56.8 L/min).

11.3.3.2 For water curtains employing automatic sprinklers, the number of sprinklers calculated in this water curtain shall be the number in the length corresponding to the length parallel to the branch lines in the area determined by 22.4.4.1.1.

11.3.3.3 If a single fire can be expected to operate sprinklers within the water curtain and within the design area of a hydraulically calculated system, the water supply to the water curtain shall be added to the water demand of the hydraulic calculations and shall be balanced to the calculated area demand.

11.3.3.4 Hydraulic design calculations shall include a design area selected to include ceiling sprinklers adjacent to the water curtain.

11.3.3.5 Sprinklers Under a Roof or Ceiling in Combustible Concealed Spaces of Wood Joist or Wood Truss Construction with Members 3 ft (914 mm) or Less on Center and a Slope Having a Pitch of 4 in 12 or Greater.

11.3.3.5.1 Where sprinkler spacing does not exceed 8 ft (2.5 m) measured perpendicular to the slope, the minimum sprinkler discharge pressure shall be 7 psi (0.5 bar).

11.3.3.5.2 Where sprinkler spacing exceeds 8 ft (2.5 m) measured perpendicular to the slope, the minimum sprinkler discharge pressure shall be 20 psi (1.4 bar).

11.3.3.5.3 Hose stream allowance and water supply duration requirements shall be in accordance with those for light hazard occupancies in Table 11.2.3.1.2.

Chapter 12 General Requirements for Storage

12.1 General. The requirements of Section 12.1 shall apply to all storage arrangements and commodities other than miscellaneous storage (Chapter 13) and as modified by specific sections in Chapter 14 through Chapter 20.

12.1.1 Roof Vents and Draft Curtains. Sprinkler protection criteria are based on the assumption that roof vents and draft curtains are not being used. (See Section C.6.)

12.1.2 Ceiling Slope. The sprinkler system criteria specified in Chapter 12 and Chapters 14 through 20 are intended to apply to buildings with ceiling slopes not exceeding 2 in 12 (16.7 percent) unless modified by a specific section in Chapter 12 and Chapters 14 through 20.

12.1.3 Building and Storage Height.

12.1.3.1 The maximum building height shall be measured to the underside of the roof deck or ceiling.

12.1.3.2 Early suppression fast-response (ESFR) sprinklers shall be used only in buildings equal to, or less than, the height of the building for which they have been listed.

12.1.3.3 The sprinkler system design shall be based on the storage height and clearance to ceiling that routinely or periodically exist in the building and create the greatest water demand. Where storage is placed above doors, the storage height shall be calculated from the base of storage above the door.

12.1.3.4* Ceiling Height.

12.1.3.4.1 For ceiling heights that exceed 30 ft (9.14 m), where the distance between the ceiling height and top of storage exceeds 20 ft (6.1 m), protection shall be provided for the storage height that would result in a 20 ft (6.1 m) distance between the ceiling height and top of storage.

12.1.3.4.2 The requirements of 12.1.3.4 shall not apply to storage arrangements protected in accordance with Chapter 13, Miscellaneous Storage.

12.2* Hose Connections.

12.2.1 Small hose connections [1½ in. (38 mm)] shall be provided where required by the authority having jurisdiction in accordance with 8.17.5 for first-aid fire-fighting and over-haul operations.

12.2.2 Small hose connections shall not be required for the protection of Class I, II, III, and IV commodities stored 12 ft (3.7 m) or less in height.

12.3* Adjacent Hazards or Design Methods. For buildings with two or more adjacent hazards or design methods, the following shall apply:

- (1) Where areas are not physically separated by a barrier or partition capable of delaying heat from a fire in one area from fusing sprinklers in the adjacent area, the required sprinkler protection for the more demanding design basis shall extend 15 ft (4.6 m) beyond its perimeter.
- (2) The requirements of 12.3(1) shall not apply where the areas are separated by a barrier partition that is capable of preventing heat from a fire in one area from fusing sprinklers in the adjacent area.

12.4* Wet Pipe Systems.

12.4.1 Sprinkler systems shall be wet pipe systems.

12.4.2* In areas that are subject to freezing or where special conditions exist, dry-pipe systems and preaction systems shall be permitted to protect storage occupancies.

12.4.3 ESFR sprinklers shall only be permitted to be wet pipe systems.

12.5 Dry Pipe and Preaction Systems.

12.5.1 For dry pipe systems and preaction systems, the area of sprinkler operation shall be increased by 30 percent without revising the density.

- A.3.3.3 Bathroom.** A room is still considered a bathroom if it contains just a toilet. Additionally, two bathrooms can be adjacent to each other and are considered separate rooms provided they are enclosed with the required level of construction.

The term *bathroom*, as defined in 3.3.3, was added to NFPA 13 to help identify and clarify the physical boundaries and characteristics of a bathroom. This definition provides clarification when applied to 8.14.8.1 for the omission of sprinklers in some bathrooms. Many modern dwelling units contain several small adjacent rooms that together provide the basic requirements for the term *bathroom*. These individual rooms or compartments should be treated as bathrooms as defined by 3.3.3.

- NEW 3.3.4 Ceiling Height.** The distance between the floor and the underside of the ceiling above (or roof deck) within the area.

NEW 3.3.5 Ceiling Types.

Definitions of ceiling types, as defined in 3.3.5.1 through 3.3.5.4, were added to NFPA 13 to clarify that where used throughout NFPA 13 these terms have specific meanings that impact the use of specific sprinklers. In many cases these terms provide limits on the applications of specific types of sprinklers and must be understood when choosing a specific sprinkler type.

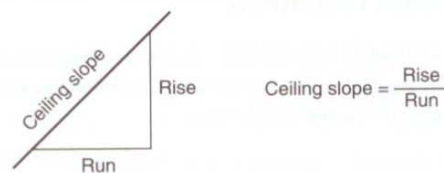
- NEW 3.3.5.1 Flat Ceiling.** A continuous ceiling in a single plane.

The term *flat ceiling*, as defined in 3.3.5.1, does not mean that ceiling is horizontal. In many instances and applications flat ceilings will have some type of slope.

- NEW 3.3.5.2 Horizontal Ceiling.** A ceiling with a slope not exceeding 2 in 12.

A *horizontal ceiling*, as defined in 3.3.5.2, is limited to a ceiling plane where the slope of the ceiling plane does not exceed 2 units of rise for every 12 units of run. Exhibit 3.1 illustrates how to determine ceiling slope.

EXHIBIT 3.1 Ceiling Slope.



- NEW 3.3.5.3 Sloped Ceiling.** A ceiling with a slope exceeding 2 in 12.

A *sloped ceiling*, as defined in 3.3.5.2, is limited to a ceiling plane where the slope of the ceiling plane exceeds 2 units of rise for every 12 units of run. Exhibit 3.1 illustrates how to determine ceiling slope.

- NEW 3.3.5.4 Smooth Ceiling.** A continuous ceiling free from significant irregularities, lumps, or indentations.

The term *smooth ceiling*, as defined in 3.3.5.4, applies to the actual surface of the ceiling and is applicable to each type of ceiling defined in 3.3.5.1, 3.3.5.2, and 3.3.5.3.

- 3.3.6 Compartment.** A space completely enclosed by walls and a ceiling. The compartment enclosure is permitted to have openings to an adjoining space if the openings have a minimum lintel depth of 8 in. (203 mm) from the ceiling.