

## Model CC2 — 4.2 and 5.6 K-factor Combustible Concealed Space Sprinklers Specific Application, Upright

### IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information. Always refer to Technical Data Sheet TFP700 for the “INSTALLER WARNING” that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail to operate in a fire situation or cause it to operate prematurely.

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[docs.jci.com/tycofire/TFP632](http://docs.jci.com/tycofire/TFP632)

## General Description

The Model CC2 Combustible Concealed Sprinklers are fast response, upright, specific application sprinklers designed to provide protection of specific light hazard combustible, as well as non-combustible, concealed spaces requiring sprinkler protection. The CC2 Sprinklers comply with the criterion for the protection of combustible concealed spaces as described in NFPA 13.

The Model CC2 Sprinklers are designed for installation on BLAZEMASTER CPVC wet pipe systems, other UL Listed CPVC pipe products, and steel

wet pipe or dry pipe sprinkler systems (refer to the respective Design Criteria sections). They provide the following features as compared to the 2.8K-factor Model CC1 Sprinklers described on Technical Data Sheet TFP630:

- Can be used on steel dry pipe sprinkler systems
- Increased spacing from 10 ft (3,1 m) to 12 ft (3,7 m)
- Increased coverage area from 100 ft<sup>2</sup> (9,3 m<sup>2</sup>) to 144 ft<sup>2</sup> (13,4 m<sup>2</sup>)

The effectiveness of the Model CC2 Sprinklers in combustible concealed spaces was clearly evident during the full scale fire testing for this product.

Concealed spaces between floors, as well as low pitch attics (slope of 2:12 or less) are inherently shallow. Standard spray sprinklers, by design, have an umbrella like spray pattern that poses a difficult challenge when trying to achieve effective coverage within a shallow space. The Model CC2 Combustible Concealed Space Sprinklers have addressed the difficult “above ceiling” fire challenge for both wet pipe and dry pipe sprinkler systems.

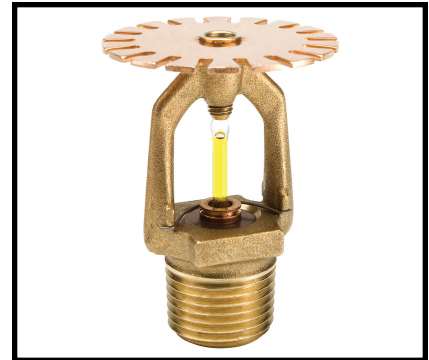
### NOTICE

*The Model CC2 Combustible Concealed Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.*

*The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions.*

## Sprinkler Identification Number

TY2189 – Upright, 4.2K  
TY3189 – Upright, 5.6K



## Technical Data

### Approvals

UL Listed

Listings and approvals only apply to the service conditions indicated in the Design Criteria sections.

### Maximum Working Pressure

175 psi (12,1 bar)

### Pipe Thread Connection

1/2 in. NPT

### Discharge Coefficient

K = 4.2 GPM/psi<sup>1/2</sup> (60,5 LPM/bar<sup>1/2</sup>)  
K = 5.6 GPM/psi<sup>1/2</sup> (80,6 LPM/bar<sup>1/2</sup>)

### Temperature Rating

175°F (79°C)

### Finish

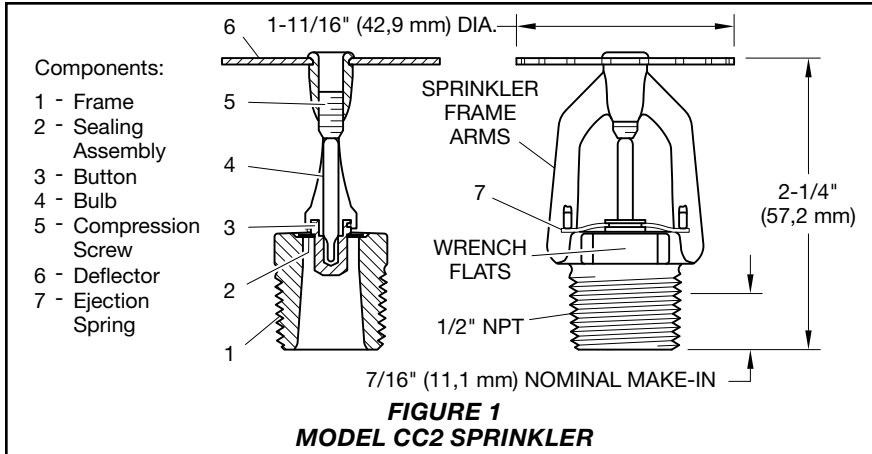
Natural Brass

### Physical Characteristics

Frame .....	Brass
Button .....	Bronze
Sealing Assembly . . .	Stainless Steel w/TEFLON
Bulb .....	Glass (3 mm)
Compression Screw .....	Brass
Deflector .....	Bronze

## Operation

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass bulb allowing the sprinkler to activate and flow water.



## Design Criteria

Design criteria is provided as follows:

- 175°F (79°C), Model CC2 Combustible Concealed Sprinklers with CPVC Pipe and horizontal slope above sprinklers not exceeding 2:12, see Area of Use (CPVC Pipe)
- 175°F (79°C), Model CC2 Combustible Concealed Sprinklers with Steel Pipe and horizontal slope above sprinklers not exceeding 2:12, see Area of Use (Steel Pipe)

## Design Criteria, CPVC Pipe

**CC2 Temperature Rating (CPVC Pipe)**  
 175°F (79°C)

### Area of Use (CPVC Pipe)

Horizontal (slope not exceeding 2:12) combustible concealed spaces of:

- Unobstructed wood truss construction or unobstructed bar joist construction, see Figure 2
- Non-combustible, insulation-filled solid wood or composite wood joist construction, see Figure 3

**NOTE:** In order to be considered “non-combustible insulation-filled solid wood or composite wood joist 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, and the insulation must be secured in place with metal wire netting. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the CC2 Sprinklers in the event of a fire.

### Concealed Space Area (CPVC Pipe)

The area of the concealed space is not limited; however, for both Figure 2 and Figure 3, where CPVC pipe is being utilized, draft-curtains or full height walls must be provided at 1000 ft<sup>2</sup> (93 m<sup>2</sup>) areas. This draft curtain shall be at least 1/3 the depth of the concealed space or 8 in. (200 mm), whichever is greater, and be constructed using a material that will not allow heat to escape through or above the draft curtain.

### Concealed Space Size (CPVC Pipe)

The depth of the concealed space is 36 in. (915 mm) maximum to 12 in. (305 mm) minimum.

### System Type (CPVC Pipe)

Light hazard, wet pipe system

### Minimum Distance Between Model CC2 Sprinklers (CPVC Pipe)

The minimum distance between sprinklers is 7 ft (2,1 m).

**NOTE:** Minimum spacing does not apply to any additional sprinklers required for protection of BLAZEMASTER CPVC that is offset over an obstruction.

### Maximum Distance Between Model CC2 Sprinklers (CPVC Pipe)

12 ft (3,7 m)

### Maximum Coverage Area (CPVC Pipe)

144 ft<sup>2</sup> (13,4 m<sup>2</sup>)

### Deflector Position (CPVC Pipe)

- 1-1/2 in. to 4 in. (40 to 100 mm) below upper deck for wood truss construction or bar joist construction, see Figure 2
- 1-1/2 in. to 4 in. (40 to 100 mm) below solid wood or composite wood joists, see Figure 3

### Minimum Distance Away From Trusses (CPVC Pipe)

4-1/2 in. (114 mm)

### Remote Area (CPVC Pipe)

The remote area is 1000 ft<sup>2</sup> (93 m<sup>2</sup>)

**NOTE:** The remote area does not include any additional sprinklers required for protection of BLAZEMASTER CPVC that is offset over an obstruction.

### Required Density (CPVC Pipe)

0.10 gpm/ft<sup>2</sup> (4,1 mm/min)

### Minimum Operating Pressure (CPVC Pipe)

7 psi (0,48 bar)

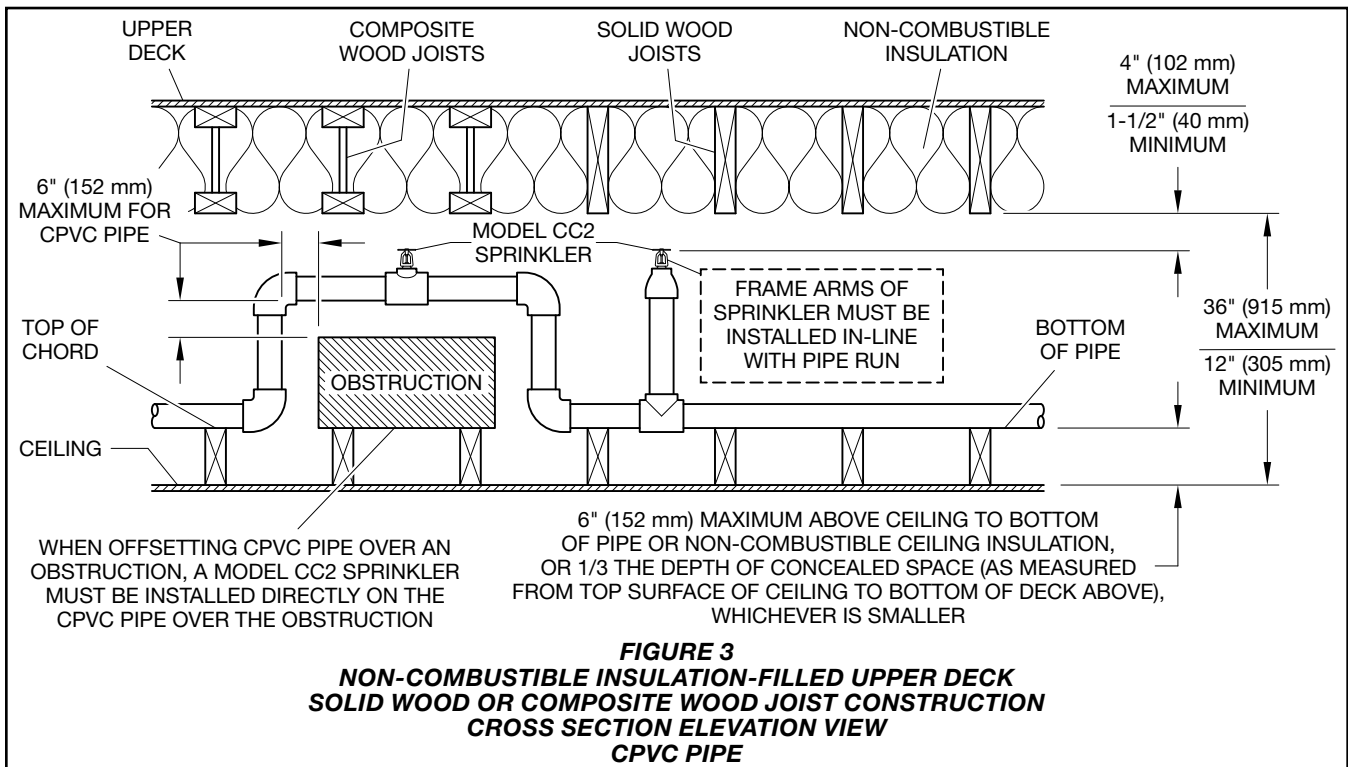
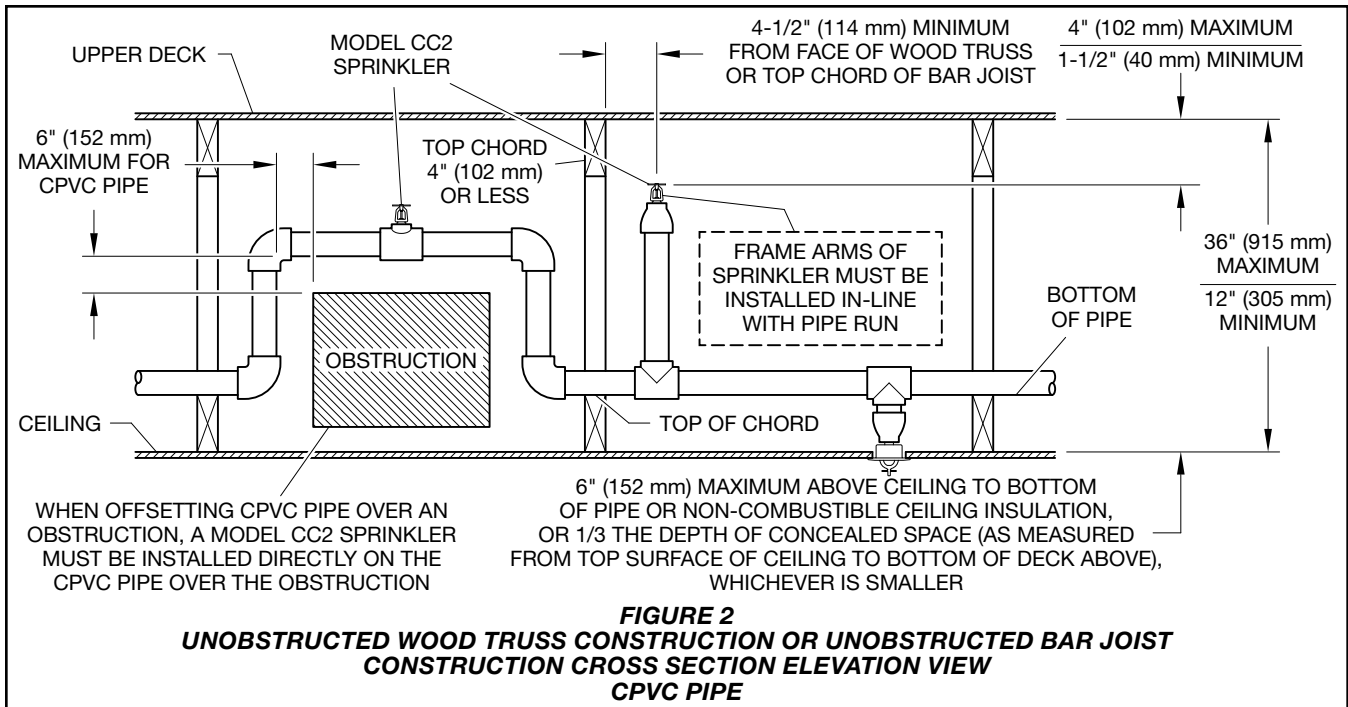
**NOTE:** The minimum resulting flow for the 4.2K is 11.1 gpm, and the minimum resulting flow for the 5.6K is 14.8 gpm. Therefore, for coverage areas less than the maximum permitted coverage area of 144 ft<sup>2</sup>, the 4.2K may provide a hydraulic advantage. The use of the CC1 sprinkler having a K-factor of 2.8, minimum operating pressure of 10 psi, and resulting minimum flow of 9.5 gpm may provide a further hydraulic advantage for yet smaller coverage areas. The CC1 is described in Technical Data Sheet TFP630.

### Obstructions (CPVC Pipe)

See Figure 8 in this data sheet for obstructions rules.

### Use of UL Listed BLAZEMASTER CPVC Piping with Model CC2 Sprinklers

BLAZEMASTER CPVC product may be used in concealed spaces requiring automatic sprinklers, when used in conjunction with Model CC2 Sprinklers. In order to use the BLAZEMASTER CPVC product for wood truss or bar joist construction, the horizontal run of pipe must be a maximum of 6 in. (150 mm) above the ceiling or non-combustible 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, see Figure 2. For insulation filled solid wood or composite wood joist construction, the horizontal run of pipe must be a maximum of 6 in. (150 mm) above ceiling or non-combustible ceiling insulation, or 1/3 the depth of concealed space (as measured from the top surface of the ceiling to the bottom surface of the joist insulation above), whichever is smaller, see Figure 3. The CPVC piping can then be used to supply the Model CC2 Sprinklers, as well as the sprinklers below the ceiling. Unless modified by this Technical Data Sheet, all other guidelines of the “BLAZEMASTER — Installation Instructions & Technical Manual” must be met. 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.

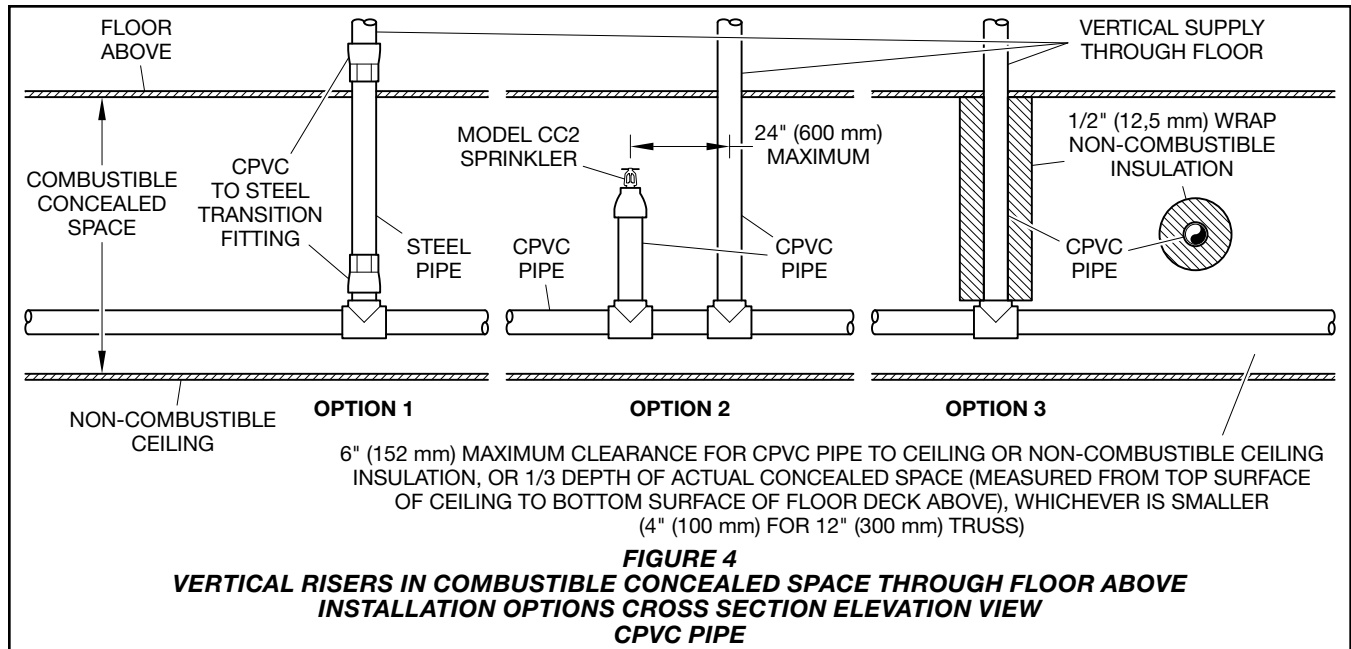
Where the CPVC must be offset up and over an obstruction and the pipe exceeds the allowed horizontal positioning requirements specified above

as well as shown in Figures 2 and 3, additional Model CC2 Sprinklers are to be installed as shown in Figure 2 and 3 to protect the BLAZEMASTER CPVC product.

A minimum lateral distance of 18 in. (460 mm) must be maintained between

the CPVC pipe and heat pumps, fan motors, and heat lamps.

Where CPVC piping is installed as a vertical riser to the next floor above, see Figure 4 for installation options.



## Design Criteria, Steel Pipe

**CC2 Temperature Rating (Steel Pipe)**  
 175°F (79°C)

### Area of Use (Steel Pipe)

Horizontal (slope not exceeding 2:12) combustibles concealed spaces of:

- unobstructed wood truss construction or unobstructed bar joist construction, see Figure 5
- solid wood joist construction where the upper deck and ceiling joists may have a maximum depth of 12 in. (300 mm) and typical on center joist spacing of minimum 16 in. (400 mm), see Figure 6
- non-combustible insulation filled solid wood joist or wood composite joist construction, see Figure 7
- obstructed wood truss construction, see Figure 8

**NOTE:** In order to be considered “non-combustible insulation filled solid wood joist or composite wood joist 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, and the insulation must be secured in place with metal wire netting. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the CC2 Sprinklers in the event of a fire.

### Concealed Space Area (Steel Pipe)

The area of the concealed space is not limited; however,

- for unobstructed wood truss construction or concealed spaces of non-combustible, unobstructed bar joist construction, see Figure 5, draft-curtains or full height walls must be provided at 1000 ft<sup>2</sup> (93 m<sup>2</sup>) areas. This draft curtain shall be at least 1/3 the depth of the concealed space or 8 in. (200 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, see Figure 6, and obstructed wood truss construction, see Figure 8, blocking must be provided in each upper deck and ceiling joist channel at a maximum 32 ft (9,75 m) intervals. This blocking shall be installed to the full depth of the joists and be installed so as to not allow heat to escape through or above the blocking. The blocking must be constructed using a non-combustible material or the joist construction material.

Draft curtains must protrude below the joist a minimum of 6 in. (150 mm) or 1/3 the space, whichever is greatest, and run parallel with the joist spaced at 31 ft (9,4 m) width maximum to limit the area to a maximum of 1000 ft<sup>2</sup> (93 m<sup>2</sup>). The draft curtain may be constructed of 1/4 in. (6,4 mm) plywood to prevent heat from escaping beyond the area.

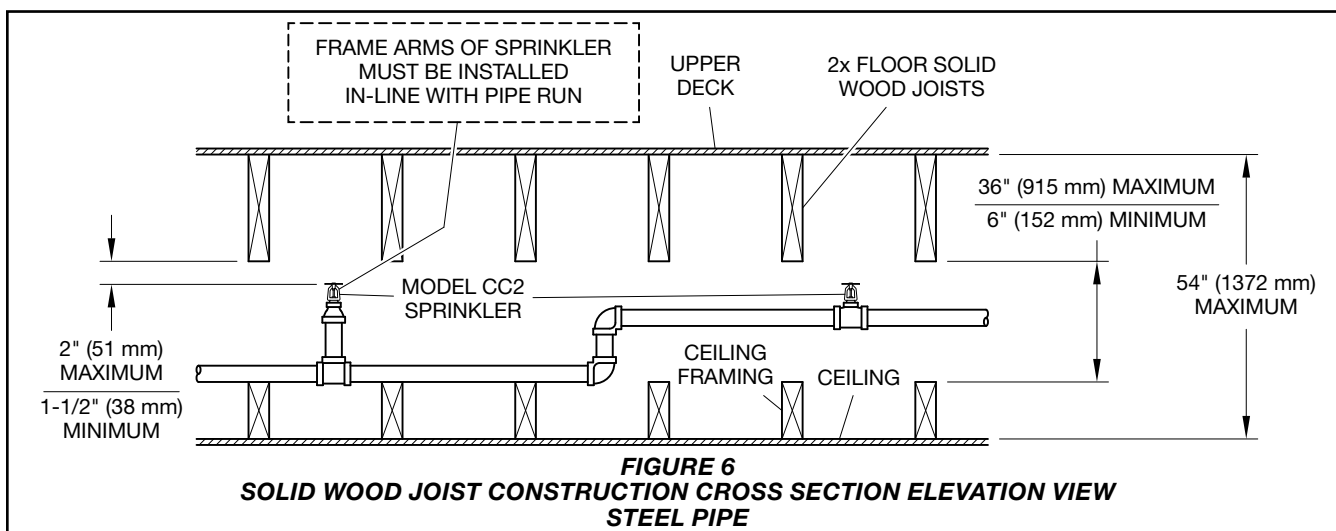
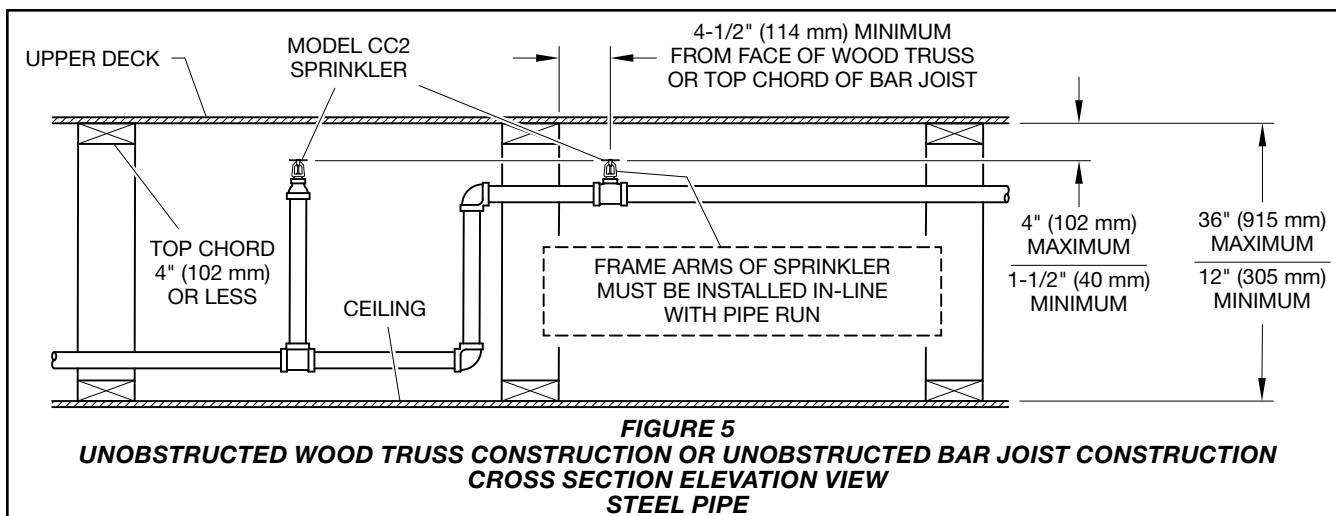
- for non-combustible, insulation-filled solid wood joist or composite wood joist construction, see Figure 7, the requirement for draft curtains or blocking does not apply.

### Concealed Space Size (Steel Pipe)

The minimum and maximum concealed space depth is as follows:

For unobstructed wood truss construction or concealed spaces of unobstructed bar joist construction, see Figure 5, the depth of the concealed space is 36 in. (915 mm) maximum to 12 in. (305 mm) minimum.

For solid wood joist construction, see Figure 6, solid wood or composite wood joist construction filled with non-combustible insulation, see Figure 7, or obstructed wood truss construction, see Figure 8, the maximum depth of the concealed space is 54 inches from bottom of upper deck to top of ceiling, and the minimum depth is 6 inches from the bottom of the upper deck joists to the top of the ceiling joists.



**System Type (Steel Pipe)**

Light hazard, wet or dry pipe system using steel pipe.

**NOTE:** Use of the 4.2K sprinklers in dry pipe systems is permitted by section 8.3.4.3 of NFPA 13 (2007 edition) where piping is corrosion resistant or internally galvanized.

**Minimum Distance Between Model CC2 Sprinklers (Steel Pipe)**

7 ft (2,1 m)

**Maximum Distance Between Model CC2 Sprinklers (Steel Pipe)**

12 ft (3,7 m)

**Maximum Coverage Area (Steel Pipe)**

144 ft<sup>2</sup> (13,4 m<sup>2</sup>)

**Deflector Position (Steel Pipe)**

1-1/2 in. to 4 in. (40 to 100 mm) below upper deck for wood truss construction or concealed spaces of non-combustible bar joist construction, see Figure 5.

1-1/2 in. to 2 in. (40-50 mm) below solid wood joist, see Figure 6, or top chord of a wood truss that has a depth greater than 4 inches

1-1/2 in. to 4 in. (40 to 100 mm) below non-combustible insulation filled solid wood joists or composite wood joists, see Figure 7.

**Remote Area (Steel Pipe)**

The remote area for wood truss construction or bar joist construction, see Figure 5, or solid wood joist construction, see Figure 6, is 1000 ft<sup>2</sup> (93 m<sup>2</sup>) for wet or dry pipe systems.

The remote area for non-combustible insulation filled solid wood joist or wood composite joist construction, see Figure 7, is to be calculated per the requirements of NFPA 13.

**Required Density (Steel Pipe)**

0.10 gpm/ft<sup>2</sup> (4,1 mm/min)

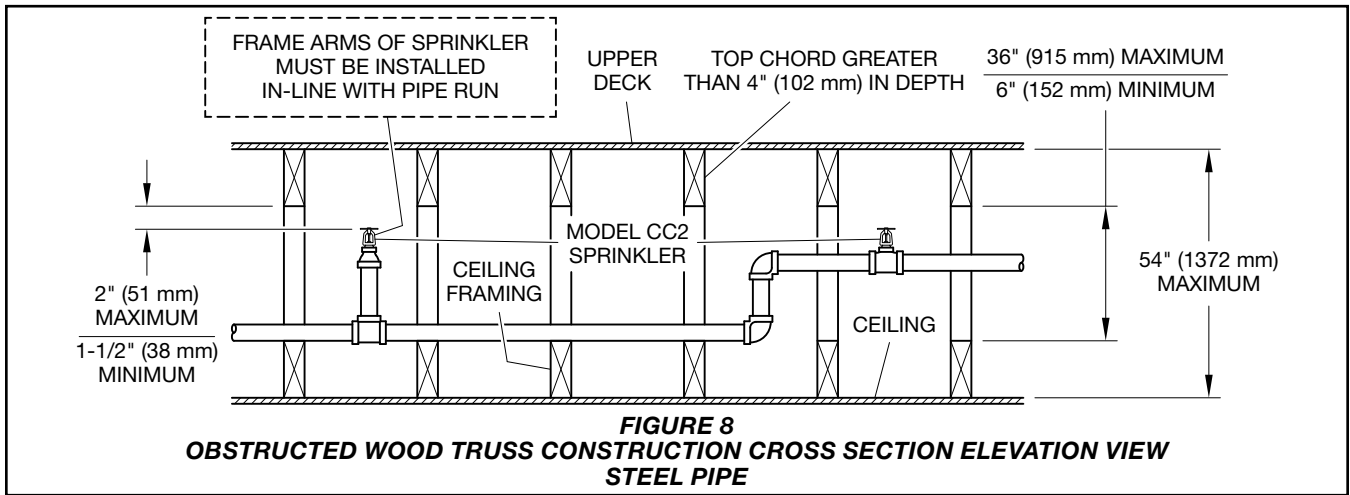
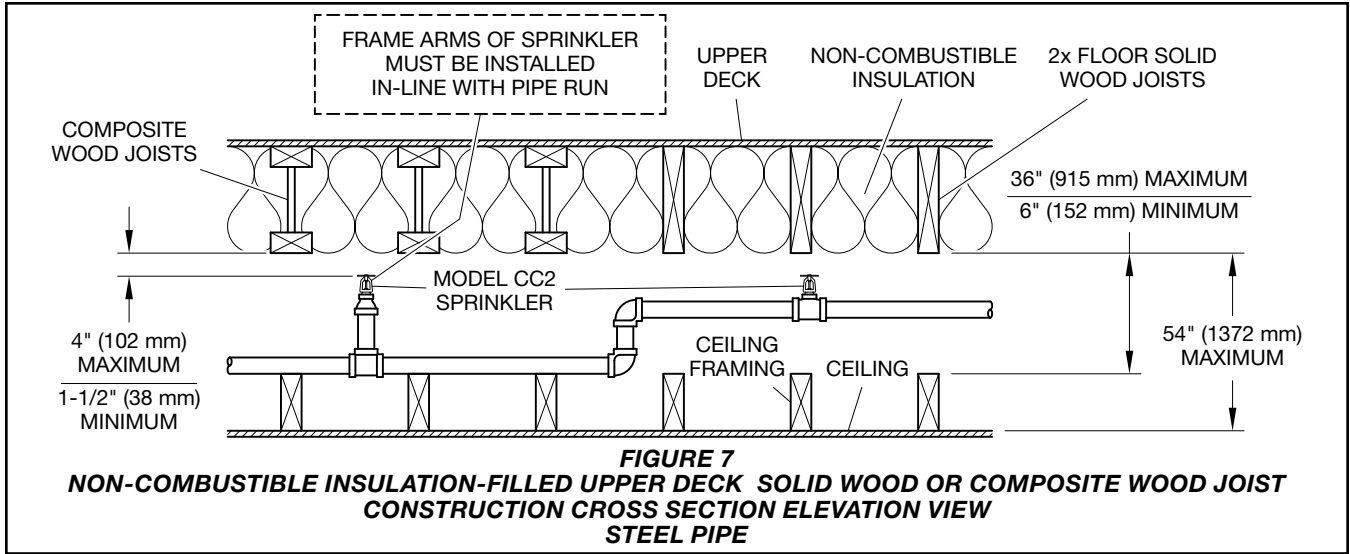
**Minimum Operating Pressure (Steel Pipe)**

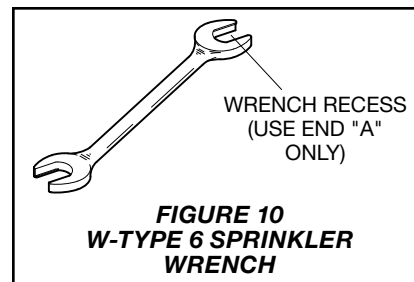
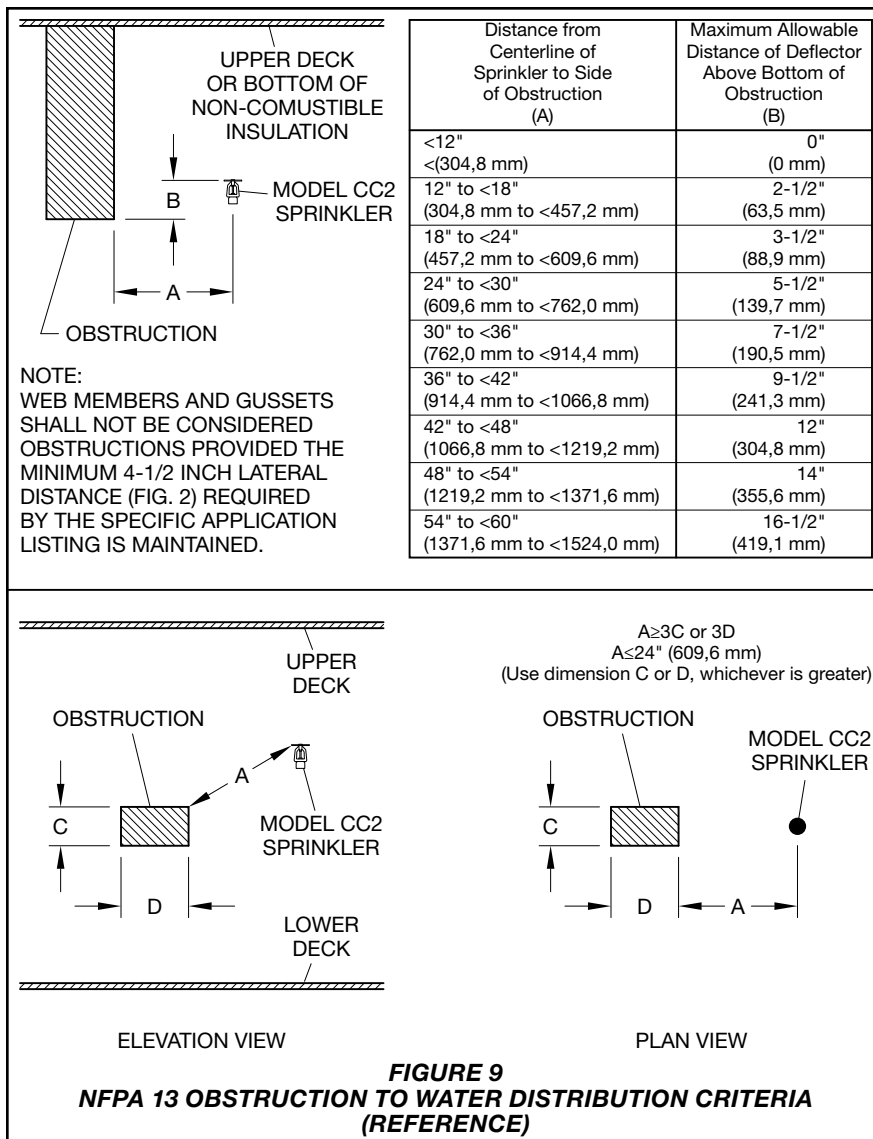
7 psi (0,48 bar)

**NOTE:** The minimum resulting flow for the 4.2K is 11.1 gpm, and the minimum resulting flow for the 5.6K is 14.8 gpm. Therefore, for coverage areas less than the maximum permitted coverage area of 144 ft<sup>2</sup>, the 4.2K may provide a hydraulic advantage. The use of the CC1 sprinkler having a K factor of 2.8, minimum operating pressure of 10 psi, and resulting minimum flow of 9.5 gpm may provide a further hydraulic advantage for yet smaller coverage areas when designing wet pipe systems. The CC1 is described in Technical Data Sheet TFP630.

**Obstructions (Steel Pipe)**

See Figure 9 in this data sheet for obstructions rules.





## Installation

The Model CC2 Sprinklers must be installed in accordance with this section.

### General Instructions

The Model CC2 Sprinklers are to be installed upright and with their frame arms, see Figure 1, in-line with the pipe run, see Figures 2 through 8, as applicable).

Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm) for the 175°F (79°C) temperature rating.

A leak-tight 1/2 in. NPT sprinkler joint should be obtained with a torque of 7 to 14 lb-ft (9,5 to 19,0 N·m). Higher levels of torque may distort the sprinkler inlet with consequent leakage or impairment of the sprinkler.

The Model CC2 Sprinklers must only be installed in the upright position with the deflector parallel to the upper deck. With pipe thread sealant applied to the pipe threads, use only the W-Type 6 (End A) Sprinkler Wrench, see Figure 10, for installation of the Model CC2 Sprinklers by applying the wrench to the sprinkler wrench flats only.

## Care and Maintenance

The Model CC2 Sprinklers must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, permission to shut down the affected fire protection systems must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

Sprinklers that are found to be leaking or exhibiting visible signs of corrosion must be replaced.

Automatic sprinklers must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified sprinklers must be replaced. Sprinklers that have been exposed to corrosive products of combustion, but have not operated, should be replaced if they cannot be completely cleaned by wiping the sprinkler with a cloth or by brushing it with a soft bristle brush.

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. Refer to the Installation section for additional information.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (e.g., NFPA 25), in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

## Limited Warranty

For warranty terms and conditions, visit [www.tyco-fire.com](http://www.tyco-fire.com).

## Ordering Procedure

Contact your local distributor for availability. When placing an order, indicate the full product name and Part Number (P/N).

### Sprinkler Assemblies with NPT Thread Connections

Specify: SIN (specify), K-factor (specify), Model CC2 Combustible Concealed Space Sprinkler, Specific Application, Upright, 175°F (79°C), P/N (specify):

TY2189, 4.2K .....51-311-1-175  
TY3189, 5.6K ..... 51-301-1-175

### Sprinkler Wrench:

Specify: W-Type 6 Sprinkler Wrench, P/N 56-000-6-387





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Contacts | [www.tyco-fire.com](http://www.tyco-fire.com)

## TFP632 Change History Appendix

ISSUE DATE	NOTES
03-23	Pages 3 and 4, end of Design Criteria, CPVC Pipe sub-section, added reference to new Figure 4 added to Page 4 providing guidance on protecting vertical risers passing through concealed space from floor below to floor above; Adjusted sequence and placement of all other later Figures and content accordingly.
08-22	Page 1, added QR code and URL to allow convenient access to electronic version from printed document; Page 8, changed corporate address and telephone number to 1467 Elmwood Avenue, Cranston, RI 02910   Telephone +1-401-781-8220, formerly 1400 Pennbrook Parkway, Lansdale, PA 19446   Telephone +1-215-362-0700.
12-18	Clarified use of BlazeMaster or other UL Listed CPVC pipe and fittings in sprinkler piping system within protected concealed space.
08-18	Updated Tyco® branding and document format; Added Johnson Controls copyright; Added disclaimer stating specifications and information subject to change without notice; Added reference to Regulatory and Health Warning Technical Data Sheet TFP2300.
08-16	Reduced remote area criteria for steel pipe in dry pipe systems protecting wood truss, bar joist or solid wood joist construction to 1000 ft <sup>2</sup> (93 m <sup>2</sup> ), formerly 1300 ft <sup>2</sup> (121 m <sup>2</sup> ), (now equal to that of steel pipe in wet pipe systems protecting same construction types.
07-15	Updated installation criteria dimensions for various construction types shown in Figures 2 to 7.
04-14	Removed criteria from Figure 8 for obstructions extending from lower deck.
03-14	Corrected K-factor for TY2189 shown in Sprinkler Identification Number section to 4.2K, formerly shown as 5.6K.
01-14	Updated to reflect changes in NFPA 13 allowing fire protection of construction using wood trusses having top chords greater than 4 in. (100 mm) in depth.
07-07	Changed maximum distance below non-combustible insulation to 4 in. (100 mm), formerly 2 in. (50 mm), see Figures 3 and 6.
03-05	Added 4.2K option.
04-04	Updated Specific Application Listings allowing use of CPVC pipe and fittings.
01-04	Technical Data Sheet TFP632 describes Model CC2 5.6K Combustible Concealed Space Sprinkler.