

Victaulic® FireLock™ Series FL-SA/DS and FL-SA/RE Specific Application Low Flow Attic Scheme, Quick Response Upright, K5.6 (8.0)



FL-SA/RE, V5620



FL-SA/DS, V5621

1.0 PRODUCT DESCRIPTION

SPECIFIC APPLICATION ATTIC SPRINKLERS		
SIN	V5620	V5621
ORIENTATION	Upright	Upright
K-FACTOR ¹	5.6 Imp./8.1 S.I.	5.6 Imp./8.1 S.I.
CONNECTION	½" NPT	½" NPT
MAX. WORKING PRESSURE	175 psi (1200 kPa)	175 psi (1200 kPa)
GLOBE RE-DESIGNATION	GL5620	GL5621

AVAILABLE WRENCHES	
SPRINKLER	V56 Open End
Upright	■

Factory Hydrostatic Test: 100% @ 500 psi/3447 kPa/34 bar

Min. Operating Pressure: UL: 12.8 psi/88 kPa/0.9 bar

Temperature Rating: See tables in section 2.0

¹ For K-Factor when pressure is measured in bar, multiply S.I. units by 10.0.

2.0 CERTIFICATION/LISTINGS



Sprinkler Model	SIN	Nominal K Factor Imperial	Listing Agency/ Approved Temperature Ratings	Area of Use	Roof Span ft	Roof Pitch
RE	V5620	5.6	cULus 200°F/93°C	RIDGE/SLOPE	72' MAX	3:12 to 6:12
DS	V5621	5.6	cULus 200°F/93°C	HIP/SINGLE SLOPE	72' MAX	

NOTE

- Listings and approval as of printing.
- Listed to be utilized per NFPA 13 in conformance with the New Technology and Equivalency Sections.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

3.0 SPECIFICATIONS – MATERIAL

Deflector: Bronze

Bulb Nominal Diameter: 3.0 mm

Load Screw: Brass

Pip Cap: Brass

Spring Seal Assembly: PTFE coated Beryllium nickel alloy

Frame: Brass

Lodgement Spring: Stainless steel

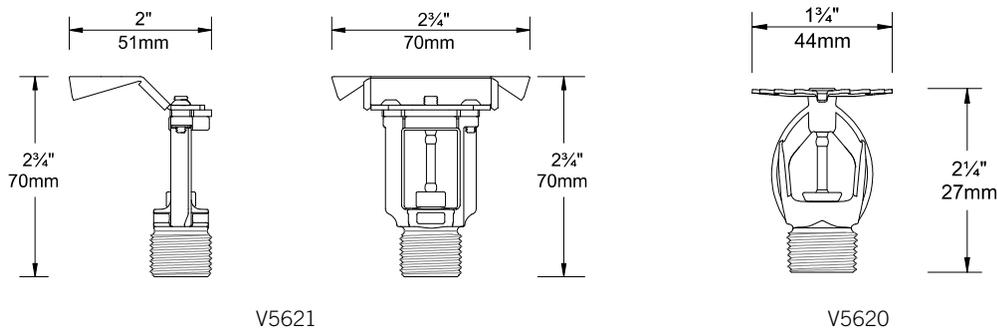
Installation Wrench: Ductile iron

Sprinkler Frame Finishes: Plain brass

NOTE

- For cabinets and other accessories refer to separate sheet.

4.0 DIMENSIONS



5.0 PERFORMANCE

Installation

The Specific Application Attic Sprinklers for Protecting Attics must be installed in accordance with this section. The FL-SA/RE and FL-SA/DS Specific Application Attic Sprinklers comprise an overall protection scheme which takes into account strategic positioning for activation sensitivity while providing unique distribution characteristics specifically designed for attic construction.

The protection methodology utilizing these sprinklers has been full scale fire tested in the built attic environment. As such, they must be installed in accordance with the guidelines set forth within this data sheet. The NFPA 13 Density/Area prescriptive spacing requirements do not apply as these sprinklers are not bound by the NFPA 13 "S x L Rules". The positioning and spacing requirements of this data sheet take precedence over any other prescriptive requirements that may exist in NFPA 13.

To install the Specific Application Attic Sprinklers, the following steps shall be taken:

Step 1. Sprinklers must be oriented correctly as follows:

- Series FL-SA/RE Sprinklers
 - At horizontal ridge (peak) – installed in the upright vertical position with deflector parallel to the ceiling below (i.e. sprinkler centerline perpendicular to the ridgeline).
 - Near eave or under hip type roofs – installed in the upright position with deflector parallel to roof deck (i.e. sprinkler centerline perpendicular to the roof slope).
- Series FL-SA/DS Sprinklers
 - These sprinklers are installed downslope from a ridgeline/peak (See FIGURE 11). Installed in the upright position with deflector parallel to roof deck (i.e. sprinkler centerline perpendicular to the roof slope).

Step 2. With pipe thread sealant applied to the pipe threads, hand tighten the sprinkler into the sprinkler fitting.

NOTE

- Do not grasp the sprinkler by the deflector.

Step 3. Wrench-tighten the sprinkler using only the appropriate wrench. Wrenches are only to be applied to the sprinkler wrench flats or wrench hex, as applicable.

NOTE

- Do not apply wrench to frame arms.

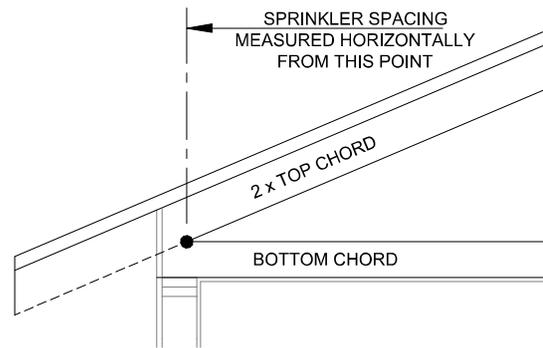


Figure 6A

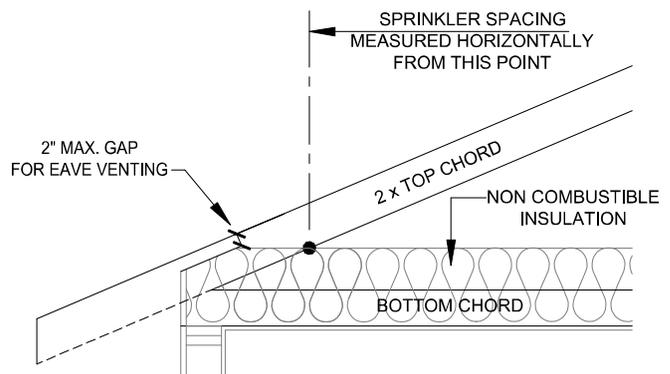


Figure 6B

FIGURE 6: DIMENSION FROM EAVE

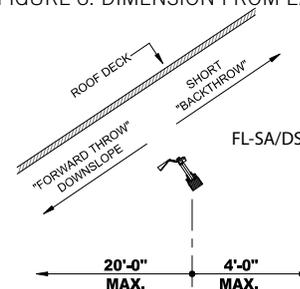


FIGURE 7: SPRINKLER FRAME ORIENTATION TO ROOF SLOPE

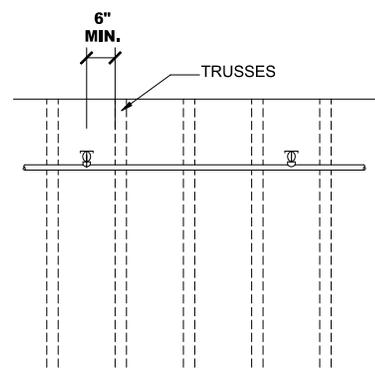


FIGURE 8: DIMENSION FROM TRUSS

5.0 PERFORMANCE (CONTINUED)

System Design Procedure

Gable Style Roof

Option 1: Ridge Sprinklers Only

- When utilizing this option Series FL-SA/RE sprinklers are used to protect the entirety of the attic space. The span of the attic is measured along the floor (or ceiling of floor below) of the attic space from the peak to the intersection of the bottom of the top chord of the roof joist and the non-combustible insulation or floor joist on the floor (or ceiling of floor below). The span is twice the longer of the two measured spans. (See Figure 6)
- The maximum span which can be protected by a single line of FL-SA/RE sprinklers at the peak is a total span of 24 ft or a maximum half span of 12 ft.

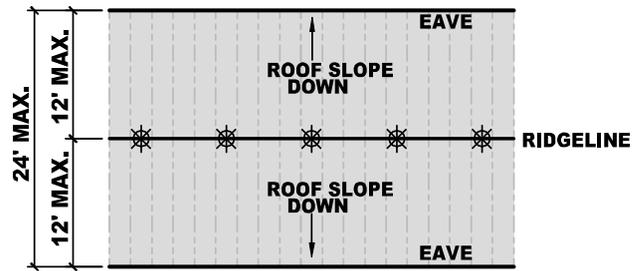


Figure 9A

Option 2: Ridgeline Sprinklers/Eave

Sprinklers (FL-SA/RE)

- This approach utilizes the FL-SA/RE sprinklers at the Ridgeline and downslope covering to the eave. (See Figure 10 for dimensional limitations)

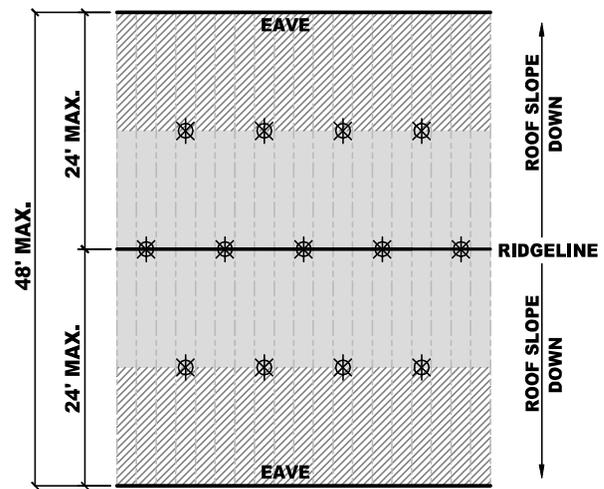


Figure 9B

Option 3: Ridgeline Sprinklers with Downslope

Sprinklers

- The maximum span of this approach is 72 ft or a half span of 36 ft. as measured horizontally. (See Figure 10 and Figure 11 for dimensional limitations)

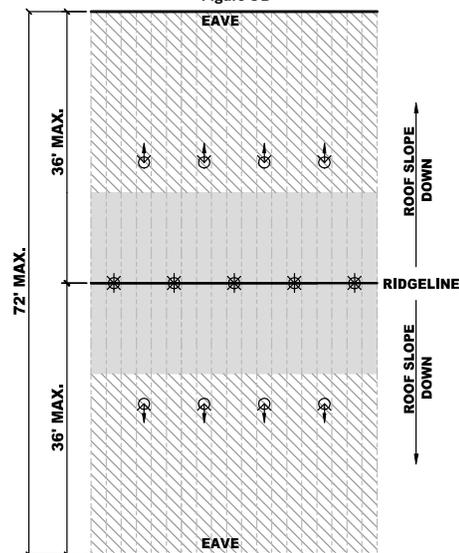


Figure 9C

-  = Model FL-SA/RE
-  = Model FL-SA/DS

5.0 PERFORMANCE (CONTINUED)

Ridgeline Design Criteria

Sprinkler Model

- FL-SA/RE

Flow Rate

- 20 gpm

Distance Between Sprinklers Along Ridge

- Minimum 6 ft
- Maximum 8 ft

Minimum Distance to Downslope Sprinkler

- 6 ft (measured horizontally)

Maximum Distance to Downslope Sprinkler

- 16 ft (measured horizontally)

Deflector Distance Below Ceiling (At Ridgeline)

- Minimum 16 in
- Maximum 24 in

Deflector Distance Below Ceiling (When Downslope of Ridgeline)

- Install with deflector below bottom of top chord
1" minimum to 3" maximum.

Lateral Maximum Distance From Ridgeline

- 12 in

Distance From Hip Peak

- Minimum 1 ft
- Maximum 4 ft

NOTE

- If a flat sloped ceiling is present utilizing non combustible insulation, the insulation must completely fill the pockets between the joists, and the insulation must be secured in place with metal wire netting or equivalent. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the sprinkler. Attic sprinklers have not been evaluated for use with spray foam insulation.



= Model FL-SA/RE



= Model FL-SA/DS

Installation

- When installed for Ridgeline protection, the FL-SA/RE Sprinkler has a zone of protection of 24 ft. wide as measured horizontally across the ridgeline). The maximum zone of protection on either side of the ridgeline is 12 ft. (as measured horizontally). The zone of protection along the ridgeline is 8 ft. (4 ft. maximum to either side of the FL-SA/RE Sprinkler).
- When a FL-SA/RE sprinkler is installed under a horizontal Ridge, the deflector is to be positioned parallel with the floor/ceiling below. (Regardless of allowed offset from directly below ridge)
- Maximum span for FL-SA/RE sprinkler to cover is 24 ft wide attic.
- Sprinklers must be installed with the frame arms parallel to the ridge.
- Centerline of sprinkler must be a minimum of 6" laterally from face of any truss. (see Figure 8)
- For obstruction criteria, see Obstruction section within this data sheet.
- When installed under a flat sloped ceiling (noncombustible insulation filled joist channels) maximum deflector to ceiling distance is the same as maximum distance below bottom of top chord or deflector distance below ridge.

Hydraulic Calculations

- See Hydraulic Design Section

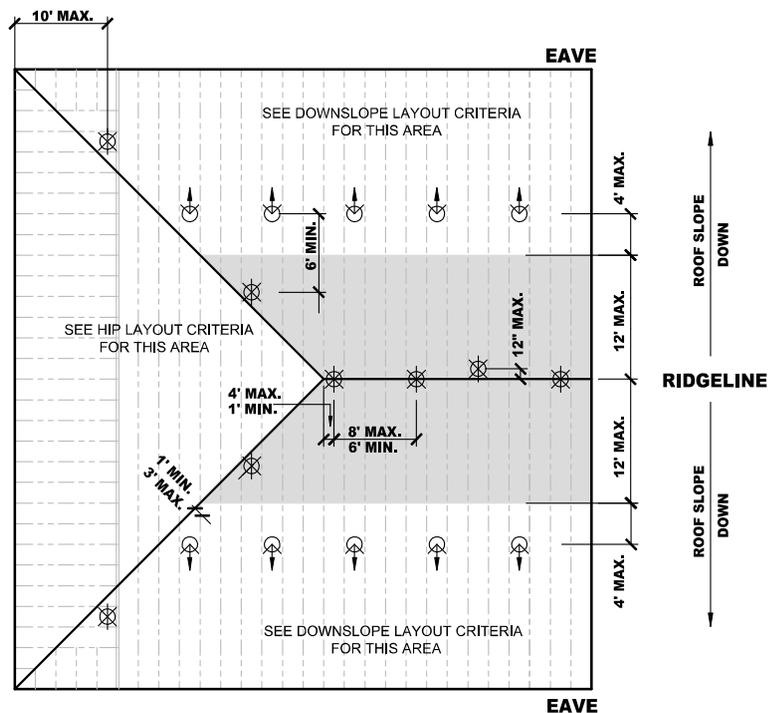


Figure 10: Ridgeline Layout Criteria

5.0 PERFORMANCE (CONTINUED)

Downslope Design Criteria

Sprinkler Model

- FL-SA/DS

Flow Rate

- 20 gpm

Distance Between Sprinklers Perpendicular to Slope

- Minimum 4 ft
- Maximum 8 ft

Maximum Sprinkler Throw (measured horizontally)

- Upslope - 4 ft
- Downslope - 20 ft

Minimum Distance Between Sprinklers Downslope of the FL-SA/DS (Throw Direction)

- 15 ft

Deflector Distance Below Ceiling

- Install with deflector below bottom of top chord
1" minimum to 4" maximum.

Distance Away From Hip Line

- Minimum 1 ft
- Maximum 3 ft

Installation

- The FL-SA/DS Sprinkler has a zone of protection of 20 ft. forward (measured on the horizontal); 4 ft. backwards (measured on the horizontal); and 8 ft. wide (4 ft. laterally to either side of the sprinkler).
- Ensure that the sprinkler deflector is installed with the deflector parallel to the sloped roof above.
- Centerline of sprinkler must be a minimum of 6" laterally from face of truss (See Figure 8).
- Must be offset at least one channel laterally from any Ridgeline sprinkler.
- Sprinklers must be installed with the frame arms perpendicular to the roof slope.
- For obstruction criteria, see Obstruction section within this data sheet.
- When installed under a flat sloped ceiling (noncombustible insulation filled joist channels) maximum deflector to ceiling distance is the same as maximum distance below bottom of top chord.

Hydraulic Calculations

- See Hydraulic Design Section

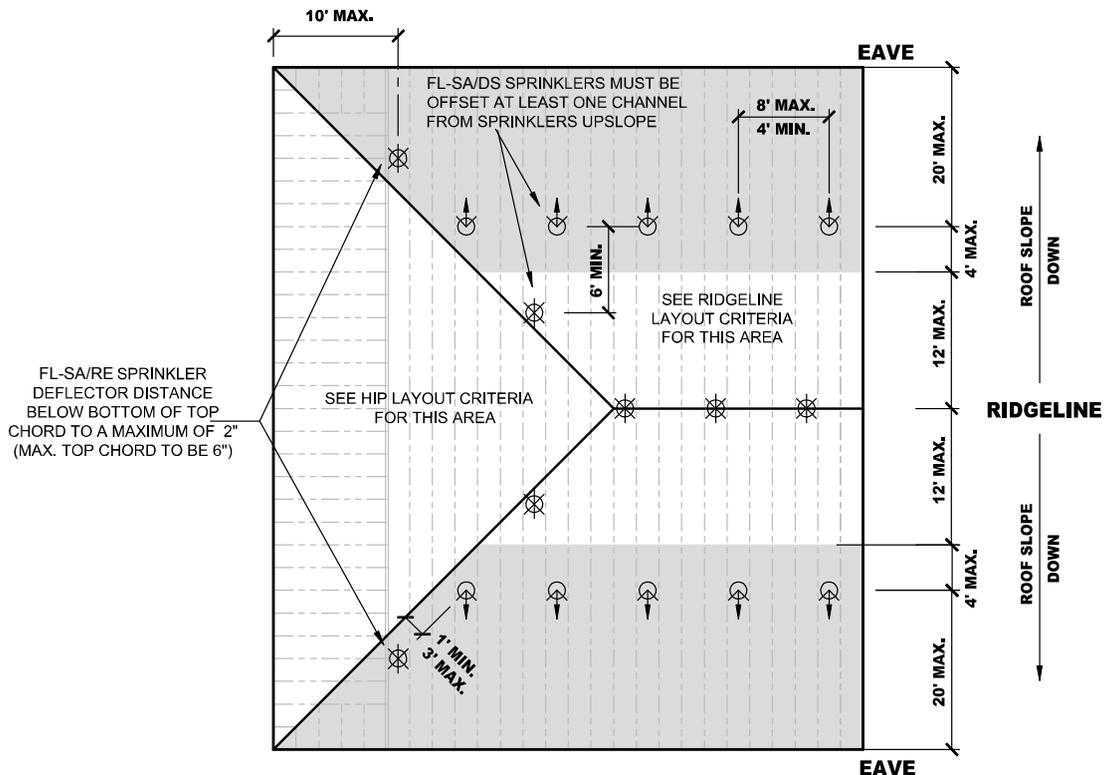
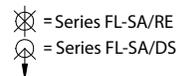


Figure 11: Downslope Layout Criteria

NOTE

- If a flat sloped ceiling is present utilizing non combustible insulation, the insulation must completely fill the pockets between the joists, and the insulation must be secured in place with metal wire netting or equivalent. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the sprinkler. Attic sprinklers have not been evaluated for use with spray foam insulation.



5.0 PERFORMANCE (CONTINUED)

Hip Area Sprinkler Design Criteria

Hip Truss/Jack Truss Construction

Sprinkler Model

- FL-SA/RE

FLOW RATE

- 20 gpm

Distance Between Sprinklers

First Row From Eave (measured horizontally)

- Minimum 6 ft
- Maximum 8 ft

Distance Between Sprinklers

All Other Rows Upslope (measured horizontally)

- Minimum 6 ft
- Maximum 12 ft

Distance From Eave To First Row (measured horizontally)

- Minimum 5 ft
- Maximum 12 ft

Distance Between Rows (measured horizontally)

- Minimum 6 ft
- Maximum 10 ft

Minimum Distance Between Sprinklers

- 6 ft

Deflector Distance Below Ceiling

- Install with deflector below bottom of top chord 1" minimum to 3" maximum.

Sprinkler At Apex

- A FL-SA/RE Sprinkler must be installed between 1 ft. to 5 ft. down from the intersection of the ridgeline and hip lines (Apex)

Sprinklers Adjacent To Hip Line

- All FL-SA/RE Sprinklers directly adjacent to hip line shall be 1 ft. to 3 ft. from hip line (as measured perpendicular to hip line)

Installation

- Ensure that the sprinkler is installed with the deflector parallel to the sloped roof above.
- Sprinklers must be installed with the frame arms perpendicular to the roof slope (see Figure 7).
- For obstruction criteria, see Obstruction section within this data sheet.
- When installed under a flat sloped ceiling (noncombustible insulation filled joist channels) maximum deflector to ceiling distance is the same as maximum distance below bottom of top chord.

Hydraulic Calculations

- See Hydraulic Design Section

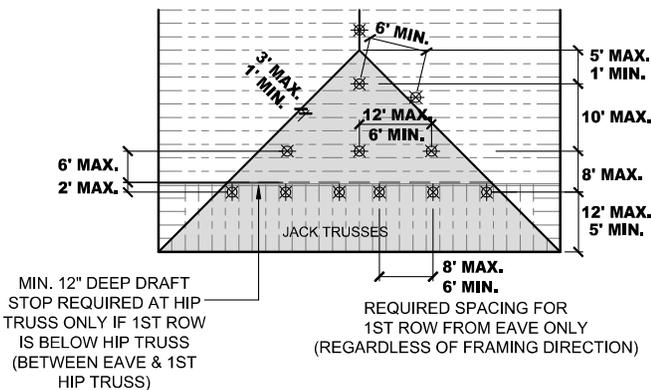


FIGURE 12A: HIP LAYOUT CRITERIA WHEN FIRST ROW OF SPRINKLERS PLACED "WITHIN" JACK TRUSSES

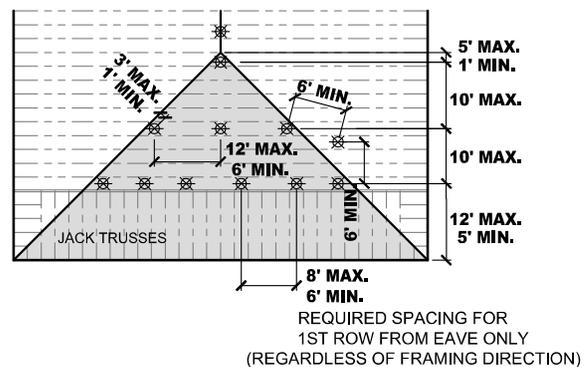
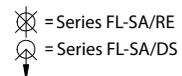


FIGURE 12B: HIP LAYOUT CRITERIA WHEN FIRST ROW OF SPRINKLERS PLACED "BEYOND" JACK TRUSSES

FIGURE 12: HIP LAYOUT CRITERIA - HIP TRUSS/ JACK TRUSS CONSTRUCTION

NOTE

- If a flat sloped ceiling is present utilizing non combustible insulation, the insulation must completely fill the pockets between the joists, and the insulation must be secured in place with metal wire netting or equivalent. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the sprinkler. Attic sprinklers have not been evaluated for use with spray foam insulation.



5.0 PERFORMANCE (CONTINUED)

Hip Area Sprinkler Design Criteria

Framing Members Parallel to Roof Slope

Sprinkler Model

- FL-SA/RE

Flow Rate

- 20 gpm

Distance From Eave to First Row (Measured Horizontally)

- Minimum 5 ft
- Maximum 12 ft

Maximum Distance Between Sprinklers

- See Figure 13

Deflector Distance Below Ceiling

- Install with deflector below bottom of top chord 1" minimum to 3" maximum.

Sprinkler at Apex

- A FL-SA/RE Sprinkler must be installed between 1 ft. to 5 ft. down from the intersection of the ridgeline and hip lines (Apex)

Sprinklers Adjacent To Hip Line

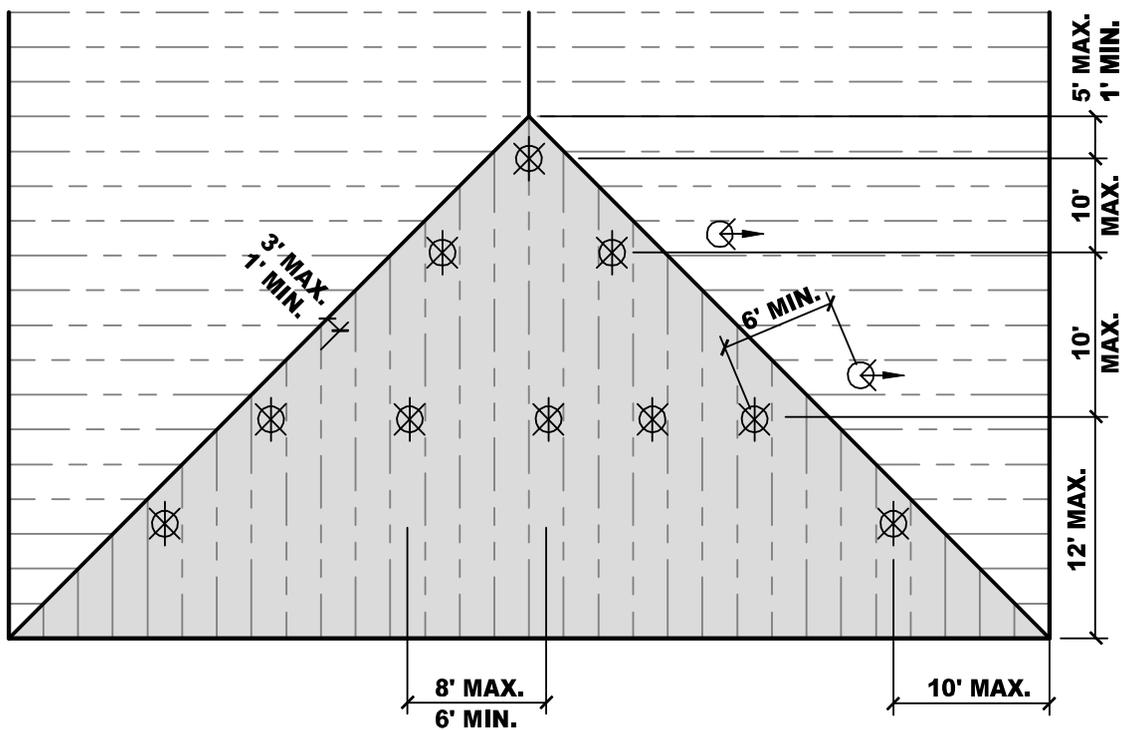
- All FL-SA/RE Sprinklers directly adjacent to hip line shall be 1 ft. to 3 ft. from hip line (as measured perpendicular to hip line)

Installation

- Ensure that the sprinkler is installed with the deflector parallel to the sloped roof above
- Sprinklers must be installed with the frame arms perpendicular to the roof slope.
- For obstruction criteria, see Obstruction section within this data sheet.
- When installed under a flat sloped ceiling (noncombustible insulation filled joist channels) maximum deflector to ceiling distance is the same as maximum distance below bottom of top chord.

Hydraulic Calculations

- See Hydraulic Design Section

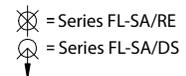


TYPICAL BELOW ENTIRE HIP ROOF WHEN FRAMING IS PARALLEL TO ROOF SLOPE

FIGURE 13: HIP LAYOUT CRITERIA
FRAMING MEMBERS PARALLEL TO ROOF SLOPE

NOTE

- If a flat sloped ceiling is present utilizing non combustible insulation, the insulation must completely fill the pockets between the joists, and the insulation must be secured in place with metal wire netting or equivalent. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the sprinkler. Attic sprinklers have not been evaluated for use with spray foam insulation.



5.0 PERFORMANCE (CONTINUED)

Hip Area Sprinkler Design Criteria

Framing Members Parallel to Roof Slope

Sprinkler Model

- FL-SA/DS (FL-SA/RE @ apex)

Flow Rate

- 20 gpm

Distance Between Sprinklers (Laterally)

- Minimum 4 ft.
- Maximum 8 ft.

Distance From Eave To First Row (Measured Horizontally)

- Minimum 5 ft.
- Maximum 20 ft.

Deflector Distance Below Ceiling

- Install with deflector below bottom of top chord 1" minimum to 4" maximum.

Sprinkler At Apex

- A FL-SA/RE Sprinkler must be installed between 1 ft. to 5 ft. down from the intersection of the ridgeline and hip lines (Apex)

Sprinklers Adjacent To Hip Line

- All FL-SA/RE Sprinklers directly adjacent to hip line shall be 1 ft. to 3 ft. from hip line (as measured perpendicular to hip line)

Installation

- Ensure that the sprinkler is installed with the deflector parallel to the sloped roof above
- Sprinklers must be installed with the frame arms perpendicular to the roof slope.
- For obstruction criteria, see Obstruction section within this data sheet
- When installed under a flat sloped ceiling (noncombustible insulation filled joist channels) maximum deflector to ceiling distance is the same as maximum distance below bottom of top chord.

Hydraulic Calculations

- See Hydraulic Design Section

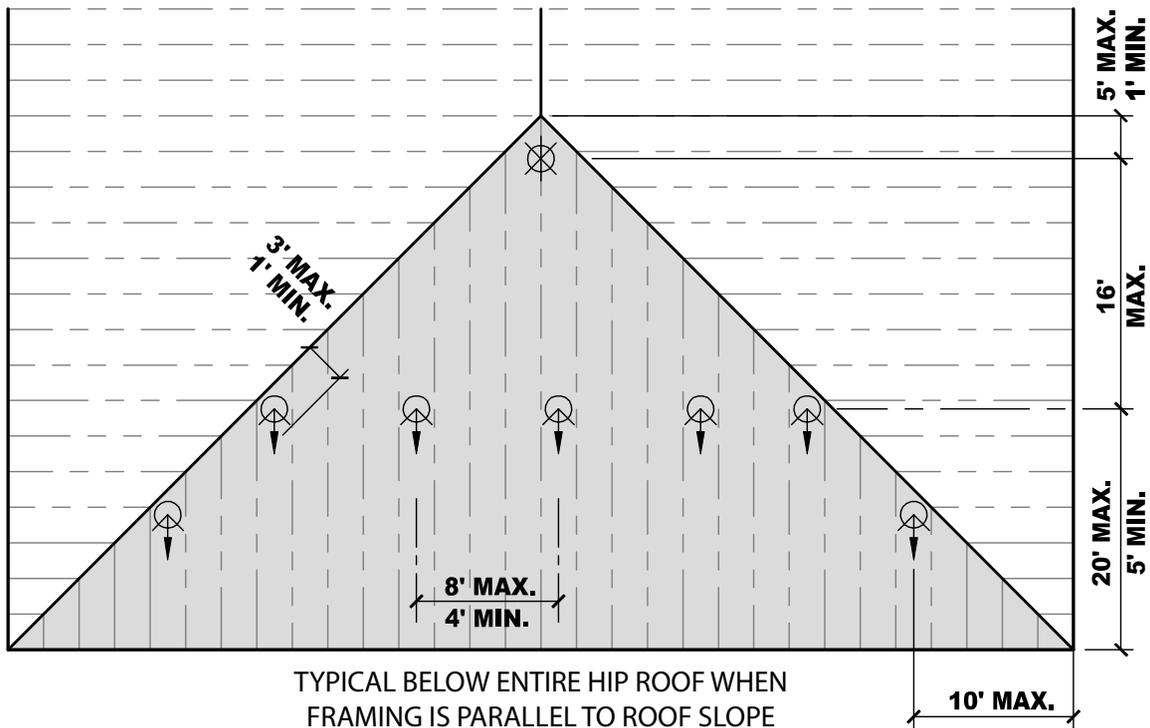


FIGURE 13A: HIP LAYOUT CRITERIA
FRAMING MEMBERS PARALLEL TO ROOF SLOPE

NOTE

- If a flat sloped ceiling is present utilizing non combustible insulation, the insulation must completely fill the pockets between the joists, and the insulation must be secured in place with metal wire netting or equivalent. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the sprinkler. Attic sprinklers have not been evaluated for use with spray foam insulation.

⊗ = Series FL-SA/RE
⊙ = Series FL-SA/DS

5.0 PERFORMANCE (CONTINUED)

Single Slope Design Criteria

Sprinkler Model

- FL-SA/DS

Flow Rate

- 20 gpm

Deflector Distance Below Peak (See Figure 14a)

- Minimum 16 in.
- Maximum 24 in.

Deflector Distance Below Sloping Roof Deck (See Figure 14a)

- Install with deflector below bottom of top chord to a maximum of 2 in.

Distance Between Sprinklers Perpendicular to the Slope

- Minimum 4 ft.
- Maximum 8 ft.

Maximum Allowed Sprinkler Throw (Measured Horizontally)

- Downslope - 16 ft.

NOTE

- If a flat sloped ceiling is present utilizing non combustible insulation, the insulation must completely fill the pockets between the joists, and the insulation must be secured in place with metal wire netting or equivalent. The metal wire netting is intended to hold the insulation in place should the insulation become wetted by the operation of the sprinkler. Attic sprinklers have not been evaluated for use with spray foam insulation.

Minimum Distance Between Sprinklers Downslope Of The FL-SA/DS (Throw Direction)

- 15 ft. (as measured on the slope)

Installation

- Ensure that the sprinkler deflector is installed with the deflector parallel to the sloped roof above.
- Centerline of sprinkler must be a minimum of 6" laterally from face of truss. See Figure 8.
- When two rows of FL-SA/DS sprinklers are utilized, the adjacent rows of sprinklers must be offset at least one channel laterally from each other. See Figure 14C.
- Sprinklers must be installed with the frame arms perpendicular to the roof slope. See Figure 7.
- For obstruction criteria, see Obstruction section within this data sheet.
- When installed under a flat sloped ceiling (noncombustible insulation filled joist channels) maximum deflector to ceiling distance is the same as maximum distance below bottom of top chord.

Hydraulic Calculations

- See Hydraulic Design Section

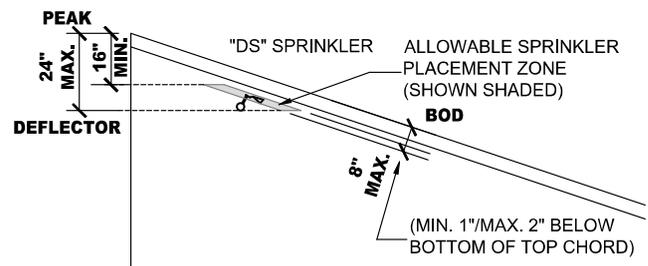


FIGURE 14A - SECTION VIEW DS SPRINKLER & DEFLECTOR PLACEMENT AT PEAK

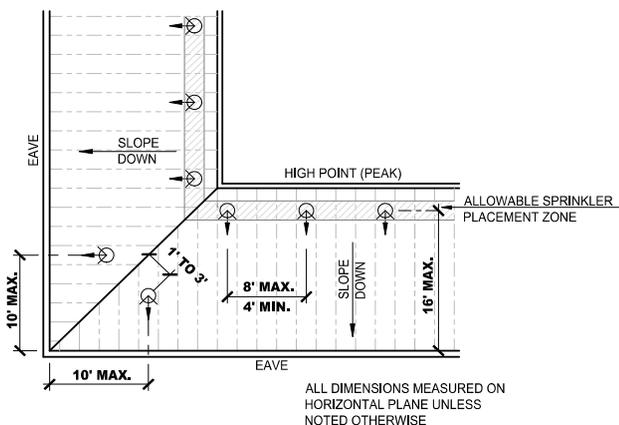


FIGURE 14B - 1 ROW DS SPRINKLER (HIP SHOWN AT CORNER)

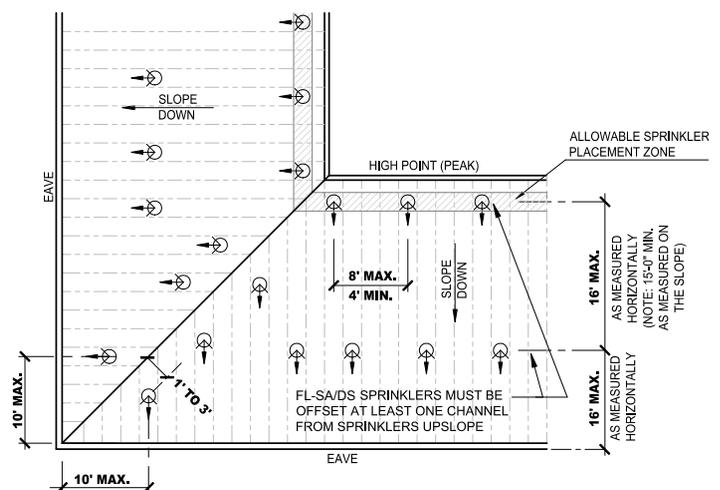


FIGURE 14C - 2 ROW DS SPRINKLER (HIP SHOWN AT CORNER)

FIGURE 14: SINGLE SLOPE LAYOUT CRITERIA

5.0 PERFORMANCE (CONTINUED)

Dormer Protection Criteria

The protection scheme for dormer roofs shall be in accordance with the following guidelines:

Dormers Built Entirely Over (on top) of Main Roof Sheathing – 4 Sprinklers or Less – Any Slope

- RE/DS Sprinklers allowed (CPVC allowance applies for wet systems only)
- Standard Spray Sprinklers allowed

Dormers Built Entirely Over (on top) of Main Roof Sheathing - More than 4 Sprinklers

- RE/DS Sprinklers allowed where the pitch is between 3:12 and 6:12. Protection scheme utilized shall be in accordance with this document
- Standard Spray Sprinklers allowed for any slope

Dormers Open to Attic Space Below – 4 Sprinklers or Less – Any Slope

- RE/DS Sprinklers allowed (CPVC allowance applies for wet systems only)
- Standard Spray Sprinklers allowed.

Dormers Open to Attic Space Below - More than 4 Sprinklers

- RE/DS Sprinklers allowed where the pitch is between 3:12 and 6:12. Protection scheme utilized shall be in accordance with this document
- Standard Spray Sprinklers allowed for any slope. (Required to calculate Attic in accordance with NFPA 13 (i.e. 2535 sq. ft. for Dry Systems)

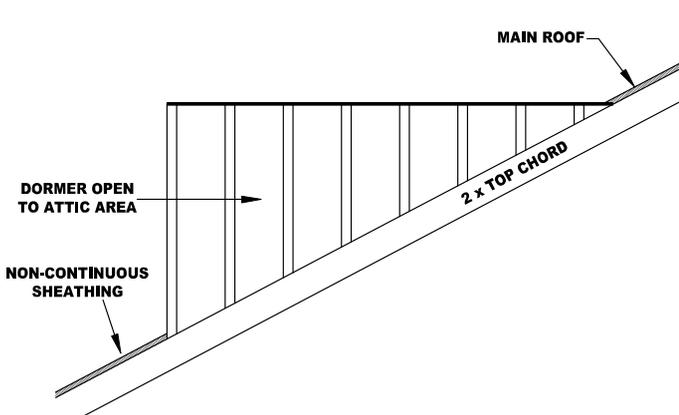


FIGURE 15A
DORMER OPEN TO ATTIC SPACE

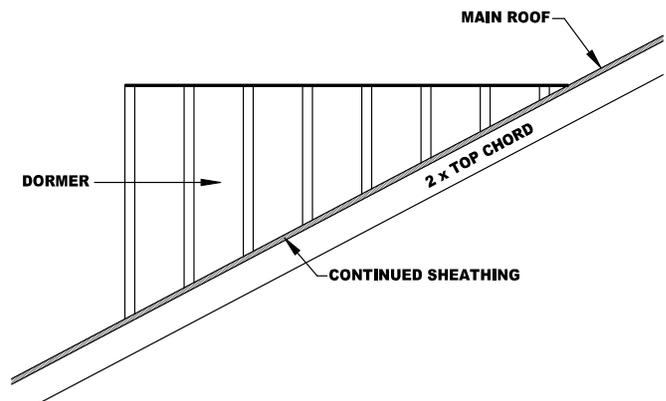


FIGURE 14C
2 ROW DS SPRINKLER
(HIP SHOWN AT CORNER)

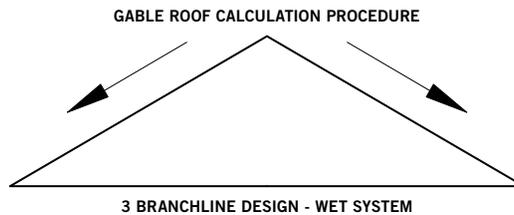
FIGURE 15: DORMERS SECTION VIEW

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

The Specific Application Attic protection scheme shall be hydraulically calculated in accordance with the following guidelines. These calculation guidelines are applicable only to the special Attic Protection scheme utilizing FL-SA/RE and FL-SA/DS sprinklers. These requirements are based on special full scale fire testing and in no way should be utilized when designing other than these specially listed and tested sprinklers for use in sloped combustible attic structures.

As with Hydraulic Calculations performed in accordance with NFPA 13, multiple areas of piping may need to be investigated and multiple calculations performed should it not be readily obvious of the hydraulically most demanding area due to non-typical pipe layout. Hose allowances must be included in the hydraulic calculations in accordance with NFPA 13.



3 Branchline Design – Wet System

Perform the following 2 calculations:

Calculation #1: Calculate the 5 most hydraulically demanding sprinklers consisting of 5 FL-SA/RE (Ridgeline) sprinklers. Minimum sprinkler flow is 20 gpm per sprinkler. See Figure 16A.

Calculation #2: Calculate the 5 most hydraulically demanding sprinklers consisting of 2 FL-SA/DS (Downslope) sprinklers and 3 FL-SA/RE (Ridgeline) sprinklers. Minimum sprinkler flow is 20 gpm per sprinkler. See Figure 16B.

Note: If additional sprinklers are required beyond an obstruction, calculate up to 2 additional sprinklers beyond the obstruction. See Figure 16B.

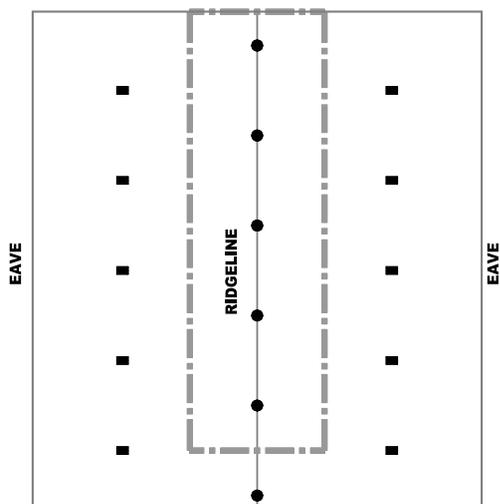


FIGURE 16A
DORMER OPEN TO ATTIC SPACE

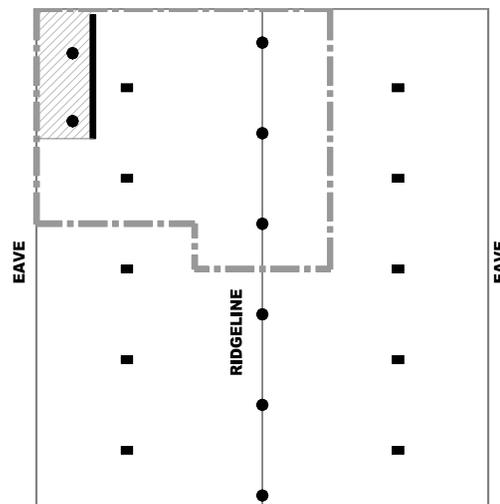


FIGURE 16B
2 ROW DS SPRINKLER
(HIP SHOWN AT CORNER)

FIGURE 16: HYDRAULIC CALCULATION REQUIRED FOR WET 3 BRANCHLINE SYSTEM

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

3 Branchline Design - Dry System

Perform the following 2 calculations:

Calculation #1: Calculate the 6 most hydraulically demanding sprinklers consisting of 6 FL-SA/RE (Ridgeline) sprinklers. Minimum sprinkler flow is 20 gpm per sprinkler. See Figure 17A.

Calculation #2: Calculate the 6 most hydraulically demanding sprinklers consisting of 2 FL-SA/DS (Downslope) sprinklers and 4 FL-SA/RE (Ridgeline) sprinklers. Minimum sprinkler flow is 20 gpm per sprinkler. See Figure 17B.

Note: If additional sprinklers are required beyond an obstruction, calculate up to 2 additional sprinklers beyond the obstruction. See Figure 17B.

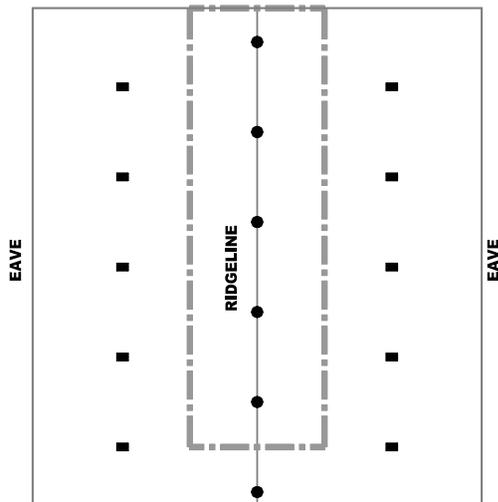


FIGURE 17A

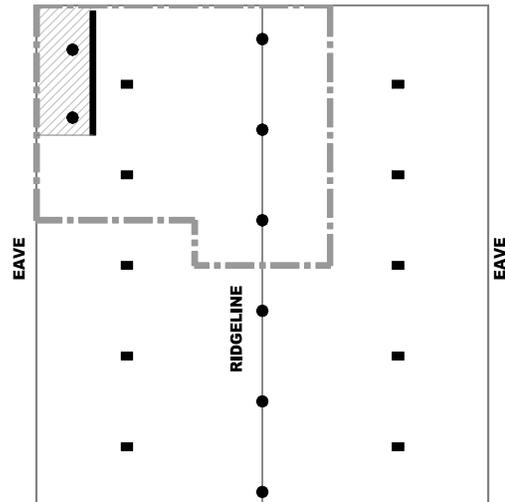


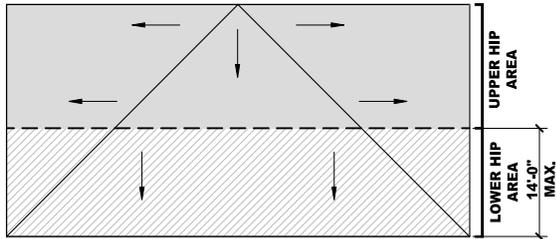
FIGURE 17B

FIGURE 17: HYDRAULIC CALCULATIONS REQUIRED FOR DRY 3 BRANCHLINE SYSTEM

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Hip Roof Calculation Procedure



When a Hip is included in the design of the attic, there are three calculations required. One calculation for the “Ridge/Hip Transition” area. The second and third calculations determine the pipe sizing for the Hip area itself. For the purposes of these hydraulic calculations the Hip is broken into two areas; the “Lower Hip” area; and the “Upper Hip” area. See above figure.

Hip Calculation (Hip Truss/Jack Truss Construction) - Wet System

Calculation #1 – Ridge/Hip Transitions

- Calculate the most demanding 7 contiguous sprinklers with a maximum of 5 sprinklers along the ridge plus the 2 most demanding sprinklers within the hip area. See Figure 18A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #2 – Lower Hip Area

- Calculate up to the 7 most demanding contiguous sprinklers along the eave. This may include sprinklers on both sides of the hip line as shown. See Figure 18B.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #3 – Upper Hip Area

If there are 4 sprinklers or less in the shaded area (Figure 18B):

- Calculate up to the 7 most demanding contiguous sprinklers in the "Upper Hip" area. This may include sprinklers on both sides of the hip line as shown.
- Minimum sprinkler flow is 20 gpm per sprinkler.

If there are more than 4 sprinklers in the shaded area (Figure 18C):

- Calculate the hydraulically most demanding 75% of the total number of sprinklers located within the "Upper Hip" area, rounding up to the nearest sprinkler. (Minimum number of sprinklers to be calculated is 7)
- Minimum sprinkler flow is 20 gpm per sprinkler.

– Example shown in Figure 18C results in 9 sprinklers to be calculated. (12 x 0.75 = 9)

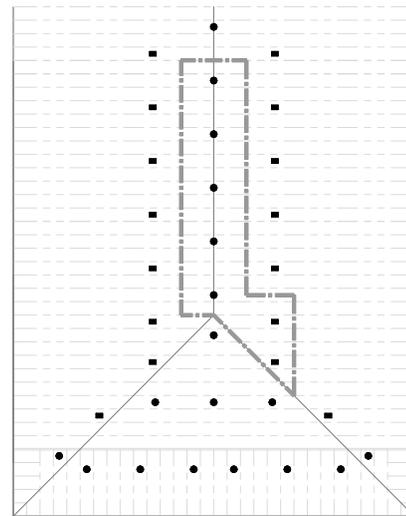


FIGURE 18A

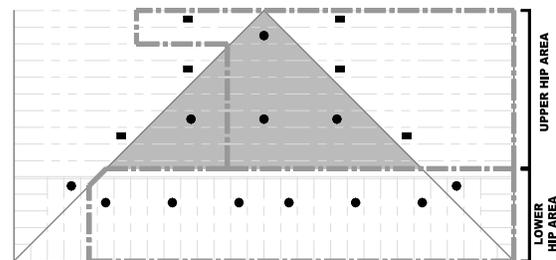


FIGURE 18B

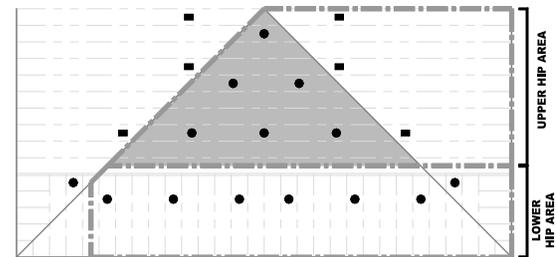


FIGURE 18C

FIGURE 18: HYDRAULIC CALCULATIONS REQUIRED FOR HIP - WET SYSTEM (HIP TRUSS/JACK TRUSS CONSTRUCTION)

- = RE
- = DS

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Hip Calculation (Hip Truss/Jack Truss Construction - Dry System)

Calculation #1 – Ridge/Hip Transitions

- Calculate the most demanding 8 contiguous sprinklers with a maximum of 6 sprinklers along the ridge plus the 2 most demanding sprinklers within the hip area. See FIGURE 19A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #2 – Lower Hip Area

- Calculate the 8 most demanding contiguous sprinklers along the eave. This may include sprinklers on both sides of the hip line as shown. See FIGURE 19B.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #3 – Upper Hip Area

If there are 4 sprinklers or less in the shaded area (FIGURE 19B):

- Calculate up to the 8 most demanding contiguous sprinklers in the "Upper Hip" area. This may include sprinklers on both sides of the hip line as shown. See FIGURE 19B.
- Minimum sprinkler flow is 20 gpm per sprinkler.

If there are more than 4 sprinklers in the shaded area (FIGURE 19C):

- Calculate all sprinklers in the "Upper Hip" area.
- Minimum sprinkler flow is 20 gpm per sprinkler.

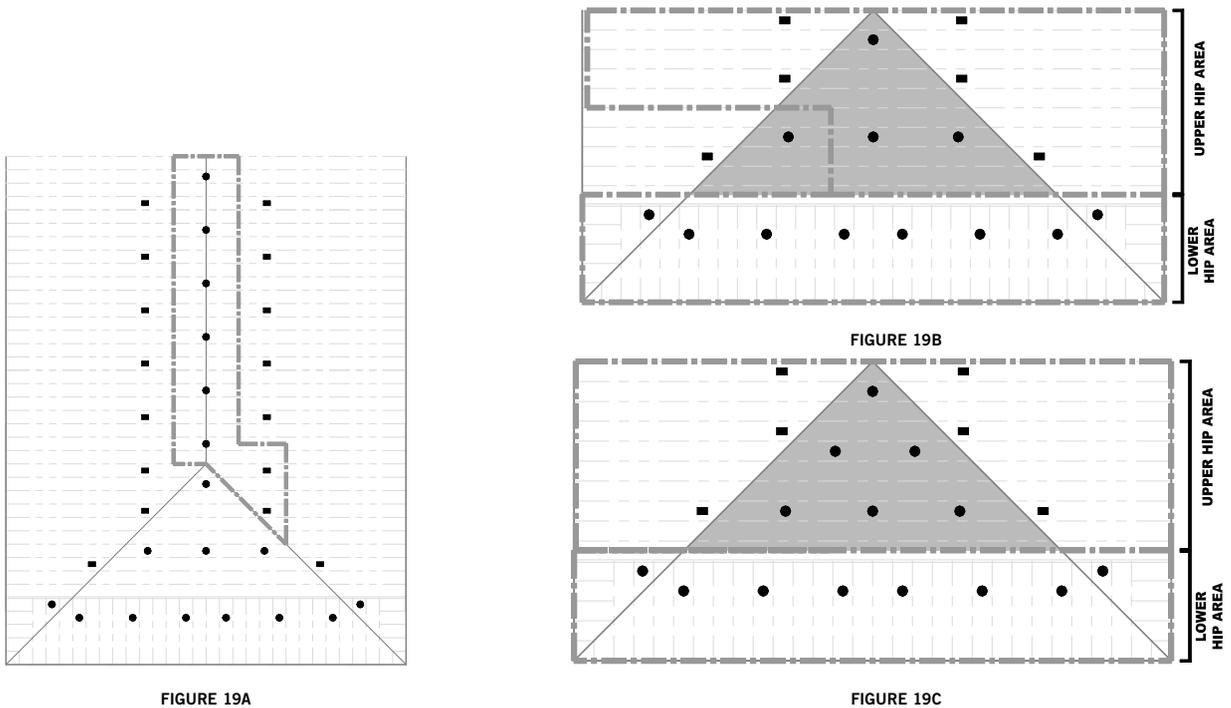


FIGURE 19: HYDRAULIC CALCULATIONS REQUIRED FOR HIP - DRY SYSTEM (HIP TRUSS/JACK TRUSS CONSTRUCTION)

- = RE
- = DS

(Examples shown in these figures are for reference only. Actual sprinklers selected based on piping configuration which results in the most demanding hydraulic demand.)

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Hip Calculation RE Sprinklers (Framing Members Parallel To Roof Slope) - Wet System

Calculation #1 – Ridge/Hip Transitions

- Calculate the most demanding 7 contiguous sprinklers with a maximum of 5 sprinklers along the ridge plus the 2 most demanding sprinklers within the hip area. See Figure 18A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #2 – Hip Area

- Calculate all sprinklers within the hip area shown shaded. See Figure 20.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Hip Calculation RE Sprinklers (Framing Members Parallel To Roof Slope) - Dry System

Calculation #1 – Ridge/Hip Transitions

- Calculate the most demanding 8 contiguous sprinklers with a maximum of 6 sprinklers along the ridge plus the 2 most demanding sprinklers within the hip area. See Figure 19A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #2 – Hip Area

- Calculate all sprinklers within the hip area shown shaded. See Figure 20.
- Minimum sprinkler flow is 20 gpm per sprinkler.

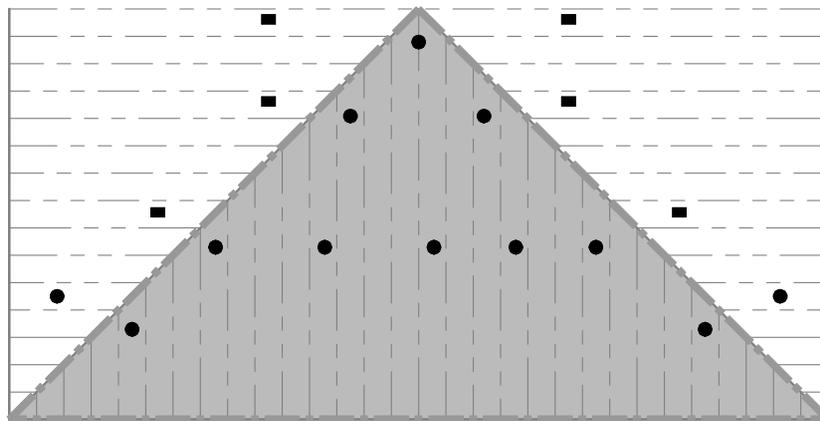


FIGURE 20: HYDRAULIC CALCULATIONS REQUIRED FOR RE @ HIP (FRAMING MEMBERS PARALLEL TO SLOPE)

- = RE
- = DS

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Hip Calculation DS Sprinklers (Framing Members Parallel To Roof Slope) - Wet System

Calculation #1 – Ridge/Hip Transitions

- Calculate the most demanding 7 contiguous sprinklers with a maximum of 5 sprinklers along the ridge plus the 2 most demanding sprinklers within the hip area. See Figure 18A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #2 – Hip Area

- Calculate all sprinklers within the hip area shown shaded. See Figure 20A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Hip Calculation DS Sprinklers (Framing Members Parallel To Roof Slope) - Dry System

Calculation #1 – Ridge/Hip Transitions

- Calculate the most demanding 8 contiguous sprinklers with a maximum of 6 sprinklers along the ridge plus the 2 most demanding sprinklers within the hip area. See Figure 19A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Calculation #2 – Hip Area

- Calculate all sprinklers within the hip area shown shaded. See Figure 20A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

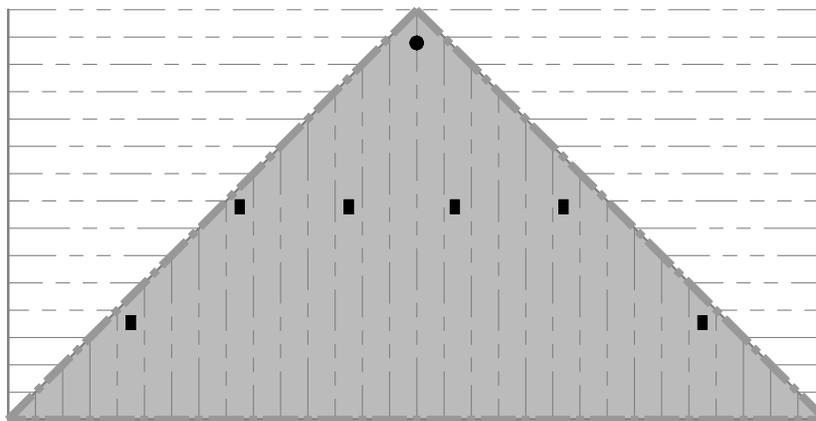


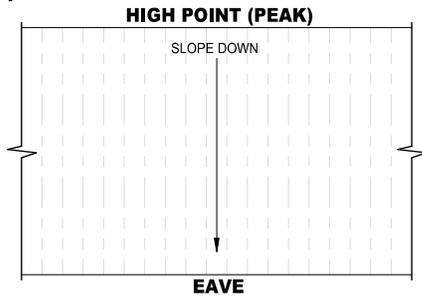
FIGURE 20A: HYDRAULIC CALCULATIONS REQUIRED FOR DS @ HIP (FRAMING MEMBERS PARALLEL TO SLOPE)

- = RE
- = DS

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Single Slope Roof Calculation Procedure



When a single slope roof area exists, the following calculation procedures shall be followed to size piping to the sprinklers protecting this area. NOTE: Single Slopes (with vertical shear walls) result in different fire dynamics than might be seen with gable and/or hip roof construction.

Single Slope Roof Calculation - Wet System

1: Row Protection

- Calculate the most hydraulically demanding 5 contiguous DS sprinklers. See Figure 21A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

2: Row Protection

The following 2 sets of calculations shall be performed:

- Calculation #1: Calculate the most hydraulically demanding 5 contiguous sprinklers consisting of 3 at the high point and 2 on the adjacent slope. See Figure 21B.
- Calculation #2: Calculate the most hydraulically demanding 5 contiguous sprinklers along the high point. See Figure 21C.
- Minimum sprinkler flow is 20 gpm per sprinkler.

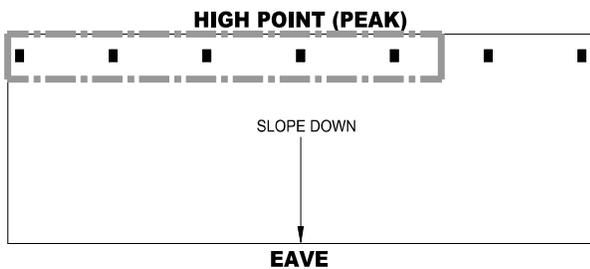


FIGURE 21A
1 ROW PROTECTION CALCULATION

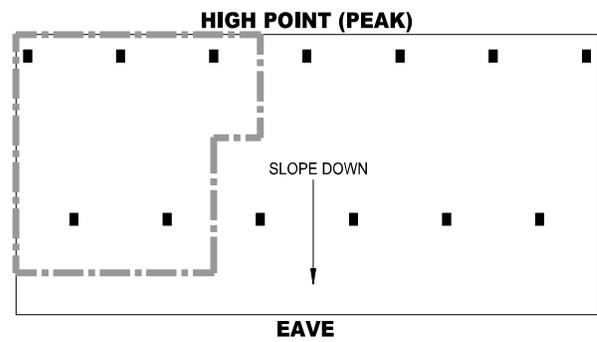


FIGURE 21B
2 ROW PROTECTION CALCULATION #1

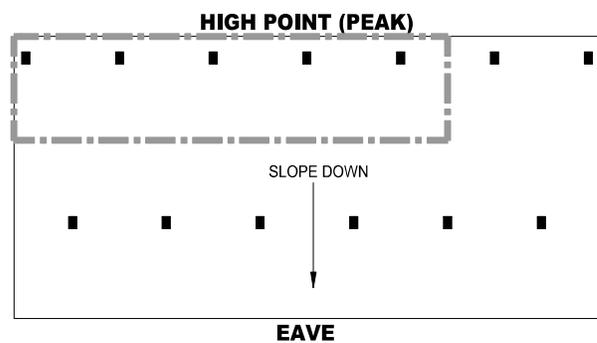


FIGURE 21C
2 ROW PROTECTION CALCULATION #2

FIGURE 21: HYDRAULIC CALCULATIONS REQUIRED FOR WET SYSTEM
SINGLE SLOPE DESIGN

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Single Slope Roof Calculation Procedure

Single Slope Roof Calculation - Dry System

1: Row Protection

- Calculate the most hydraulically demanding 7 contiguous DS sprinklers. See Figure 22A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

2: Row Protection

The following 2 sets of calculations shall be performed:

- Calculation #1: Calculate the 7 most hydraulically demanding contiguous DS sprinklers located along the high point (peak). See Figure 22B.
- Calculation #2: Calculate the 7 most hydraulically contiguous DS sprinklers consisting of 5 DS at the high point (peak) and 2 DS sprinklers on the adjacent downslope branchline. See Figure 22C.
- Minimum sprinkler flow is 20 gpm per sprinkler.

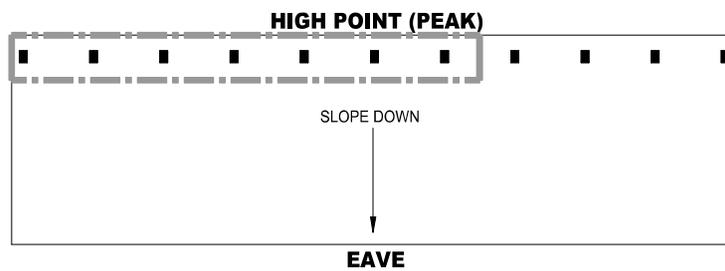


FIGURE 22A
1 ROW PROTECTION CALCULATION #1

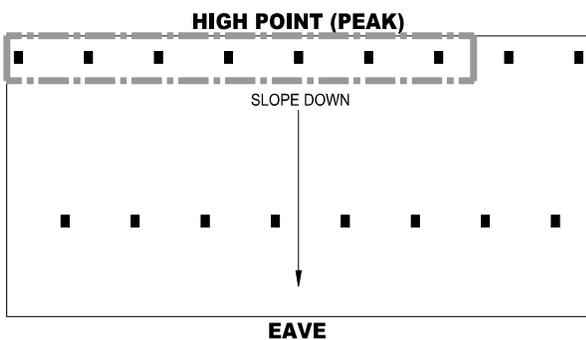


FIGURE 22B
1 ROW PROTECTION CALCULATION

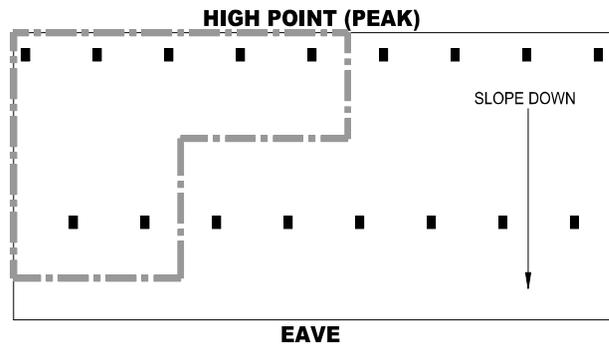


FIGURE 22C
1ROW PROTECTION CALCULATION #2

FIGURE 21: HYDRAULIC CALCULATIONS REQUIRED FOR DRY SYSTEM
SINGLE SLOPE DESIGN

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Single Slope Roof With Hip Calculation Procedure

Single Slope Roof Calculation - Wet System

1: Row Protection

- Calculate the 5 most hydraulically demanding contiguous DS sprinklers located along the high point plus the 2 most demanding sprinklers along the hip line. See Figure 23A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

2: Row Protection

The following 3 sets of calculations shall be performed:

- Calculation #1: Calculate the 3 most hydraulically demanding contiguous DS sprinklers located along the high point (peak) plus the 2 most demanding sprinklers along the hip line. See Figure 23B.
- Calculation #2: Calculate the most hydraulically demanding 5 contiguous sprinklers along the high point. See Figure 23C.
- Calculation #3: Calculate all sprinklers within the shaded corner Hip area as shown. See Figure 23D.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Note: The "plus 2" most demanding sprinklers along the hip line may vary from that shown in the figures depending on actual piping. Designer may need to investigate multiple options to determine the 2 most demanding sprinklers to incorporate into the calculations.

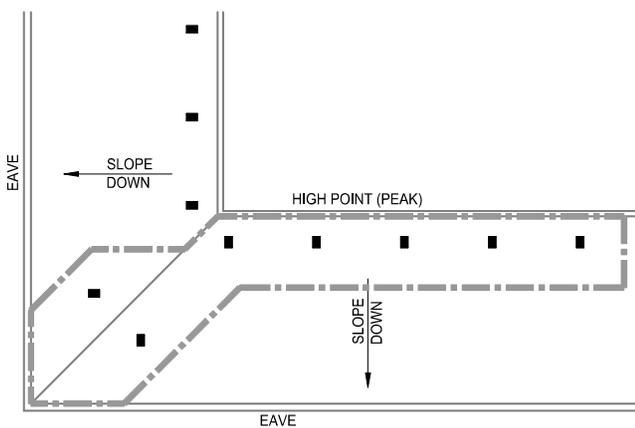


FIGURE 23A: 1 ROW PROTECTION CALCULATION

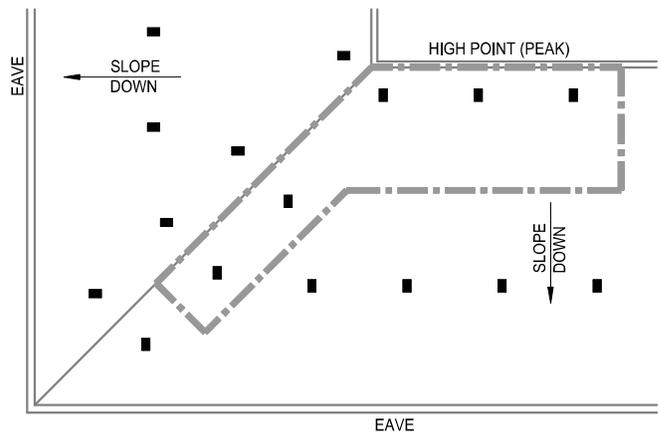


FIGURE 23B: 2 ROW PROTECTION CALCULATION #1

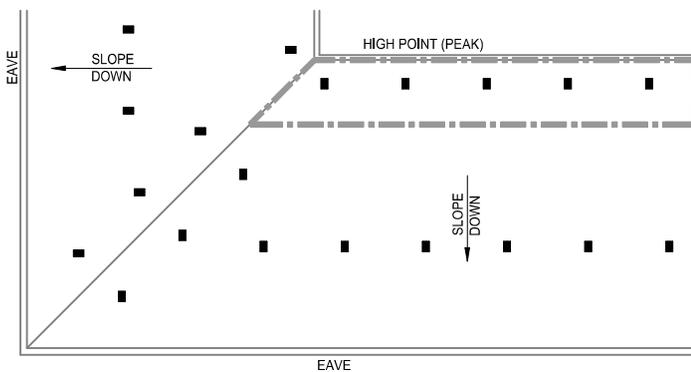


FIGURE 23C: 2 ROW PROTECTION CALCULATION #2

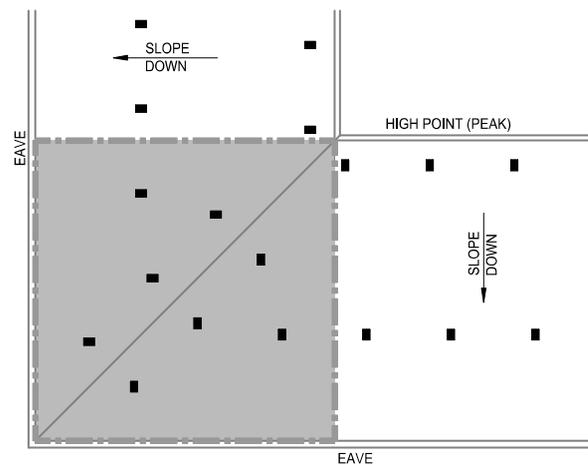


FIGURE 23D: 2 ROW PROTECTION CALCULATION #3

FIGURE 23: SINGLE SLOPE DESIGN

5.0 PERFORMANCE (CONTINUED)

Hydraulic Design

Single Slope Roof With Hip Calculation Procedure

Single Slope Roof Calculation - Dry System

1 Row Protection

- Calculate the 7 most hydraulically demanding contiguous DS sprinklers located along the high point plus the 2 most demanding sprinklers along the hip line. See Figure 24A.
- Minimum sprinkler flow is 20 gpm per sprinkler.

2 Row Protection

The following 2 sets of calculations shall be performed:

- Calculation #1: Calculate the 7 most hydraulically demanding contiguous DS sprinklers located along the high point (peak) plus the 2 most demanding sprinklers along the hip line. See Figure 24B.
- Calculation #2: Calculate all sprinklers within the shaded corner Hip area as shown. See Figure 24C.
- Minimum sprinkler flow is 20 gpm per sprinkler.

Note: The "plus 2" most demanding sprinklers along the hip line may vary from that shown in the figures depending on actual piping. Designer may need to investigate multiple options to determine the 2 most demanding sprinklers to incorporate into the calculations.

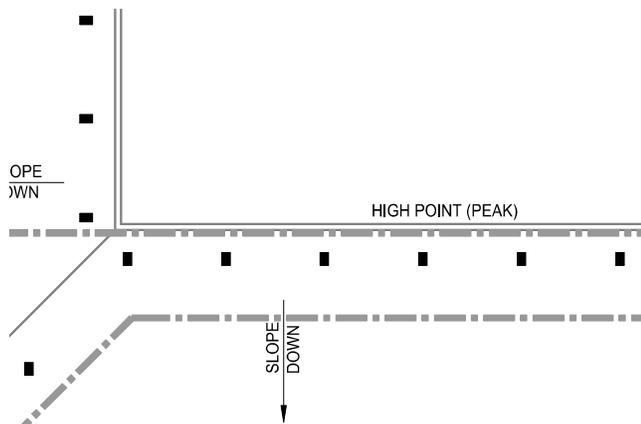


FIGURE 24A: 1 ROW PROTECTION CALCULATION

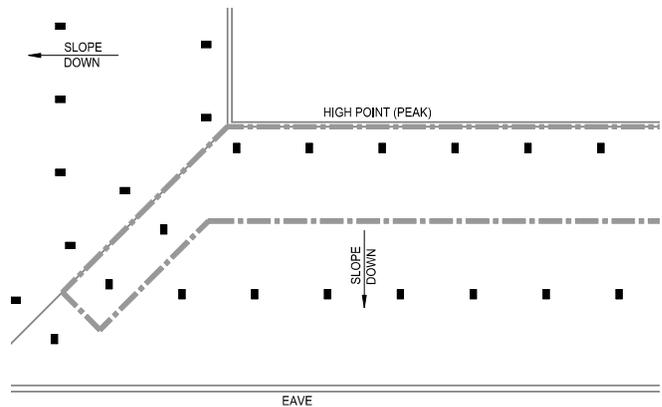


FIGURE 24B: 2 ROW PROTECTION CALCULATION #1

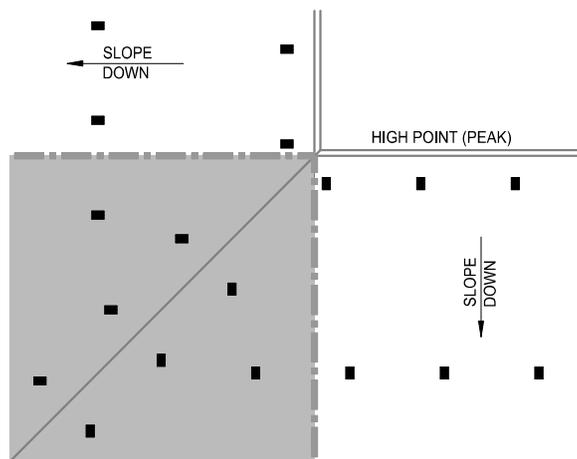


FIGURE 24C: 2 ROW PROTECTION CALCULATION #2

FIGURE 24: SINGLE SLOPE DESIGN

5.0 PERFORMANCE (CONTINUED)

Obstructions

The following guidelines outline criteria to minimize critical obstructions to spray pattern development and to maximize effectiveness in achieving control.

General

- Structural trusses and web members are not considered "obstructions" provided a minimum 6" lateral distance from sprinklers to side of truss/web member is maintained.
- FL-SA/RE and FL-SA/DS sprinklers may be installed directly on maximum nominal 2½" (DN65) pipe without the need for a "Sprig-up". For pipe larger than 2½" nominal, see NPFA 13 for Sprig requirements.
- Sprinklers shall be positioned away from obstructions a minimum distance of Four (4) times the maximum dimension of the obstruction (e.g. Ducts, pipe). This 4X requirement does not apply to truss web members provided the web members do not exceed 6" and the minimum lateral distance of 6" from sprinkler to side of member is maintained.

Obstruction criteria is otherwise grouped into three categories (See Figure 25, Figure 26 and Figure 27)

• Vertical Obstructions

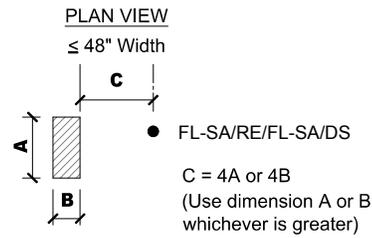
Those obstructions which run vertically through the attic. These may consist of fireplace flues, walls, vents, stacks, etc. These obstructions will typically run up to or penetrate the roof deck.

• Suspended Horizontal Obstructions

Those obstructions which are typically "suspended" within the attic space itself and run horizontally. These obstructions will have clearance over and under the obstruction to allow discharge of water around the obstruction. These obstructions may consist of ductwork; walkways; etc. Horizontal obstructions located within 1'-0" vertically of the bottom chords or ceiling joists are not considered "Suspended" Horizontal Obstructions.

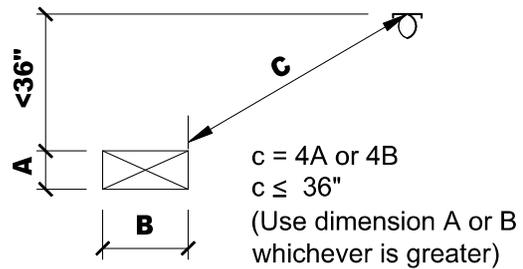
• Obstructions at Upper Deck

Those obstructions which are either attached directly to the roof deck or to the top chords/joists of the roof framing in a manner that little to no discharge of water can pass/clear the top of the obstruction. These obstructions can have an impact on the upper portion of the spray pattern from sprinklers.



Should the sprinkler not be able to be located a distance of 4X away from obstruction, an additional sprinkler must be installed on the opposite side of the obstruction within 1'-0" from the opposite side of the obstruction.

FIGURE 25: VERTICAL OBSTRUCTIONS
FL-SA/RE/FL-SA/DS SPRINKLERS



No additional sprinkler required below, if equal to or less than 48" suspended obstruction.

FIGURE 26A

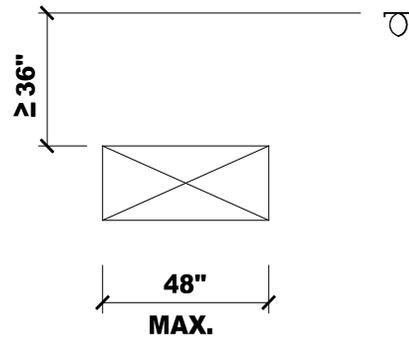
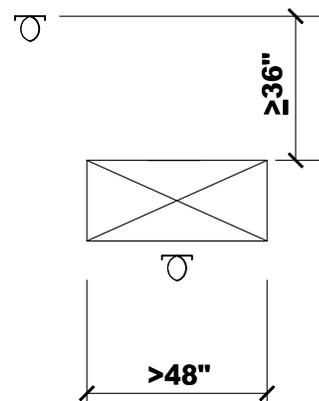


FIGURE 26B



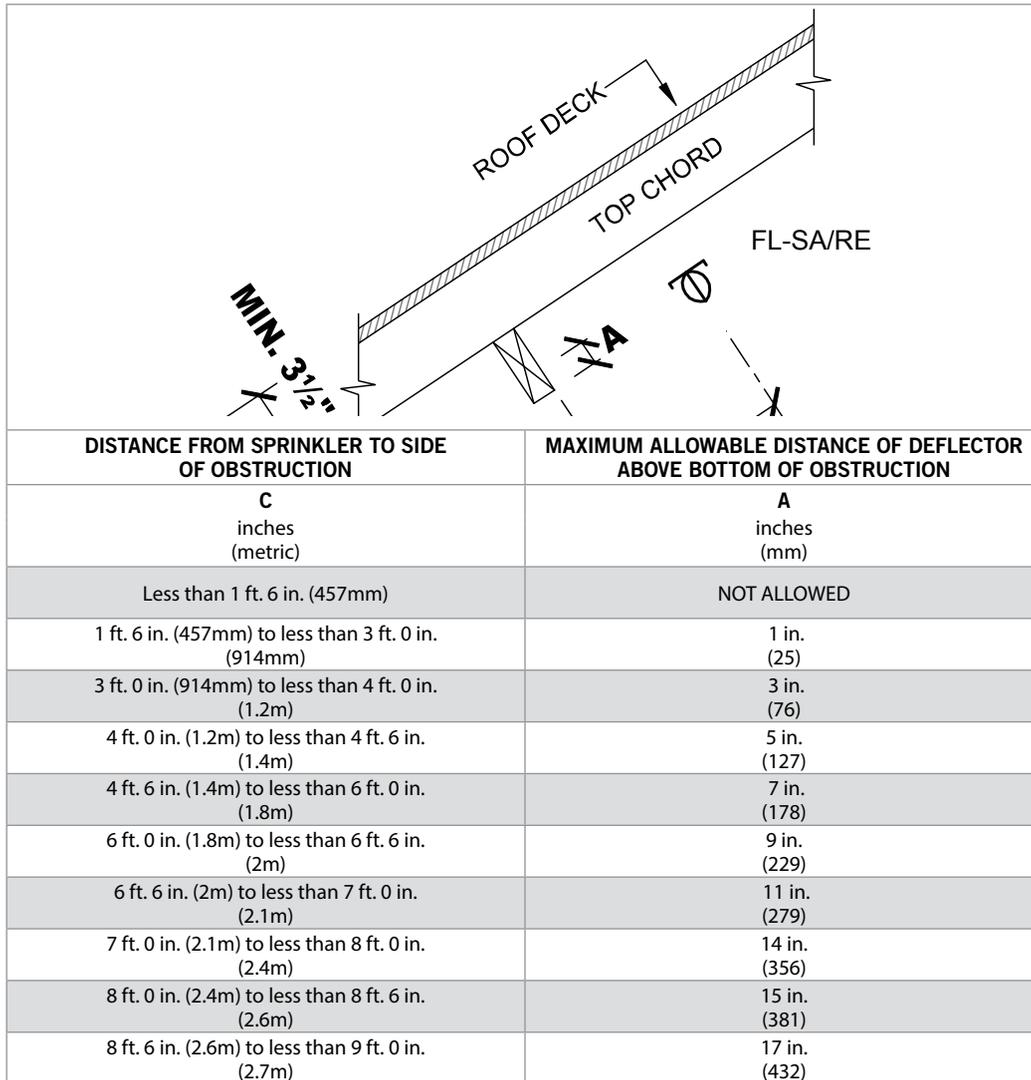
Additional sprinkler required below, if greater than 48" suspended obstruction.

FIGURE 26C

FIGURE 26:
SUSPENDED HORIZONTAL OBSTRUCTIONS
FL-SA/RE/FL-SA/DS SPRINKLERS

5.0 PERFORMANCE (CONTINUED)

Obstructions



*Minimum 3 1/2" clear space needed for unimpeded hot gas flow

FIGURE 27: OBSTRUCTIONS AT UPPER DECK FL-SA/RE SPRINKLER

5.0 PERFORMANCE (CONTINUED)

Obstructions

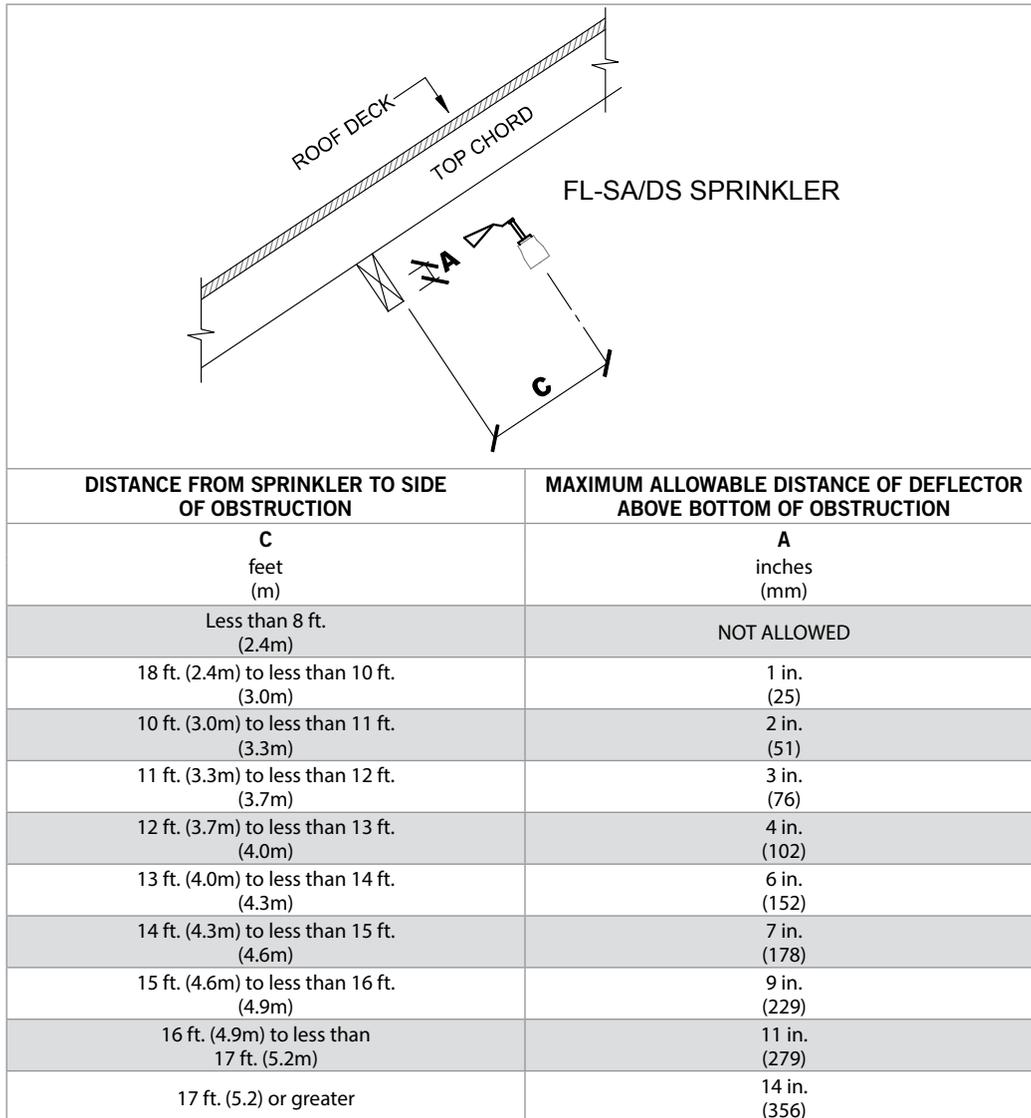


FIGURE 28: OBSTRUCTIONS AT UPPER DECK
FL-SA/DS SPRINKLER

5.0 PERFORMANCE (CONTINUED)

Obstructions

Piggyback Trusses

When trusses are stacked (“Piggyback”) at the peak, consideration to obstructions to the spray pattern of the RE sprinklers must be made. These “Piggyback” configurations will typically include 2X “Stiffeners” running perpendicular to the trusses. Additionally, these “stiffeners” will be sandwiched between the uppermost and lowermost horizontal chords of the two stacked trusses. In the event that all members are above the level of the FL-SA/RE deflector, no obstruction exists to the FL-SA/RE spray pattern. See Figure 29 and Figure 30.

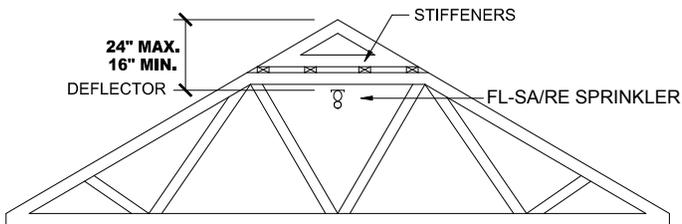


FIGURE 29: DEFLECTOR COMPLETELY BELOW STIFFENERS AND HORIZONTAL WEB MEMBERS (NO OBSTRUCTION)

In the event that the FL-SA/RE Deflector is located completely above the stiffeners and horizontal web members, the parameters of Figure 28 must be met for the spray pattern to be considered unobstructed.

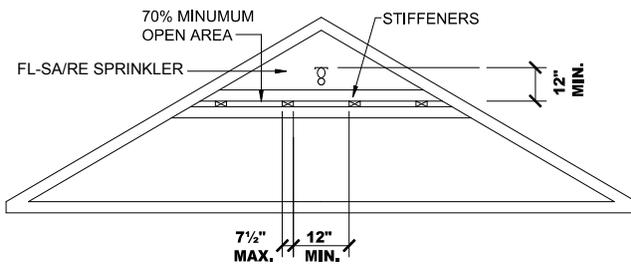


FIGURE 30: DEFLECTOR ABOVE STIFFENERS AND HORIZONTAL WEB MEMBERS (NO OBSTRUCTION)

5.0 PERFORMANCE (CONTINUED)

CPVC Guidelines

Use Of UI Listed CpvC Piping With Globe Specific Application Attic Sprinklers (Wet Systems Only)

UL Listed CPVC piping may be used in a combustible concealed attic space requiring sprinklers when installed in accordance with the following guidelines. For clarity, the following guidelines reference both "Ridgeline/ Downslope" areas as well as "Hip" areas. Refer to Figure 1 on page 1 for explanation of these areas.

Notice: For installations in accordance with Figure 31, where the use of non-combustible insulation is specified, verify with the insulation manufacturer as to the non-combustibility of the insulation. The non-combustible insulation (fiberglass) may be faced or unfaced. Where faced, the facing need not be non-combustible. The insulation is to have a flame spread index of not more than 25. Verify chemical compatibility of the insulation with the UL Listed CPVC by consulting the CPVC Manufacturer's literature.

CPVC At Bottom Chords To Feed Ceiling Sprinklers Below

UL Listed CPVC may be used to feed the wet system ceiling sprinklers on the floor below when adhering to the following guidelines: (See Figure 31)

- There must be 6 in. (152.4 mm) of non-combustible insulation covering the horizontal or vertical pipe extending 12 in. (304.8 mm) on each side away from the centerline of the pipe. Refer to Figure 29A.
- The area above the pipe must be protected with FL-SA/RE and FL-SA/DS Special Application Attic Sprinklers. If the pipe is located inside the ceiling joist, the joist channel must be covered or filled with 6 in. (152.4 mm) of non-combustible insulation on top of the pipe and the area above must be protected by FL-SA/RE and/or FL-SA/DS Sprinklers. Refer to Figure 29B. Insulation is for fire protection purposes. It is not freeze protection. CPVC must be installed in accordance with the CPVC Manufacturer's installation guide instructions.

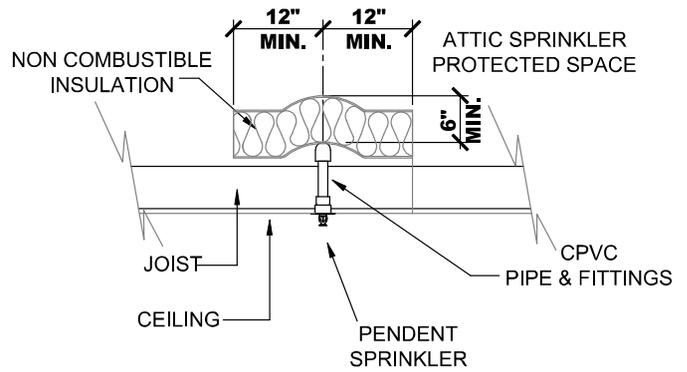


FIGURE 31A

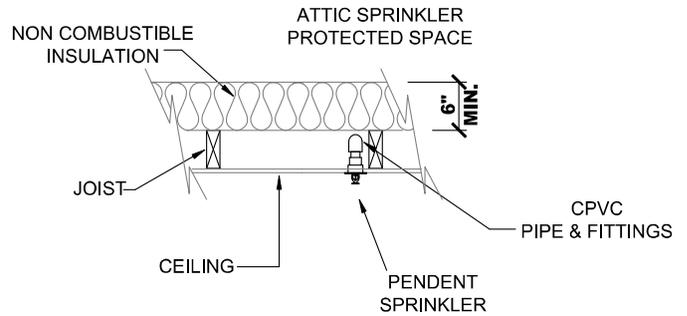


FIGURE 31B

FIGURE 31: NON-COMBUSTIBLE INSULATION FOR THE PROTECTION OF CPVC PIPE

5.0 PERFORMANCE (CONTINUED)

CPVC Guidelines

Use of UL Listed CPVC Piping with Specific Application Attic Sprinklers (Wet Systems Only)

CPVC at Ridgeline/Downslope Areas Only

UL Listed CPVC Pipe and Fittings may be used to feed the FL-SA/RE and FL-SA/DS sprinklers protecting the attic space when adhering to the following guidelines: (See Figure 32)

- Wet Systems only
- Risers are vertical and protected by FL-SA/RE or FL-SA/DS Sprinklers located at a maximum lateral distance of 12 in. (304.8 mm) from the riser centerline.
- FL-SA/RE or FL-SA/DS Sprinklers are directly mounted on the branchline.
- FL-SA/RE or FL-SA/DS Sprinklers are on arm-overs and located at a maximum lateral distance of 6 in. (152.4 mm) from the branchline centerline.
- FL-SA/RE or FL-SA/DS Sprinklers are on vertical sprigs attached to the branchline.

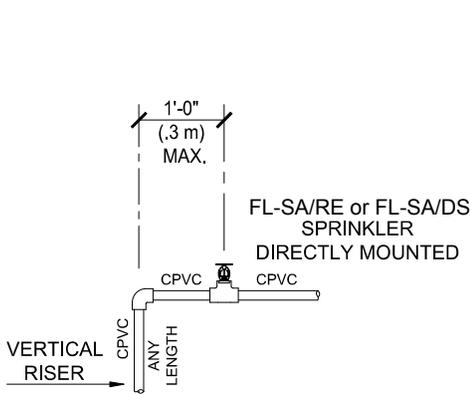


FIGURE 32A
VERTICAL RISER DIRECT MOUNT

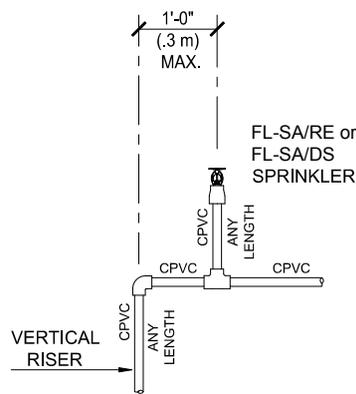


FIGURE 32B
VERTICAL RISER SPRIG UP

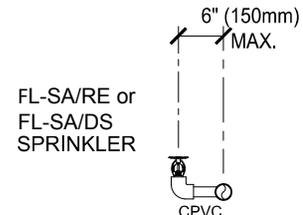


FIGURE 32C
DIRECT MOUNT
ARM-OVER

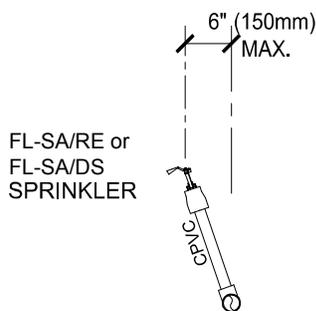


FIGURE 32D
ANGLED SPRIG

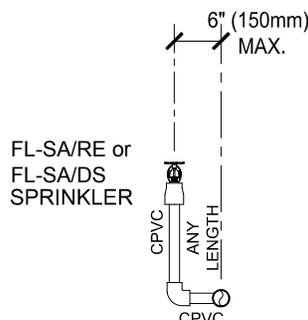


FIGURE 32E
ARM OVER SPRIG

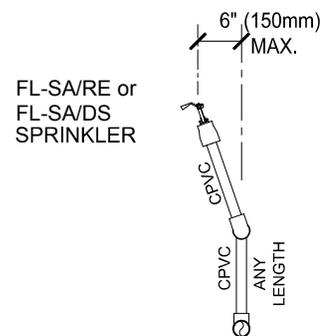


FIGURE 32F
VERTICAL SPRIG WITH
SWING JOINT

FIGURE 32: CPVC ALLOWANCE GUIDELINES
WET SYSTEMS ONLY
(DIRECTLY FEEDING FL-SA/RE / FL-SA/DS SPRINKLERS)

5.0 PERFORMANCE (CONTINUED)

CPVC Guidelines

CPVC at Hip Areas

Listed CPVC may be used to feed the FL-SA/RE and FL-SA/DS sprinklers protecting the Hip areas when adhering to the following guidelines:

- Wet systems only
- When the horizontal branchline piping feeding sprinklers within the hip roof areas is run over the bottom chords of the trusses, it shall be covered with a minimum of 6 in. (152.4 mm) in depth of non-combustible insulation (See Figure 34). This insulation must extend nominally 12 in. (304.8 mm) on each side away from the centerline of the CPVC branchline. Insulation is for fire protection purposes. It is not freeze protection.
- When the horizontal CPVC branchline piping feeding the sprinklers within the hip roof areas is located within the ceiling joist, the joist channel must be covered or filled with a minimum of 6 in (152.4 mm) depth of noncombustible insulation on top of the branchline feeding the sprigs (See Figure 33). Insulation is for fire protection purposes. It is not freeze protection.
- A minimum lateral distance of 18 in (450 mm) is maintained between the CPVC pipe and a heat producing device such as heat pumps, fan motors, and heat lamps.
- The sprinklers (RE or DS) may be fed by exposed vertical sprigs directly to a sprinkler or exposed angled sprigs directly to a sprinkler provided:
 - Vertical sprigs have no maximum exposed length, the RE or DS Sprinkler is located at a maximum lateral distance of 12 in (3304.8 mm) from the sprig centerline.
 - Angled sprigs with a maximum exposed length of 3 ft. (0.9 m).

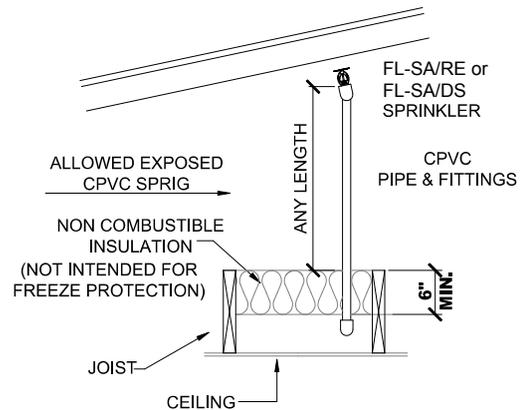


FIGURE 33A
VERTICAL SPRIG

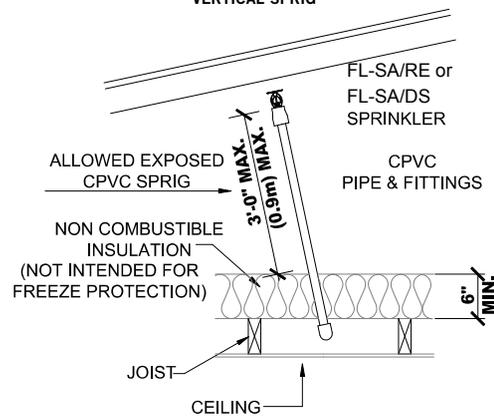


FIGURE 33B
ANGLED SPRIG
FIGURE 33: EXPOSED CPVC AT HIP ROOF AREAS
(HORIZONTAL BRANCHLINE WITHIN JOISTS)
WET SYSTEMS ONLY

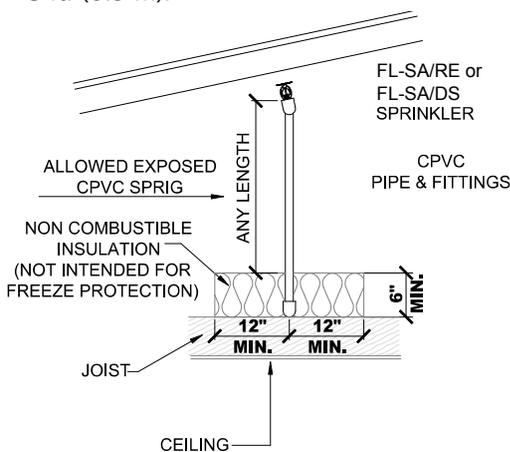


FIGURE 34A
VERTICAL SPRIG

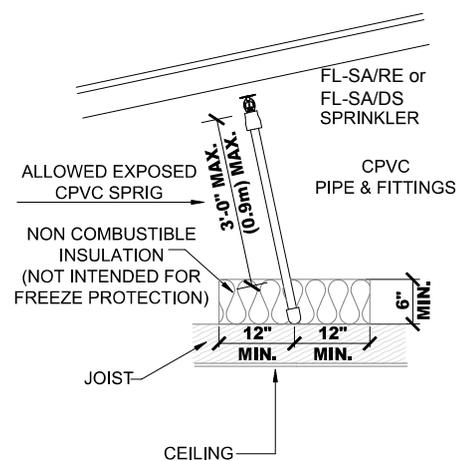


FIGURE 34B
ANGLED SPRIG

FIGURE 34: CPVC AT HIP ROOF AREAS
(HORIZONTAL BRANCHLINE OVER JOISTS)
WET SYSTEMS ONLY

6.0 NOTIFICATIONS

⚠ WARNING



- Read and understand all instructions before attempting to install any Victaulic products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

- These products shall be used only in fire protection systems that are designed and installed in accordance with current, applicable National Fire Protection Association (NFPA 13, 13D, 13R, etc.) standards, or equivalent standards, and in accordance with applicable building and fire codes. These standards and codes contain important information regarding protection of systems from freezing temperatures, corrosion, mechanical damage, etc.
- The installer shall understand the use of this product and why it was specified for the particular application.
- The installer shall understand common industry safety standards and potential consequences of improper product installation.
- It is the system designer's responsibility to verify suitability of materials for use with the intended fluid media within the piping system and external environment.
- The material specifier shall evaluate the effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on materials to confirm system life will be acceptable for the intended service.

Failure to follow installation requirements and local and national codes and standards could compromise system integrity or cause system failure, resulting in death or serious personal injury and property damage.

7.0 REFERENCE MATERIALS

Ratings: All glass bulbs are rated for temperatures from -67°F/-55°C.

User Responsibility for Product Selection and Suitability

Each user bears final responsibility for making a determination as to the suitability of Victaulic products for a particular end-use application, in accordance with industry standards and project specifications, and the applicable building codes and related regulations as well as Victaulic performance, maintenance, safety, and warning instructions. Nothing in this or any other document, nor any verbal recommendation, advice, or opinion from any Victaulic employee, shall be deemed to alter, vary, supersede, or waive any provision of Victaulic Company's standard conditions of sale, installation guide, or this disclaimer.

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Note

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

Installation

Reference should always be made to the Victaulic installation handbook or installation instructions of the product you are installing. Handbooks are included with each shipment of Victaulic products, providing complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

Warranty

Refer to the Warranty section of the current Price List or contact Victaulic for details.

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