

Reliable®

Model KFR-CCS Combustible Concealed Space Sprinkler

cULus Listed

Features

- cULus Listed for areas of coverage up to 256 square feet
- Sprinkler may be installed on the same branch line that supplies sprinklers below ceiling
- Nominal K-factor of 5.6 (80 metric)
- Fusible link operating element
- Quick response 212°F (100°C) fusible link operating element
- Standard brass finish

Product Description

Reliable's Model KFR-CCS Combustible Concealed Space Sprinkler is a quick response, upright, special sprinkler designed to provide protection of specific light hazard combustible and noncombustible concealed spaces requiring sprinkler protection. The KFR-CCS sprinkler is specifically listed for the protection of shallow combustible concealed spaces described in NFPA 13.

The Model KFR-CCS Sprinkler utilizes a fast response solder-link fusible element that has demonstrated response times in laboratory tests which are five to ten times faster than standard response sprinklers. This feature enables the sprinkler to apply water to a fire much faster than standard response sprinklers of the same temperature rating.

Application

The Model KFR-CCS sprinkler is specifically listed for use in horizontal combustible concealed spaces with a slope not exceeding 2:12 with combustible wood truss, wood joist construction, or bar joist construction having a combustible upper surface and where the depth of the space is less than 36" (914 mm) from deck to deck, from deck to ceiling, or with double wood joist construction with a maximum of 36" (914 mm) between the top of the bottom joist and the bottom of the upper joist. NFPA 13 permits the use of the Model KFR-CCS sprinkler (a) where the space is less than 12" (305 mm) from deck to deck or deck to ceiling, and/or (b) where a portion of the protected space exceeds 36" (914 mm).

Installation

Model KFR-CCS Sprinklers are to be installed in the upright position with their frames arms parallel to the pipe (Refer to Figs. 4 through 9). When installing the Model KFR-CCS sprinkler use only the Reliable Model W2 installation wrench. Usage of any other type of installation wrench may damage the sprinkler and will immediately void the manufacture's warranty.



Model W2 Wrench

Note: A leak tight 1/2" NPT (R1/2) sprinkler joint can be obtained with an installation torque of approximately 8 -18 ft-lbs (10.8 – 24.4 N-m). Do not tighten sprinklers over these recommended limits. Doing so may cause leakage and/or premature operation.

Maintenance

Model KFR-CCS Sprinklers should be inspected and maintained in accordance with the applicable version of NFPA 25. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using compressed air or by vacuuming, provided equipment does not touch the sprinkler. Replace any sprinkler which has been painted (other than factory applied) or damaged in any way. A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Prior to installation, sprinklers should be maintained in the original cartons and packaging to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

Guarantee

For Reliable Automatic Sprinkler Co., Inc. guarantee, terms, and conditions, visit www.reliablesprinkler.com.

Ordering Information

Specify: Model KFR-CCS Sprinkler

Technical Specifications

Style: Upright
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.6 (80 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: Nickel Alloy
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finish

Standard Brass

Temperature Ratings

212°F (100°C)

Sensitivity

Fast Response

Sprinkler Wrench

Model W2

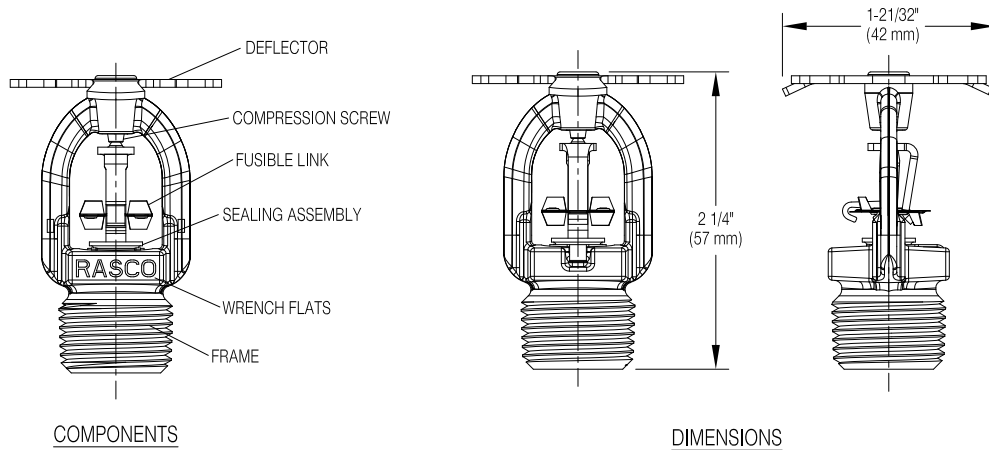
Approvals

cULus Listed



Model KFR-CCS Components and Installation Dimensions

Figure 1



Model KFR-CCS General Application Criteria

Minimum Distance (Spacing) Between Sprinklers

6' (1.83 m)

Note: This minimum spacing does not apply to any additional sprinklers that are required for protection of CPVC piping that is offset over an obstruction (refer to figures 4 and 5).

Maximum Distance (Spacing) Between Sprinklers

14' (4.27 m) for solid wood and composite wood joist construction. For wood truss or bar joist construction, 14' (4.27 m) for concealed spaces that are less than 18" (457 mm) in depth; 16' (4.88 m) for concealed spaces that are 18" (457 mm) or more in depth.

Maximum Coverage Area Per Sprinkler

196 ft² (18.2 m²) for solid wood or composite wood joist construction. For wood truss or bar joist construction, 196 ft² (18.2 m²) for concealed spaces that are less than 18" (457 mm) in depth; 256 ft² (23.8 m²) for concealed spaces that are 18" (457 mm) or more in depth.

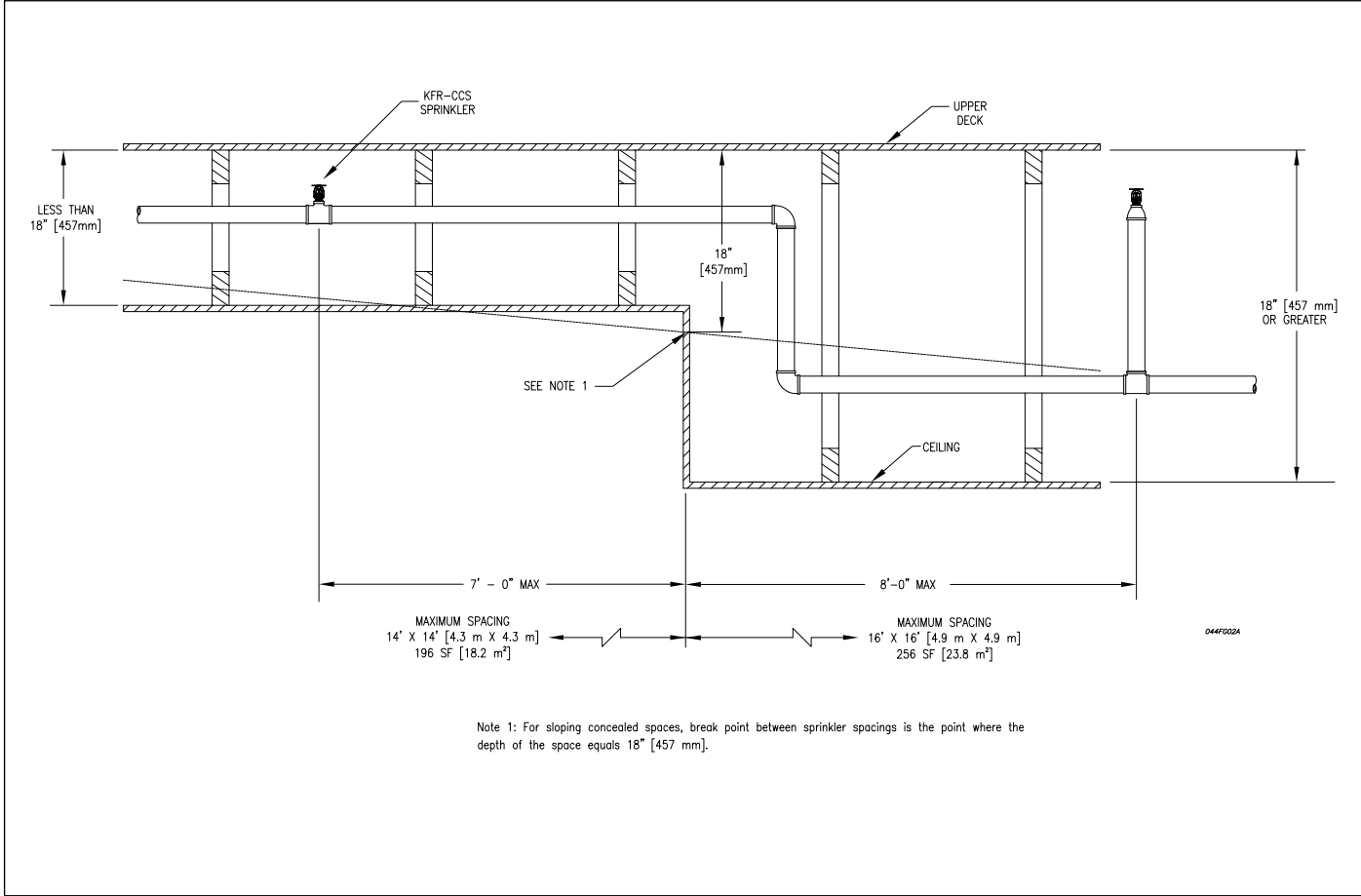
Note: Sprinkler spacing, and therefore coverage area, is determined by the depth of the concealed space. When transitions occur in the concealed space, the sprinklers may immediately be spaced at the largest approved coverage area per the above listings for the concealed space depth (refer to Fig. 2).

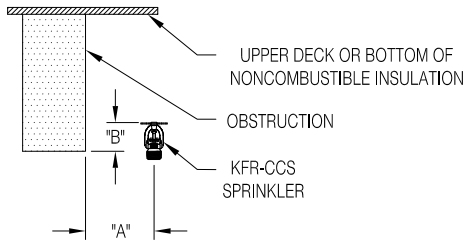
Obstruction Rules

All obstruction criteria per the applicable version of the NFPA 13 apply unless modified by this bulletin (refer to Fig. 3). The KFR-CCS is classified as an Extended Coverage Upright Spray Sprinkler where the maximum coverage area per sprinkler exceeds 225 ft² (20.9 m²). The KFR-CCS is classified as a Standard Upright Spray Sprinkler where the maximum coverage area per sprinkler is 225 ft² (20.9 m²) or less.

Model KFR-CCS Sprinkler Spacing at Change in Concealed Space Depth

Figure 2

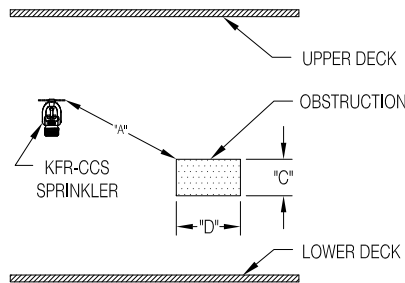




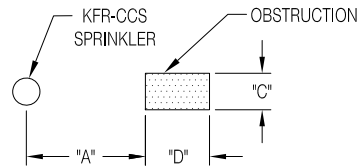
NOTE:
SPRINKLER DEFLECTOR MUST BE AT OR BELOW THE BOTTOM OF THE TOP CHORD OF THE TRUSS.

OTHER WEB MEMBERS AND GUSSETS SHALL NOT BE CONSIDERED OBSTRUCTIONS PROVIDED THE MINIMUM 4-1/2" LATERAL DISTANCE (FIG. 4, 6, & 8) REQUIRED BY THE SPECIFIC APPLICATION LISTING IS MAINTAINED.

DISTANCE FROM CENTERLINE OF SPRINKLER TO SIDE OF OBSTRUCTION. DIMENSION "A"	MAXIMUM ALLOWABLE DISTANCE OF DEFLECTOR ABOVE BOTTOM OF OBSTRUCTION. DIMENSION "B"
<12" [<305mm]	0" [0mm]
12" TO <18" [305mm TO <457mm]	2.5" [64mm]
18" TO <24" [457mm TO <610mm]	3.5" [89mm]
24" TO <30" [610mm TO <762mm]	5.5" [140mm]
30" TO <36" [762mm TO <914mm]	7.5" [191mm]
36" TO <42" [914mm TO <1067mm]	9.5" [241mm]
42" TO <48" [1067mm TO <1219mm]	12" [305mm]
48" TO <54" [1219mm TO <1372mm]	14" [356mm]
54" TO <60" [1372mm TO <1524mm]	16.5" [419mm]

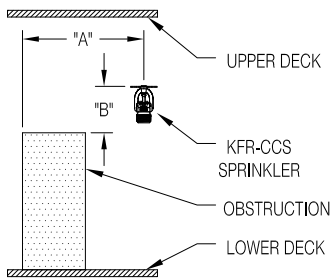


ELEVATION VIEW



PLAN VIEW

A ≥ 3C OR 3D (USE DIMENSION C OR D, WHICHEVER IS GREATER)
MAXIMUM CLEAR DISTANCE REQUIRED IS 24 IN. (610 mm)



044FG03A

HORIZONTAL DISTANCE DIMENSION "A"	MINIMUM VERTICAL DISTANCE BELOW DEFLECTOR DIMENSION "B"
≤6" [≤152mm]	3" [76mm]
>6" TO 9" [>152mm TO 229mm]	4" [102mm]
>9" TO 12" [>229mm TO 305mm]	6" [152mm]
>12" TO 15" [>305mm TO 381mm]	8" [203mm]
>15" TO 18" [>381mm TO 457mm]	9.5" [241mm]
>18" TO 24" [>457mm TO 610mm]	12.5" [318mm]
>24" TO 30" [>610mm TO 762mm]	15.5" [394mm]
>30" [>762mm]	18" [457mm]

When used with CPVC piping, the Model KFR-CCS Sprinkler is specifically listed to provide protection of combustible concealed spaces where the construction methods consist of:

1. Wood trusses or wood bar joist (Refer to Fig. 4)
2. Noncombustible insulation-filled solid wood or composite wood joists* (Refer to Fig. 5)

***Note:** In order to be considered “noncombustible insulation-filled, solid wood or composite wood joists” construction, the insulation (including insulation provided with a combustible vapor barrier), must completely fill the pockets between the joists to the bottom of the joists. Insulation installed above the elevation of Model KFR-CCS sprinklers in wood truss, solid wood joist or composite wood joist must be secured into place with metal wire netting. The metal wire netting is intended to hold the insulation in place should the insulation become wet by the operation of Model KFR-CCS Sprinklers in the event of a fire.

In order to use the CPVC pipe and fittings, the horizontal runs of pipe must be a maximum of 6 in. (152 mm) above the ceiling or noncombustible ceiling insulation, or 1/3 the depth of concealed space (as measured from the top surface of the ceiling to the bottom of the deck above), whichever is smaller (Refer to Figs. 4 & 5).

The CPVC piping can be used to supply the Model KFR-CCS Sprinklers as well as sprinklers installed below the ceiling. Unless modified by this technical data sheet, all guidelines provided by the CPVC pipe and fitting manufacturer must be followed.

When using 1 in. (DN25) or larger pipe, a hanger must be located at the truss nearest a sprig for purposes of restraint. If using 3/4 in. (DN19) piping, all sprigs over 12 in. (305 mm) must be laterally braced using methods described in the NFPA standards. Where the CPVC must be offset up and over an obstruction and the pipe exceeds the allowed horizontal positioning requirements specified above as well as shown in Figs. 4 and 5, additional Model KFR-CCS Sprinklers are to be installed to protect the CPVC products. A minimum lateral distance of 18 in. (457 mm) must be maintained between the CPVC pipe and heat pumps, fan motors, and heat lamps.

Concealed Space Area

The area of the concealed space is not limited; however, for both Figs. 4 and Fig. 5 where CPVC pipe is being utilized, draft-curtains or full height walls must be provided at 1,000 ft² (93 m²) maximum areas. This draft curtain shall be at least 1/3 the depth of the concealed space or 8 in. (203 mm), whichever is greater, and be constructed using a material that will not allow heat to escape through or above the draft curtain.

System Type

Light hazard, wet pipe system.

Minimum Distance Away From Face of Wood Truss or Top Chord of Bar Joist

4.5 in. (114 mm) (Refer to Fig. 3)

Deflector Position

At or below the bottom of the top chord; 1.5 in. (38 mm) minimum to 4 in. (102mm) maximum below upper deck (or insulation if present) for wood truss construction or wood bar joist construction (Fig. 4).

1.5 in. (38 mm) minimum to 4 in. (102mm) maximum below bottom of insulation for noncombustible insulation-filled solid or composite joist construction (Fig. 5).

Hydraulic Design Area

Calculate all sprinklers within the draft curtain area, up to the 1,000 ft² (93 m²) maximum draft curtain area.

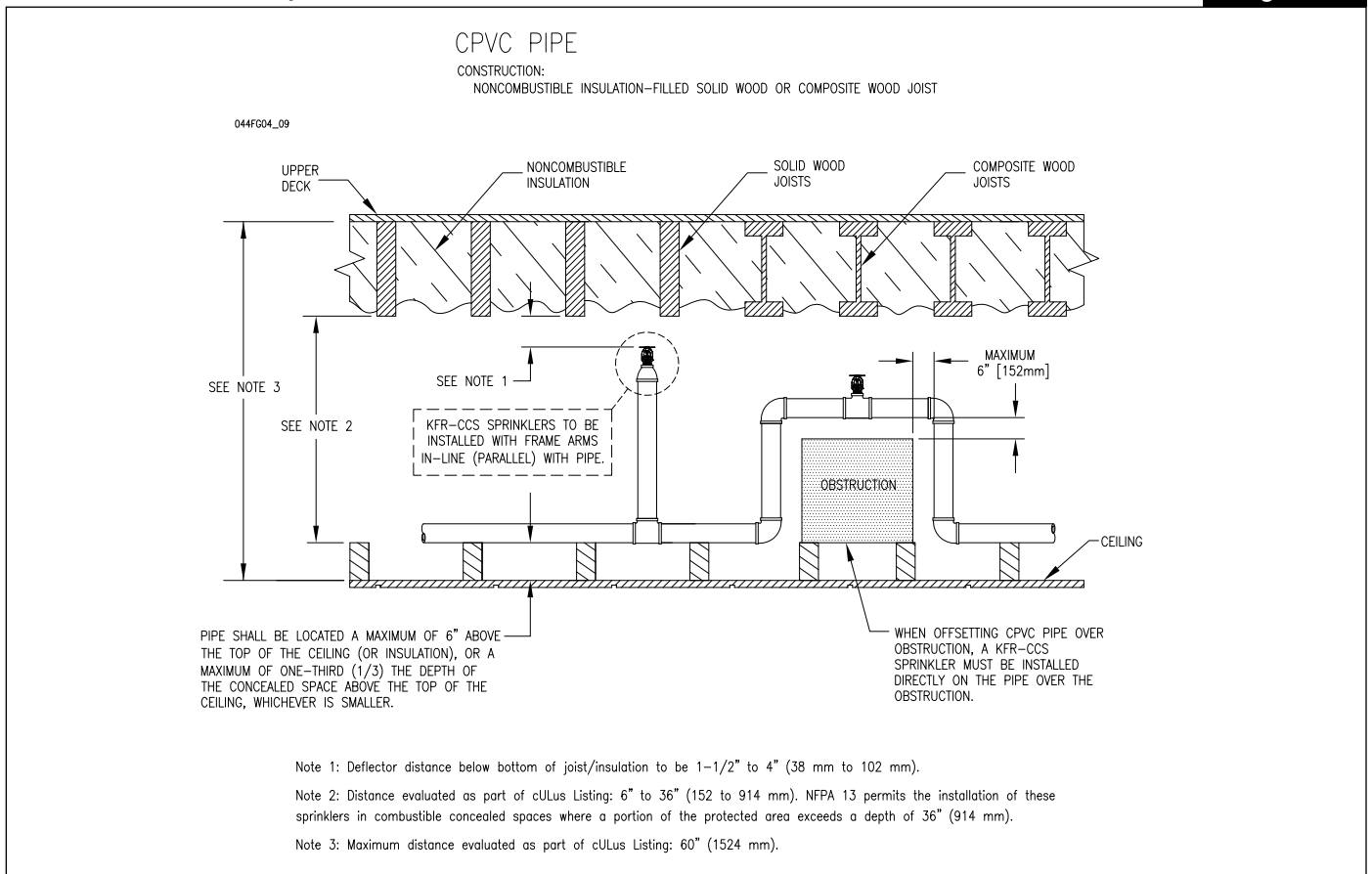
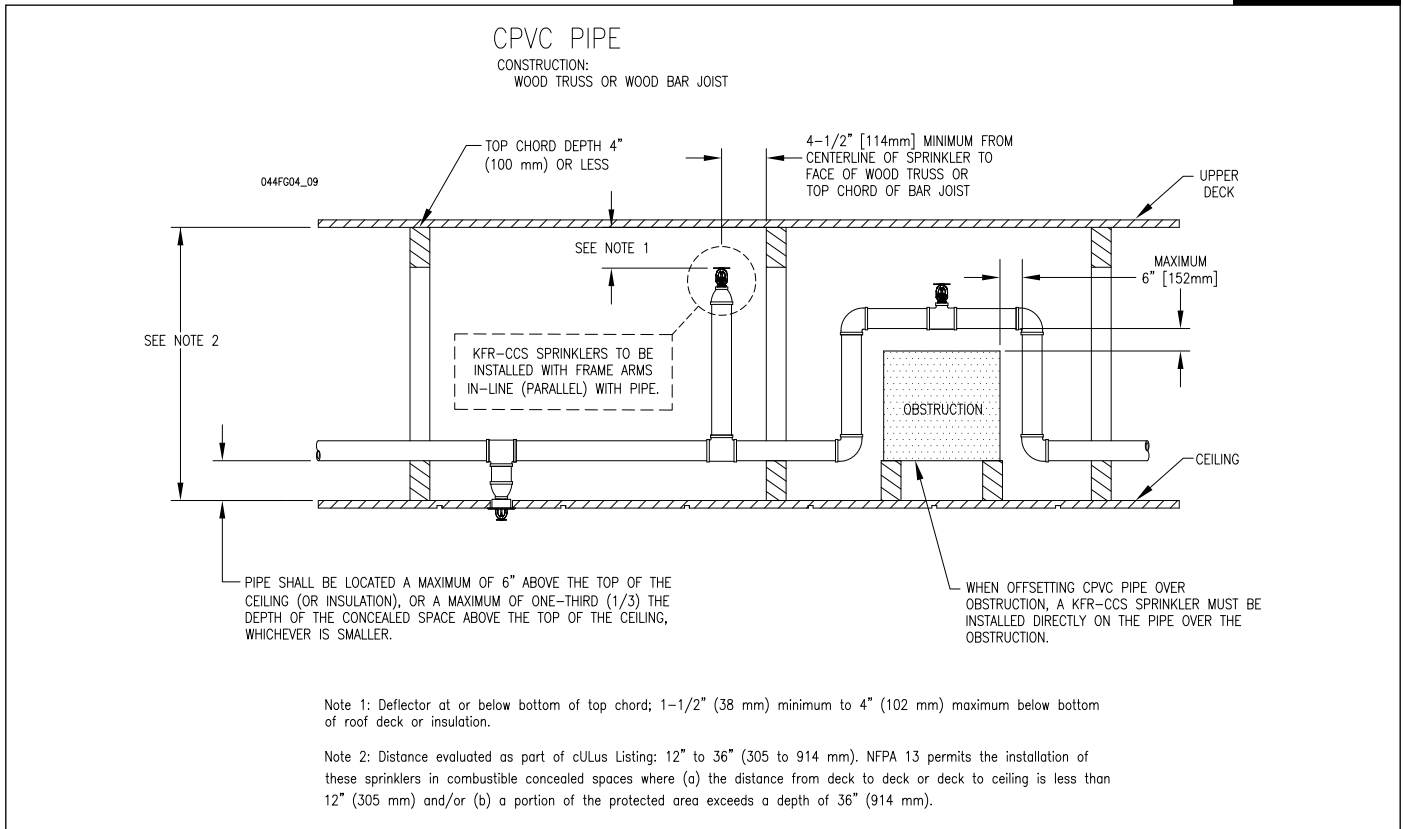
Note: Additional sprinklers that are required for protection of CPVC piping that is offset over an obstruction do not need to be included in the remote area.

Required Density

0.10 gpm/ft² (4.08 Lpm/m²)

Minimum Operating Pressure

7 psi (0.48 bar)



Model KFR-CCS Specific Application Criteria for Steel Pipe Systems

When used with steel piping, the Model KFR-CCS Sprinkler is specifically listed to provide protection of combustible concealed areas where the construction methods consist of:

1. Wood trusses or wood bar joists (Refer to Fig. 6)
2. Solid wood joist construction where the upper ceiling joists may have a maximum depth of 12 in. (305 mm). (Refer to Fig. 7).
3. Noncombustible insulation-filled, solid wood or composite wood joists* (Refer to Fig. 8)
4. Obstructed wood trusses; top chord more than 4" deep (Refer to Fig. 9).

***Note:** In order to be considered "noncombustible insulation-filled, solid wood or composite wood joists" construction, the insulation (including insulation provided with a combustible vapor barrier), must completely fill the pockets between the joists to the bottom of the joists. Insulation installed above the elevation of Model KFR-CCS sprinklers in wood truss, solid wood joist or composite wood joist must be secured into place with metal wire netting. The metal wire netting is intended to hold the insulation in place should the insulation become wet by the operation of Model KFR-CCS Sprinklers in the event of a fire.

Concealed Space Area

The area of the concealed space is not limited; however, for wood truss construction or concealed spaces of noncombustible bar joist construction (Refer to Fig. 6) draft-curtains or full height walls must be provided at 1,000 ft² (93 m²) areas. The draft curtain shall be at least 1/3 the depth of the concealed space or 8 in. (203 mm), whichever is greater, and be constructed using a material that will not allow heat to escape through or above the draft curtain.

For solid wood joist construction (Refer to Fig. 7) and obstructed wood truss construction (Refer to Fig. 8), blocking must be provided in each joist or top chord channel at maximum 32 ft. (9.75 m) intervals. This blocking shall be installed to the full depth of the joist or top chord and be installed so as to not allow heat to escape through or above the blocking. The blocking must be constructed using a noncombustible material or be of the same material as the joist or truss member. Draft curtains must be protrude below the joist a minimum of 6 in. (152 mm) or 1/3 the space, whichever is greatest and run parallel with the joist spaced at 31 ft. (9.45 m) width maximum to limit the area to a maximum of 1,000 ft² (93 m²). The draft curtain may be constructed of ¼ in. (6.4 m) plywood to prevent heat from escaping beyond the area.

For noncombustible insulation-filled, solid wood joist or composite wood joist construction (Refer to Fig. 9), the requirement for draft curtains or blocking does not apply.

System Type

Light hazard, wet or dry pipe system.

Deflector Position

At or below the bottom of the top chord; 1.5 in. (38 mm) minimum to 4 in. (102mm) maximum below upper deck (or insulation if present) for wood truss construction or wood bar joist construction (Fig. 6).

1.5 in. (38 mm) minimum to 2 in. (51 mm) maximum below the bottom of the top chord for spaces constructed of obstructed wood trusses (Fig. 8).

1.5 in. (38 mm) minimum to 2 in. (51 mm) maximum below the bottom of the upper joist for concealed spaces constructed of exposed solid wood joists (Fig. 7).

1.5 in. (38 mm) minimum to 4 in. (102mm) maximum below bottom of insulation for noncombustible insulation-filled solid or composite joist construction (Fig. 9).

Minimum Distance Away From Face of Wood Truss or Top Chord of Bar Joist

4.5 in. (114 mm) (Refer to Fig. 4)

Hydraulic Design Area

For wood truss construction (Fig. 6), solid wood joist construction (Fig. 7), or obstructed wood truss construction (Fig. 8), calculate all sprinklers within the draft curtain area, up to the 1,000 ft² (93 m²) maximum draft curtain area for both wet and dry pipe systems.

For noncombustible insulation-filled solid wood joist or composite wood joist construction (Fig. 9) where draft curtains are not required, calculate per the requirements of NFPA 13.

Required Density

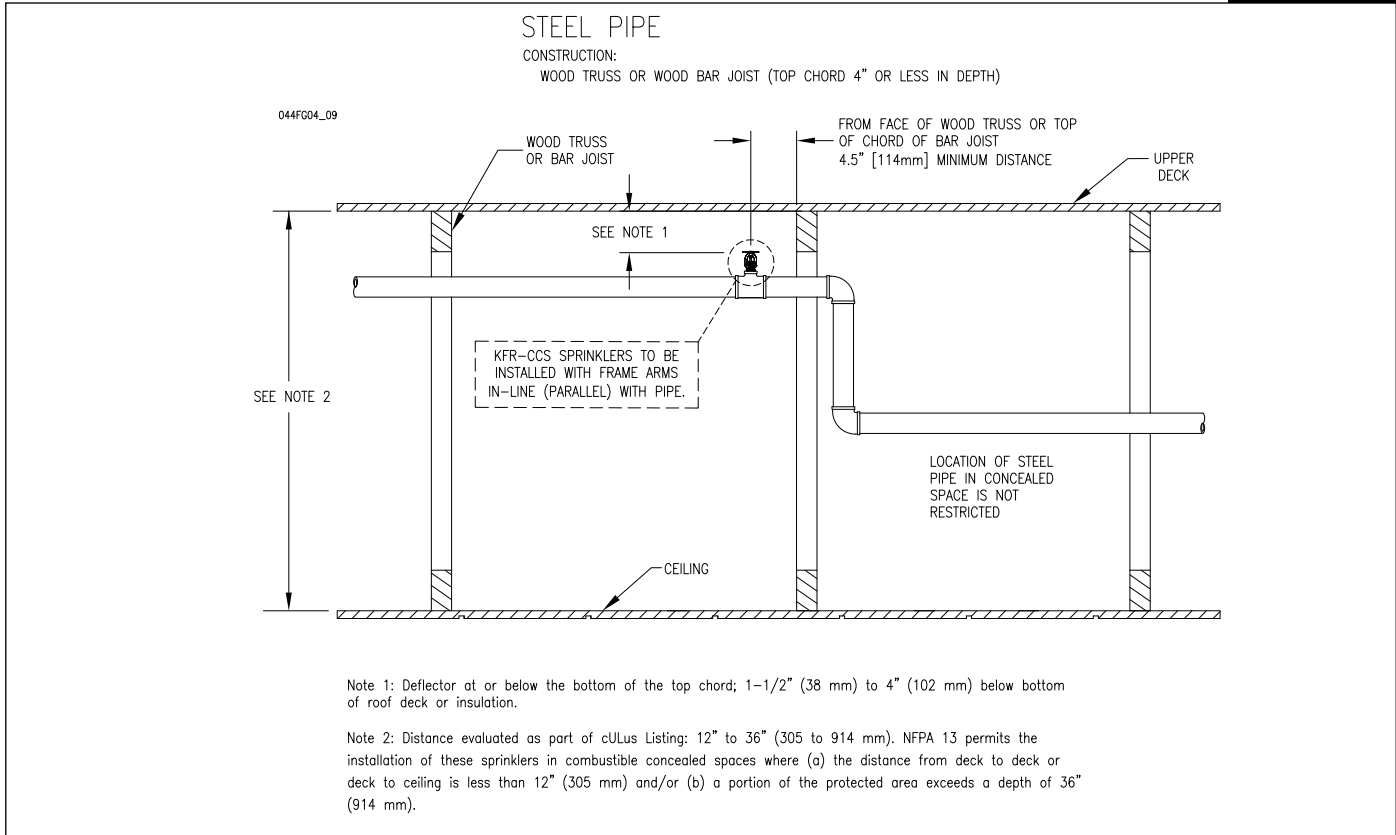
0.10 gpm/ft² (4.08 Lpm/m²)

Minimum Operating Pressure

7 psi (0.48 bar)

Model KFR-CCS Steel Pipe

Figure 6



Model KFR-CCS Steel Pipe

Figure 7

