**Chapter 13 Installation Requirements for CMSA Sprinklers**

13.1 General

Control mode specific application (CMSA) sprinklers shall be selected for use and installation as indicated in this chapter and shall be positioned and spaced in accordance with Section 9.5.

13.2 CMSA Sprinklers

13.2.1 General

All requirements of Section 9.5 shall apply to CMSA sprinklers except as modified in Section 13.2.

13.2.1.1

CMSA pendent sprinklers shall be installed in accordance with Section 9.5 and the manufacturer's installation instructions in lieu of the requirements in Section 13.2.

13.2.2

CMSA sprinklers shall be permitted to be used in wet, dry, or preaction systems and shall be installed in accordance with their listing.

13.2.3 Temperature Ratings

13.2.3.1

Unless the requirements of 13.2.3.2, 13.2.3.3, or 13.2.3.4 are met, sprinkler temperature ratings shall be the same as those indicated in Table 9.4.2.5(a) and Table 9.4.2.5(b) or those used in large-scale fire testing to determine the protection requirements for the hazard involved.

13.2.3.2

Sprinklers of intermediate- and high-temperature ratings shall be installed in specific locations as required by 9.4.2.

13.2.3.3

In storage occupancies, ordinary, intermediate, or high temperature-rated sprinklers shall be used for wet pipe systems.

13.2.3.4

In storage occupancies, high temperature-rated sprinklers shall be used for dry pipe systems.

13.2.4 Occupancy and Hazard

13.2.4.1

Quick-response CMSA sprinklers designed to meet any criteria in Chapter 12 through Chapter 20 shall be permitted to protect light and ordinary hazard occupancies.

13.2.4.2

Standard-response CMSA sprinklers designed to meet any criteria in Chapter 12 through Chapter 20 shall be permitted to protect ordinary hazard occupancies.

13.2.5\* Protection Areas Per Sprinkler (CMSA Sprinklers)

13.2.5.1 Determination of Protection Area of Coverage

The protection area of coverage per sprinkler (As) shall be determined in accordance with 9.5.2.1.

13.2.5.2 Maximum Protection Area of Coverage

13.2.5.2.1

The maximum allowable protection area of coverage for a sprinkler (As) shall be in accordance with the value indicated in Table 13.2.5.2.1.

Table 13.2.5.2.1 Protection Areas and Maximum Spacing for CMSA Sprinklers

Construction Type Protection Area Maximum Spacing

ft2 m2 ft m

Noncombustible unobstructed 130 12 12 3.7

Noncombustible obstructed 130 12 12 3.7

Combustible unobstructed 130 12 12 3.7

Combustible obstructed 100 9 10 3.0

Rack storage combustible obstructed 100 9 10 3.0

Rack storage unobstructed and noncombustible obstructed 100 9 12 3.7

13.2.5.2.2

In any case, the maximum area of coverage of any sprinkler shall not exceed 130 ft2 (12 m2).

13.2.5.3 Minimum Protection Area of Coverage

The minimum allowable protection area of coverage for a sprinkler (As) shall be not less than 80 ft2 (7.4 m2).

13.2.6 Sprinkler Spacing (CMSA Sprinklers)

13.2.6.1\* Maximum Distance Between Sprinklers

13.2.6.1.1

Under unobstructed and obstructed noncombustible construction and unobstructed combustible construction, the distance between sprinklers shall be limited to not more than 12 ft (3.7 m) between sprinklers, as shown in Table 13.2.5.2.1.

13.2.6.1.2

Under obstructed combustible construction, the maximum distance shall be limited to 10 ft (3 m).

13.2.6.2 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 13.2.5.2.1.

13.2.6.3 Minimum Distance From Walls

Sprinklers shall be located a minimum of 4 in. (100 mm) from a wall.

13.2.6.4 Minimum Distance Between Sprinklers

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

13.2.7 Deflector Position (CMSA Sprinklers)

13.2.7.1\* Distance Below Ceilings

13.2.7.1.1 Unobstructed Construction

Under unobstructed construction, the distance between the sprinkler deflector and the ceiling shall be a minimum of 6 in. (150 mm) and a maximum of 8 in. (200 mm).

13.2.7.1.2 Obstructed Construction

Under obstructed construction, the sprinkler deflector shall be located in accordance with one of the following arrangements:

Installed with the deflectors located a minimum of 6 in. (150 mm) and a maximum of 12 in. (300 mm) from the ceiling.

Installed with the deflectors within the horizontal planes 1 in. to 6 in. (25 mm to 150 mm) below wood joist, composite wood joist, solid obstructed noncombustible, or solid obstructed limited combustible construction, to a maximum distance of 22 in. (550 mm) below the ceiling/roof or deck. Where CMSA sprinklers are installed under open wood joist construction, their minimum operating pressure shall be 50 psi (3.4 bar) for a K-11.2 (160) sprinkler or 22 psi (1.5 bar) for a K-16.8 (240) sprinkler in accordance with 22.1.5.1.

Installed with deflectors of sprinklers under concrete tee construction with stems spaced less than 7 ft 6 in. (2.3 m) but more than 3 ft (900 mm) on centers, regardless of the depth of the tee, located at or above a horizontal plane 1 in. (25 mm) below the bottom of the stems of the tees and in compliance with Table 13.2.8.1.2.

13.2.8\* Obstructions to Sprinkler Discharge (CMSA Sprinklers)

13.2.8.1 Performance Objective

13.2.8.1.1

Sprinklers shall be located so as to minimize obstructions to discharge as defined in 9.5.5.2 and 9.5.5.3, or additional sprinklers shall be provided to ensure adequate coverage of the hazard.

13.2.8.1.2

Sprinklers shall be arranged to comply with 9.5.5.2, Table 13.2.8.1.2, and Figure 13.2.8.1.2.

Table 13.2.8.1.2 Positioning of Sprinklers to Avoid Obstructions to Discharge (CMSA Sprinklers)

Distance from Sprinkler to Side of Obstruction (A) Maximum Allowable Distance of Deflector Above Bottom of Obstruction (B)

[in. (mm)]

Less than 1 ft (300 mm) 0 (0)

1 ft (300 mm) to less than 1 ft 6 in. (450 mm) 11/2 (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) 51/2 (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)

Note: For A and B, refer to Figure 13.2.8.1.2.

FIGURE 13.2.8.1.2 Positioning of Sprinkler to Avoid Obstruction to Discharge (CMSA Sprinklers).

13.2.8.1.3

The requirements of 13.2.8.1.2 shall not apply where sprinklers are positioned on opposite sides of the obstruction.

13.2.8.2 Obstructions to Sprinkler Discharge Pattern Development

13.2.8.2.1 General

13.2.8.2.1.1

Continuous or noncontinuous obstructions less than or equal to 36 in. (900 mm) below the sprinkler deflector that prevent the pattern from fully developing shall comply with 13.2.8.2.

13.2.8.2.1.2

Regardless of the rules of this section, solid continuous obstructions shall meet the requirements of 13.2.8.1.2 or 13.2.8.1.3.

13.2.8.2.1.3\*

Unless the requirements of 13.2.8.1.2 or 13.2.8.1.3 are met, for obstructions 8 in. (200 mm) or less in width, as shown in Figure 13.2.8.2.1.3, sprinklers shall be positioned such that they are located at least a distance three times greater than the maximum dimension of the obstruction from the sprinkler (e.g., webs and chord members, pipe, columns, and fixtures).

FIGURE 13.2.8.2.1.3 Minimum Distance from Obstruction (CMSA Sprinklers).

13.2.8.2.2 Branch Lines

Upright sprinklers shall be positioned with respect to branch lines in accordance with one of the following:

Upright sprinklers shall be permitted to be attached directly to branch lines less than or equal to 4 in. (100 mm) nominal in diameter.

Upright sprinklers shall be permitted to be offset horizontally a minimum of 12 in. (300 mm) from the pipe.

Upright sprinklers shall be permitted to be supplied by a riser nipple (sprig) to elevate the sprinkler deflector a minimum of 12 in. (300 mm) from the centerline of any pipe over 4 in. (100 mm) nominal in diameter.

13.2.8.3\* Obstructions That Prevent Sprinkler Discharge From Reaching Hazard

13.2.8.3.1

Continuous or noncontinuous obstructions that interrupt the water discharge in a horizontal plane below the sprinkler deflector in a manner to limit the distribution from reaching the protected hazard shall comply with 13.2.8.3.

13.2.8.3.2

Sprinklers shall be positioned with respect to fluorescent lighting fixtures, ducts, and obstructions more than 24 in. (600 mm) wide and located entirely below the sprinklers so that the minimum horizontal distance from the near side of the obstruction to the center of the sprinkler is not less than the value specified in Table 13.2.8.3.2 and Figure 13.2.8.3.2.

Table 13.2.8.3.2 Obstruction Entirely Below Sprinkler (CMSA Sprinklers)

Minimum Distance to Side of Obstruction (A) Distance of Deflector Above Bottom of Obstruction (B)

[in. (mm)]

Less than 6 in. (150 mm) 11/2 (40)

6 in. (150 mm) to less than 12 in. (300 mm) 3 (75)

12 in. (300 mm) to less than 18 in. (450 mm) 4 (100)

18 in. (450 mm) to less than 24 in. (600 mm) 5 (125)

24 in. (600 mm) to less than 30 in. (750 mm) 51/2 (140)

30 in. (750 mm) to less than 36 in. (900 mm) 6 (150)

Note: For A and B, refer to Figure 13.2.8.3.2.

FIGURE 13.2.8.3.2 Obstruction Entirely Below Sprinkler (CMSA Sprinklers)

13.2.8.3.3

Sprinklers installed under open gratings shall be shielded from the discharge of overhead sprinklers.

13.2.8.3.4

Where the bottom of the obstruction is located 24 in. (600 mm) or more below the sprinkler deflectors, the following shall occur:

Sprinklers shall be positioned so that the obstruction is centered between adjacent sprinklers in accordance with Figure 13.2.8.3.4.

The obstruction width shall meet the following requirements:

The obstruction shall be limited to a maximum width of 24 in. (600 mm) in accordance with Figure 13.2.8.3.4.

Where the obstruction is greater than 24 in. (600 mm) wide, one or more lines of sprinklers shall be installed below the obstruction.

The obstruction extension shall meet the following requirements:

The obstruction shall not extend more than 12 in. (300 mm) to either side of the midpoint between sprinklers in accordance with Figure 13.2.8.3.4.

Where the extensions of the obstruction exceed 12 in. (300 mm), one or more lines of sprinklers shall be installed below the obstruction.

At least 18 in. (450 mm) clearance shall be maintained between the top of storage and the bottom of the obstruction in accordance with Figure 13.2.8.3.4.

FIGURE 13.2.8.3.4 Obstruction More Than 24 in. (600 mm) Below Sprinklers (CMSA Sprinklers).

13.2.8.3.5

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

The sprinkler shall be located at least 36 in. (900 mm) above the top of the obstruction in accordance with Figure 13.2.8.3.5.

The obstruction shall be limited to a maximum width of 12 in. (300 mm) in accordance with Figure 13.2.8.3.5.

The obstruction shall be limited to a maximum extension of 6 in. (150 mm) to either side of the centerline of the branch line in accordance with Figure 13.2.8.3.5.

FIGURE 13.2.8.3.5 Obstruction More Than 36 in. (900 mm) Below Sprinklers (CMSA Sprinklers).

13.2.9 Clearance to Storage (CMSA Sprinklers)

The clearance between the deflector and the top of storage shall be 36 in. (900 mm) or greater.