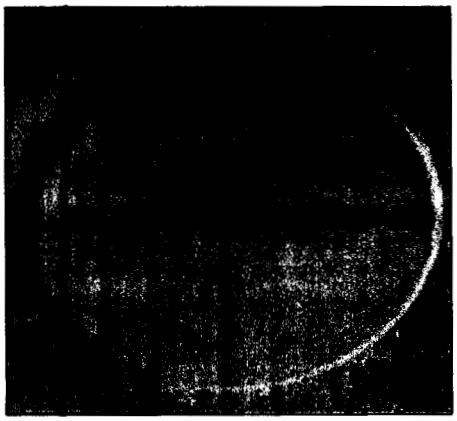
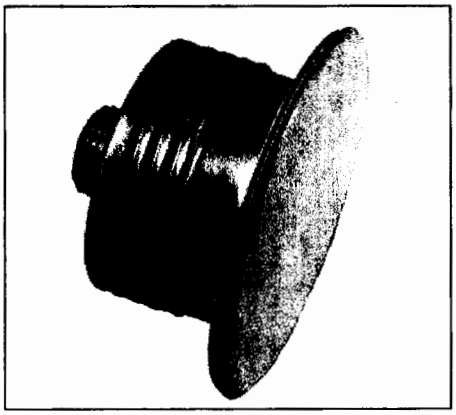
Bulletin 006 Rev. E

Reliable®

Model RFC43 (SIN RA0612) Model RFC49 (SIN RA0616) Residential Flat Concealed Sprinklers

A Residential Flat Concealed Sprinkler engineered for a minimum design density of 0.05 gpm/ft² with low GPM requirements.





Features

1. Very low water flow requirements.
2. ½" (13mm) Total adjustment.
3. Thread-On/Thread-Off or Push-On/Thread Off cover attachment option.
4. Smooth aesthetic ceiling profile.
5. Available in brass, chrome and black plated or painted finishes.

Listings & Approval

1. Listed by Underwriters Laboratories, and certified by UL for Canada (cULus)
2. NYC MEA 258-93-E

UL Listing Categories

Residential Automatic Sprinklers

UL Guide Number

VKKW

Product Description

Model RFC43 and RFC49 Concealed Residential Sprinklers are fast response residential fusible solder link automatic sprinklers. Residential sprinklers differ from standard sprinklers primarily in their response time and water distribution patterns.

Model RFC43 and RFC49 sprinklers discharge water in a hemispherical pattern below the sprinkler deflector. Residential distribution patterns are higher and generally contain a finer droplet size than standard sprinkler patterns.

The combination of speed of operation and high discharge pattern required for residential sprinklers has demonstrated, in fire testing, an ability for controlling residential fires, and thereby providing significant evacuation time for occupants.

The RFC43 and RFC49 Sprinklers provide the best form of fire protection by combining an attractive appearance and ½" (13mm) of cover adjustment for ease of installation. The small diameter cover plate is easily and positively attached and blends into the ceiling, concealing the most dependable fire protection available, an automatic sprinkler system.

The RFC43 and RFC49 are UL Listed Residential Sprinklers to be installed in the residential portions of any occupancy in accordance with NFPA 13, 13R, & 13D.

The RFC43 and RFC49 can reduce the need for precise cutting of drop nipples. The threaded cover plate assembly can be adjusted without tools to fit accurately against the ceiling. The fire protection system need not be shut down to adjust or remove the cover plate assembly.

Application and Installation

The RFC43 and RFC49, for residential installations, use a 165°F (74°C) fusible solder link in a tuning fork style sprinkler frame with a drop-down deflector. This assembly is recessed into the ceiling and concealed by a flat cover plate. The cover plate is attached to the skirt, using 135°F (57°C) ordinary temperature classification solder. When the ceil-

ing temperature rises, the solder holding the cover plate releases the cover allowing the deflector to drop into position and exposing the sprinkler inside to ceiling temperature. The subsequent operation of the solder link opens the waterway and causes the deflector to drop into position to distribute the discharging water in a hemispherical pattern below the sprinkler deflector. Any adjustment of thread engagement between the cover plate and cup will assure that the drop-down deflector is properly located below the ceiling. The residential distribution pattern contains a finer droplet size than a standard sprinkler, and the pattern produces significantly higher wall wetting.

After a 2⅝ inch diameter hole is cut in the ceiling, the sprinkler is to be installed with the Model FC Wrench. When installing a sprinkler, the wrench is first positioned into the sprinkler/cup assembly and around the hexagonal body of the sprinkler frame. The Wrench must bottom out against the cup in order to ensure proper, safe installation. The sprinkler is then tightened into the pipe fitting. When inserting or removing the wrench from the sprinkler/cup assembly, care should be taken to prevent damage to the sprinkler. DO NOT WRENCH ON ANY OTHER PART OF THE SPRINKLER/CUP ASSEMBLY. MODEL RFC43 AND RFC49 CONCEALED SPRINKLERS MUST BE INSTALLED ONLY WITH 135°F RATED COVERS.

Note: A leak tight ½" NPT (R1/2) sprinkler joint can be obtained with a torque of 8-18 ft-lbs (10,8 - 24,4 N-m). Do not tighten sprinklers over maximum recommended torque. It may cause leakage or impairment of the sprinklers.

Cover assemblies provide up to ½" (13mm) of adjustment. Turn the cover clockwise until the flange is in contact with the ceiling. For the push-on/thread-off option, the cover assembly is pushed onto the cup and final adjustment is made by turning the cover clockwise until the skirt flange makes full contact with the ceiling. Cover removal requires turning in the counter-clockwise direction.

In ceilings that have a plenum space above the sprinkler, the plenum space may have neutral or negative pressurization but must not be positively pressurized. Inspect all sprinklers after installation to ensure that the gap between the cover plate and ceiling and the 4 slots in the cup are all open and free from any air flow impediment.

Temperature Rating

Sprinkler	Cover Plate	Max. Ambient Temp.
165°F/74°C	135°F/57°C	100°F/38°C

Installation Data: RFC43 (SIN RA0612)

Thread Size inch (mm)	K Factor	Sprinkler Spacing ft. (m)	Maximum Distance to Wall ft. (m)	Minimum Distance between sprinklers ft. (m)	Minimum Required Sprinkler Discharge	
					Flow gpm (Lpm)	Press. psi (bar)
½" (15mm)	4.3	12 x 12 (3.6x3.6)	6 (1.83)	8 (2.43)	12 (45)	7.8 (0.54)
½" (15mm)	4.3	14 x 14 (4.3x4.3)	7 (2.13)	8 (2.43)	13 (49)	9.1 (0.63)
½" (15mm)	4.3	16 x 16 (4.9x4.9)	8 (2.43)	8 (2.43)	13 (49)	9.1 (0.63)
½" (15mm)	4.3	18 x 18 (5.5x5.5)	9 (2.74)	8 (2.43)	18 (68)	17.5 (1.21)
½" (15mm)	4.3	20 x 20 (6.0x6.0)	10 (3.05)	8 (2.43)	21 (79)	23.8 (1.64)

Note: 1 bar = 100 Kpa

Installation Data: RFC49 (RA0616)

Thread Size inch (mm)	K Factor	Sprinkler Spacing ft. (m)	Maximum Distance to Wall ft. (m)	Minimum Distance between sprinklers ft. (m)	Minimum Required Sprinkler Discharge	
					Flow gpm (Lpm)	Press. psi (bar)
½" (15mm)	4.9	12 x 12 (3.6x3.6)	6 (1.83)	8 (2.43)	13 (49)	7.0 (0.48)
½" (15mm)	4.9	14 x 14 (4.3x4.3)	7 (2.13)	8 (2.43)	13 (49)	7.0 (0.48)
½" (15mm)	4.9	16 x 16 (4.9x4.9)	8 (2.43)	8 (2.43)	13 (49)	7.0 (0.48)
½" (15mm)	4.9	18 x 18 (5.5x5.5)	9 (2.74)	8 (2.43)	17 (64.3)	12.0 (0.83)
½" (15mm)	4.9	20 x 20 (6.0x6.0)	10 (3.05)	8 (2.43)	20 (75.7)	16.7 (1.14)

Note: 1 bar = 100 Kpa

FOR SLOPED CEILING APPLICATIONS SEE RASCO BULLETIN 035.

Maintenance

Model RFC43 and RFC49 Concealed Sprinklers should be inspected quarterly and the sprinkler system maintained in accordance with NFPA 25. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove any sprinkler cover plate assembly 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 until used to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

Model RFC43 and RFC49 Residential Concealed Sprinkler Specification

Sprinklers shall be cULus Listed low flow residential concealed sprinklers with drop-down deflector and adjustable flat cover plate engineered for a minimum design density of 0.05 gpm/ft². Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Thermal element shall consist of an approved black-painted beryllium-nickel fusible solder link with symmetric lever mechanism, maintaining a Teflon-coated Belleville spring washer and machined brass cap water seal assembly containing no plastic parts. Sprinkler K-factor shall be nominal 4.3 (62.4), having a 7/16" orifice. Temperature rating shall be Ordinary 165°F (74°C); cover plate temperature rating to be 135°F (57°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange allowing a ½" cover plate adjustment. Any secure engagement between the cover plate and the cup will assure that the drop-down deflector is properly located below the ceiling. A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the drop-down sprinkler deflector from damage, which could occur during construction before the cover plate is installed. Standard cover finish: [Chrome] [White] [Specialty – specify]. Residential concealed sprinklers shall be Reliable Model RFC43, SIN RA0612 (Bulletin 006) or Model RFC49, SIN RA0616 (Bulletin 006).

Ordering Information

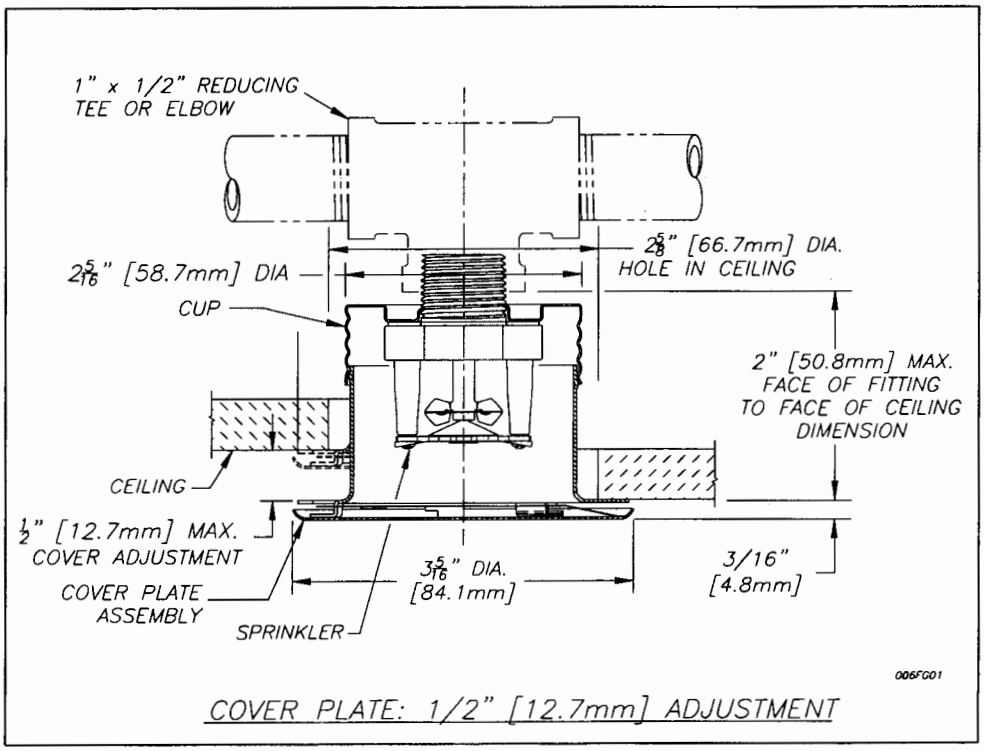
Specify:

1. Sprinkler Model
2. Cover Plate Finish
3. Thread-On or Push-On Feature

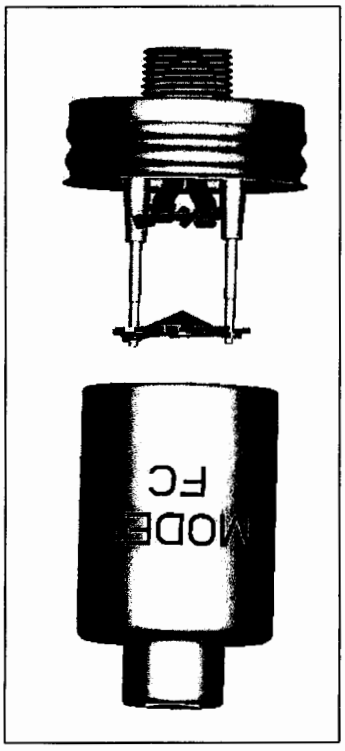
Cover Plate Finishes [1]

Standard Finishes
Chrome White
Special Application Finishes
Bright Brass Black Plating Black Paint Off White Satin Chrome

[1] Other colors and finishes available. Consult factory for details.
Note: Paint or any other coatings applied over the factory finish will void all approvals and warranties.



COVER PLATE: 1/2" [12.7mm] ADJUSTMENT



Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gaugesIdentification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest published Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable. Productsmanufactured and distributed by Reliable have been protecting life and property for over 90 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by

Reliable®

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Recycled Paper

Revision lines indicate updated or new data.

EG. Printed in U.S.A 04/10 P/N 9999970261

Reliable®

Model F1 Residential Sprinklers for Design Density of .05 gpm/ft²

Bulletin 135 Rev. H

Model F1 Res Sprinklers engineered for the lowest flows to meet the minimum design density of .05 gpm/ft²

Types:

1. F1 Res 30 Pendent
2. F1 Res 30 Recessed Pendent/F2
3. F1 Res 30 Recessed Pendent/FP
4. F1 Res 49 Pendent
5. F1 Res 49 Recessed Pendent/F1
6. F1 Res 49 Recessed Pendent/FP
7. F1 Res 58 Pendent
8. F1 Res 58 Recessed Pendent/F1
9. F1 Res 58 Recessed Pendent/FP
10. F1 Res 76 Pendent
11. F1 Res 76 Recessed Pendent/F1
12. F1 Res 76 Recessed Pendent/FP
13. F1 Res 30 CCP Pendent
14. F1 Res 49 CCP Pendent
15. F1 Res 58 CCP Pendent
16. F1 Res 76 CCP Pendent
17. F1 Res 44 HSW
18. F1 Res 44 Recessed HSW/F2
19. F1 Res 58 HSW
20. F1 Res 58 HSW Recessed HSW/F2
21. F1 Res 44 SWC

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)
2. NYC MEA 258-93-E

Slope Ceiling Approvals: Refer to Bulletin 035

Sprinklers for .10 Density: Refer to Bulletin 176

UL Listing Category

Residential Automatic Sprinkler

UL Guide Number

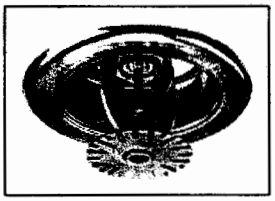
VKKW

Patents

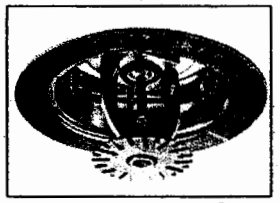
US Patent No. 6,516,893 applies to the Model F1 Res 49 & 58 Pendent Sprinklers

Product Description

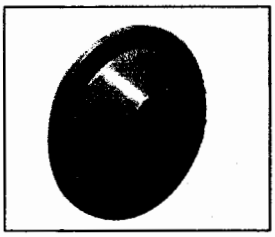
Model F1 Res Pendent sprinklers (Figs. 1, 2, 3, & 4) are fast response sprinklers combining excellent durability, high sensitivity glass-bulb and low profile decorative design. The F1 Res Horizontal Sidewall sprinklers (Figs. 5, 6 & 7) are equally attractive when above ceiling piping cannot be used.



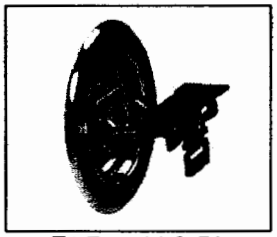
F1 Res 30, 49, 58 & 76 Recessed Pendent / F1



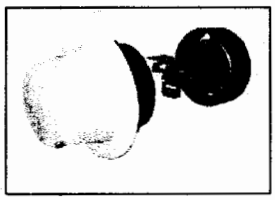
F1 Res 30, 49, 58 & 76 Recessed Pendent / FP



F1 Res 30, 49, 58 & 76 CCP Pendent



F1 Res 44 & 58 Recessed HSW/F2



F1 Res 44 SWC

The 3mm glass-bulb pendent sprinklers permit the efficient use of residential water supplies for sprinkler coverage in residential fire protection design.

The low flow F1 Res sprinklers are specially engineered for fast thermal response to meet the sensitive fire protection application needs of the latest residential market standards (UL 1626 Standard). Upon fire conditions, rising heat causes a sprinkler's heat-sensitive glass-bulb to shatter, releasing the waterway for water flow onto the deflector, evenly distributing the discharged water to control a fire.

Technical Data:

- Thermal Sensor: Nominal 3mm glass-bulb
- Sprinkler Frame : Brass Casting
- Sprinklers' Pressure Rating : 175 psi
  Factory Hydrostatically Tested to 500 psi
- Thread Size: ½" NPT (R½)
- K-Factor: 3.0 (Actual) - F1 Res 30 Pendent Sprinkler
  4.9 (Actual) - F1 Res 49 Pendent Sprinkler
  5.8 (Actual) - F1 Res 58 Pendent & HSW Sprinkler
  7.6 (Actual) - F1 Res 76 Pendent Sprinkler
  4.4 (Actual) - F1 Res 44 HSW Sprinkler
- Density: Minimum 0.05 gpm/ft²

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

Application

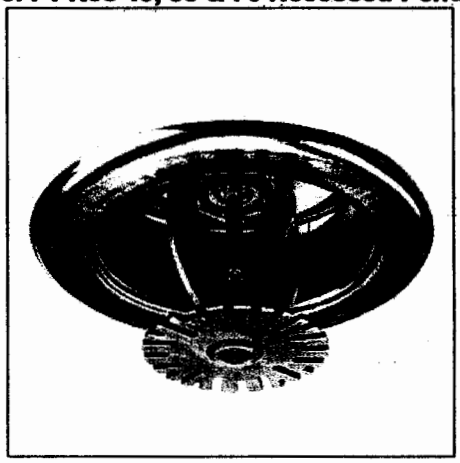
Model F1 Res Sprinklers are used for Residential Fire Protection according to UL 1626 Standard*. Be sure that orifice size, temperature rating, deflector style and sprinkler type are in accordance with the latest published standards of The National Fire Protection Association or the approving authority having jurisdiction.

Installation

Models F1 Res sprinklers are to be installed as shown. Model F1, F2 and FP Escutcheons, illustrated herewith, are the only recessed escutcheons to be used with Model F1 Res sprinklers. Use of any other recessed escutcheon will void all approvals and warranties. For installing Model F1 Res Pendent sprinklers use only the Model D sprinkler

- **Model F1 Res 30, 49, 58 & 76 Pendent**

- **Model F1 Res 30 Recessed Pendent / F2**
- **Model F1 Res 49, 58 & 76 Recessed Pendent / F1**



F1 escutcheon, 3/4" (19mm) adjustment

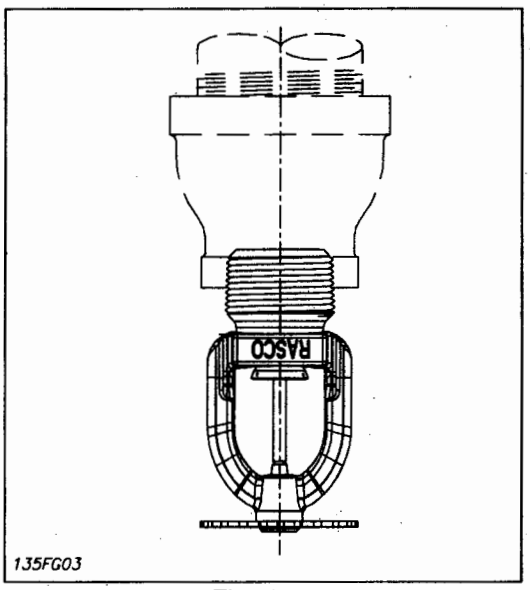


Fig. 1

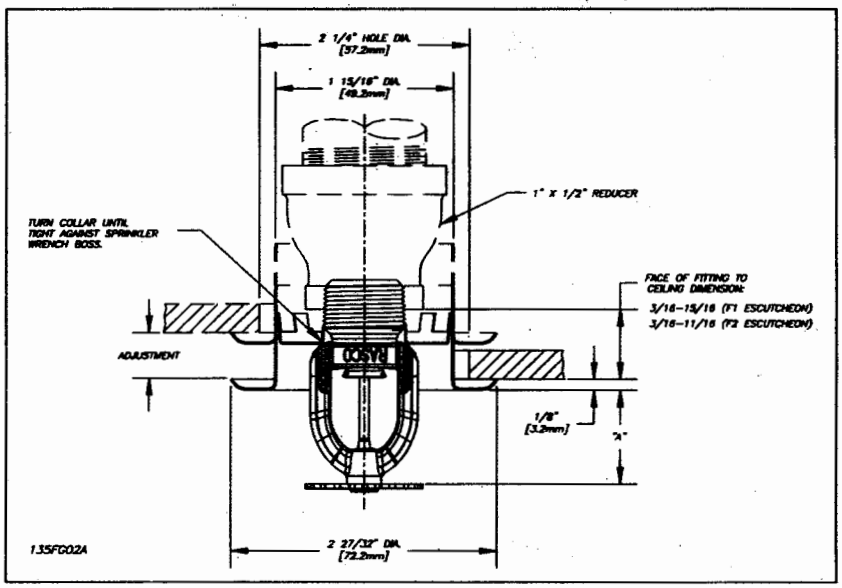


Fig. 2

Wrench; for installing Models F1 Res Recessed Pendent, CCP & SWC sprinklers use only the Model GFR2 sprinkler wrench; for installing Model F1 Res Recessed HSW sprinklers use only the Model GFR2 Sprinkler Wrench. Use of wrenches other than those specified may damage these sprinklers. Install F1 Res 44 with a ceiling to deflector distance of 4" - 12". Flow arrow on deflector must point away from near wall and "Top" marking must face ceiling.

Escutcheon*, F1 or F2, Data:

Type	Adjustment Inch (mm)	"A" Inch (mm)	Face of fitting to ceiling Inch (mm)
F1	3/4 (19.0)	Min.=3/4" (19.1) Max.=1 1/2" (38.1)	3/16 - 15/16 (4.7 - 24.0)
F2	1/2 (12.7)	Min.=15/16" (23.8) Max.=1 1/2" (38.1)	3/16 - 11/16 (4.7 - 17.4)

* **Note:** Escutcheons F1 or F2 may be used with Model F1 Res 49, 58 & 76 Recessed Pendent Sprinkler

Technical Data: F1Res 30 Pendent and Recessed Pendent

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	Actual K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	21/64" (8.2)	155 175	68 79	175 (12)	100	38	3.0	2.25 (57)

Deflector - to - ceiling
Maximum 1" (25mm) to 4" (100mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	8 (30.3)	7.0 (0,48)	R3511
14 x 14 (4,3 x 4,3)	10 (37.8)	11 (0,76)	

Technical Data: F1Res 49 Pendent and Recessed Pendent.

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	Actual K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	7/16" (11)	155 175	68 79	175 (12)	100 150	38 66	4.9	2.25 (57)

Deflector - to - ceiling
Maximum 1" (25mm) to 4" (100mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	13 (49)	7.0 (0,48)	R3516
14 x 14 (4,3 x 4,3)	13 (49)	7.0 (0,48)	
16 x 16 (4,9 x 4,9)	13 (49)	7.0 (0,48)	
18 x 18 (5,5 x 5,5)	17 (64.3)	12.0 (0,83)	
20 x 20 (6,1 x 6,1)	20 (75.7)	16.7 (1,14)	

Deflector - to - ceiling
Maximum 4" (100mm) to 8" (203mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	15 (57)	9.4 (0,65)	R3516
14 x 14 (4,3 x 4,3)	16 (60.5)	10.6 (0,73)	
16 x 16 (4,9 x 4,9)	17 (64.3)	12.0 (0,83)	
18 x 18 (5,5 x 5,5)	19 (72)	15.0 (1,0)	
20 x 20 (6,1 x 6,1)	22 (83.2)	20.2 (1,4)	

***Note:** The F1 Res 49 pendent and recessed pendent residential sprinklers can be installed per NFPA 13 in beamed ceilings meeting the following criteria:

1. Maximum beam depth = 7" (178mm)
2. Beam spacing at or greater than 7.5 ft. (2.3m) on center.

Technical Data: F1Res 58 Pendent and Recessed Pendent.

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	Actual K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	½" (13)	155 175	68 79	175 (12)	100 150	38 66	5.8	2.25 (57)

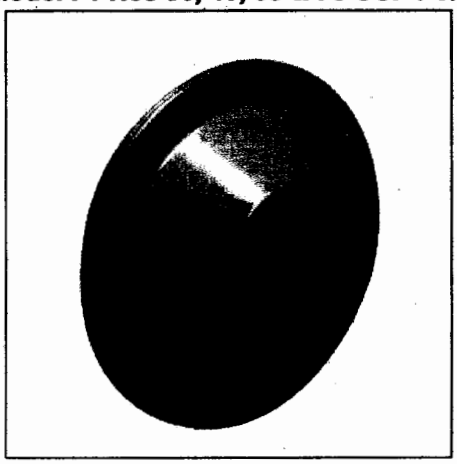
Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Ceiling -to- Deflector Inch (mm)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	16 (61)	7.6 (0,53)	1- 4 (25 - 100)	R3513
14 x 14 (4,3 x 4,3)	16 (61)	7.6 (0,53)		
16 x 16 (4,9 x 4,9)	16 (61)	7.6 (0,53)		
18 x 18 (5,5 x 5,5)	19 (72)	10.8 (0,75)		
20 x 20 (6,1 x 6,1)	22 (83.3)	14.4 (1,0)		

Technical Data: F1 Res 76 Pendent and Recessed Pendent

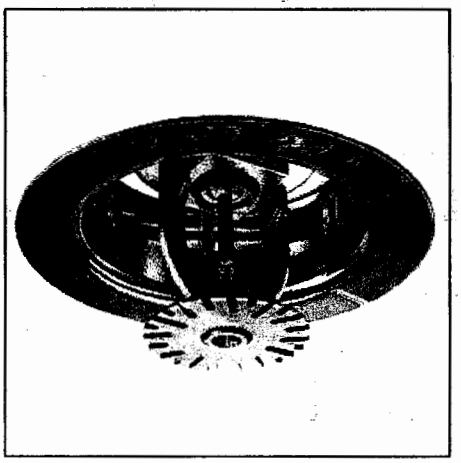
Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
¾" NPT (R½)	17/32" (13.5)	155 175	68 79	175 (12)	100 150	38 66	7.6	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	21 (79.5)	7.6 (0,53)	R7618
14 x 14 (4,3 x 4,3)	21 (79.5)	7.6 (0,53)	
16 x 16 (4,9 x 4,9)	21 (79.5)	7.6 (0,53)	
18 x 18 (5,5 x 5,5)	21 (79.5)	7.6 (0,53)	
20 x 20 (6,1 x 6,1)	23 (87.1)	9.2 (0,63)	

- **Model F1 Res 30, 49, 58 & 76 CCP Pendent**



- **Model F1 Res 30, 49, 58 & 76 Recessed Pendent / FP**



FP push-on/thread-off escutcheon

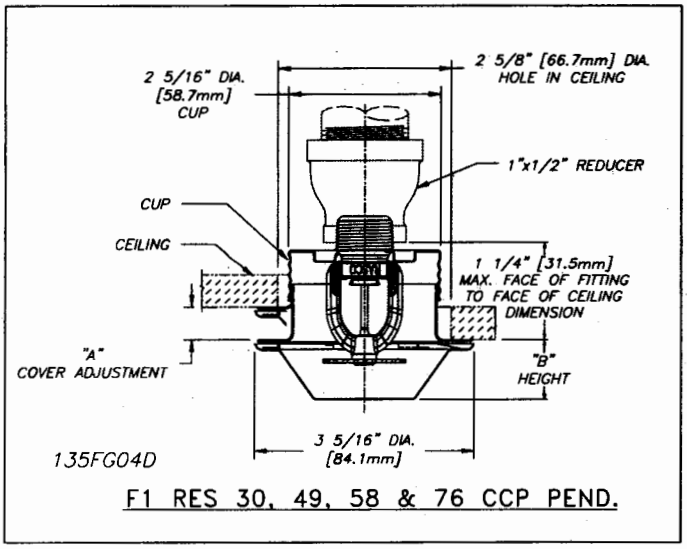


Fig. 3

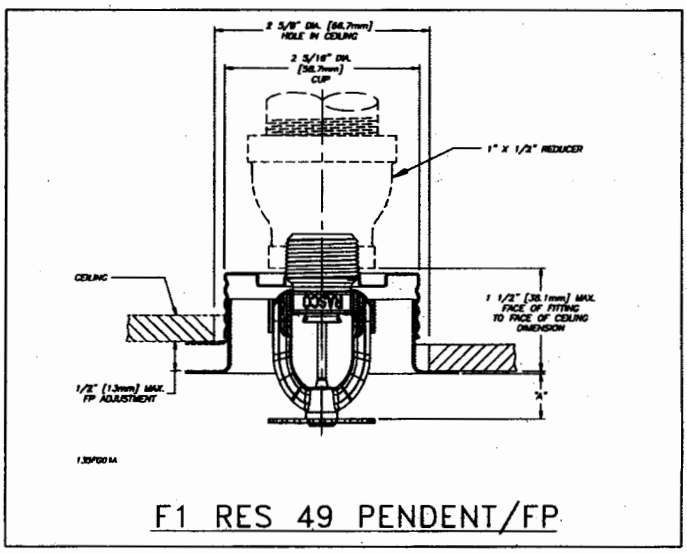


Fig. 4

Note: The F1 Res 76 will use a 1" x ¾" reducer.

Technical Data: F1Res 30 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	21/64" (8.2)	155	68	135	57	175 (12)	100	38	3.0	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	8 (30.3)	7.0 (0,48)	R3511
14 x 14 (4,3 x 4,3)	11 (41.6)	13.4 (0,92)	

Technical Data: F1Res 49 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	7/16" (11)	155	68	135	57	175 (12)	100	38	4.9	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	13 (49)	7.0 (0,48)	R3516
14 x 14 (4,3 x 4,3)	13 (49)	7.0 (0,48)	
16 x 16 (4,9 x 4,9)	14 (53)	8.2 (0,56)	
18 x 18 (5,5 x 5,5)	18 (68.1)	13.5 (0,93)	
20 x 20 (6,1 x 6,1)	20 (75.7)	16.7 (1,14)	

CCP Options Data:

"A" Cover Adjustment Inch (mm)	"B" CCP Height Inch (mm)
1/2 (12.7)	15/16 (24)
5/16 (7.9)	3/4 (19)

FP Data "A":

FP Position	"A" Inch (mm)
Max. Recessed	7/16 (11)
Min. Recessed	15/16 (24)

Note: Sprinklers shown in Fig. 3 and Fig. 4 are not suitable for installation in ceilings which have positive pressure in the space above.

Technical Data: F1Res 58 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	1/2" (13)	155	68	135	57	175 (12)	100	38	5.8	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	16 (61)	7.6 (0,53)	R3513
14 x 14 (4,3 x 4,3)	16 (61)	7.6 (0,53)	
16 x 16 (4,9 x 4,9)	16 (61)	7.6 (0,53)	
18 x 18 (5,5 x 5,5)	19 (72)	10.8 (0,75)	
20 x 20 (6,1 x 6,1)	22 (83.3)	14.4 (1,0)	

Technical Data: F1Res 76 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
3/4" NPT (R3/4)	17/32" (13.5)	155 175	68 79	135	57	175 (12)	100 150	38 66	7.6	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	21 (79.5)	7.6 (0,53)	R7618
14 x 14 (4,3 x 4,3)	21 (79.5)	7.6 (0,53)	
16 x 16 (4,9 x 4,9)	21 (79.5)	7.6 (0,53)	
18 x 18 (5,5 x 5,5)	22 (83.3)	8.4 (0,58)	
20 x 20 (6,1 x 6,1)	25 (94.6)	10.8 (0,74)	

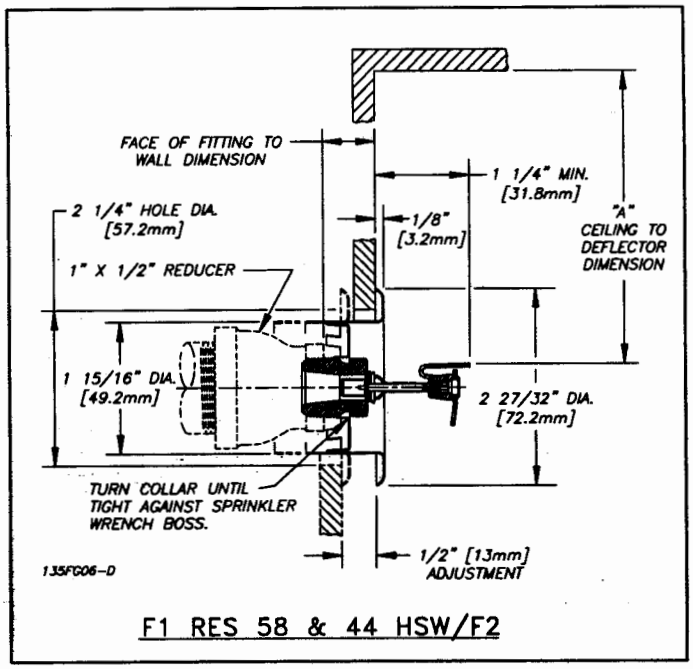
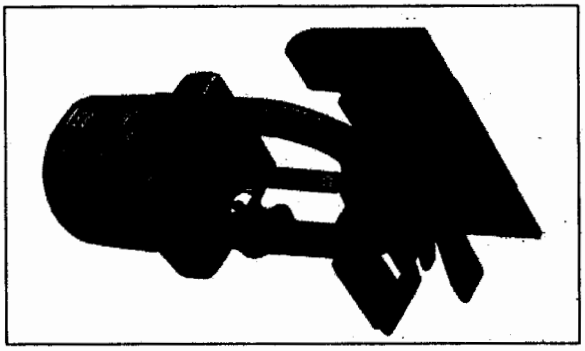
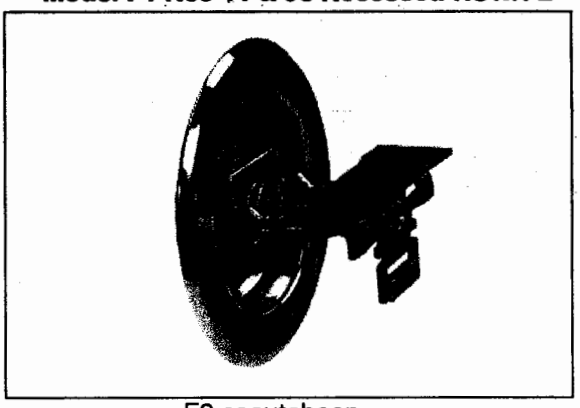


Fig. 5

- **Model F1 Res 44 & 58 HSW**



- **Model F1 Res 44 & 58 Recessed HSW/F2**



F2 escutcheon,
1/2" (13mm) adjustment

Technical Data: F1Res 44 HSW & HSW/F2

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	3/8" (10)	155 175	68 79	175 (12)	100 150	38 66	4.4	2.45 (62)

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	½ (13)	3/16 - 11/16 (4.7 - 17.4)

Max. Sprinkler Spacing ft (m)	"A" Ceiling to Deflector Inch (mm)	Sprinkler Temp. Rating °F (°C)		Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	4 - 6 (101 - 152)	155 (68)	175 (79)	12 (45,4)	7.5 (0,52)	R3531
14 x 14 (4,3 x 4,3)		155 (68)	175 (79)	14 (53,0)	10.2 (0,71)	
16 x 16 (4,9 x 4,9)		155 (68)	175 (79)	16 (60,6)	13.3 (0,92)	
16 x 18 (4,9 x 5,5)		155 (68)	175 (79)	18 (68,1)	16.8 (1,16)	
18 x 18 (5,5 x 5,5)		155 (68)	175 (79)	19 (72,0)	18.7 (1,29)	
16 x 20 (4,9 x 6,1)		155 (68)	175 (79)	23 (87,1)	27.4 (1,89)	
12 x 12 (3,6 x 3,6)	6 - 12 (152 - 305)	155 (68)	175 (79)	14 (53,0)	10.2 (0,71)	
14 x 14 (4,3 x 4,3)		155 (68)	175 (79)	16 (60,6)	13.3 (0,92)	
16 x 16 (4,9 x 4,9)		155 (68)	175 (79)	17 (64,4)	15.0 (1,04)	
16 x 18 (4,9 x 5,5)		155 (68)	175 (79)	20 (75,7)	20.7 (1,43)	
16 x 20 (4,9 x 6,1)		155 (68)	175 (79)	23 (87,1)	27.4 (1,89)	

Technical Data: F1Res 58 HSW & HSW/F2

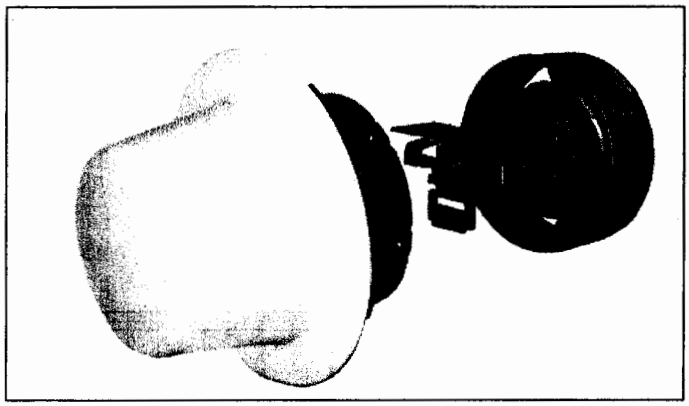
Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	½" (13)	155 175	68 79	175 (12)	100 150	38 66	5.8	2.45 (62)

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	½ (13)	3/16 - 11/16 (4.7 - 17.4)

Max. Sprinkler Spacing ft (m)	"A" Ceiling to Deflector Inch (mm)	Sprinkler Temp. Rating °F (°C)		Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	4 - 6 (101 - 152)	155 (68)	175 (79)	16 (60,6)	7.6 (0,53)	R3533
14 x 14 (4,3 x 4,3)		155 (68)	175 (79)	18 (68,2)	9.7 (0,67)	
16 x 16 (4,9 x 4,9)		155 (68)	175 (79)	21 (79,5)	13.2 (0,91)	
16 x 18 (4,9 x 5,5)		155 (68)	175 (79)	25 (94,7)	18.6 (1,28)	
16 x 20 (4,9 x 6,1)		155 (68)	175 (79)	29 (109,8)	25 (1,73)	
12 x 12 (3,6 x 3,6)	6 - 12 (152 - 305)	155 (68)	175 (79)	22 (83,3)	14.4 (1,0)	
14 x 14 (4,3 x 4,3)		155 (68)	175 (79)	22 (83,3)	14.4 (1,0)	
16 x 16 (4,9 x 4,9)		155 (68)	175 (79)	26 (98,4)	20.1 (1,39)	
16 x 18 (4,9 x 5,5)		155 (68)	175 (79)	31 (117,4)	28.6 (1,97)	

- **Model F1 Res 44 SWC**



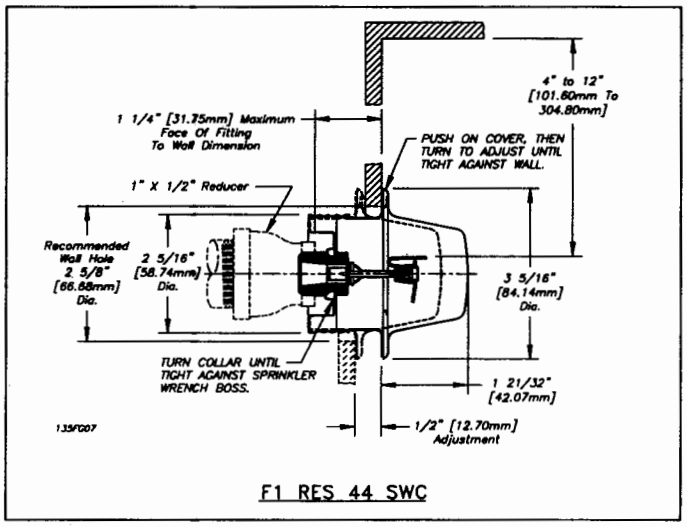


Fig. 6

Technical Data: F1Res 44 SWC

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Cover Temp. Rating °F	Cover Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	3/8" (10)	155	68	135	57	175 (12)	100	38	4.4	2.45 (62)

Max. Sprinkler Spacing ft (m)	"A" Ceiling to Deflector Inch (mm)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3,6 x 3,6)	4 - 6 (101 - 152)	13 (49,2)	8.7 (0,60)	R3531
14 x 14 (4,3 x 4,3)		14 (53,0)	10.2 (0,71)	
16 x 16 (4,9 x 4,9)		17 (64,3)	15.0 (1,1)	
16 x 18 (4,9 x 5,5)		19 (71,8)	18.7 (1,13)	
16 x 20 (4,9 x 6,1)		23 (87,1)	27.4 (1,89)	
12 x 12 (3,6 x 3,6)	6 - 12 (152 - 305)	14 (52,9)	10.2 (0,71)	
14 x 14 (4,3 x 4,3)		15 (56,7)	11.7 (0,81)	
16 x 16 (4,9 x 4,9)		18 (68,1)	16.8 (1,16)	
16 x 18 (4,9 x 5,5)		20 (75,6)	20.7 (1,43)	

Maintenance

Model F1 Res 30, 49, F1 Res 58, F1 Res 76 and F1 Res 44 Sprinklers should be inspected quarterly, and the sprinkler system maintained in accordance with NFPA 25, 13, 13D, and 13R. Do not clean sprinkler with soap and water, Ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove 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 remain in the original cartons and packaging until used. This will minimize the potential for damage to sprinklers that could cause improper operation or non-operation.

Model F1 Res 30, 49 & 58 Pendent Sprinkler Specifications

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Deflector-to-ceiling distance listing shall be 1" to 8" maximum. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 3.0, 4.9 and 5.8. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential pendent sprinklers shall be Reliable Model F1 Res 30, 49 & 58, SIN R3511, R3516 & R3513 (Bulletin 135).

Model F1 Res 49 & 58 Recessed Pendent/F1, Model F1 Res 30, 49 & 58 Recessed Pendent/F2, Model F1 Res 30, 49 & 58 Recessed Pendent/FP

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential recessed pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Deflector-to-ceiling distance listing shall be 1" to 8" maximum. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 3.0, 4.9 & 5.8. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Recessed escutcheon assembly shall be a steel, two-piece escutcheon [with ½" adjustment (Model F2)] [with ¾" adjustment (Model F1)] [of push-on and thread off design with ½" adjustment (Model FP)]. Standard finish shall be [brass][bright chrome] [white painted]. Residential recessed pendent sprinklers shall be Reliable [Model F1 Res 30, 49 & 58 Recessed Pendent/F1] [Model F1 Res 30, 49 & 58 Recessed Pendent/F2] [Model F1 Res 30, 49 & 58 Recessed Pendent/FP] SIN R3511, R3516 & R3513 (Bulletin 135).

Model F1 Res 30, 49 & 58 CCP Pendent (Concealed)

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential concealed sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F (68°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange. Method of attaching the cover plate to the sprinkler cup shall be a push-on and thread-off design allowing a ½" cover plate adjustment. Cover plate temperature rating shall be 135°F (57°C). A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the sprinkler from damage, which could occur during construction before the cover plate is installed. Standard cover plate finish: [White] [Custom Color– specify].]. Concealed pendent sprinklers shall be Reliable Model F1 Res 30, 49 & 58 CCP, SIN R3511, R3516 & R3513 (Bulletin 135).

Model F1 Res 44 Horizontal Sidewall Residential Sprinkler Specifications

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential horizontal sidewall sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where horizontal sidewall residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 4.4 (62.8). Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential horizontal sidewall sprinklers shall be Reliable Model F1 Res 44, SIN R3531 (Bulletin 135).

Model F1 Res 44 Recessed Horizontal Sidewall Sprinkler

Use description for the Model F1 Res 44 horizontal sidewall sprinkler with the following modifications: Replace "horizontal sidewall sprinkler" with "recessed horizontal sprinkler." Add: Recessed escutcheon assembly shall be a steel, two-piece escutcheon with ½" adjustment (Model F2). Standard finish shall be [brass][bright chrome] [white painted] [Special finish– specify]. Residential recessed horizontal sidewall sprinklers shall be Reliable Model F1 Res 44/F2, SIN R3531 (Bulletin 135).

Model F1 Res 76 Pendent

Sprinklers shall be [cULus Listed] low flow residential pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with machined or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 7.6. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential pendent sprinklers shall be Reliable Model F1 Res 76, SIN R7618 (Bulletin 135).

Model F1 Res 76 Recessed Pendent/F1, Model F1 Res 76 Recessed Pendent/F2, Model F1 Res 76 Recessed Pendent/FP

Sprinklers shall be [cULus Listed] low flow residential recessed pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with machined or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 7.6. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Recessed escutcheon assembly shall be a steel, two-piece escutcheon [with ½" adjustment (Model F2)] [with ¾" adjustment (Model F1)] [of push-on and thread off design with ½" adjustment (Model FP)]. Standard finish shall be [brass][bright chrome] [white painted]. Residential recessed pendent sprinklers shall be Reliable [Model F1 Res 76 Recessed Pendent/F1] [Model F1 Res 76 Recessed Pendent/F2] [Model F1 Res 76 Recessed Pendent/FP] SIN R7618 (Bulletin 135).

Model F1 Res 76 CCP Pendent (Concealed)

Sprinklers shall be [cULus Listed] low flow residential concealed sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with machined or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F (68°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange. Method of attaching the cover plate to the sprinkler cup shall be a push-on and thread-off design allowing a ½" cover plate adjustment. Cover plate temperature rating shall be 135°F (57°C). A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the sprinkler from damage, which could occur during construction before the cover plate is installed. Standard cover plate finish: [White] [Custom Color– specify].]. Concealed pendent sprinklers shall be Reliable Model F1 Res 76 CCP, SIN R7618 (Bulletin 135).

Finishes [1]

Standard Finishes		
Sprinkler	**F1, F2, FP Escutcheons**	**Cover Plates**
Bronze Chrome Plated White and Black Polyester Coated	Brass Bright Chrome Plated White Painted	White Painted Chrome
Special Application Finishes		
Sprinkler	**F1, F2, Escutcheons**	**Cover Plates**
Bright Brass Black Plated Black Paint Off White Satin Chrome	Bright Brass Black Plated Black Paint Off White Satin Chrome	Bright Brass Black Plated Black Paint Off White Satin Chrome

[1] Other finishes and colors are available on special order. Consult factory for details.

Note: Paint or any other coating applied over the factory finish will void all approvals and warranties.

Ordering Information

Specify:

1. Sprinkler Model
2. Sprinkler Type
3. Temperature Rating
4. Sprinkler Finish
5. Escutcheon Finish
6. Cover Plate Finish

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- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gaugesIdentification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest published Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable.

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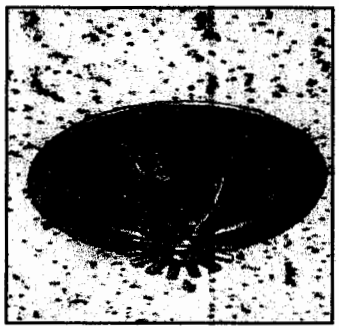
Model F3QR Quick Response Dry Sprinklers

Bulletin 157 Rev.G

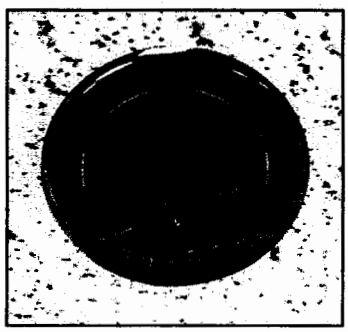
Features

1. The Model F3QR sprinkler utilizes Belleville Spring Closure Technology. Reliable is the first in the industry to produce a Quick Response Dry Concealed sprinkler utilizing this technology.
2. Styles available
   - Pendent
   - Recessed FP Pendent
   - Recessed F1 Pendent
   - Concealed
   - Horizontal Sidewall
   - Recessed Horizontal Sidewall - FP
   - Recessed F1 Horizontal Sidewall
3. 1½" (38mm) escutcheon adjustment on pendent sprinkler.
4. ½" (13mm) escutcheon adjustment on recessed sprinkler with push-on/ thread-off FP Model Escutcheon ring.
5. ⅜" (9.5mm) cover plate adjustment on concealed sprinkler with push-on/ thread-off CCP Cover Plate.
6. ¾" (19mm) escutcheon adjustment on recessed sprinkler with G/F1 Escutcheon.
7. Attractive appearance. Employs 3mm frangible glass bulb and galvanized nipple.
8. Lengths available to accommodate installation dimensions from 2" - to - 48" (51mm - to - 1219mm), in ¼" (6mm) increments.
9. Available in a variety of plated and painted finishes.

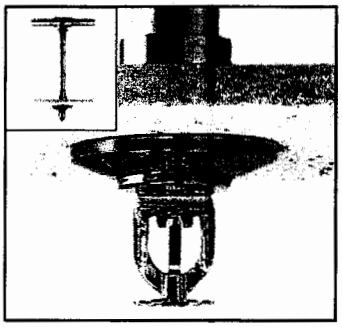
Concealed



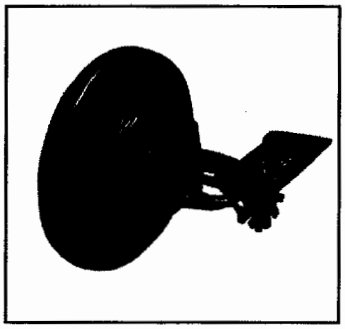
Recessed FP Pendent



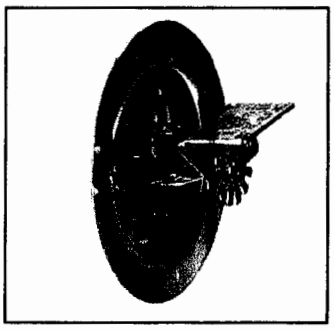
Recessed F1 Pendent



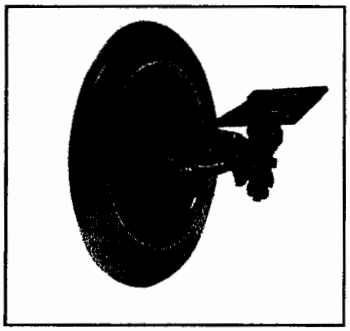
Pendent



Horizontal Sidewall



Recessed FP Horizontal Sidewall



Recessed F1 Horizontal Sidewall

Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)

Style	Response	Sprinkler System Type	Hazard
Pendent Recessed Pendent Recessed F1 Pendent CCP Concealed (R5714)	Quick	Wet Pipe Dry Pipe All Preaction	Light Ordinary
Horizontal Sidewall Recessed FP Horizontal Sidewall Recessed F1 Horizontal Sidewall (R5734)			

2. Certified by FM Approvals

Style	Response	Sprinkler System Type	Hazard
Pendent Recessed F1 Pendent (R5714)	Quick	Wet Pipe, Single Interlock Preaction	Light Ordinary, Groups 1&2
Horizontal Sidewall Recessed F1 Horizontal Sidewall (R5734)	Quick	Wet Pipe, Single Interlock Preaction	Light

3. NYC MEA 258-93-E

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford NY 10523

Model F3QR Dry Pendent Sprinkler

"A" Dim.	2" to 48" (51mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White [2]	Brass Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.
[2] White coated sprinklers will have chrome plated cans.

Standard Temperature Ratings

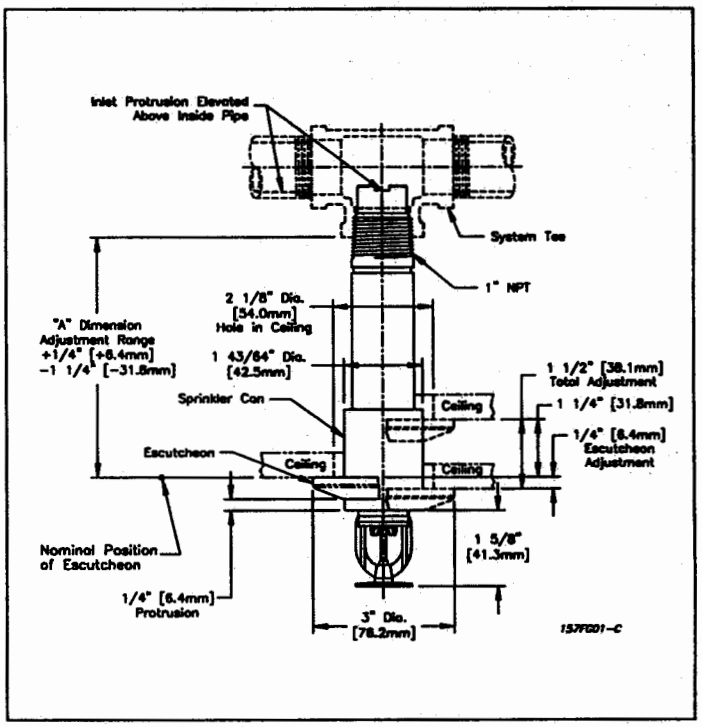
Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High	286°F (141°C)	225°F (107°C)	Blue

Sprinkler can and escutcheon fabricated of brass for better weather resistance in exterior applications.

Sprinkler Guard: Model C-2

Sprinkler Installation Wrench
Model G3 Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Note: The sprinkler Can protrudes ¼" when escutcheon is in nominal position. Escutcheon adjustment provides +¼" (+6mm) to -1¼" (-32mm) "A" dimension adjustment range.

Model F3QR Dry Recessed Pendent Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White	Brass Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details. Cup remains unfinished. Only the escutcheon will contain desired finish.

Standard Temperature Ratings

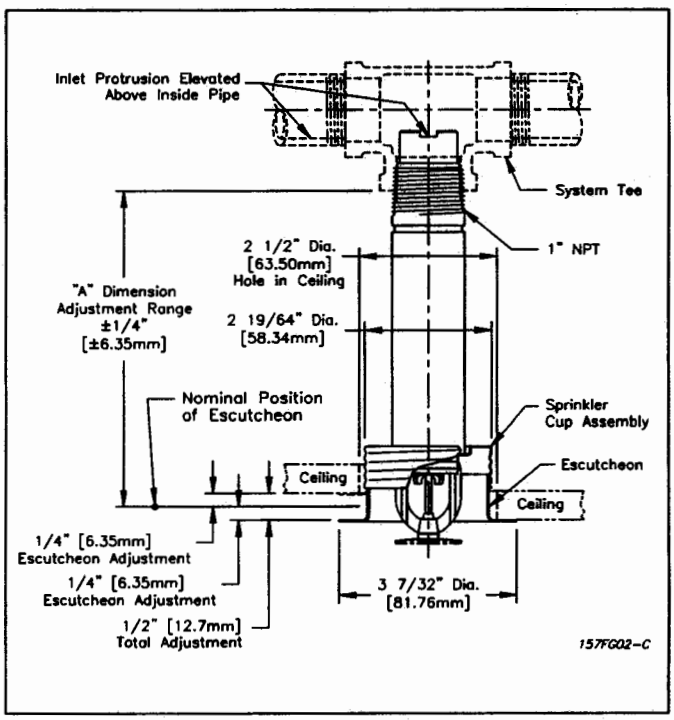
Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High*	286°F (141°C)	225°F (107°C)	Blue

Sprinkler cup and FP escutcheon fabricated of steel and recomended for interior applications.

* Listed and Certified only by cULus

Sprinkler Installation Wrench
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Note: Do not install the Model F3QR Dry Pendent Recessed Sprinkler in ceilings which have positive pressure in the space above.

Model F3QR Dry Pendent Concealed Sprinkler

"A" Dim.	3½" to 48"(89mm to 1219mm) in ¼" (6mm) increments

CCP Cover Plate[1] Finishes[2]

Standard Finishes	Special Application Finishes
Chrome Plated White	Bright Brass Plated Black Plated Black Paint Off White Satin Chrome

(1) Utilizes the ½" cover plate with ⅜" total adjustment.

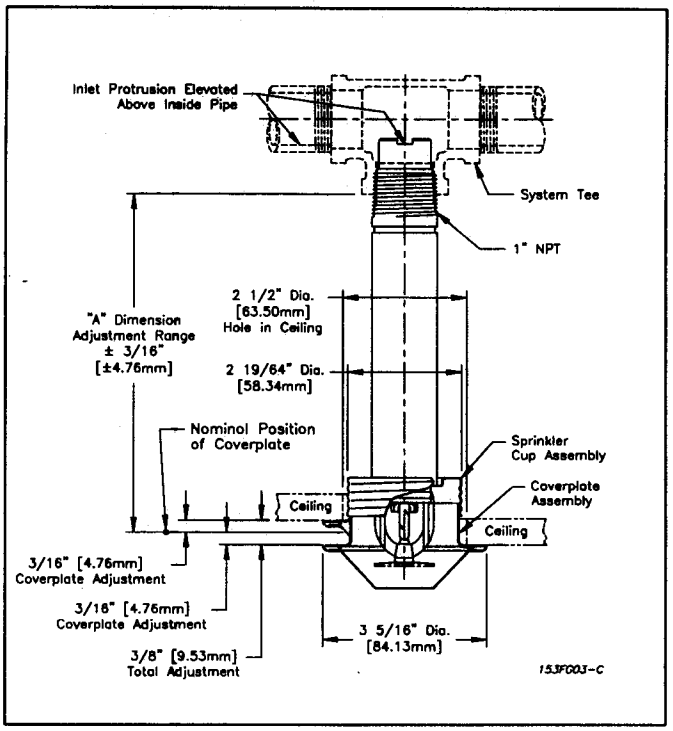
(2) Other finishes and colors are available on special order. Consult factory for details.

Standard Temperature Ratings

Classification	Sprinkler Temperature Rating	Cover Plate Temp. Rating	Max. Ambient Temp.
Ordinary	135°F (57°C)	135°F (57°C)	100°F (38°C)
Ordinary	155°F (68°C)	135°F (57°C)	100°F (38°C)
Intermediate	200°F (93°C)	165°F (74°C)	150°F (66°C)
High*	286°F (141°C)	165°F (74°C)	150°F (66°C)

Sprinkler cup fabricated of steel and CCP Cover Plate fabricated of brass and recommended for interior applications.

* Listed and Certified only by cULus.



Note: Do not install the Model F3QR Dry Pendent Concealed Sprinkler in ceilings which have positive pressure in the space above.

Sprinkler Installation Wrench:

Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714

Model F3QR Dry Horizontal Sidewall Sprinkler

"A" Dim.	2" to 48" (51mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White [2]	Brass Chrome Plated White

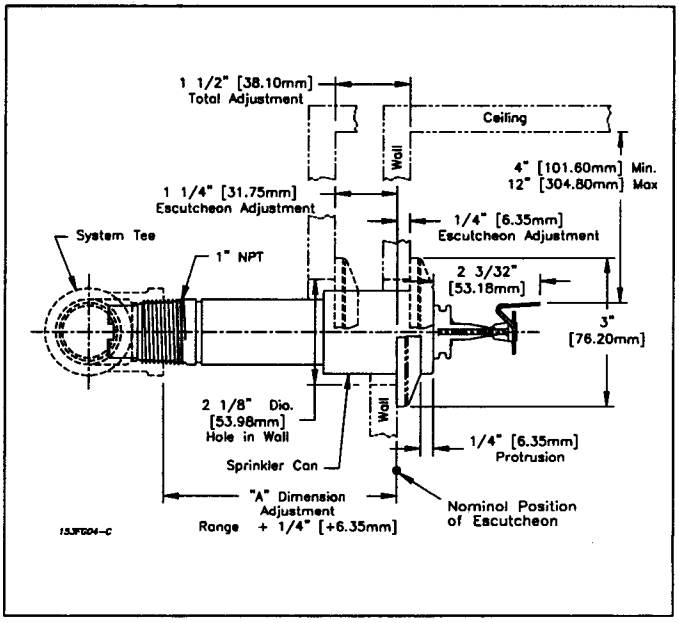
(1) Other finishes and colors are available on special order. Consult factory for details.

(2) White coated sprinklers will have chrome plated can.

Standard Temperature Ratings

Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High	286°F (141°C)	225°F (107°C)	Blue

Sprinkler can and escutcheon fabricated of brass for weather resistance in exterior applications.



Note: The sprinkler Can protrudes ¼" when escutcheon is in nominal position. Escutcheon adjustment provides +¼" (+6mm) to -1¼" (-32mm) "A" dimension adjustment range.

Sprinkler Installation Wrench:

Model G3 Sprinkler Wrench

Sprinkler Identification Number (SIN): R5734

Model F3QR Dry Recessed F1 Pendent Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon	Collar
Chrome Plated White	Chrome Plated White	Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.

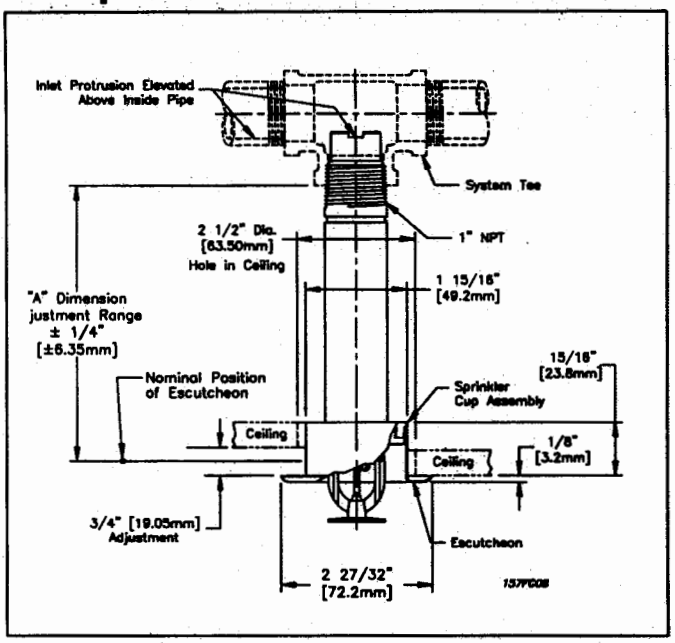
Standard Temperature Ratings

Classification	Sprinkler Temperature Rating		Max. Ambient Temp.		Bulb Color
Ordinary	135°F	(57°C)	100°F	(38°C)	Orange
Ordinary	155°F	(68°C)	100°F	(38°C)	Red
Intermediate	200°F	(93°C)	150°F	(66°C)	Green
High*	286°F	(141°C)	225°F	(107°C)	Blue

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Model F3QR Dry Horizontal Recessed F1 Sidewall Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon	Collar
Chrome Plated White	Chrome Plated White	Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.

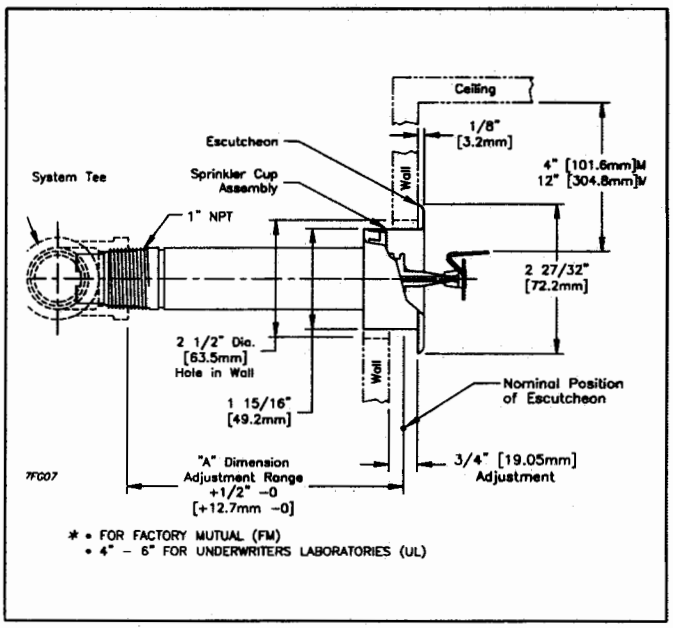
Standard Temperature Ratings

Classification	Sprinkler Temperature Rating		Max. Ambient Temp.		Bulb Color
Ordinary	135°F	(57°C)	100°F	(38°C)	Orange
Ordinary	155°F	(68°C)	100°F	(38°C)	Red
Intermediate	200°F	(93°C)	150°F	(66°C)	Green
High*	286°F	(141°C)	225°F	(107°C)	Blue

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5734



- Listed by cULus for Quick Response. Approved by FM for Standard Response.
- Recessed Horizontal sidewall sprinklers are listed with cULus for installation of min. 4" (100mm) - to - max. 6" (150mm) below ceiling and approved by FM for installation of min. 4" (100mm) - to - max. 12" (300mm) below ceiling.

Model F3QR Dry Horizontal Recessed Sidewall Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White	Brass Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details. Cup remains unfinished. "See page 2"

Standard Temperature Ratings

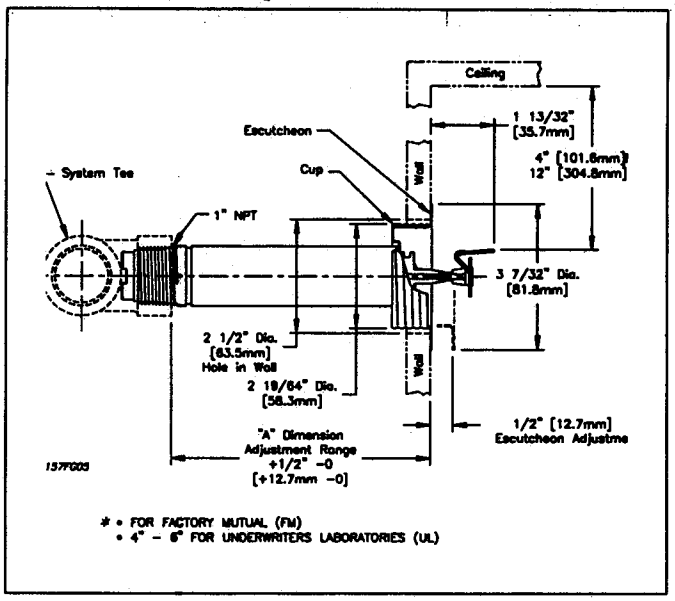
Classification	Sprinkler Temperature Rating		Max. Ambient Temp.		Bulb Color
Ordinary	135°F	(57°C)	100°F	(38°C)	Orange
Ordinary	155°F	(68°C)	100°F	(38°C)	Red
Intermediate	200°F	(93°C)	150°F	(66°C)	Green
High*	286°F	(141°C)	225°F	(107°C)	Blue

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:

Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5734



Notes: Do not install the Model F3QR Dry Horizontal Recessed Sidewall Sprinkler in walls which have positive pressure in their side space.

- Listed by cULus for Quick Response. Approved by FM for Standard Response.
- Recessed Horizontal sidewall sprinklers are listed with cULus for installation of min. 4" (100mm) - to - max. 6" (150mm) below ceiling and approved by FM for installation of min. 4" (100mm) - to - max. 12" (300mm) below ceiling.

Technical Data:

Orifice Size: ½" (15mm)
Thread Size: 1" NPT per ANSI B2.1
Working Pressure: 175 psi (12 bar)
Nominal K Factor - US / (Metric): 5.6 / (80)

Product Description

Reliable Model F3QR Dry Sprinklers are quick response sprinklers utilizing a durable 3mm frangible glass bulb. This quick response enables these sprinklers to apply water to a fire much sooner than standard response sprinklers of the similar temperature rating.

Model F3QR Dry Sprinklers are intended for use in dry and preaction systems and in areas subjected to freezing temperatures, such as freezers and unheated portions inside and outside buildings.

Environments wherein dry sprinklers are employed can be corrosive. For this reason, Model F3 Sprinklers have a special wax fillet placed in the gap between the cup that supports the bulb and the wrenching boss. This wax will not interfere with the operation of the sprinkler, and it prevents contaminents from entering the internal portion of the drop nipple. The wax must not be removed.

Operation

The glass bulb consists of an accurately controlled amount of special fluid hermetically sealed inside a precisely manufactured glass capsule. This glass bulb is specially constructed to provide fast thermal response. When the temperature increases sufficiently, due to a fire, the bulb shatters allowing operating parts to clear the waterway. This enables the inlet seal to release air or water and subsequently, cause water flow over the deflector in a uniform spray pattern, controlling or extinguishing the fire.

Ordering Information

Specify:

1. Sprinkler Type (select one):
   (a) Model F3QR Dry Pendent
   (b) Model F3QR Dry Recessed Pendent
   (c) Model F3QR Dry Recessed F1 Pendent
   (d) Model F3QR Dry Concealed Pendent
   (e) Model F3QR Dry Horizontal Sidewall
   (f) Model F3QR Dry Recessed Horizontal Sidewall
   (g) Model F3QR Dry Recessed F1 Horizontal Sidewall
2. Sprinkler Temperature Rating.
3. Sprinkler Finish.
4. Escutcheon type (G/F1 or FP).
5. Cover Plate/Escutcheon Finish.
6. Length:
   "A" Dimension (face of tee to face of ceiling or wall) in ¼" (6mm) increments.
7. Model F3QR Dry Pendent (a) is available without sprinkler can and escutcheon.

Note:

1. The "A" dimension is based on a nominally gauged pipe thread "make-up" of 0.600" (15mm) per ANSI B2.1 [7½ threads approximately].
2. All platings and paintings are decorative and intended for interior use.

General Installation Instructions

Model F3QR dry sprinklers must be installed only in standard (ANSI B 16.3 class 150 and ANSI B 16.4 class 125) pipe tees in the horizontal position, even at branch line ends. They should not be installed into elbows or pipe couplings located on drop nipples to the sprinklers. For these and other fittings including CPVC*, the dry sprinkler should be installed into a fitting to allow protrusion into the fitting in accordance with the diagrams. The "A" dimension of the dry sprinkler, which extends into the freezers or a freezing zone from wet pipe systems, should be selected to provide, as a minimum, the specified lengths in inches shown in the following table, between face of the fitting and the exterior face of the protected area. The following table is used for freezing zones when the ambient temperature around the wet pipe system is kept at 40 °F (4°C), and specifies the minimum length from fitting face to inside face of ceiling or wall for different protected area temperatures.

TABLE 1 (See Fig. 8)

Minimum Length (Face to Inside Face Ceiling/Wall)	Temperature (Protected Area)**
12 inches / 300 mm	-20°F / -29°C
18 inches / 450 mm	-40°F / -40°C
24 inches / 600 mm	-60°F / -51°C
** For temperatures falling between those in the above chart, the minimum length may be determined by interpolation.	

During installation, the following steps must be followed:

1. Cut the specified size hole (see illustrations) for the sprinkler in the ceiling or wall directly in line with the tee.
2. Apply pipe joint compound to the 1" (25mm) pipe threads and install sprinkler using the Model G3 or G3 R/C Sprinkler Wrench as specified.
3. Install the Model FP push-on / thread-off escutcheon or CCP cover plate if required.

Note: Installation of the Model F3QR Sprinklers is not recommended in copper pipe systems, as this may reduce the life expectancy of the sprinklers.

Model F3QR Concealed and Recessed Installation Instructions

- The Model G3 R/C wrench (Fig. 1) is designed to locate on the wrenching pads of the recessed sprinkler while centering in the cup. A standard ½" drive ratchet may be used to drive this wrench. Figures 1 and 2 show sequentially the insertion of the wrench. First the wrench, with its jaws above the sprinkler deflector, is moved laterally until centered with the cup. Then raise the wrench inside of the cup until its jaws engage the sprinkler's square wrenching pads (Fig. 3). To remove the wrench, follow this procedure in reverse order. Care should be taken to avoid striking the deflector, with the wrench.
- Model G3 Wrench (Fig. 4) is used for installation of Pendent and Horizontal Sidewall sprinklers.
- Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACED IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

Maintenance

The Model F3QR Quick Response Dry Sprinklers should be inspected quarterly and the sprinkler system maintained in accordance with NFPA 25. Do not remove the factory applied thermally sensitive wax fillet between the bulb supporting cup and the wrenching boss. Do not replace this wax with a substitute substance. An Alternate substance may interfere with proper operation of the sprinkler. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gently vacuuming. Remove 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 until used to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

* Spears CPVC sprinkler adapter tees (with steel thread insert) can only be used with horizontal sidewall sprinklers which do not require protrusion into tees to prevent ice or debris blockage of sprinkler inlets. These CPVC tees do not permit sufficient sprinkler inlet protrusion as required for pendent installation.

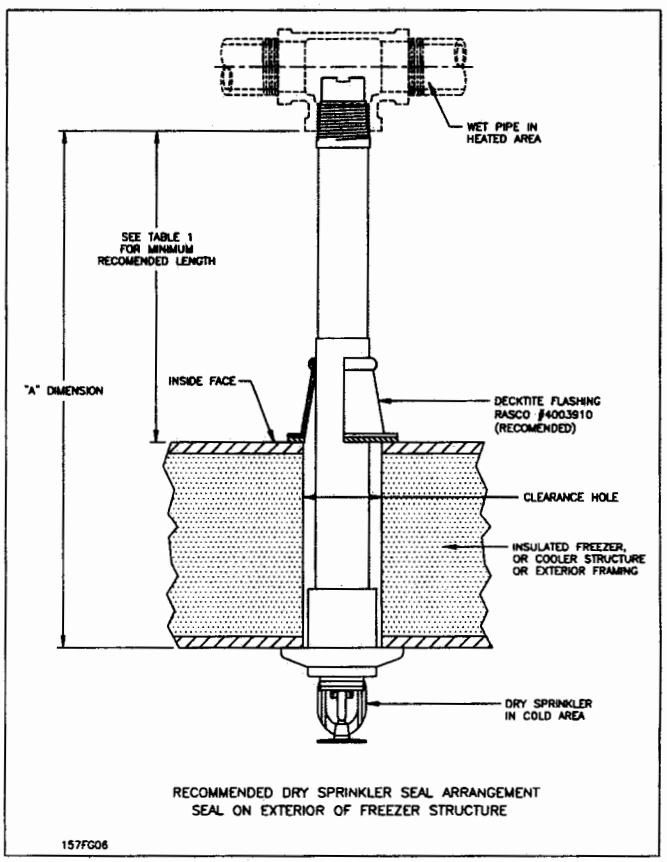


Fig. 8

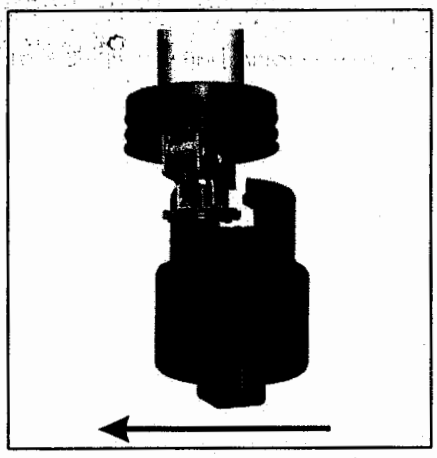


Fig. 1 - G3 R/C Wrench

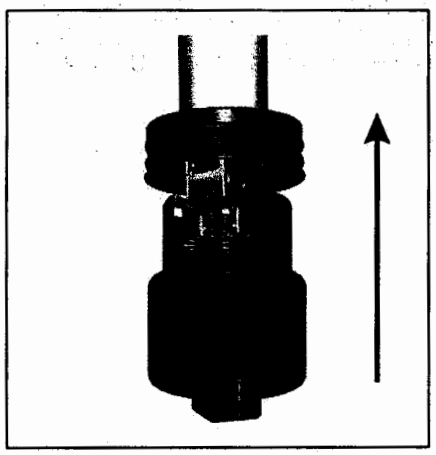


Fig. 2 - G3 R/C Wrench

Fig. 3 - G3 R/C Wrench

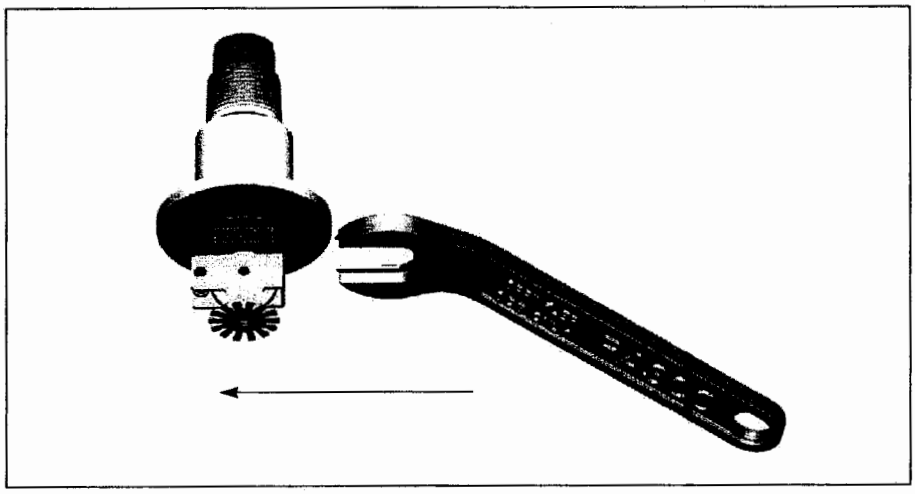


Fig. 4 - G3 Wrench

Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gauges
- Identification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest pertinent Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable.

Products manufactured and distributed by Reliable have been protecting life and property for over 80 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by

Reliable®

The Reliable Automatic Sprinkler Co., Inc.

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Reliable®

Model F1FR Series Quick Response Standard Spray

Bulletin 014 Rev. D

Model F1FR 56 Sprinkler Types

Standard Upright
Standard Pendent
Conventional
Vertical Sidewall
Horizontal Sidewall

Model F1FR 56 Recessed Sprinkler Types

Standard Pendent/F1/F2/FP
Horizontal Sidewall

Model F1FR 56 Concealed Sprinkler Types

Standard Pendent

Listing & Approvals

1. Underwriters Laboratories Inc. and Certified for Canada (cULus).
2. Factory Mutual Approvals (FM)
3. Loss Prevention Council (LPCB, UK)
4. VdS Schadenverhütung GmbH

UL Listing Category

Sprinklers, Automatic & Open (VNIV)
Quick Response Sprinkler

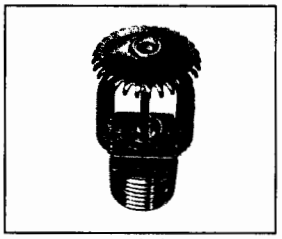
Product Description

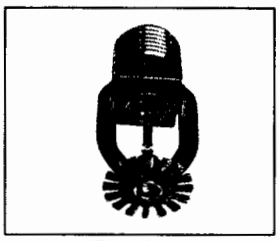
Reliable Models F1FR Series Sprinklers are quick response sprinklers which combine the durability of a standard sprinkler with the attractive low profile of a decorative sprinkler.

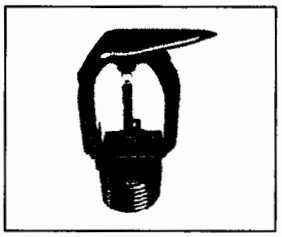
The Models F1FR Series Recessed automatic sprinklers utilize a 3.0 mm frangible glass bulb. These sprinklers have demonstrated response times in laboratory tests which are five to ten times faster than standard response sprinklers. This quick response enables the Model F1FR Series sprinklers to apply water to a fire much faster than standard sprinklers of the same temperature rating.

The glass bulb consists of an accurately controlled amount of special fluid hermetically sealed inside a precisely manufactured glass capsule. This glass bulb is specially constructed to provide fast thermal response.

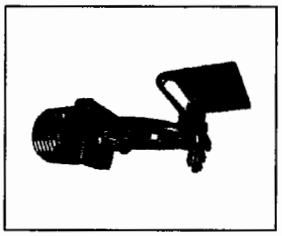
At normal temperatures, the glass bulb contains the fluid in both the liquid and vapor phases. The vapor phase can be seen as a small bubble. As heat is applied, the liquid expands, forcing the bubble smaller and smaller as the liquid pressure increases. Continued heating forces the liquid to push out against the bulb, causing the glass to shatter, opening the waterway and allowing the deflector to distribute the discharging water.

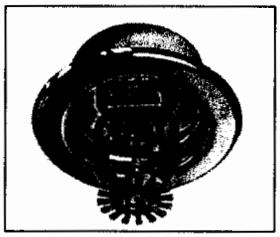

Upright

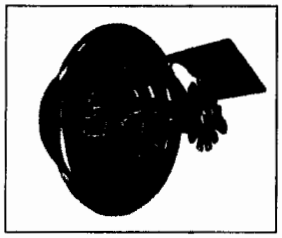

Pendent

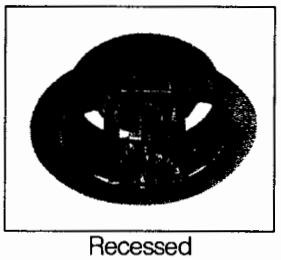

Vertical Sidewall


Conventional


Horizontal Sidewall


Recessed
Pendent/F1/F2


Recessed
Horizontal Sidewall


Recessed
Pendent/FP

Application

Quick response sprinklers are used in fixed fire protection systems: Wet, Dry, Deluge or Preaction. Care must be exercised that the orifice size, temperature rating, deflector style and sprinkler type are in accordance with the latest published standards of the National Fire Protection Association or the approving Authority Having Jurisdiction. Quick response sprinklers are intended for installation as specified in NFPA 13. Quick response sprinklers and standard response sprinklers should not be intermixed.

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

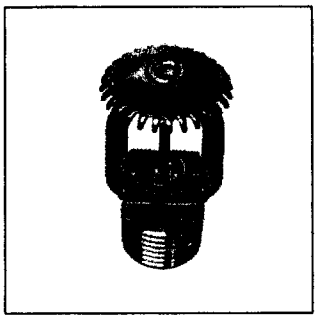
Model F1FR Quick Response Upright, Pendent & Conventional Sprinklers

Installation Wrench: Model D Sprinkler Wrench

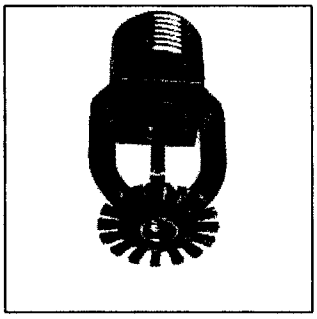
Installation Data:

Nominal Orifice	Thread Size	Nominal K Factor		Sprinkler Height	Approval Organization	Sprinkler Identification Number (SIN)	
		US	Metric			Upright	Pendent
Standard-Upright (SSU) and pendent Deflectors Marked to Indicate Position							
½" (15mm)	½" NPT(R½)	5.6	80	2.25" (57mm)	1, 2, 3, 4	RA1425[1]	RA1414 [1][2]
Conventional-Install in Upright or Pendent Position							
15mm[1]	½" NPT(R½)	5.6	80	57mm	3,4	RA1475	

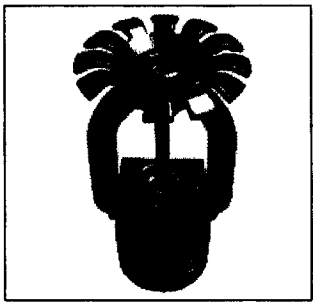
[1] cULus listed corrosion resistant (Polyester coated) sprinkler.
[2] Polyester coated FM approved sprinkler.



Upright



Pendent



Conventional

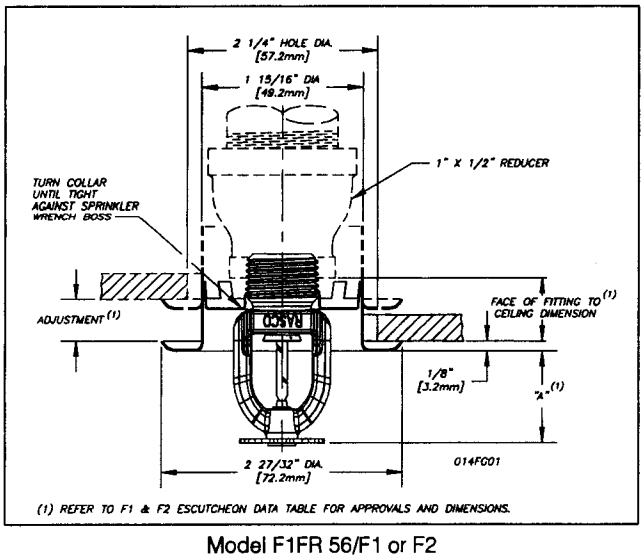
Model F1FR 56 Quick Response Recessed Pendent Sprinkler

Installation Wrench: Model GFR2 Sprinkler Wrench

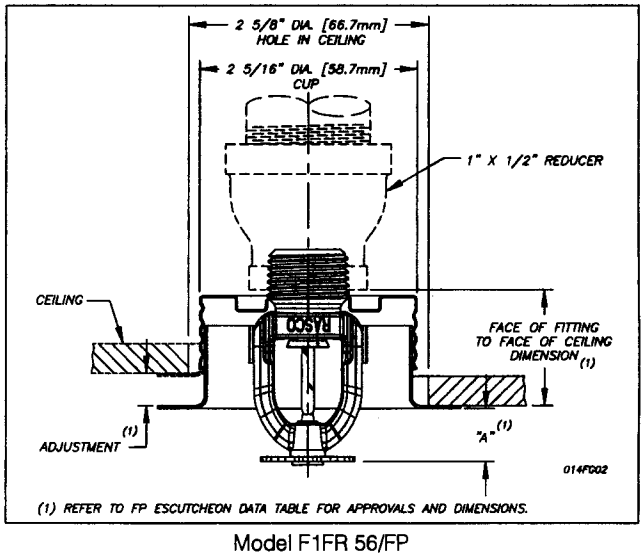
Installation Data:

Nominal Orifice	Thread Size	K Factor		Sprinkler Height	Sprinkler Identification Number (SIN)
		US	Metric		
½" (15mm)	½" NPT(R½)	5.6	80	2.25" (57mm)	RA1414

[1] Refer to escutcheon data table for approvals and dimensions.



Model F1FR 56/F1 or F2



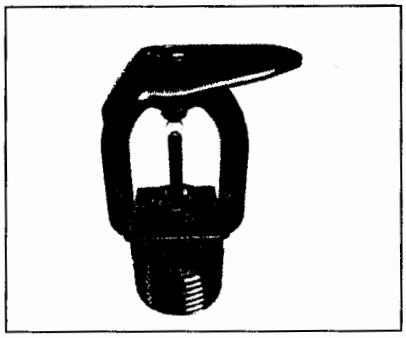
Model F1FR 56/FP

Model F1FR Quick Response Vertical Sidewall Sprinkler

Installation Wrench: Model D Sprinkler Wrench
Installation Position: Upright or Pendent
Approval Type: Light Hazard Occupancy
Installation Data:

Nominal Orifice	Thread Size	Nominal K Factor		Sprinkler Height	Approval Organizations	Sprinkler Identification Numbers (SIN)
		US	Metric			
½" (15mm)	½" NPT (R1/2)	5.6	8.0	2.25" (57mm)	1,2,3,4	RA1485
15mm	½" NPT (R1/2)	5.6	8.0	2.25" (57mm)	4[1]	

[1] LPC Approval is for pendent position only.



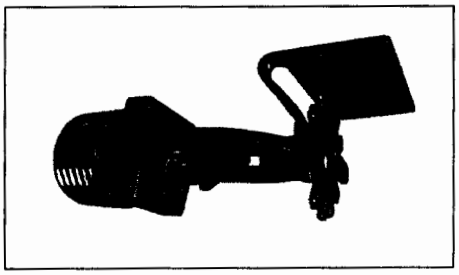
Vertical Sidewall

Sprinkler Type	Deflector to Ceiling Distance (Min. - Max.)
Upright	4" (102mm) - 12" (305mm)
Pendent	4" (102mm) - 12" (305mm)

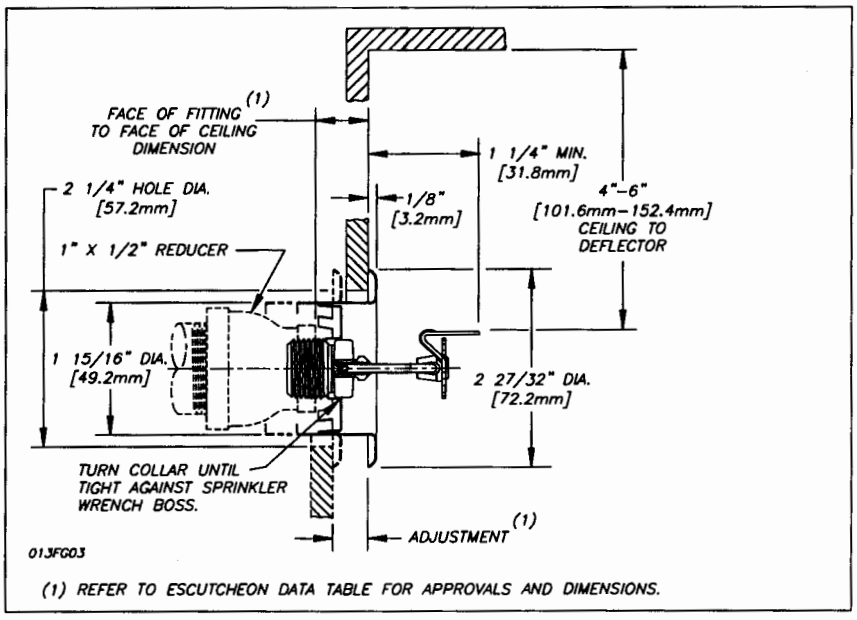
Model F1FR Quick Response Horizontal Sidewall Sprinkler

Deflector: HSW
Installation Wrench: Model D Sprinkler Wrench
Installation Data: Horizontal Sidewall

Nominal Orifice	Thread Size	Nominal K Factor		Sprinkler Height	Approval Organizations and Type of Approval		Sprinkler Identification Numbers (SIN)
		US	Metric		Light Hazard	Ordinary Hazard	
½" (15mm)	½" NPT (R1/2)	5.6	80	2.63" (67mm)	1,2	1	RA1435



Horizontal Sidewall



Model F1FR Quick Response Concealed Pendent Sprinklers

Installation Wrench: Model RC1 Sprinkler Wrench

Technical Data:

Nominal Orifice	"K" Factor		Thread Size	Model	Temp. Rating		Max. Ambient Temp	Bulb Color	Approvals	Sprinkler Identification Number(SIN)
	US	Metric			Sprinkler	Cover				
½" (15mm)	5.6	80	½" NPT	F1FR	135°F/57°C	135°F/57°C	100°F/38°C	Orange	1, 2	RA1414
½" (15mm)	5.6	80	½" NPT	F1FR	155°F/68°C	135°F/57°C	100°F/38°C	Red	1, 2, 4[1]	RA1414
½" (15mm)	5.6	80	½" NPT	F1FR	175°F/79°C	165°F/74°C	100°F/38°C	Yellow	1, 2	RA1414
½" (15mm)	5.6	80	½" NPT	F1FR	200°F/93°C	165°F/74°C	100°F/38°C	Green	1, 2	RA1414

[1] For VdS only = 155°F/68°C Norbulb and 1/2" [12,7mm] adjustment.

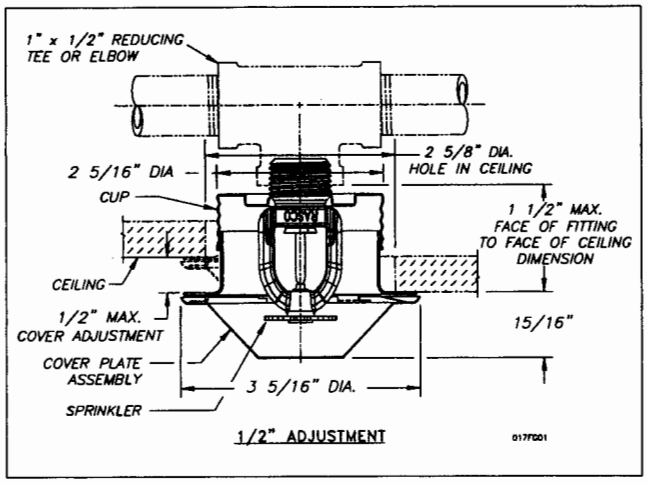


Figure 1

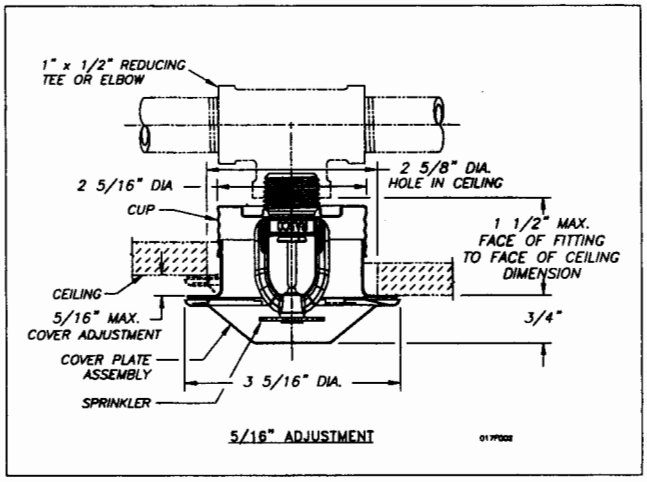


Figure 2

Installation Aid

A protective cap is included for use during installation.

Important: The F1FR 56 Sprinkler with Model CCP cover plate is not an FM Approved combination.

Installation

Quick response sprinklers are intended for installation as specified in NFPA 13. Quick response sprinklers and standard response sprinklers should not be intermixed.

The Model F1FR 56 Recessed Quick Response Sprinklers are to be installed as shown. The Model F1 or F2 Escutcheons illustrated are the only recessed escutcheons to be used with the Model F1FR 56 Sprinklers. The use of any other recessed escutcheon will void all approvals and negate all warranties.

When installing Model F1FR 56 Sprinklers, use the Model D Sprinkler Wrench. Use the Model GFR2 Wrench for installing F1FR 56 Recessed Pendent Sprinklers. Any other type of wrench may damage these sprinklers.

NOTE: A leak tight ½" NPT (R1/2) sprinkler joint can be obtained with a torque of 8-18 ft-lbs (10,8 - 24,4 N-m). Do not tighten sprinklers over maximum recommended torque. It may cause leakage or impairment of the sprinklers.

The Model F1FR 56/ CCP Concealed Sprinkler uses the ½" orifice, ½" NPT (R1/2), 135°F (57°C), 155°F (68°C), 175°F (79°C) or 200°F (93°C) Model F1FR 56 Pendent Sprinkler with a threaded Model CCP cup which is factory attached to the sprinkler. The assembly is completed by the installation of the attractive, low profile, 135°F (57°C) or 165°F (74°C) rated Model CCP push on cover plate assembly. The cover plate and sprinkler cup assemblies are joined using a cover plate skirt with flexible tabs for threaded engagement. A choice of two cover plate assemblies provide either ½" (13mm) or $^{5}/_{16}$" (8mm) of cover adjustment.

Do not install these sprinklers in ceiling which have positive pressure in the space above.

After a $2^{5}/_{8}$" (67mm) diameter hole is cut in the ceiling, the sprinkler is easily installed with the Model RC1 Wrench. A Teflon* based thread sealant should be applied to the sprinkler threads only. The Model RC1 Wrench is then used to engage the sprinkler wrenching surfaces and to install the sprinkler in the fitting. When inserting or removing the wrench from the sprinkler/cup assembly, care should be taken to prevent damage to the sprinkler. DO NOT WRENCH ON ANY OTHER PART OF THE SPRINKLER. The cover plate is then pushed onto the cup. Final adjustment is made by hand turning the cover plate until the skirt flange makes full contact with the ceiling. Cover plate removal requires turning in the counter clockwise direction.

After installation, inspect all sprinklers to ensure that there is a gap between the cover plate and ceiling and that the four cup slots are open and free from any air flow impediment to the space above.

Concealed cover plate/cup assemblies are listed only for use with specific sprinklers. The use of any other concealed cover plate/cup assembly with the Model F1FR 56 Pendent Sprinkler or the use of the Model CCP Concealed cover plate assembly on any sprinkler with which it is not specifically listed my prevent good fire protection and will void all guarantees, warranties, listings and approvals.

Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACED IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

Temperature Ratings

Classification	Sprinkler Temperature °C	Sprinkler Temperature °F	Max. Ambient Temp.	Bulb Color
Ordinary	57	135	100°F (38°C)	Orange
Ordinary	68	155	100°F (38°C)	Red
Intermediate	79	175	150°F (66°C)	Yellow
Intermediate	93	200	150°F (66°C)	Green
High [1]	141	286	225°F (107°C)	Blue

[1] Not available for recessed sprinklers.

Escutcheon Data [1]

Escutcheon Model	Approvals	Adjustment	"A" Dimension	Face of Fitting to Ceiling or Wall Dimension
F1	1, 3, 4	Max Recess Min Recess	1½" (38.1mm) ¾" (19.1mm)	3/16" - 15/16" (5mm - 24mm)
F2	1, 2, 3, 4	Max Recess Min Recess	1 ½" (38.1mm) 1" (25mm)	3/16" - 11/16" (5mm - 17mm)
FP Push-on/ Thread-off	1, 4	Max Recessed Min Recessed	7/16" (11mm) 15/16 (24mm)	1½" (38.1mm) 1" (25.4mm)

[1] SIN: RA1435 - cULus and FM permits use with F1 or F2 escutcheons for light hazard only.

Maintenance

The Models F1FR 56 and F1FR 56 Recessed Sprinklers should be inspected quarterly and the sprinkler system maintained in accordance with NFPA 25. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove 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.

Sprinkler Types

Standard Upright
Standard Pendent
Conventional
Recessed Pendent
Vertical Sidewall
Horizontal Sidewall
Recessed Horizontal sidewall
Concealed pendent

Finishes [1]

Standard Finishes		
Sprinkler	**Escutcheon**	**Cover plate**
Bronze Chrome Plated White Polyester Coated [4][5]	Brass Chrome Plated White Painted	Chrome White
Special Application Finishes		
Sprinkler	**Escutcheon**	**Cover plate**
Bright Brass [3]	Bright Brass	Bright Brass
Black Plated	Black Plated	Satin
Black Paint [2]	Black Paint	Off White
Off White [2]	Off White	Black Paint
Satin Chrome	Satin Chrome	Black Plated

[1] Other finishes and colors are available on special order. Consult the factory for details.
[2] cULus Listed only.
[3] 200°F (93°C) maximum.
[4] cULus listed "corrosion resistance" applies to SIN Numbers RA1425 (Upright) and RA1414 (Pendent) in standard black or white.
[5] FM Approvals finish as "Polyester coated" applies to SIN Number RA1414 (Pendent) in standard black or white.

Ordering Information

Specify:

1. Sprinkler Model
2. Sprinkler Type
3. Orifice Size
4. Deflector Type
5. Temperature Rating
6. Sprinkler Finish
7. Escutcheon Type
8. Escutcheon Finish (where applicable)
9. Cover plate Model
10. Cover plate Thread size
11. Cover plate Temperature
12. Cover plate Adjustment
13. Cover plate Finish

Note: When Model F1FR 56 Recessed sprinklers are ordered, the sprinklers and escutcheons are packaged separately.

Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gaugesIdentification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest published Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable. Productsmanufactured and distributed by Reliable have been protecting life and property for over 90 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by

Reliable®

The Reliable Automatic Sprinkler Co., Inc.
(800) 431-1588 Sales Offices
(800) 848-6051 Sales Fax
(914) 829-2042 Corporate Offices
www.reliablesprinkler.com Internet Address

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Bulletin 035 Rev. H

Reliable®

Residential Sprinkler For Sloped Ceilings

Guidelines for Listed Residential Sprinkler Installations below Sloped Ceilings

The installation guidelines cover Residential Sprinkler Models:

F1 Res 49 Pendent
F1 Res 49 Recessed Pendent/F2
F1 Res 58 Pendent
F1 Res 58 Recessed Pendent/F2
F1 Res 44 HSW
F1 Res 44 Recessed HSW/F2
F1 Res 49 CCP
F1 Res 58 CCP
RFC 43 Flat Concealed
RFC 49 Flat Concealed

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)
2. NYC MEA 258-93-E

UL Listing Category

Residential Automatic Sprinkler
UL Guide Number
VKKW

Patents: US Patent number 6,516,893

Model F1 Res 49

Product Description for F1 Res Sprinklers

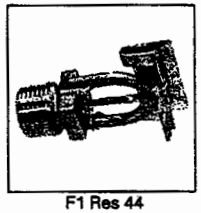
Model F1 Res Pendent sprinklers are fast response sprinklers combining excellent durability, high sensitivity glass-bulb and low profile decorative design. The F1 Res Horizontal Sidewall sprinklers are equally attractive when above ceiling piping cannot be used.

The 3mm glass-bulb pendent sprinklers, with a K Factor of 4.9 & 5.8 for pendent and 4.4 for horizontal sidewall, permit the efficient use of residential water supplies for sprinkler coverage in residential fire protection design.

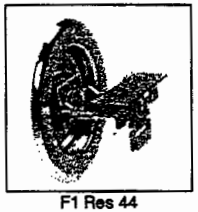
The low flow F1 Res sprinklers are specially engineered for fast thermal response to meet the sensitive fire protection application needs of the latest residential market standards (UL 1626 Standard *). Upon fire conditions, rising heat causes a sprinkler's heat-sensitive glass-bulb to shatter, releasing the waterway for water flow onto the deflector, evenly distributing the discharged water to control a fire.

F1 Res 49 & 58 Pendent

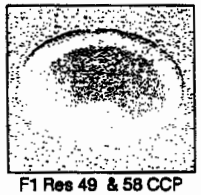
F1 Res 49 & 58 Recessed Pendent / F2



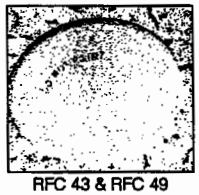
F1 Res 44 HSW



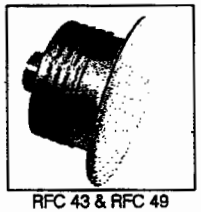
F1 Res 44 Recessed HSW/F2



F1 Res 49 & 58 CCP Pendent



RFC 43 & RFC 49



RFC 43 & RFC 49

* Effective date July 12, 2002

Product Description for RFC 43 & RFC 49

Model RFC43 & RFC49 Concealed Residential Sprinklers are fast response residential fusible solder link automatic sprinklers. Residential sprinklers differ from standard sprinklers primarily in their response time and water distribution patterns.

Model RFC43 & RFC49 sprinklers discharge water in a hemispherical pattern below the sprinkler deflector. Residential distribution patterns are higher and generally contain a finer droplet size than standard sprinkler patterns.

The combination of speed of operation and high discharge pattern required for residential sprinklers has demonstrated, in fire testing, an ability for controlling residential fires, and thereby providing significant evacuation time for occupants.

The RFC43 & RFC49 Sprinkler provides the best form of fire protection by combining an attractive appearance and ½" (13mm) of cover adjustment for ease of installation. The small diameter cover plate is easily and positively attached and blends into the ceiling, concealing the most dependable fire protection available, an automatic sprinkler system.

The RFC43 & RFC49 are UL Listed Residential Sprinkler to be installed in the residential portions of any occupancy in accordance with NFPA 13, 13R, & 13D.

The RFC43 & RFC49 can reduce the need for precise cutting of drop nipples. The threaded cover plate assembly can be adjusted without tools to fit accurately against the ceiling. The fire protection system need not be shut down to adjust or remove the cover plate assembly.

Technical Data (F1 Res Sprinklers):

- Thermal Sensor : Nominal 3mm glass-bulb
- Sprinkler Frame : Brass Casting
- Sprinkler Pressure Rating : 175 psi
  Factory Hydrostatically Tested to 500 psi
- Thread Size : ½" NPT (R½)
- K Factor : 4.9 (Actual) - F1 Res 49 Pendent Sprinkler
  4.4 (Actual) - F1 Res 44 HSW Sprinkler
  5.8 (Actual) - F1 Res 58 Pendent Sprinkler
- Density : Minimum .05 gpm/ft²

Technical Data (RFC 43 & RFC 49):

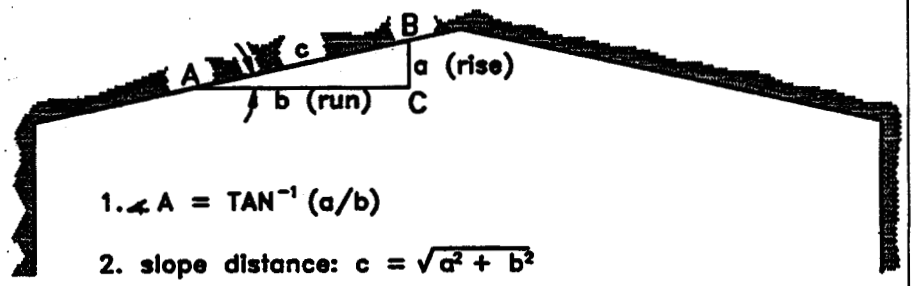
- Thermal Sensor : 165°F Fusible Link
- Sprinkler Frame : Brass Machined
- Sprinkler Pressure Rating : 175 psi
  Factory Hydrostatically Tested to 500 psi
- Thread Size : ½" NPT (R½)
- K Factor : 4.3 (Actual) RFC43;
  4.9 (Actual) RFC49
- Density : Minimum .05 gpm/ft²

Application

Model F1 Res and RFC 43 & RFC 49 Sprinklers are used for Residential Fire Protection according to UL 1626 Standard*. Be sure that orifice size, temperature rating, deflector style, cover plate and sprinkler type are in accordance with the latest published standards of The National Fire Protection Association or the approving Authority Having Jurisdiction.

* Effective date July 12, 2002

METHOD OF CALCULATING THE CONVERSION OF 'RISE–OVER–RUN' TO DEGREES OF AN ANGLE.



1. $\angle A = TAN^{-1} (a/b)$

2. slope distance: $c = \sqrt{a^2 + b^2}$

Example: a = 4
b = 12

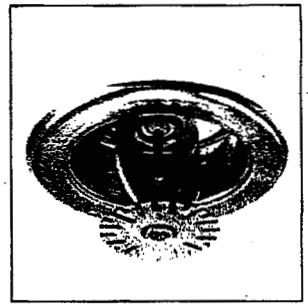
$\angle A = TAN^{-1} (a/b)$
$\angle A = TAN^{-1} = (0.333)$
$\angle A = 18.43°$

slope distance: $c = \sqrt{4^2 + 12^2}$
$c = \sqrt{160}$
$c = 12.65$

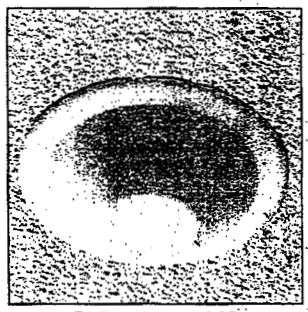
035_ROR-A

Model F1 Res 49 Pendent & F1 Res 49 Recessed Pendent/F2 & F1 Res 49 CCP Pendent, Model F1 Res 58 Pendent & F1 Res 58 Recessed Pendent/F2 & F1 Res 58 CCP Pendent, RFC 43 & RFC 49 Pendent Flat Concealed Sprinklers installed below Sloped Ceilings.

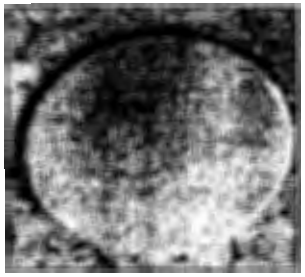
F1 Res 49 & 58
Pendent



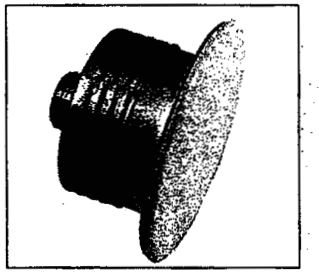
F1 Res 49 & 58
Recessed Pendent / F2



F1 Res 49 & 58 CCP
Pendent

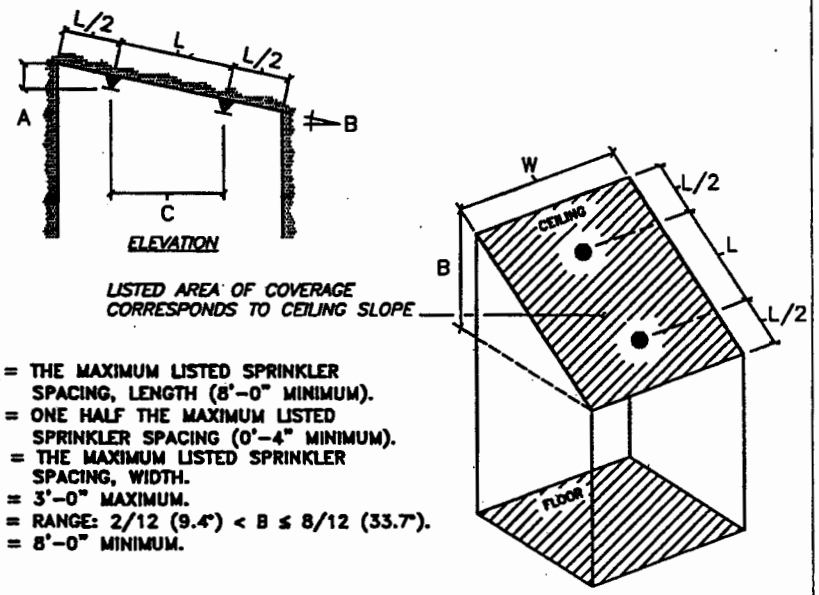


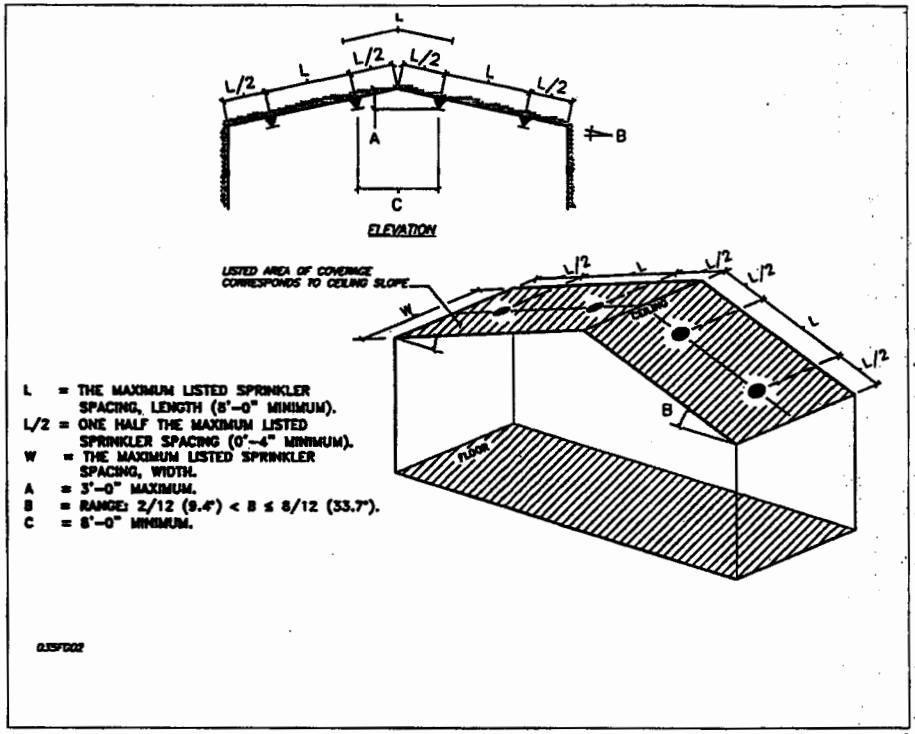
RFC 43 & RFC 49



RFC 43 & RFC 49

Note: F1 Res 49 CCP Pendent, RFC 43 and RFC 49 sprinklers are not suitable for installation in ceilings which have positive pressure in the space above.





Sprinkler spacing below multiple sloped ceilings with a maximum slope of $^{8}/_{12}$ (33.7°) pitch.

Model F1Res 49 Pendent & F1 Res 49 Recessed Pendent/F2 Installed below Sloped Ceiling.

Technical Data

Thread Size	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Escutcheon	Sprinkler Identification Number (SIN)
½" NPT (R½)	175 (12)	100 (38)	4.9 (69,94)	2.25" (57mm)	F2 (1/2" Adjustment)	R3516

Table 1 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 5/12 (33.7°) Pitch				Max. Slope of 4/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)		Pressure psi (bar)		Sprinkler Temp. Rating °F (°C) 155 (68) & 175 (79)	
	155°F (68°C)	175°F (79°C)	155°F (68°C)	175°F (79°C)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	13 (49)	13 (49)	7.0 (0,48)	7.0 (0,48)	13 (49)	7.0 (0,48)
14 x 14 (4,3 x 4,3)	13 (49)	13 (49)	7.0 (0,48)	7.0 (0,48)	13 (49)	7.0 (0,48)
16 x 16 (4,9 x 4,9)	13 (49)	13 (49)	7.0 (0,48)	7.0 (0,48)	13 (49)	7.0 (0,48)
18 x 18 (5,5 x 5,5)	17 (64,3)	18 (68,2)	12.0 (0,83)	13.5 (0,93)	18 (68,3)	13.5 (0,93)
20 x 20 (6,1 x 6,1)	20 (75,7)	21 (79,5)	16.7 (1,15)	18.4 (1,26)	20 (75,7)	16.7 (1,15)

Model F1Res 49 CCP Pendent Installed below Sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	CCP Assy. Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Sprinkler Identification Number (SIN)
½" NPT (R½)	155 (68)	135 (57)	175 (12)	100 (38)	4.9 (69,94)	2.25" (57mm)	R3516

Table 2 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 5/12 (33.7°) Pitch		Max. Slope of 4/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	14 (53)	8.2 (0,57)	13 (49)	7.0 (0,48)
14 x 14 (4,3 x 4,3)	14 (53)	8.2 (0,57)	13 (49)	7.0 (0,48)
16 x 16 (4,9 x 4,9)	14 (53)	8.2 (0,57)	14 (53)	8.2 (0,56)
18 x 18 (5,5 x 5,5)	23 (87)	22 (1,52)	20 (75,7)	17 (1,17)
20 x 20 (6,1 x 6,1)	23 (87)	22 (1,52)	21 (75,7)	17 (1,17)

Model F1Res 58 Pendent & F1 Res 58 Recessed Pendent/F2 Installed below Sloped Ceiling.

Technical Data

Thread Size	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Escutcheon	Sprinkler Identification Number (SIN)
½" NPT (R½)	175 (12)	100 (38)	5.8 (83,36)	2.25" (57mm)	F2 (½" Adjustment)	R3513

Table 3 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 5/12 (33.7°) Pitch				Max. Slope of 4/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)		Pressure psi (bar)		Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
	155°F (68°C)	175°F (79°C)	155°F (68°C)	175°F (79°C)	155°F (68°C)	155°F (68°C)
12 x 12 (3,6 x 3,6)	21 (79.5)	23 (87)	13.1 (0,9)	15.7 (1,1)		
14 x 14 (4,3 x 4,3)	21 (79.5)	23 (87)	13.1 (0,9)	15.7 (1,1)		
16 x 16 (4,9 x 4,9)	21 (79.5)	23 (87)	13.1 (0,9)	15.7 (1,1)		
18 x 18 (5,5 x 5,5)	23 (87)		15.7 (1,1)		20 (75,7)	12 (0,83)
20 x 20 (6,1 x 6,1)	23 (87)		15.7 (1,1)		20 (75,7)	12 (0,83)

Model F1Res 58 CCP Pendent Installed below sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	CCP Assy. Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Sprinkler Identification Number (SIN)
½" NPT (R½)	155 (68)	135 (57)	175 (12)	100 (38)	5.8 (83,36)	2.25" (57mm)	R3513

Table 4 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
18 x 18 (5,5 x 5,5)	20 (75,7)	12 (0,83)
20 x 20 (6,1 x 6,1)	20 (75,7)	12 (0,83)

Model RFC43 Pendent Flat Concealed Installed below Sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	Coverplate Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Max. Adjustment	Sprinkler Identification Number (SIN)
½" NPT (R½)	165 (74)	135 (57)	175 (12)	100 (38)	4.3 (61.4)	½" (13mm)	RA0612

Table 5 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 5/12 (33.7°) Pitch		Max. Slope of 4/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	18 (68)	17.5 (1.21)	13 (49)	9.1 (0,63)
14 x 14 (4,3 x 4,3)	18 (68)	17.5 (1.21)	13 (49)	9.1 (0,63)
16 x 16 (4,9 x 4,9)	18 (68)	17.5 (1.21)	13 (49)	9.1 (0,63)
18 x 18 (5,5 x 5,5)	24 (91)	31 (2,14)	18 (68)	17.5 (1.21)
20 x 20 (6,1 x 6,1)	24 (91)	31 (2,14)	21 (79)	23.8 (1,64)

Model RFC 49 Pendent Flat Concealed Installed below Sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	Coverplate Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Max. Adjustment	Sprinkler Identification Number (SIN)
½" NPT (R½)	165 (74)	135 (57)	175 (12)	100 (38)	4.9 (69,94)	½" (13mm)	RA0616

Table 6 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 5/12 (33.7°) Pitch		Max. Slope of 4/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
16 x 16 (4,9 x 4,9)	28 (106)	23 (19,3)		
18 x 18 (5,5 x 5,5)	29 (109,8)	29 (20,0)	18 (68)	13,5 (0,93)
20 x 20 (6,1 x 6,1)	30 (113,6)	30 (30,0)	23 (87)	22 (1,52)

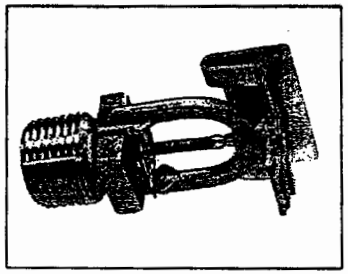
Installation Guidelines

1. For systems designed in accordance with NFPA 13, 13D and 13R, where specific UL Listed flows are not required, consult with the local Authority Having Jurisdiction regarding the number of design sprinklers for sloped ceilings having a pitch greater than (9.4°).
2. Installation of UL Listed residential sprinklers under sloped ceilings shall be limited to a type of unobstructed construction consisting of smooth ceilings, as defined by NFPA 13, having a maximum pitch of 4/12 (18.4°) or 8/12 (33.7°).
3. Spacing of residential sprinklers under sloped ceilings is measured along the slope when determining the distance off of walls and between sprinklers.
4. Measure listed areas of coverage along the sloped ceiling. The actual floor coverage area will be less than the listed area.
5. For coverage areas less than the listed coverage area shown in Tables 1 through 5, use the minimum flow requirement for the next largest listed coverage area.
6. Minimum spacing between pendent type sprinklers is 8 ft. (2.4 m). Minimum distance from a pendent type sprinkler and an adjacent wall is 4" (102 mm).
7. Residential sprinklers located closest to the peak of the ceiling shall have the deflectors located not more than 3 ft (1m) vertically down from the peak. Align deflectors parallel with the ceiling slope 1" to 4" (25mm to 102mm) below the sloped ceiling.
8. Hydraulic Requirements:
   a. For NFPA 13D Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of two sprinklers (where specific UL Listed flows are required) that requires the greatest hydraulic demand.
   b. For NFPA 13R Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of four (4) sprinklers (where specific UL Listed flows are required), that requires the greatest hydraulic demand.

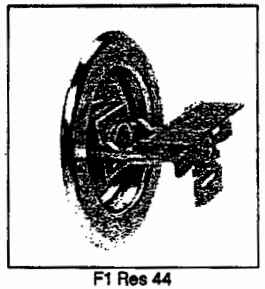
c. For NFPA 13 systems, the design area shall be the area that includes the four (4) hydraulically most demanding sprinklers. The minimum required discharge from each of the four hydraulically demanding sprinklers shall be the greater of the following:
   (1) In accordance with the minimum flow rates indicated by the individual listings (that already will provide a minimum density of 0.1 gpm/ft2); or
   (2) A calculated value based on delivering a minimum of 0.1 gpm/ft2 over the design area.

9. Because of the varied nature of residential construction features, there will be some compartment designs which cannot be fully sprinklered in accordance with NFPA 13, 13D, or 13R. In these instances, consult the Authority Having Jurisdiction (AHJ) for guidance and approval. This includes sloped ceilings having a pitch greater than 8/12 (33.7°).
10. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACE IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

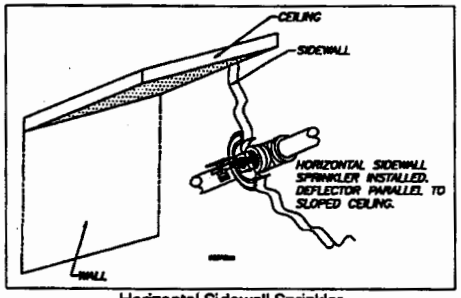
Model F1Res 44 and F1 Res 44 HSW/F2 Installed below Sloped Ceiling.



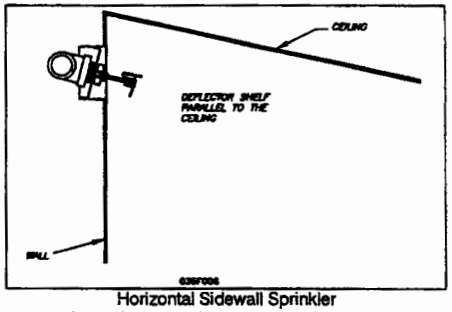
F1 Res 44
HSW



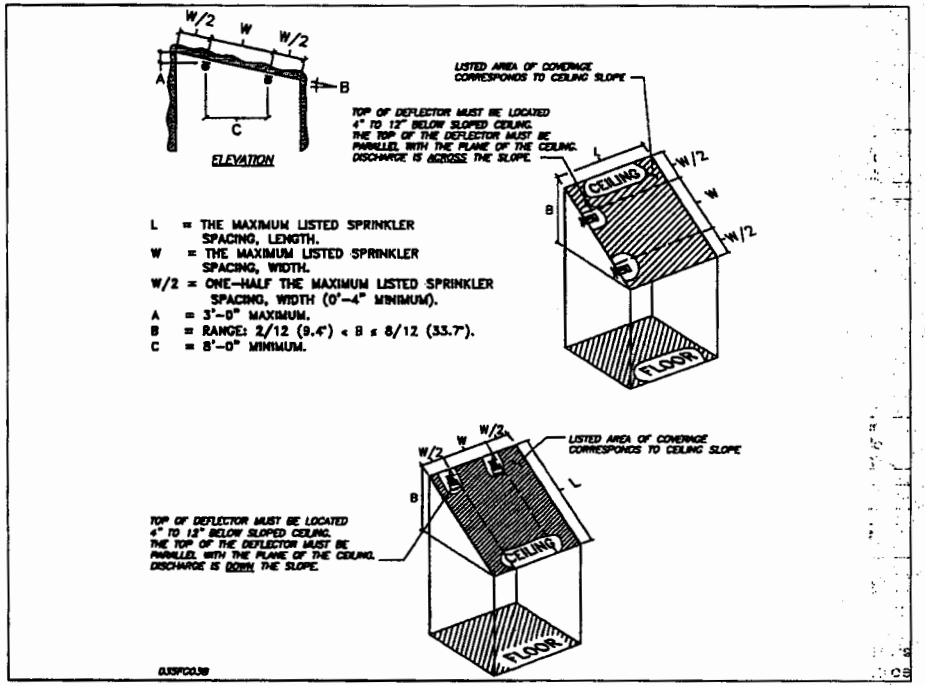
F1 Res 44
Recessed HSW/F2



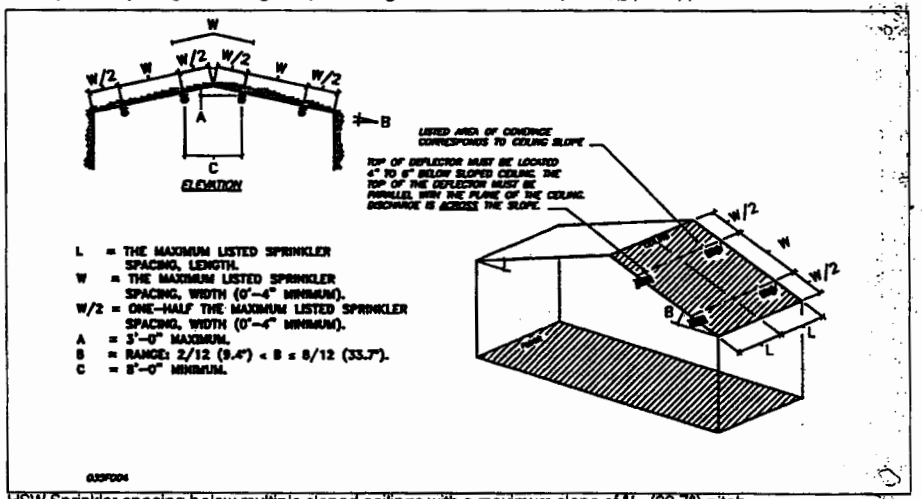
Horizontal Sidewall Sprinkler
(with discharge directed across the slope)



Horizontal Sidewall Sprinkler
(with discharge directed down the slope)



HSW sprinkler spacing below single sloped ceilings with a maximum slope of $^{8}/_{12}$ (33.7°) pitch.



HSW Sprinkler spacing below multiple sloped ceilings with a maximum slope of $^{8}/_{12}$ (33.7°) pitch.

Model F1RES 44 HSW & F1RES 44 HSW Recessed HSW/F2 installed below Sloped Ceiling.
Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Lenght	Escutcheon	Sprinkler Identification Number (SIN)
½" NPT (R½)	155 (68) 175 (79)	175 (12)	100 (38)	4.4 (62,8)	2.45" (62mm)	F2 (½" Adjustment)	R3531

Table 7 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (18.4°) Pitch			
	Discharge Directed Across the Slope 4" to 6" Deflector to Ceiling		Discharge Directed Across the Slope 6" to 12" Deflector to Ceiling	
	Min. Flow gpm (Lpm)	Pressure psi (bar)	Min. Flow gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	16 (60,5)	13.3 (0,92)	17 (64,3)	15 (1,04)
14 x 14 (4,3 x 4,3)	16 (60,5)	13.3 (0,92)	17 (64,3)	15 (1,04)
16 x 16 (4,9 x 4,9)	16 (60,5)	13.3 (0,92)	17 (64,3)	15 (1,04)
18 x 18 (4,9 x 5,5)	18 (68,1)	16,8 (1,16)	20 (75,6)	20,7 (1,43)
20 x 20 (4,6 x 6,1)	23 (68,1)	27,4 (1,89)	23 (68,1)	27,4 (1,89)

Table 8 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 8/12 (33.7°) Pitch					
	Discharge Directed Down the Slope 4" to 6" Deflector to Ceiling		Discharge Directed Down the Slope 6" to 12" Deflector to Ceiling		[2][3]Discharge Directed Across the Slope 4" to 12" Deflector to Ceiling	
	[1] Min. Flow gpm (Lpm)	Pressure psi (bar)	[1] Min. Flow gpm (Lpm)	Pressure psi (bar)	[1] Min. Flow gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	12 (45,4)	7,6 (0,52)	17 (53,0)	10,2 (0,71)	16 (60,6)	13,3 (0,92)
14 x 14 (4,3 x 4,3)	14 (53,0)	10,2 (0,71)	16 (60,6)	13,3 (0,92)	16 (60,6)	13,3 (0,92)
16 x 16 (4,9 x 4,9)	16 (60,6)	13,3 (0,92)	17 (64,4)	15 (1,04)	16 (60,6)	13,3 (0,92)
18 x 18 (4,9 x 5,5)	18 (68,1)	16,8 (1,16)	20 (75,6)	20,7 (1,43)		
20 x 20 (4,6 x 6,1)	23 (72,0)	27,4 (1,89)	23 (87,1)	27,4 (1,89)		

[1] Minimum flow per sprinkler gpm (Lpm).
[2] Minimum 3 head design in a compartment.
[3] 155°F only.

Installation Guidelines

1. For systems designed in accordance with NFPA 13, 13D and 13R, where specific UL Listed flows are not required, consult with the local Authority Having Jurisdiction regarding the number of design sprinklers for sloped ceilings having pitch greater than (9.4°).
2. Installation of UL Listed residential sprinklers under sloped ceilings shall be limited to a type of unobstructed construction consisting of flat, smooth ceilings, as defined by NFPA 13, having a maximum pitch of 4/12 (18.4°) or 8/12 (33.7°).
3. Where listed, install horizontal sidewall sprinklers along the wall below the sloped ceiling when discharge is directed across the slope, and install at the peak below the sloped ceiling when discharge is directed down the slope. Always align the sprinkler deflector parallel with the direction of the sloped ceiling.
4. Residential HSW sprinklers located closed to the peak of the ceiling shall have the deflectors located not more than 3 ft. (1m) vertically down from the peak.
5. Spacing of residential HSW sprinklers under sloped ceilings is measured along the slope when determining the distance off of walls and between sprinklers.
6. Measure listed areas of coverage along the sloped ceiling. The actual floor coverage area will be less than the listed area.
7. For coverage areas less than the listed coverage area shown in Tables 1 through 8, use the minimum flow requirement for next largest listed coverage area.
8. Minimum spacing between horizontal sidewall sprinklers is 8 ft. (2.4 m). Minimum distance from a horizontal sidewall sprinkler and an adjacent wall is 4" (102 mm).
9. Hydraulic Requirements:
   a. For NFPA 13D Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of two sprinklers (where specific UL Listed flows are required) that requires the greatest hydraulic demand.
   b. For NFPA 13R Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of four (4) sprinklers (where specific UL Listed flows are required), that requires the greatest hydraulic demand.
   c. For NFPA 13 systems, the design area shall be the area that includes the four (4) hydraulically most demanding sprinklers. The minimum required discharge from each of the four hydraulically demanding sprinklers shall be the greater of the following:
      (1) In accordance with the minimum flow rates indicated by the individual listings (that already will provide a minimum density of 0.1 gpm/ft2); or
      (2) A calculated value based on delivering a minimum of 0.1 gpm/ft2 over the design area.
10. Because of the varied nature of residential construction features, there will be some compartment designs which cannot be fully sprinklered in accordance with NFPA 13, 13D, or 13R. In these instances, consult the Authority Having Jurisdiction (AHJ) for guidance and approval. This includes sloped ceilings having a pitch greater than 8/12 (33.7°).
11. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACE IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

Model F1 res 49 Pendent, F1 Recessed Pendent/F2, F1Res 49 Concealed (CCP), RFC 49 and RFC 43 installed below sloped ceiling with a maximun slope of 8/12 (33.7°) pitch.

Table 9 - Application

Model	K - Factor (metric)	Max. Spacing Ft. x Ft (m x m)	Min. Flow/Pressure gpm (lpm) / psi (bar)	Sprinkler Temperature Rating °F (°C)	Coverplate Temperature Rated°F (°C)
F1 Res 49Pendent	4.9 (69,94)	10 x 10 (3 x 3)	13(49) / 7.0(0,48)	155 (68)	–
F1 Res 49 Recessed Pendent/F2	4.9 (69,94)	10 x 10 (3 x 3)	13(49) / 7.0(0,48)	155 (68)	–
F1 Res 49CCP Pendent	4.9 (69,94)	10 x 10 (3 x 3)	13(49) / 7.0(0,48)	155 (68)	135 (57)
RFC49Pendent	4.9 (69,94)	10 x 10 (3 x 3)	14(53) / 8.2(0,57)	165 (74)	135 (57)
RFC43Pendent	4.3 (61,4)	10 x 10 (3 x 3)	18(68) / 17.5(1,21)	165 (74)	135 (57)

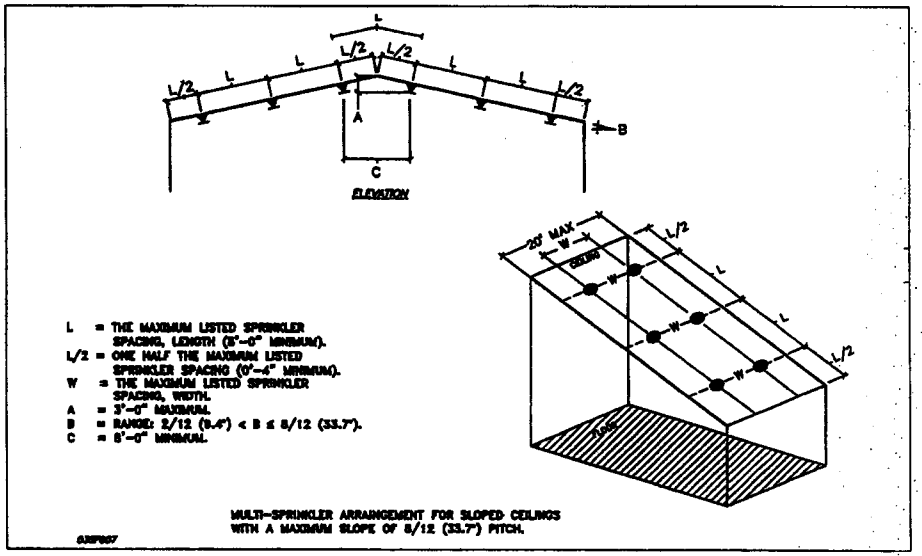


Fig. 7

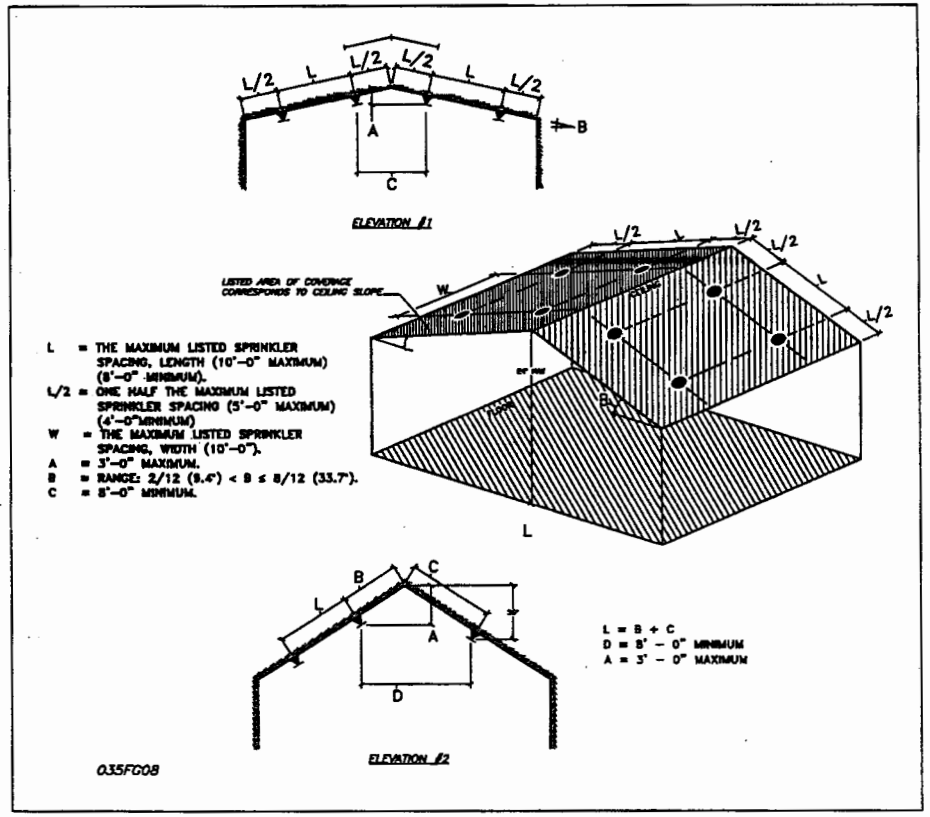


Fig. 8

Installation Guidelines per UL1626A

1. For systems designed in accordance with NFPA 13, 13D and 13R, where specific UL Listed flows are not required, consult with the local Authority Having Jurisdiction regarding the number of design sprinklers for sloped ceilings having pitch greater than (9.4°).
2. Installation of UL Listed residential sprinklers under sloped ceilings shall be limited to a type of unobstructed construction consisting of smooth ceilings, as defined by NFPA 13, having a maximum pitch of 8/12 (33.7°).
3. Spacing of residential sprinklers under sloped ceilings is measured along the slope when determining the distance off of walls and between sprinklers.
4. Measure listed areas of coverage along the sloped ceiling. The actual floor coverage area will be less than the listed area.
5. For coverage areas less than the listed coverage area shown in Tables 8, use the minimum flow requirement listed.
6. Minimum spacing between pendent type sprinklers is 8 ft. (2.4 m). Minimum distance from a pendent type sprinkler and an adjacent wall is 4" (102 mm).
7. Reidential sprinklers located closest to the peak of the ceiling shall have the deflectors located not more than 3 ft (1 m) vertically down from the peak. Align deflectors parallel with the ceiling slope 1" to 4" (25mm to 102mm) below the slope ceiling.
8. Hydraulic Requirements:
   a. For UL1626A, the number of design sprinklers shall include up to a maximum of two sprinklers that requires the greatest hydraulic demand.
9. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACE IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.
10. A maximum distance from the floor to the ceiling peak of 24 ft.
11. A maximum of two sprinklers installed within 3 ft. vertically of the peak.
12. Installation is for smooth, flat ceilings only that do not extend into or serve as a ceiling for an upper level floor in the structure.

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Reliable®

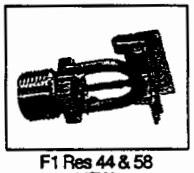
Model F1 Res and RFC Residential Sprinkler Design and Installation Guide

Bulletin 140 Rev.I

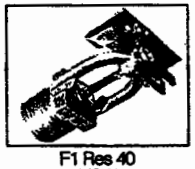

F1 Res 49, 58 & 76 Pendent


F1 Res 49, 58 & 76 Recessed Pendent / F1


F1 Res 49, 58 & 76 Recessed Pendent / FP

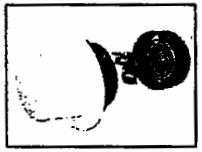

F1 Res 44 & 58 HSW


F1 Res 44 & 58 Recessed HSW/F2


F1 Res 40 HSW


F1 Res 40 Recessed HSW/F2


F1 Res 49, 58 & 76 CCP Pendent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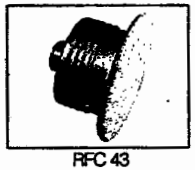
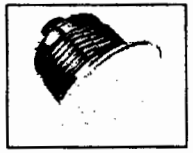

RFC 43


RFC 56

Sprinkler Model and Type	Sprinkler Identification Number	Reliable Bulletin Number
F1 Res 49 Pendent F1 Res 49 Recessed Pendent/F1 F1 Res 49 Recessed Pendent/FP F1 Res 49 Concealed Pendent/CCP	R3516	Horizontal Ceilings – 135 Sloped Ceilings - 035
F1 Res 58 Pendent F1 Res 58 Recessed Pendent/F1 F1 Res 58 Recessed Pendent/FP F1 Res 58 Concealed Pendent/CCP	R3513	Horizontal Ceilings - 135
RFC43 Concealed Pendent	RA0612	Horizontal Ceilings – 006 Sloped Ceilings – 035
RFC56 Concealed Pendent	RA0914	Horizontal Ceilings – 009
F1 Res 44 Horizontal Sidewall F1 Res 44 Recessed Horizontal Sidewall	R3531	Horizontal Ceilings – 135 Sloped Ceilings - 035
F1 Res 44 SWC Concealed Horizontal Sidewall	R3531	Horizontal Ceilings – 135
F1 Res 58 Horizontal Sidewall F1 Res 58 Recessed Horizontal Sidewall/F2	R3533	Horizontal Ceilings - 135
F1 Res 40 Horizontal Sidewall F1 Res 40 Recessed Horizontal Sidewall/F2	R3538	Horizontal Ceilings – 135 Sloped Ceilings - 035
F1 Res 76 Pendent F1 Res 76 Recessed Pendent/F1 F1 Res 76 Recessed Pendent/FP F1 Res 76 Concealed Pendent/CCP	R7618	Horizontal Ceilings – 135, 176

Table A
Model F1 Res and Model RFC Residential Sprinklers

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

General

Reliable residential sprinklers utilize a fast response thermal element and are intended for use in only wet-pipe residential sprinkler systems designed in accordance with the following NFPA standards: NFPA 13D, Installation of Sprinkler Systems for One-and Two-Family Dwellings and Manufactured Homes; NFPA 13R, Installation of Sprinkler Systems for Residential Occupancies Up to and Including Four Stories in Height; and for the residential portions of any occupancy as permitted by NFPA 13, Installation of Sprinkler Systems. Fast response and high wall wetting characteristics of residential sprinklers improve life safety by maintaining a tenable environment, providing escape time for occupants.

NFPA 13D is appropriate for protection against fire hazards only in one-and two-family dwellings and manufactured homes. Residential portions of any other type of building or occupancy should be protected with residential sprinklers in accordance with NFPA 13, or in accordance with NFPA 13R. NFPA 13R is appropriate for use as an option to NFPA 13 only in those residential occupancies up to and including four stories in height. Where buildings are greater than four stories in height, or where buildings are of mixed use where residential is not the predominant occupancy, protect residential portions of such buildings with residential or quick response sprinklers in accordance with NFPA 13.

This document provides design guidelines for the Model F1/Res and RFC Residential Sprinklers shown in Table A, which are cULus Listed to provide a minimum density of 0.05 gpm/ft², in accordance with the above-mentioned standards, manufacturer's instructions, and technical bulletins. Where documentation for residential sprinkler systems does not exist for particular applications, information based on NFPA 13 is used.

Residential fire sprinkler systems should only be designed and installed by competent individuals trained and experienced with automatic sprinkler system design and installation. Several criteria may apply to a given installation and the designer and/or installer must be familiar with the applicable codes, standards, and guidelines governing such an installation. The Reliable Model F1/Res and RFC residential sprinklers described herein must be installed and maintained in compliance with this document manufacturer's recommendations, with the latest published standards of the National Fire Protection Association (NFPA), and with any additional local jurisdictional requirements. Failure to comply may result in the impairment of sprinkler integrity and proper operation. Because of the various features of residential type architecture, there will be some compartment designs which cannot be fully sprinklered in accordance with the recommendations of NFPA 13, 13D, or 13R. In these instances, consult the Authority Having Jurisdiction for guidance and approval.

The owner is responsible for maintaining their fire protection system and associated devices in proper operating condition. Refer to NFPA 25, Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, for guidance on testing and maintenance of automatic sprinkler systems.

Approvals

All Reliable residential sprinklers have been designed and tested in accordance with the Third **Edition of Underwriters Laboratories (UL) 1626**, Standard for Residential Sprinklers for Fire Protection Service. Typically, they are cULus Listed for installation under smooth, flat ceilings of unobstructed construction, unless otherwise noted in the specific listings, with specific approved spacing, flows, and pressures. Reliable residential sprinklers are cULus Listed for installation on both horizontal ceilings with a maximum slope of 2/12 (9.4°) pitch, and sloped ceilings having maximum slopes of 4/12 (18.4°) and 8/12 (33.7°) pitch. The design criteria for residential sprinklers contained in the current NFPA 13D, 13R, and 13 Standards must be followed except as modified by the individual UL 1626 listing information, the information in the Reliable residential sprinkler bulletins, and this installation guide. The Authority Having Jurisdiction (AHJ) must make final approval for all residential sprinkler installations for compliance with all applicable codes, standards, and jurisdictional requirements.

One of the most important revisions of the Third Edition of UL 1626 is the new minimum density requirement for residential sprinklers manufactured after July 12, 2002. When establishing a minimum cULus Listed flow rate, the manufacturer must use a minimum discharge rate over the specified coverage area corresponding to a 0.05 gpm/ft² density. In some cases, however, to successfully pass the UL 1626 fire tests, the UL Listed flow rate may be greater than the calculated 0.05 gpm/ft² density. Increased flow rates for horizontal sidewall type sprinklers, which exceed this minimum density, is common. Because this minimum density is a listing requirement, the use of residential sprinklers meeting this criterion is

applicable to all editions of NFPA 13, 13R and 13D. The design criteria for residential sprinklers contained in the current NFPA Standards must be followed except as modified by the individual cULus Listing information provided in the technical bulletins referenced in Table A.

Definitions

The following NFPA definitions are applicable to the terms used in this installation guide. Where terms are not included, refer to NFPA 13, NFPA 13D and NFPA 13R for official definitions:

Residential Sprinkler – A type of fast-response sprinkler that has a thermal element with an RTI of 50 (m-s)$^{1/2}$ or less, has been specifically tested for its ability to enhance survivability in the room of fire origin and listed for use in the protection of dwelling units. Residential sprinklers posses a fast response thermal element and produce a spray pattern that discharges water higher on the wall than a standard spray sprinkler.

Dwelling – Any building that contains not more than one or two dwelling units intended to be used, rented, leased, let or hired out to be occupied or that are occupied for habitation purposes.

Dwelling Unit – One or more rooms, arranged for the use of one or more individuals living together, as in a single housekeeping unit, that normally have cooking, living, sanitary, and sleeping facilities. Dwelling units include hotel rooms, dormitory rooms, condominiums, apartments, and similar living units.

Compartment – A compartment is a space completely enclosed by walls and a ceiling. The compartment enclosure is permitted to have openings (in walls) to an adjoining space, provided that soffits or lintels along the ceiling over the compartment opening has a minimum depth of 8 in. (203mm) from the ceiling. In other words, areas such as hallways, stairwells, and rooms must be separated by beams, lintels or soffits 8 or more inches in depth to be considered single compartments.

Obstructed Construction – Panel construction and other construction where beams, trusses, or other members impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire. See NFPA 13 Appendix for detailed explanations of this type of construction.

Unobstructed Construction – Construction where beams, trusses, or other members do not impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire. This type of construction has the following features: (1) horizontal structural members that are not solid; (2) openings of the structural members are at least 70% of the cross sectional area; (3) depth of the structural members do not exceed the least dimension of the openings; or (4) the spacing of structural members exceeds 7.5 feet on center. See NFPA 13 Appendix for detailed explanations of this type of construction.

Flat Ceiling – a continuous ceiling in a single plane.

Smooth Ceiling – A continuous ceiling free from significant irregularities, lumps or indentations.

Horizontal Ceiling – A ceiling that does not exceed a slope of 2/12 pitch (slope of 16.7% or 9.4°).

Sloped Ceiling – A ceiling exceeding a maximum slope of 2/12 (9.4°) pitch.

Installation Considerations

Residential sprinklers utilizing a glass bulb thermal element have orange protective caps and straps to provide temporary protection to the frangible glass bulb during shipping and installation.

a. Do not install any bulb type sprinkler if the bulb is cracked or there is liquid missing from the bulb. While holding the sprinkler in the horizontal position, a small air bubble having an approximate diameter of 1/16" should be visible.
b. The sprinkler is designed for installation with the protective strap in place using the appropriate sprinkler wrench.
c. Sprinklers that are dropped during the installation process or that are installed on piping other than that in accordance with item "a" shall be replaced, including sprinklers with protective caps or straps.
d. Protective caps and straps shall be removed only using means in accordance with the manufacturer's installation instructions. They are not to be left on the sprinkler after the sprinkler system is placed in service.
e. Protective caps and straps shall be removed only when water supply is made available to the sprinkler for the purposes of fire protection and placed in service.
f. A leak-tight ½" NPT sprinkler joint should be obtained with a maximum torque of 14 ft-lbs to 21 ft-lbs. (approximately 2 turns past hand tight. Do not over tighten). Higher levels of torque may distort the sprinkler inlet or bend the frame, causing leakage or impairment of the sprinkler.

Where applicable, escutcheon plates must be installed. Absence of an escutcheon plate, where there is an annular space between the ceiling and the sprinkler, may delay sprinkler operation in the event of a fire.

Never introduce any leak stopping additives to any fire sprinkler system.

Residential sprinklers must be installed with the manufacturer's specified sprinkler wrench. Channel locks, crescent wrenches or anything other than the proper sprinkler wrench shall not be used.

Installing sprinklers in CPVC and copper piping systems require special considerations. Never install the sprinkler into the reducing fitting prior to attaching the reducing fitting to the system piping. When installing residential sprinklers or commercial sprinklers in a CPVC piping system, sprinklers must be installed only after the reducing fitting has been installed and the CPVC manufacturer's setting time for the primer and/or cement has passed. This is to ensure that the cement does not accumulate within the sprinkler. In copper piping systems, sprinklers must be installed only after the inside of the sprinkler drop and associated fittings have been wire-brushed to remove any residual flux.. Residual flux can cause corrosion. Both of these conditions can impair and prevent proper sprinkler operation.

System Design Criteria

Permitted Sprinklers for Residential Sprinkler Systems

For NFPA 13D and 13R sprinkler systems, only listed residential sprinklers shall be used, with the following exceptions:

1. Listed standard dry-pendent or dry sidewall sprinklers shall be permitted to be extended into unheated areas not intended for living purposes.
2. Quick-response sprinklers shall be permitted to be used in mechanical closets.
3. For NFPA 13R systems, listed quick-response sprinklers shall be permitted to be installed in dwelling units meeting the definition of a compartment where no more than four (4) sprinklers are located within the dwelling unit.

Non-residential sprinklers are to be installed in accordance with the criteria specified by NFPA 13.

Residential Sprinkler Positioning and Spacing Requirements

When locating residential sprinklers, consideration must be given to sensitivity, sprinkler spacing, obstructions to discharge, temperature rating, and proximity to heat sources.

Sprinkler Sensitivity - Deflector Positioning

Residential pendent sprinklers not listed with specific positioning criteria must be positioned so that the deflectors are within 1 in. to 4 in. (25.4 mm to 102 mm) from the ceiling. On flat, horizontal ceilings, Reliable Model F1 Res 49 pendent and recessed pendent sprinklers may also be positioned with the deflector 4" to 8" (102 mm to 203 mm) from the ceiling, in accordance with the listed flows and pressures shown in Bulletin 135.

If located in closets, it is permitted to install pendent sprinklers so that the deflector is within 12 inches (305 mm) of the ceiling. Residential sidewall sprinklers that have not been listed with specific positioning criteria must be positioned so that the deflectors are within 4 in. to 6 in. (102 mm to 152 mm) from the ceiling. Install sidewall sprinklers having listed positioning criteria in accordance with their listing. Under both horizontal and sloped ceilings, always align sprinkler deflectors so that the deflector is parallel with the plane of the ceiling surface.

Sprinkler Spacing Under Horizontal Ceilings

Several maximum coverage areas are used for residential sprinklers in accordance with minimum listed flows and pressures. The area of coverage must be equal to or greater than both the length and width of the hazard area. Residential sprinklers must be located not more than half the listed spacing nor less than 4" (102 mm) from walls. Adjacent sprinklers must be located no farther apart than the listed spacing; the minimum distance to prevent cold soldering, unless otherwise specified, is 8 feet (2.44 m).

When selecting an area of coverage, the suggested practice is to select one that can be adequately supplied by the available water supply, allowing for the installation of as few sprinklers as possible while observing all guidelines pertaining to obstructions and spacing. After selection of an area of coverage, sprinklers must be spaced according to the criteria set forth in the NFPA standards and this document.

Sprinkler Spacing Under Sloped Ceilings

For installation under sloped ceilings, several maximum coverage areas are also provided, but at different minimum flows and pressures than those for horizontal ceilings. The spacing of sprinklers is measured along the slope when determining the distance off of walls and between sprinklers. Residential sprinklers may be located no more than ½ the listed spacing nor less than 4" (102 mm) from the peak of the sloped ceiling. Residential sprinklers located at the highest elevation must not be located more than 3 feet (0.9 m) measured vertically down from the peak. Refer to Reliable Bulletin 035 for listed coverage areas, flow and pressure requirements, and positioning criteria for residential sprinklers installed under sloped ceilings.

Obstruction to Water Distribution

Refer to Figures 1 through 13 for the location of sprinklers relative to obstructions. The discharge from residential sprinklers is directed radially outward and downward from the sprinkler. Sprinklers must be located such that there will not be any spaces shielded from distribution by walls, dividing partitions, or other dwelling construction features. If the sprinkler water distribution pattern is obstructed, the obstruction is to be considered the maximum distance of coverage for a given sprinkler. Additional sprinklers beyond the obstruction may be necessary unless the obstruction criteria contained herein can be met. Consult the appropriate NFPA standard and/or the AHJ for guidance regarding these situations.

Reliable flat plate concealed sprinklers, the Models RFC 43 and RFC 56, utilize a drop-down style deflector. The distance the deflector drops below the ceiling is needed when determining the position of the deflector above the bottom of an obstruction. These distance are as follows:

- Nonadjusted (cover plate flush to cup) - 7/8" (22mm)
- At full (½") adjustment - ⅜" (9.5mm)

Continuous and Noncontinuous Obstructions

A minimum distance is required to be maintained between sprinklers and continuous obstructions, such as beams, soffits, and long horizontal light fixtures. See Figures 1, 2, 4, 5, 6, 7 and/or 13.

A minimum distance is also required to be maintained between sprinklers and noncontinuous obstructions, such as ceiling fans and certain light fixtures. The ceiling fan motor housing is the primary element that can obstruct the sprinkler discharge pattern. Testing has demonstrated that no adverse effects occur as a result of the ceiling fan's blade rotation in either direction.

With regards to location of sprinklers near light fixtures, there are two considerations; the amount of heat the light gives off and the light fixture as an obstruction. The minimum distance of a sprinkler relative to the light as a heat source is given in Table B. If the light is also an obstruction, then the obstruction criteria must be applied, relative to the minimum distance required from Table B.

For noncontinuous obstructions, apply the "four times rule" as provided in NFPA 13 where it is determined that the sprinkler can spray to at least two sides of the obstruction, either over and under or around the obstruction on both sides. Sprinklers shall be positioned away from the obstruction a minimum distance of four times the maximum dimension of the obstruction. The maximum clear distance required shall be 36" (914mm).

Temperature Ratings

Ordinary temperature rated sprinklers (135°F [57°C], 155°F [57°C]) are only permitted for installation where the maximum ambient ceiling temperature will not exceed 100°F (38°C). Where ambient ceiling temperatures are expected to exceed 100°F (38°C), use intermediate temperature-rated residential sprinklers (175°F [79°C]), which can be exposed to a maximum ambient temperature of 150°F (66°C). The following practices apply, unless higher expected ambient temperatures require a higher temperature rated sprinkler:

1. Sprinklers under glass or plastic skylights exposed to direct rays of the sun shall be of the intermediate temperature classification.
2. Sprinklers in an unventilated concealed space under insulated roof or in an unventilated attic shall be of the intermediate temperature classification.
3. Residential sprinklers must be located so as to prevent inadvertent operation due to exposure to normal heat sources. Sprinklers must be positioned a sufficient distance away from heat sources such as fireplaces, ovens, kitchen ranges, hot water pipes, water heaters, furnaces and associated ductwork, and light fixtures. The following minimum distances in accordance with NFPA 13D and 13R must be maintained as indicated in Table B.

Table B – Minimum Distances for Ordinary and Intermediate Residential Sprinklers Relative to Specific Heat Sources

Heat Source	Minimum Distance from Edge of Source to Ordinary Temperature Sprinkler (135°F or 155°F)	Minimum Distance from Edge of Source to Intermediate Temperature Sprinkler (175°F)
	in. (mm)	in. (mm)
Side of open or Recessed fireplace	36 (914)	12 (305)
Front of recessed fireplace	60 (1524)	36 (914)
Coal or wood-burning stove	42 (1067)	12 (305)
Kitchen range	18 (457)	9 (229)
Wall oven	18 (457)	9 (229)
Hot air flues	18 (457)	9 (229)
Uninsulated heat ducts	18 (457)	9 (229)
Uninsulated hot water pipes	12 (305)	6 (152)
Side of ceiling or wall-mounted hot air diffusers	24 (607)	12 (305)
Front of wall-mounted hot air diffusers	36 (914)	18 (457)
Hot water heater or furnace	6 (152)	3 (76)
Light Fixture 0 W – 250 W 250 W – 499 W	 6 (152) 12 (305)	 3 (76) 6 (152)

Hydraulic Design Requirements

Reliable residential sprinkler listings indicate minimum flow rates for each specified coverage area. Hydraulic calculations are required to verify adequate water supply at the hydraulically most remote single sprinkler operating at the minimum flow and pressure listed for single-sprinkler operation. Where a compartment has more than one sprinkler, multiple sprinkler calculations are required, and each sprinkler must be calculated flowing identical minimum flow rates. No reduction in minimum flow requirements is provided for flowing multiple sprinklers. More design sprinklers may need to be calculated than the minimum stated by the NFPA standards where unusual conditions may result in more sprinklers operating. These conditions include sloped ceilings having a pitch greater than 8/12 (33.7°) or beamed ceilings qualifying as obstructed construction, as defined by NFPA 13. Consult with the AHJ regarding the number of "design sprinklers" for these types of applications.

NFPA 13D

The number of design sprinklers under flat, smooth, horizontal ceilings shall include all sprinklers within a compartment, up to a maximum of two (2) sprinklers, that requires the greatest hydraulic demand. The cULus Listed specific coverage criteria for systems designed to NFPA 13R are given in the technical bulletins referenced in Table A, as a function of the maximum allowable coverage area and temperature rating. For actual coverage areas less than or between those indicated in the respective bulletin, it is necessary to use the minimum required flow for the next largest area, as shown above.

For example, assuming the use of a pendent sprinkler, for an actual coverage area of 12 ft x 14 ft (3.7 m x 4.2 m), the specific coverage criteria for a 14 ft x 14 ft (4.2 m x 4.2 m) coverage area must be used. For an actual coverage area of 15 ft x 15 ft (4.6 m x 4.6 m), the specific coverage criteria for a 16 ft x 16 ft (4.9 m x 4.9 m) coverage area must be used.

NFPA 13R

The number of design sprinklers under flat, smooth, horizontal ceilings shall include all sprinklers within a compartment, up to a maximum of four (4) sprinklers, that requires the greatest hydraulic demand. The cULus Listed specific coverage criteria for systems designed to NFPA 13R are given in the technical bulletins referenced in Table A, as a function of the maximum allowable coverage area and temperature rating. For actual coverage areas less than or between those indicated in the respective bulletin, it is necessary to use the minimum required flow for the next largest area, as shown above.

NFPA 13

For residential sprinkler systems designed to NFPA 13, a minimum density of 0.1 gpm/ft2 must be provided over the "design area" that includes the four (4) hydraulically most demanding sprinklers for the actual coverage areas being protected by the 4 sprinklers. The minimum required discharge from each of the four most hydraulically demanding sprinklers shall be the greater of the following:

1. The flow rates given in the Reliable Residential Sprinkler Technical Bulletins referenced in Table A for NFPA 13D and 13R as a function of temperature rating and maximum allowable coverage area (for actual coverage areas less than or between those indicated in the respective technical bulletin, it is required to use the minimum required flow for the next largest coverage area); or
2. A minimum discharge density of 0.1 gpm/ft² applied over the "design area" consisting of the four most hydraulically demanding sprinklers for the actual coverage areas being protected by the four sprinklers. The maximum dimension of the actual coverage area cannot be any greater than the maximum coverage area indicated in the technical bulletins referenced in Table A.

Design Note: Using the $A_s = S \times L$ method to determine the sprinkler protection area of coverage in accordance with NFPA 13, apply the 0.1 gpm/ft² density to this area to determine the minimum required flow. Compare this flow to the minimum 0.05 gpm/ft² cULus Listed flow for the appropriate coverage area in the technical bulletin for the specific residential sprinkler. If the flow stated in the technical bulletin is less than the calculated 0.1 gpm/ft² density flow required, the .1 density flow must then be used in the equation $Q=K\sqrt{P}$, solving for P, to establish the minimum required pressure using the sprinkler K-factor. **Note:** In many cases the listed flow of individual residential sprinklers may exceed the required minimum 0.05 gpm/ft² density. Reliable has available residential sprinklers with larger K-factors (K=5.6 and K=5.8) that will provide lower pressure demands for 0.1 gpm/ft² densities in NFPA 13 residential applications.

Example No. 1

If a room is 12 ft wide x 20 ft long (3.6 m x 6.1 m), the coverage area being considered would be 240 ft² (22.3 m²). Using an F1 Res 49 pendent sprinkler (1"-4" ceiling-to-deflector distance), the flow for a 20 ft x 20 ft (6.1 m x 6.1 m) coverage area is 20 gpm @ 16.7 psi (75.7 L/min @ 1.14 bar). However, based on a discharge density of 0.1 gpm/ft², the flow rate required would be 24 gpm (90.8 L). Therefore, 24 gpm (90.8 L/min) would be the minimum flow required for each design sprinkler. The corresponding pressure would be 24 psi (1.65 bar)

Example No. 2

If a room is 10 ft wide x 20 ft long (3.0 m x 6.1 m), the coverage area being considered would be 200 ft² (18.6 m²). Using an F1 Res 58 pendent sprinkler (1"-4" ceiling-to-deflector distance), the flow for a 20 ft x 20 ft (6.1 m x 6.1 m) coverage area is 22 gpm @ 14.4 psi (83.3 L/min @ 0.99 bar). Based on a discharge density of 0.1 gpm/ft², the flow rate required would only be 20 gpm (75.7 L/min). However, the flow of 22 gpm must still be used as the minimum flow for each design sprinkler, since this is the minimum cULus Listed flow for this sprinkler at the 20 ft x 20 ft coverage area.

Example No. 3

For a situation where the coverage area per sprinkler is 16 ft x 8 ft (4.9 m x 2.4 m), or 128 ft² (11.9 m²), the F1 RES 44 HSW, having a temperature rating of 155°F (68°C) and positioned 4" to 6" (101 mm to 152 mm) below the ceiling, requires a minimum flow of 16 gpm @ 13.3 psi (60.6 L/min @ .92 bar) for a 16 ft x 16 ft (4.9 m x 4.9 m) coverage area. Based on a minimum discharge of 0.1 gpm/ft², the flow rate needed would only be 12.8 gpm @ 10.2 psi (48.4 L/min @ 0.7 bar). However, the flow rate of 16 gpm (60.6 L/min) must still be used for each design sprinkler.

Sloped Ceilings

Specific UL Listed flows, pressures and coverage areas for sloped ceilings are provided in Reliable Bulletin 035. Refer to this bulletin for hydraulic design requirements. The number of design sprinklers is the same as that specified for hortzontal ceilings, with the exception of the Model F1Res 40 HSW & F1Res 44 HSW. These sprinklers require a minimum 3 sprinkler design in a compartment when discharging across the slope, as specified in Bulletin 035.

For systems designed to NFPA 13, 13D or 13R, where specific cULus Listed flows for sloped ceilings are not required, consult with the AHJ regarding the number of "design sprinklers" for sloped ceilings having a pitch greater than 2 in 12 (9.4°). cULus Listed flows and pressures do not exist for sloped ceilings having a pitch greater than 8/12 (33.7°). Again, consult with the AHJ regarding the number of "design sprinklers" for these types of applications. Listed areas of coverage must correspond to ceiling slope, and spacing of sprinklers under sloped ceilings is measured along the slope when determining distance off of walls and between sprinklers.

Care and Maintenance

It is recommended that automatic sprinkler systems be inspected and maintained in accordance with the criteria set forth in NFPA 25, Inspection, Testing and Maintenance of Water-Based Fire Protection Systems by a qualified inspection service.

Do not clean the sprinklers with soap and water, detergents, ammonia, or any other cleaning fluid. Remove dust by using a soft brush or feather duster, or by gentle vacuuming with a soft bristle brush.

Any sprinklers that have operated, been damaged or been painted outside of the factory shall be replaced with a new sprinkler. The new sprinkler shall have the same performance characteristics as the original sprinkler; that is the same temperature rating, nominal K-factor, coverage area, and the same or lower flow rate requirements.

Wet-pipe sprinkler systems must be maintained at a minimum temperature of 40°F (4°C). Exposure to freezing temperatures can damage system piping and residential sprinklers.

Do not hang anything from sprinklers or sprinkler piping. Do not put curtains, drapes or valences around sprinklers. Doing so will obstruct the discharge pattern of the sprinkler.

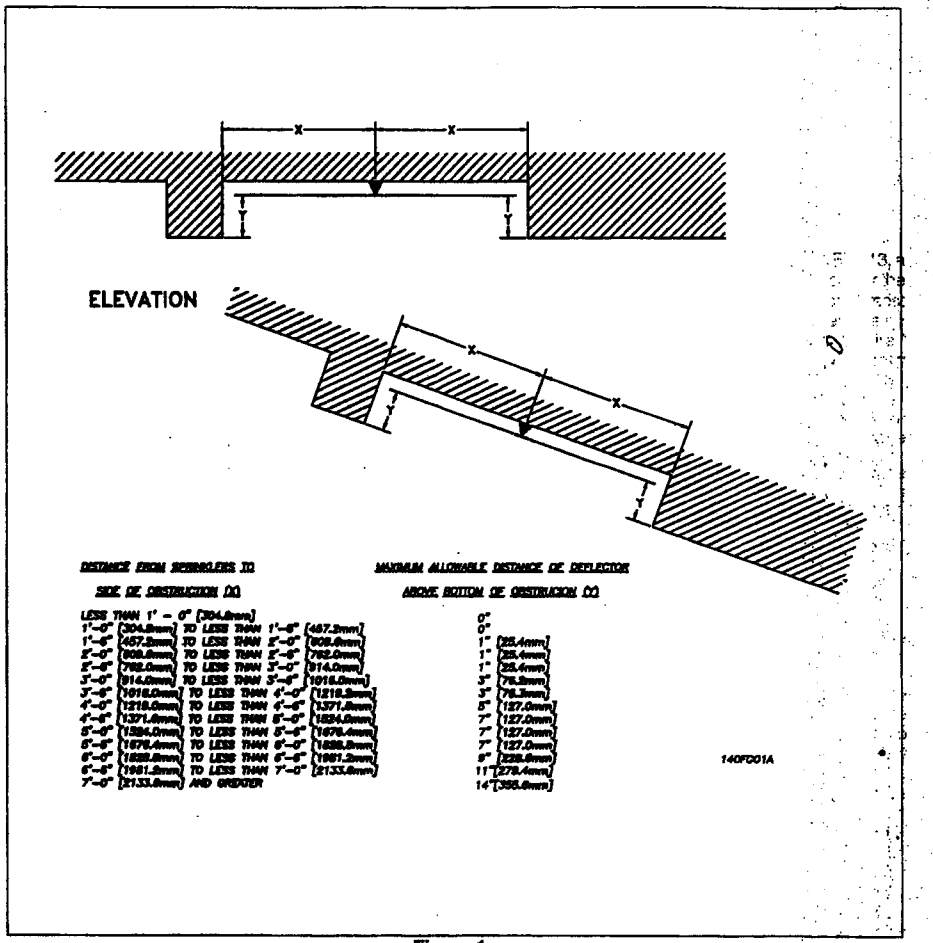


Figure 1

Position of sprinklers to avoid obstructions to discharge radially from pendent sprinklers.

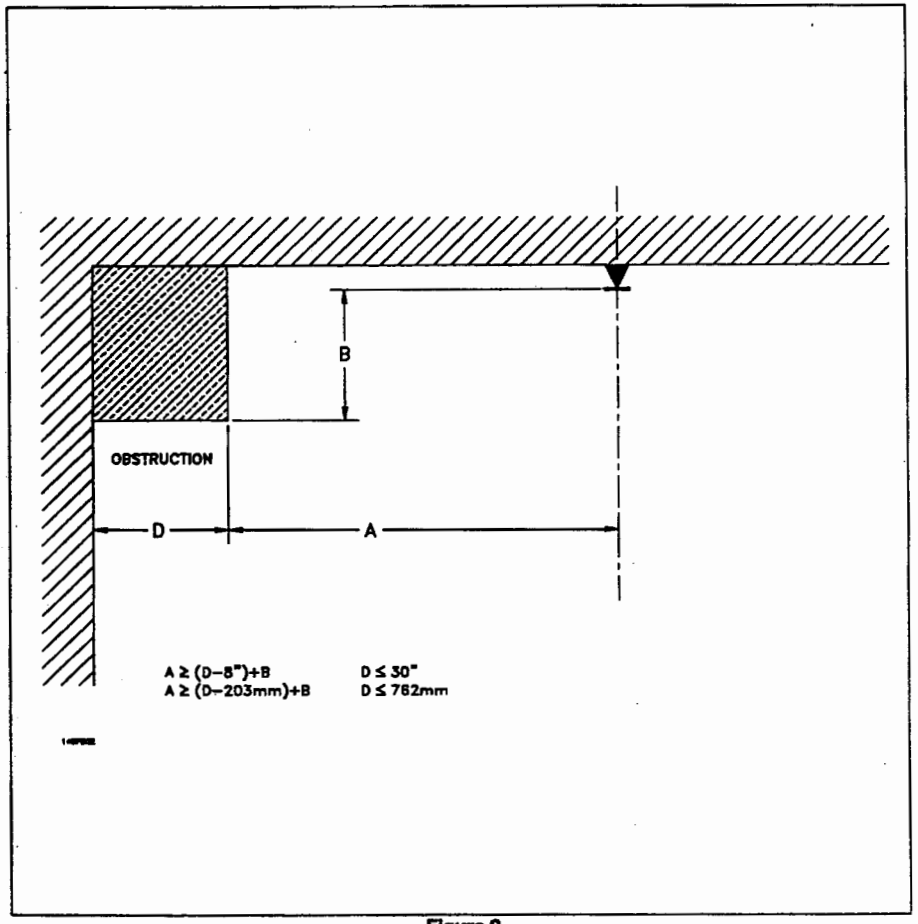
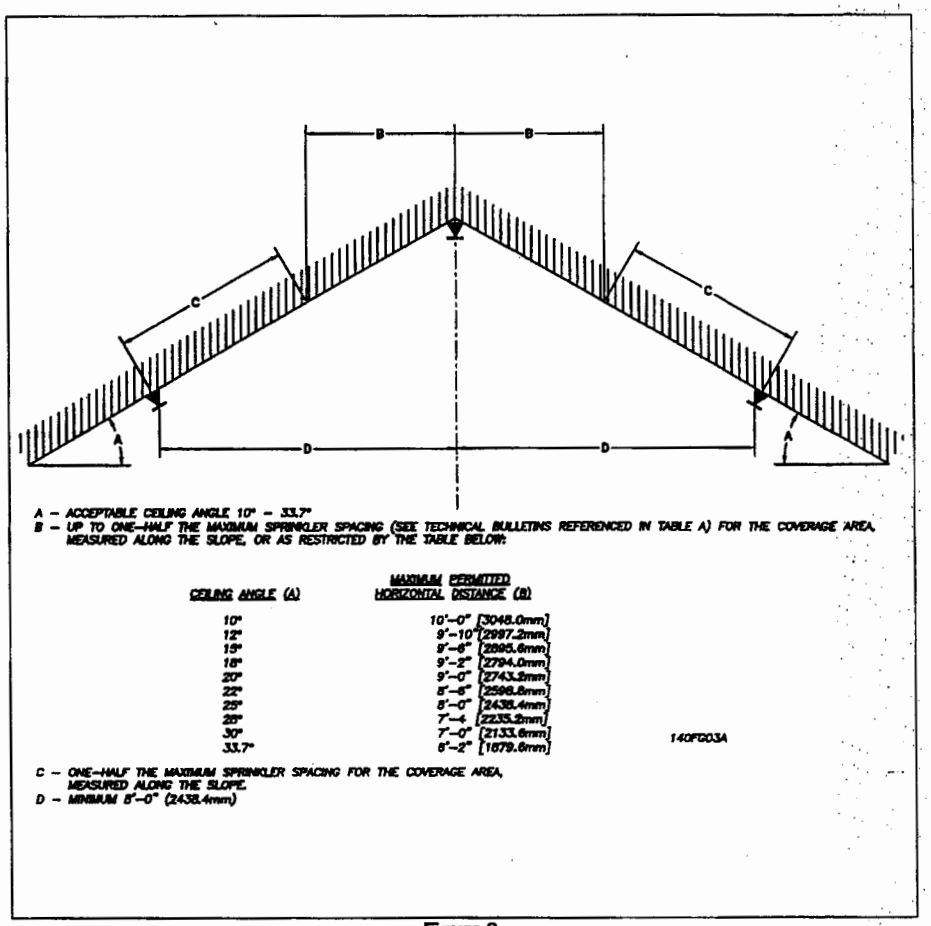


Figure 2
Positioning of pendent type sprinklers relative to obstructions against walls.



A – ACCEPTABLE CEILING ANGLE 10° – 33.7°
B – UP TO ONE–HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL BULLETINS REFERENCED IN TABLE A) FOR THE COVERAGE AREA, MEASURED ALONG THE SLOPE, OR AS RESTRICTED BY THE TABLE BELOW:

CEILING ANGLE (A)	MAXIMUM PERMITTED HORIZONTAL DISTANCE (B)
10°	10'–0" [3048.0mm]
12°	9'–10" [2997.2mm]
15°	9'–6" [2895.6mm]
18°	9'–2" [2794.0mm]
20°	9'–0" [2743.2mm]
22°	8'–6" [2590.8mm]
25°	8'–0" [2438.4mm]
28°	7'–4 [2235.2mm]
30°	7'–0" [2133.6mm]
33.7°	6'–2" [1879.6mm]

140FD03A

C – ONE–HALF THE MAXIMUM SPRINKLER SPACING FOR THE COVERAGE AREA, MEASURED ALONG THE SLOPE.
D – MINIMUM 8'–0" (2438.4mm)

Figure 3
Sprinkler spacing for pendent sprinklers located at the peak.

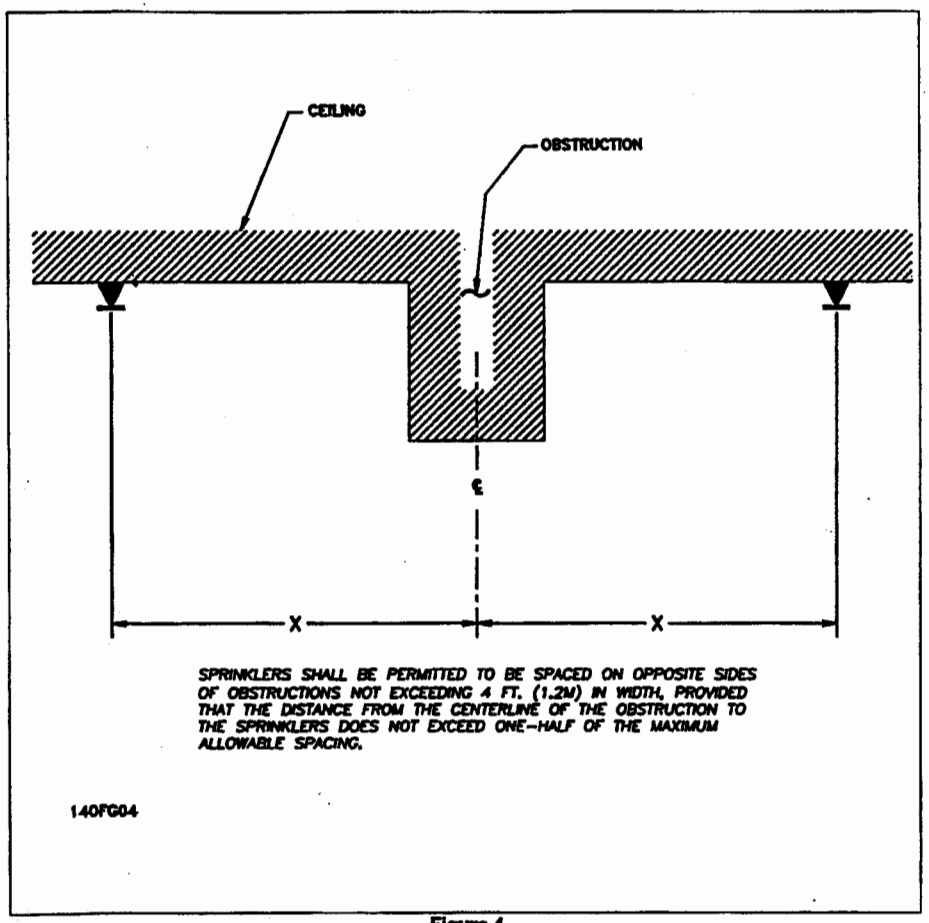


Figure 4
Positioning of pendent sprinklers relative to continuous obstructions at the ceiling.

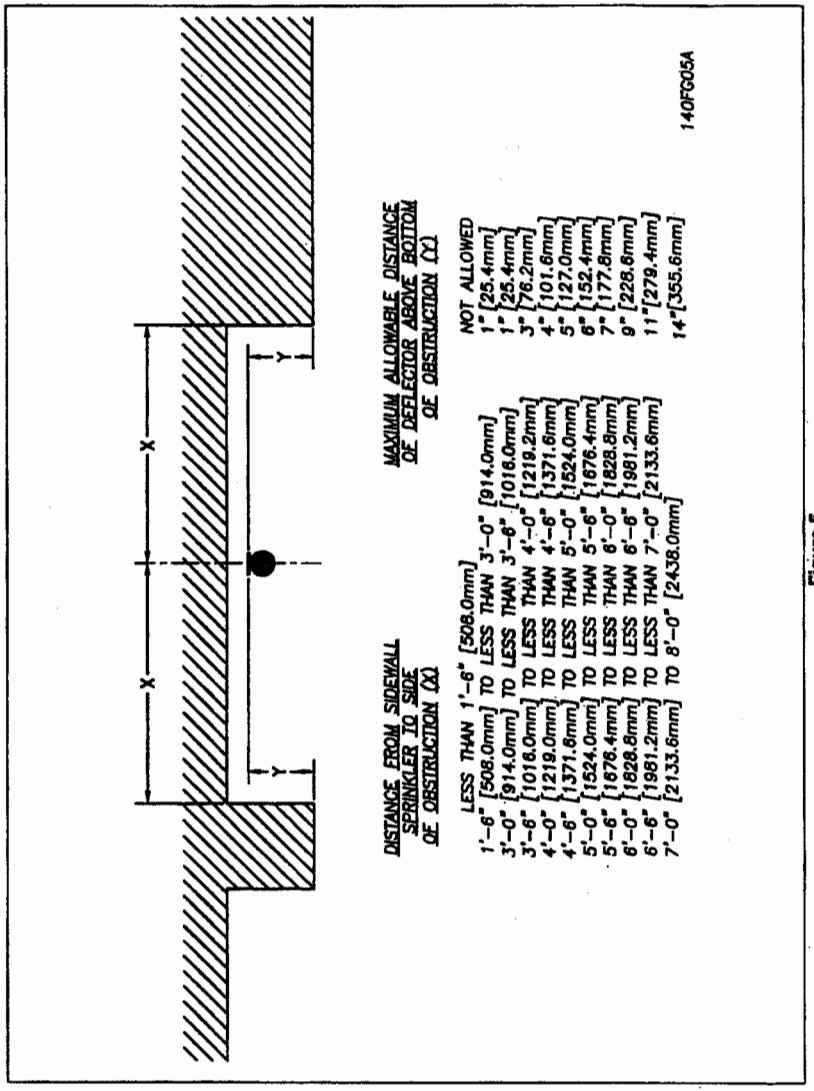
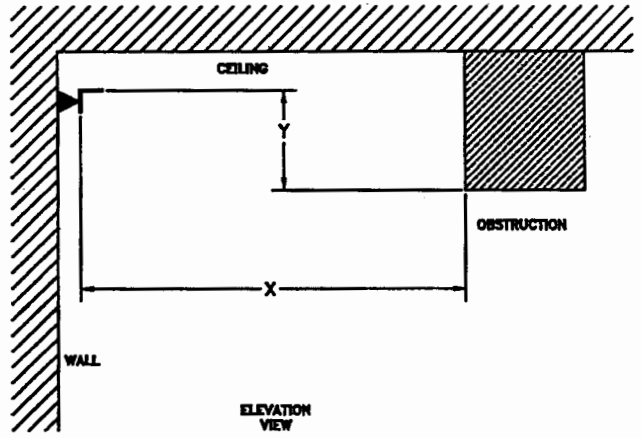


Figure 5
Positioning of sidewall sprinklers to avoid obstructions along the wall.



DISTANCE FROM SIDEWALL SPRINKLER TO SIDE OF OBSTRUCTION (X)	MAXIMUM ALLOWABLE DISTANCE OF DEFLECTOR ABOVE BOTTOM OF OBSTRUCTION (Y)
LESS THAN 8'–0" [2438.4mm]	NOT ALLOWED
8'–0" [2834.4mm] TO LESS THAN 10'–0" [3048.0mm]	1" [25.4mm]
10'–0" [3048.0mm] TO LESS THAN 11' –0" [3352.0mm]	2" [50.8mm]
11'–0" [3352.0mm] TO LESS THAN 12'–0" [3657.6mm]	3" [76.2mm]
12'–0" [3657.6mm] TO LESS THAN 13'–0" [3962.4mm]	4" [101.6mm]
13'–0" [3962.4mm] TO LESS THAN 14'–0" [4267.2mm]	6" [152.4mm]
14'–0" [4267.2mm] TO LESS THAN 15'–0" [4572.0mm]	7" [177.8mm]
15'–0" [4572.0mm] TO LESS THAN 16'–0" [4876.6mm]	9" [228.6mm]
16'–0" [4876.6mm] TO LESS THAN 17'–0" [5181.6mm]	11" [279.4mm]
17'–0" [5181.6mm] OR GREATER	14" [355.6mm]

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Figure 6

Positioning of sidewall sprinklers to avoid obstructions.

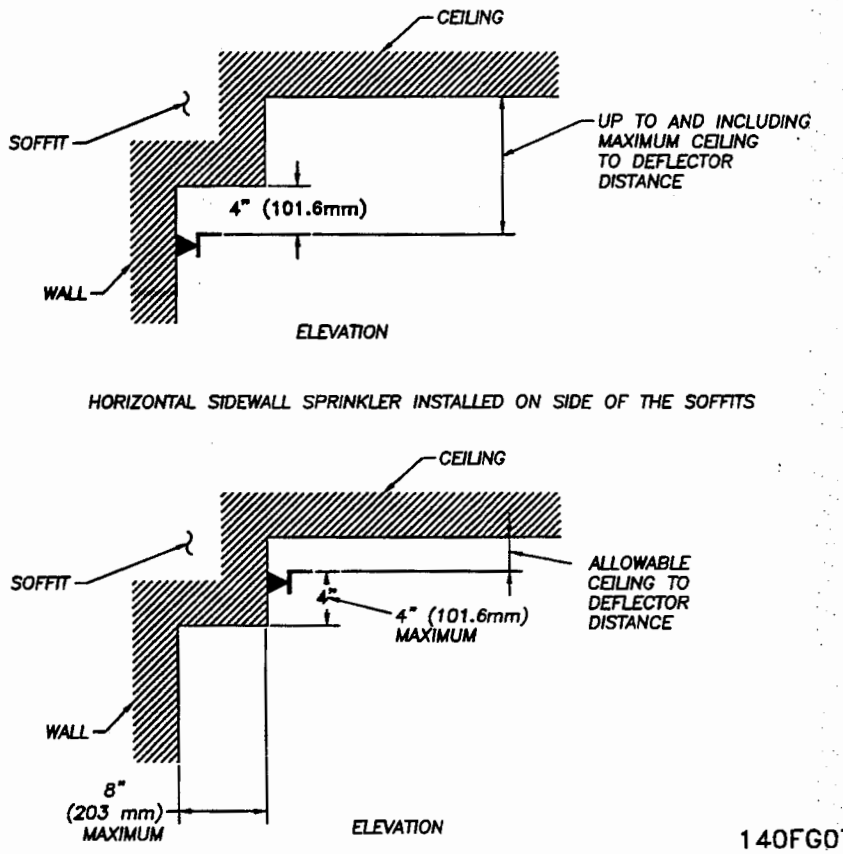


Figure 7

Positioning of HSW sprinklers relative to continuous obstructions along a wall.

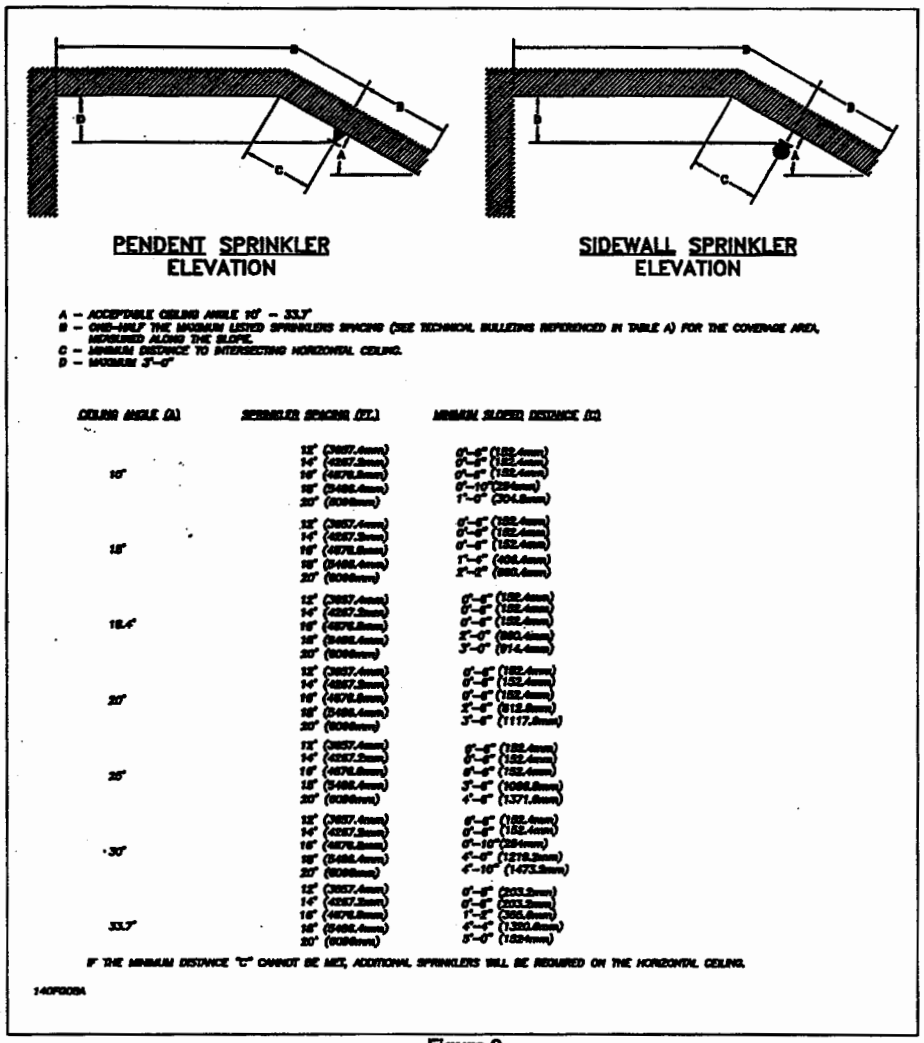


Figure 8

Obstruction to discharge by intersecting horizontal ceiling.

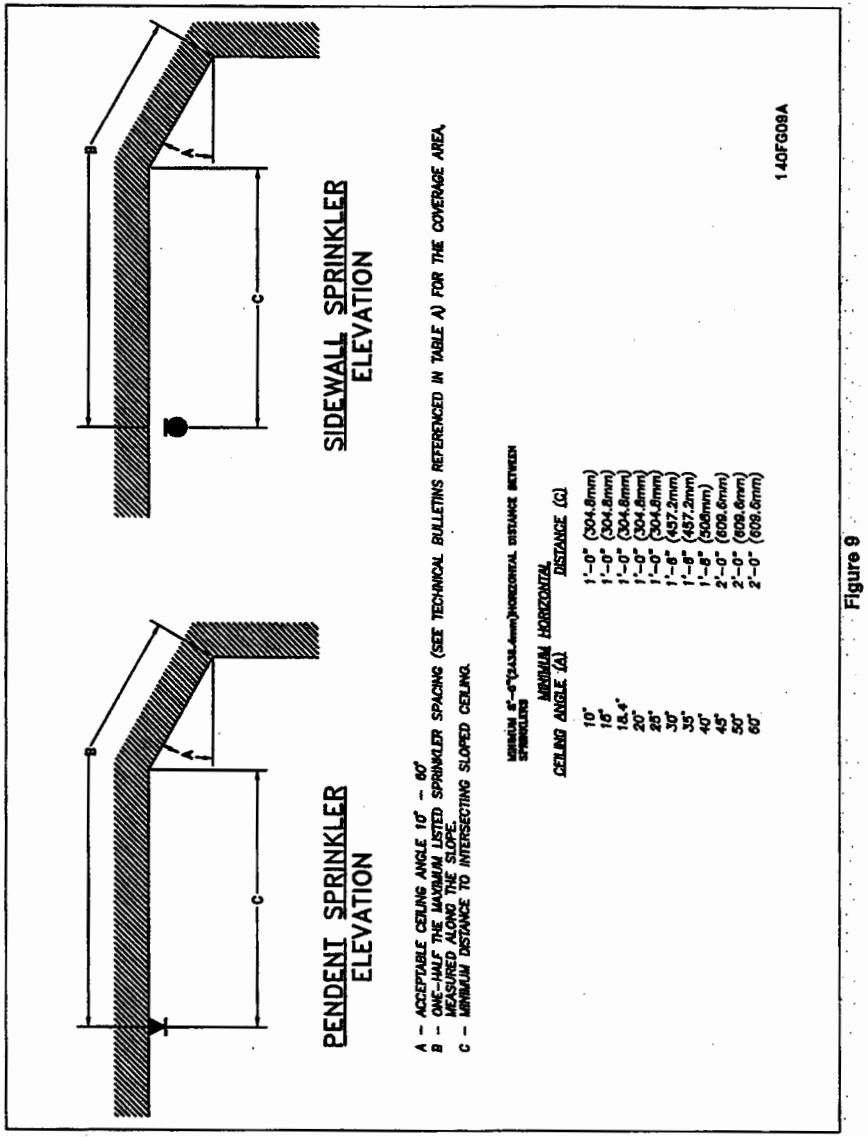
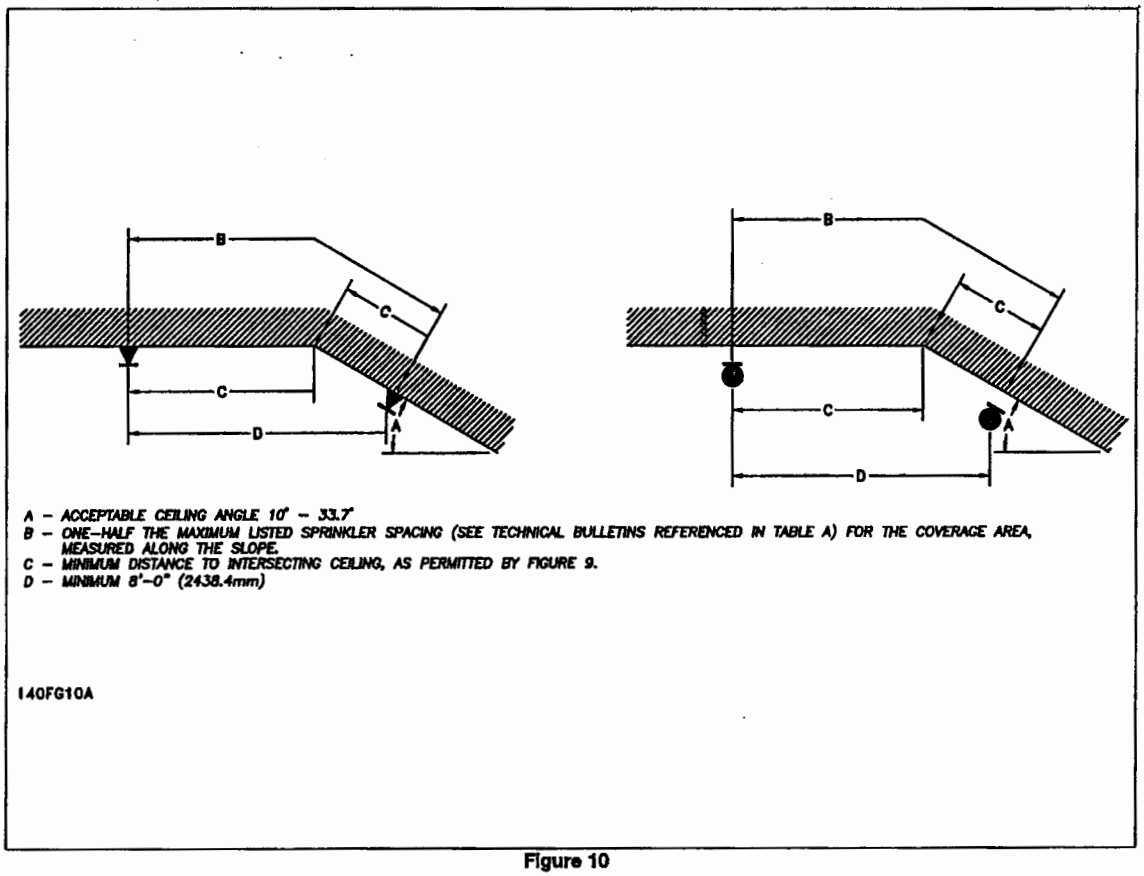


Figure 9

Obstruction to discharge by intersecting sloped ceiling.



A – ACCEPTABLE CEILING ANGLE 10° – 33.7°
B – ONE–HALF THE MAXIMUM LISTED SPRINKLER SPACING (SEE TECHNICAL BULLETINS REFERENCED IN TABLE A) FOR THE COVERAGE AREA, MEASURED ALONG THE SLOPE.
C – MINIMUM DISTANCE TO INTERSECTING CEILING, AS PERMITTED BY FIGURE 9.
D – MINIMUM 8'–0" (2438.4mm)

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Figure 10

Minimum distance between sprinklers on intersecting ceilings.

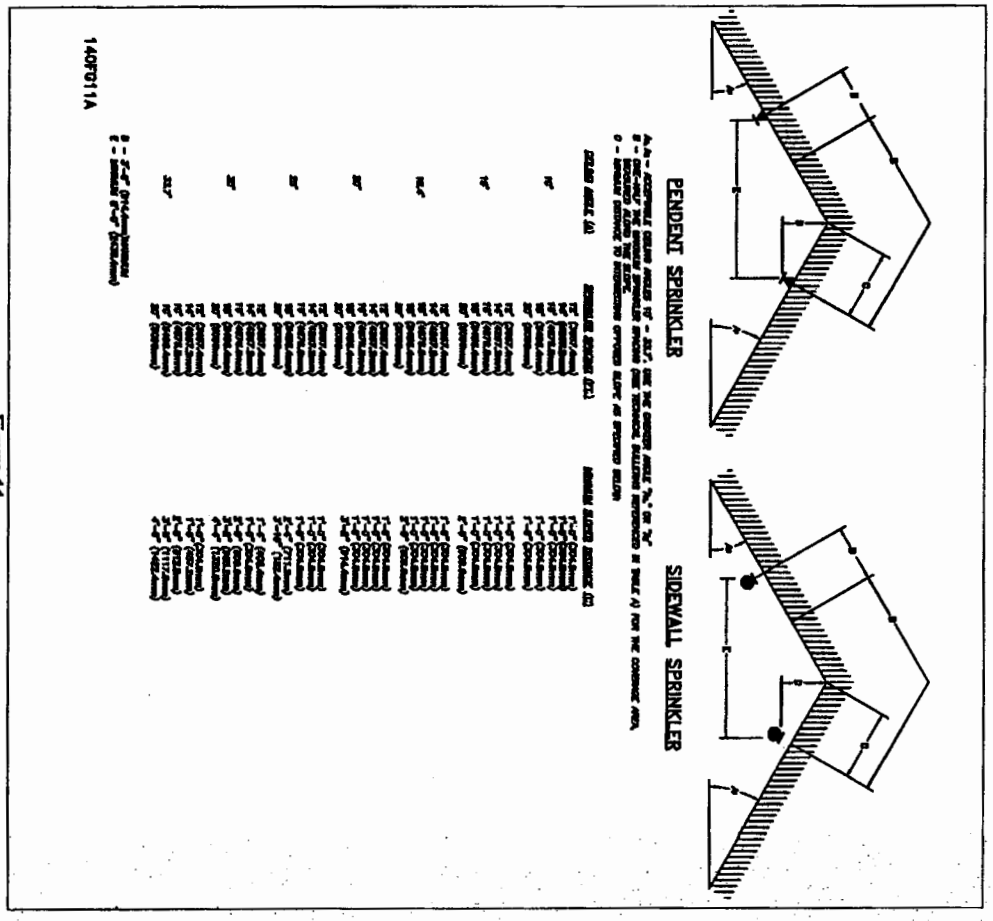


Figure 11

Non-symmetric sprinkler locations on opposing scopes.

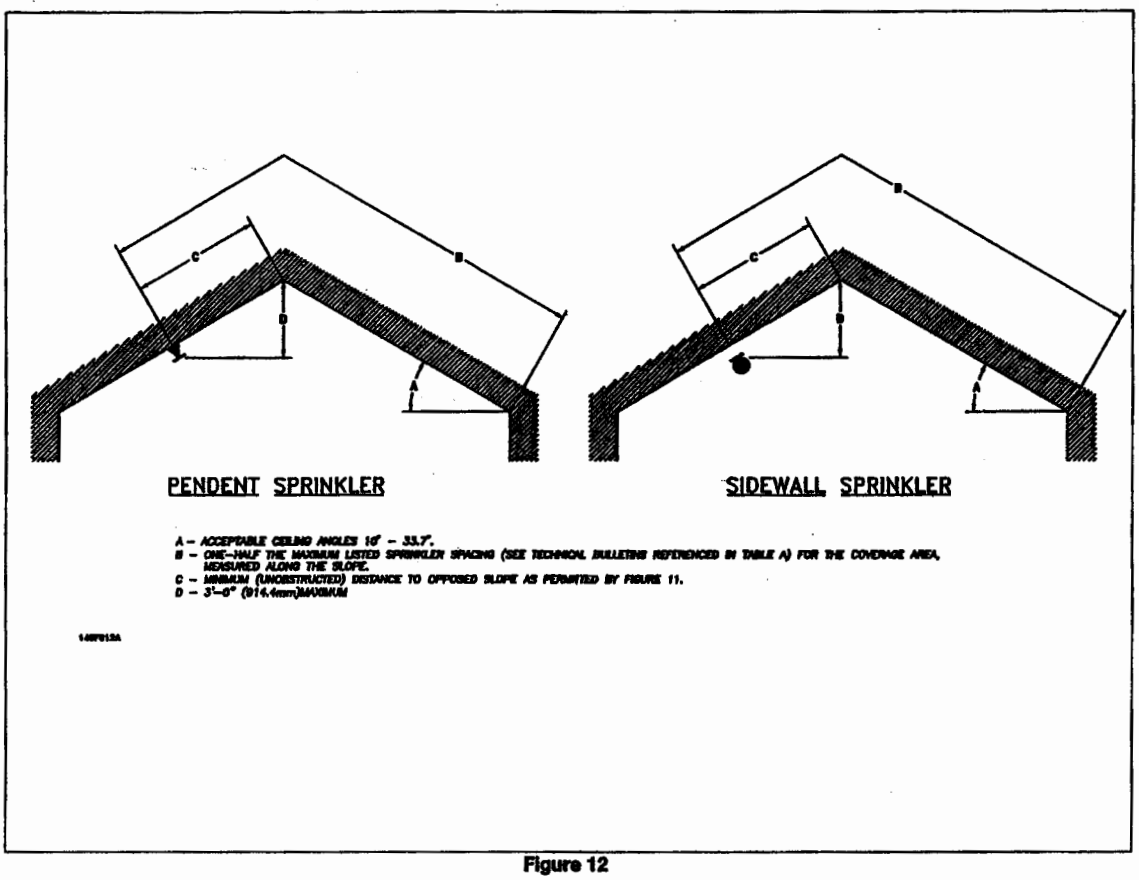


Figure 12

Single sprinkler coverage criteria for cathedral ceilings.

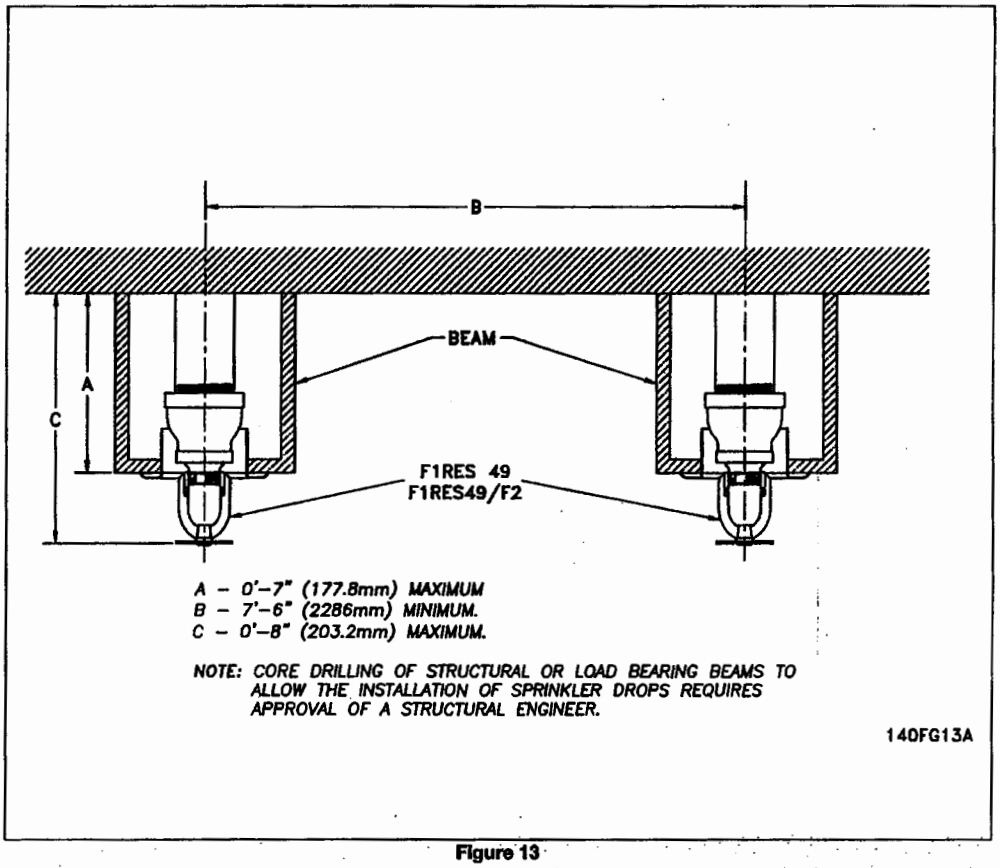


Figure 13

Pendent sprinkler positioning for beamed ceiling.

Model MP (Multi-Purpose) 1" Residential Riser

Bulletin 414 Rev.D

1" (25mm) Residential Riser for Providing Water Flow Alarm on Multipurpose Residential Fire Sprinkler Systems

Features

1. Designed to alarm on single fire sprinkler operation and not during normal household water usage.
2. Potable-water safe.
3. Water-flow Detector is preset to operate at 12 gpm ± 1 gpm (45.4 Lpm ± 3.8 Lpm), and is factory installed with a weather–proof metal cover.
4. Dedicated UL Listed water-flow detector assures optimum sensitivity while the adjustable delay device minimizes false alarms caused by pressure surges or short periods of water usage above 12 gpm.
5. Switch can be wired for 24 VDC or 125/250 VAC operation.
6. Stainless steel 1" (25mm) manifold with NPT or Metric Inlet and Outlet Threads.
7. Factory assembled and tested.
8. Rated working pressure not to exceed 175 psi.
9. UL Listed Assembly. NSF-61 Approved.
10. When the Model MP Riser is utilized in sprinkler systems with sprinklers having K-factors less than 4.4, there must be a minimun of 15 psi of operating pressure at the system's most remote head.

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. (cULus)
2. NSF-61 Approved

Product Description

The Multi-Purpose-Riser comes factory assembled with the necessary accessories for a cost effective, complete riser assembly.

Cast-on lettering identifies manifold size and flow direction. This Riser can be used safely where domestic water and fire protection water are combined.

The water flow detector range, preset to 12 gpm ± 1 gpm, is designed to protect the system from false tripping when multiple household fixtures are in use. When the Model MP Riser is utilized in sprinkler systems with sprinklers having K-factors less than 4.4, there must be a minimun of 15 psi of operating pressure at the system's most remote head.

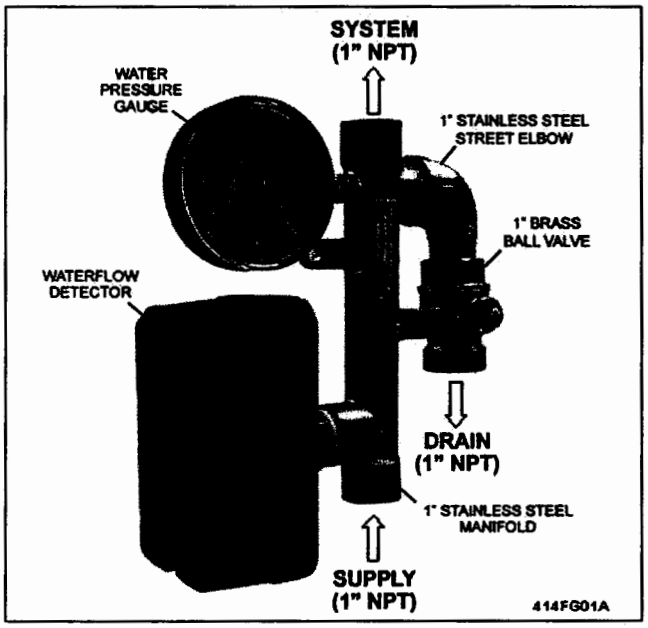


Fig.1

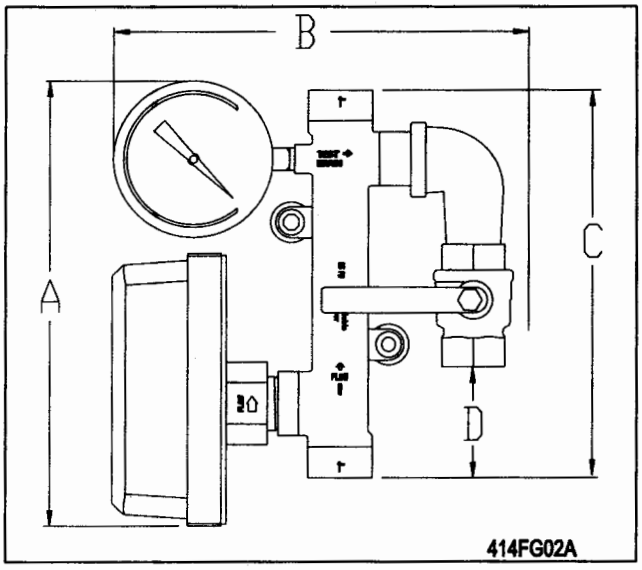


Fig.2

Technical Data:

Description	Multi Purpose Riser Trim				
Manifold Size:	Dimensions Inch (mm)				Weight*
1" (25mm)	A	B	C	D	Lbs (kg)
	11 (280)	10 (254)	9.5 (241)	2.75 (70)	5.7 (2.1)

* Support Bracket Kit (optional) - 1 lb (0.45 kg)

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York, 10523

Installation:

1. Install the manifold with the flow arrow pointing towards the SYSTEM side using 1" NPT threaded connections. Use potable water - safe thread sealants only (teflon tape is recommended).
2. Connect 1" Brass Ball Valve to drain.
3. Place the sprinkler system in service.
4. Follow directions on the water-flow detector switch for electrical connections.

Caution:

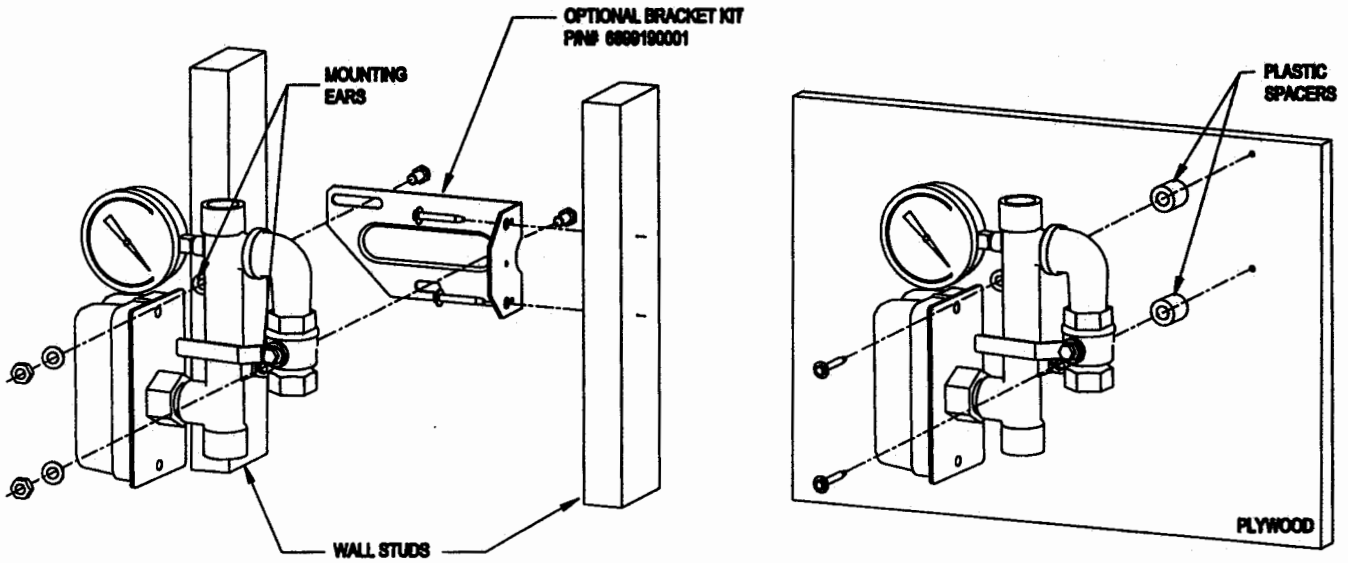
Automatic sprinkler systems having non-fire protection connection (permitting continual water flow) require dielectric fittings, according to NFPA 13 sect. 4-6, when dissimilar metal piping materials are joined.

Ordering Information:

Specify:

1. Model MP 1" (25mm) Residential Riser.
2. NPT (P/N 6501200120) or Metric (P/N 6501200121) Threads for Inlet and Outlet.
3. Support Bracket Kit (P/N 6899190001), if required.

Recommended Installations



TO PREVENT DAMAGE TO PIPING, IT IS RECOMMENDED THAT THE MODEL MP 1" RESIDENTIAL RISER BE ANCHORED USING THE TWO MOUNTING EARS LOCATED ON THE STAINLESS STEEL MANIFOLD.

414FG03A

Fig. 3

The equipment presented in this bulletin is to be installed in accordance with the latest pertinent Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable.
Products manufactured and distributed by Reliable have been protecting life and property for over 80 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by

Reliable®

The Reliable Automatic Sprinkler Co., Inc.

(800) 431-1588 Sales Offices
(800) 848-6051 Sales Fax
(914) 829-2042 Corporate Offices
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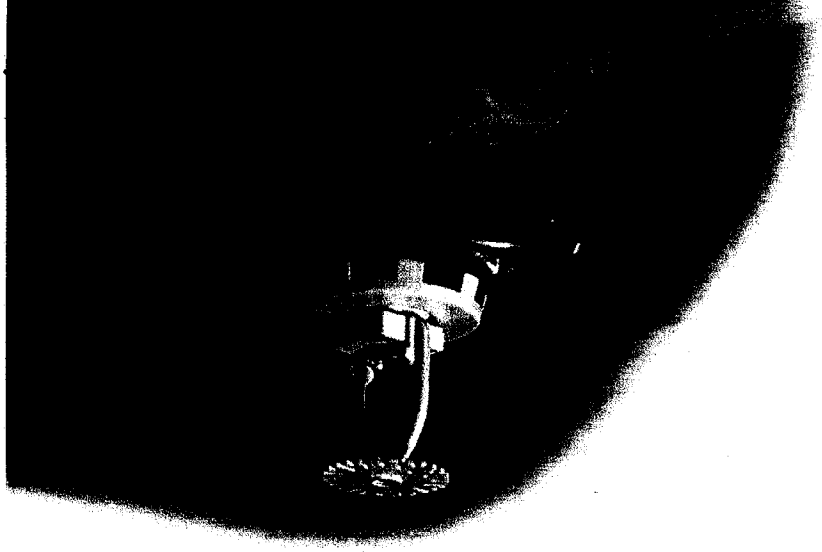

uponor

RESIDENTIAL FIRE SAFETY SYSTEMS

DOMESTIC WATER BYPA SS

INSTRUCTION SHEET

Sprinkler System with Domestic Water Bypass

A domestic water bypass allows the Uponor AquaSAFE™ fire sprinkler system to operate properly even when flow-restricting devices, such as water softeners and filtration systems, are present in the home.

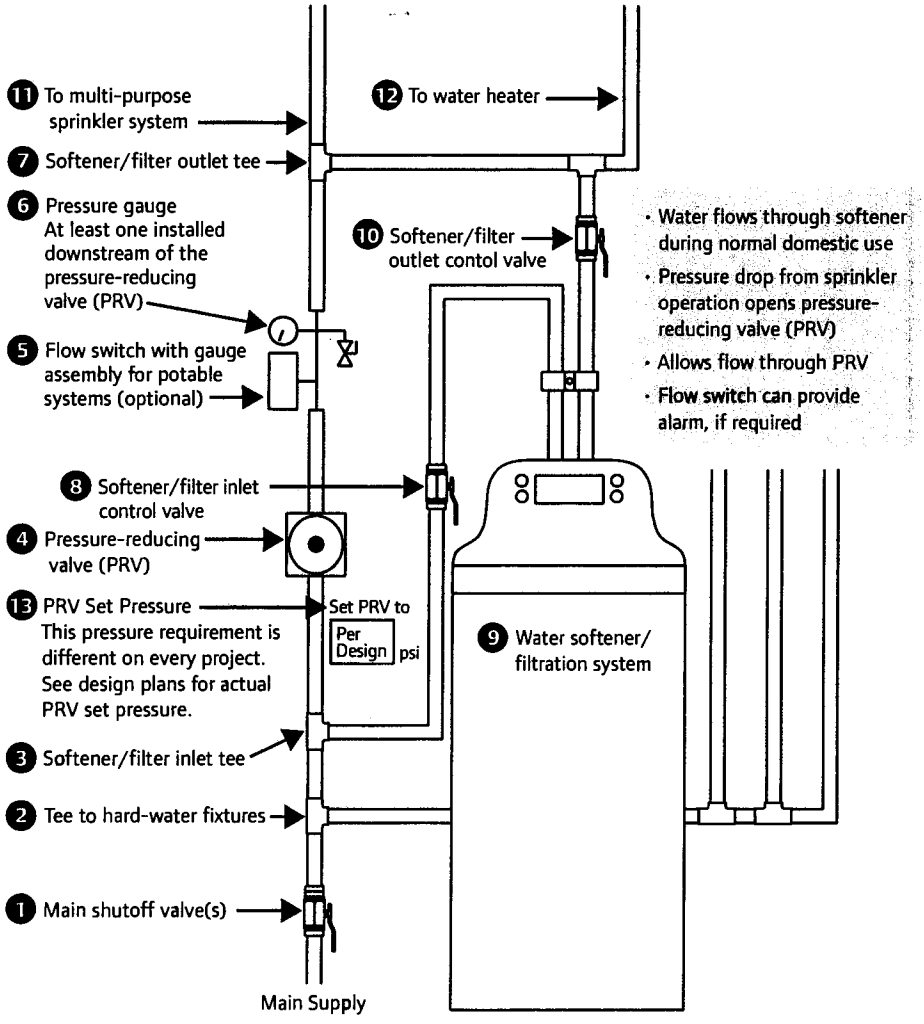

Figure 1: Domestic Water Bypass Installation with Optional Flow Switch

When a sprinkler activates and water pressure drops significantly, a pressure-reducing valve (PRV) opens and routes the water directly to the sprinkler system, taking the path of least resistance, thus avoiding the flow-restricting device.

The PRV opens only during sprinkler activation and not domestic use. Therefore, the flow-restricting device does not negatively impact the water supply of the fire sprinkler system and allows homeowners to use regular residential plumbing devices versus commercial devices.

Note: When the flow switch detects water flow through the bypass, it can activate an optional alarm, which alerts occupants that the sprinkler system is operating.

Bypass Components

- Pressure-reducing valve (PRV)
- Pressure gauge
- Alarm flow switch (if required)
- Electric alarm bell, horn or strobe light (if required)
- Required tubing and fittings

Domestic Water Bypass Installation Guidelines

Refer to the figure on the front page and use the following steps to properly install a domestic water bypass.

1. Install the domestic water bypass line. There needs to be a straight line from the Main Shutoff Valve (1) to the PRV (4) and also from the PRV to the Softener/Filter Outlet Tee (7). This will ensure proper operation of your fire sprinkler system. If additional 90° elbows are installed on the piping through the PRV, contact the Uponor Design Department at 888.594.7726 to recalculate the system.

2. Close the Softener/Filter Inlet Control Valve (8). All of the water will now flow through the PRV and not through the domestic Water Softener/ Filtration System (9).
3. Now that the Water Softener/ Filtration System (9) is isolated, open a single plumbing fixture downstream of the PRV. The Pressure Gauge (6) will show a pressure drop downstream of the PRV. The Pressure Gauge (6) reading will continue to drop until it reaches the point at which the PRV is preset.
4. If the flowing pressure on the Pressure Gauge (6) is lower or higher than the pressure indicated on the bypass detail in the Set Pressure box (13), turn the adjusting nut on the PRV until the Pressure Gauge (6) reading matches the pressure on the bypass detail. DO NOT adjust the PRV so that the downstream pressure is lower than that shown on the bypass detail. Doing so will cause the sprinkler system to fail.
5. Open the Softener/Filter Inlet Control Valve (8). The Pressure Gauge (6) reading will increase. The water is now flowing through the Water Softener/ Filtration System (9) only. If a sprinkler activates, the downstream pressure will drop below the PRV set point and water will flow through the PRV (4), thus introducing hard or unfiltered water into the system.
6. Turn off all domestic fixtures and perform the fire sprinkler flow test. If the PRV (4) has been set correctly, the flow test should be successful.
7. After the flow test is completed, open multiple outlets downstream of the PRV (4). Make note of how many outlets can be flowing before the pressure is equal to or below the PRV Set Pressure. Inform the customer that they will be able flow a specified number of outlets simultaneously. If the customer exceeds that number of flowing fixtures, the system will receive hard or unfiltered water.

Troubleshooting

Hard or Unfiltered Water Issues

If hard or unfiltered water is introduced into the system, it could be due to the following reasons.

1. The customer is exceeding the maximum amount of plumbing fixtures they can have flowing simultaneously. Inform them that they can also test the system by repeating the process in **Step 7** of the Domestic Water Bypass Installation Guidelines.
2. The city pressure has changed significantly. If this occurs, the PRV will have to be readjusted.
3. The water softener is too small for the customer's domestic-use needs or is malfunctioning. The customer may need to purchase a water softener with higher flow characteristics or have their softener repaired.
4. The PRV has been set incorrectly (too high).

The Flow Test Does Not Work

1. Make sure the PRV Set Pressure in the field is equal to or higher than the Set Pressure shown on the plan. If the actual PRV Set Pressure is lower than the Set Pressure shown on the bypass detail (13), there will not be enough pressure available to perform a successful flow test.
2. Contact the Uponor Design Department at 888.594.7726 to verify the friction loss across the PRV is not too great and to see if there is something else causing a flow restriction.

Uponor, Inc.
5925 148thStreet West
Apple Valley MN 55124 USA

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Fax: 952.997.1751
Web: www.uponor-usa.com

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Uponor AquaPEX® White

Submittal Information
Revision C: Oct. 7, 2009

Project Information

Job Name:

Location: | Part No. Ordered:

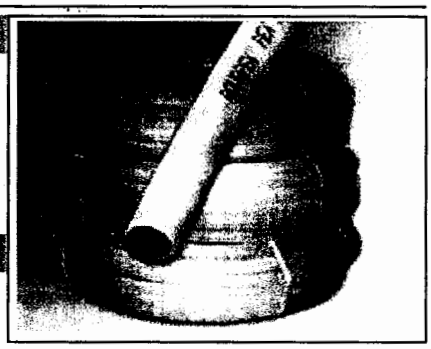
Engineer: | Date Submitted:

Contractor: | Submitted By:

Manufacturer's Representative: | Approved By:

Technical Data

Material:	Crosslinked polyethylene PEX-a Engel Method; PEX 5006
Standard Grade Hydrostatic Ratings (PPI):	200°F (93°C) at 80 psi 180°F (82°C) at 100 psi 73.4°F (23°C) at 160 psi ½", ¾", and 1" AquaPEX® White only: 120°F (49°C) at 130 psi
Linear Expansion Rate:	1.10"/10°F (12°C)/100'



Product Information and Application Use

Uponor AquaPEX White is tubing used for hot and cold domestic potable water distribution, residential fire safety and radiant heating systems containing no ferrous corrodible components or where ferrous components are isolated from the tubing.

✓	Description	Part Number	I.D. (A)	O.D. (B)	Weight
☐	¼" Uponor AquaPEX White, 100-ft. coil	F1040250	0.241"	0.375"	4.0 lbs.
☐	⅜" Uponor AquaPEX White, 400-ft. coil	F1090375	0.350"	0.500"	20.0 lbs.
☐	⅜" Uponor AquaPEX White, 1,000-ft. coil	F1120375	0.350"	0.500"	44.0 lbs.
☐	½" Uponor AquaPEX White, 100-ft. coil*	F1040500	0.475"	0.625"	6.0 lbs.
☐	½" Uponor AquaPEX White, 300-ft. coil*	F1060500	0.475"	0.625"	18.0 lbs.
☐	½" Uponor AquaPEX White, 1,000-ft. coil*	F1120500	0.475"	0.625"	54.0 lbs.
☐	⅝" Uponor AquaPEX White, 300-ft. coil	F1060625	0.574"	0.750"	28.0 lbs.
☐	⅝" Uponor AquaPEX White, 1000-ft. coil	F1120625	0.574"	0.750"	86.0 lbs.
☐	¾" Uponor AquaPEX White, 100-ft. coil*	F1040750	0.671"	0.875"	10.0 lbs.
☐	¾" Uponor AquaPEX White, 300-ft. coil*	F1060750	0.671"	0.875"	34.0 lbs.
☐	¾" Uponor AquaPEX White, 500-ft. coil*	F1100750	0.671"	0.875"	54.0 lbs.
☐	1" Uponor AquaPEX White, 100-ft. coil*	F1041000	0.862"	1.125"	20.0 lbs.
☐	1" Uponor AquaPEX White, 300-ft. coil*	F1061000	0.862"	1.125"	56.0 lbs.
☐	1" Uponor AquaPEX White, 500-ft. coil*	F1101000	0.862"	1.125"	93.0 lbs.
☐	1¼" Uponor AquaPEX White, 100-ft. coil	F1061250	1.054"	1.375"	34.0 lbs.
☐	1¼" Uponor AquaPEX White, 300-ft. coil	F1021250	1.054"	1.375"	106.0 lbs.
☐	1½" Uponor AquaPEX White, 100-ft. coil	F1061500	1.244"	1.625"	44.0 lbs.
☐	1½" Uponor AquaPEX White, 300-ft. coil	F1021500	1.244"	1.625"	133.0 lbs.
☐	2" Uponor AquaPEX White, 100-ft. coil	F1062000	1.629"	2.125"	68.2 lbs.
☐	2" Uponor AquaPEX White, 200-ft. coil	F1052000	1.629"	2.125"	136.4 lbs.
☐	2" Uponor AquaPEX White, 300-ft. coil	F1022000	1.629"	2.125"	204.6 lbs.
☐	3" Uponor AquaPEX White, 100-ft. coil	F1063000	2.400"	3.125"	128.0 lbs.
☐	3" Uponor AquaPEX White, 350-ft. coil	F1023000	2.400"	3.125"	442.0 lbs.

Installation

Approved fittings are ProPEX® fittings[1] for sizes ⅜" through 2" AquaPEX. Use WIPEX™ fittings for 3" AquaPEX. Refer to the AquaPEX Professional Plumbing Installation Handbook, AquaSAFE™ Fire Safety Installation Guide or the Uponor Radiant Installation Handbook for details.

Standards

CSA B137.5; ASTM F876; ASTM F877; ASTM F1960; ASTM-E84; ASTM-E119/UL 263

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

*½", ¾", 1" UL 1821; *ULC/ORD - C 199 P; IAPMO; CSA; HUD; WARNOCK HERSEY; NSF; ITS; UL; ICC; ANSI/NSF 14- and 61-certified; CAN/ULC S102.2; U.S.: ¾" diameter and smaller; Canada: 1" diameter and smaller

Related Applications

PEX-a Plumbing Systems
AquaSAFE Fire Safety Systems

Contact Information

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Mississauga, ON L5N 1W1 CANADA
Phone: (888) 994-7726
Fax: (800) 638-9517
www.uponor.ca

[1] ProPEX® is a registered trademark of Uponor, Inc. ProPEX™ is a trademark of Uponor Ltd.

Print Stream on Tubing	Explanation

[1] For ½-inch tubing only
[2] USA, Material Type, Extruder No., Year, Month, Day
[3] Footage marking in increments of three feet (3')

Table 1-1: Print Stream Identification

ProPEX® Sprinkler Adapters and Fittings

Uponor offers sprinkler adapter fittings specifically designed for the AquaSAFE Fire Safety system. These fittings feature ProPEX connections and a standard ½" NPT outlet for connecting fire sprinklers.

Table 1-2 shows the required tubing length needed to approximate the equivalent pressure resistance of the different types of Uponor ProPEX fittings.

Calculated Equivalent Tubing Length

Fitting Type	Tubing Size	
Tee - Run	2'	2'
Tee - 90°	6'	6'
90° Elbow	5'	6'
Coupling	2'	2'

Table 1-2: Pressure Resistance (Fittings/Tubing)

Fire Sprinkler Adapter Mounting Bracket

Submittal Information
Revision A: Dec. 3, 2009

Job Name:

Location: Part No. Ordered:

Engineer: Date Submitted:

Contractor: Submitted By:

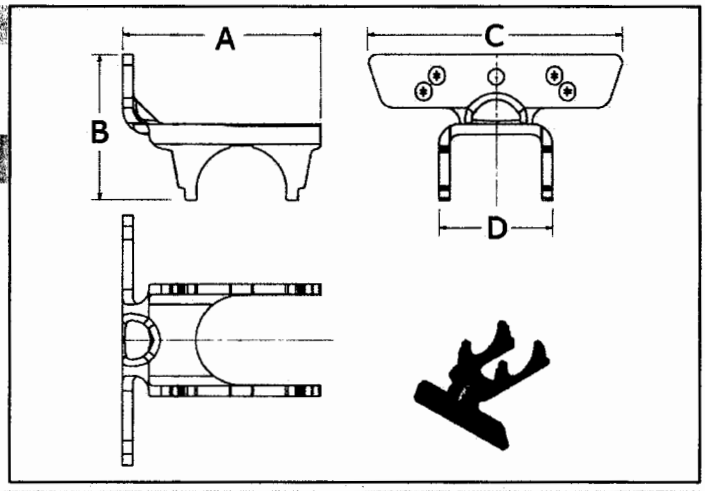
Manufacturer's Representative: Approved By:

Technical Data

Material: 1050 Annealed (spheroidized) spring steel

Product Information and Application Use

Uponor's Fire Sprinkler Adapter Mounting Bracket is designed to rigidly mount ProPEX® Lead-free Brass Fire Sprinkler Adapter Tees (LF7701010 and LF7707575) in Uponor AquaSAFE™ multi-purpose residential fire sprinkler systems.[1]



✓	Description	Part Number	A	B	C	D	Weight
☐	Fire Sprinkler Adapter Mounting Bracket, ¾" and 1"	A7750700	2.48"	1.84"	3.16"	1.42"	0.21 lbs.

Installation

Attach the sprinkler-mounting bracket or sprinkler adapter to the structure with two #10 x 1½" Pan Head, Full Thread Screws (F7001500) or equivalent. Refer to the sprinkler plan mounting details for correct placement of brackets and adapters, taking into account the ceiling type and sprinkler model. When installing adapter tee into bracket, use Fire Sprinkler Adapter Push-on Nut (F7000005). For more information, refer to the Uponor AquaSAFE Looped System Installation Guide.

Related Products

LF7701010: ProPEX Brass Fire Adapter Tee, 1" PEX x 1" PEX x ½" FNPT
LF7707575: ProPEX Brass Fire Adapter Tee, ¾" PEX x ¾" PEX x ½" FNPT

Standards

UL1821; ULC/ORD – C199P (for use with brass sprinkler adapter tees)

Codes

N/A

Listings

N/A

Related Applications

PEX-a Plumbing Systems
AquaSAFE Fire Safety Systems

Contact Information

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5925 148th Street West
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www.uponor.ca

ProPEX® Lead-free (LF) Brass Male Threaded Adapter

Submittal Information
Revision A: Jan. 28, 2010

Project Information

Job Name:

Location: Part No. Ordered:

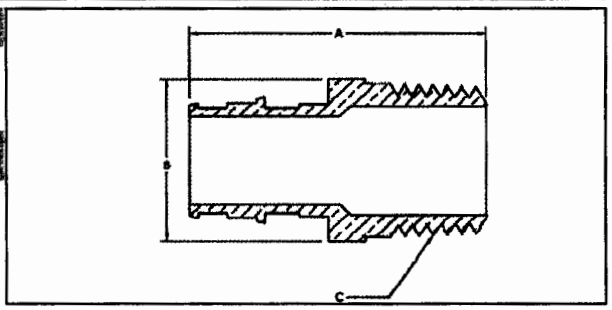
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: C69300 Brass



Product Information and Application Use

ProPEX® Lead-free Male Threaded Adapters connect Uponor PEX tubing to male NPT threads.[1] These adapters are safe for direct burial in soil.

✓	Description	Part Number	A	B	C	Weight
☐	ProPEX LF Brass Male Threaded Adapter, ⅜" PEX x ½" NPT	LF4523850	1.62"	⅞" HEX	½" NPT	0.11 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, ½" PEX x ½" NPT	LF4525050	1.73"	⅞" HEX	½" NPT	0.32 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, ½" PEX x ¾" NPT	LF4525075	1.78"	1⅛" HEX	¾" NPT	0.18 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, ¾" PEX x ¾" NPT*	LF4527575	2.02"	1⅛" HEX	¾" NPT	0.20 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, ¾" PEX x 1" NPT*	LF4527510	2.22"	1⅜" HEX	1" NPT	0.35 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, 1" PEX x ¾" NPT	LF4521075	2.25"	1¼" HEX	¾" NPT	0.30 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, 1" PEX x 1" NPT*	LF4521010	2.46"	1⅜" HEX	1" NPT	0.44 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, 1¼" PEX x 1¼" NPT	LF4521313	2.72"	1¾" HEX	1¼" NPT	0.75 lbs.
☐	ProPEX LF Brass Male Threaded Adapter, 1½" PEX x 1½" NPT	LF4521515	3.00"	2¼" HEX	1½" NPT	0.80 lbs.
☐	ProPEX Brass Male Threaded Adapter, 2" PEX x 2" NPT	LF4522020	3.86"	2½" HEX	2" NPT	1.90 lbs.

Installation

ProPEX Tool and ProPEX Rings (sold separately) are required for connecting the PEX tubing. Refer to the AquaPEX® Professional Plumbing Installation Guide or Radiant Floor Heating Installation Handbook for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; HUD MR 1269; ICC ESR 1099; IAPMO 3558; U.P. Code, Annex G; *UL 1821; *ULC/ORD C199P

Related Applications

PEX-a Plumbing Systems
Radiant Heating and Cooling Systems
Snow and Ice Melting Systems
Permafrost Protection Systems
Turf Conditioning Systems

Contact Information

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5925 148th Street West
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ProPEX® Lead-free (LF) Brass Coupling

Submittal Information
Revision A: Jan. 28, 2010

Project Information

Job Name:

Location: | Part No. Ordered:

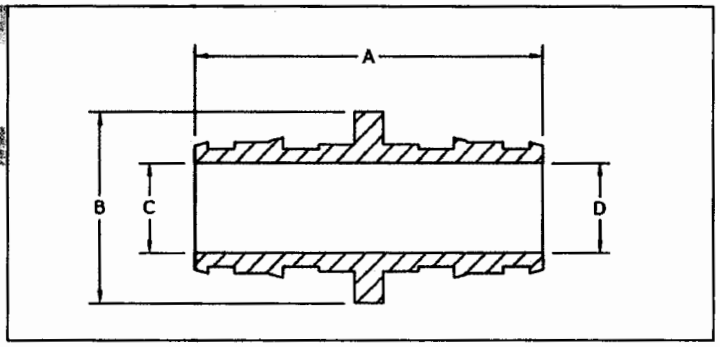
Engineer: | Date Submitted:

Contractor: | Submitted By:

Manufacturer's Representative: | Approved By:

Technical Data

Material C69300 Brass



Product Information and Application Use

ProPEX® Lead-free Brass Couplings are available for use in hot and cold domestic potable water systems.[1] Also approved for use in any radiant heating system. The coupling features the Uponor ProPEX Fitting for connections to Wirsbo hePEX™ tubing or Uponor AquaPEX® tubing. Couplings are safe for direct burial in soil.

✓	Description	Part Number	A	B	C	D	Weight
☐	ProPEX LF Brass Coupling, ⅜" PEX x ½" PEX	LF4543850	1.42"	0.740"	0.398"	0.280"	0.05 lbs
☐	ProPEX LF Brass Coupling, ½" PEX x ½" PEX*	LF4545050	1.54"	0.740"	0.398"	N/A	0.07 lbs
☐	ProPEX LF Brass Coupling, ¾" PEX x ¾" PEX*	LF4547575	2.02"	1.187"	0.595"	N/A	0.13 lbs
☐	ProPEX LF Brass Coupling, ¾" PEX x 1" PEX*	LF4547510	2.25"	1.345"	0.795"	0.595"	0.16 lbs
☐	ProPEX LF Brass Coupling, 1" PEX x 1" PEX*	LF4541010	2.49"	1.345"	0.818"	N/A	0.20 lbs

Installation

ProPEX Tool and ProPEX Rings (sold separately) are required for connecting the PEX tubing. Use the appropriately sized Uponor ProPEX Ring for tubing connections. For more information, refer to the AquaPEX Professional Plumbing Installation Guide, the AquaSAFE™ Residential Fire Sprinkler Installation Guide or the Radiant Floor Heating Installation Handbook.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

IAMPO 3558; HUD MR 1269; ICC ESR 1099; NSF 14- and 61-certified; U.P. Code, Annex G; *UL 1821; *ULC/ORD C199P

Related Applications

PEX-a Plumbing Systems
Uponor Residential Fire Safety Systems
Radiant Heating and Cooling Systems
Snow and Ice Melting Systems
Permafrost Protection Systems
Turf Conditioning Systems

Contact Information

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www.uponor.ca

ProPEX® Lead-free (LF) Brass Tee

Submittal Information
Revision B: Jan. 28, 2010

Job Name:

Location: Part No. Ordered:

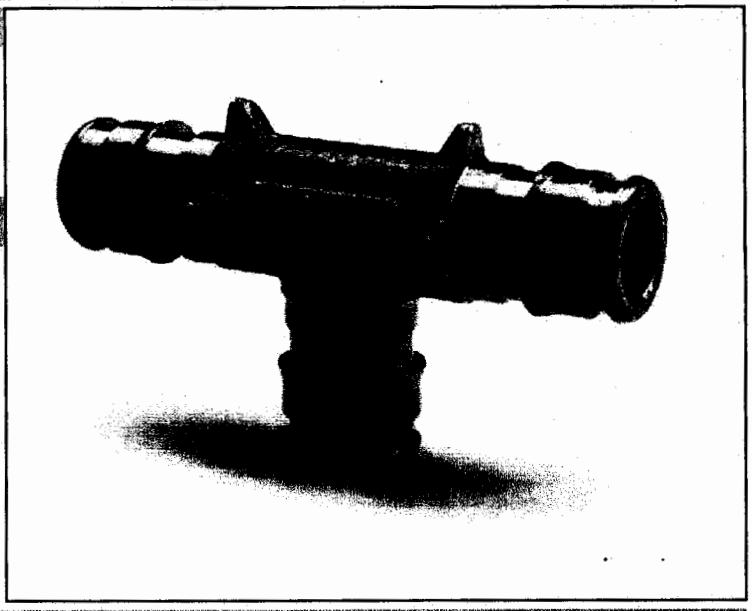
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: C69300 Brass



Product Information and Application Use

Uponor's ProPEX® Lead-free Brass Tees are ideal for use in hot and cold domestic potable water systems.[1]

This product is approved for use in the AquaSAFE™ Residential Fire Safety System. Also approved for any hydronic heating system application.

Each end of the ProPEX LF Brass Tee is manufactured with the Uponor ProPEX Fitting for connections to Wirsbo hePEX™ or Uponor AquaPEX® tubing. This product is safe for direct burial in soil.

	Description	Part Number	Length	Width	Weight
☐	ProPEX LF Brass Tee, ½" PEX x ½" PEX x ½" PEX	LF4705050	2.52"	1.45"	0.20 lbs.
☐	ProPEX LF Brass Tee, ¾" PEX x ¾" PEX x ¾" PEX	LF4707575	3.27"	1.93"	0.40 lbs.
☐	ProPEX LF Brass Tee, 1" PEX x 1" PEX x 1" PEX	LF4701010	4.09"	2.42"	0.40 lbs.

Installation

ProPEX Tool and ProPEX Rings (sold separately) are required for connecting the PEX tubing. Do not solder within 18 inches of the ProPEX connection. Refer to the AquaPEX Professional Plumbing Installation Guide, AquaSAFE Homeowner Handbook or Radiant Floor Heating Installation Handbook for additional information.

Standards

CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

IAPMO 3558; ANSI/NSF 14- and 61-certified; HUD MR 1269; ICC ESR 1099; UL 1821; ULC/ORD C 199P; U.P. Code, Annex G

Related Applications

PEX-a Plumbing Systems
Uponor Residential Fire Safety Systems
Radiant Heating and Cooling Systems

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www.uponor.ca

ProPEX® Lead-free (LF) Brass Fire Sprinkler Adapter Tee

Submittal Information
Revision A: Dec. 3, 2009

Job Name:

Location: Part No. Ordered:

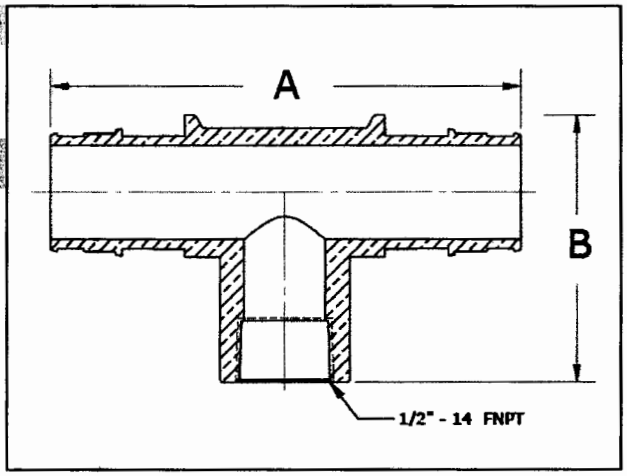
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: C69300 Brass



Product Description and Application Use

Designed for use with ¾" or 1" Uponor AquaPEX® tubing, the ProPEX® Lead-free Brass Fire Sprinkler Adapter Tee connects fire sprinklers to the Uponor residential AquaSAFE™ Looped multipurpose fire safety system, which combines fire sprinklers with a home's potable cold-water plumbing system. Use Uponor ProPEX fittings for the connections.

✓	Description	Part Number	A	B	Weight
☐	ProPEX LF Brass Fire Sprinkler Adapter Tee, 1" PEX x 1" PEX x ½" FNPT	LF7701010	4.09"	2.325"	0.62 lbs.
☐	ProPEX LF Brass Fire Sprinkler Adapter Tee, ¾" PEX x ¾" PEX x ½" FNPT	LF7707575	3.62"	2.325"	0.64 lbs.

Installation

Use the appropriate Uponor ProPEX Ring for the tubing. Install the tee using the Fire Sprinkler Adapter Mounting Bracket (A7750700) and Fire Sprinkler Adapter Push-on Nut (F7000005). For more information, refer to the Uponor AquaSAFE Looped System Installation Guide.

Related Products

A7750700: Fire Sprinkler Adapter Mounting Bracket, ¾" and 1"
F7000005: Fire Sprinkler Adapter Push-on Nut

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960; UL 1821; ULC/ORD – C199P

Codes

IPC; UPC; NSPC; IRC; IMC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; ICC ESR 1099; HUD MR 1269; IAPMO

Related Applications

PEX-a Plumbing Systems
AquaSAFE Fire Safety Systems

Contact Information

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www.uponor.ca

ProPEX® Fire Sprinkler Adapter

Submittal Information
Revision A: Feb. 1, 2008

Project Information

Job Name:

Location: Part No. Ordered:

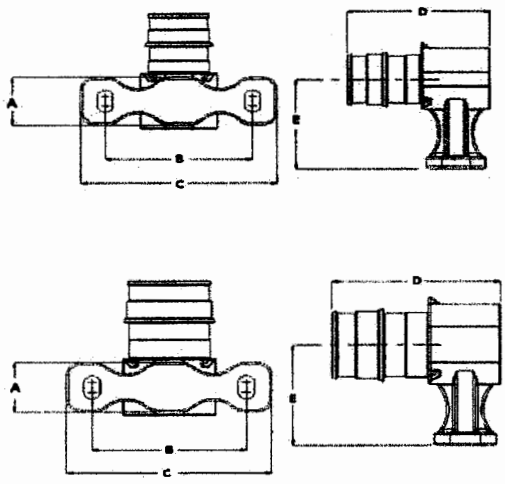
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: 300 Series Stainless Steel



Product Information and Application Use

The ProPEX® Fire Sprinkler Adapter is used in conjunction with the respective Reliable® Sprinkler to provide a multi-purpose residential fire sprinkler system[1]. The system is installed with the cold-potable portion of the Uponor plumbing system for residential applications. The connections are made with Uponor ProPEX fittings. The fittings are designed for use only with ¾" Wirsbo AQUAPEX® tubing or 1" Wirsbo AQUAPEX tubing in the Uponor AQUASAFE® Looped System.

Description	Part Number	A	B	D	C	E	Weight
☐ ProPEX Fire Sprinkler Adapter, ¾" PEX x ½" FNPT	Q7517550	0.75"	1.88"	2.50"	1.82"	1.41"	0.268 lbs.
☐ ProPEX Fire Sprinkler Adapter, 1" PEX x ½" FNPT	Q7511050	0.75"	1.88"	2.50"	2.06"	1.54"	0.408 lbs.

Installation

Use the appropriate Uponor ProPEX Ring for tubing. For more information, refer to the Uponor AQUASAFE® Looped System Installation Guide.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F 1960; UL 1821; ULC/ORD - C 199 P

Codes

IPC; UPC; NSPC; IRC; IMC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; ICC ESR 1099; HUD MR 1269; IAPMO 3558

Related Applications

PEX-a Plumbing Systems

Contact Information

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[1] **Reliable® Sprinkler is a registered trademark of the Reliable Automatic Sprinkler Co., Inc. ProPEX® is a registered trademark of Uponor, Inc. ProPEX ™ is a trademark of Uponor Ltd.**

WIRSBO
Life, Safety, Comfort Systems

5925 148th Street West
Apple Valley, MN 55124
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Fax: (952) 891-1409
www.wirsbo.com

AQUASAFE™ Four-port Fitting Subassembly

Submittal Information
Component

Project Information

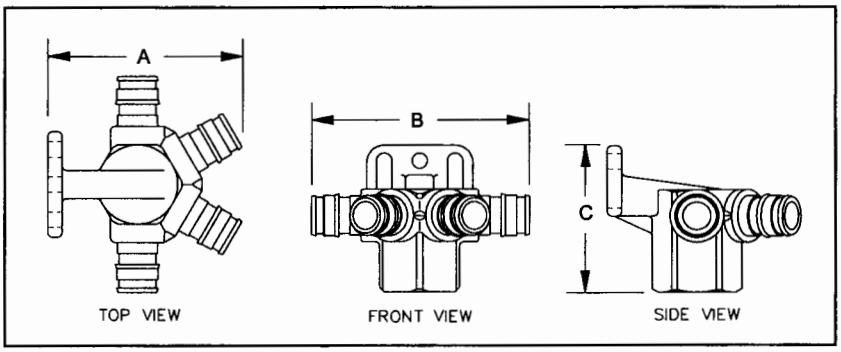
Job Name:_____ Part No. Ordered:_____
Location:_____ Quantity Ordered:_____
_____ P.O. Number:_____
Engineer:_____ Date Submitted:_____
Contractor:_____ Submitted By:_____
Mfg. Rep:_____ Approved By:_____

Technical Data

Material.....300 Series Stainless Steel
Fitting type.....Wirsbo ProPEX® (ASTM F1960)
PEX tubing connection size.....1/2"

Dimensional Information

A	*B*	*C*	*Weight*
2.72"	3.09"	2.06"	0.56 lbs.



Product Information and Application Use

The AQUASAFE's patented four-port fitting is used in conjunction with the respective Reliable® sprinkler head to provide a multi-purpose fire sprinkler system. AQUASAFE system is installed with the cold side of the Wirsbo AQUAPEX® plumbing system for residential applications. The four-port design eliminates any stagnant loops within the domestic potable water system and provides guaranteed flow to the sprinkler head upon activation. The connections on the four-port fitting are made with the durable Wirsbo ProPEX fitting. The four-port fitting is designed for use only with 1/2" Wirsbo AQUAPEX tubing.

Accessories

- Q71600 and Q71800 series sprinkler heads with 0.04 gpm/ft^2 densities
- Q74000 and Q74900 series sprinkler heads with 0.05 gpm/ft^2 densities
- F1120500: 1/2" AQUAPEX tubing
- Q4690502: 1/2" ProPEX rings

Installation

- The four-port fitting comes from the manufacturer with the appropriate sprinkler head installed.
- If sprinkler head replacement is required in the field, ensure the proper tools, sealant and instructions are utilized.
- Refer to the AQUASAFE Installation Handbook for additional information.

Codes and Standards

- ASTM F1960
- UL Standard 1821
- ANSI/NSF Standard 14
- ANSI/NSF Standard 61
- NFPA 13D
- International Plumbing Code (IPC)
- Uniform Plumbing Code (UPC)

Bringing comfort to life
Uponor

ProPEX® 1" Copper Branch Manifold

Submittal Information
Revision B: March 1, 2010

Project Information

Job Name:

Location: Part No. Ordered:

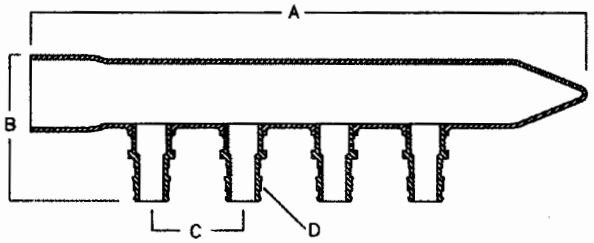
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material:	Type L Copper
Maximum Temperature (no pressure):	320°F (160°C)
Maximum Working Temperature/Pressure:	210°F at 150 psi (99°C at 10.3 bar)
Maximum Flow Rate at 5 fps:	12.8 gpm
Maximum Flow Rate at 8 fps:	20.5 gpm



Product Information and Application Use

The Uponor ProPEX® 1" Copper Branch Manifold is used for hot and cold domestic potable water distribution systems.[1]

The manifold includes a 1" Copper Sweat Fitting Adapter supply connection. All outlets feature ½" ProPEX Fittings.

✓	Description	Part Number	A	B	C	D	Weight
☐	ProPEX 1" Copper Branch Manifold with ½" ProPEX outlets, 4 outlets	Q2801050	8.95"	2.40"	1.50"	0.50"	0.80 lbs.
☐	ProPEX 1" Copper Branch Manifold with ½" ProPEX outlets, 6 outlets	Q2811050	11.95"	2.40"	1.50"	0.50"	1.10 lbs.
☐	ProPEX 1" Copper Branch Manifold with ½" ProPEX outlets, 8 outlets	Q2821050	14.95"	2.40"	1.50"	0.50"	1.40 lbs.
☐	ProPEX 1" Copper Branch Manifold with ½" ProPEX outlets, 10 outlets	Q2831050	17.95"	2.40"	1.50"	0.50"	1.70 lbs.
☐	ProPEX 1" Copper Branch Manifold with ½" ProPEX outlets, 12 outlets	Q2841050	20.95"	2.40"	1.50"	0.50"	1.90 lbs.

Installation

Use any product designed to mount 1" copper pipe as a mounting bracket. Any bend within six inches of the ProPEX connection to the manifold requires the use of a Tube Talon (F7050750) or Bend Support (A5110500 and A5150500). Refer to the AquaPEX® Professional Plumbing Installation Guide or the AquaSAFE™ Residential Fire Sprinkler Installation Guide for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

UL 1821; ULC/ORD - C 199P; ICC ESR 1099; ANSI/NSF 14- and 61-certified; IAPMO

Related Applications

PEX-a Plumbing Systems
Uponor Residential Fire Safety Systems

Contact Information

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ProPEX® Brass Male Threaded Adapter

Submittal Information
Revision B: Feb. 4, 2010

Project Information

Job Name:

Location: | Part No. Ordered:

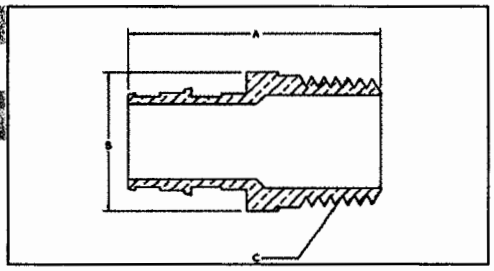
Engineer: | Date Submitted:

Contractor: | Submitted By:

Manufacturer's Representative: | Approved By:

Technical Data

Material: CA 360 Brass



Product Information and Application Use

ProPEX® Brass Male Threaded Adapters connect Uponor PEX tubing to male NPT threads.[1] These adapters are safe for direct burial in soil.

Description	Part Number	A	B	C	Weight
☐ ProPEX Brass Male Threaded Adapter, ⅜" PEX x ½" NPT	Q4523850	1.62"	0.875" HEX	0.50" NPT	0.11 lbs.
☐ ProPEX Brass Male Threaded Adapter, ½" PEX x ½" NPT	Q4525050	1.73"	0.875" HEX	0.50" NPT	0.32 lbs.
☐ ProPEX Brass Male Threaded Adapter, ½" PEX x ¾" NPT	Q4525075	1.78"	1.125" HEX	0.75" NPT	0.18 lbs.
☐ ProPEX Brass Male Threaded Adapter, ⅝" PEX x ¾" NPT	Q4526375	1.94"	1.125" HEX	0.75" NPT	0.18 lbs.
☐ ProPEX Brass Male Threaded Adapter, ¾" PEX x ¾" NPT*	Q4527575	2.02"	1.125" HEX	0.75" NPT	0.20 lbs.
☐ ProPEX Brass Male Threaded Adapter, ¾" PEX x 1" NPT	Q4527510	2.22"	1.375" HEX	1.00" NPT	0.35 lbs.
☐ ProPEX Brass Male Threaded Adapter, 1" PEX x ¾" NPT	Q4521075	2.25"	1.250" HEX	0.75" NPT	0.30 lbs.
☐ ProPEX Brass Male Threaded Adapter, 1" PEX x 1" NPT*	Q4521010	2.46"	1.375" HEX	1.00" NPT	0.44 lbs.
☐ ProPEX Brass Male Threaded Adapter, 1¼" PEX x 1¼" NPT	Q4521313	2.72"	1.750" HEX	1.25" NPT	0.75 lbs.
☐ ProPEX Brass Male Threaded Adapter, 1½" PEX x 1½" NPT	Q4521515	3.00"	2.250" HEX	1.50" NPT	0.80 lbs.
☐ ProPEX Brass Male Threaded Adapter, 2" PEX x 2" NPT	Q4522020	3.86"	2.500" HEX	2.00" NPT	1.90 lbs.

Installation

ProPEX Tool and ProPEX Rings (sold separately) are required for connecting the PEX tubing. Refer to the AquaPEX® Professional Plumbing Installation Guide or Radiant Floor Heating Installation Handbook for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; HUD MR 1269; ICC ESR 1099; IAPMO 3558; *UL 1821; *ULC/ORD C199P

Related Applications

PEX-a Plumbing Systems
Radiant Heating and Cooling Systems
Uponor Residential Fire Safety Systems

Contact Information

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ProPEX® Brass Coupling

Submittal Information
Revision B: March 17, 2009

Project Information

Job Name:

Location: Part No. Ordered:

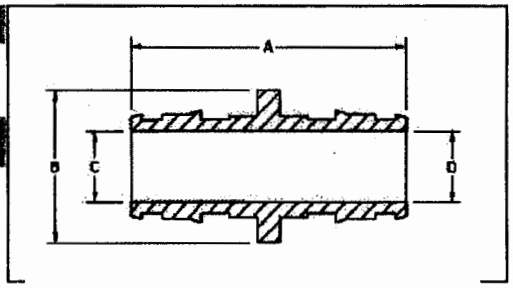
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: CA 360 Brass



Product Information and Application Use

ProPEX® Brass Couplings are available for use in hot and cold domestic potable water systems and Uponor Residential Fire Safety Systems.[1] Also approved for use in any radiant heating system. Each end of the fitting is manufactured with the ProPEX fitting for connections to Uponor hePEX™ tubing or any Uponor AquaPEX® tubing.

✓	Description	Part Number	A	B	C	D	Weight
☐	ProPEX Brass Coupling, ⅜" PEX x ⅜" PEX	Q4543838	1.31"	0.750"	0.260"	N/A	0.04 lbs
☐	ProPEX Brass Coupling, ½" PEX x ½" PEX*	Q4545050	1.54"	0.740"	0.398"	N/A	0.07 lbs
☐	ProPEX Brass Coupling, ⅝" PEX x ⅝" PEX	Q4546363	1.86"	0.910"	0.520"	N/A	0.08 lbs
☐	ProPEX Brass Coupling, ¾" PEX x ¾" PEX *	Q4547575	2.02"	1.187"	0.595"	N/A	0.13 lbs
☐	ProPEX Brass Coupling, 1" PEX x 1" PEX*	Q4541010	2.49"	1.345"	0.818"	N/A	0.20 lbs
☐	ProPEX Brass Coupling, ⅜" PEX x ½" PEX	Q4543850	1.42"	0.740"	0.398"	0.280"	0.05 lbs
☐	ProPEX Brass Coupling, ½" PEX x ¾" PEX	Q4545075	1.78"	1.070"	0.614"	0.398"	0.09 lbs
☐	ProPEX Brass Coupling, ¾" PEX x 1" PEX*	Q4547510	2.25"	1.345"	0.795"	0.595"	0.16 lbs
☐	ProPEX Brass Coupling, 2" PEX x 1½" PEX	Q4542015	4.10"	2.600"	1.110"	1.580"	1.10 lbs
☐	ProPEX Brass Coupling, 2" PEX x 2" PEX	Q4542020	4.54"	2.600"	1.580"	N/A	1.30 lbs

Installation

Use the appropriate ProPEX Ring for connecting the tubing. Refer to the AquaPEX Installation Handbook, Radiant Floor Installation Handbook or the Uponor AQUASAFE® Installation Guide for additional information.

Standards

ASTM F877; ASTM F1960; CAN/CSA B137.5

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; *UL 1821; *ULC/ORD C199P; ICC ESR 1099; HUD MR 1269; IAPMO 3558

Related Applications

PEX-a Plumbing Systems
AQUASAFE Fire Safety Systems
Radiant Heating and Cooling Systems
Snow and Ice Melting Systems
Permafrost Protection Systems
Turf Conditioning Systems

Contact Information

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ProPEX® Brass Female Threaded Adapter

Submittal Information
Revision B: Feb. 4, 2010

Project Information

Job Name:

Location: Part No. Ordered:

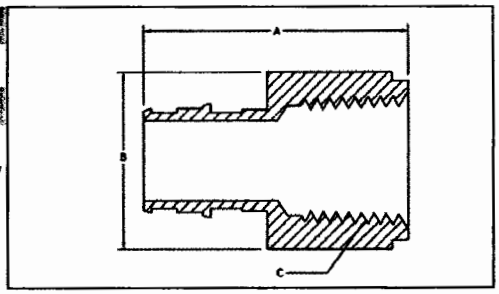
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: CA 360 Brass



Product Information and Application Use

The ProPEX® Brass Female Threaded Adapter connects Uponor PEX tubing to female NPT threads.[1] These fittings are used in hot and cold domestic potable water systems or in any radiant heating system. One end of the adapter is manufactured with the Uponor ProPEX Fitting for connections to Wirsbo hePEX™ tubing or Uponor AquaPEX® tubing. The other end of the adapter connects to female threaded connections. These adapters are safe for direct burial in soil.

✓	Description	Part Number	A	B	C	Weight
☐	ProPEX Brass Female Threaded Adapter, ½" PEX x ½" NPT	Q4575050	1.57"	1.000" HEX	0.50" NPT	0.20 lbs.
☐	ProPEX Brass Female Threaded Adapter, ½" PEX x ¾" NPT	Q4575075	1.75"	1.187" HEX	0.75" NPT	0.40 lbs.
☐	ProPEX Brass Female Threaded Adapter, ⅝" PEX x ¾" NPT	Q4576375	1.91"	1.187" HEX	0.75" NPT	0.20 lbs.
☐	ProPEX Brass Female Threaded Adapter, ¾" PEX x ¾" NPT*	Q4577575	1.87"	1.375" HEX	0.75" NPT	0.20 lbs.
☐	ProPEX Brass Female Threaded Adapter, ¾" PEX x 1" NPT	Q4577510	2.21"	1.500" HEX	1.00" NPT	0.40 lbs.
☐	ProPEX Brass Female Threaded Adapter, 1" PEX x ¾" NPT	Q4571075	2.17"	1.187" HEX	0.75" NPT	0.25 lbs.
☐	ProPEX Brass Female Threaded Adapter, 1" PEX x 1" NPT	Q4571010	2.44"	1.500" HEX	1.00" NPT	0.45 lbs.
☐	ProPEX Brass Female Threaded Adapter, 1¼" PEX x 1¼" NPT	Q4571313	2.57"	2.000" HEX	1.25" NPT	1.00 lbs.
☐	ProPEX Brass Female Threaded Adapter, 1½" PEX x 1½" NPT	Q4571515	2.75"	2.500" HEX	1.50" NPT	2.20 lbs.
☐	ProPEX Brass Female Threaded Adapter, 2" PEX x 2" NPT	Q4572020	3.53"	3.000" HEX	2.00" NPT	2.20 lbs.

Installation

ProPEX Tool and ProPEX Rings (sold separately) are required for connecting the PEX tubing. For more information, refer to the AquaPEX Professional Plumbing Installation Guide or the Radiant Floor Heating Installation Handbook.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; ICC ESR 1099; HUD MR 1269; *UL 1821; *ULC/ORD C199P

Related Applications

PEX-a Plumbing Systems
Radiant Heating and Cooling Systems
Uponor Residential Fire Safety Systems

Contact Information

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ProPEX® Ring

Submittal Information
Revision A: March 17, 2009

Project Information

Job Name:

Location: Part No. Ordered:

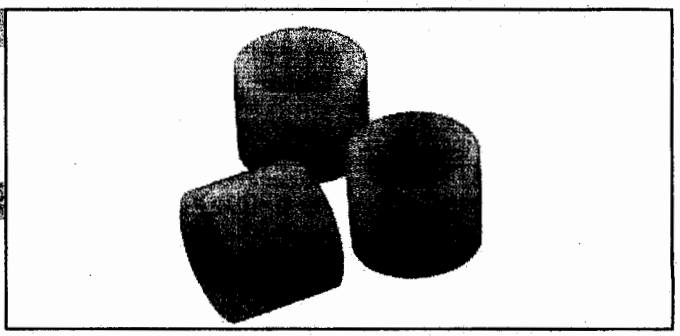
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material:	PEX-a (Engel Method)
Density:	926 to 940 kg/m^3
Degree of Crosslinking:	70% to 89%



Product Information and Application Use

Manufactured from PEX-a material, Uponor ProPEX® Rings are required to make a proper ProPEX connection.[1] Red print on the rings indicates hot lines. The ½" and ¾" ProPEX rings with stop includes a leading edge chamfer and stop edge.

	Description	Part Number	Length	I.D.	O.D.	Weight
☐	ProPEX Ring, ⅜"	Q4690302	0.54"	0.49"	0.74"	0.005 lbs.
☐	ProPEX Ring with Stop, ½" (red print)	Q4690511	0.63"	0.63"	0.87"	0.006 lbs.
☐	ProPEX Ring with Stop, ½"	Q4690512	0.63"	0.63"	0.87"	0.006 lbs.
☐	ProPEX Ring, ⅝"	Q4680625	0.79"	0.75"	1.00"	0.008 lbs.
☐	ProPEX Ring with Stop, ¾"	Q4690756	0.87"	0.88"	1.13"	0.012 lbs.
☐	ProPEX Ring, 1"	Q4681000	1.10"	1.13"	1.42"	0.020 lbs.
☐	ProPEX Ring, 1¼"	Q4681250	1.35"	1.38"	1.66"	0.030 lbs.
☐	ProPEX Ring, 1½"	Q4681500	1.61"	1.63"	1.91"	0.040 lbs.
☐	ProPEX Ring, 2"	Q4682000	1.97"	2.14"	2.61"	0.133 lbs.

Installation

Square cut the Uponor ProPEX tubing. Remove excess material. Slide the ProPEX Ring over the end of the tubing (maximum $^1/_{16}$" over-hang). When using the ½" ProPEX Ring with stop edge, slide the ring on (i.e., chamfered edge first) until the end of the tubing contacts the stop edge. Expand tubing and ring. Rotate tool a quarter turn after each expansion to prevent the formation of grooves. Remove the expansion tool and fully seat the tubing and ring against the shoulder of the fitting. You should make ProPEX connections at temperatures above 5°F /-15°C. For more information, refer to the AquaPEX® Professional Plumbing Installation Handbook, AQUASAFE® Fire Safety Installation Guide or the Uponor Radiant Installation Handbook.

Standards

ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

UL 1821 (½", ¾" and 1"); ULC/ORD - C 199 P (½", ¾" and 1"); HUD MR 1269; ICC ESR 1099; ANSI/NSF 14- and 61-certified

Related Applications

PEX-a Plumbing Systems
Radiant Heating and Cooling Systems
AQUASAFE Fire Safety Systems

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ProPEX® Brass Tee

Submittal Information
Revision B: March 17, 2009

Project Information

Job Name:

Location: | Part No. Ordered:

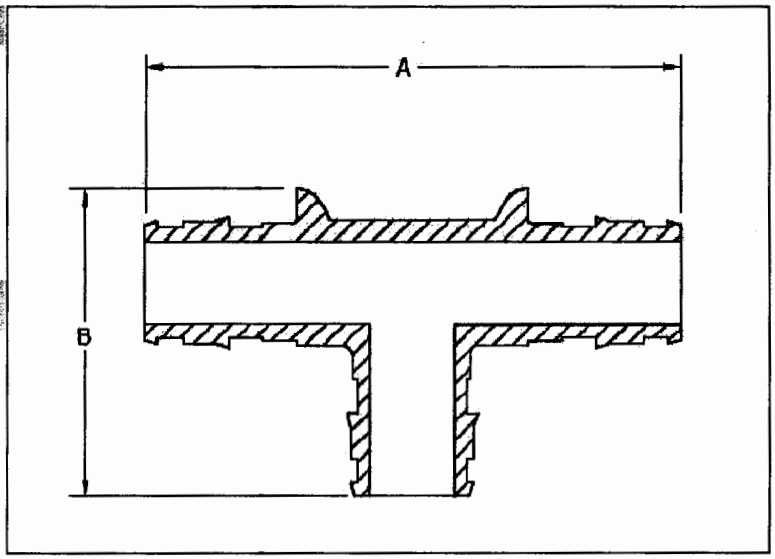
Engineer: | Date Submitted:

Contractor: | Submitted By:

Manufacturer's Representative: | Approved By:

Technical Data

Material: CA 360 Brass / EN12165 Brass



Product Information and Application Use

ProPEX® Brass Tee makes diverting connections for Uponor PEX tubing in supply and return mains.[1] Available for use in hot and cold domestic potable water systems, AQUASAFE® Residential Fire Safety Systems and in any hydronic heating system. Each end of the fitting is manufactured with the ProPEX fitting for connections to hePEX™ or any AquaPEX® tubing. Branch size is listed last in the part description.

✓	Description	Part Number	Width (A)	Height (B)	Weight
☐	ProPEX Brass Tee, ½" PEX x ½" PEX x ½" PEX*	Q4705050	2.52"	1.45"	0.20 lbs.
☐	ProPEX Brass Tee, ¾" PEX x ¾" PEX x ¾" PEX*	Q4707575	3.27"	1.93"	0.20 lbs.
☐	ProPEX Brass Tee, 1" PEX x 1" PEX x 1" PEX*	Q4701010	4.09"	2.42"	0.40 lbs.
☐	ProPEX Brass Tee, 2" PEX x 2" PEX x 2" PEX	Q4702000	7.43"	4.43"	2.40 lbs.

Installation

Use appropriate PEX Ring for connecting the tubing. Refer to the AquaPEX Installation Handbook, the Uponor AQUASAFE Installation Guide or the Uponor Radiant Floor Installation Handbook for additional information.

Standards

ASTM F877; ASTM F1960; CAN/CSA B137.5

Codes

UPC; IPC; NSPC; NPC of Canada

Listings

ANSI/NSF 14 & 16 Certified; ICC ESR 1099; HUD MR 1269; IAPMO 3558; *UL 1821; *ULC/ORD C199P

Related Applications

PEX-a Plumbing Systems
AQUASAFE Fire Safety Systems
Radiant Heating and Cooling Systems

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ProPEX® Brass Reducing Tee

Submittal Information
Revision B: March 17, 2009

Project Information

Job Name:

Location: Part No. Ordered:

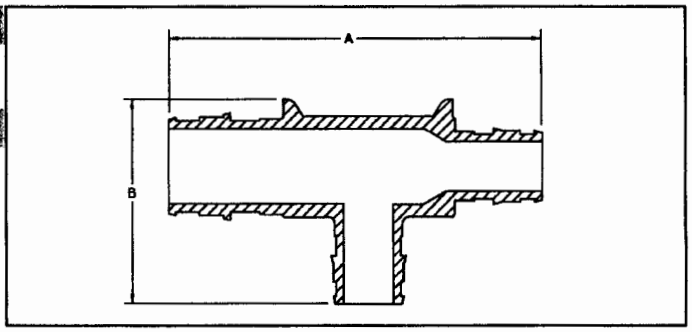
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: CA 360 Brass/EN 12165 Brass



Product Information and Application Use

ProPEX® Brass Reducing Tee makes diverting connections for Uponor PEX tubing in supply and return mains.[1] Available for use in hot and cold domestic potable water systems, AQUASAFE® Residential Fire Safety Systems and in any hydronic heating system. Each end of the fitting is manufactured with the ProPEX fitting for connections to hePEX™ or any AquaPEX® tubing. Branch size is listed last in the part description.

✓	Description	Part Number	A	B	Weight
☐	ProPEX Brass Reducing Tee, ½" PEX x ½" PEX x ¾" PEX	Q4705575	2.80"	1.93"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, ¾" PEX x ½" PEX x ½" PEX	Q4707555	3.03"	1.69"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, ¾" PEX x ½" PEX x ¾" PEX	Q4707557	3.03"	1.93"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, ¾" PEX x ¾" PEX x ½" PEX	Q4707550	3.27"	1.69"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, ¾" PEX x ¾" PEX x 1" PEX*	Q4707710	3.62"	2.42"	0.50 lbs.
☐	ProPEX Brass Reducing Tee, 1" PEX x ¾" PEX x ¾" PEX*	Q4701775	3.86"	2.18"	0.30 lbs.
☐	ProPEX Brass Reducing Tee, 1" PEX x ¾" PEX x 1" PEX*	Q4701751	3.86"	2.42"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, 1" PEX x 1" PEX x ½" PEX*	Q4701150	4.09"	1.95"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, 1" PEX x 1" PEX x ¾" PEX*	Q4701175	4.09"	2.18"	0.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 2" PEX x 1½" PEX	Q4702215	7.43"	3.99"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 2" PEX x 1¼" PEX	Q4702213	7.43"	3.73"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 2" PEX x 1" PEX	Q4702210	7.43"	3.47"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 2" PEX x ¾" PEX	Q4702275	7.43"	3.23"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 1½" PEX x 1½" PEX	Q4702055	6.99"	3.99"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 1½" PEX x 1¼" PEX	Q4702053	6.99"	3.73"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 1½" PEX x 1" PEX	Q4702051	6.99"	3.47"	2.40 lbs.
☐	ProPEX Brass Reducing Tee, 2" PEX x 1½" PEX x ¾" PEX	Q4702575	6.99"	3.23"	2.40 lbs.

Installation

Use appropriate PEX Ring for connecting the tubing. Refer to the AquaPEX Installation Handbook, the AQUASAFE Installation Guide or the Radiant Floor Installation Handbook for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; NPC of Canada

Listings

IAPMO 3558; ANSI/NSF 14- and 61-certified; HUD MR 1269; ICC ESR 1099; *UL 1821; *ULC/ORD C 199P

Related Applications

PEX-a Plumbing Systems
Radiant Heating and Cooling Systems
AQUASAFE Fire Safety Systems

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ProPEX® Fire Sprinkler Adapter

Submittal Information
Revision B: March 17, 2009

Job Name:

Location: Part No. Ordered:

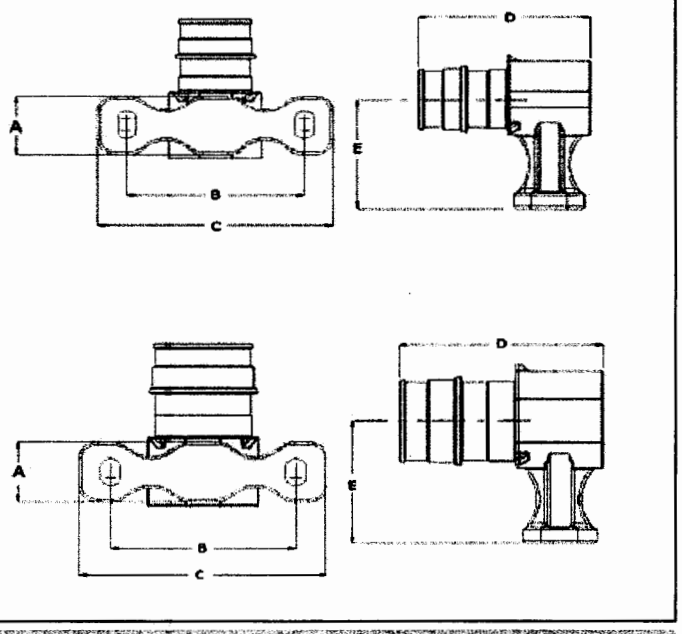
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: 300 Series Stainless Steel



Product Information and Application Use

Use the ProPEX® Fire Sprinkler Adapter in conjunction with the appropriate sprinkler to provide a multi-purpose residential fire sprinkler system[1]. For residential applications, the system is installed with the cold-potable portion of the Uponor plumbing system. Make connections with Uponor ProPEX fittings. These fittings are designed for use only with ¾" or 1" AquaPEX® White tubing in the Uponor AQUASAFE® Looped System.

✓	Description	Part Number	A	B	C	D	E	Weight
☐	ProPEX Fire Sprinkler Adapter, ¾" PEX x ½" FNPT	Q7517550	0.75"	1.88"	2.50"	1.82"	1.41"	0.268 lbs.
☐	ProPEX Fire Sprinkler Adapter, 1" PEX x ½" FNPT	Q7511050	0.75"	1.88"	2.50"	2.06"	1.54"	0.408 lbs.

Installation

Use appropriate ProPEX Ring for connecting the tubing. Refer to the AquaPEX Installation Handbook or the Uponor AQUASAFE® Installation Guide for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F 1960

Codes

IPC; UPC; NSPC; IRC; IMC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; U.P. Code; ICC ESR 1099; HUD MR 1269; UL 1821; ULC/ORD - C 199 P

Related Applications

PEX-a Plumbing Systems
AQUASAFE Fire Safety Systems

Contact Information

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ProPEX® Fire Sprinkler Adapter Tees

Submittal Information
Revision B: March 17, 2009

Job Name:

Location: Part No. Ordered:

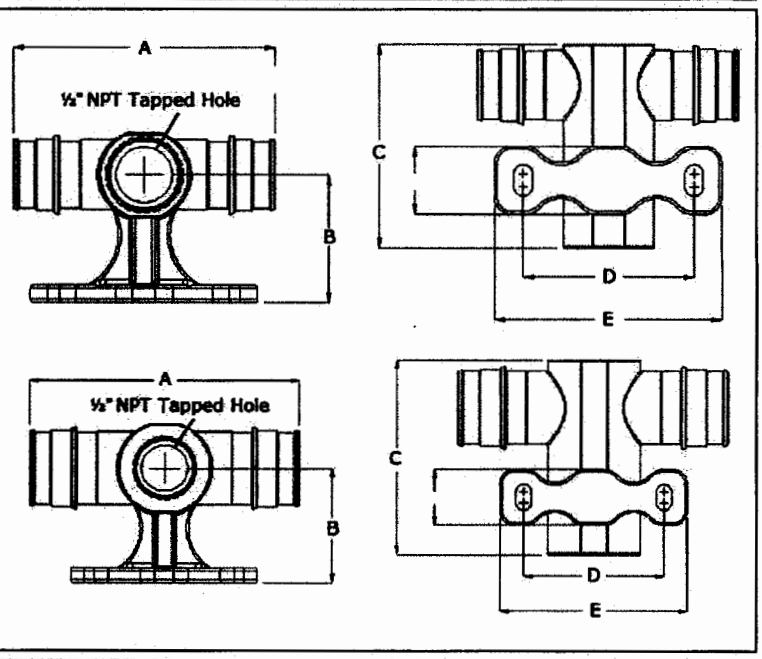
Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Material: 300 Series Stainless Steel



Product Information and Application/Use

Use the ProPEX® Fire Sprinkler Adapter Tee in conjunction with the appropriate sprinkler to provide a multi-purpose residential fire sprinkler system[1]. The system is installed with the cold-potable portion of the Uponor plumbing system for residential applications. Make the connections with Uponor ProPEX fittings. The fittings are designed for use only with ¾" or 1" AquaPEX® White tubing in the Uponor AQUASAFE® Looped System.

Description	Part Number	A	B	C	D	E	Weight
☐ ProPEX Fire Sprinkler Adapter Tee, ¾" PEX x ¾" PEX x ½" FNPT	Q7527575	2.89"	1.41"	2.25"	1.88"	2.50"	0.408 lbs.
☐ ProPEX Fire Sprinkler Adapter Tee, ¾" PEX x ¾" PEX x ½" FNPT	Q7521010	3.61"	1.54"	2.63"	1.88"	2.50"	0.268 lbs.

Installation

Use appropriate PEX Ring for connecting the tubing. Refer to the AquaPEX Installation Handbook, the Uponor AQUASAFE® Installation Guide for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; IRC; IMC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; U.P. Code; ICC ESR 1099; HUD MR 1269; UL 1821; ULC/ORD - C 199 P

Related Applications

PEX-a Plumbing Systems
AQUASAFE Fire Safety Systems

Contact Information

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ProPEX® Fire Sprinkler Adapter Elbow

Submittal Information
Revision B: March 17, 2009

Project Information

Job Name:

Location: Part No. Ordered:

Engineer: Date Submitted:

Contractor: Submitted By:

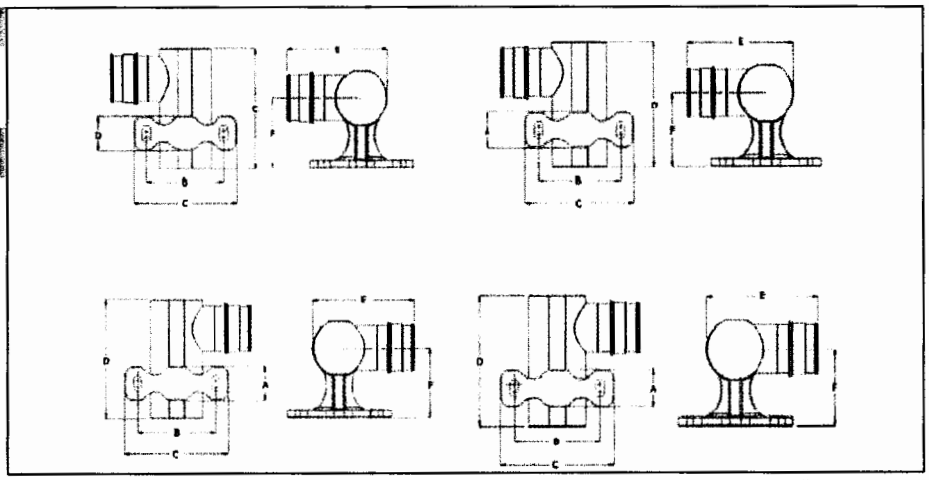
Manufacturer's Representative: Approved By:

Technical Data

Material: 300 Series Stainless Steel

Product Information and Application Use

Use the ProPEX® Fire Sprinkler Adapter Elbow in conjunction with the appropriate sprinkler to provide a multipurpose residential fire sprinkler system[1]. The system is installed with the cold-potable portion of the Uponor plumbing system for residential applications. Make connections using Uponor ProPEX fittings. The fittings are designed for use only with ¾" or 1" AquaPEX® White tubing in the Uponor AQUASAFE® Looped System.



Description	Part Number	A	B	C	D	E	F	Weight
☐ ProPEX Fire Sprinkler Adapter Right Elbow, ¾" PEX x ½" FNPT	Q7537550	2.25"	1.95"	1.41"	2.25"	1.95"	1.41"	0.410 lbs.
☐ ProPEX Fire Sprinkler Adapter Right Elbow, 1" PEX x ½" FNP	Q7531050	2.63"	2.43"	1.54"	2.63"	2.43"	1.54"	0.783 lbs.
☐ ProPEX Fire Sprinkler Adapter Left Elbow, ¾" PEX x ½" FNPT	Q7547550	2.25"	1.95"	1.41"	2.25"	1.95"	1.41"	0.410 lbs.
☐ ProPEX Fire Sprinkler Adapter Left Elbow, 1" PEX x ½" FNPT	Q7541050	2.63"	2.43"	1.54"	2.63"	2.43"	1.54"	0.783 lbs.

Installation

Use appropriate ProPEX Ring when connecting the tubing. Refer to the AquaPEX Installation Handbook or the Uponor AQUASAFE Installation Guide for additional information.

Standards

CAN/CSA B137.5; ASTM F877; ASTM F1960

Codes

IPC; UPC; NSPC; IRC; IMC; NPC of Canada

Listings

ANSI/NSF 14- and 61-certified; ICC ESR 1099; HUD MR 1269; IAPMO 3558; UL 1821; ULC/ORD - C 199 P

Related Applications

PEX-a Plumbing Systems
AQUASAFE Fire Safety Systems

Contact Information

Uponor, Inc.
5925 148th Street West
Apple Valley, MN 55124 USA
Phone: (800) 321-4739
Fax: (952) 891-2008
www.uponor-usa.com

Uponor Ltd.
2000 Argentia Rd., Plaza 1, Ste. 200
Mississauga, ON L5N 1W1 CANADA
Phone: (888) 994-7726
Fax: (800) 638-9517
www.uponor.ca

Tube Talon

Submittal Information
Tubing Support
Revision A: 01/MAR/2007

PROJECT INFORMATION

Job Name: _____

Location: _____ Part No. Ordered: _____

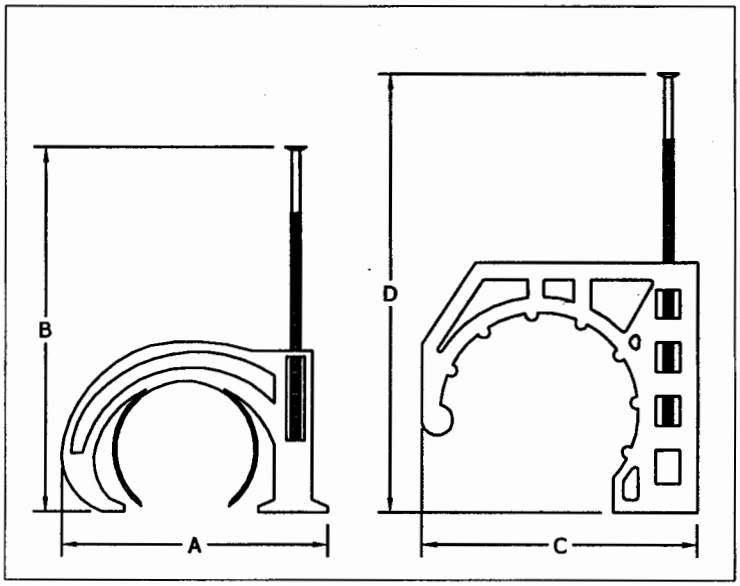
Engineer: _____ Date Submitted: _____

Contractor: _____ Submitted By: _____

Mfg Rep: _____ Approved By: _____

TECHNICAL DATA

Material HDPE



PRODUCT INFORMATION & APPLICATION USE

The Uponor Tube Talons are designed to attach Wirsbo PEX tubing to a desired surface

[X] DESCRIPTION	PART NUMBER	A	B	C	D	WEIGHT
[ ] Tube Talon (1/2", 5/8", 3/4" PEX)	F7050750	1.55"	2.00"	N/A	N/A	1.60 lbs
[ ] Tube Talon (1" PEX)	F7051000	N/A	N/A	1.66"	2.38"	1.10 lbs

INSTALLATION

- Mount the tube talon over the tubing and surface it is to be supported on.
- Attach the tube talon to the desired surface with the provided nail.
- Refer to the Uponor Radiant Floor Installation Handbook or the Uponor AQUAPEX Professional Plumbing Installation Guide for additional information.

CODES / STANDARDS / LISTINGS

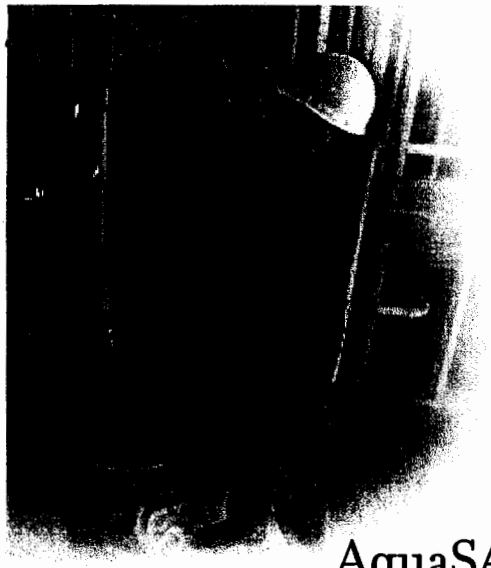
N/A

RELATED APPLICATIONS

AQUAPEX - Hot & Cold Potable Water Systems
Uponor Radiant Floor Heating Systems

CONTACT INFORMATION

Uponor Canada, Ltd.
655 Park Street
Regina, SK S4N 5N1
Phone: 888-994-7726
Fax: 800-638-9517
www.uponor.ca.com



uponor

FIRE SAFETY SYSTEMS

AQUASAFE™ FLOW TEST VERIFICATION

FORM

AquaSAFE™ Flow Test Verification Form

Alliance Member ID: 1416

Company Name: ALL ASPECT P+H

Contact: PETER SERAFIN

Phone: 207.632-2857

Fax: _____

Job Name: WELLER ST

Project Number: 110308-40L

Job Address: 27 WELLER ST

City: PORTLAND

State, ZIP: MAINE 04103

For designs not provided by Uponor, complete the following information.

Designer's Name: _____

Company: _____

Phone: _____

Fax: _____

Is the warning sign permanently attached close to the main shutoff valve? ☑ Yes ☐ No

Was this system required by code? ☑ Yes ☐ No

Important: Installing contractor must submit this completed form. Failure to do so nullifies the system warranty. E-mail or fax completed form to the Uponor Fire Safety Design Department at technical.services@uponor.com or 952.997.1731. For questions, contact Uponor Technical Services at 888.594.7726 or technical.services@uponor.com.

Color of test orifice used: _____

Static pressure (not flowing) reading at incoming water supply into home or at main shutoff: _____

Residual pressure (flowing) reading at incoming water supply into home or at main shutoff: _____

What time of day was the flow test taken? _____

Flow test method used? ☐ Bucket ☐ Flow Meter

Flow test gpm: _____

How many gallons of water did the design predict as required? _____

Did the test meet or exceed design flow? ☐ Yes ☐ No

Which sprinkler did you flow? Number: _____

Location of head: _____

Date left in service with all valves open: _____

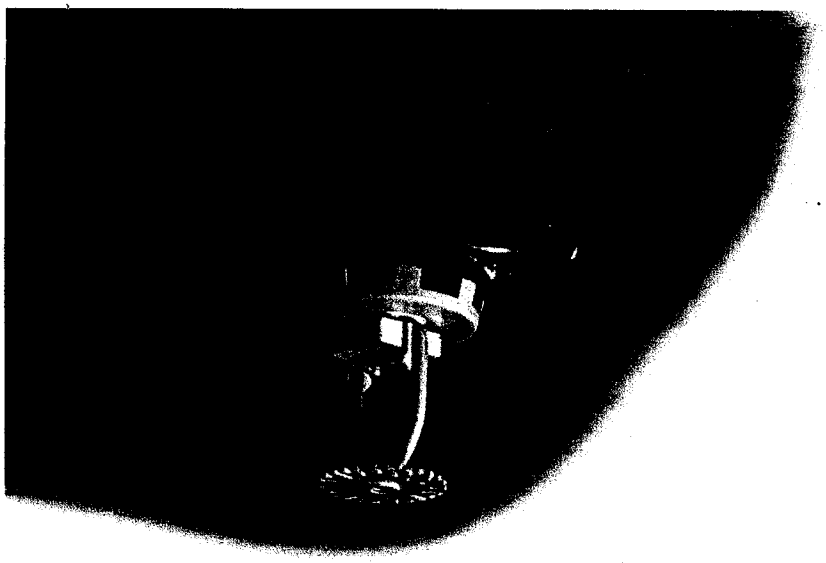
Test Witnessed and Verified by:

Name	Signature	Occupation	Date

Additional Explanations and Notes _____

Uponor, Inc.
5925 148th Street West
Apple Valley, MN 55124 USA

Tel: 800.321.4739
Fax: 952.997.1731
Web: www.uponor-usa.com



uponor

RESIDENTIAL FIRE SAFETY SYSTEMS

DOMESTIC WATER BYPA SS

INSTRUCTION SHEET

Sprinkler System with Domestic Water Bypass

A domestic water bypass allows the Uponor AquaSAFE™ fire sprinkler system to operate properly even when flow-restricting devices, such as water softeners and filtration systems, are present in the home.

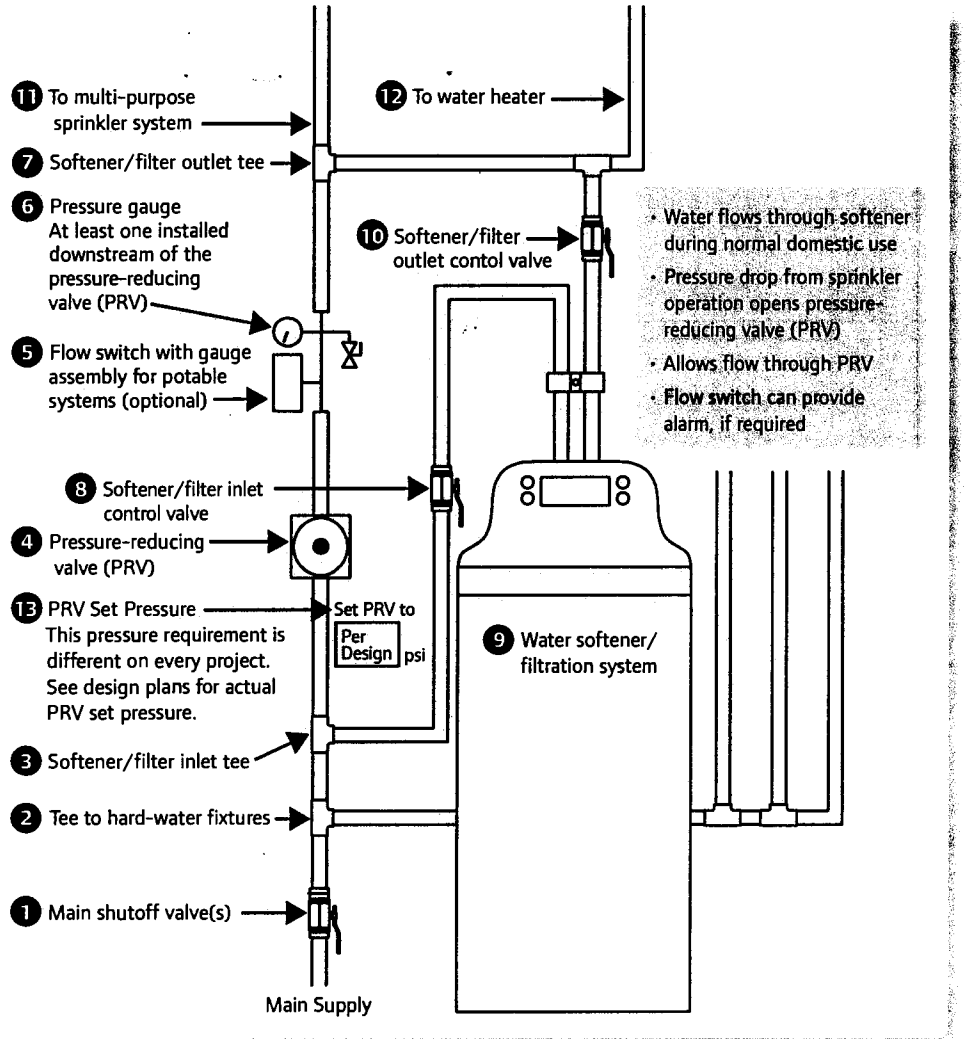


Figure 1: Domestic Water Bypass Installation with Optional Flow Switch

When a sprinkler activates and water pressure drops significantly, a pressure-reducing valve (PRV) opens and routes the water directly to the sprinkler system, taking the path of least resistance, thus avoiding the flow-restricting device.

The PRV opens only during sprinkler activation and not domestic use. Therefore, the flow-restricting device does not negatively impact the water supply of the fire sprinkler system and allows homeowners to use regular residential plumbing devices versus commercial devices.

Note: When the flow switch detects water flow through the bypass, it can activate an optional alarm, which alerts occupants that the sprinkler system is operating.

Bypass Components

- Pressure-reducing valve (PRV)
- Pressure gauge
- Alarm flow switch (if required)
- Electric alarm bell, horn or strobe light (if required)
- Required tubing and fittings

Domestic Water Bypass Installation Guidelines

Refer to the figure on the front page and use the following steps to properly install a domestic water bypass.

1. Install the domestic water bypass line. There needs to be a straight line from the Main Shutoff Valve (1) to the PRV (4) and also from the PRV to the Softener/Filter Outlet Tee (7). This will ensure proper operation of your fire sprinkler system. If additional 90° elbows are installed on the piping through the PRV, contact the Uponor Design Department at 888.594.7726 to recalculate the system.

2. Close the Softener/Filter Inlet Control Valve (8). All of the water will now flow through the PRV and not through the domestic Water Softener/ Filtration System (9).
3. Now that the Water Softener/ Filtration System (9) is isolated, open a single plumbing fixture downstream of the PRV. The Pressure Gauge (6) will show a pressure drop downstream of the PRV. The Pressure Gauge (6) reading will continue to drop until it reaches the point at which the PRV is preset.
4. If the flowing pressure on the Pressure Gauge (6) is lower or higher than the pressure indicated on the bypass detail in the Set Pressure box (13), turn the adjusting nut on the PRV until the Pressure Gauge (6) reading matches the pressure on the bypass detail. DO NOT adjust the PRV so that the downstream pressure is lower than that shown on the bypass detail. Doing so will cause the sprinkler system to fail.
5. Open the Softener/Filter Inlet Control Valve (8). The Pressure Gauge (6) reading will increase. The water is now flowing through the Water Softener/ Filtration System (9) only. If a sprinkler activates, the downstream pressure will drop below the PRV set point and water will flow through the PRV (4), thus introducing hard or unfiltered water into the system.
6. Turn off all domestic fixtures and perform the fire sprinkler flow test. If the PRV (4) has been set correctly, the flow test should be successful.
7. After the flow test is completed, open multiple outlets downstream of the PRV (4). Make note of how many outlets can be flowing before the pressure is equal to or below the PRV Set Pressure. Inform the customer that they will be able flow a specified number of outlets simultaneously. If the customer exceeds that number of flowing fixtures, the system will receive hard or unfiltered water.

Troubleshooting

Hard or Unfiltered Water Issues

If hard or unfiltered water is introduced into the system, it could be due to the following reasons.

1. The customer is exceeding the maximum amount of plumbing fixtures they can have flowing simultaneously. Inform them that they can also test the system by repeating the process in **Step 7** of the Domestic Water Bypass Installation Guidelines.
2. The city pressure has changed significantly. If this occurs, the PRV will have to be readjusted.
3. The water softener is too small for the customer's domestic-use needs or is malfunctioning. The customer may need to purchase a water softener with higher flow characteristics or have their softener repaired.
4. The PRV has been set incorrectly (too high).

The Flow Test Does Not Work

1. Make sure the PRV Set Pressure in the field is equal to or higher than the Set Pressure shown on the plan. If the actual PRV Set Pressure is lower than the Set Pressure shown on the bypass detail (13), there will not be enough pressure available to perform a successful flow test.
2. Contact the Uponor Design Department at 888.594.7726 to verify the friction loss across the PRV is not too great and to see if there is something else causing a flow restriction.

Uponor, Inc.
5925 148thStreet West
Apple Valley MN 55124 USA

Tel: 800.321.4739
Fax: 952.997.1751
Web: www.uponor-usa.com

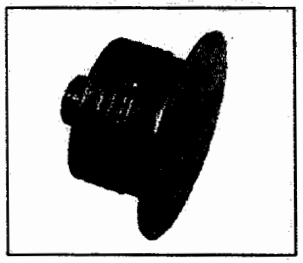
uponor

Reliable®

Model RFC43 (SIN RA0612)
Model RFC49 (SIN RA0616)
Flat Concealed Residential Sprinklers

Bulletin 006 Rev.D

A Concealed Residential Sprinkler engineered for a minimum design density of 0.05 gpm/ft² with low GPM requirements.



Features

1. Very low water flow requirements.
2. ½" (13mm) Total adjustment.
3. Thread-On/Thread-Off or Push-On/Thread Off cover attachment option.
4. Smooth aesthetic ceiling profile.
5. Available in brass, chrome and black plated or painted finishes.

Listings & Approval

1. Listed by Underwriters Laboratories, and certified by UL for Canada (cULus)
2. NYC MEA 258-93-E

UL Listing Categories

Residential Automatic Sprinklers

UL Guide Number

VKKW

Product Description

Model RFC43 and RFC49 Concealed Residential Sprinklers are fast response residential fusible solder link automatic sprinklers. Residential sprinklers differ from standard sprinklers primarily in their response time and water distribution patterns.

Model RFC43 and RFC49 sprinklers discharge water in a hemispherical pattern below the sprinkler deflector. Residential distribution patterns are higher and generally contain a finer droplet size than standard sprinkler patterns.

The combination of speed of operation and high discharge pattern required for residential sprinklers has demonstrated, in fire testing, an ability for controlling residential fires, and thereby providing significant evacuation time for occupants.

The RFC43 and RFC49 Sprinklers provide the best form of fire protection by combining an attractive appearance and ½" (13mm) of cover adjustment for ease of installation. The small diameter cover plate is easily and positively attached and blends into the ceiling, concealing the most dependable fire protection available, an automatic sprinkler system.

The RFC43 and RFC49 are UL Listed Residential Sprinklers to be installed in the residential portions of any occupancy in accordance with NFPA 13, 13R, & 13D.

The RFC43 and RFC49 can reduce the need for precise cutting of drop nipples. The threaded cover plate assembly can be adjusted without tools to fit accurately against the ceiling. The fire protection system need not be shut down to adjust or remove the cover plate assembly.

Application and Installation

The RFC43 and RFC49, for residential installations, use a 165°F (74°C) fusible solder link in a tuning fork style sprinkler frame with a drop-down deflector. This assembly is recessed into the ceiling and concealed by a flat cover plate. The cover plate is attached to the skirt, using 135°F (57°C) ordinary temperature classification solder. When the ceiling temperature rises, the solder holding the cover plate releases the cover allowing the deflector to drop into position and exposing the sprinkler inside to ceiling temperature. The subsequent operation of the solder link opens the waterway and causes the deflector to drop into position to distribute the discharging water in a hemispherical pattern below the sprinkler deflector. Any adjustment of thread engagement between the cover plate and cup will assure that the drop-down deflector is properly located below the ceiling. The residential distribution pattern contains a finer droplet size than a standard sprinkler, and the pattern produces significantly higher wall wetting.

After a 2 5/8 inch diameter hole is cut in the ceiling, the sprinkler is to be installed with the Model FC Wrench. When installing a sprinkler, the wrench is first positioned into the sprinkler/cup assembly and around the hexagonal body of the sprinkler frame. The wrench must bottom out against the cup in order to ensure proper, safe installation. The sprinkler is then tightened into the pipe fitting. When inserting or removing the wrench from the sprinkler/cup assembly, care should be taken to prevent damage to the sprinkler. DO NOT WRENCH ON ANY OTHER PART OF THE SPRINKLER/CUP ASSEMBLY. MODEL RFC43 AND RFC49 CONCEALED SPRINKLERS MUST BE INSTALLED ONLY WITH 135°F RATED COVERS.

Cover assemblies provide up to ½" (13mm) of adjustment. Turn the cover clockwise until the flange is in contact with the ceiling. For the push-on/thread-off option, the cover assembly is pushed onto the cup and final adjustment is made by turning the cover clockwise until the skirt flange makes full contact with the ceiling. Cover removal requires turning in the counter-clockwise direction.

In ceilings that have a plenum space above the sprinkler, the plenum space may have neutral or negative pressurization but must not be positively pressurized. Inspect all sprinklers after installation to ensure that the gap between the cover plate and ceiling and the 4 slots in the cup are all open and free from any air flow impediment.

Temperature Rating

Sprinkler	Cover Plate	Max. Ambient Temp.
165°F/74°C	135°F/57°C	100°F/38°C

Installation Data: RFC43 (SIN RA0612)

Thread Size inch (mm)	K Factor	Sprinkler Spacing ft. (m)	Maximum Distance to Wall ft. (m)	Minimum Distance between sprinklers, ft. (m)	Minimum Required Sprinkler Discharge	
					Flow gpm (Lpm)	Press. psi (bar)
½" (15mm)	4.3	12 x 12 (3.6x3.6)	6 (1.83)	8 (2.43)	12 (45)	7.8 (0.54)
½" (15mm)	4.3	14 x 14 (4.3x4.3)	7 (2.13)	8 (2.43)	13 (49)	9.1 (0.63)
½" (15mm)	4.3	16 x 16 (4.9x4.9)	8 (2.43)	8 (2.43)	13 (49)	9.1 (0.63)
½" (15mm)	4.3	18 x 18 (5.5x5.5)	9 (2.74)	8 (2.43)	18 (68)	17.5 (1.21)
½" (15mm)	4.3	20 x 20 (6.0x6.0)	10 (3.05)	8 (2.43)	21 (79)	23.8 (1.64)

Note: 1 bar = 100 Kpa

Installation Data: RFC49 (RA0616)

Thread Size inch (mm)	K Factor	Sprinkler Spacing ft. (m)	Maximum Distance to Wall ft. (m)	Minimum Distance between sprinklers, ft. (m)	Minimum Required Sprinkler Discharge	
					Flow gpm (Lpm)	Press. psi (bar)
½" (15mm)	4.9	12 x 12 (3.6x3.6)	6 (1.83)	8 (2.43)	13 (49)	7.0 (0.48)
½" (15mm)	4.9	14 x 14 (4.3x4.3)	7 (2.13)	8 (2.43)	13 (49)	7.0 (0.48)
½" (15mm)	4.9	16 x 16 (4.9x4.9)	8 (2.43)	8 (2.43)	13 (49)	7.0 (0.48)
½" (15mm)	4.9	18 x 18 (5.5x5.5)	9 (2.74)	8 (2.43)	17 (64.3)	12.0 (0.83)
½" (15mm)	4.9	20 x 20 (6.0x6.0)	10 (3.05)	8 (2.43)	20 (75.7)	16.7 (1.14)

Note: 1 bar = 100 Kpa

FOR SLOPED CEILING APPLICATIONS SEE RASCO BULLETIN 035.

Maintenance

Model RFC43 and RFC49 Concealed Sprinklers should be inspected quarterly and the sprinkler system maintained in accordance with NFPA 25. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove any sprinkler cover plate assembly 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 until used to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

Model RFC43 and RFC49 Residential Concealed Sprinkler Specification

Sprinklers shall be cULus Listed low flow residential concealed sprinklers with drop-down deflector and adjustable flat cover plate engineered for a minimum design density of 0.05 gpm/ft². Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Thermal element shall consist of an approved black-painted beryllium-nickel fusible solder link with symmetric lever mechanism, maintaining a Teflon-coated Belleville spring washer and machined brass cap water seal assembly containing no plastic parts. Sprinkler K-factor shall be nominal 4.3 (62.4), having a 7/16" orifice. Temperature rating shall be Ordinary 165°F (74°C); cover plate temperature rating to be 135°F (57°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange allowing a ½" cover plate adjustment. Any secure engagement between the cover plate and the cup will assure that the drop-down deflector is properly located below the ceiling. A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the drop-down sprinkler deflector from damage, which could occur during construction before the cover plate is installed. Standard cover finish: [Chrome] [White] [Specialty – specify]. Residential concealed sprinklers shall be Reliable Model RFC43, SIN RA0612 (Bulletin 006) or Model RFC49, SIN RA0616 (Bulletin 006).

Ordering Information

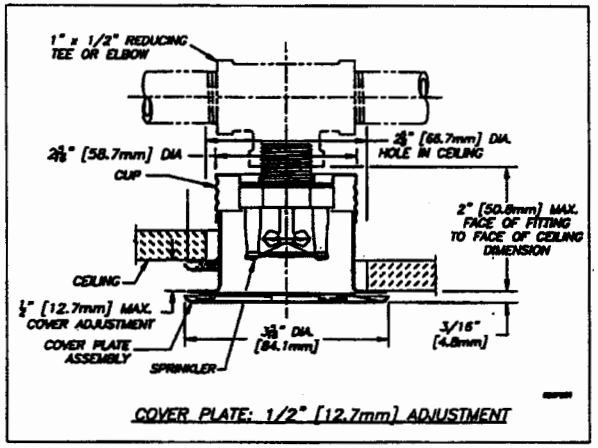
Specify:

1. Sprinkler Model
2. Cover Plate Finish
3. Thread-On or Push-On Feature

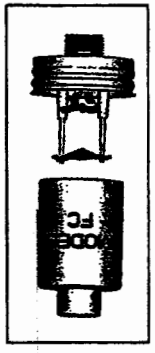
Cover Plate Finishes [1]

Standard Finishes
Chrome White
Special Application Finishes
Bright Brass Black Plating Black Paint Off White Satin Chrome

[1] Other colors and finishes available. Consult factory for details.
Note: Paint or any other coatings applied over the factory finish will void all approvals and warranties.



COVER PLATE: 1/2" [12.7mm] ADJUSTMENT



Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Supertrol electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gauges
- Identification signs
- Fire department connection

Manufactured by:
Reliable
The Reliable Automatic Sprinkler Co., Inc.
(800) 431-1588 Sales Offices
(800) 848-8051 Sales Fax
(914) 829-2042 Corporate Offices
www.reliablesprinkler.com Internet Address
Recycled Paper
Revision lines indicate updated or new data.
E.G. Printed in USA. 12/06 P/N 9888870261

Reliable®

Model F1 Residential Sprinklers for Design Density of .05 gpm/ft²

Bulletin 135 Rev.G

Model F1 Res Sprinklers engineered for the lowest flows to meet the minimum design density of .05 gpm/ft²

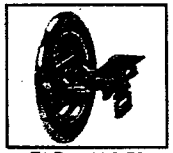
Types:

1. F1 Res 30 Pendent
2. F1 Res 30 Recessed Pendent/F2
3. F1 Res 30 Recessed Pendent/FP
4. F1 Res 49 Pendent
5. F1 Res 49 Recessed Pendent/F1
6. F1 Res 49 Recessed Pendent/FP
7. F1 Res 58 Pendent
8. F1 Res 58 Recessed Pendent/F1
9. F1 Res 58 Recessed Pendent/FP
10. F1 Res 76 Pendent
11. F1 Res 76 Recessed Pendent/F1
12. F1 Res 76 Recessed Pendent/FP
13. F1 Res 30 CCP Pendent
14. F1 Res 49 CCP Pendent
15. F1 Res 58 CCP Pendent
16. F1 Res 76 CCP Pendent
17. F1 Res 44 HSW
18. F1 Res 44 Recessed HSW/F2
19. F1 Res 58 HSW
20. F1 Res 58 HSW Recessed HSW/F2
21. F1 Res 44 SWC
22. F1 Res 40 HSW
23. F1 Res 40 Recessed HSW/F2

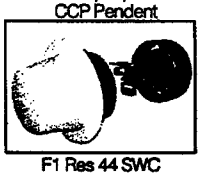
F1 Res 30, 49, 58 & 76 Recessed Pendent/F1

F1 Res 30, 49, 58 & 76 Recessed Pendent/FP

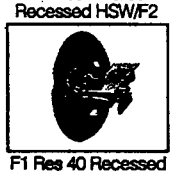
F1 Res 30, 49, 58 & 76 CCP Pendent



F1 Res 44 & 58 Recessed HSW/F2



F1 Res 44 SWC



F1 Res 40 Recessed HSW/F2

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)
2. NYC MEA 258-93-E

Slope Ceiling Approvals: Refer to Bulletin 035

Sprinklers for .10 Density: Refer to Bulletin 176

UL Listing Category

Residential Automatic Sprinkler

UL Guide Number

VKKW

Patents

US Patent No. 6,516,893 applies to the Model F1 Res 49 & 58 Pendent Sprinklers

Product Description

Model F1 Res Pendent sprinklers (Figs. 1, 2, 3, & 4) are fast response sprinklers combining excellent durability, high sensitivity glass-bulb and low profile decorative design. The F1 Res Horizontal Sidewall sprinklers (Figs. 5, 6 & 7) are equally attractive when above ceiling piping cannot be used.

The 3mm glass-bulb pendent sprinklers permit the efficient use of residential water supplies for sprinkler coverage in residential fire protection design.

The low flow F1 Res sprinklers are specially engineered for fast thermal response to meet the sensitive fire protection application needs of the latest residential market standards (UL 1626 Standard). Upon fire conditions, rising heat causes a sprinkler's heat-sensitive glass-bulb to shatter, releasing the waterway for water flow onto the deflector, evenly distributing the discharged water to control a fire.

Technical Data:

- Thermal Sensor: Nominal 3mm glass-bulb
- Sprinkler Frame : Brass Casting
- Sprinklers' Pressure Rating : 175 psi
  Factory Hydrostatically Tested to 500 psi
- Thread Size: ½" NPT (R½)
- K-Factor: 3.0 (Actual) - F1 Res 30 Pendent Sprinkler
  4.9 (Actual) - F1 Res 49 Pendent Sprinkler
  5.8 (Actual) - F1 Res 58 Pendent & HSW Sprinkler
  7.6 (Actual) - F1 Res 76 Pendent Sprinkler
  4.4 (Actual) - F1 Res 44 HSW Sprinkler
  4.0 (Actual) - F1 Res 40 HSW Sprinkler
- Density: Minimum 0.05 gpm/ft²

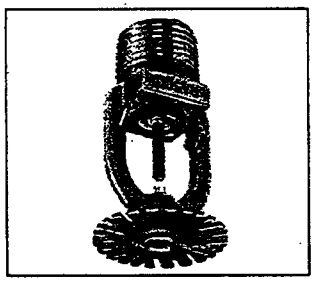
Application

Model F1 Res Sprinklers are used for Residential Fire Protection according to UL 1626 Standard*. Be sure that orifice size, temperature rating, deflector style and sprinkler type are in accordance with the latest published standards of The National Fire Protection Association or the approving authority having jurisdiction.

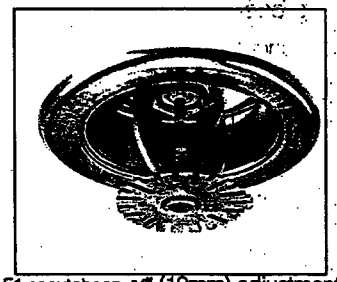
Installation

Models F1 Res sprinklers are to be installed as shown. Model F1, F2 and FP Escutcheons, illustrated herewith, are the only recessed escutcheons to be used with Model F1 Res sprinklers. Use of any other recessed escutcheon will void all approvals and warranties. For installing Model F1 Res Pendent sprinklers use only the Model D sprinkler Wrench; for installing Models F1 Res Recessed Pendent, CCP & SWC sprinklers use only the Model GFR2 sprinkler wrench; for installing Model F1 Res Recessed HSW sprinklers use only the Model GFR2 Sprinkler Wrench. Use of wrenches other than those specified may damage these sprinklers. Install F1 Res 44 and 40 HSW with a ceiling to deflector distance of 4" - 12". Flow arrow on deflector must point away from near wall and "Top" marking must face ceiling.

- **Model F1 Res 30, 49, 58 & 76 Pendent**



- **Model F1 Res 30 Recessed Pendent / F2**
- **Model F1 Res 49, 58 & 76 Recessed Pendent / F1**



F1 escutcheon, ¾" (19mm) adjustment

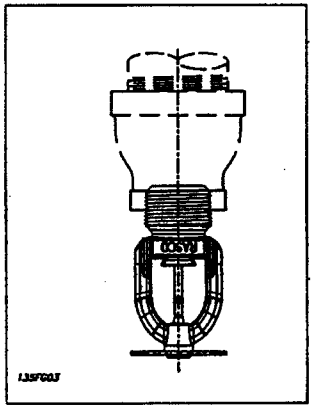


Fig. 1

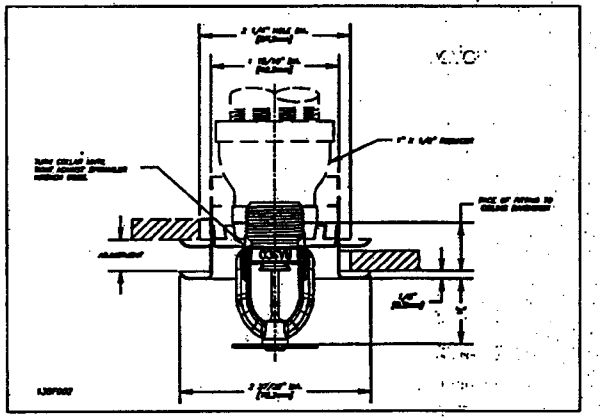


Fig. 2

Escutcheon*, F1 or F2, Data:

Type	Adjustment inch (mm)	"A" inch (mm)	Face of fitting to ceiling inch (mm)
F1	¾ (19.0)	Min.= ¾" (19.1) Max.= 1½" (38.1)	¾ - 1 5/8 (4.7 - 24.0)
F2	½ (12.7)	Min.= 15/16" (23.8) Max.= 1½" (38.1)	¾ - 1 3/8 (4.7 - 17.4)

* Note: Escutcheons F1 or F2 may be used with Model F1 Res 49, 58 & 76 Recessed Pendent.

Technical Data: F1 Res 30 Pendent and Recessed Pendent

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	Actual K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	5/16" (8.2)	155 175	68 79	175 (12)	100	38	3.0	2.25 (57)

Deflector - to - ceiling
Maximum 1" (25mm) to 4" (100mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	8 (30.3)	7.0 (0.48)	R3511
14 x 14 (4.3x4.3)	10 (37.8)	11 (0.76)	

Technical Data: F1 Res 49 Pendent and Recessed Pendent

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	Actual K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	7/16" (11)	155 175	68 79	175 (12)	100 150	38 66	4.9	2.25 (57)

Deflector - to - ceiling
Maximum 1" (25mm) to 4" (100mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	13 (49)	7.0 (0.48)	R3516
14 x 14 (4.3x4.3)	13 (49)	7.0 (0.48)	
16 x 16 (4.9x4.9)	13 (49)	7.0 (0.48)	
18 x 18 (5.5x5.5)	17 (64.3)	12.0 (0.83)	
20 x 20 (6.1x6.1)	20 (75.7)	16.7 (1.14)	

***Deflector - to - ceiling**
Maximum 4" (100mm) to 8" (203mm)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	15 (57)	9.4 (0.65)	R3516
14 x 14 (4.3x4.3)	16 (60.5)	10.6 (0.73)	
16 x 16 (4.9x4.9)	17 (64.3)	12.0 (0.83)	
18 x 18 (5.5x5.5)	19 (72)	15.0 (1.0)	
20 x 20 (6.1x6.1)	22 (83.2)	20.2 (1.4)	

***Note:** The F1 Res 49 pendent and recessed pendent residential sprinklers can be installed per NFPA 13 in beamed ceilings meeting the following criteria:
1. Maximum beam depth = 7" (178mm)
2. Beam spacing at or greater than 7.5 ft. (2.3m) on center.

Technical Data: F1 Res 58 Pendent and Recessed Pendent

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	½" (13)	155 175	68 79	175 (12)	100 150	38 66	5.8	2.25 (57)

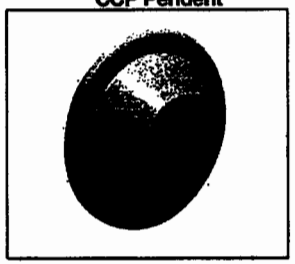
Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Ceiling-to-Deflector Inch (mm)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	16 (61)	7.6 (0.53)	1-4 (25-100)	R3513
14 x 14 (4.3x4.3)	16 (61)	7.6 (0.53)		
16 x 16 (4.9x4.9)	16 (61)	7.6 (0.53)		
18 x 18 (5.5x5.5)	19 (72)	10.8 (0.75)		
20 x 20 (6.1x6.1)	22 (83.3)	14.4 (1.0)		

Technical Data: F1 Res 76 Pendent and Recessed Pendent

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	17/32" (13.5)	155 175	68 79	175 (12)	100 150	38 66	7.6	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	21	7.6 (0.53)	R7618
14 x 14 (4.3x4.3)	21	7.6 (0.53)	
16 x 16 (4.9x4.9)	21	7.6 (0.53)	
18 x 18 (5.5x5.5)	21	7.6 (0.53)	
20 x 20 (6.1x6.1)	23	9.2 (0.63)	

- **Model F1 Res 30, 49, 58 & 76 CCP Pendent**



- **Model F1 Res 30, 49, 58 & 76 Recessed Pendent / FP**

FP push-on/thread-off escutcheon

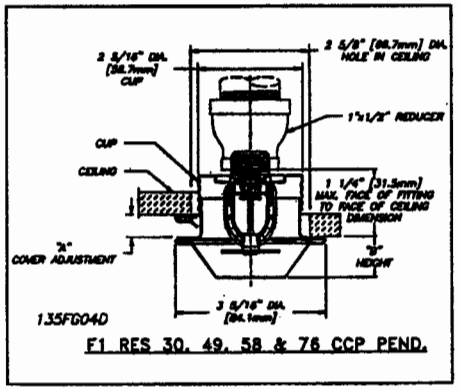


Fig. 3

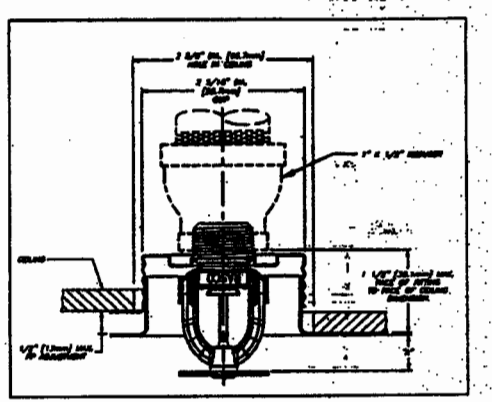


Fig. 4

NOTE: The F1 Res 76 will use a 1" x ¾" reducer.

Technical Data: F1 Res 30 CCP Pendent and Recessed Pendent / FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	5/16" (8.2)	155	68	135	57	175 (12)	100	38	3.0	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	8 (30.3)	7.0 (0.48)	R3511
14 x 14 (4.3x4.3)	11 (41.6)	13.4 (0.92)	

Technical Data: F1 Res 49 CCP Pendent and Recessed Pendent / FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	7/16" (11)	155	68	135	57	175 (12)	100	38	4.9	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	13 (49)	7.0 (0.48)	R3516
14 x 14 (4.3x4.3)	13 (49)	7.0 (0.48)	
16 x 16 (4.9x4.9)	14 (53)	8.2 (0.56)	
18 x 18 (5.5x5.5)	18 (68.1)	13.5 (0.93)	
20 x 20 (6.1x6.1)	20 (75.7)	16.7 (1.14)	

CCP Options Data:

"A" Cover Adjustment Inch (mm)	"B" CCP Height Inch (mm)
½ (12.7)	15/16 (24)
5/16 (7.9)	¾ (19)

FP Data "A":

FP Position	"A" Inch (mm)
Max. Recessed	7/16 (11)
Min. Recessed	15/16 (24)

Note: Sprinklers shown in Fig. 3 and Fig. 4 are not suitable for installation in ceilings which have positive pressure in the space above.

Technical Data: F1 Res 58 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	½" (13)	155	68	135	57	175 (12)	100	38	5.8	2.25 (57)

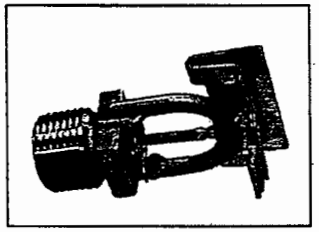
Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	16 (61)	7.6 (0.53)	R3513
14 x 14 (4.3x4.3)	16 (61)	7.6 (0.53)	
16 x 16 (4.9x4.9)	16 (61)	7.6 (0.53)	
18 x 18 (5.5x5.5)	19 (72)	10.8 (0.75)	
20 x 20 (6.1x6.1)	22 (83.3)	14.4 (1.0)	

Technical Data: F1 Res 76 CCP Pendent and Recessed Pendent/FP

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	CCP Assembly Temp. Rating °F	CCP Assembly Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
¾" NPT (R¾)	17/32" (13.5)	155 175	68 79	135	57	175 (12)	100 150	38 66	7.6	2.25 (57)

Max. Sprinkler Spacing ft (m)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	21	7.6 (0.53)	R7618
14 x 14 (4.3x4.3)	21	7.6 (0.53)	
16 x 16 (4.9x4.9)	21	7.6 (0.53)	
18 x 18 (5.5x5.5)	22	8.4 (0.58)	
20 x 20 (6.1x6.1)	25	10.8 (0.74)	

• **Model F1 Res 44 & 58 HSW**



• **Model F1 Res 44 & 58 Recessed HSW/F2**

F2 escutcheon, ½" (13mm) adjustment

Technical Data: F1 Res 44 HSW & HSW/F2

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	¾" (10)	155 175	68 79	175 (12)	100 150	38 66	4.4	2.45 (62)

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	½ (13)	3/16 - 11/16 (4.7 - 17.4)

Max. Sprinkler Spacing ft (m)	"A" Ceiling-to-Deflector Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	155 (68)	175 (79)	12 (45.4)	7.5 (0.52)	R3531
14 x 14 (4.3x4.3)		155 (68)	175 (79)	14 (53.0)	10.2 (0.71)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	16 (60.6)	13.3 (0.92)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	18 (68.1)	16.8 (1.16)	
18 x 18 (5.5x5.5)		155 (68)	175 (79)	19 (72.0)	18.7 (1.29)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	23 (87.1)	27.4 (1.89)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	155 (68)	175 (79)	14 (53.0)	10.2 (0.71)	
14 x 14 (4.3x4.3)		155 (68)	175 (79)	16 (60.6)	13.3 (0.92)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	17 (64.4)	15.0 (1.04)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	20 (75.7)	20.7 (1.43)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	23 (87.1)	27.4 (1.89)	

Technical Data: F1 Res 58 HSW & HSW/F2

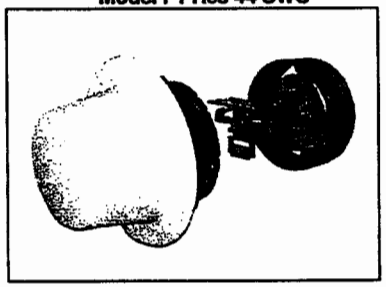
Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	½" (13)	155 175	68 79	175 (12)	100 150	38 66	5.8	2.45 (62)

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	½ (13)	3/16 - 11/16 (4.7 - 17.4)

Max. Sprinkler Spacing ft (m)	"A" Ceiling -to- Deflector Inch (mm)	Sprinkler Temp. Rating °F (°C)		Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	155 (68)	175 (79)	16 (60.6)	7.6 (0.53)	R3533
14 x 14 (4.3x4.3)		155 (68)	175 (79)	18 (68.2)	9.7 (0.67)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	21 (79.5)	13.2 (0.91)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	25 (94.7)	18.6 (1.28)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	29 (109.8)	25 (1.73)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	155 (68)	175 (79)	22 (83.3)	14.4 (1.0)	
14 x 14 (4.3x4.3)		155 (68)	175 (79)	22 (83.3)	14.4 (1.0)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	26 (98.4)	20.1 (1.39)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	31 (117.4)	28.6 (1.97)	

- **Model F1 Res 44 SWC**



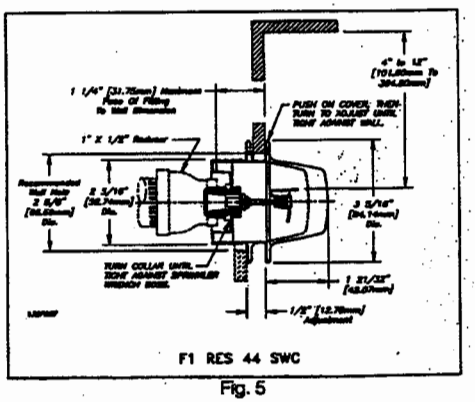


Fig. 5

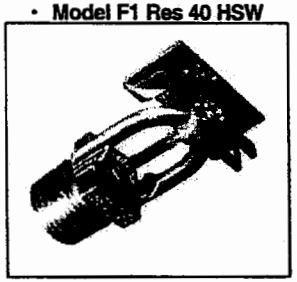
Technical Data: F1 Res 44 SWC

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	Sprinkler Temp. Rating °C	Cover Temp. Rating °F	Cover Temp. Rating °C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	Max. Ambient Temp. °C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	⅜" (10)	155	68	135	57	175 (12)	100	38	4.4	2.45 (62)

Max. Sprinkler Spacing ft (m)	"A" Ceiling -to- Deflector Inch (mm)	Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	13 (49.2)	8.7 (0.60)	R3531
14 x 14 (4.3x4.3)		14 (53.0)	10.2 (0.71)	
16 x 16 (4.9x4.9)		17 (64.3)	15.0 (1.1)	
16 x 18 (4.9x5.5)		19 (71.8)	18.7 (1.13)	
16 x 20 (4.9x6.1)		23 (87.1)	27.4 (1.89)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	14 (52.9)	10.2 (0.71)	
14 x 14 (4.3x4.3)		15 (56.7)	11.7 (0.81)	
16 x 16 (4.9x4.9)		18 (68.1)	16.8 (1.16)	
16 x 18 (4.9x5.5)		20 (75.6)	20.7 (1.43)	

2.

- **Model F1 Res 40 HSW**



- **Model F1 Res 40 Recessed HSW/F2**

F2 escutcheon, ½" (13mm) adjustment

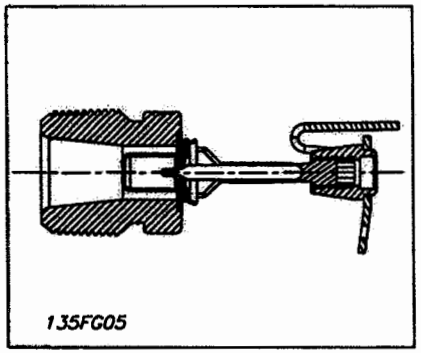


Fig. 6

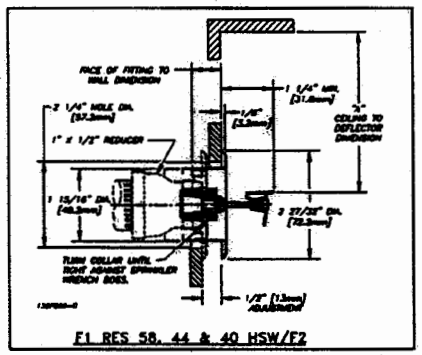


Fig. 7

Technical Data: F1 Res 40 HSW & HSW/F2

Thread Size	Nominal Orifice Inch (mm)	Sprinkler Temp. Rating °F	°C	Max. Pressure psi (bar)	Max. Ambient Temp. °F	°C	K Factor	Sprinkler Length Inch (mm)
½" NPT (R½)	½" (10)	155 175	68 79	175 (12)	100 150	38 66	4.0	2.45 (62)

Escutcheon, F2, Data:

Type	Adjustment Inch (mm)	Face of Fitting to wall Inch (mm)
F2	½ (13)	3/16 - 11/16 (4.7 - 17.4)

Max. Sprinkler Spacing ft (m)	"A" Ceiling-to-Deflector Inch (mm)	Sprinkler Temp. Rating °F (°C)		Flow gpm (Lpm)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
12 x 12 (3.6x3.6)	4 - 6 (101-152)	155 (68)	175 (79)	13 (49.0)	10.6 (0.73)	R3538
14 x 14 (4.3x4.3)		155 (68)	175 (79)	16 (60.5)	16.0 (1.10)	
16 x 16 (4.9x4.9)		155 (68)		17 (64.3)	18.1 (1.24)	
16 x 16 (4.9x4.9)			175 (79)	18 (68.1)	20.2 (1.39)	
16 x 18 (4.9x5.5)		155 (68)	175 (79)	20 (75.7)	25.0 (1.72)	
18 x 18 (5.5x5.5)		155 (68)	175 (79)	22 (83.3)	30.2 (2.08)	
16 x 20 (4.9x6.1)		155 (68)	175 (79)	23 (87.0)	33.1 (2.28)	
12 x 12 (3.6x3.6)	6 - 12 (152-305)	155 (68)	175 (79)	13 (49 0)	10.6 (0.73)	
14 x 14 (4.3x4.3)		155 (68)	175 (79)	17 (64.3)	18.1 (1.24)	
16 x 16 (4.9x4.9)		155 (68)	175 (79)	20 (75.7)	25.0 (1.72)	

Finishes[1]

Standard Finishes		
Sprinkler	**F1, F2, FP Escutcheons**	**Cover Plates**
Bronze Chrome Plated White Polyester Coated	Brass Bright Chrome Plated White Painted	White Painted Chrome
Special Application Finishes		
Sprinkler	**F1, F2, Escutcheons**	**Cover Plates**
Bright Brass Black Plated Black Paint Off White Satin Chrome	Bright Brass Black Plated Black Paint Off White Satin Chrome	Bright Brass Black Plated Black Paint Off White Satin Chrome

[1] Other finishes and colors are available on special order. Consult factory for details.

Note: Paint or any other coating applied over the factory finish will void all approvals and warranties.

Maintenance

Model F1 Res 30, 49, F1 Res 58, F1 Res 76, F1 Res 44 and F1 Res 40 Sprinklers should be inspected quarterly, and the sprinkler system maintained in accordance with NFPA 25, 13, 13D, and 13R. Do not clean sprinkler with soap and water, Ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Remove 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 remain in the original cartons and packaging until used. This will minimize the potential for damage to sprinklers that could cause improper operation or non-operation.

Model F1 Res 30, 49 & 58 Pendent Sprinkler Specifications

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Deflector-to-ceiling distance listing shall be 1" to 8" maximum. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 3.0, 4.9 and 5.8. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential pendent sprinklers shall be Reliable Model F1 Res 30, 49 & 58, SIN R3511, R3516 & R3513 (Bulletin 135).

Ordering Information

Specify:

1. Sprinkler Model
2. Sprinkler Type
3. Temperature Rating
4. Sprinkler Finish
5. Escutcheon Finish
6. Cover Plate Finish

Model F1 Res 49 & 58 Recessed Pendent/F1, Model F1 Res 30, 49 & 58 Recessed Pendent/F2, Model F1 Res 30, 49 & 58 Recessed Pendent/FP

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential recessed pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Deflector-to-ceiling distance listing shall be 1" to 8" maximum. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 3.0, 4.9 & 5.8. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Recessed escutcheon assembly shall be a steel, two-piece escutcheon [with ½" adjustment (Model F2)] [with ¾" adjustment (Model F1)] [of push-on and thread off design with ½" adjustment (Model FP)]. Standard finish shall be [brass][bright chrome] [white painted]. Residential recessed pendent sprinklers shall be Reliable [Model F1 Res 3.0, 49 & 58 Recessed Pendent/F1] [Model F1 Res 30, 49 & 58 Recessed Pendent/F2] [Model F1 Res 30, 49 & 58 Recessed Pendent/FP] SIN R3511, R3516 & R3513 (Bulletin 135).

Model F1 Res 30, 49 & 58 CCP Pendent (Concealed)

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential concealed sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where pendent residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F (68°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange. Method of attaching the cover plate to the sprinkler cup shall be a push-on and thread-off design allowing a ½" cover plate adjustment. Cover plate temperature rating shall be 135°F (57°C). A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the sprinkler from damage, which could occur during construction before the cover plate is installed. Standard cover plate finish: [White] [Custom Color– specify].]. Concealed pendent sprinklers shall be Reliable Model F1 Res 30, 49 & 58 CCP, SIN R3511, R3516 & R3513 (Bulletin 135).

Model F1 RES 40 and F1 Res 44 Horizontal Sidewall Residential Sprinkler Specifications

Model F1 Res 40 Horizontal Sidewall Sprinkler

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential horizontal sidewall sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where horizontal sidewall residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 4.0 (57.1). Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential horizontal sidewall sprinklers shall be Reliable Model F1 Res 40, SIN R3538 (Bulletin 135).

Model F1 Res 40 Recessed Horizontal Sidewall Sprinkler

Use description for the Model F1 Res 40 horizontal sidewall sprinkler with the following modifications: Replace "horizontal sidewall sprinkler" with "recessed horizontal sprinkler." Add: Recessed escutcheon assembly shall be a steel, two-piece escutcheon with ½" adjustment (Model F2). Standard finish shall be [brass][bright chrome] [white painted] [Special finish– specify]. Residential recessed horizontal sidewall sprinklers shall be Reliable Model F1 Res 40/F2, SIN R3538 (Bulletin 135).

Model F1 Res 44 Horizontal Sidewall Sprinkler

Sprinklers shall be [cULus Listed] [New York City MEA Approved (258-93-E)] low flow residential horizontal sidewall sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Where horizontal sidewall residential sprinklers are installed under sloped ceilings having a pitch from [4/12] to [8/12], the sprinklers shall be listed for such use. Sprinkler frame and deflector shall be of bronze frame construction having a ½" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with top-loaded extruded or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 4.4 (62.8). Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential horizontal sidewall sprinklers shall be Reliable Model F1 Res 44, SIN R3531 (Bulletin 135).

Model F1 Res 44 Recessed Horizontal Sidewall Sprinkler

Use description for the Model F1 Res 44 horizontal sidewall sprinkler with the following modifications: Replace "horizontal sidewall sprinkler" with "recessed horizontal sprinkler." Add: Recessed escutcheon assembly shall be a steel, two-piece escutcheon with ½" adjustment (Model F2). Standard finish shall be [brass][bright chrome] [white painted] [Special finish– specify]. Residential recessed horizontal sidewall sprinklers shall be Reliable Model F1 Res 44/F2, SIN R3531 (Bulletin 135).

Model F1 Res 76 Pendent

Sprinklers shall be [cULus Listed] low flow residential pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with machined or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 7.6. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Residential pendent sprinklers shall be Reliable Model F1 Res 76, SIN R7618 (Bulletin 135).

Model F1 Res 76 Recessed Pendent/F1, Model F1 Res 76 Recessed Pendent/F2, Model F1 Res 76 Recessed Pendent/FP

Sprinklers shall be [cULus Listed] low flow residential recessed pendent sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with machined or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of [155°F (68°C)] [175°F (79°C)]. Sprinklers shall have a nominal K-factor of 7.6. Standard finish: [Bronze] [Chrome-plated] [White Polyester] [Special finish– specify]. Recessed escutcheon assembly shall be a steel, two-piece escutcheon [with ½" adjustment (Model F2)] [with ¾" adjustment (Model F1)] [of push-on and thread off design with ½" adjustment (Model FP)]. Standard finish shall be [brass][bright chrome] [white painted]. Residential recessed pendent sprinklers shall be Reliable [Model F1 Res 76 Recessed Pendent/F1] [Model F1 Res 76 Recessed Pendent/F2] [Model F1 Res 76 Recessed Pendent/FP] SIN R7618 (Bulletin 135).

Model F1 Res 76 CCP Pendent (Concealed)

Sprinklers shall be [cULus Listed] low flow residential concealed sprinklers engineered to provide a minimum design density of 0.05 gpm/ft² over the listed coverage area. Listed flows as specified by the manufacturer's technical data sheets are to be used. Residential sprinklers shall be installed in conformance with the manufacturer's installation guidelines and the applicable installation standard. Sprinkler frame and deflector shall be of bronze frame construction having a ¾" NPT thread. Water seal assembly shall consist of a Teflon-coated Belleville spring washer with machined or cold head cup with 3 mm glass bulb containing no plastic parts, and having a temperature rating of 155°F (68°C). Cover plate assembly shall consist of a brass cover plate and copper alloy retainer flange. Method of attaching the cover plate to the sprinkler cup shall be a push-on and thread-off design allowing a ½" cover plate adjustment. Cover plate temperature rating shall be 135°F (57°C). A plastic protective cap shall be provided and factory installed inside the sprinkler cup to protect the sprinkler from damage, which could occur during construction before the cover plate is installed. Standard cover plate finish: [White] [Custom Color– specify].]. Concealed pendent sprinklers shall be Reliable Model F1 Res 76 CCP, SIN R7618 (Bulletin 135).

Manufactured by

Reliable®

The Reliable Automatic Sprinkler Co., Inc.

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Bulletin 157 Rev.G

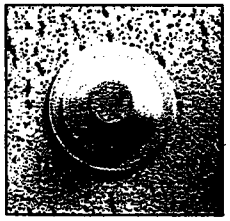
Reliable®

Model F3QR Quick Response Dry Sprinklers

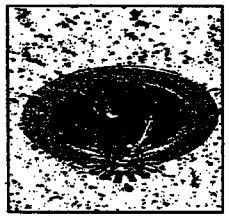
Bulletin 157 Rev.G

Features

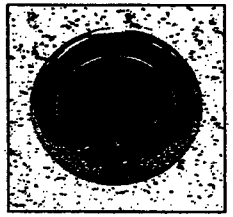
1. The Model F3QR sprinkler utilizes Belleville Spring Closure Technology. Reliable is the first in the industry to produce a Quick Response Dry Concealed sprinkler utilizing this technology.
2. Styles available
   - Pendent
   - Recessed FP Pendent
   - Recessed F1 Pendent
   - Concealed
   - Horizontal Sidewall
   - Recessed Horizontal Sidewall - FP
   - Recessed F1 Horizontal Sidewall
3. 1½" (38mm) escutcheon adjustment on pendent sprinkler.
4. ½" (13mm) escutcheon adjustment on recessed sprinkler with push-on/ thread-off FP Model Escutcheon ring.
5. ⅜" (9.5mm) cover plate adjustment on concealed sprinkler with push-on/ thread-off CCP Cover Plate.
6. ¾" (19mm) escutcheon adjustment on recessed sprinkler with G/F1 Escutcheon.
7. Attractive appearance. Employs 3mm frangible glass bulb and galvanized nipple.
8. Lengths available to accommodate installation dimensions from 2" - to - 48" (51mm - to - 1219mm), in ¼" (6mm) increments.
9. Available in a variety of plated and painted finishes.



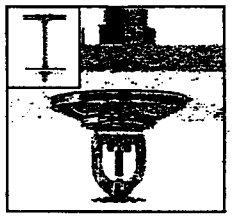
Concealed



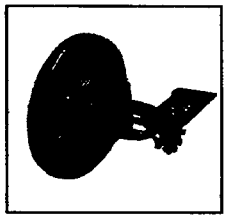
Recessed FP Pendent



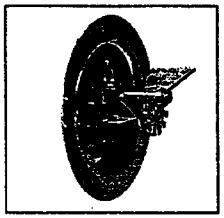
Recessed F1 Pendent



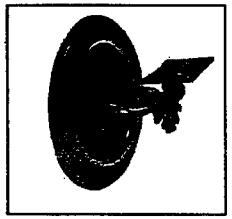
Pendent



Horizontal Sidewall



Recessed FP
Horizontal Sidewall



Recessed F1
Horizontal Sidewall

Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)

Style	Response	Sprinkler System Type	Hazard
Pendent Recessed Pendent Recessed F1 Pendent CCP Concealed (R5714)	Quick	Wet Pipe Dry Pipe All Preaction	Light Ordinary
Horizontal Sidewall Recessed FP Horizontal Sidewall Recessed F1 Horizontal Sidewall (R5734)			

2. Certified by FM Approvals

Style	Response	Sprinkler System Type	Hazard
Pendent Recessed F1 Pendent (R5714)	Quick	Wet Pipe, Single Interlock Preaction	Light Ordinary, Groups 1&2
Horizontal Sidewall Recessed F1 Horizontal Sidewall (R5734)	Quick	Wet Pipe, Single Interlock Preaction	Light

3. NYC MEA 258-93-E

Model F3QR Dry Pendent Sprinkler

"A" Dim.	2" to 48" (51mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White [2]	Brass Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.
[2] White coated sprinklers will have chrome plated cans.

Standard Temperature Ratings

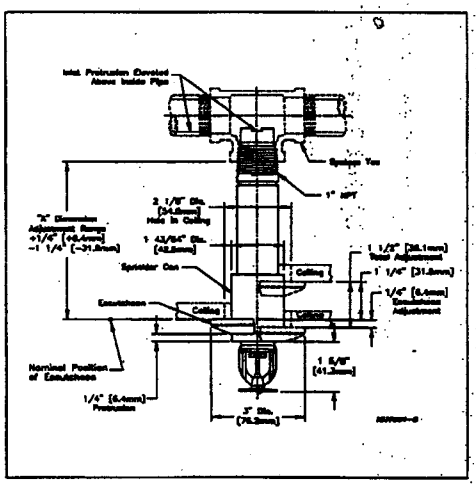
Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High	286°F (141°C)	225°F (107°C)	Blue

Sprinkler can and escutcheon fabricated of brass for better weather resistance in exterior applications.

Sprinkler Guard: Model C-2

Sprinkler Installation Wrench
Model G3 Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Note: The sprinkler Can protrudes ¼" when escutcheon is in nominal position. Escutcheon adjustment provides +¼" (+6mm) to -1¼" (-32mm) "A" dimension adjustment range.

Model F3QR Dry Recessed Pendent Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White	Brass Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details. Cup remains unfinished. Only the escutcheon will contain desired finish.

Standard Temperature Ratings

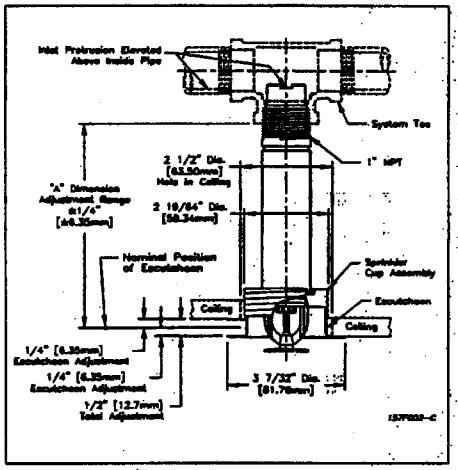
Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High*	286°F (141°C)	225°F (107°C)	Blue

Sprinkler cup and FP escutcheon fabricated of steel and recomended for interior applications.

* Listed and Certified only by cULus

Sprinkler Installation Wrench
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Note: Do not install the Model F3QR Dry Pendent Recessed Sprinkler in ceilings which have positive pressure in the space above.

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford NY 10523

Model F3QR Dry Pendent Concealed Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

CCP Cover Plate[1] Finishes[2]

Standard Finishes	Special Application Finishes
Chrome Plated White	Bright Brass Plated Black Plated Black Paint Off White Satin Chrome

[1] Utilizes the ½" cover plate with ⅜" total adjustment.
[2] Other finishes and colors are available on special order. Consult factory for details.

Standard Temperature Ratings

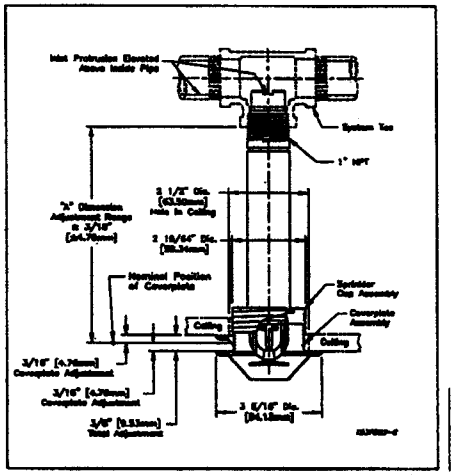
Classification	Sprinkler Temperature Rating	Cover Plate Temp. Rating	Max. Ambient Temp.
Ordinary	135°F (57°C)	135°F (57°C)	100°F (38°C)
Ordinary	155°F (68°C)	135°F (57°C)	100°F (38°C)
Intermediate	200°F (93°C)	165°F (74°C)	150°F (66°C)
High*	286°F (141°C)	165°F (74°C)	150°F (66°C)

Sprinkler cup fabricated of steel and CCP Cover Plate fabricated of brass and recommended for interior applications.

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Note: Do not install the Model F3QR Dry Pendent Concealed Sprinkler in ceilings which have positive pressure in the space above.

Model F3QR Dry Horizontal Sidewall Sprinkler

"A" Dim.	2" to 48" (51mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze Chrome Plated White[2]	Brass Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.
[2] White coated sprinklers will have chrome plated can.

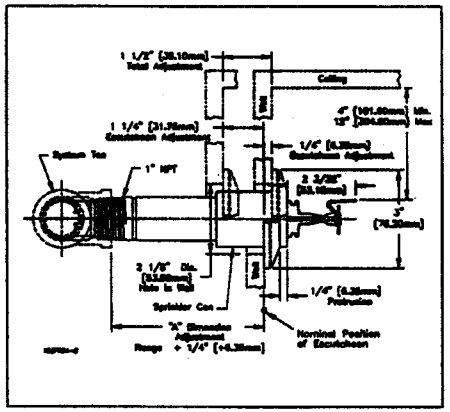
Standard Temperature Ratings

Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High	286°F (141°C)	225°F (107°C)	Blue

Sprinkler can and escutcheon fabricated of brass for weather resistance in exterior applications.

Sprinkler Installation Wrench:
Model G3 Sprinkler Wrench

Sprinkler Identification Number (SIN): R5734



Note: The sprinkler Can protrudes ¼" when escutcheon is in nominal position. Escutcheon adjustment provides +¼" (+6mm) to -1¼" (-32mm) "A" dimension adjustment range.

Model F3QR Dry Recessed F1 Pendent Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon	Collar
Chrome Plated White	Chrome Plated White	Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.

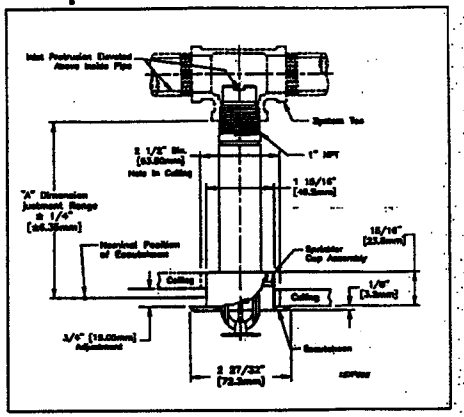
Standard Temperature Ratings

Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High*	286°F (141°C)	225°F (107°C)	Blue

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5714



Model F3QR Dry Horizontal Recessed F1 Sidewall Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon	Collar
Chrome Plated White	Chrome Plated White	Chrome Plated White

[1] Other finishes and colors are available on special order. Consult factory for details.

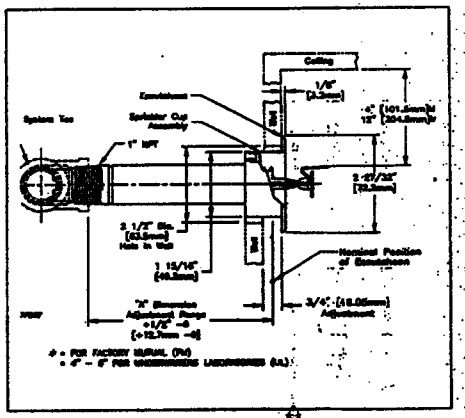
Standard Temperature Ratings

Classification	Sprinkler Temperature Rating	Max. Ambient Temp.	Bulb Color
Ordinary	135°F (57°C)	100°F (38°C)	Orange
Ordinary	155°F (68°C)	100°F (38°C)	Red
Intermediate	200°F (93°C)	150°F (66°C)	Green
High*	286°F (141°C)	225°F (107°C)	Blue

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5734



- Listed by cULus for Quick Response. Approved by FM for Standard Response.
- Recessed Horizontal sidewall sprinklers are listed with cULus for installation of min. 4" (100mm) - to - max. 6" (150mm) below ceiling and approved by FM for installation of min. 4" (100mm) - to - max. 12" (300mm) below ceiling.

Model F3QR Dry Horizontal Recessed Sidewall Sprinkler

"A" Dim.	3½" to 48" (89mm to 1219mm) in ¼" (6mm) increments

Finishes[1]

Sprinkler	Escutcheon
Bronze	Brass
Chrome Plated	Chrome Plated
White	White

[1] Other finishes and colors are available on special order. Consult factory for details. Cup remains unfinished. "See page 2"

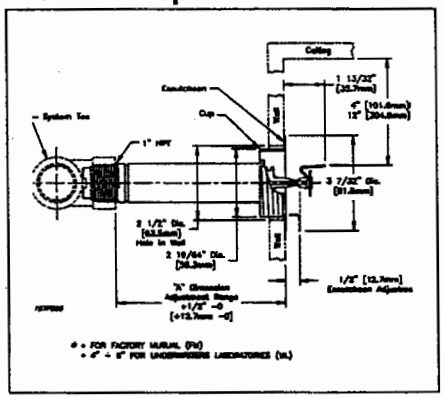
Standard Temperature Ratings

Classification	Sprinkler Temperature Rating		Max. Ambient Temp.		Bulb Color
Ordinary	135°F	(57°C)	100°F	(38°C)	Orange
Ordinary	155°F	(68°C)	100°F	(38°C)	Red
Intermediate	200°F	(93°C)	150°F	(66°C)	Green
High*	286°F	(141°C)	225°F	(107°C)	Blue

* Listed and Certified only by cULus.

Sprinkler Installation Wrench:
Model G3 R/C Sprinkler Wrench

Sprinkler Identification Number (SIN): R5734



* - FOR FACTORY MUTUAL (FM)
** - 2" - 6" FOR UNDERWRITERS LABORATORIES (UL)

Notes: Do not install the Model F3QR Dry Horizontal Recessed Sidewall Sprinkler in walls which have positive pressure in their side space.

- Listed by cULus for Quick Response. Approved by FM for Standard Response.
- Recessed Horizontal sidewall sprinklers are listed with cULus for installation of min. 4" (100mm) - to - max. 6" (150mm) below ceiling and approved by FM for installation of min. 4" (100mm) - to - max. 12" (300mm) below ceiling.

Technical Data:

Orifice Size: ½" (15mm)
Thread Size: 1" NPT per ANSI B2.1
Working Pressure: 175 psi (12 bar)
Nominal K Factor - US / (Metric): 5.6 / (80)

Product Description

Reliable Model F3QR Dry Sprinklers are quick response sprinklers utilizing a durable 3mm frangible glass bulb. This quick response enables these sprinklers to apply water to a fire much sooner than standard response sprinklers of the similar temperature rating.

Model F3QR Dry Sprinklers are intended for use in dry and preaction systems and in areas subjected to freezing temperatures, such as freezers and unheated portions inside and outside buildings.

Environments wherein dry sprinklers are employed can be corrosive. For this reason, Model F3 Sprinklers have a special wax fillet placed in the gap between the cup that supports the bulb and the wrenching boss. This wax will not interfere with the operation of the sprinkler, and it prevents contaminents from entering the internal portion of the drop nipple. The wax must not be removed.

Operation

The glass bulb consists of an accurately controlled amount of special fluid hermetically sealed inside a precisely manufactured glass capsule. This glass bulb is specially constructed to provide fast thermal response. When the temperature increases sufficiently, due to a fire, the bulb shatters allowing operating parts to clear the waterway. This enables the inlet seal to release air or water and subsequently, cause water flow over the deflector in a uniform spray pattern, controlling or extinguishing the fire.

Ordering Information

Specify:

1. Sprinkler Type (select one):
   (a) Model F3QR Dry Pendent
   (b) Model F3QR Dry Recessed Pendent
   (c) Model F3QR Dry Recessed F1 Pendent
   (d) Model F3QR Dry Concealed Pendent
   (e) Model F3QR Dry Horizontal Sidewall
   (f) Model F3QR Dry Recessed Horizontal Sidewall
   (g) Model F3QR Dry Recessed F1 Horizontal Sidewall
2. Sprinkler Temperature Rating.
3. Sprinkler Finish.
4. Escutcheon type (G/F1 or FP).
5. Cover Plate/Escutcheon Finish.
6. Length:
   "A" Dimension (face of tee to face of ceiling or wall) in ¼" (6mm) increments.
7. Model F3QR Dry Pendent (a) is available without sprinkler can and escutcheon.

Note:

1. The "A" dimension is based on a nominally gauged pipe thread "make-up" of 0.600" (15mm) per ANSI B2.1 [7½ threads approximately].
2. All platings and paintings are decorative and intended for interior use.

General Installation Instructions

Model F3QR dry sprinklers must be installed only in standard (ANSI B 16.3 class 150 and ANSI B 16.4 class 125) pipe tees in the horizontal position, even at branch line ends. They should not be installed into elbows or pipe couplings located on drop nipples to the sprinklers. For these and other fittings including CPVC*, the dry sprinkler should be installed into a fitting to allow protrusion into the fitting in accordance with the diagrams. The "A" dimension of the dry sprinkler, which extends into the freezers or a freezing zone from wet pipe systems, should be selected to provide, as a minimum, the specified lengths in inches shown in the following table, between face of the fitting and the exterior face of the protected area. The following table is used for freezing zones when the ambient temperature around the wet pipe system is kept at 40 °F (4°C), and specifies the minimum length from fitting face to inside face of ceiling or wall for different protected area temperatures.

TABLE 1 (See Fig. 8)

Minimum Length (Face to Inside Face Ceiling/Wall)	Temperature (Protected Area)**
12 inches / 300 mm	-20°F / -29°C
18 inches / 450 mm	-40°F / -40°C
24 inches / 600 mm	-60°F / -51°C

** For temperatures falling between those in the above chart, the minimum length may be determined by interpolation.

During installation, the following steps must be followed:

1. Cut the specified size hole (see illustrations) for the sprinkler in the ceiling or wall directly in line with the tee.
2. Apply pipe joint compound to the 1" (25mm) pipe threads and install sprinkler using the Model G3 or G3 R/C Sprinkler Wrench as specified.
3. Install the Model FP push-on / thread-off escutcheon or CCP cover plate if required.

Note: Installation of the Model F3QR Sprinklers is not recommended in copper pipe systems, as this may reduce the life expectancy of the sprinklers.

Model F3QR Concealed and Recessed Installation Instructions

- The Model G3 R/C wrench (Fig. 1) is designed to locate on the wrenching pads of the recessed sprinkler while centering in the cup. A standard ½" drive ratchet may be used to drive this wrench. Figures 1 and 2 show sequentially the insertion of the wrench. First the wrench, with its jaws above the sprinkler deflector, is moved laterally until centered with the cup. Then raise the wrench inside of the cup until its jaws engage the sprinkler's square wrenching pads (Fig. 3). To remove the wrench, follow this procedure in reverse order. Care should be taken to avoid striking the deflector, with the wrench.
- Model G3 Wrench (Fig. 4) is used for installation of Pendent and Horizontal Sidewall sprinklers.
- Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACED IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

Maintenance

The Model F3QR Quick Response Dry Sprinklers should be inspected quarterly and the sprinkler system maintained in accordance with NFPA 25. Do not remove the factory applied thermally sensitive wax fillet between the bulb supporting cup and the wrenching boss. Do not replace this wax with a substitute substance. An Alternate substance may interfere with proper operation of the sprinkler. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gently vacuuming. Remove 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 until used to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

* Spears CPVC sprinkler adapter tees (with steel thread insert) can only be used with horizontal sidewall sprinklers which do not require protrusion into tees to prevent ice or debris blockage of sprinkler inlets. These CPVC tees do not permit sufficient sprinkler inlet protrusion as required for pendent installation.

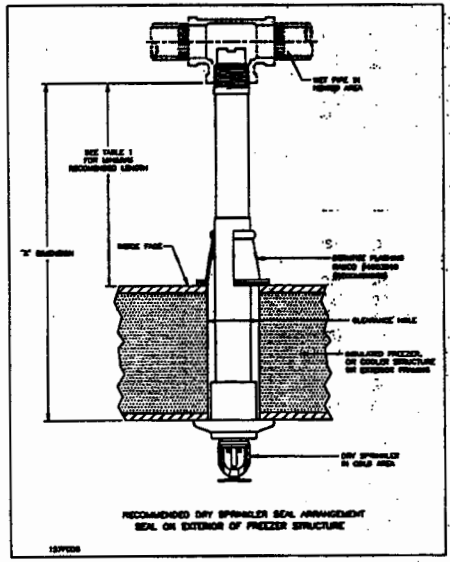


Fig. 8

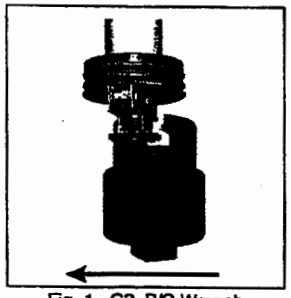


Fig. 1 - G3 R/C Wrench

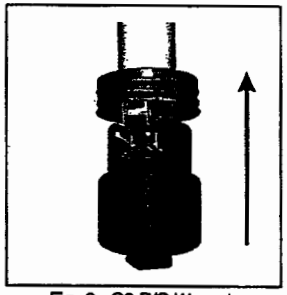


Fig. 2 - G3 R/C Wrench

Fig. 3 - G3 R/C Wrench

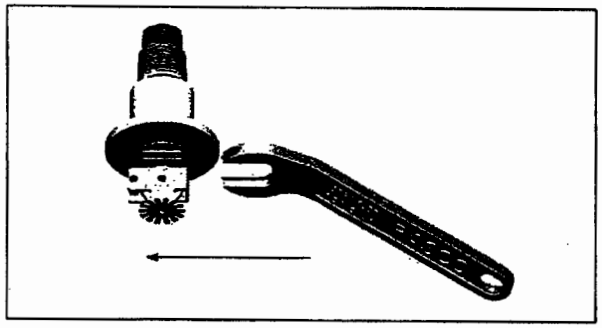


Fig. 4 - G3 Wrench

Reliable...For Complete Protection

Reliable offers a wide selection of sprinkler components. Following are some of the many precision-made Reliable products that guard life and property from fire around the clock.

- Automatic sprinklers
- Flush automatic sprinklers
- Recessed automatic sprinklers
- Concealed automatic sprinklers
- Adjustable automatic sprinklers
- Dry automatic sprinklers
- Intermediate level sprinklers
- Open sprinklers
- Spray nozzles
- Alarm valves
- Retarding chambers
- Dry pipe valves
- Accelerators for dry pipe valves
- Mechanical sprinkler alarms
- Electrical sprinkler alarm switches
- Water flow detectors
- Deluge valves
- Detector check valves
- Check valves
- Electrical system
- Sprinkler emergency cabinets
- Sprinkler wrenches
- Sprinkler escutcheons and guards
- Inspectors test connections
- Sight drains
- Ball drips and drum drips
- Control valve seals
- Air maintenance devices
- Air compressors
- Pressure gauges
- Identification signs
- Fire department connection

The equipment presented in this bulletin is to be installed in accordance with the latest pertinent Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable.

Products manufactured and distributed by Reliable have been protecting life and property for over 80 years, and are installed and serviced by the most highly qualified and reputable sprinkler contractors located throughout the United States, Canada and foreign countries.

Manufactured by

Reliable

The Reliable Automatic Sprinkler Co., Inc.
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(914) 829-2042 Corporate Offices
www.reliablesprinkler.com Internet Address

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Residential Sprinkler For Sloped Ceilings

Bulletin 035 Rev. H

Guidelines for Listed Residential Sprinkler installations below Sloped Ceilings

The installation guidelines cover Residential Sprinkler Models:

F1 Res 49 Pendent
F1 Res 49 Recessed Pendent/F2
F1 Res 58 Pendent
F1 Res 58 Recessed Pendent/F2
F1 Res 44 HSW
F1 Res 44 Recessed HSW/F2
F1 Res 49 CCP
F1 Res 58 CCP
RFC 43 Flat Concealed
RFC 49 Flat Concealed

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. and UL Certified for Canada (cULus)
2. NYC MEA 258-93-E

UL Listing Category

Residential Automatic Sprinkler
UL Guide Number
VKKW

Patents: US Patent number 6,516,893

Model F1 Res 49

Product Description for F1 Res Sprinklers

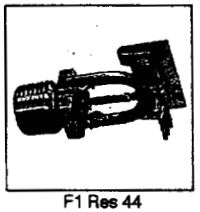
Model F1 Res Pendent sprinklers are fast response sprinklers combining excellent durability, high sensitivity glass-bulb and low profile decorative design. The F1 Res Horizontal Sidewall sprinklers are equally attractive when above ceiling piping cannot be used.

The 3mm glass-bulb pendent sprinklers, with a K Factor of 4.9 & 5.8 for pendent and 4.4 for horizontal sidewall, permit the efficient use of residential water supplies for sprinkler coverage in residential fire protection design.

The low flow F1 Res sprinklers are specially engineered for fast thermal response to meet the sensitive fire protection application needs of the latest residential market standards (UL 1626 Standard *). Upon fire conditions, rising heat causes a sprinkler's heat-sensitive glass-bulb to shatter, releasing the waterway for water flow onto the deflector, evenly distributing the discharged water to control a fire.

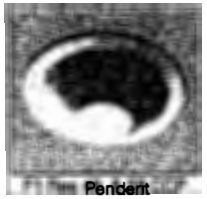
F1 Res 49 & 58 Pendent

F1 Res 49 & 58 Recessed Pendent / F2

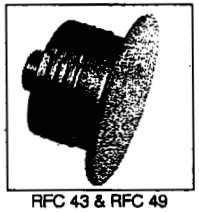


F1 Res 44 HSW

F1 Res 44 Recessed HSW/F2



Pendent



RFC 43 & RFC 49

* Effective date July 12, 2002

Product Description for RFC 43 & RFC 49

Model RFC43 & RFC49 Concealed Residential Sprinklers are fast response residential fusible solder link automatic sprinklers. Residential sprinklers differ from standard sprinklers primarily in their response time and water distribution patterns.

Model RFC43 & RFC49 sprinklers discharge water in a hemispherical pattern below the sprinkler deflector. Residential distribution patterns are higher and generally contain a finer droplet size than standard sprinkler patterns.

The combination of speed of operation and high discharge pattern required for residential sprinklers has demonstrated, in fire testing, an ability for controlling residential fires, and thereby providing significant evacuation time for occupants.

The RFC43 & RFC49 Sprinkler provides the best form of fire protection by combining an attractive appearance and ½" (13mm) of cover adjustment for ease of installation. The small diameter cover plate is easily and positively attached and blends into the ceiling, concealing the most dependable fire protection available, an automatic sprinkler system.

The RFC43 & RFC49 are UL Listed Residential Sprinkler to be installed in the residential portions of any occupancy in accordance with NFPA 13, 13R, & 13D.

The RFC43 & RFC49 can reduce the need for precise cutting of drop nipples. The threaded cover plate assembly can be adjusted without tools to fit accurately against the ceiling. The fire protection system need not be shut down to adjust or remove the cover plate assembly.

Technical Data (F1 Res Sprinklers):

- Thermal Sensor : Nominal 3mm glass-bulb
- Sprinkler Frame : Brass Casting
- Sprinkler Pressure Rating : 175 psi Factory Hydrostatically Tested to 500 psi
- Thread Size : ½" NPT (R½)
- K Factor : 4.9 (Actual) - F1 Res 49 Pendent Sprinkler
  4.4 (Actual) - F1 Res 44 HSW Sprinkler
  5.8 (Actual) - F1 Res 58 Pendent Sprinkler
- Density : Minimum .05 gpm/ft²

Technical Data (RFC 43 & RFC 49):

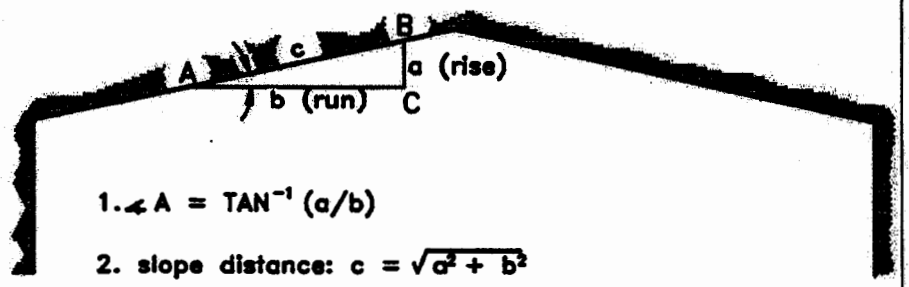
- Thermal Sensor : 165°F Fusible Link
- Sprinkler Frame : Brass Machined
- Sprinkler Pressure Rating : 175 psi Factory Hydrostatically Tested to 500 psi
- Thread Size : ½" NPT (R½)
- K Factor : 4.3 (Actual) RFC43;
  4.9 (Actual) RFC49
- Density : Minimum .05 gpm/ft²

Application

Model F1 Res and RFC 43 & RFC 49 Sprinklers are used for Residential Fire Protection according to UL 1626 Standard*. Be sure that orifice size, temperature rating, deflector style, cover plate and sprinkler type are in accordance with the latest published standards of The National Fire Protection Association or the approving Authority Having Jurisdiction.

* Effective date July 12, 2002

METHOD OF CALCULATING THE CONVERSION OF 'RISE–OVER–RUN' TO DEGREES OF AN ANGLE.



1. $\measuredangle A = TAN^{-1} (a/b)$

2. slope distance: $c = \sqrt{a^2 + b^2}$

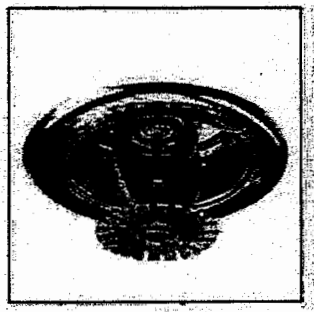
Example: a = 4
b = 12

$\measuredangle A = TAN^{-1} (a/b)$
$\measuredangle A = TAN^{-1} = (0.333)$
$\measuredangle A = 18.43°$

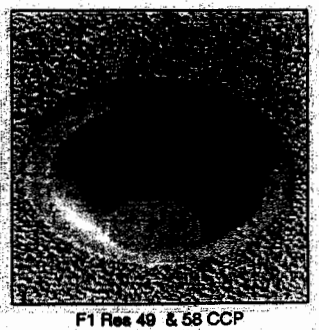
slope distance: $c = \sqrt{4^2 + 12^2}$
$c = \sqrt{160}$
$c = 12.65$

035_ROR-A

F1 Res 49 & 58
Pendent

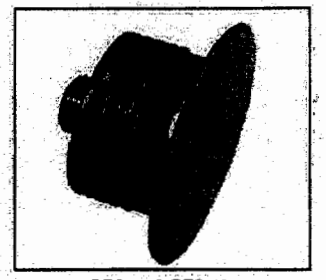


F1 Res 49 & 58
Recessed Pendent / F2



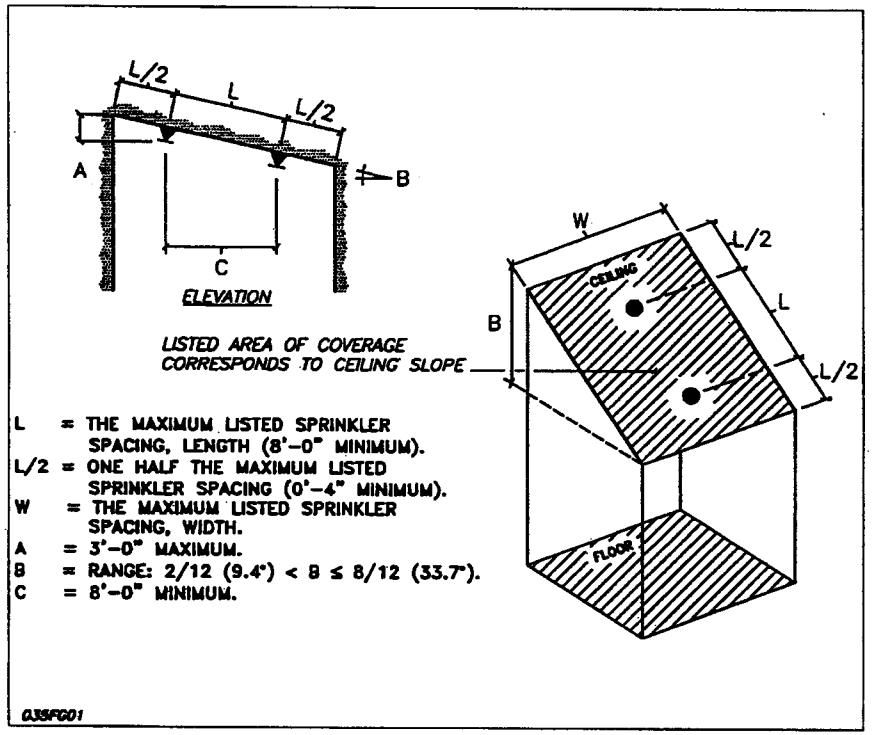
F1 Res 49 & 58 CCP
Pendent

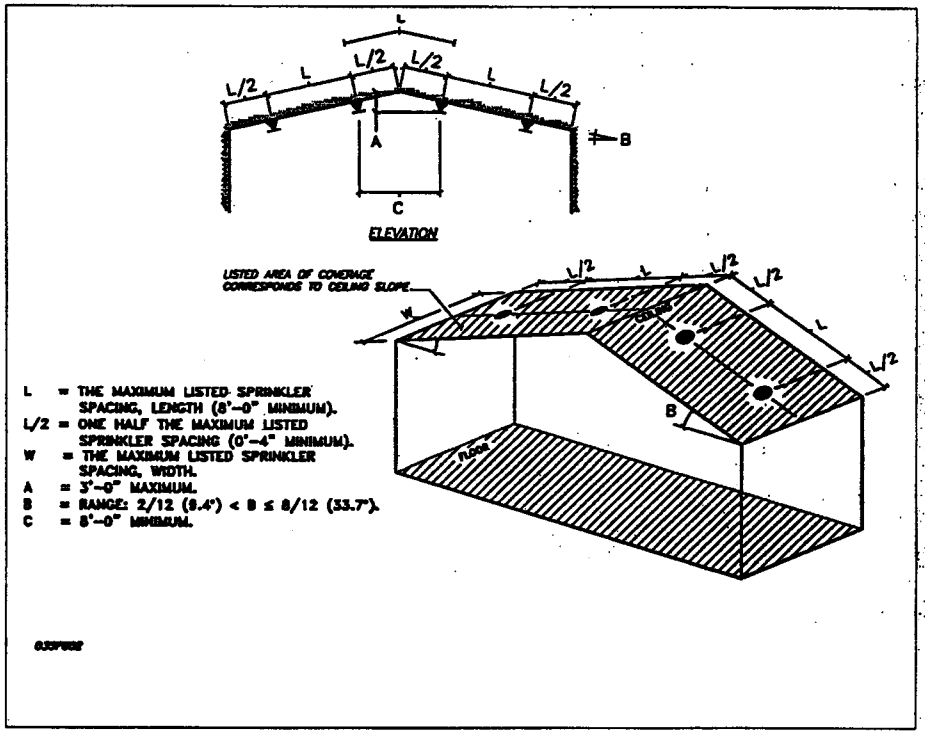
RFC 43 & RFC 49



RFC 43 & RFC 49

Note: F1 Res 49 CCP Pendent, RFC 43 and RFC 49 sprinklers are not suitable for installation in ceilings which have positive pressure in the space above.





Sprinkler spacing below multiple sloped ceilings with a maximum slope of $^{8}/_{12}$ (33.7°) pitch.

Model F1Res 49 Pendent & F1 Res 49 Recessed Pendent/F2 Installed below Sloped Ceiling.

Technical Data

Thread Size	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Escutcheon	Sprinkler Identification Number (SIN)
½" NPT (R½)	175 (12)	100 (38)	4.9 (69,94)	2.25" (57mm)	F2 (1/2" Adjustment)	R3516

Table 1 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (33.7°) Pitch				Max. Slope of 5/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)		Pressure psi (bar)		Sprinkler Temp. Rating °F (°C) 155 (68) & 175 (79)	
	155°F (68°C)	175°F (79°C)	155°F (68°C)	175°F (79°C)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	13 (49)	13 (49)	7.0 (0,48)	7.0 (0,48)	13 (49)	7.0 (0,48)
14 x 14 (4,3 x 4,3)	13 (49)	13 (49)	7.0 (0,48)	7.0 (0,48)	13 (49)	7.0 (0,48)
16 x 16 (4,9 x 4,9)	13 (49)	13 (49)	7.0 (0,48)	7.0 (0,48)	13 (49)	7.0 (0,48)
18 x 18 (5,5 x 5,5)	17 (64,3)	18 (68,2)	12.0 (0,83)	13.5 (0,93)	16 (68,3)	13.5 (0,93)
20 x 20 (6,1 x 6,1)	20 (75,7)	21 (79,5)	16.7 (1,15)	18.4 (1,28)	20 (75,7)	16.7 (1,15)

Model F1Res 49 CCP Pendent Installed below Sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	CCP Assy. Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Sprinkler Identification Number (SIN)
½" NPT (R½)	155 (68)	135 (57)	175 (12)	100 (38)	4.9 (69,94)	2.25" (57mm)	R3516

Table 2 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (33.7°) Pitch		Max. Slope of 5/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	14 (53)	8.2 (0,57)	13 (49)	7.0 (0,48)
14 x 14 (4,3 x 4,3)	14 (53)	8.2 (0,57)	13 (49)	7.0 (0,48)
16 x 16 (4,9 x 4,9)	14 (53)	8.2 (0,57)	14 (53)	8.2 (0,56)
18 x 18 (5,5 x 5,5)	23 (87)	22 (1,52)	20 (75,7)	17 (1,17)
20 x 20 (6,1 x 6,1)	23 (87)	22 (1,52)	21 (75,7)	17 (1,17)

Model F1Res 58 Pendent & F1 Res 58 Recessed Pendent/F2 Installed below Sloped Ceiling.

Technical Data

Thread Size	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Escutcheon	Sprinkler Identification Number (SIN)
½" NPT (R½)	175 (12)	100 (38)	5.8 (83,38)	2.25" (57mm)	F2 (1/2" Adjustment)	R3513

Table 3 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (33.7°) Pitch				Max. Slope of 5/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)		Pressure psi (bar)		Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
	155°F (68°C)	175°F (79°C)	155°F (68°C)	175°F (79°C)	155°F (68°C)	155°F (68°C)
12 x 12 (3,6 x 3,6)	21 (79.5)	23 (87)	13.1 (0,9)	15.7 (1,1)		
14 x 14 (4,3 x 4,3)	21 (79.5)	23 (87)	13.1 (0,9)	15.7 (1,1)		
16 x 16 (4,9 x 4,9)	21 (79.5)	23 (87)	13.1 (0,9)	15.7 (1,1)		
18 x 18 (5,5 x 5,5)	23 (87)		15.7 (1,1)		20 (75,7)	12 (0,83)
20 x 20 (6,1 x 6,1)	23 (87)		15.7 (1,1)		20 (75,7)	12 (0,83)

Model F1Res 58 CCP Pendent Installed below sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	CCP Assy. Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Length	Sprinkler Identification Number (SIN)
½" NPT (R½)	155 (68)	135 (57)	175 (12)	100 (38)	5.8 (83,38)	2.25" (57mm)	R3513

Table 4 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 5/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
18 x 18 (5,5 x 5,5)	20 (75,7)	12 (0,83)
20 x 20 (6,1 x 6,1)	20 (75,7)	12 (0,83)

Model RFC43 Pendent Flat Concealed Installed below Sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	Coverplate Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Max. Adjustment	Sprinkler Identification Number (SIN)
½" NPT (R½)	165 (74)	135 (57)	175 (12)	100 (38)	4.3 (61,4)	½" (13mm)	RA0612

Table 5 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (33.7°) Pitch		Max. Slope of 5/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	18 (68)	17.5 (1,21)	13 (49)	9.1 (0,63)
14 x 14 (4,3 x 4,3)	18 (68)	17.5 (1,21)	13 (49)	9.1 (0,63)
16 x 16 (4,9 x 4,9)	18 (68)	17.5 (1,21)	13 (49)	9.1 (0,63)
18 x 18 (5,5 x 5,5)	24 (91)	31 (2,14)	18 (68)	17.5 (1,21)
20 x 20 (6,1 x 6,1)	24 (91)	31 (2,14)	21 (79)	23.8 (1,64)

Model RFC 49 Pendent Flat Concealed Installed below Sloped Ceiling.

Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	Coverplate Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Max. Adjustment	Sprinkler Identification Number (SIN)
½" NPT (R½)	165 (74)	135 (57)	175 (12)	100 (38)	4.9 (69,94)	½" (13mm)	RA0616

Table 6 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (33.7°) Pitch		Max. Slope of 5/12 (18.4°) Pitch	
	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)	Min. Flow Per Sprinkler Head gpm (Lpm)	Pressure psi (bar)
16 x 16 (4,9 x 4,9)	28 (106)	23 (19,3)		
18 x 18 (5,5 x 5,5)	29 (109,8)	29 (20,0)	18 (68)	13.5 (0,93)
20 x 20 (6,1 x 6,1)	30 (113,6)	30 (30,0)	23 (87)	22 (1,52)

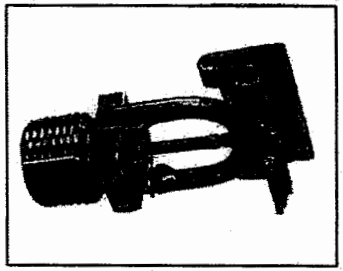
Installation Guidelines

1. For systems designed in accordance with NFPA 13, 13D and 13R, where specific UL Listed flows are not required, consult with the local Authority Having Jurisdiction regarding the number of design sprinklers for sloped ceilings having a pitch greater than (9.4°).
2. Installation of UL Listed residential sprinklers under sloped ceilings shall be limited to a type of unobstructed construction consisting of smooth ceilings, as defined by NFPA 13, having a maximum pitch of 4/12 (18.4°) or 8/12 (33.7°).
3. Spacing of residential sprinklers under sloped ceilings is measured along the slope when determining the distance off of walls and between sprinklers.
4. Measure listed areas of coverage along the sloped ceiling. The actual floor coverage area will be less than the listed area.
5. For coverage areas less than the listed coverage area shown in Tables 1 through 5, use the minimum flow requirement for the next largest listed coverage area.
6. Minimum spacing between pendent type sprinklers is 8 ft. (2.4 m). Minimum distance from a pendent type sprinkler and an adjacent wall is 4" (102 mm).
7. Residential sprinklers located closest to the peak of the ceiling shall have the deflectors located not more than 3 ft (1m) vertically down from the peak. Align deflectors parallel with the ceiling slope 1" to 4" (25mm to 102mm) below the sloped ceiling.
8. Hydraulic Requirements:
   a. For NFPA 13D Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of two sprinklers (where specific UL Listed flows are required) that requires the greatest hydraulic demand.
   b. For NFPA 13R Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of four (4) sprinklers (where specific UL Listed flows are required), that requires the greatest hydraulic demand.

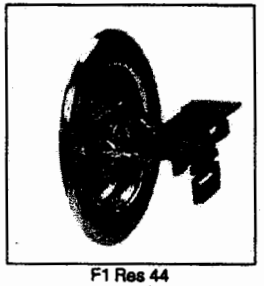
c. For NFPA 13 systems, the design area shall be the area that includes the four (4) hydraulically most demanding sprinklers. The minimum required discharge from each of the four hydraulically demanding sprinklers shall be the greater of the following:
   (1) In accordance with the minimum flow rates indicated by the individual listings (that already will provide a minimum density of 0.1 gpm/ft2); or
   (2) A calculated value based on delivering a minimum of 0.1 gpm/ft2 over the design area.

9. Because of the varied nature of residential construction features, there will be some compartment designs which cannot be fully sprinklered in accordance with NFPA 13, 13D, or 13R. In these instances, consult the Authority Having Jurisdiction (AHJ) for guidance and approval. This includes sloped ceilings having a pitch greater than 8/12 (33.7°).
10. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACE IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND, DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

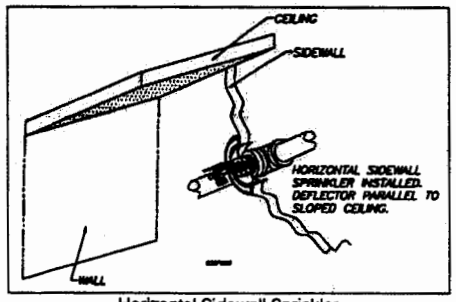
Model F1Res 44 and F1 Res 44 HSW/F2 installed below Sloped Ceiling.



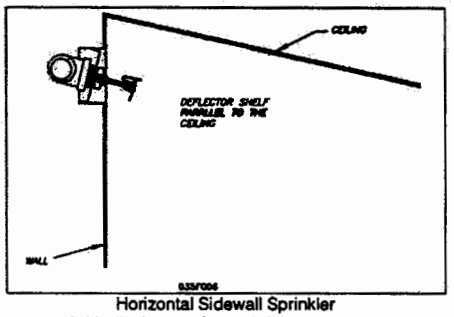
F1 Res 44
HSW



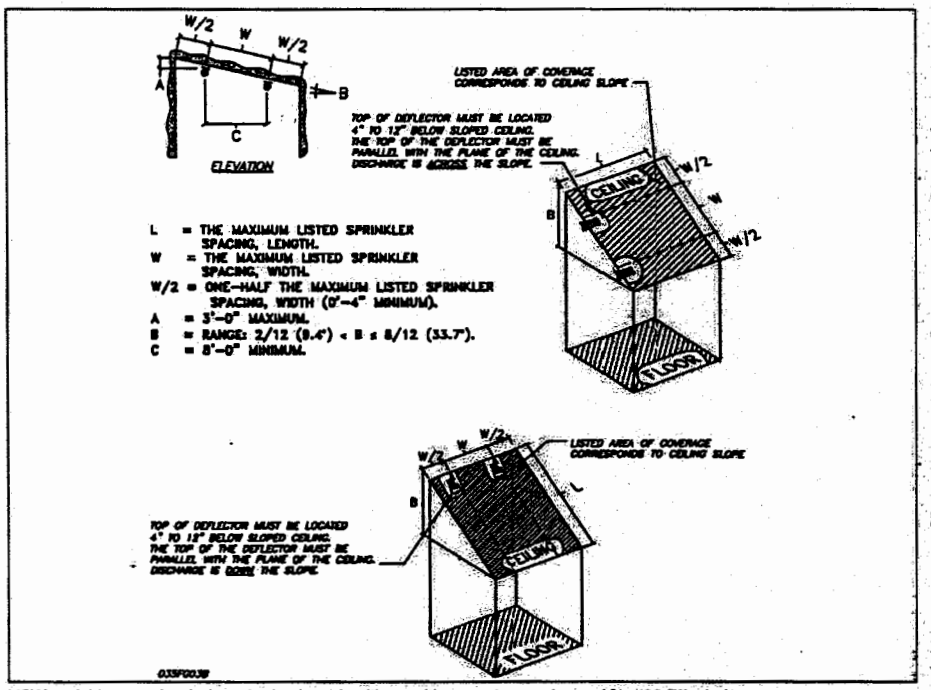
F1 Res 44
Recessed HSW/F2



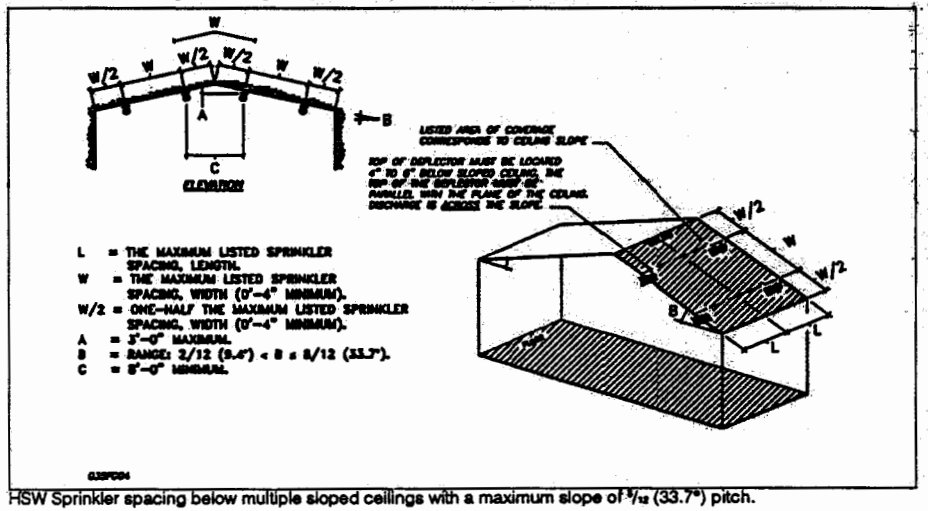
Horizontal Sidewall Sprinkler
(with discharge directed across the slope)



Horizontal Sidewall Sprinkler
(with discharge directed down the slope)



HSW sprinkler spacing below single sloped ceilings with a maximum slope of 8/12 (33.7°) pitch.



HSW Sprinkler spacing below multiple sloped ceilings with a maximum slope of 8/12 (33.7°) pitch.

Model F1RES 44 HSW & F1RES 44 HSW Recessed HSW/F2 Installed below Sloped Ceiling.
Technical Data

Thread Size	Sprinkler Temp. Rating °F (°C)	Max. Pressure psi (bar)	Max. Ambient Temp. °F (°C)	Actual K Factor (metric)	Sprinkler Lenght	Escutcheon	Sprinkler Identification Number (SIN)
½" NPT (R½)	155 (68) 175 (79)	175 (12)	100 (38)	4.4 (62,8)	2.45" (62mm)	F2 (½" Adjustment)	R3531

Table 7 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 4/12 (18.4°) Pitch			
	Discharge Directed Across the Slope 4" to 6" Deflector to Ceiling		Discharge Directed Across the Slope 6" to 12" Deflector to Ceiling	
	Min. Flow gpm (Lpm)	Pressure psi (bar)	Min. Flow gpm (Lpm)	Pressure psi (bar)
12 x 12 (3,6 x 3,6)	16 (60,5)	13.3 (0,92)	17 (64,3)	15 (1,04)
14 x 14 (4,3 x 4,3)	16 (60,5)	13.3 (0,92)	17 (64,3)	15 (1,04)
16 x 16 (4,9 x 4,9)	16 (60,5)	13.3 (0,92)	17 (64,3)	15 (1,04)
18 x 18 (4,9 x 5,5)	18 (68,1)	16.8 (1,16)	20 (75,6)	20.7 (1,43)
20 x 20 (4,6 x 6,1)	23 (68,1)	27,4 (1,89)	23 (68,1)	27,4 (1,89)

Table 8 - Application

Max. Sprinkler Spacing Along Slope (W) Width x (L) Length ft (m)	Max. Slope of 8/12 (33.7°) Pitch					
	Discharge Directed Down the Slope 4" to 6" Deflector to Ceiling		Discharge Directed Down the Slope 6" to 12" Deflector to Ceiling		[2][3]Discharge Directed Across the Slope 4" to 12" Deflector to Ceiling	
	[1] Min. Flow gpm (Lpm)	Pressure psi (bar)	[1] Min. Flow gpm (Lpm)	Pressure psi (bar)	[1] Min. Flow gpm (Lpm)	Pressure psi (bar)
12 x 12 (3.6 x 3.6)	12 (45.4)	7.5 (0.52)	17 (53.0)	10.2 (0.71)	16 (60.6)	13.3 (0.92)
14 x 14 (4.3 x 4.3)	14 (53.0)	10.2 (0.71)	16 (60.6)	13.3 (0.92)	16 (60.6)	13.3 (0.92)
16 x 16 (4.9 x 4.9)	16 (60.6)	13.3 (0.92)	17 (64.4)	15 (1.04)	16 (60.6)	13.3 (0.92)
18 x 18 (4.9 x 5.5)	18 (68.1)	16.8 (1.16)	20 (75.6)	20.7 (1.43)		
20 x 20 (4,6 x 6,1)	23 (72,0)	27.4 (1,89)	23 (87,1)	27,4 (1.89)		

(1) Minimum flow per sprinkler gpm (Lpm).
(2) Minimum 3 head design in a compartment.
(3) 155°F only.

Installation Guidelines

1. For systems designed in accordance with NFPA 13, 13D and 13R, where specific UL Listed flows are not required, consult with the local Authority Having Jurisdiction regarding the number of design sprinklers for sloped ceilings having pitch greater than (9.4°).
2. Installation of UL Listed residential sprinklers under sloped ceilings shall be limited to a type of unobstructed construction consisting of flat, smooth ceilings, as defined by NFPA 13, having a maximum pitch of 4/12 (18.4°) or 8/12 (33.7°).
3. Where listed, install horizontal sidewall sprinklers along the wall below the sloped ceiling when discharge is directed across the slope, and install at the peak below the sloped ceiling when discharge is directed down the slope. Always align the sprinkler deflector parallel with the direction of the sloped ceiling.
4. Residential HSW sprinklers located closed to the peak of the ceiling shall have the deflectors located not more than 3 ft. (1m) vertically down from the peak.
5. Spacing of residential HSW sprinklers under sloped ceilings is measured along the slope when determining the distance off of walls and between sprinklers.
6. Measure listed areas of coverage along the sloped ceiling. The actual floor coverage area will be less than the listed area.
7. For coverage areas less than the listed coverage area shown in Tables 1 through 6, use the minimum flow requirement for next largest listed coverage area.
8. Minimum spacing between horizontal sidewall sprinklers is 8 ft. (2.4 m). Minimum distance from a horizontal sidewall sprinkler and an adjacent wall is 4" (102 mm).
9. Hydraulic Requirements:
   a. For NFPA 13D Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of two sprinklers (where specific UL Listed flows are required) that requires the greatest hydraulic demand.
   b. For NFPA 13R Systems, the number of design sprinklers shall include all sprinklers within a compartment, up to a maximum of four (4) sprinklers (where specific UL Listed flows are required), that requires the greatest hydraulic demand.
   c. For NFPA 13 systems, the design area shall be the area that includes the four (4) hydraulically most demanding sprinklers. The minimum required discharge from each of the four hydraulically demanding sprinklers shall be the greater of the following:
      (1) In accordance with the minimum flow rates indicated by the individual listings (that already will provide a minimum density of 0.1 gpm/ft2): or
      (2) A calculated value based on delivering a minimum of 0.1 gpm/ft2 over the design area.
10. Because of the varied nature of residential construction features, there will be some compartment designs which cannot be fully sprinklered in accordance with NFPA 13, 13D, or 13R. In these instances, consult the Authority Having Jurisdiction (AHJ) for guidance and approval. This includes sloped ceilings having a pitch greater than 8/12 (33.7°).
11. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACE IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.

Model F1 res 49 Pendent, F1 Recessed Pendent/F2, F1Res 49 Concealed (CCP), RFC 49 and RFC 43 Installed below sloped ceiling with a maximun slope of 8/12 (33.7°) pitch.

Table 9 - Application

Model	K - Factor (metric)	Max. Spacing Ft. x Ft (m x m)	Min. Flow/Pressure gpm (lpm) / psi (bar)	Sprinkler Temperature Rating °F (°C)	Coverplate Temperature Rated°F (°C)
F1 Res 49Pendent	4.9 (69,94)	10 x 10 (3 x 3)	13(49) / 7.0(0,48)	155 (68)	-
F1 Res 49 Recessed Pendent/F2	4.9 (69,94)	10 x 10 (3 x 3)	13(49) / 7.0(0,48)	155 (68)	-
F1 Res 49CCP Pendent	4.9 (69,94)	10 x 10 (3 x 3)	13(49) / 7.0(0,48)	155 (68)	135 (57)
RFC49Pendent	4.9 (69,94)	10 x 10 (3 x 3)	14(53) / 8.2(0,57)	165 (74)	135 (57)
RFC43Pendent	4.3 (61,4)	10 x 10 (3 x 3)	18(68) / 17.5(1,21)	165 (74)	135 (57) .

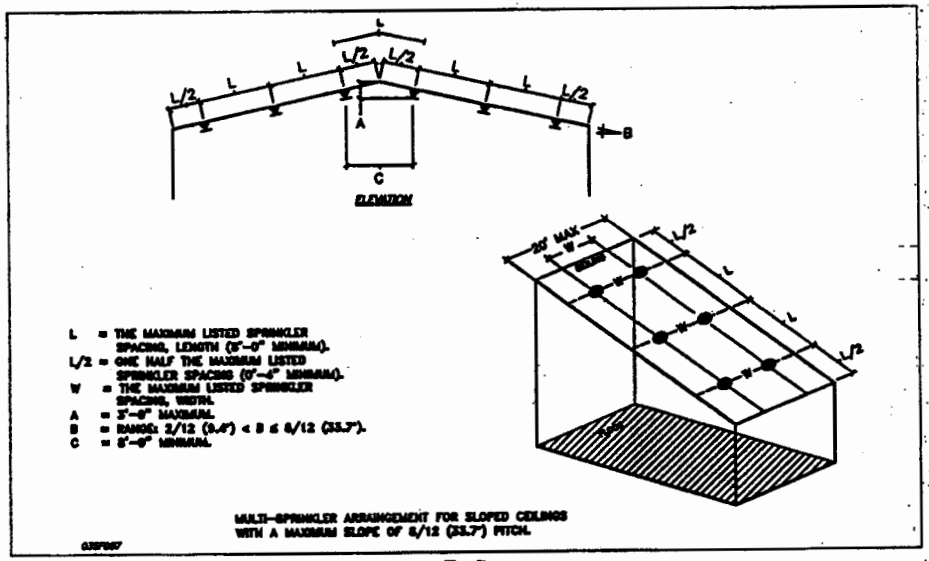


Fig. 7

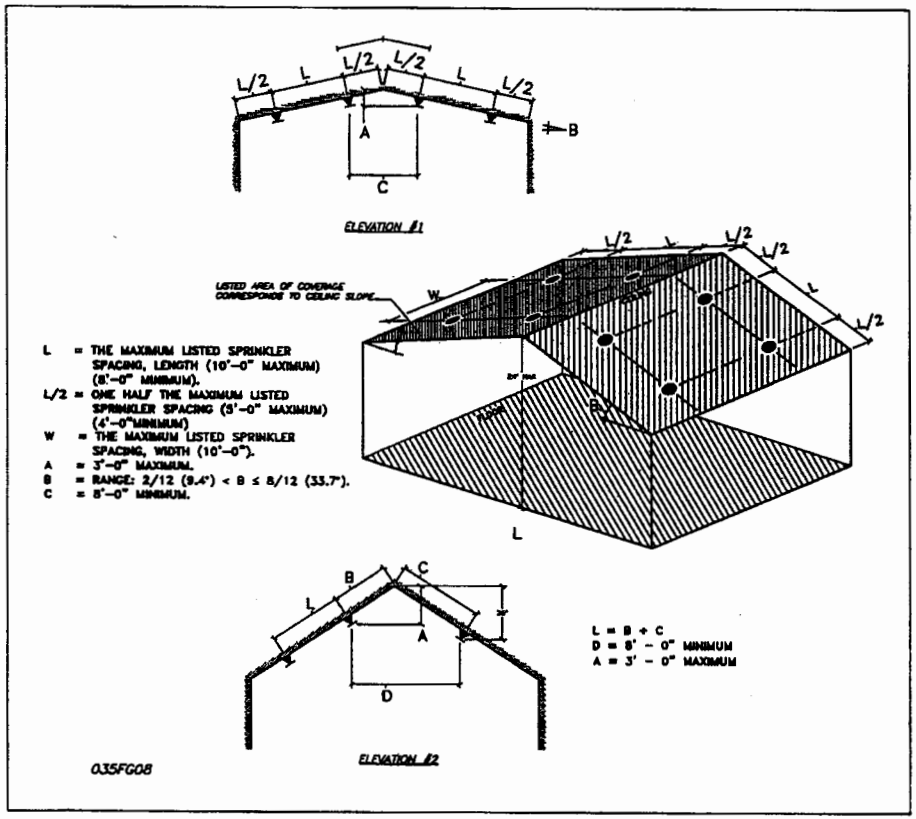


Fig. 8

Installation Guidelines per UL1626A

1. For systems designed in accordance with NFPA 13, 13D and 13R, where specific UL Listed flows are not required, consult with the local Authority Having Jurisdiction regarding the number of design sprinklers for sloped ceilings having pitch greater than (9.4°).
2. Installation of UL Listed residential sprinklers under sloped ceilings shall be limited to a type of unobstructed construction consisting of smooth ceilings, as defined by NFPA 13, having a maximum pitch of 8/12 (33.7°).
3. Spacing of residential sprinklers under sloped ceilings is measured along the slope when determining the distance off of walls and between sprinklers.
4. Measure listed areas of coverage along the sloped ceiling. The actual floor coverage area will be less than the listed area.
5. For coverage areas less than the listed coverage area shown in Tables 8, use the minimum flow requirement listed.
6. Minimum spacing between pendent type sprinklers is 8 ft. (2.4 m). Minimum distance from a pendent type sprinkler and an adjacent wall is 4" (102 mm).
7. Reidential sprinklers located closest to the peak of the ceiling shall have the deflectors located not more than 3 ft (1 m) vertically down from the peak. Align deflectors parallel with the ceiling slope 1" to 4" (25mm to 102mm) below the slope ceiling.
8. Hydraulic Requirements:
   a. For UL1626A, the number of design sprinklers shall include up to a maximum of two sprinklers that requires the greatest hydraulic demand.
9. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling and installation. REMOVE THIS PROTECTION AT THE TIME THE SPRINKLER SYSTEM IS PLACE IN SERVICE FOR FIRE PROTECTION. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when covers are in place. REMOVE PROTECTORS BY UNDOING THE CLASP BY HAND. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.
10. A maximum distance from the floor to the ceiling peak of 24 ft.
11. A maximum of two sprinklers installed within 3 ft. vertically of the peak.
12. Installation is for smooth, flat ceilings only that do not extend into or serve as a ceiling for an upper level floor in the structure.

Reliable®

Model F1 Res and RFC Residential Sprinkler Design and Installation Guide

Bulletin 140 Rev.I


F1 Res 49, 58 & 76 Pendent


F1 Res 49, 58 & 76 Recessed Pendent / F1


F1 Res 49, 58 & 76 Recessed Pendent / FP

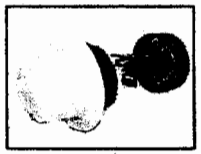

F1 Res 44 & 58 HSW


F1 Res 44 & 58 Recessed HSW/F2


F1 Res 40 HSW


F1 Res 40 Recessed HSW/F2


F1 Res 49, 58 & 76 CCP Pendent


F1 Res 44 SWC


RFC 43


RFC 56

Sprinkler Model and Type	Sprinkler Identification Number	Reliable Bulletin Number
F1 Res 49 Pendent F1 Res 49 Recessed Pendent/F1 F1 Res 49 Recessed Pendent/FP F1 Res 49 Concealed Pendent/CCP	R3516	Horizontal Ceilings – 135 Sloped Ceilings - 035
F1 Res 58 Pendent F1 Res 58 Recessed Pendent/F1 F1 Res 58 Recessed Pendent/FP F1 Res 58 Concealed Pendent/CCP	R3513	Horizontal Ceilings - 135
RFC43 Concealed Pendent	RA0612	Horizontal Ceilings – 006 Sloped Ceilings – 035
RFC56 Concealed Pendent	RA0914	Horizontal Ceilings – 009
F1 Res 44 Horizontal Sidewall F1 Res 44 Recessed Horizontal Sidewall	R3531	Horizontal Ceilings – 135 Sloped Ceilings - 035
F1 Res 44 SWC Concealed Horizontal Sidewall	R3531	Horizontal Ceilings – 135
F1 Res 58 Horizontal Sidewall F1 Res 58 Recessed Horizontal Sidewall/F2	R3533	Horizontal Ceilings - 135
F1 Res 40 Horizontal Sidewall F1 Res 40 Recessed Horizontal Sidewall/F2	R3538	Horizontal Ceilings – 135 Sloped Ceilings - 035
F1 Res 76 Pendent F1 Res 76 Recessed Pendent/F1 F1 Res 76 Recessed Pendent/FP F1 Res 76 Concealed Pendent/CCP	R7618	Horizontal Ceilings – 135, 176

Table A
Model F1 Res and Model RFC Residential Sprinklers

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York 10523

General

Reliable residential sprinklers utilize a fast response thermal element and are intended for use in only wet-pipe residential sprinkler systems designed in accordance with the following NFPA standards: NFPA 13D, Installation of Sprinkler Systems for One-and Two-Family Dwellings and Manufactured Homes; NFPA 13R, Installation of Sprinkler Systems for Residential Occupancies Up to and Including Four Stories in Height; and for the residential portions of any occupancy as permitted by NFPA 13, Installation of Sprinkler Systems. Fast response and high wall wetting characteristics of residential sprinklers improve life safety by maintaining a tenable environment, providing escape time for occupants.

NFPA 13D is appropriate for protection against fire hazards only in one-and two-family dwellings and manufactured homes. Residential portions of any other type of building or occupancy should be protected with residential sprinklers in accordance with NFPA 13, or in accordance with NFPA 13R. NFPA 13R is appropriate for use as an option to NFPA 13 only in those residential occupancies up to and including four stories in height. Where buildings are greater than four stories in height, or where buildings are of mixed use where residential is not the predominant occupancy, protect residential portions of such buildings with residential or quick response sprinklers in accordance with NFPA 13.

This document provides design guidelines for the Model F1/Res and RFC Residential Sprinklers shown in Table A, which are cULus Listed to provide a minimum density of 0.05 gpm/ft^2, in accordance with the above-mentioned standards, manufacturer's instructions, and technical bulletins. Where documentation for residential sprinkler systems does not exist for particular applications, information based on NFPA 13 is used.

Residential fire sprinkler systems should only be designed and installed by competent individuals trained and experienced with automatic sprinkler system design and installation. Several criteria may apply to a given installation and the designer and/or installer must be familiar with the applicable codes, standards, and guidelines governing such an installation. The Reliable Model F1/Res and RFC residential sprinklers described herein must be installed and maintained in compliance with this document manufacturer's recommendations, with the latest published standards of the National Fire Protection Association (NFPA), and with any additional local jurisdictional requirements. Failure to comply may result in the impairment of sprinkler integrity and proper operation. Because of the various features of residential type architecture, there will be some compartment designs which cannot be fully sprinklered in accordance with the recommendations of NFPA 13, 13D, or 13R. In these instances, consult the Authority Having Jurisdiction for guidance and approval.

The owner is responsible for maintaining their fire protection system and associated devices in proper operating condition. Refer to NFPA 25, Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, for guidance on testing and maintenance of automatic sprinkler systems.

Approvals

All Reliable residential sprinklers have been designed and tested in accordance with the Third Edition of Underwriters Laboratories (UL) 1626, Standard for Residential Sprinklers for Fire Protection Service. Typically, they are cULus Listed for installation under smooth, flat ceilings of unobstructed construction, unless otherwise noted in the specific listings, with specific approved spacing, flows, and pressures. Reliable residential sprinklers are cULus Listed for installation on both horizontal ceilings with a maximum slope of 2/12 (9.4°) pitch, and sloped ceilings having maximum slopes of 4/12 (18.4°) and 8/12 (33.7°) pitch. The design criteria for residential sprinklers contained in the current NFPA 13D, 13R, and 13 Standards must be followed except as modified by the individual UL 1626 listing information, the information in the Reliable residential sprinkler bulletins, and this installation guide. The Authority Having Jurisdiction (AHJ) must make final approval for all residential sprinkler installations for compliance with all applicable codes, standards, and jurisdictional requirements.

One of the most important revisions of the Third Edition of UL 1626 is the new minimum density requirement for residential sprinklers manufactured after July 12, 2002. When establishing a minimum cULus Listed flow rate, the manufacturer must use a minimum discharge rate over the specified coverage area corresponding to a 0.05 gpm/ft^2 density. In some cases, however, to successfully pass the UL 1626 fire tests, the UL Listed flow rate may be greater than the calculated 0.05 gpm/ft^2 density. Increased flow rates for horizontal sidewall type sprinklers, which exceed this minimum density, is common. Because this minimum density is a listing requirement, the use of residential sprinklers meeting this criterion is

applicable to all editions of NFPA 13, 13R and 13D. The design criteria for residential sprinklers contained in the current NFPA Standards must be followed except as modified by the individual cULus Listing information provided in the technical bulletins referenced in Table A.

Definitions

The following NFPA definitions are applicable to the terms used in this installation guide. Where terms are not included, refer to NFPA 13, NFPA 13D and NFPA 13R for official definitions:

Residential Sprinkler – A type of fast-response sprinkler that has a thermal element with an RTI of 50 (m-s)^{½} or less, has been specifically tested for its ability to enhance survivability in the room of fire origin and listed for use in the protection of dwelling units. Residential sprinklers posses a fast response thermal element and produce a spray pattern that discharges water higher on the wall than a standard spray sprinkler.

Dwelling – Any building that contains not more than one or two dwelling units intended to be used, rented, leased, let or hired out to be occupied or that are occupied for habitation purposes.

Dwelling Unit – One or more rooms, arranged for the use of one or more individuals living together, as in a single housekeeping unit, that normally have cooking, living, sanitary, and sleeping facilities. Dwelling units include hotel rooms, dormitory rooms, condominiums, apartments, and similar living units.

Compartment – A compartment is a space completely enclosed by walls and a ceiling. The compartment enclosure is permitted to have openings (in walls) to an adjoining space, provided that soffits or lintels along the ceiling over the compartment opening has a minimum depth of 8 in. (203mm) from the ceiling. In other words, areas such as hallways, stairwells, and rooms must be separated by beams, lintels or soffits 8 or more inches in depth to be considered single compartments.

Obstructed Construction – Panel construction and other construction where beams, trusses, or other members impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire. See NFPA 13 Appendix for detailed explanations of this type of construction.

Unobstructed Construction – Construction where beams, trusses, or other members do not impede heat flow or water distribution in a manner that materially affects the ability of sprinklers to control or suppress a fire. This type of construction has the following features: (1) horizontal structural members that are not solid; (2) openings of the structural members are at least 70% of the cross sectional area; (3) depth of the structural members do not exceed the least dimension of the openings; or (4) the spacing of structural members exceeds 7.5 feet on center. See NFPA 13 Appendix for detailed explanations of this type of construction.

Flat Ceiling – a continuous ceiling in a single plane.

Smooth Ceiling – A continuous ceiling free from significant irregularities, lumps or indentations.

Horizontal Ceiling – A ceiling that does not exceed a slope of 2/12 pitch (slope of 16.7% or 9.4°).

Sloped Ceiling – A ceiling exceeding a maximum slope of 2/12 (9.4°) pitch.

Installation Considerations

Residential sprinklers utilizing a glass bulb thermal element have orange protective caps and straps to provide temporary protection to the frangible glass bulb during shipping and installation.

a. Do not install any bulb type sprinkler if the bulb is cracked or there is liquid missing from the bulb. While holding the sprinkler in the horizontal position, a small air bubble having an approximate diameter of 1/16" should be visible.
b. The sprinkler is designed for installation with the protective strap in place using the appropriate sprinkler wrench.
c. Sprinklers that are dropped during the installation process or that are installed on piping other than that in accordance with item "a" shall be replaced, including sprinklers with protective caps or straps.
d. Protective caps and straps shall be removed only using means in accordance with the manufacturer's installation instructions. They are not to be left on the sprinkler after the sprinkler system is placed in service.
e. Protective caps and straps shall be removed only when water supply is made available to the sprinkler for the purposes of fire protection and placed in service.
f. A leak-tight ½" NPT sprinkler joint should be obtained with a maximum torque of 14 ft-lbs to 21 ft-lbs. (approximately 2 turns past hand tight. Do not over tighten). Higher levels of torque may distort the sprinkler inlet or bend the frame, causing leakage or impairment of the sprinkler.

Where applicable, escutcheon plates must be installed. Absence of an escutcheon plate, where there is an annular space between the ceiling and the sprinkler, may delay sprinkler operation in the event of a fire.

Never introduce any leak stopping additives to any fire sprinkler system.

Residential sprinklers must be installed with the manufacturer's specified sprinkler wrench. Channel locks, crescent wrenches or anything other than the proper sprinkler wrench shall not be used.

Installing sprinklers in CPVC and copper piping systems require special considerations. Never install the sprinkler into the reducing fitting prior to attaching the reducing fitting to the system piping. When installing residential sprinklers or commercial sprinklers in a CPVC piping system, sprinklers must be installed only after the reducing fitting has been installed and the CPVC manufacturer's setting time for the primer and/or cement has passed. This is to ensure that the cement does not accumulate within the sprinkler. In copper piping systems, sprinklers must be installed only after the inside of the sprinkler drop and associated fittings have been wire-brushed to remove any residual flux.. Residual flux can cause corrosion. Both of these conditions can impair and prevent proper sprinkler operation.

System Design Criteria

Permitted Sprinklers for Residential Sprinkler Systems

For NFPA 13D and 13R sprinkler systems, only listed residential sprinklers shall be used, with the following exceptions:

1. Listed standard dry-pendent or dry sidewall sprinklers shall be permitted to be extended into unheated areas not intended for living purposes.
2. Quick-response sprinklers shall be permitted to be used in mechanical closets.
3. For NFPA 13R systems, listed quick-response sprinklers shall be permitted to be installed in dwelling units meeting the definition of a compartment where no more than four (4) sprinklers are located within the dwelling unit.

Non-residential sprinklers are to be installed in accordance with the criteria specified by NFPA 13.

Residential Sprinkler Positioning and Spacing Requirements

When locating residential sprinklers, consideration must be given to sensitivity, sprinkler spacing, obstructions to discharge, temperature rating, and proximity to heat sources.

Sprinkler Sensitivity - Deflector Positioning

Residential pendent sprinklers not listed with specific positioning criteria must be positioned so that the deflectors are within 1 in. to 4 in. (25.4 mm to 102 mm) from the ceiling. On flat, horizontal ceilings, Reliable Model F1 Res 49 pendent and recessed pendent sprinklers may also be positioned with the deflector 4" to 8" (102 mm to 203 mm) from the ceiling, in accordance with the listed flows and pressures shown in Bulletin 135. If located in closets, it is permitted to install pendent sprinklers so that the deflector is within 12 inches (305 mm) of the ceiling. Residential sidewall sprinklers that have not been listed with specific positioning criteria must be positioned so that the deflectors are within 4 in. to 6 in. (102 mm to 152 mm) from the ceiling. Install sidewall sprinklers having listed positioning criteria in accordance with their listing. Under both horizontal and sloped ceilings, always align sprinkler deflectors so that the deflector is parallel with the plane of the ceiling surface.

Sprinkler Spacing Under Horizontal Ceilings

Several maximum coverage areas are used for residential sprinklers in accordance with minimum listed flows and pressures. The area of coverage must be equal to or greater than both the length and width of the hazard area. Residential sprinklers must be located not more than half the listed spacing nor less than 4" (102 mm) from walls. Adjacent sprinklers must be located no farther apart than the listed spacing; the minimum distance to prevent cold soldering, unless otherwise specified, is 8 feet (2.44 m).

When selecting an area of coverage, the suggested practice is to select one that can be adequately supplied by the available water supply, allowing for the installation of as few sprinklers as possible while observing all guidelines pertaining to obstructions and spacing. After selection of an area of coverage, sprinklers must be spaced according to the criteria set forth in the NFPA standards and this document.

Sprinkler Spacing Under Sloped Ceilings

For installation under sloped ceilings, several maximum coverage areas are also provided, but at different minimum flows and pressures than those for horizontal ceilings. The spacing of sprinklers is measured along the slope when determining the distance off of walls and between sprinklers. Residential sprinklers may be located no more than ½ the listed spacing nor less than 4" (102 mm) from the peak of the sloped ceiling. Residential sprinklers located at the highest elevation must not be located more than 3 feet (0.9 m) measured vertically down from the peak. Refer to Reliable Bulletin 035 for listed coverage areas, flow and pressure requirements, and positioning criteria for residential sprinklers installed under sloped ceilings.

Obstruction to Water Distribution

Refer to Figures 1 through 13 for the location of sprinklers relative to obstructions. The discharge from residential sprinklers is directed radially outward and downward from the sprinkler. Sprinklers must be located such that there will not be any spaces shielded from distribution by walls, dividing partitions, or other dwelling construction features. If the sprinkler water distribution pattern is obstructed, the obstruction is to be considered the maximum distance of coverage for a given sprinkler. Additional sprinklers beyond the obstruction may be necessary unless the obstruction criteria contained herein can be met. Consult the appropriate NFPA standard and/or the AHJ for guidance regarding these situations.

Reliable flat plate concealed sprinklers, the Models RFC 43 and RFC 56, utilize a drop-down style deflector. The distance the deflector drops below the ceiling is needed when determining the position of the deflector above the bottom of an obstruction. These distance are as follows:

- Nonadjusted (cover plate flush to cup) - ½" (22mm)
- At full (½") adjustment - ⅜" (9.5mm)

Continuous and Noncontinuous Obstructions

A minimum distance is required to be maintained between sprinklers and continuous obstructions, such as beams, soffits, and long horizontal light fixtures. See Figures 1, 2, 4, 5, 6, 7 and/or 13.

A minimum distance is also required to be maintained between sprinklers and noncontinuous obstructions, such as ceiling fans and certain light fixtures. The ceiling fan motor housing is the primary element that can obstruct the sprinkler discharge pattern. Testing has demonstrated that no adverse effects occur as a result of the ceiling fan's blade rotation in either direction.

With regards to location of sprinklers near light fixtures, there are two considerations; the amount of heat the light gives off and the light fixture as an obstruction. The minimum distance of a sprinkler relative to the light as a heat source is given in Table B. If the light is also an obstruction, then the obstruction criteria must be applied, relative to the minimum distance required from Table B.

For noncontinuous obstructions, apply the "four times rule" as provided in NFPA 13 where it is determined that the sprinkler can spray to at least two sides of the obstruction, either over and under or around the obstruction on both sides. Sprinklers shall be positioned away from the obstruction a minimum distance of four times the maximum dimension of the obstruction. The maximum clear distance required shall be 36" (914mm).

Temperature Ratings

Ordinary temperature rated sprinklers (135°F [57°C], 155°F [57°C]) are only permitted for installation where the maximum ambient ceiling temperature will not exceed 100°F (38°C). Where ambient ceiling temperatures are expected to exceed 100°F (38°C), use intermediate temperature-rated residential sprinklers (175°F [79°C]), which can be exposed to a maximum ambient temperature of 150°F (66°C). The following practices apply, unless higher expected ambient temperatures require a higher temperature rated sprinkler:

1. Sprinklers under glass or plastic skylights exposed to direct rays of the sun shall be of the intermediate temperature classification.
2. Sprinklers in an unventilated concealed space under insulated roof or in an unventilated attic shall be of the intermediate temperature classification.
3. Residential sprinklers must be located so as to prevent inadvertent operation due to exposure to normal heat sources. Sprinklers must be positioned a sufficient distance away from heat sources such as fireplaces, ovens, kitchen ranges, hot water pipes, water heaters, furnaces and associated ductwork, and light fixtures. The following minimum distances in accordance with NFPA 13D and 13R must be maintained as indicated in Table B.

Table B – Minimum Distances for Ordinary and Intermediate Residential Sprinklers Relative to Specific Heat Sources

Heat Source	Minimum Distance from Edge of Source to Ordinary Temperature Sprinkler (135°F or 155°F)	Minimum Distance from Edge of Source to Intermediate Temperature Sprinkler (175°F)
	in. (mm)	in. (mm)
Side of open or Recessed fireplace	36 (914)	12 (305)
Front of recessed fireplace	60 (1524)	36 (914)
Coal or wood-burning stove	42 (1067)	12 (305)
Kitchen range	18 (457)	9 (229)
Wall oven	18 (457)	9 (229)
Hot air flues	18 (457)	9 (229)
Uninsulated heat ducts	18 (457)	9 (229)
Uninsulated hot water pipes	12 (305)	6 (152)
Side of ceiling or wall-mounted hot air diffusers	24 (607)	12 (305)
Front of wall-mounted hot air diffusers	36 (914)	18 (457)
Hot water heater or furnace	6 (152)	3 (76)
Light Fixture 0 W – 250 W 250 W – 499 W	6 (152) 12 (305)	3 (76) 6 (152)

Hydraulic Design Requirements

Reliable residential sprinkler listings indicate minimum flow rates for each specified coverage area. Hydraulic calculations are required to verify adequate water supply at the hydraulically most remote single sprinkler operating at the minimum flow and pressure listed for single-sprinkler operation. Where a compartment has more than one sprinkler, multiple sprinkler calculations are required, and each sprinkler must be calculated flowing identical minimum flow rates. No reduction in minimum flow requirements is provided for flowing multiple sprinklers. More design sprinklers may need to be calculated than the minimum stated by the NFPA standards where unusual conditions may result in more sprinklers operating. These conditions include sloped ceilings having a pitch greater than 8/12 (33.7°) or beamed ceilings qualifying as obstructed construction, as defined by NFPA 13. Consult with the AHJ regarding the number of "design sprinklers" for these types of applications.

NFPA 13D

The number of design sprinklers under flat, smooth, horizontal ceilings shall include all sprinklers within a compartment, up to a maximum of two (2) sprinklers, that requires the greatest hydraulic demand. The cULus Listed specific coverage criteria for systems designed to NFPA 13R are given in the technical bulletins referenced in Table A, as a function of the maximum allowable coverage area and temperature rating. For actual coverage areas less than or between those indicated in the respective bulletin, it is necessary to use the minimum required flow for the next largest area, as shown above.

For example, assuming the use of a pendent sprinkler, for an actual coverage area of 12 ft x 14 ft (3.7 m x 4.2 m), the specific coverage criteria for a 14 ft x 14 ft (4.2 m x 4.2 m) coverage area must be used. For an actual coverage area of 15 ft x 15 ft (4.6 m x 4.6 m), the specific coverage criteria for a 16 ft x 16 ft (4.9 m x 4.9 m) coverage area must be used.

NFPA 13R

The number of design sprinklers under flat, smooth, horizontal ceilings shall include all sprinklers within a compartment, up to a maximum of four (4) sprinklers, that requires the greatest hydraulic demand. The cULus Listed specific coverage criteria for systems designed to NFPA 13R are given in the technical bulletins referenced in Table A, as a function of the maximum allowable coverage area and temperature rating. For actual coverage areas less than or between those indicated in the respective bulletin, it is necessary to use the minimum required flow for the next largest area, as shown above.

NFPA 13

For residential sprinkler systems designed to NFPA 13, a minimum density of 0.1 gpm/ft2 must be provided over the "design area" that includes the four (4) hydraulically most demanding sprinklers for the actual coverage areas being protected by the 4 sprinklers. The minimum required discharge from each of the four most hydraulically demanding sprinklers shall be the greater of the following:

1. The flow rates given in the Reliable Residential Sprinkler Technical Bulletins referenced in Table A for NFPA 13D and 13R as a function of temperature rating and maximum allowable coverage area (for actual coverage areas less than or between those indicated in the respective technical bulletin, it is required to use the minimum required flow for the next largest coverage area); or
2. A minimum discharge density of 0.1 gpm/ft^2 applied over the "design area" consisting of the four most hydraulically demanding sprinklers for the actual coverage areas being protected by the four sprinklers. The maximum dimension of the actual coverage area cannot be any greater than the maximum coverage area indicated in the technical bulletins referenced in Table A.

Design Note: Using the $A_k = S \times L$ method to determine the sprinkler protection area of coverage in accordance with NFPA 13, apply the 0.1 gpm/ft^2 density to this area to determine the minimum required flow. Compare this flow to the minimum 0.05 gpm/ft^2 cULus Listed flow for the appropriate coverage area in the technical bulletin for the specific residential sprinkler. If the flow stated in the technical bulletin is less than the calculated 0.1 gpm/ft^2 density flow required, the .1 density flow must then be used in the equation $Q=K\sqrt{P}$, solving for P, to establish the minimum required pressure using the sprinkler K-factor. **Note:** In many cases the listed flow of individual residential sprinklers may exceed the required minimum 0.05 gpm/ft^2 density. Reliable has available residential sprinklers with larger K-factors (K=5.6 and K=5.8) that will provide lower pressure demands for 0.1 gpm/ft^2 densities in NFPA 13 residential applications.

Example No. 1

If a room is 12 ft wide x 20 ft long (3.6 m x 6.1 m), the coverage area being considered would be 240 ft^2 (22.3 m^2). Using an F1 Res 49 pendent sprinkler (1"-4" ceiling-to-deflector distance), the flow for a 20 ft x 20 ft (6.1 m x 6.1 m) coverage area is 20 gpm @ 16.7 psi (75.7 L/min @ 1.14 bar). However, based on a discharge density of 0.1 gpm/ft^2, the flow rate required would be 24 gpm (90.8 L). Therefore, 24 gpm (90.8 L/min) would be the minimum flow required for each design sprinkler. The corresponding pressure would be 24 psi (1.65 bar)

Example No. 2

If a room is 10 ft wide x 20 ft long (3.0 m x 6.1 m), the coverage area being considered would be 200 ft^2 (18.6 m^2). Using an F1 Res 58 pendent sprinkler (1"-4" ceiling-to-deflector distance), the flow for a 20 ft x 20 ft (6.1 m x 6.1 m) coverage area is 22 gpm @ 14.4 psi (83.3 L/min @ 0.99 bar). Based on a discharge density of 0.1 gpm/ft^2, the flow rate required would only be 20 gpm (75.7 L/min). However, the flow of 22 gpm must still be used as the minimum flow for each design sprinkler, since this is the minimum cULus Listed flow for this sprinkler at the 20 ft x 20 ft coverage area.

Example No. 3

For a situation where the coverage area per sprinkler is 16 ft x 8 ft (4.9 m x 2.4 m), or 128 ft^2 (11.9 m^2), the F1 RES 44 HSW, having a temperature rating of 155°F (68°C) and positioned 4" to 6" (101 mm to 152 mm) below the ceiling, requires a minimum flow of 16 gpm @ 13.3 psi (60.6 L/min @ .92 bar) for a 16 ft x 16 ft (4.9 m x 4.9 m) coverage area. Based on a minimum discharge of 0.1 gpm/ft^2, the flow rate needed would only be 12.8 gpm @ 10.2 psi (48.4 L/min @ 0.7 bar). However, the flow rate of 16 gpm (60.6 L/min) must still be used for each design sprinkler.

Sloped Ceilings

Specific UL Listed flows, pressures and coverage areas for sloped ceilings are provided in Reliable Bulletin 035. Refer to this bulletin for hydraulic design requirements. The number of design sprinklers is the same as that specified for horizontal ceilings, with the exception of the Model F1Res 40 HSW & F1Res 44 HSW. These sprinklers require a minimum 3 sprinkler design in a compartment when discharging across the slope, as specified in Bulletin 035.

For systems designed to NFPA 13, 13D or 13R, where specific cULus Listed flows for sloped ceilings are not required, consult with the AHJ regarding the number of "design sprinklers" for sloped ceilings having a pitch greater than 2 in 12 (9.4°). cULus Listed flows and pressures do not exist for sloped ceilings having a pitch greater than 8/12 (33.7°). Again, consult with the AHJ regarding the number of "design sprinklers" for these types of applications. Listed areas of coverage must correspond to ceiling slope, and spacing of sprinklers under sloped ceilings is measured along the slope when determining distance off of walls and between sprinklers.

Care and Maintenance

It is recommended that automatic sprinkler systems be inspected and maintained in accordance with the criteria set forth in NFPA 25, Inspection, Testing and Maintenance of Water-Based Fire Protection Systems by a qualified inspection service.

Do not clean the sprinklers with soap and water, detergents, ammonia, or any other cleaning fluid. Remove dust by using a soft brush or feather duster, or by gentle vacuuming with a soft bristle brush.

Any sprinklers that have operated, been damaged or been painted outside of the factory shall be replaced with a new sprinkler. The new sprinkler shall have the same performance characteristics as the original sprinkler; that is the same temperature rating, nominal K-factor, coverage area, and the same or lower flow rate requirements.

Wet-pipe sprinkler systems must be maintained at a minimum temperature of 40°F (4°C). Exposure to freezing temperatures can damage system piping and residential sprinklers.

Do not hang anything from sprinklers or sprinkler piping. Do not put curtains, drapes or valences around sprinklers. Doing so will obstruct the discharge pattern of the sprinkler.

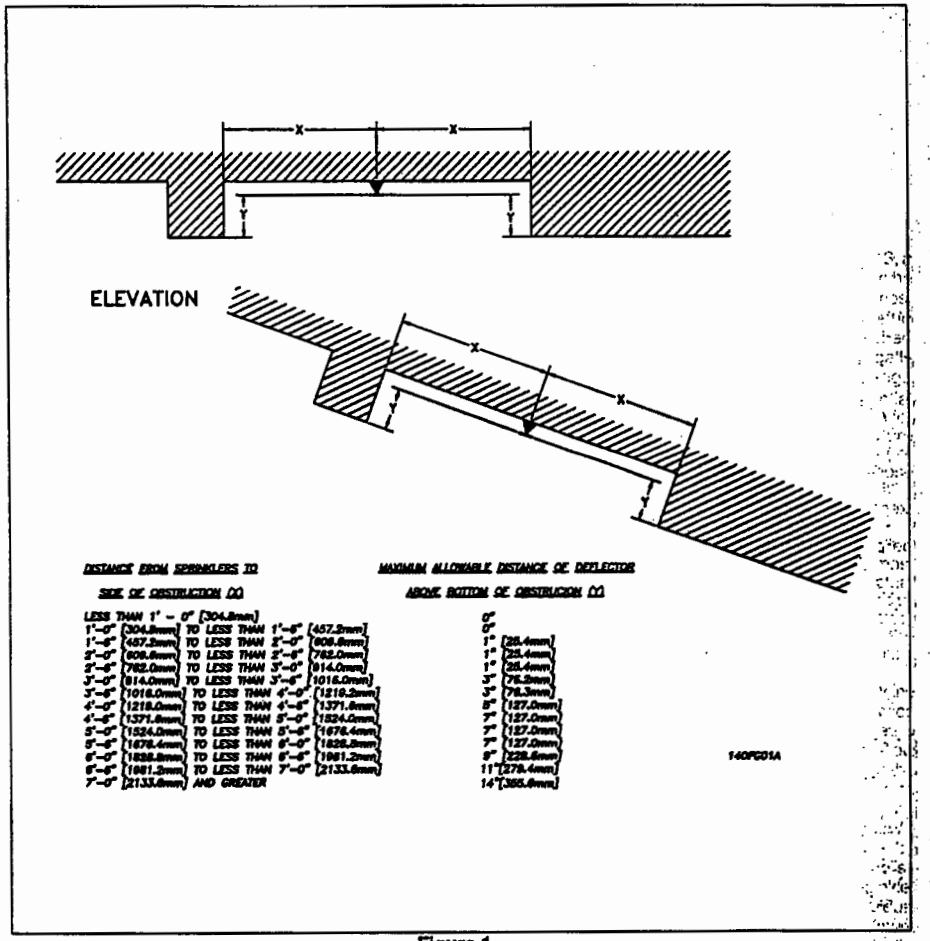


Figure 1

Position of sprinklers to avoid obstructions to discharge radially from pendent sprinklers.

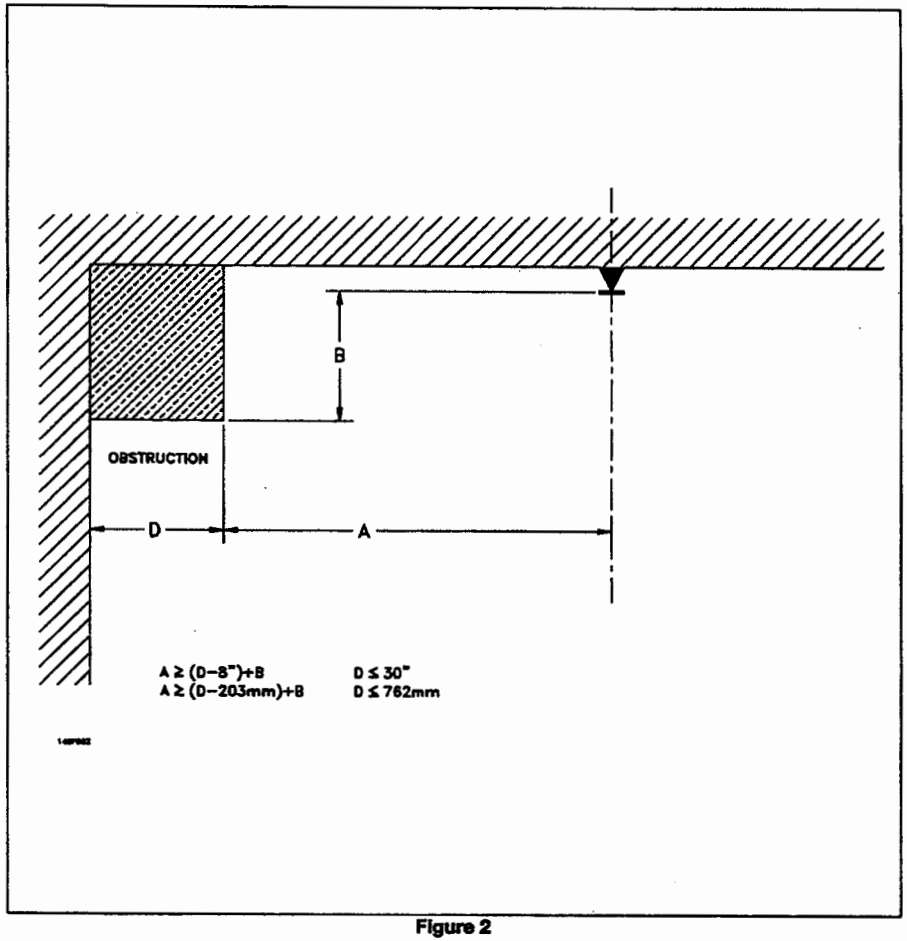
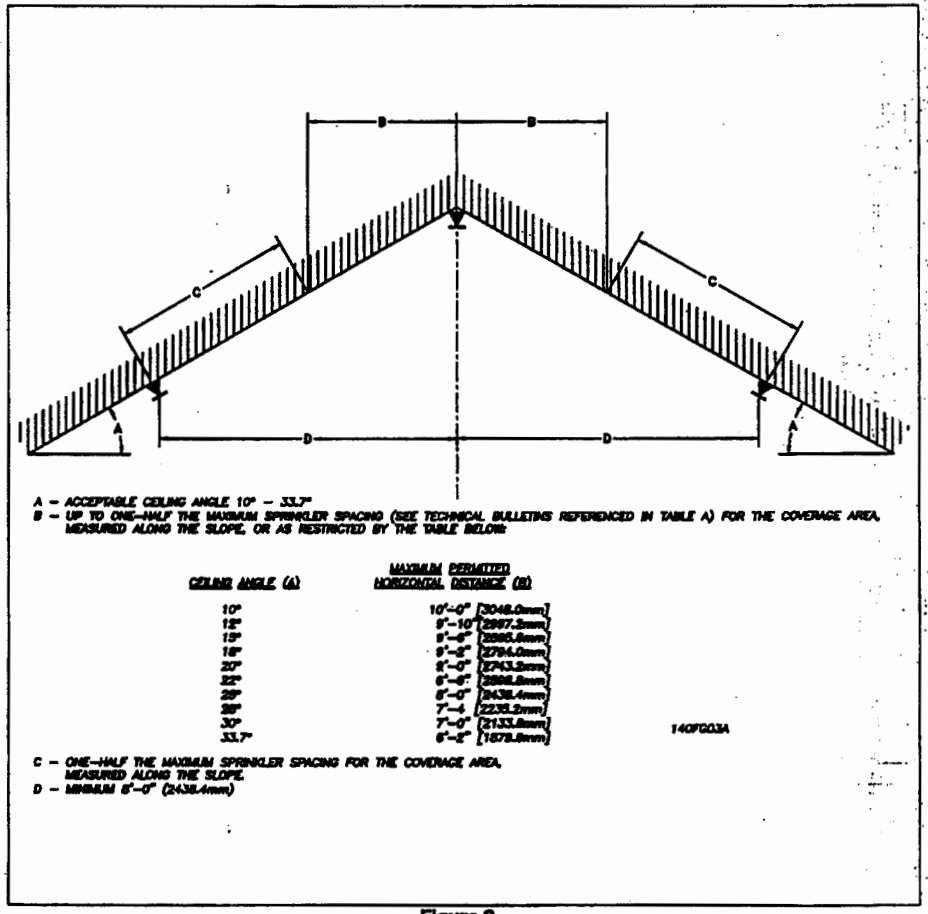


Figure 2
Positioning of pendent type sprinklers relative to obstructions against walls.



A – ACCEPTABLE CEILING ANGLE 10° – 33.7°
B – UP TO ONE–HALF THE MAXIMUM SPRINKLER SPACING (SEE TECHNICAL BULLETINS REFERENCED IN TABLE A) FOR THE COVERAGE AREA, MEASURED ALONG THE SLOPE, OR AS RESTRICTED BY THE TABLE BELOW:

CEILING ANGLE (A)	MAXIMUM PERMITTED HORIZONTAL DISTANCE (B)
10°	10'–0" [3048.0mm]
12°	9'–10" [2997.2mm]
15°	9'–8" [2895.6mm]
18°	9'–2" [2794.0mm]
20°	9'–0" [2743.2mm]
22°	8'–8" [2692.4mm]
25°	8'–0" [2438.4mm]
28°	7'–4 [2235.2mm]
30°	7'–0" [2133.6mm]
33.7°	6'–2" [1879.6mm]

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C – ONE–HALF THE MAXIMUM SPRINKLER SPACING FOR THE COVERAGE AREA, MEASURED ALONG THE SLOPE.
D – MINIMUM 8'–0" (2438.4mm)

Figure 3
Sprinkler spacing for pendent sprinklers located at the peak.

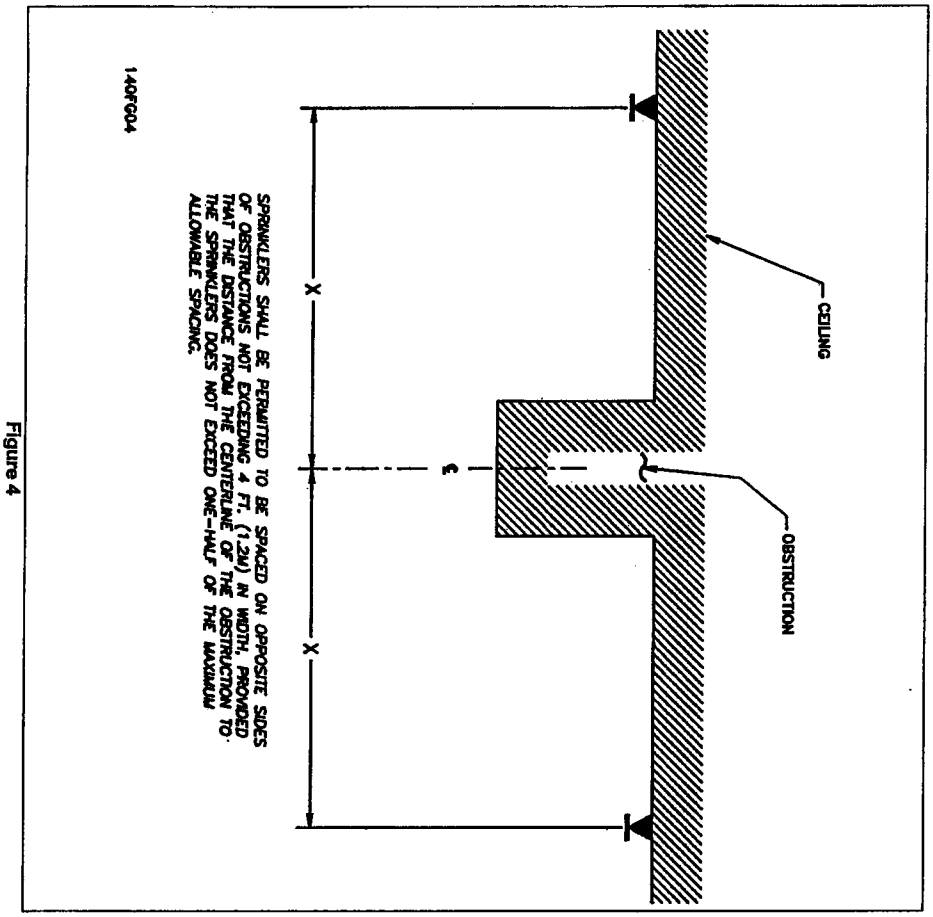
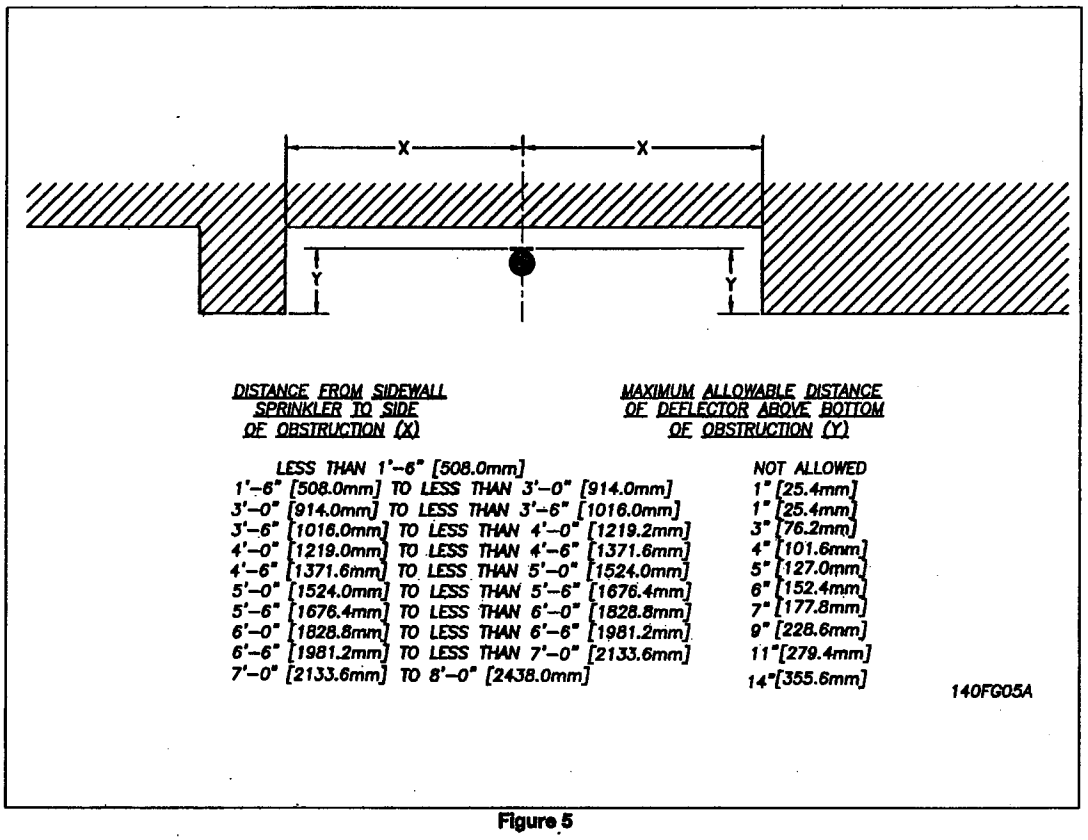


Figure 4

Positioning of pendent sprinklers relative to continuous obstructions at the ceiling.

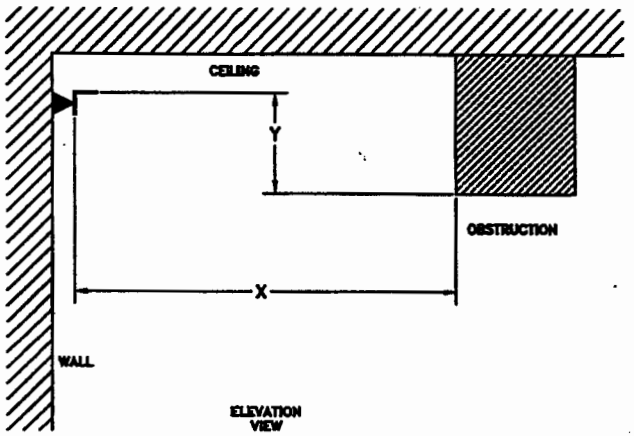
11.



12.

Figure 5

Positioning of sidewall sprinklers to avoid obstructions along the wall.



DISTANCE FROM SIDEWALL SPRINKLER TO SIDE OF OBSTRUCTION (X)	MAXIMUM ALLOWABLE DISTANCE OF DEFLECTOR ABOVE BOTTOM OF OBSTRUCTION (Y)
LESS THAN 8'-0" [2438.4mm]	NOT ALLOWED
8'-0" [2834.4mm] TO LESS THAN 10'-0" [3048.0mm]	1" [25.4mm]
10'-0" [3048.0mm] TO LESS THAN 11' -0" [3352.0mm]	2" [50.8mm]
11'-0" [3352.0mm] TO LESS THAN 12'-0" [3657.6mm]	3" [76.2mm]
12'-0" [3657.6mm] TO LESS THAN 13'-0" [3962.4mm]	4" [101.6mm]
13'-0" [3962.4mm] TO LESS THAN 14'-0" [4267.2mm]	6" [152.4mm]
14'-0" [4267.2mm] TO LESS THAN 15'-0" [4572.0mm]	7" [177.8mm]
15'-0" [4572.0mm] TO LESS THAN 16'-0" [4876.6mm]	9" [228.6mm]
16'-0" [4876.6mm] TO LESS THAN 17'-0" [5181.6mm]	11" [279.4mm]
17'-0" [5181.6mm] OR GREATER	14" [355.6mm]

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Figure 6

Positioning of sidewall sprinklers to avoid obstructions.

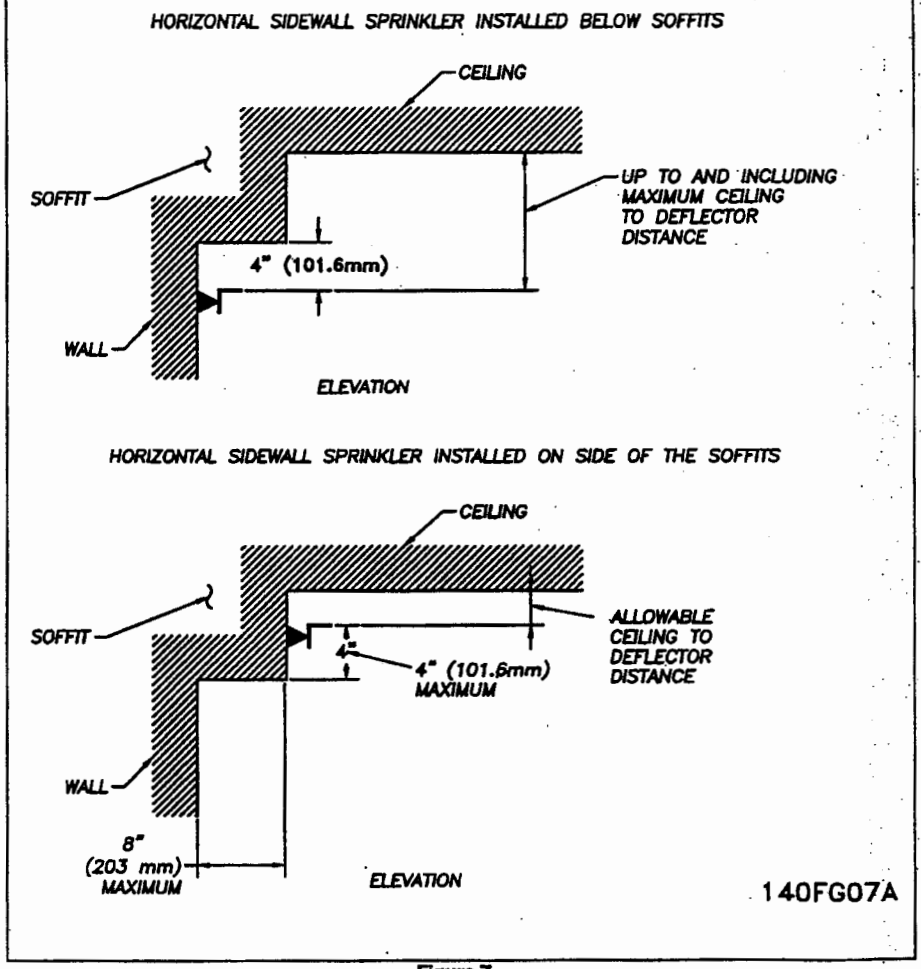


Figure 7

Positioning of HSW sprinklers relative to continuous obstructions along a wall.

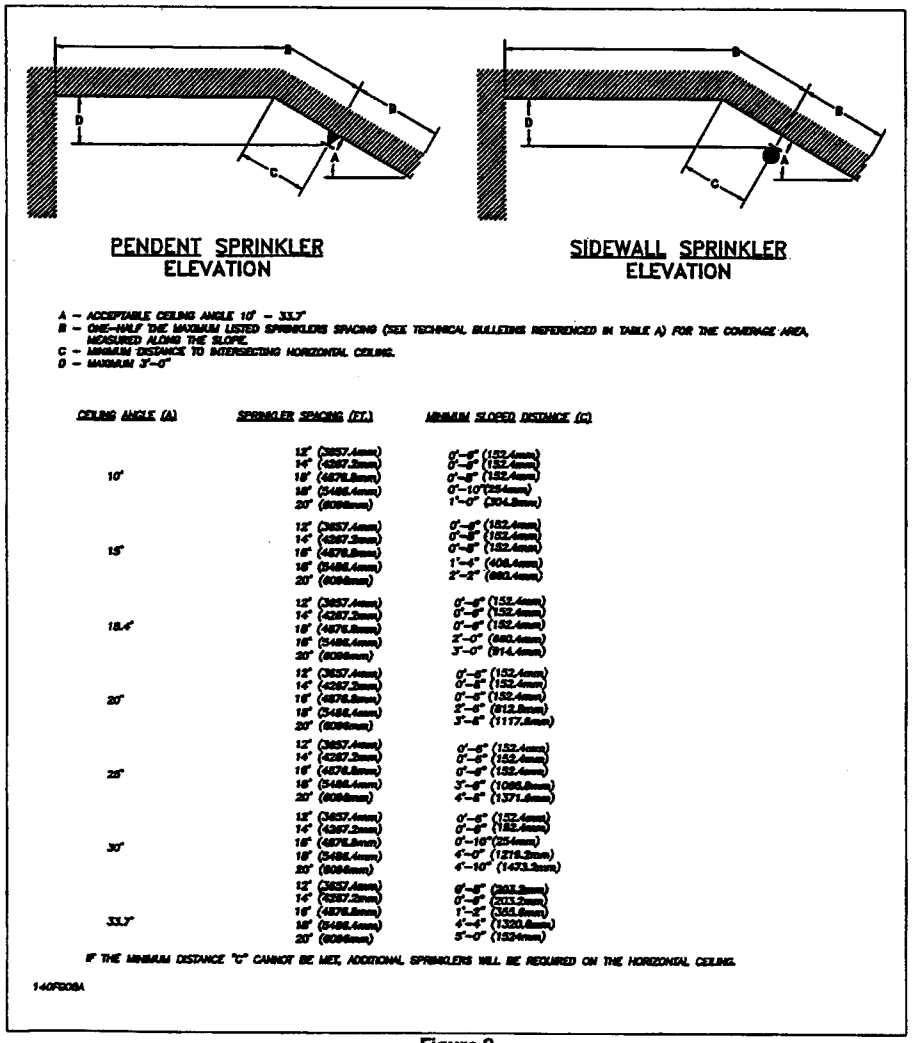


Figure 8

Obstruction to discharge by intersecting horizontal ceiling.

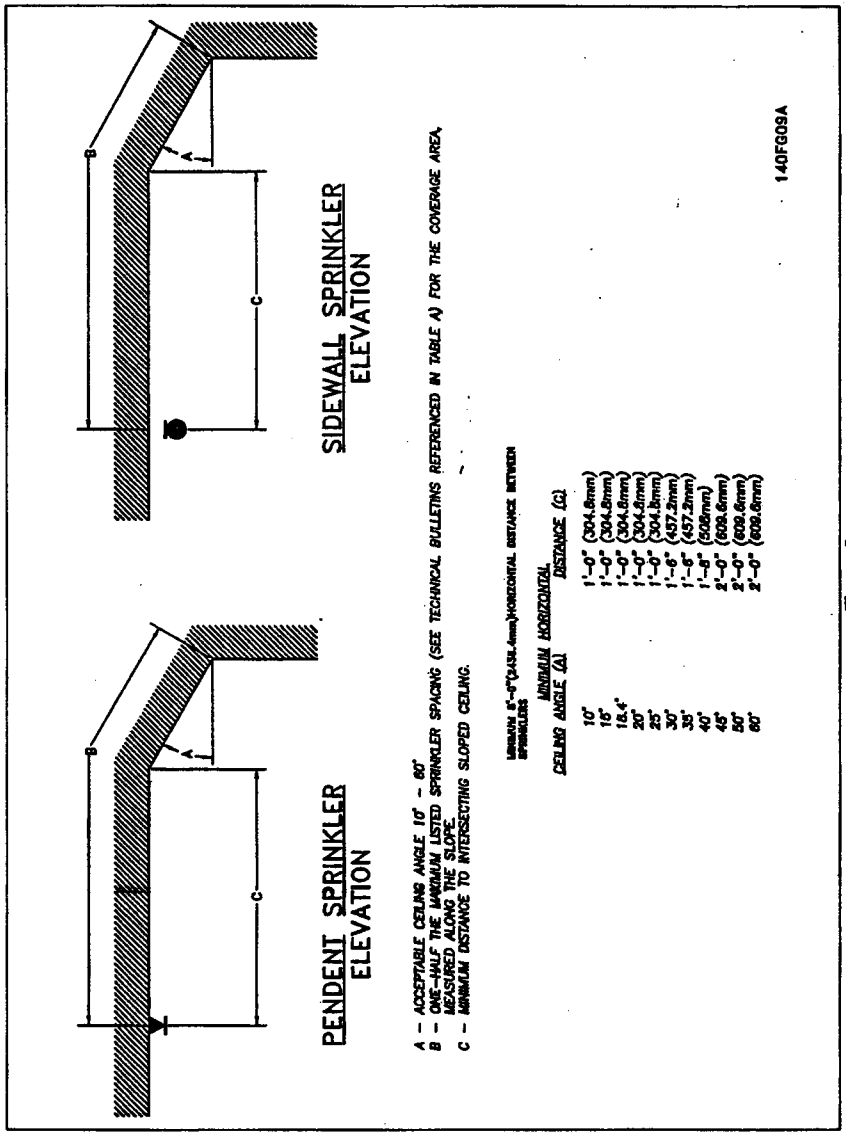
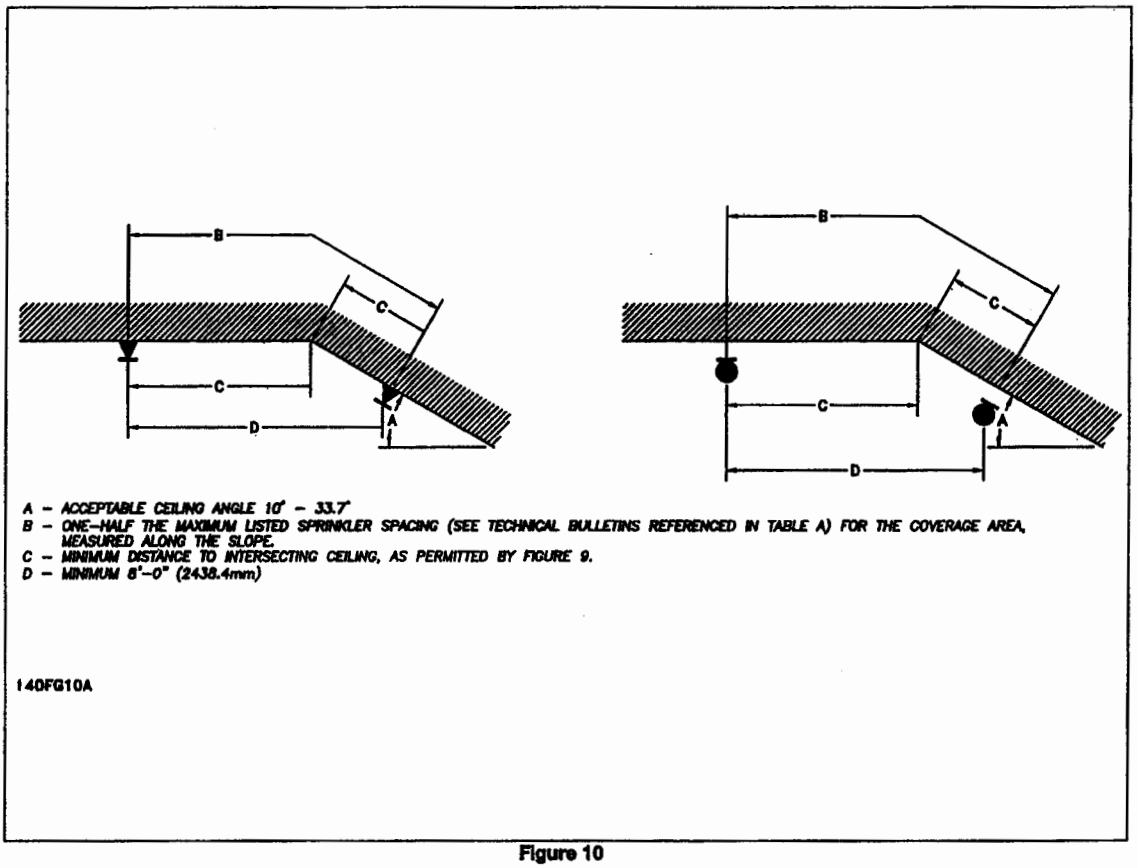


Figure 9

Obstruction to discharge by intersecting sloped ceiling.



A – ACCEPTABLE CEILING ANGLE 10° – 33.7°
B – ONE–HALF THE MAXIMUM LISTED SPRINKLER SPACING (SEE TECHNICAL BULLETINS REFERENCED IN TABLE A) FOR THE COVERAGE AREA, MEASURED ALONG THE SLOPE.
C – MINIMUM DISTANCE TO INTERSECTING CEILING, AS PERMITTED BY FIGURE 9.
D – MINIMUM 8'–0" (2438.4mm)

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Figure 10

Minimum distance between sprinklers on intersecting ceilings.

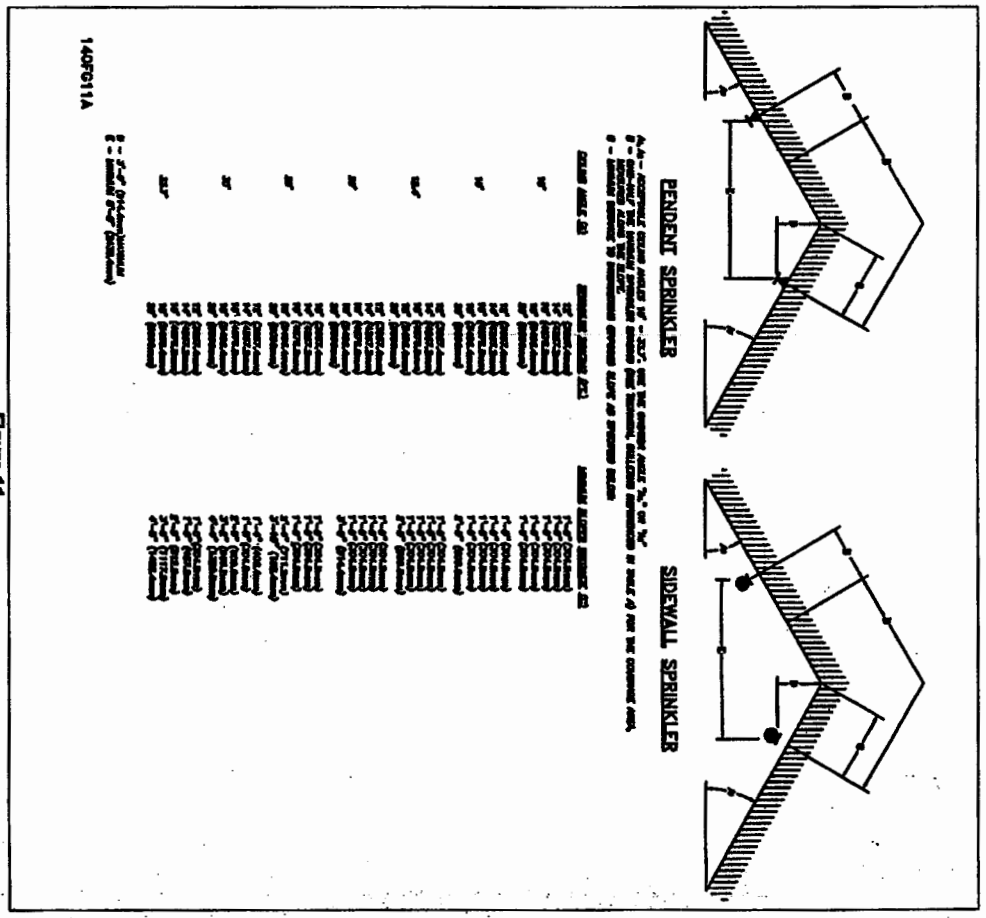


Figure 11

Non-symmetric sprinkler locations on opposing scopes.

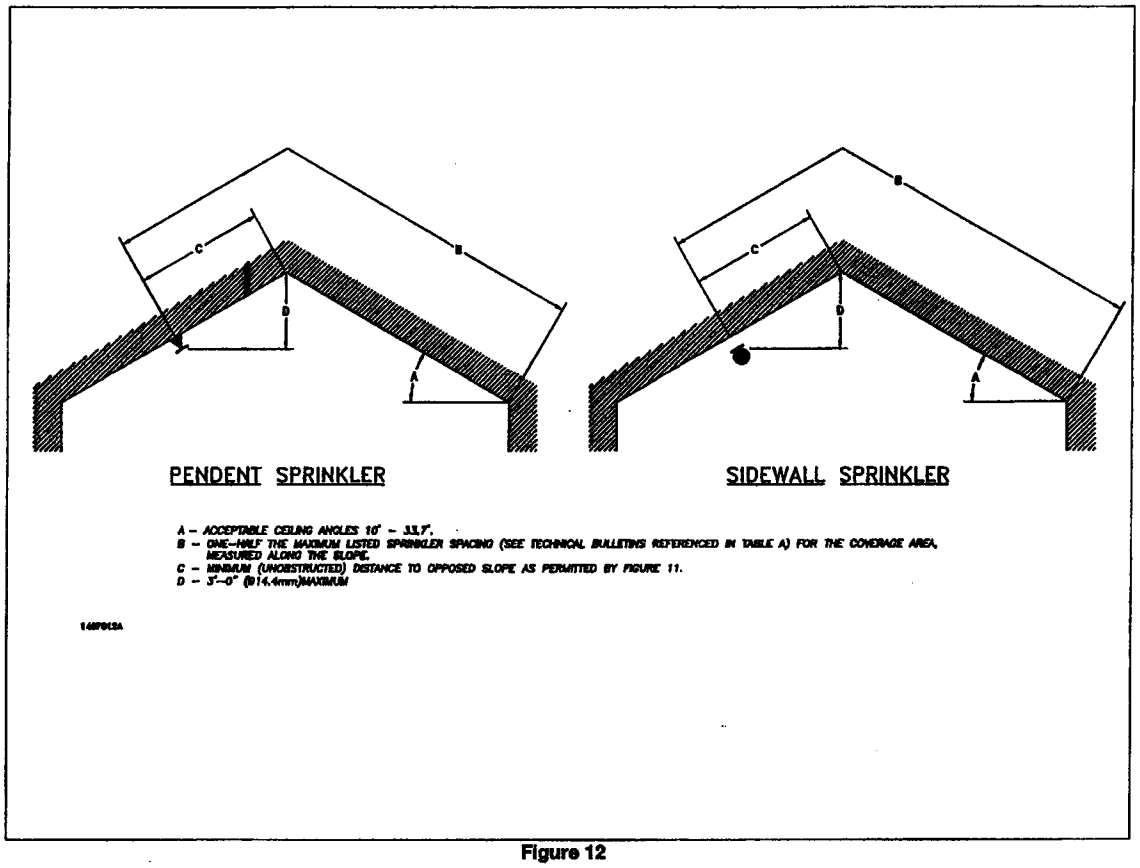


Figure 12

Single sprinkler coverage criteria for cathedral ceilings.

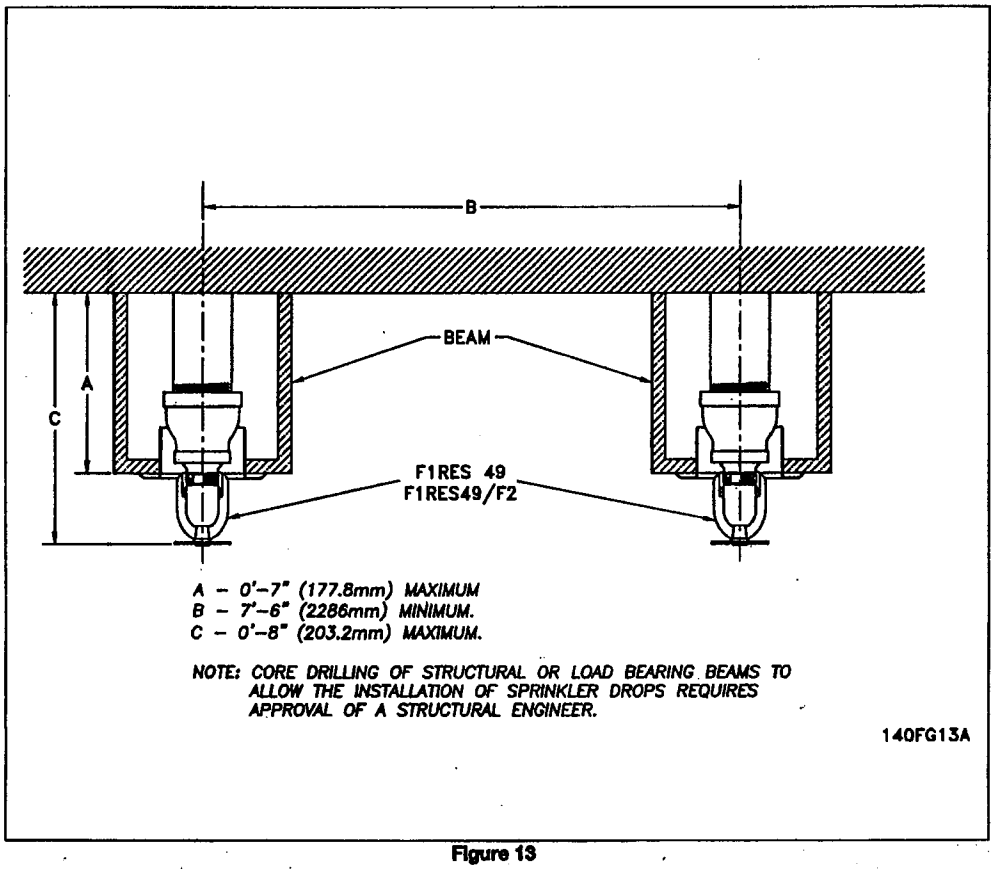


Figure 13

Pendent sprinkler positioning for beamed ceiling.

Bulletin 414 Rev.D

Model MP (Multi-Purpose) 1" Residential Riser

Bulletin 414 Rev.D

1" (25mm) Residential Riser for Providing Water Flow Alarm on Multipurpose Residential Fire Sprinkler Systems

Features

1. Designed to alarm on single fire sprinkler operation and not during normal household water usage.
2. Potable-water safe.
3. Water-flow Detector is preset to operate at 12 gpm ± 1 gpm (45.4 Lpm ± 3.8 Lpm), and is factory installed with a weather-proof metal cover.
4. Dedicated UL Listed water-flow detector assures optimum sensitivity while the adjustable delay device minimizes false alarms caused by pressure surges or short periods of water usage above 12 gpm.
5. Switch can be wired for 24 VDC or 125/250 VAC operation.
6. Stainless steel 1" (25mm) manifold with NPT or Metric Inlet and Outlet Threads.
7. Factory assembled and tested.
8. Rated working pressure not to exceed 175 psi.
9. UL Listed Assembly. NSF-61 Approved.
10. When the Model MP Riser is utilized in sprinkler systems with sprinklers having K-factors less than 4.4, there must be a minimun of 15 psi of operating pressure at the system's most remote head.

Listings & Approvals

1. Listed by Underwriters Laboratories Inc. (cULus)
2. NSF-61 Approved

Product Description

The Multi-Purpose-Riser comes factory assembled with the necessary accessories for a cost effective, complete riser assembly.

Cast-on lettering identifies manifold size and flow direction. This Riser can be used safely where domestic water and fire protection water are combined.

The water flow detector range, preset to 12 gpm ± 1 gpm, is designed to protect the system from false tripping when multiple household fixtures are in use. When the Model MP Riser is utilized in sprinkler systems with sprinklers having K-factors less than 4.4, there must be a minimun of 15 psi of operating pressure at the system's most remote head.

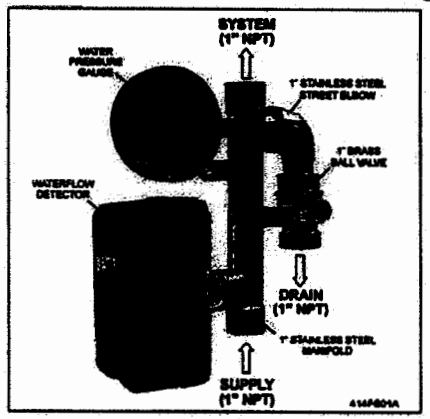


Fig.1

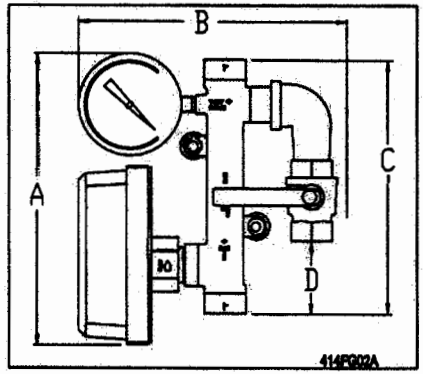


Fig.2

Technical Data:

Description	Multi Purpose Riser Trim				
Manifold Size	Dimensions inch (mm)				Weight*
	A	B	C	D	Lbs (kg)
1" (25mm)	11 (280)	10 (254)	9.5 (241)	2.75 (70)	5.7 (2.1)

* Support Bracket Kit (optional) - 1 lb (0.45 kg)

Installation:

1. Install the manifold with the flow arrow pointing towards the SYSTEM side using 1" NPT threaded connections. Use potable water - safe thread sealants only (teflon tape is recommended).
2. Connect 1" Brass Ball Valve to drain.
3. Place the sprinkler system in service.
4. Follow directions on the water-flow detector switch for electrical connections.

Caution:

Automatic sprinkler systems having non-fire protection connection (permitting continual water flow) require dielectric fittings, according to NFPA 13 sect. 4-6, when dissimilar metal piping materials are joined.

Ordering Information:

Specify

1. Model MP 1" (25mm) Residential Riser.
2. NPT (P/N 6501200120) or Metric (P/N 6501200121) Threads for Inlet and Outlet.
3. Support Bracket Kit (P/N 6899190001), if required.

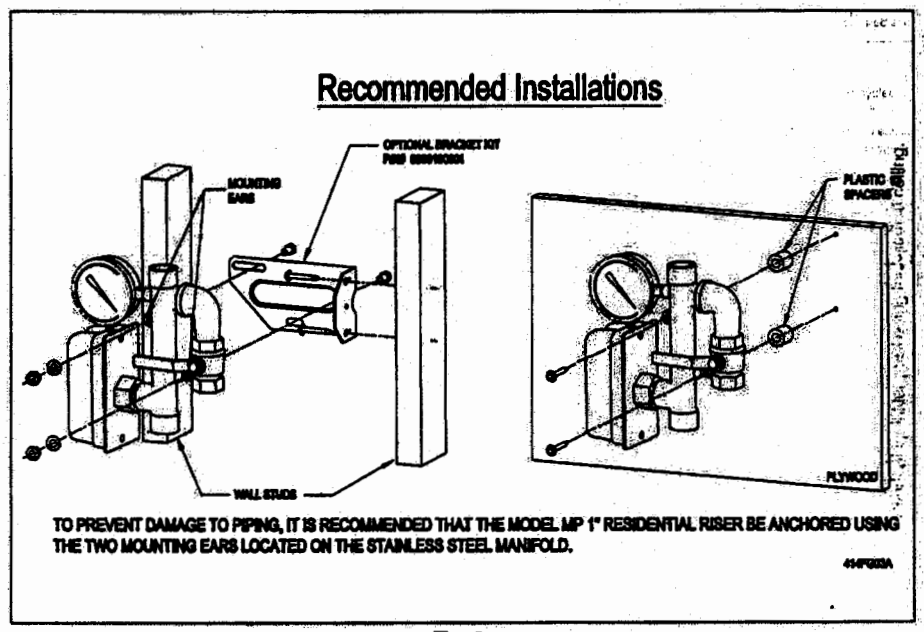


Fig. 3

Manufactured by

Reliable

The Reliable Automatic Sprinkler Co., Inc.

(800) 431-1588 Sales Offices
(800) 848-8051 Sales Fax
(914) 829-2042 Corporate Offices
www.reliablesprinkler.com Internet Address

Recycled Paper

Revision lines indicate updated or new data.

E.G. Printed in USA 08/08 P/N 6899970342

The Reliable Automatic Sprinkler Co., Inc., 103 Fairview Park Drive, Elmsford, New York, 10523

uponor

AQUASAFE® Fire Safety System

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name	:	WILKYS ST - One Head Calculation (H.12)
Drawing	:	RESIDENTIAL
Location	:	PORTLAND ME 04102
Remote Area	:	LOOPED
Contract	:	110308-40L
Data File	:	110308-40L 27 Wilkie Street.wx1

HYDRAULIC DESIGN INFORMATION SHEET

Name - WILKYS ST
Date - 03/16/11
Location - PORTLAND ME 04102
Building - RESIDENTIAL
System No. - LOOPED
Contractor - ALL ASPECTS
Contract No. - 110308-40L
Calculated By - DEVON HUYNH
Drawing No. - 1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ( )NFPA 13 Residential ( )NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: (X)1 ( )2 ( )4 ( )
S ( )Other
T ( )Specific Ruling Made by Date
E
M Listed Flow at Start Point - 17 Gpm System Type
Listed Pres. at Start Point - 12.03Psi (X) Wet ( ) Dry
D MAXIMUM LISTED SPACING 18 x 18 ( ) Deluge ( ) PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model RFC49
I Elevation at Highest Outlet - 128 Feet Size 3/8 K-Factor 4.9
G Note: Temperature Rating 155
N

Calculation Gpm Required 17 Psi Required 56.91 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - x Rated Cap. Cap.
T Time of Test - x @ Psi Elev.
E Static (Psi) - 80 Elev.
R Residual (Psi) - 75 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

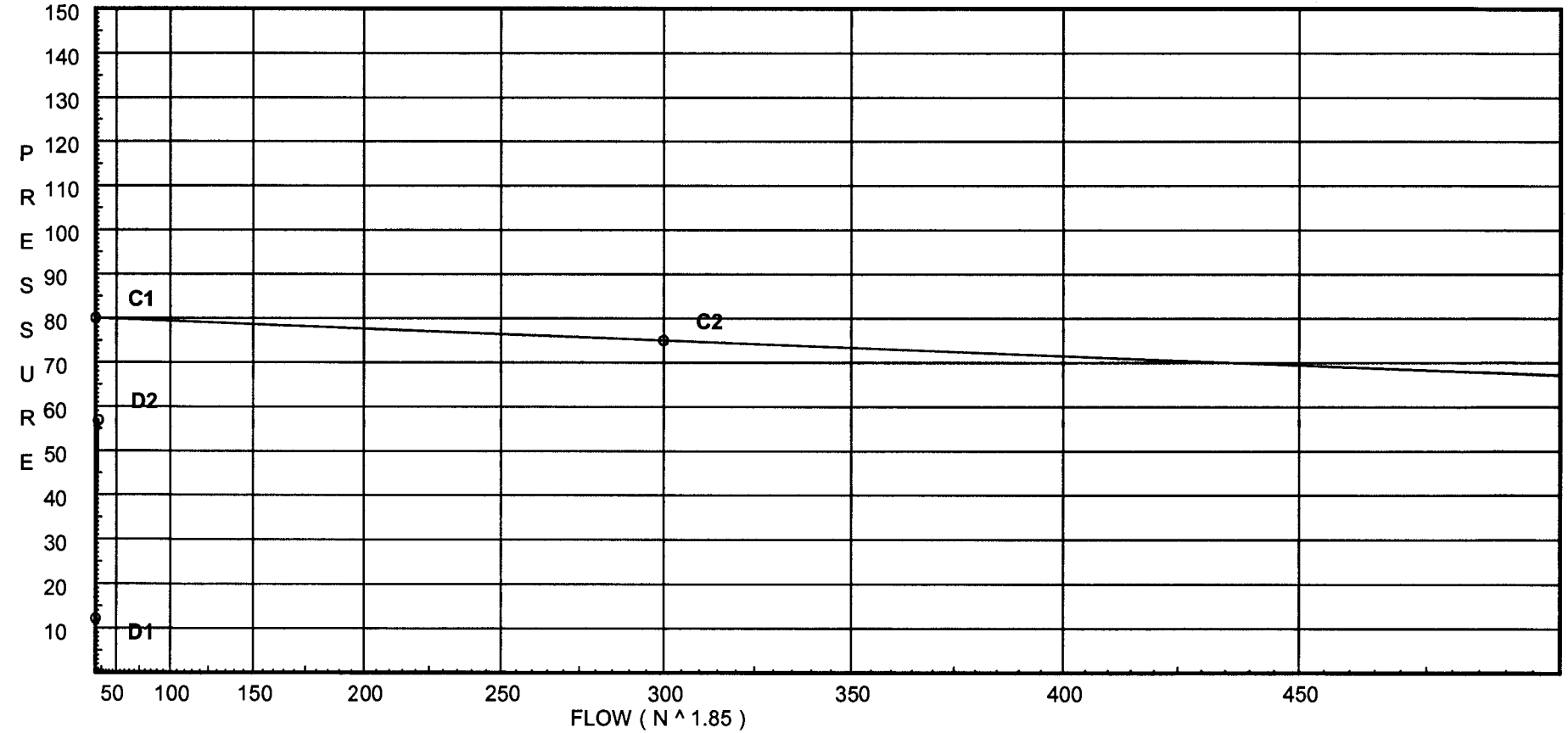
P Location: x
P
L Source of Information: CITY SUPPLY
Y

City Water Supply:

C1 - Static Pressure	:	**80**
C2 - Residual Pressure:		**75**
C2 - Residual Flow	:	**300**

Demand:

D1 - Elevation	:	**12.127**
D2 - System Flow	:	**16.9953**
D2 - System Pressure	:	**56.910**
Hose (Adj City)	:	_____
Hose (Demand)	:	_____
D3 - System Demand	:	**16.9953**
Safety Margin	:	**23.066**



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Utb	Aquapex Tee - Branch	2	6	6	9.08	12.88	13.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr	Aquapex Tee - Run	1	2	2	1.64	2.39	2.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
STR	80.0	75	300.0	79.975	17.0	56.91

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.12	128.0	4.9	12.03	17.0	
T.46	128.0		16.79		
T.36	118.0		21.48		
H.5	118.0		22.07		
H.4	118.0		22.61		
T.32	118.0		22.76		
T.31	118.0		22.92		
T.27	108.0		28.06		
T.28	108.0		28.69		
S.1	104.0		32.08		
MTR	100.0		45.87		
STR	100.0		56.91		
T.43	128.0		13.95		
H.13	128.0		14.31		
H.14	128.0		16.23		
T.44	128.0		16.71		
H.15	128.0		17.21		
T.45	128.0		17.61		
T.34	118.0		22.22		
T.29	108.0		26.75		
T.26	108.0		28.03		
H.19	128.0		17.03		
T.50	128.0		17.46		
T.38	118.0		22.01		
T.33	108.0		26.58		
H.8	108.0		26.98		
H.7	108.0		27.28		
H.2	108.0		27.7		
T.25	108.0		28.03		
H.1	108.0		28.43		
T.47	128.0		17.12		
H.17	128.0		17.31		
H.16	128.0		17.46		
H.18	128.0		17.15		
T.48	128.0		17.17		
H.23	128.0		17.25		
T.51	128.0		17.3		
H.22	128.0		17.32		
H.21	128.0		17.36		
H.24	128.0		17.39		
H.20	128.0		17.42		
H.11	118.0		21.59		

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
T.41	118.0		21.63		
H.10	118.0		21.79		
T.40	118.0		21.89		
T.39	118.0		21.91		
T.37	118.0		22.01		
H.6	118.0		22.12		
T.35	118.0		22.23		
H.9	118.0		21.91		
H.3	108.0		28.03		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H.12	9.64	0.67	1Utb	6.0	18.000	12.030		K Factor = 4.90
to		150.0		0.0	6.000	0.0		
T.46	9.64	0.1982		0.0	24.000	4.756		Vel = 8.77
T.46	-3.69	0.86		0.0	15.000	16.786		
to		150.0		0.0	0.0	4.331		
T.36	5.95	0.0241		0.0	15.000	0.361		Vel = 3.29
T.36	-1.40	0.67	1Utb	6.0	6.000	21.478		
to		150.0		0.0	6.000	0.0		
H.5	4.55	0.0494		0.0	12.000	0.593		Vel = 4.14
H.5	0.0	0.67	1Utr	2.0	9.000	22.071		
to		150.0		0.0	2.000	0.0		
H.4	4.55	0.0494		0.0	11.000	0.543		Vel = 4.14
H.4	0.0	0.67	1Utr	2.0	1.000	22.614		
to		150.0		0.0	2.000	0.0		
T.32	4.55	0.0493		0.0	3.000	0.148		Vel = 4.14
T.32	3.16	0.86	1Utr	2.0	2.000	22.762		
to		150.0		0.0	2.000	0.0		
T.31	7.71	0.0390		0.0	4.000	0.156		Vel = 4.26
T.31	0.0	0.86	1Utb	6.0	15.000	22.918		
to		150.0		0.0	6.000	4.331		
T.27	7.71	0.0389		0.0	21.000	0.816		Vel = 4.26
T.27	6.80	0.86	1Utr	2.0	3.000	28.065		
to		150.0		0.0	2.000	0.0		
T.28	14.51	0.1252		0.0	5.000	0.626		Vel = 8.01
T.28	2.49	0.86	1T	2.871	7.000	28.691		
to		150.0		0.0	2.871	1.732		
S.1	17.0	0.1677		0.0	9.871	1.655		Vel = 9.39
S.1	0.0	0.86	2E	2.297	10.000	32.078		
to		150.0		0.0	2.297	11.732		* Fixed loss = 10
MTR	17.0	0.1678		0.0	12.297	2.063		Vel = 9.39
MTR	0.0	0.911	1E	1.521	10.000	45.873		
to		150.0	1T	3.801	6.082	9.000		* Fixed loss = 9
STR	17.0	0.1267	1G	0.76	16.082	2.037		Vel = 8.37
	0.0							
	17.00					56.910		K Factor = 2.25
H.12	7.35	0.67	1Utr	2.0	14.000	12.030		
to		150.0		0.0	2.000	0.0		
T.43	7.35	0.1201		0.0	16.000	1.921		Vel = 6.69
T.43	0.0	0.67	1Utr	2.0	1.000	13.951		
to		150.0		0.0	2.000	0.0		
H.13	7.35	0.1200		0.0	3.000	0.360		Vel = 6.69
H.13	0.0	0.67	1Utr	2.0	14.000	14.311		
to		150.0		0.0	2.000	0.0		
H.14	7.35	0.1201		0.0	16.000	1.922		Vel = 6.69
H.14	0.0	0.67	1Utr	2.0	2.000	16.233		
to		150.0		0.0	2.000	0.0		
T.44	7.35	0.1200		0.0	4.000	0.480		Vel = 6.69
T.44	-3.81	0.67	1Utb	6.0	10.000	16.713		
to		150.0		0.0	6.000	0.0		
H.15	3.54	0.0311		0.0	16.000	0.497		Vel = 3.22

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******** Notes *******
H.15	0.0	0.67	1Utr	2.0	5.000	17.210		
to		150.0	1Utb	6.0	8.000	0.0		
T.45	3.54	0.0312		0.0	13.000	0.405		Vel = 3.22
T.45	2.28	0.86		0.0	12.000	17.615		
to		150.0		0.0	0.0	4.331		
T.34	5.82	0.0230		0.0	12.000	0.276		Vel = 3.21
T.34	-1.34	0.86	1Utr	2.0	12.000	22.222		
to		150.0		0.0	2.000	4.331		
T.29	4.48	0.0143		0.0	14.000	0.200		Vel = 2.47
T.29	1.87	0.67	2Utb	12.0	2.000	26.753		
to		150.0		0.0	12.000	0.0		
T.26	6.35	0.0915		0.0	14.000	1.281		Vel = 5.78
T.26	0.45	0.86		0.0	1.000	28.034		
to		150.0		0.0	0.0	0.0		
T.27	6.8	0.0310		0.0	1.000	0.031		Vel = 3.76
	0.0							
	6.80					28.065		K Factor = 1.28
T.44	3.81	0.67	1Utr	2.0	7.000	16.713		
to		150.0		0.0	2.000	0.0		
H.19	3.81	0.0356		0.0	9.000	0.320		Vel = 3.47
H.19	0.0	0.67	1Utr	2.0	10.000	17.033		
to		150.0		0.0	2.000	0.0		
T.50	3.81	0.0356		0.0	12.000	0.427		Vel = 3.47
T.50	1.06	0.86		0.0	13.000	17.460		
to		150.0		0.0	0.0	4.331		
T.38	4.87	0.0166		0.0	13.000	0.216		Vel = 2.69
T.38	-0.07	0.86	1Utr	2.0	13.000	22.007		
to		150.0		0.0	2.000	4.331		
T.33	4.8	0.0162		0.0	15.000	0.243		Vel = 2.65
T.33	-1.86	0.67	1Utr	2.0	10.000	26.581		
to		150.0	1Utb	6.0	8.000	0.0		
H.8	2.94	0.0219		0.0	18.000	0.395		Vel = 2.68
H.8	0.0	0.67		0.0	14.000	26.976		
to		150.0		0.0	0.0	0.0		
H.7	2.94	0.0220		0.0	14.000	0.308		Vel = 2.68
H.7	0.0	0.67	1Utr	2.0	17.000	27.284		
to		150.0		0.0	2.000	0.0		
H.2	2.94	0.0219		0.0	19.000	0.417		Vel = 2.68
H.2	0.0	0.67	1Utr	2.0	13.000	27.701		
to		150.0		0.0	2.000	0.0		
T.25	2.94	0.0219		0.0	15.000	0.329		Vel = 2.68
T.25	-0.46	0.67	1Utr	2.0	17.000	28.030		
to		150.0	1Utb	6.0	8.000	0.0		
H.1	2.48	0.0161		0.0	25.000	0.403		Vel = 2.26
H.1	0.0	0.67	1Utb	6.0	10.000	28.433		
to		150.0		0.0	6.000	0.0		
T.28	2.48	0.0161		0.0	16.000	0.258		Vel = 2.26
	0.0							

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
	2.48					28.691		K Factor = 0.46		
T.46	3.70	0.67	1Utb	6.0	2.000	16.786				
to		150.0	1Utr	2.0	8.000	0.0				
T.47	3.7	0.0336		0.0	10.000	0.336		Vel = 3.37		
T.47	-1.43	0.67	1Utb	6.0	8.000	17.122				
to		150.0		0.0	6.000	0.0				
H.17	2.27	0.0137		0.0	14.000	0.192		Vel = 2.07		
H.17	0.0	0.67	1Utr	2.0	9.000	17.314				
to		150.0		0.0	2.000	0.0				
H.16	2.27	0.0136		0.0	11.000	0.150		Vel = 2.07		
H.16	0.0	0.67	1Utr	2.0	3.000	17.464				
to		150.0	1Utb	6.0	8.000	0.0				
T.45	2.27	0.0137		0.0	11.000	0.151		Vel = 2.07		
	0.0									
	2.27					17.615		K Factor = 0.54		
T.47	1.42	0.67	1Utr	2.0	3.000	17.122				
to		150.0		0.0	2.000	0.0				
H.18	1.42	0.0058		0.0	5.000	0.029		Vel = 1.29		
H.18	0.0	0.67	1Utr	2.0	1.000	17.151				
to		150.0		0.0	2.000	0.0				
T.48	1.42	0.0057		0.0	3.000	0.017		Vel = 1.29		
T.48	0.0	0.67	1Utr	2.0	12.000	17.168				
to		150.0		0.0	2.000	0.0				
H.23	1.42	0.0057		0.0	14.000	0.080		Vel = 1.29		
H.23	0.0	0.67	1Utr	2.0	7.000	17.248				
to		150.0		0.0	2.000	0.0				
T.51	1.42	0.0058		0.0	9.000	0.052		Vel = 1.29		
T.51	-0.36	0.67	1Utb	6.0	1.000	17.300				
to		150.0		0.0	6.000	0.0				
H.22	1.06	0.0034		0.0	7.000	0.024		Vel = 0.96		
H.22	0.0	0.67	1Utr	2.0	10.000	17.324				
to		150.0		0.0	2.000	0.0				
H.21	1.06	0.0033		0.0	12.000	0.040		Vel = 0.96		
H.21	0.0	0.67		0.0	9.000	17.364				
to		150.0		0.0	0.0	0.0				
H.24	1.06	0.0033		0.0	9.000	0.030		Vel = 0.96		
H.24	0.0	0.67	1Utr	2.0	6.000	17.394				
to		150.0		0.0	2.000	0.0				
H.20	1.06	0.0032		0.0	8.000	0.026		Vel = 0.96		
H.20	0.0	0.67	1Utr	2.0	4.000	17.420				
to		150.0	1Utb	6.0	8.000	0.0				
T.50	1.06	0.0033		0.0	12.000	0.040		Vel = 0.96		
	0.0									
	1.06					17.460		K Factor = 0.25		
T.36	1.40	0.67	1Utr	2.0	13.000	21.478				
to		150.0	1Utb	6.0	8.000	0.0				
H.11	1.4	0.0055		0.0	21.000	0.116		Vel = 1.27		
H.11	0.0	0.67	1Utb	6.0	1.000	21.594				
to		150.0		0.0	6.000	0.0				
T.41	1.4	0.0056		0.0	7.000	0.039		Vel = 1.27		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
T.41	0.36	0.67	1Utb	6.0	12.000	21.633				
to		150.0		0.0	6.000	0.0				
H.10	1.76	0.0085		0.0	18.000	0.153		Vel = 1.60		
H.10	0.0	0.67	1Utr	2.0	10.000	21.786				
to		150.0		0.0	2.000	0.0				
T.40	1.76	0.0085		0.0	12.000	0.102		Vel = 1.60		
T.40	-0.79	0.67	1Utb	6.0	1.000	21.888				
to		150.0	1Utr	2.0	8.000	0.0				
T.39	0.97	0.0029		0.0	9.000	0.026		Vel = 0.88		
T.39	0.79	0.67	1Utb	6.0	3.000	21.914				
to		150.0	1Utr	2.0	8.000	0.0				
T.37	1.76	0.0085		0.0	11.000	0.093		Vel = 1.60		
T.37	0.06	0.67	1Utb	6.0	6.000	22.007				
to		150.0		0.0	6.000	0.0				
H.6	1.82	0.0091		0.0	12.000	0.109		Vel = 1.66		
H.6	0.0	0.67	1Utr	2.0	5.000	22.116				
to		150.0	1Utb	6.0	8.000	0.0				
T.35	1.82	0.0091		0.0	13.000	0.118		Vel = 1.66		
T.35	1.34	0.67	2Utb	12.0	9.000	22.234				
to		150.0		0.0	12.000	0.0				
T.32	3.16	0.0251		0.0	21.000	0.528		Vel = 2.88		
	0.0									
	3.16					22.762		K Factor = 0.66		
T.51	0.36	0.86		0.0	13.000	17.300				
to		150.0		0.0	0.0	4.331				
T.41	0.36	0.0002		0.0	13.000	0.002		Vel = 0.20		
	0.0									
	0.36					21.633		K Factor = 0.08		
T.40	0.79	0.67	1Utr	2.0	2.000	21.888				
to		150.0	1Utb	6.0	8.000	0.0				
H.9	0.79	0.0020		0.0	10.000	0.020		Vel = 0.72		
H.9	0.0	0.67		0.0	3.000	21.908				
to		150.0		0.0	0.0	0.0				
T.39	0.79	0.0020		0.0	3.000	0.006		Vel = 0.72		
	0.0									
	0.79					21.914		K Factor = 0.17		
T.38	0.06	0.86	1Utb	6.0	3.000	22.007				
to		150.0		0.0	6.000	0.0				
T.37	0.06	0.0		0.0	9.000	0.0		Vel = 0.03		
	0.0									
	0.06					22.007		K Factor = 0.01		
T.34	1.34	0.86	1Utb	6.0	2.000	22.222				
to		150.0		0.0	6.000	0.0				
T.35	1.34	0.0015		0.0	8.000	0.012		Vel = 0.74		
	0.0									
	1.34					22.234		K Factor = 0.28		
T.33	1.87	0.67	2Utb	12.0	6.000	26.581				
to		150.0		0.0	12.000	0.0				
T.29	1.87	0.0096		0.0	18.000	0.172		Vel = 1.70		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
	0.0									
	1.87					26.753		K Factor = 0.36		
T.25	0.45	0.67		0.0	1.000	28.030				
to		150.0		0.0	0.0	0.0				
H.3	0.45	0.0010		0.0	1.000	0.001		Vel = 0.41		
H.3	0.0	0.67	1Utr	2.0	2.000	28.031				
to		150.0		0.0	2.000	0.0				
T.26	0.45	0.0008		0.0	4.000	0.003		Vel = 0.41		
	0.0									
	0.45					28.034		K Factor = 0.08		

uponor

AQUASAFE® Fire Safety System

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name	:	WILKYS ST - Two Head Calculation (H.21 & H.22)
Drawing	:	RESIDENTIAL
Location	:	PORTLAND ME 04102
Remote Area	:	LOOPED
Contract	:	110308-40L
Data File	:	110308-40L 27 Wilkie Street.wx2

HYDRAULIC DESIGN INFORMATION SHEET

Name - WILKYS ST
Date - 03/16/11
Location - PORTLAND ME 04102
Building - RESIDENTIAL
System No. - LOOPED
Contractor - ALL ASPECTS
Contract No. - 110308-40L
Calculated By - DEVON HUYNH
Drawing No. - 1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL

SYSTEM

Type of Calculation: ( )NFPA 13 Residential ( )NFPA 13R (X)NFPA 13D
Number of Sprinklers Flowing: ( )1 (X)2 ( )4 ( )
( )Other
( )Specific Ruling Made by Date

Listed Flow at Start Point - 13 Gpm System Type
Listed Pres. at Start Point - 7.04 Psi (X) Wet ( ) Dry
MAXIMUM LISTED SPACING 16 x 16 ( ) Deluge ( ) PreAction
Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
Additional Flow Added - Gpm Make RELIABLE Model RFC49
Elevation at Highest Outlet - 128 Feet Size 3/8 K-Factor 4.9
Note: Temperature Rating 155

Calculation Summary: Gpm Required 26.2235 Psi Required 63.59 At Ref Pt STR
C-Factor Used: Overhead 150 Underground 150

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - x	Rated Cap.	Cap.
Time of Test - x	@ Psi	Elev.
Static (Psi) - 80	Elev.	
Residual (Psi) - 75	Other	Well
Flow (Gpm) - 300		Proof Flow Gpm
Elevation - 100		

SUPPLY

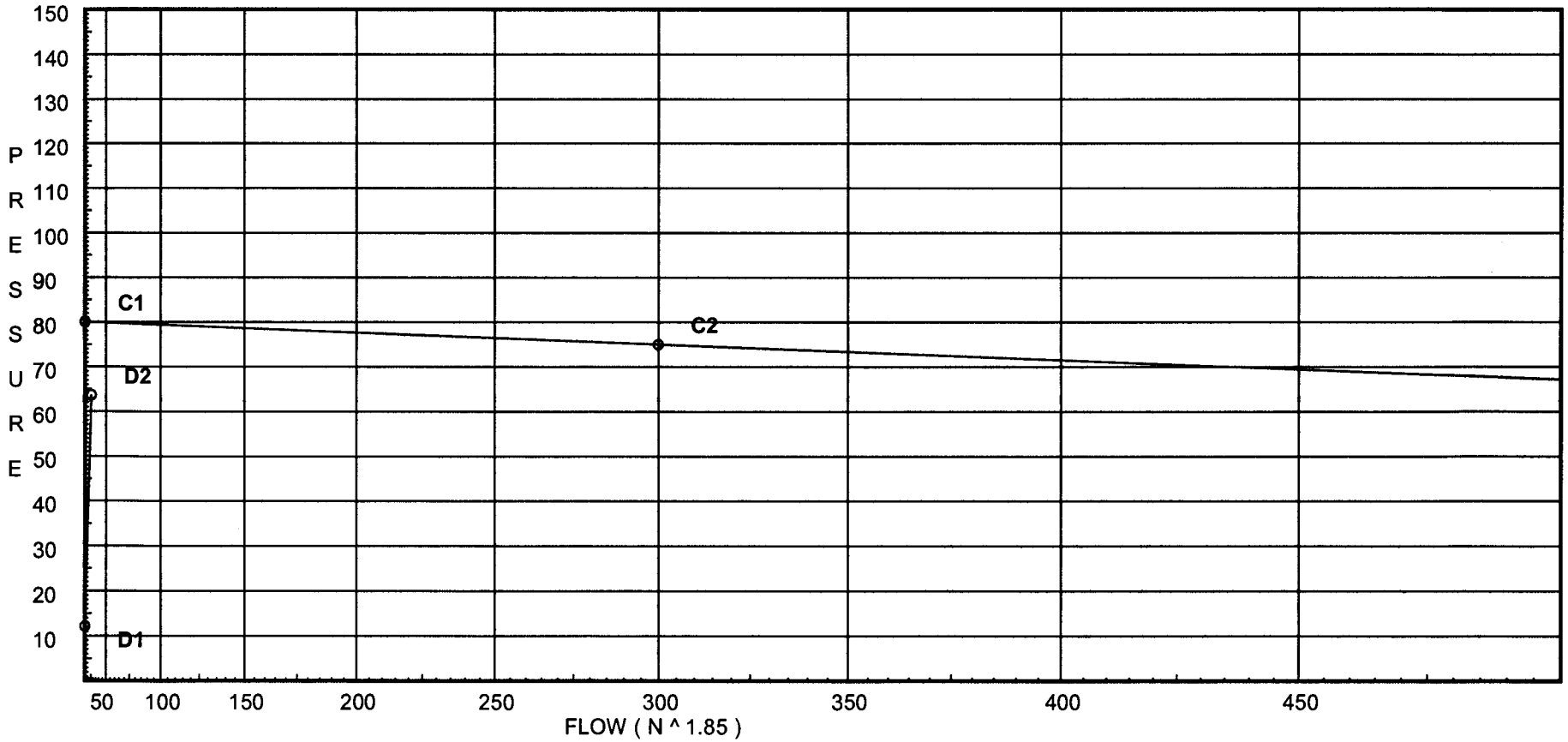
Location: x

Source of Information: CITY SUPPLY

City Water Supply:
- **C1 - Static Pressure : 80**
- **C2 - Residual Pressure: 75**
- **C2 - Residual Flow : 300**

Demand:

D1 - Elevation	**12.127**
D2 - System Flow	**26.2235**
D2 - System Pressure	**63.591**
Hose (Adj City)	_____
Hose (Demand)	_____
D3 - System Demand	**26.2235**
Safety Margin	**16.354**



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Utb	Aquapex Tee - Branch	2	6	6	9.08	12.88	13.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr	Aquapex Tee - Run	1	2	2	1.64	2.39	2.39	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Flow Summary - NFPA 2007

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
STR	80.0	75	300.0	79.945	26.22	63.591

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.21	128.0	4.9	7.04	13.0	
H.24	128.0		9.02		
H.20	128.0		10.78		
T.50	128.0		13.42		
T.38	118.0		18.27		
T.33	108.0		23.31		
H.8	108.0		24.26		
H.7	108.0		25.0		
H.2	108.0		26.01		
T.25	108.0		26.81		
H.1	108.0		27.71		
T.28	108.0		28.29		
S.1	104.0		33.72		
MTR	100.0		50.05		
STR	100.0		63.59		
H.22	128.0	4.9	7.28	13.22	
T.51	128.0		10.83		
T.41	118.0		15.99		
H.10	118.0		16.92		
T.40	118.0		17.55		
T.39	118.0		17.7		
T.37	118.0		18.27		
H.6	118.0		18.75		
T.35	118.0		19.26		
T.32	118.0		20.48		
T.31	118.0		20.81		
T.27	108.0		26.89		
H.23	128.0		11.57		
T.48	128.0		12.71		
H.18	128.0		12.96		
T.47	128.0		13.37		
H.17	128.0		13.82		
H.16	128.0		14.18		
T.45	128.0		14.54		
T.34	118.0		19.26		
T.29	108.0		23.94		
T.26	108.0		26.82		
H.11	118.0		16.46		
T.36	118.0		17.87		
H.5	118.0		19.07		
H.4	118.0		20.18		
H.9	118.0		17.66		

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
T.46	128.0		13.51		
H.12	128.0		13.59		
T.43	128.0		13.64		
H.13	128.0		13.65		
H.14	128.0		13.7		
T.44	128.0		13.72		
H.15	128.0		14.17		
H.19	128.0		13.59		
H.3	108.0		26.81		

Final Calculations - Hazen-Williams

Uponor
WILKYS ST - Two Head Calculation (H.21 & H.22)

Date 3/16/2011

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
H.21	10.20	0.67		0.0	9.000	7.040		K Factor = 4.90
to		150.0		0.0	0.0	0.0		
H.24	10.2	0.2199		0.0	9.000	1.979		Vel = 9.28
H.24	0.0	0.67	1Utr	2.0	6.000	9.019		
to		150.0		0.0	2.000	0.0		
H.20	10.2	0.2200		0.0	8.000	1.760		Vel = 9.28
H.20	0.0	0.67	1Utr	2.0	4.000	10.779		
to		150.0	1Utb	6.0	8.000	0.0		
T.50	10.2	0.2199		0.0	12.000	2.639		Vel = 9.28
T.50	-2.32	0.86		0.0	13.000	13.418		
to		150.0		0.0	0.0	4.331		
T.38	7.88	0.0405		0.0	13.000	0.526		Vel = 4.35
T.38	0.63	0.86	1Utr	2.0	13.000	18.275		
to		150.0		0.0	2.000	4.331		
T.33	8.51	0.0467		0.0	15.000	0.700		Vel = 4.70
T.33	-3.78	0.67	1Utr	2.0	10.000	23.306		
to		150.0	1Utb	6.0	8.000	0.0		
H.8	4.73	0.0531		0.0	18.000	0.956		Vel = 4.30
H.8	0.0	0.67		0.0	14.000	24.262		
to		150.0		0.0	0.0	0.0		
H.7	4.73	0.0531		0.0	14.000	0.743		Vel = 4.30
H.7	0.0	0.67	1Utr	2.0	17.000	25.005		
to		150.0		0.0	2.000	0.0		
H.2	4.73	0.0531		0.0	19.000	1.009		Vel = 4.30
H.2	0.0	0.67	1Utr	2.0	13.000	26.014		
to		150.0		0.0	2.000	0.0		
T.25	4.73	0.0531		0.0	15.000	0.796		Vel = 4.30
T.25	-0.89	0.67	1Utr	2.0	17.000	26.810		
to		150.0	1Utb	6.0	8.000	0.0		
H.1	3.84	0.0361		0.0	25.000	0.903		Vel = 3.49
H.1	0.0	0.67	1Utb	6.0	10.000	27.713		
to		150.0		0.0	6.000	0.0		
T.28	3.84	0.0361		0.0	16.000	0.577		Vel = 3.49
T.28	22.38	0.86	1T	2.871	7.000	28.290		
to		150.0		0.0	2.871	1.732		
S.1	26.22	0.3741		0.0	9.871	3.693		Vel = 14.48
S.1	0.0	0.86	2E	2.297	10.000	33.715		
to		150.0		0.0	2.297	11.732		* Fixed loss = 10
MTR	26.22	0.3741		0.0	12.297	4.600		Vel = 14.48
MTR	0.0	0.911	1E	1.521	10.000	50.047		
to		150.0	1T	3.801	6.082	9.000		* Fixed loss = 9
STR	26.22	0.2826	1G	0.76	16.082	4.544		Vel = 12.91
	0.0							
	26.22					63.591		K Factor = 3.29
H.21	2.80	0.67	1Utr	2.0	10.000	7.040		
to		150.0		0.0	2.000	0.0		
H.22	2.8	0.0202		0.0	12.000	0.242		Vel = 2.55
H.22	13.22	0.67	1Utb	6.0	1.000	7.282		K Factor = 4.90
to		150.0		0.0	6.000	0.0		
T.51	16.02	0.5071		0.0	7.000	3.550		Vel = 14.58

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
T.51	-5.97	0.86		0.0	13.000	10.832		
to		150.0		0.0	0.0	4.331		
T.41	10.05	0.0634		0.0	13.000	0.824		Vel = 5.55
T.41	-5.37	0.67	1Utb	6.0	12.000	15.987		
to		150.0		0.0	6.000	0.0		
H.10	4.68	0.0519		0.0	18.000	0.935		Vel = 4.26
H.10	0.0	0.67	1Utr	2.0	10.000	16.922		
to		150.0		0.0	2.000	0.0		
T.40	4.68	0.0520		0.0	12.000	0.624		Vel = 4.26
T.40	-2.11	0.67	1Utb	6.0	1.000	17.546		
to		150.0	1Utr	2.0	8.000	0.0		
T.39	2.57	0.0171		0.0	9.000	0.154		Vel = 2.34
T.39	2.11	0.67	1Utb	6.0	3.000	17.700		
to		150.0	1Utr	2.0	8.000	0.0		
T.37	4.68	0.0519		0.0	11.000	0.571		Vel = 4.26
T.37	-0.64	0.67	1Utb	6.0	6.000	18.271		
to		150.0		0.0	6.000	0.0		
H.6	4.04	0.0397		0.0	12.000	0.476		Vel = 3.68
H.6	0.0	0.67	1Utr	2.0	5.000	18.747		
to		150.0	1Utb	6.0	8.000	0.0		
T.35	4.04	0.0397		0.0	13.000	0.516		Vel = 3.68
T.35	0.92	0.67	2Utb	12.0	9.000	19.263		
to		150.0		0.0	12.000	0.0		
T.32	4.96	0.0580		0.0	21.000	1.218		Vel = 4.51
T.32	6.68	0.86	1Utr	2.0	2.000	20.481		
to		150.0		0.0	2.000	0.0		
T.31	11.64	0.0832		0.0	4.000	0.333		Vel = 6.43
T.31	0.0	0.86	1Utb	6.0	15.000	20.814		
to		150.0		0.0	6.000	4.331		
T.27	11.64	0.0833		0.0	21.000	1.749		Vel = 6.43
T.27	10.74	0.86	1Utr	2.0	3.000	26.894		
to		150.0		0.0	2.000	0.0		
T.28	22.38	0.2792		0.0	5.000	1.396		Vel = 12.36
	0.0							
	22.38					28.290		K Factor = 4.21
T.51	5.98	0.67	1Utr	2.0	7.000	10.832		
to		150.0		0.0	2.000	0.0		
H.23	5.98	0.0818		0.0	9.000	0.736		Vel = 5.44
H.23	0.0	0.67	1Utr	2.0	12.000	11.568		
to		150.0		0.0	2.000	0.0		
T.48	5.98	0.0819		0.0	14.000	1.146		Vel = 5.44
T.48	0.0	0.67	1Utr	2.0	1.000	12.714		
to		150.0		0.0	2.000	0.0		
H.18	5.98	0.0817		0.0	3.000	0.245		Vel = 5.44
H.18	0.0	0.67	1Utr	2.0	3.000	12.959		
to		150.0		0.0	2.000	0.0		
T.47	5.98	0.0818		0.0	5.000	0.409		Vel = 5.44
T.47	-2.35	0.67	1Utb	6.0	8.000	13.368		
to		150.0		0.0	6.000	0.0		
H.17	3.63	0.0325		0.0	14.000	0.455		Vel = 3.30

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
H.17	0.0	0.67	1Utr	2.0	9.000	13.823				
to		150.0		0.0	2.000	0.0				
H.16	3.63	0.0325		0.0	11.000	0.357		Vel = 3.30		
H.16	0.0	0.67	1Utr	2.0	3.000	14.180				
to		150.0	1Utb	6.0	8.000	0.0				
T.45	3.63	0.0325		0.0	11.000	0.357		Vel = 3.30		
T.45	3.36	0.86		0.0	12.000	14.537				
to		150.0		0.0	0.0	4.331				
T.34	6.99	0.0324		0.0	12.000	0.389		Vel = 3.86		
T.34	-0.92	0.86	1Utr	2.0	12.000	19.257				
to		150.0		0.0	2.000	4.331				
T.29	6.07	0.0249		0.0	14.000	0.349		Vel = 3.35		
T.29	3.78	0.67	2Utb	12.0	2.000	23.937				
to		150.0		0.0	12.000	0.0				
T.26	9.85	0.2061		0.0	14.000	2.886		Vel = 8.96		
T.26	0.89	0.86		0.0	1.000	26.823				
to		150.0		0.0	0.0	0.0				
T.27	10.74	0.0710		0.0	1.000	0.071		Vel = 5.93		
	0.0									
	10.74					26.894		K Factor = 2.07		
T.41	5.37	0.67	1Utb	6.0	1.000	15.987				
to		150.0		0.0	6.000	0.0				
H.11	5.37	0.0671		0.0	7.000	0.470		Vel = 4.89		
H.11	0.0	0.67	1Utr	2.0	13.000	16.457				
to		150.0	1Utb	6.0	8.000	0.0				
T.36	5.37	0.0671		0.0	21.000	1.410		Vel = 4.89		
T.36	1.31	0.67	1Utb	6.0	6.000	17.867				
to		150.0		0.0	6.000	0.0				
H.5	6.68	0.1006		0.0	12.000	1.207		Vel = 6.08		
H.5	0.0	0.67	1Utr	2.0	9.000	19.074				
to		150.0		0.0	2.000	0.0				
H.4	6.68	0.1005		0.0	11.000	1.105		Vel = 6.08		
H.4	0.0	0.67	1Utr	2.0	1.000	20.179				
to		150.0		0.0	2.000	0.0				
T.32	6.68	0.1007		0.0	3.000	0.302		Vel = 6.08		
	0.0									
	6.68					20.481		K Factor = 1.48		
T.40	2.11	0.67	1Utr	2.0	2.000	17.546				
to		150.0	1Utb	6.0	8.000	0.0				
H.9	2.11	0.0118		0.0	10.000	0.118		Vel = 1.92		
H.9	0.0	0.67		0.0	3.000	17.664				
to		150.0		0.0	0.0	0.0				
T.39	2.11	0.0120		0.0	3.000	0.036		Vel = 1.92		
	0.0									
	2.11					17.700		K Factor = 0.50		
T.47	2.35	0.67	1Utb	6.0	2.000	13.368				
to		150.0	1Utr	2.0	8.000	0.0				
T.46	2.35	0.0146		0.0	10.000	0.146		Vel = 2.14		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
T.46	-1.31	0.67	1Utb	6.0	18.000	13.514				
to		150.0		0.0	6.000	0.0				
H.12	1.04	0.0032		0.0	24.000	0.078		Vel = 0.95		
H.12	0.0	0.67	1Utr	2.0	14.000	13.592				
to		150.0		0.0	2.000	0.0				
T.43	1.04	0.0032		0.0	16.000	0.051		Vel = 0.95		
T.43	0.0	0.67	1Utr	2.0	1.000	13.643				
to		150.0		0.0	2.000	0.0				
H.13	1.04	0.0033		0.0	3.000	0.010		Vel = 0.95		
H.13	0.0	0.67	1Utr	2.0	14.000	13.653				
to		150.0		0.0	2.000	0.0				
H.14	1.04	0.0032		0.0	16.000	0.051		Vel = 0.95		
H.14	0.0	0.67	1Utr	2.0	2.000	13.704				
to		150.0		0.0	2.000	0.0				
T.44	1.04	0.0032		0.0	4.000	0.013		Vel = 0.95		
T.44	2.32	0.67	1Utb	6.0	10.000	13.717				
to		150.0		0.0	6.000	0.0				
H.15	3.36	0.0283		0.0	16.000	0.453		Vel = 3.06		
H.15	0.0	0.67	1Utr	2.0	5.000	14.170				
to		150.0	1Utb	6.0	8.000	0.0				
T.45	3.36	0.0282		0.0	13.000	0.367		Vel = 3.06		
	0.0									
	3.36					14.537		K Factor = 0.88		
T.50	2.32	0.67	1Utr	2.0	10.000	13.418				
to		150.0		0.0	2.000	0.0				
H.19	2.32	0.0142		0.0	12.000	0.171		Vel = 2.11		
H.19	0.0	0.67	1Utr	2.0	7.000	13.589				
to		150.0		0.0	2.000	0.0				
T.44	2.32	0.0142		0.0	9.000	0.128		Vel = 2.11		
	0.0									
	2.32					13.717		K Factor = 0.63		
T.46	1.31	0.86		0.0	15.000	13.514				
to		150.0		0.0	0.0	4.331				
T.36	1.31	0.0015		0.0	15.000	0.022		Vel = 0.72		
	0.0									
	1.31					17.867		K Factor = 0.31		
T.37	0.64	0.86	1Utb	6.0	3.000	18.271				
to		150.0		0.0	6.000	0.0				
T.38	0.64	0.0004		0.0	9.000	0.004		Vel = 0.35		
	0.0									
	0.64					18.275		K Factor = 0.15		
T.33	3.78	0.67	2Utb	12.0	6.000	23.306				
to		150.0		0.0	12.000	0.0				
T.29	3.78	0.0351		0.0	18.000	0.631		Vel = 3.44		
	0.0									
	3.78					23.937		K Factor = 0.77		
T.34	0.92	0.86	1Utb	6.0	2.000	19.257				
to		150.0		0.0	6.000	0.0				
T.35	0.92	0.0008		0.0	8.000	0.006		Vel = 0.51		

Final Calculations - Hazen-Williams

Uponor
WILKYS ST - Two Head Calculation (H.21 & H.22)

Date 3/16/2011

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
	0.0									
	0.92					19.263		K Factor = 0.21		
T.25	0.89	0.67		0.0	1.000	26.810				
to		150.0		0.0	0.0	0.0				
H.3	0.89	0.0030		0.0	1.000	0.003		Vel = 0.81		
H.3	0.0	0.67	1Utr	2.0	2.000	26.813				
to		150.0		0.0	2.000	0.0				
T.26	0.89	0.0025		0.0	4.000	0.010		Vel = 0.81		
	0.0									
	0.89					26.823		K Factor = 0.17		