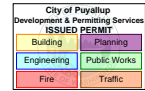




FIRE SPRINKLER EQUIPMENT INDEX

PROJECT INFORMATION:BRADLEY HEIGHTS APARTMENTS (E)
206 27TH AVE SE
PUYALLUP, WA 98374

12/3/2025

SFS PROJECT NUMBER: **TC25207****VALVES**

NO.	MANUFACTURER	SIZE	MODEL	DESCRIPTION
1	WILKINS	2"	950XLTDABFSS	DOUBLE CHECK DETECTOR BACKFLOW ASSEMBLY
2	AGF	2"	8241R	13R RISER WITH TEST AND DRAIN
3	ALEUM	2"	DGC	SWING CHECK VALVE

SPRINKLERS

NO.	MANUFACTURER	SIZE	MODEL	DESCRIPTION
4	RELIABLE	5.6K	F1FR56	QUICK RESPONSE SSU SPRINKLERS
5	RELIABLE	5.6K	F3QR56	DRY HSW SPRINKLERS
6	RELIABLE	4.9K	F1RES49	WHITE SEMI REC. RESIDENTIAL SPRINKLERS
7	RELIABLE	5.6K	DH56	EXT. COV. DRY HSWL SPRINKLER
8	TYCO	5.6K	DS1	EXT. COV. DRY HSWL SPRINKLER

HANGERS AND BRACING

NO.	MANUFACTURER	SIZE	MODEL	DESCRIPTION
9	AFCON	1" - 2"	551	SIDE MOUNT CPVC HANGER
10	TOLCO	1" - 2"	28M	OFFSET CPVC HANGER
11	TOLCO	1"	200	HANGER RING

PIPE AND FITTINGS

NO.	MANUFACTURER	SIZE	MODEL	DESCRIPTION
12	TYCO GRINNELL	2"	577	RIGID PIPE COUPLING
13	HILTI	N/A	FS-ONE	FIRE STOPPING SEALANT
14	STATE	2"	SCH 40	STEEL SPRINKLER PIPE
15	IPEX	1" - 2"	BLAZEMASTER	CPVC PIPE W/ COMPATIBILITY DOCS

MISC. EQUIPMENT

NO.	MANUFACTURER	SIZE	MODEL	DESCRIPTION
16	RELIABLE	12 HEAD	RHB1	SPARE HEAD CABINET

Application

Designed for installation on potable water connections in fire sprinkler systems to protect against both backsiphonage and backpressure of polluted water into the potable water supply. Model 950XLTDABF shall provide protection where a potential health hazard does not exist. Incorporates metered by-pass to detect leaks and unauthorized water use.

Standards Compliance

- UL® Classified (horizontal & vertical)
- C-UL® Classified (horizontal & vertical)
- ASSE Listed 1048 (horizontal & vertical)
- AWWA Compliant C510 (horizontal & vertical)
- Approved by the Foundation for Cross Connection
- Control and Hydraulic Research at the University of Southern California (horizontal & vertical)

Materials

Main valve body Cast Bronze ASTM B 584
 Access covers Cast Bronze ASTM B 584
 Fasteners Stainless Steel, 300 Series
 Elastomers Silicone (FDA approved)
 Buna Nitrile (FDA approved)
 Polymers Noryl™, NSF Listed
 Springs Stainless Steel, 300 series
 Test cock cover Plastic

Features

Sizes: 2"
 Maximum working water pressure 175 PSI
 Maximum working water temperature 180°F
 Hydrostatic test pressure 350 PSI
 End connections (Threaded) ANSI B1.20.1



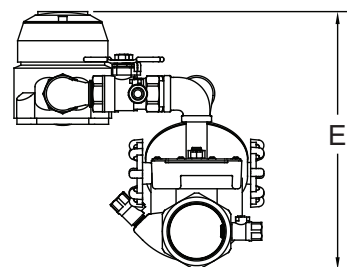
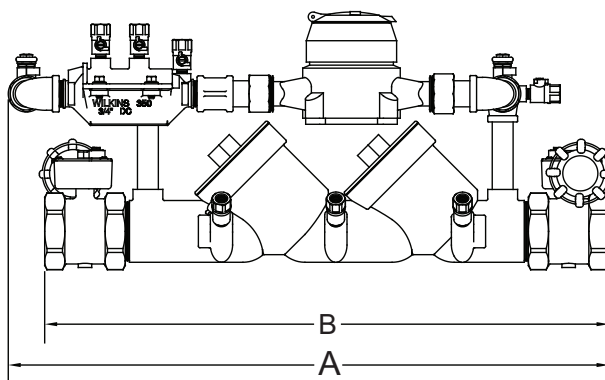
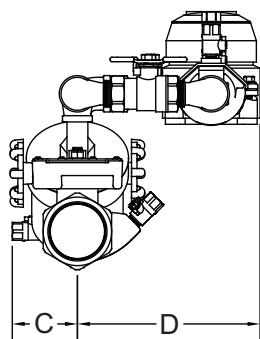
950XLTDABFSS

Options (suffixes can be combined)

- ☐ SS - with butterfly valve supervisory switches (UL and FM Approved for indoor and outdoor use)
- ☐ LM - less water meter
- ☐ - with gal meter (standard)
- ☐ CFM - with cu ft meter

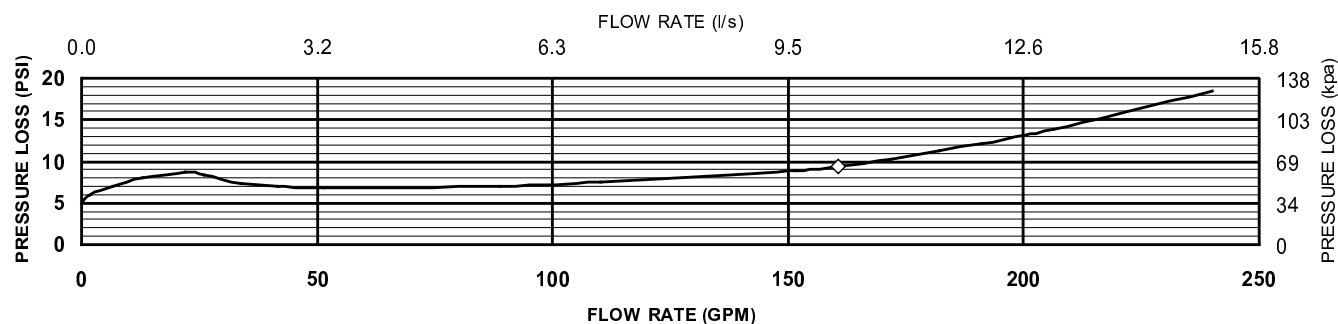
Accessories

- ☐ Repair kit (rubber only)
- ☐ Test Cock Lock (Model TCL24)
- ☐ QT-SET quick test fitting set

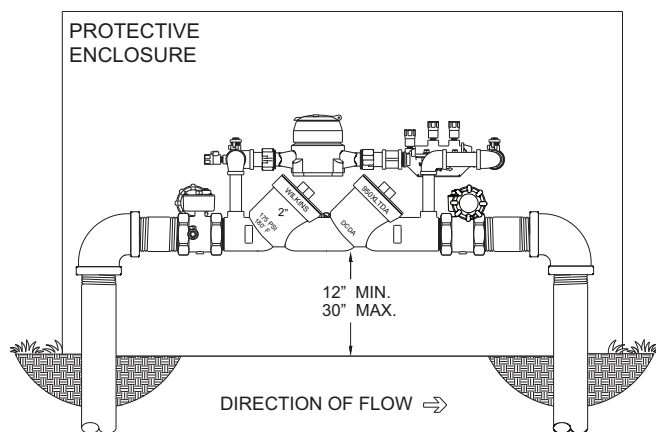
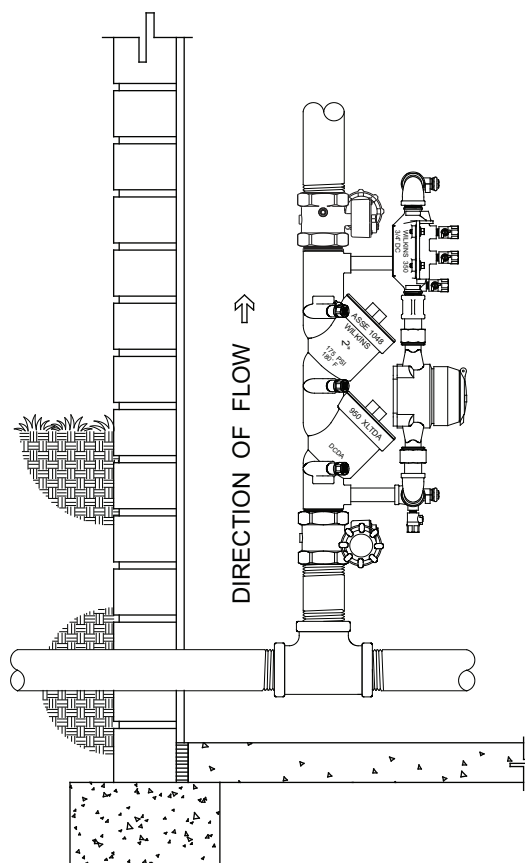


Dimensions & Weights (do not include pkg.)

MODEL SIZE		DIMENSIONS (approximate)										WEIGHT	
		A		B		C		D		E		lbs.	kg
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		
2	50	26	660.4	23 1/8	587.4	3	76.2	7 1/2	190.5	10 3/8	263.5	36	16.3

MODEL 950XLTDABF 2" (STANDARD)**Typical Installation**

Local codes shall govern installation requirements. To be installed in accordance with the manufacturer's instructions and the latest edition of the Uniform Plumbing Code. Unless otherwise specified, the assembly shall be mounted at a minimum of 12" (305mm) and a maximum of 30" (762mm) above adequate drains with sufficient side clearance for testing and maintenance. The installation shall be made so that no part of the unit can be submerged.

**OUTDOOR INSTALLATION****VERTICAL INSTALLATION****Specifications**

The Double Check Detector Backflow Prevention Assembly shall be ASSE Listed 1048, and supplied with butterfly valves. The main body and access covers shall be bronze (ASTM B 584), the seat ring and all internal polymers shall be NSF® Listed Noryl™ and the seat disc elastomers shall be SILICONE. The first and second check shall be located at a 45° angle and accessible for maintenance from the top of the device, without removing the device from the line. Each check shall have separate access covers and test cocks shall be accessible from the top of the device. Test cocks shall be protected from debris by a plug. The Double Check Detector Backflow Prevention Assembly shall be a ZURN WILKINS Model 950XLTDABF.

RISERPACK®

Residential Model 8000/8011

QUALITY COMPONENTS FOR FIRE SPRINKLER SYSTEMS

Model 8000

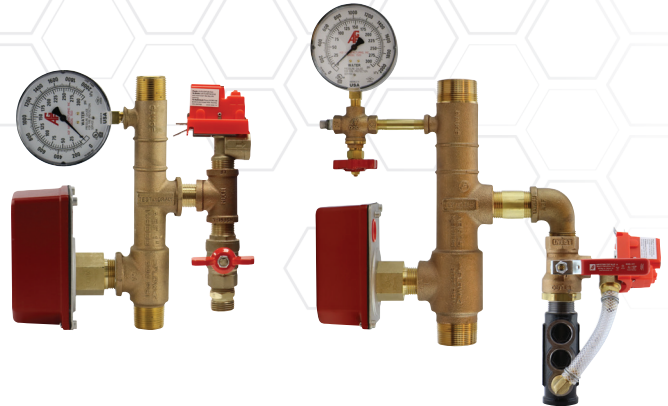


13D

13R

Model 8011

Includes Pressure Relief Valve and Drain Trim



13D

13R

Residential TEST_{AND}DRAIN Risers

AGF Residential RISERPACK Model 8000 and Model 8011 are 300 PSI rated, pre-assembled risers designed for NFPA 13D and 13R wet pipe fire sprinkler systems.

RISERPACK models come in 1", 1¼", 1½", and 2" sizes. Residential manifolds are cast bronze with THD x THD, THD x GRV, or GRV x GRV connections. All models include a standard water flow switch and pressure gauge. 1¼"-2" models feature an INSPECTORS TEST valve. Inspectors TEST valves allow system access for integrity testing, and offer a range of orifice sizes (K2.8-K5.6). 13R models include a 3-way universal gauge valve for pressure testing.

8011 models include a UL listed/FM approved, 175 PSI rated pressure relief valve with drain trim (200, 225, and 300 PSI ratings are also available).

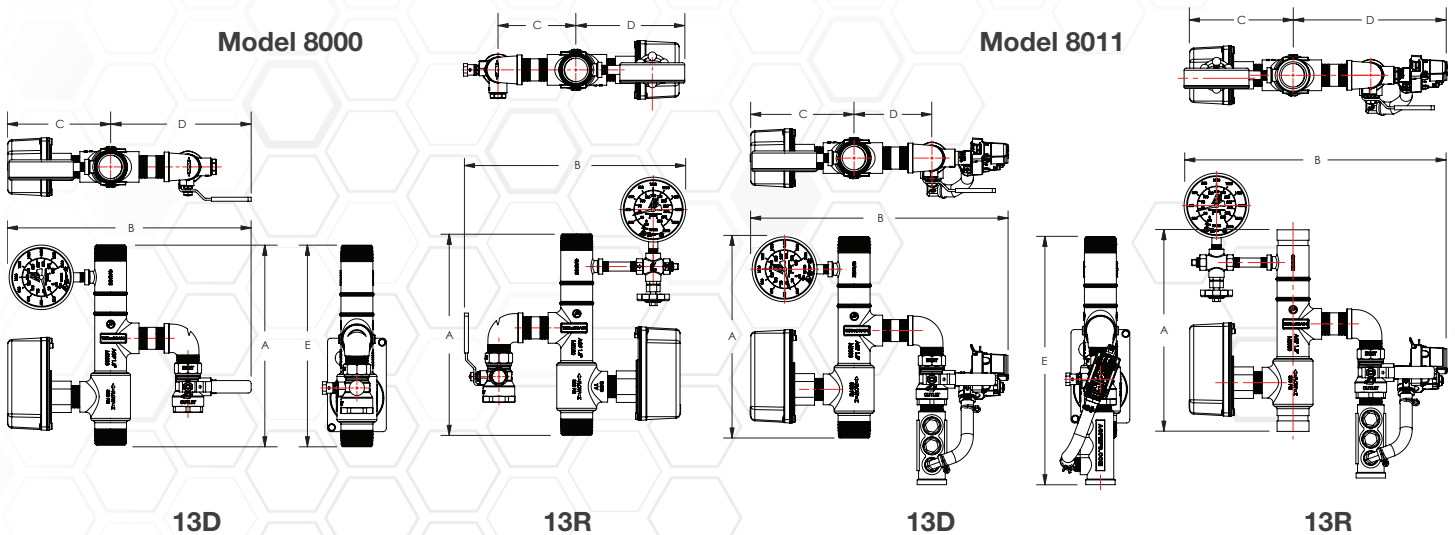
Models

Orifice Size		13D Part Numbers		13R Part Numbers													
		1"		1¼"		1½"						2"					
		Thd		Thd		Thd		Thd x Grv		Grv		Thd		Thd x Grv		Grv	
K-Factor	Fractional	8000	8011	8000	8011	8000	8011	8000	8011	8000	8011	8000	8011	8000	8011	8000	8011
2.8	3/8"	8100D	8200D	8110R	8210R	8120R	8220R	8215R	8225R	8130R	8230R	8140R	8240R	8145R	8245R	8150R	8250R
4.2	7/16"	8101D	8201D	8111R	8211R	8121R	8221R	8216R	8226R	8131R	8231R	8141R	8241R	8146R	8246R	8151R	8251R
5.6	1/2"	8102D	8202D	8112R	8212R	8122R	8222R	8127R	8227R	8132R	8232R	8142R	8242R	8147R	8247R	8152R	8252R



WWW.AGFMFG.COM

Dimensions



	Size	A	B	C	D	E	
						13D	13R
8000	1"	10½" (267 mm)	12¼" (311 mm)	4¾" (121 mm)	6¼" (159 mm)	10¾" (273 mm)	-
	1"	10½" (267 mm)	12¼" (311 mm)	2⅞" (73 mm)	6¼" (159 mm)	10¾" (273 mm)	-
8011	1¼"	11" (279 mm)	15" (381 mm)	4" (102 mm)	6½" (165 mm)	14⅝" (371 mm)	18" (458 mm)
	1½"	12" (305 mm)	15¼" (387 mm)	4⅞" (105 mm)	6⅝" (168 mm)	15" (382 mm)	18⅜" (468 mm)
	2"	12" (305 mm)	15¾" (399 mm)	4⅞" (111 mm)	6⅞" (174 mm)	15" (382 mm)	18⅞" (468 mm)

Sizes have been rounded to the highest millimeter

- 1" RISERPACK Model 8000 features a ¾" ball valve with patented TESTANDRAIN orifice specific outlet designed to accept a garden hose or hard pipe drain line.
- 1¼", 1½", and 2" models feature an INSPECTORSTEST Model 3011BV with optional orifice size (K2.8-K5.6).

NOTE: UL and FM standards for sprinkler system pressure relief valves require relief valves to operate within a range of their ratings. FM requires a relief valve to OPEN at a pressure no less than 85% of their rating and UL requires OPENING at a pressure no greater than 105% of their rating. Both standards require the relief valves to CLOSE within a percentage below OPEN. Choose the relief valve comparing static pressure to 90% of the relief valve's rating to determine the estimated minimum OPENING and 80% of the relief valve's rating for approximate maximum CLOSING. The relief valve should be installed where it is easily accessible for maintenance. Care should be taken that the relief valve CANNOT be isolated from the system when the system is operational. A relief valve should NEVER have a shutoff valve or a plug downstream of its outlet.

USA Patent and Other Patents Pending

For use on wet fire sprinkler systems.

Manifold Sizes

1", 1¼", 1½", and 2"

Orifice Options

2.8K, 4.2K, and 5.6K

Connections

Inlet.....THD, GRV, or THD x GRV

Outlet.....THD, GRV, or THD x GRV

Installation Orientation

Horizontal

Vertical

Rating

300 PSI

Compliance

NFPA 13

NYC-BSA No. 720-87-SM

Approvals

UL/ULC (EX27218, EX4019, EX4533 & EX6266)

FM



AGF Manufacturing Inc.
100 Quaker Lane, Malvern, PA 19355

Phone: 610-240-4900

Fax: 610-240-4906

www.agfmfg.com

Job Name: _____

Architect: _____

Engineer: _____

Contractor: _____

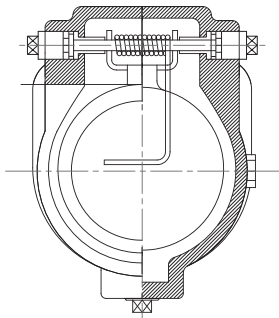
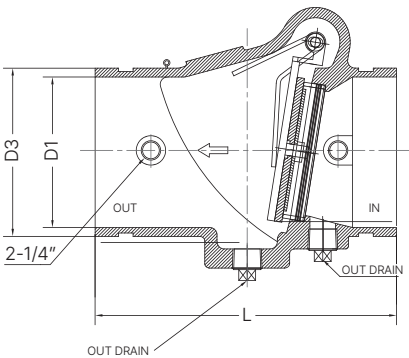
DGC
Swing Check Valve, Grooved



Technical Features

- **Connections:** Grooved Ends (AWWA C606)
- **Sizes:** 2", 2½", 3", 4", 5", 6", 8", 10", 12"
- **Approvals:** UL, ULC, FM
- **Maximum Working Pressure:** 300PSI (Max. Test Pressure: 600PSI)
- **Maximum Working Temperature:** 250°F (120°C)
- **Application:** Indoor and Outdoor
- **Coating:** Epoxy Coated Interior and Exterior, AWWA C550
- Low pressure-drop, Non-slam performance

Components	Material	Specification
Body	Ductile Iron, Epoxy Coated	ASTM A536 Gr. 65-45-12
Clapper	Stainless Steel	ANSI 304
Coil Spring	Stainless Steel	ANSI 302
Nut	Stainless Steel	ANSI 304
Bolt	Stainless Steel	ANSI 304
Washer	Stainless Steel	ANSI 304
Facing Seal	Rubber	EPDM
Seat Ring	Stainless Steel	ANSI 304
Drain Plug	Ductile Iron	Drain Plug
Pin Plug	Ductile Iron	Pin Plug
Bushing	Aluminum Bronze	Bushing
Hinge Pin	Stainless Steel	Hinge Pin
Hook	Steel	Hook



Dimensions

Nominal Pipe Size	L		D1		D3		Weight lbs
	in	mm	in	mm	in	mm	
2"	6.7	170.0	1.9	49.0	2.4	60.3	6.00
2½"	7.2	184.0	2.4	62.2	2.9	73.0	8.50
3"	7.6	195.0	2.9	74.0	3.5	89.1	10.50
4"	8.1	205.0	3.9	98.0	4.5	114.3	15.50
5"	9.8	247.7	5.0	127.0	5.6	141.3	21.00
6"	12.6	320.0	6.1	156.0	6.6	168.3	40.00
8"	14.6	372.0	7.9	201.6	8.6	218.2	73.50
10"	18.0	457.2	9.8	249.0	10.7	273.0	117.00
12"	21.1	534.9	11.8	298.6	12.8	323.9	166.00

Check Valves





F1FR56 Series
Quick Response Sprinklers
K-factor 5.6 (80)

Features

- Standard coverage quick-response sprinklers
- Upright, pendent, horizontal sidewall, and vertical sidewall deflectors
- Low profile, compact design
- Available in a wide variety of finishes

Product Description

Reliable Model F1FR56 series sprinklers are quick-response standard spray automatic fire sprinklers utilizing a sensitive 3.0 mm glass bulb thermal element.

Pendent and horizontal sidewall sprinklers may be installed exposed or surface mounted using escutcheons such as the Reliable Models B, C, or HB (reference Technical Bulletin 204). When installed recessed or concealed, the Model F1FR56 series sprinklers are specifically listed with and may only be installed with listed Reliable escutcheons and cover plates. Refer to the technical information on the following pages for specific listings for recessed and concealed installations and refer to Figures 5 and 6 for dimensional information.

When fitted with an approved water shield, these sprinklers may be considered intermediate sprinklers for use in racks, below grated walkways, and other areas where intermediate level sprinklers are required.

Table A provides a summary of the approvals and availability of specific Model F1FR series sprinkler configurations. Additional technical information for each sprinkler model is provided on the following pages.

Important! Reliable fire sprinklers must be handled, stored, and installed in accordance with the guidelines in Caution Sheet 310 and this bulletin. Failure to follow these instructions may result in unintended operation or nonoperation of the fire protection system.



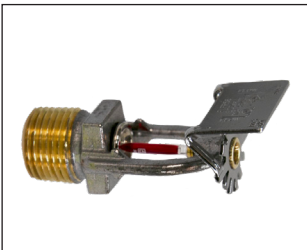
Model F1FR56 Pendent



Model F1FR56 Upright



Model F1FR56 Vertical Sidewall



Model F1FR56
Horizontal Sidewall

Note: Not all versions of the product are shown.

F1FR Series Sprinkler Summary

Table A

Sprinkler Model	K-Factor gpm/psi ^{1/2} (lpm/bar ^{1/2})	Orientation	Listings & Approvals	Max. Working Pressure psi (bar)	Sprinkler Identification Number (SIN)
F1FR56	5.6 (80)	Upright Intermediate Upright	cULus, FM, LPCB, VdS, EC, WM, UKCA	175 (12) 250 (17) (cULus only)	RA1425
		Pendent	cULus, FM, LPCB, VdS, EC, WM, UKCA	175 (12) 250 (17) (cULus only)	RA1414
		Concealed Pendent	cULus, VdS, EC, WM, UKCA	175 (12) 250 (17) (cULus only)	RA1414
		Horizontal Sidewall	cULus, FM	175 (12)	RA1435
		Vertical Sidewall	cULus, FM, LPCB, UKCA	175 (12)	RA1485

Model F1FR56 Upright Sprinkler

SIN RA1425

Technical Specifications

Style: Upright, Intermediate Upright

Threads: 1/2" NPT or ISO 7-R1/2

Nominal K-Factor: 5.6 (80 metric)

Max. Working Pressure:

175 psi (12 bar)

250 psi (17 bar) (cULus only)

Material Specifications

Thermal Sensor: 3 mm Glass Bulb

Sprinkler Frame: Brass Alloy

Cap: Bronze Alloy

Sealing Washer: Nickel with PTFE

Load Screw: Copper Alloy

Deflector: Brass Alloy

Sprinkler Finishes

(See Table B)

Sensitivity

Quick response

Temperature Ratings

135°F (57°C)

155°F (68°C)

175°F (79°C)

200°F (93°C)

286°F (141°C)

Guards & Shields

Factory Water Shield (cULus, FM)

F-1 Guard (cULus, FM)

F-3 Guard with Shield (cULus, FM)

Sprinkler Wrench

Model W2

Model W14 (with guard installed)

Listings and Approvals

cULus Listed

FM Approved

LPCB

VdS

EC

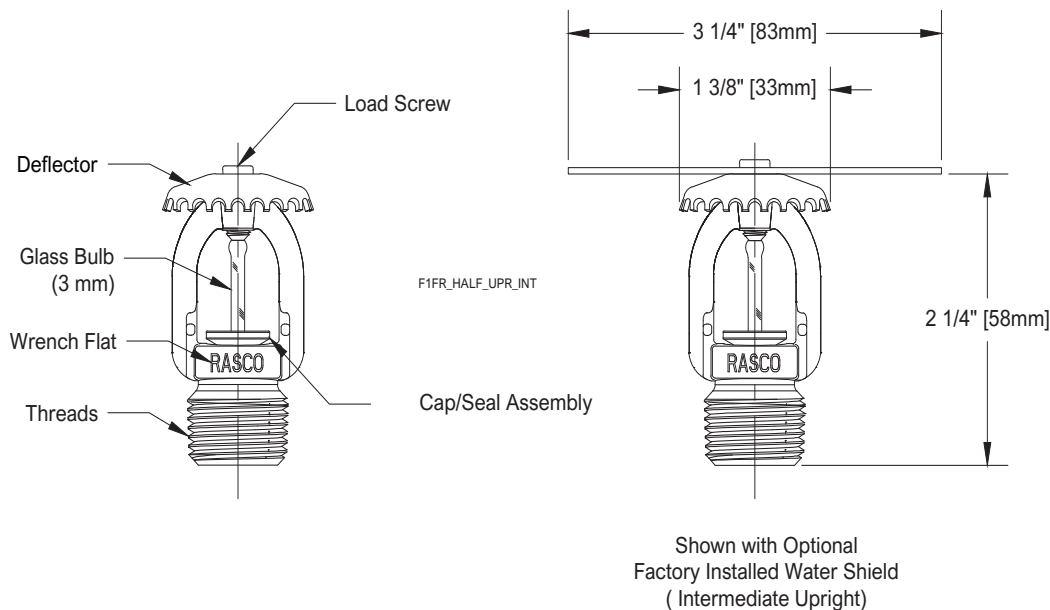
WM

UKCA: 0832-UKCA-CPR-S5045



Model F1FR56 Upright Sprinkler Components and Dimensions

Figure 1



Technical Specifications

Style:

Pendent
Recessed Pendent
Concealed Pendent

Threads: 1/2" NPT or ISO 7-R1/2

Nominal K-Factor: 5.6 (80 metric)

Max. Working Pressure:

175 psi (12 bar)
250 psi (17 bar) (cULus only)

Material Specifications

Thermal Sensor: 3 mm Glass Bulb

Sprinkler Frame: Brass Alloy

Cap: Bronze Alloy

Sealing Washer: Nickel with PTFE

Load Screw: Copper Alloy

Deflector: Brass Alloy

Sprinkler Finishes

(See Table B)

Sensitivity

Quick response

Temperature Ratings⁽¹⁾

135°F (57°C)
155°F (68°C)
175°F (79°C)
200°F (93°C)
286°F (141°C)

Recessed Escutcheons

Model F1 (cULus, LPCB, VdS, CE, WM)
Model F2 (cULus, FM, LPCB, VdS, CE, WM)
Model FP (cULus, VdS, CE, WM)

Cover Plate

Model CCP (cULus, VdS⁽²⁾, CE⁽²⁾)

Guards & Shields⁽³⁾

F-1 Guard (FM)
F-5 Guard/Shield Kit (FM)
F-7 Guard (cULus)
F-8 Guard/Shield Kit (cULus)
S-1 Shield (cULus, FM)

Sprinkler Wrenches

Model W2 (pendent)
Model W1 (recessed or concealed)
Model W14 (with guard installed)

Listings and Approvals⁽⁴⁾

cULus Listed
FM Approved
LPCB
VdS
EC
WM
UKCA: 0832-UKCA-CPR-S5045, 0831-UK-CA-CPR-5072 (CCP)

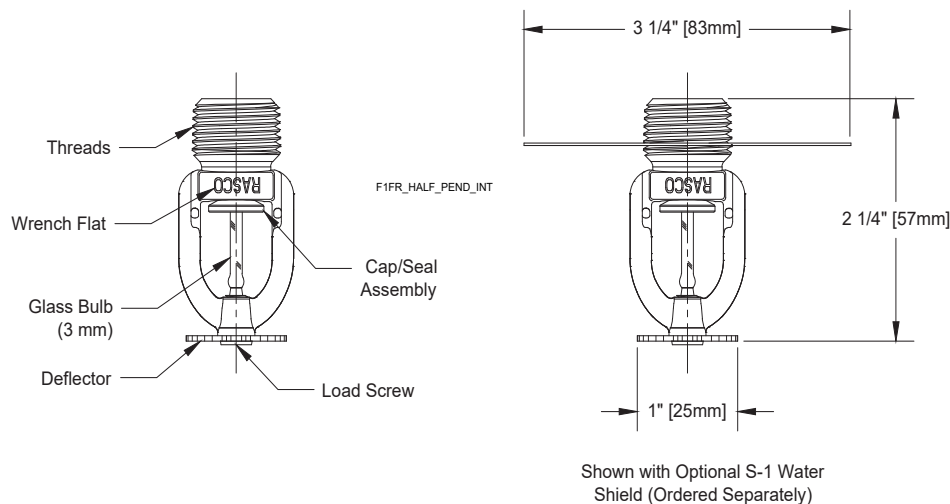


Notes:

- 286°F (141°C) temperature rated sprinkler not listed for recessed or concealed use.
- VdS and CE approval for CCP concealed use is for 155°C (68°C) sprinkler ONLY.
- Not suitable for recessed or concealed pendent installations.
- When used surface mounted or exposed. See Recessed Escutcheon and Cover Plate section for specific approvals when installed recessed or concealed.

Model F1FR56 Pendent Sprinkler Components and Dimensions

Figure 2



Note: Please refer to Figure 8 for recessed and concealed installation.

Technical Specifications**Style:**

Horizontal Sidewall
Recessed Horizontal Sidewall

Threads: 1/2" NPT or ISO 7-R1/2**Nominal K-Factor:** 5.6 (80 metric)**Max. Working Pressure:**

175 psi (12 bar)

Material Specifications**Thermal Sensor:** 3 mm Glass Bulb**Sprinkler Frame:** Brass Alloy**Cap:** Bronze Alloy**Sealing Washer:** Nickel with PTFE**Load Screw:** Copper Alloy**Deflector:** Brass Alloy**Recessed Escutcheons⁽²⁾**

Model F1 (cULus)

Model F2 (cULus, FM)

Model FP (cULus)

Guards & Shields⁽³⁾

F-4 Guard (FM)

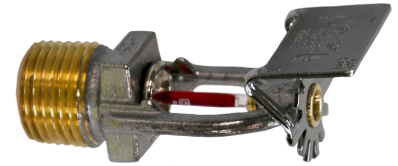
F-7 Guard (cULus)

Sprinkler Wrenches

Model W2 (non-recessed)

Model W1 (recessed)

Model W14 (with guard installed)

Listings and ApprovalscULus Listed⁽⁴⁾FM Approved⁽⁵⁾**Sprinkler Finishes**

(See Table B)

Sensitivity

Quick response

Temperature Ratings ⁽¹⁾

135°F (57°C)

155°F (68°C)

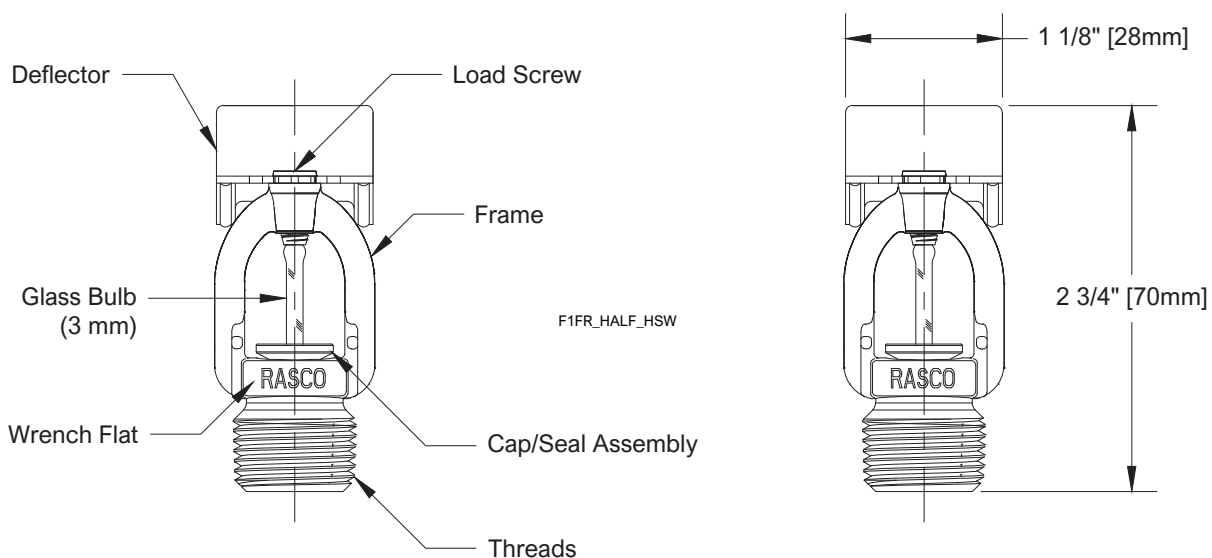
175°F (79°C)

200°F (93°C)

286°F (141°C)

Notes:

1. 286°F (141°C) temperature rated sprinkler not listed for recessed use.
2. FM approved recessed installation when used with Model F2 escutcheon ONLY.
3. Not suitable for recessed horizontal sidewall installations.
4. cULus Listed for Light and Ordinary Hazard when installed exposed or surface mounted. Listed for Light Hazard ONLY when installed recessed.
5. FM Approved for Light Hazard ONLY.

Model F1FR56 Horizontal Sidewall Sprinkler Components and Dimensions**Figure 3****Note:** Please refer to Figure 9 for recessed installation.

Technical Specifications

Style:

Upright Vertical Sidewall
Pendent Vertical Sidewall

Threads: 1/2" NPT or ISO 7-R1/2

Nominal K-Factor: 5.6 (80 metric)

Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm Glass Bulb

Sprinkler Frame: Brass Alloy

Cap: Bronze Alloy

Sealing Washer: Nickel with PTFE

Load Screw: Copper Alloy

Deflector: Brass Alloy

Sprinkler Finishes

(See Table B)

Sensitivity

Quick response

Temperature Ratings

135°F (57°C)

155°F (68°C)

175°F (79°C)

200°F (93°C)

286°F (141°C)

Guards & Shields

F-2 Guard (FM)

Sprinkler Wrenches

Model W2

Model W14 (with guard installed)

Listings and Approvals⁽¹⁾

cULus Listed

FM Approved

LPCB⁽²⁾

UKCA: 0832-UKCA-CPR-S5045

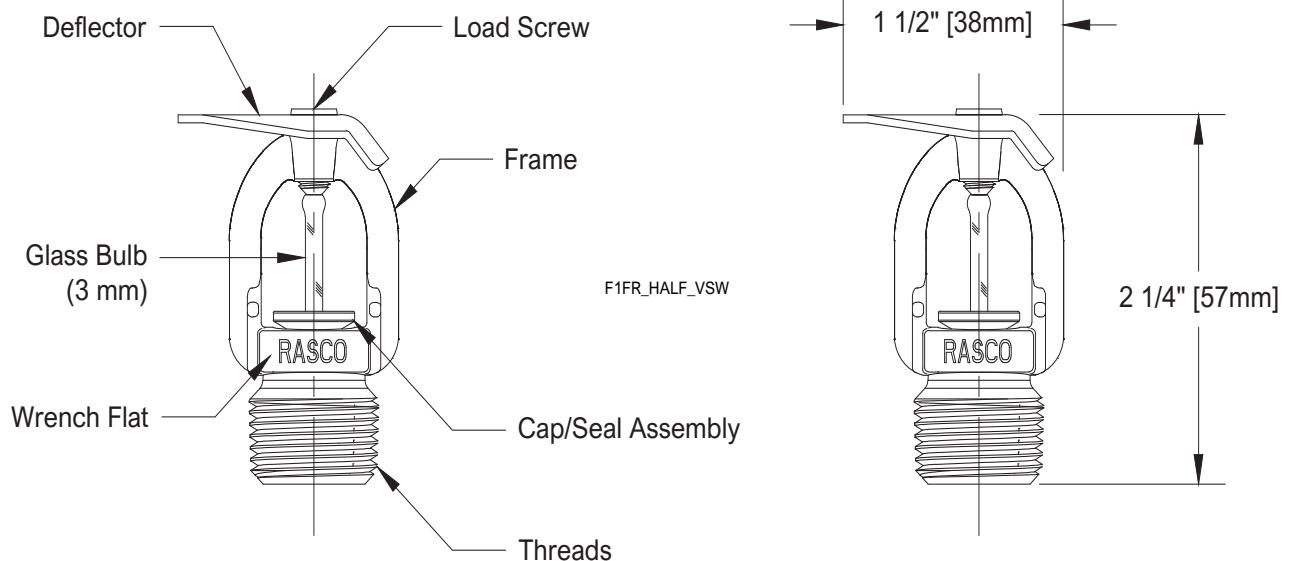


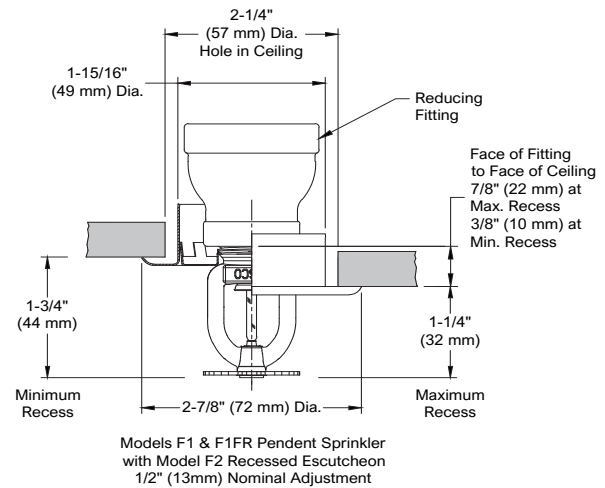
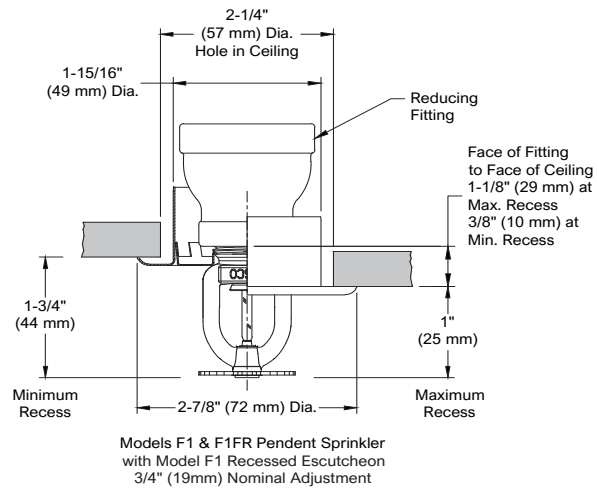
Notes:

1. Listed and approved for Light Hazard ONLY.
2. LPCB approved for use in pendent position ONLY.

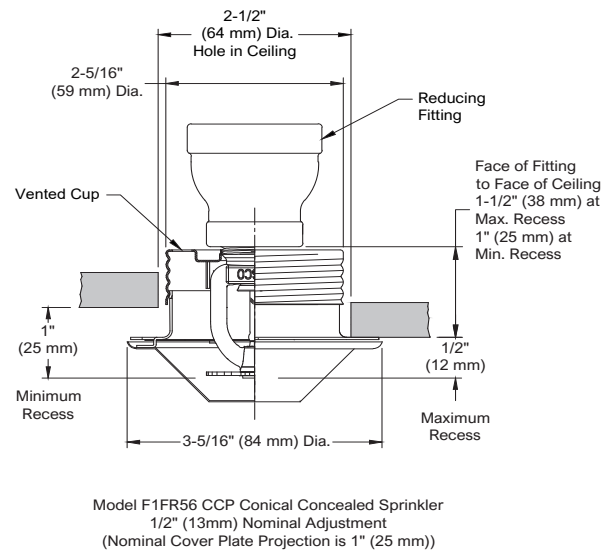
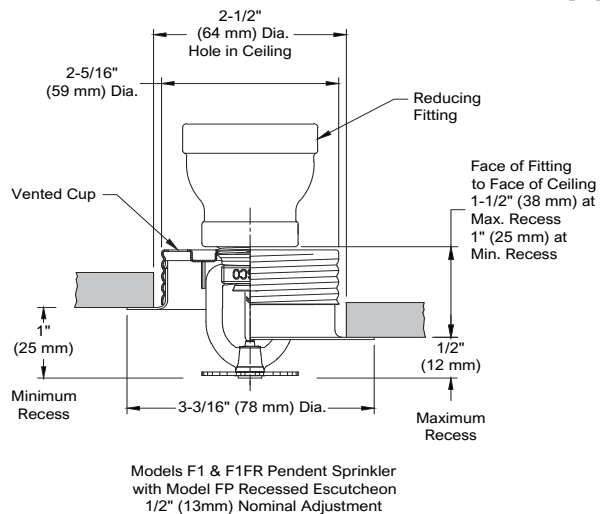
Model F1FR56 Vertical Sprinkler Components and Dimensions

Figure 4





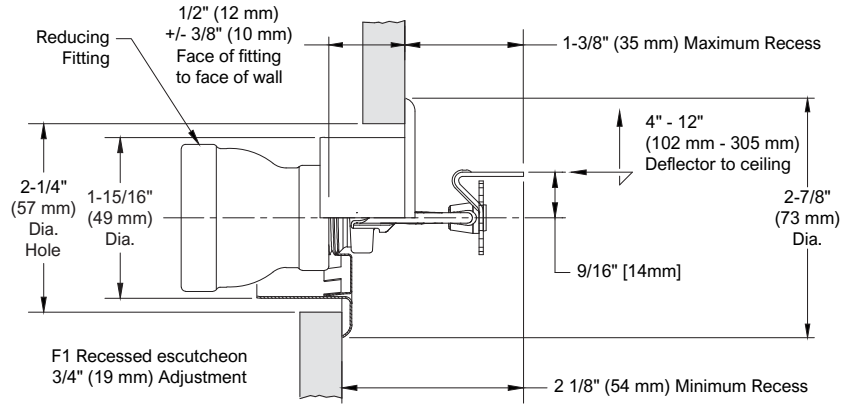
F1_REC_PEND_CCP



Note: Model FP recessed assemblies may not be used where the pressure in the space above the ceiling is positive with respect to the protected area. Ensure that the openings in the Model FP cup are unobstructed following installation.

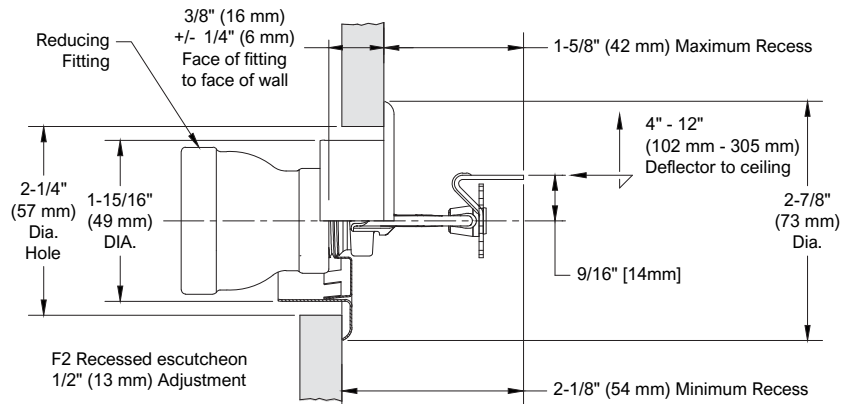
Note: Model CCP concealed assemblies may not be used where the pressure in the space above the ceiling is positive with respect to the protected area. Ensure that the openings in the Model CCP cup are unobstructed following installation.



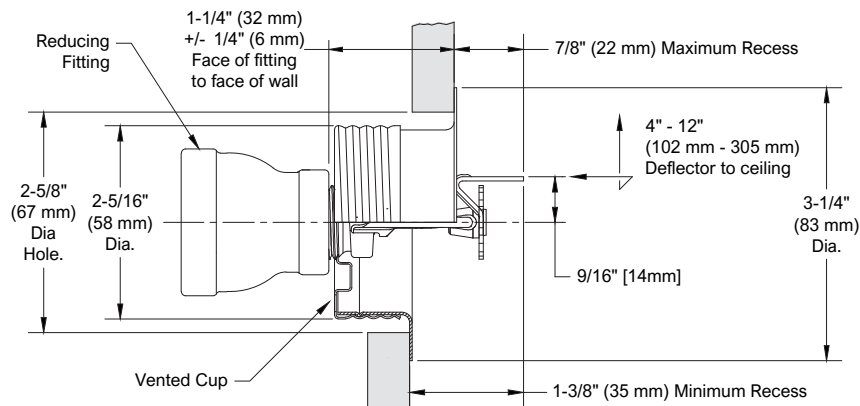


Model F1FR Horizontal Sidewall Sprinkler
with Model F1 Recessed Escutcheon
3/4" (19mm) Nominal Adjustment

F1FR_REC_HSW



Model F1FR Horizontal Sidewall Sprinkler
with Model F2 Recessed Escutcheon
1/2" (13mm) Nominal Adjustment



Model F1FR Horizontal Sidewall Sprinkler
with Model FP Recessed Escutcheon
1/2" (13mm) Nominal Adjustment

Note: Model FP recessed assemblies may not be used where the pressure in the space behind the sprinkler is positive with respect to the space in the protected area. Ensure that the openings in the Model FP cup are unobstructed following installation.

Wrenches



Model W2 (upright, pendent)



Model W14 (with guard installed)



Model W1
(recessed, concealed pendent)

Finishes⁽¹⁾

Table B

Standard Finishes			Special Application Finishes		
Sprinkler	F1, F2 and FP ⁽²⁾ Escutcheons	CCP Cover Plate ⁽²⁾	Sprinkler	F1, F2 and FP ⁽²⁾ Escutcheons	CCP Cover Plate ⁽²⁾
Bronze	Brass	Chrome	Electroless Nickel PTFE ⁽³⁾⁽⁴⁾	Bright Brass	Bright Brass
Chrome	Chrome	White Paint	Bright Brass ⁽⁵⁾	Satin Chrome	Satin Chrome
White Polyester ⁽³⁾	White Polyester		Satin Chrome	Custom Color Polyester	Custom Color Paint
			Custom Color Polyester ⁽³⁾		

Notes:

1. Paint or any other coating applied over the factory finish will void all approvals and warranties.
2. Model FP escutcheons and Model CCP sprinklers utilize a galvanized steel cup with a finished trim ring or cover plate.
3. cULus Listed as corrosion resistant.
4. FM Approved as corrosion resistant.
5. For 200°F (93°C) maximum temperature rated sprinklers only.

Installation

Model F1FR Series sprinklers must be installed in accordance with NFPA13 and the requirements of all applicable authorities having jurisdiction. Model F1FR Series sprinklers must be installed with the Reliable sprinkler installation wrench identified in this Bulletin. Any other wrench may damage the sprinkler. A leak tight sprinkler joint can be obtained with a torque of 8 to 18 lb-ft (11 to 24 N-m). Do not tighten sprinklers over the maximum recommended installation torque. Exceeding the maximum recommended installation torque may cause leakage or impairment of the sprinkler.

Glass bulb sprinklers have orange bulb protectors or protective caps to minimize bulb damage during shipping, handling and installation. Reliable sprinkler installation wrenches are designed to install sprinklers with bulb protectors in place. Remove the bulb protector at the time when the sprinkler system is placed in service for fire protection. Removal of the bulb protector before this time may leave the bulb vulnerable to damage. Remove bulb protectors by undoing the clasp by hand. Do not use tools to remove bulb protectors.

Reliable Model F1FR series sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25, as well as the requirements of any Authorities Having Jurisdiction.

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.

Do not clean sprinklers with soap and water, ammonia liquid or any other cleaning fluids. Remove dust by gentle vacuuming without touching the sprinkler.

Replace any sprinkler which has been painted (other than factory applied). A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Failure to properly maintain sprinklers may result in inadvertent operation or non-operation during a fire event.

Guarantee

Maintenance

For the guarantee, terms, and conditions, visit www.reliablesprinkler.com.

Ordering Information

Specify the following when ordering:

Model

- F1FR56

Deflector/Orientation

- Upright
- Intermediate Upright
- Pendent
- CCP Concealed Pendent
- Horizontal Sidewall
- Vertical Sidewall

Temperature Rating

- See sprinkler technical specifications

Sprinkler Finish

- See Table B

Recessed Escutcheon⁽¹⁾⁽²⁾

- F1
- F2
- FP

Escutcheon Finish

- See Table B

CCP Cover Plate Temperature Rating

- 135°F (57°C) [For use with 135°F (57°C) and 155°F (68°C) sprinklers.]
- 165°F (74°C) [For use with 175°F (79°C) and 200°F (93°C) sprinklers.]

CCP Cover Plate Finish

- See Table B

Sprinkler Wrench

- Model W2
- Model W1 (recessed, concealed)
- Model W14 (with guard installed)

Notes:

1. 286°F (141°C) sprinklers are not listed to be used recessed or concealed.
2. For FM, recessed sprinklers must use the Model F2 escutcheon.



Model F3QR56 Series Quick-Response Dry Sprinkler

K-factor 5.6 (80 metric)

Features

- Various trim options available
- Sprinklers and trim available in a wide variety of standard and special application finishes
- Listed corrosion resistant combinations of sprinkler and trim available

Product Description

Model F3QR56 dry sprinklers are Quick-Response, standard coverage sprinklers with a nominal K-factor of 5.6 (80 metric). Available in pendent, horizontal sidewall, and upright configurations, Model F3QR56 dry sprinklers utilize a 3mm glass bulb ordinary, intermediate, or high temperature classification operating element.

Model F3QR56 dry sprinklers are intended for installation on wet pipe, dry pipe, or preaction systems in accordance with NFPA 13, FM Property Loss Prevention Data Sheets, or other applicable installation standards.

Model F3QR56 dry sprinklers are available in a variety of trim options and finish combinations as shown on the following pages. The Reliable escutcheons and cover plates shown are the only escutcheons and cover plates listed for use with the sprinkler. The use of any other escutcheon or cover plate will void all guarantees, warranty, listing, and approvals.

Standard inlet fitting threads are 1" NPT or ISO7-R1 threads. An inlet fitting with 3/4" NPT or ISO7-R3/4 threads (cULus listed only) is also available for select sprinklers for replacement of existing sprinklers.

Table A provides a basic summary of Model F3QR56 dry sprinklers. Additional technical information is provided on the following individual sprinkler pages.

Important! Reliable fire sprinklers must be handled, stored, and installed in accordance with the guidelines in Caution Sheet 310 and this bulletin. Failure to follow these instructions may result in unintended operation or nonoperation of the fire protection system.



(Note: not all versions of sprinkler shown, please see pages 2 through 13)

Sprinkler Summary

Table A

Model	K-Factor gpm/psi ^{1/2} (lpm/bar ^{1/2})	Approvals*	Max. Working Pressure psi (bar)	Sprinkler Identification Number (SIN)
F3QR56 Dry Pendent	5.6 (80)	cULus, FM	175 (12.0) cULus 250 (17.2)	R5714
F3QR56 Dry Horizontal Sidewall	5.6 (80)	cULus, FM	175 (12.0) cULus 250 (17.2)	R5734
F3QR56 Dry Upright	5.6 (80)	cULus	175 (12.0)	R5724

*Note: Approvals may not apply to all trim, inlet thread, temperature, and/or finish combinations. See pages 2-11 for additional technical information.

Model F3QR56 Dry Pendent: Standard Escutcheon - SIN R5714

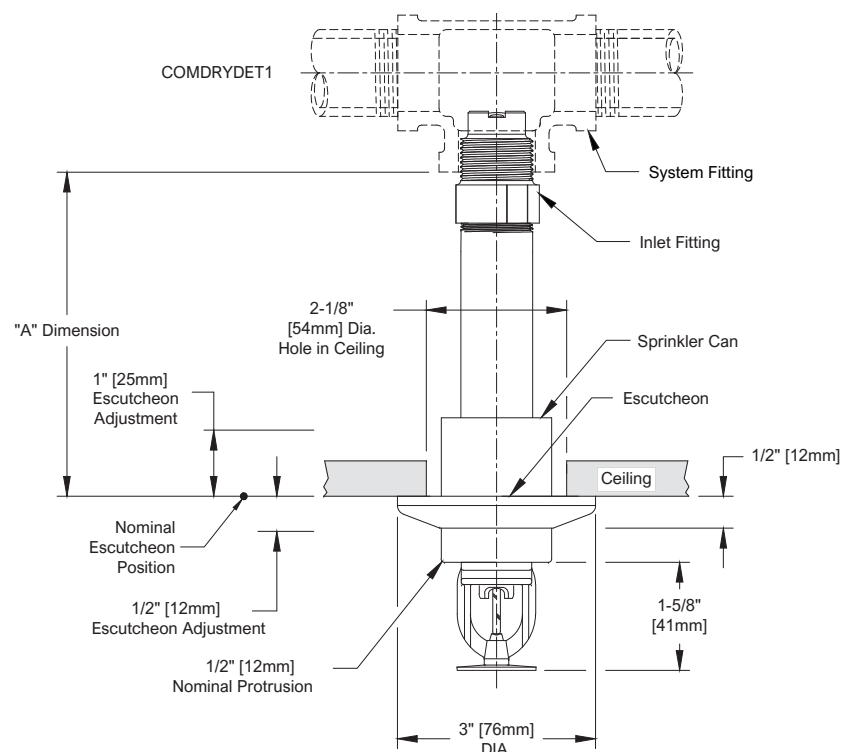
Table B

"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals	Sprinkler Guard
2" to 48" (51mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 2" to 36" (51mm to 914mm) in 1/4" (6mm) increments for 3/4" connections	Ordinary	155°F (68°C)	Red	cULus, FM	C-2
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus, FM	

Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Pendent Sprinkler: Standard Escutcheon

Figure 1



Note: The sprinkler can protrudes 1/2" (12mm) when escutcheon is in nominal position. Escutcheon adjustment provides -1/2" (12mm) to +1" (25mm) "A" dimension adjustment range.



Finish Combinations: Standard Escutcheon

Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Polished Stainless
Bronze	Laquered Brass
Chrome	Polished Stainless
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾⁽⁴⁾	Polished Stainless

Notes:

1. UL Listed as Corrosion Resistant.
2. Escutcheons do not carry corrosion resistant listings.
3. Base material is 316 stainless steel unless noted.
4. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Pendent: HB Escutcheon - SIN R5714

Table C

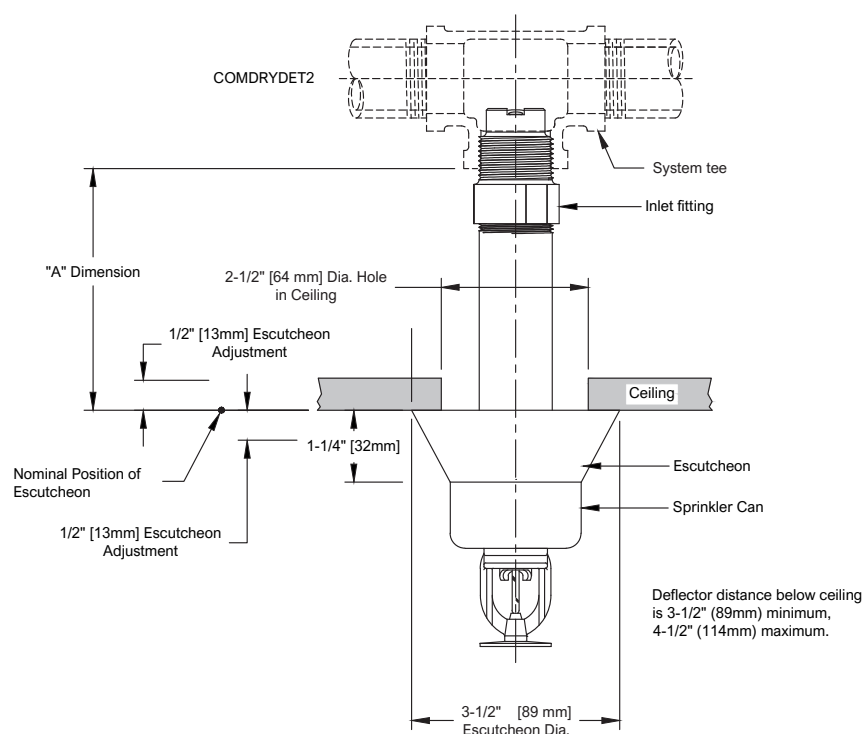
"A" Dimension in (mm)	Temperature Classification	Temperature Rating F (C)	Glass Bulb Color	Approvals	Sprinkler Guard
3½" to 48" (89mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 3½" to 36" (89mm to 914mm) in 1/4" (6mm) increments for 3/4" connections	Ordinary	155°F (68°C)	Red	cULus, FM	C-2
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus, FM	

Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).



Model F3QR56 Dry Pendent Sprinkler: HB Escutcheon

Figure 2



Note: The sprinkler can protrudes 1¼" when escutcheon is in nominal position. Escutcheon adjustment provides -½" (-12.7mm) to +½" (+12.7mm) "A" dimension adjustment range.

Finish Combinations: HB Escutcheon	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Chrome
Chrome	Chrome
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾⁽⁴⁾	Stainless Steel

Notes:

1. UL Listed as Corrosion Resistant.
2. Escutcheons do not carry corrosion resistant listings.
3. Base material is cold rolled steel unless noted.
4. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Pendent: FP Escutcheon - SIN R5714

Table D

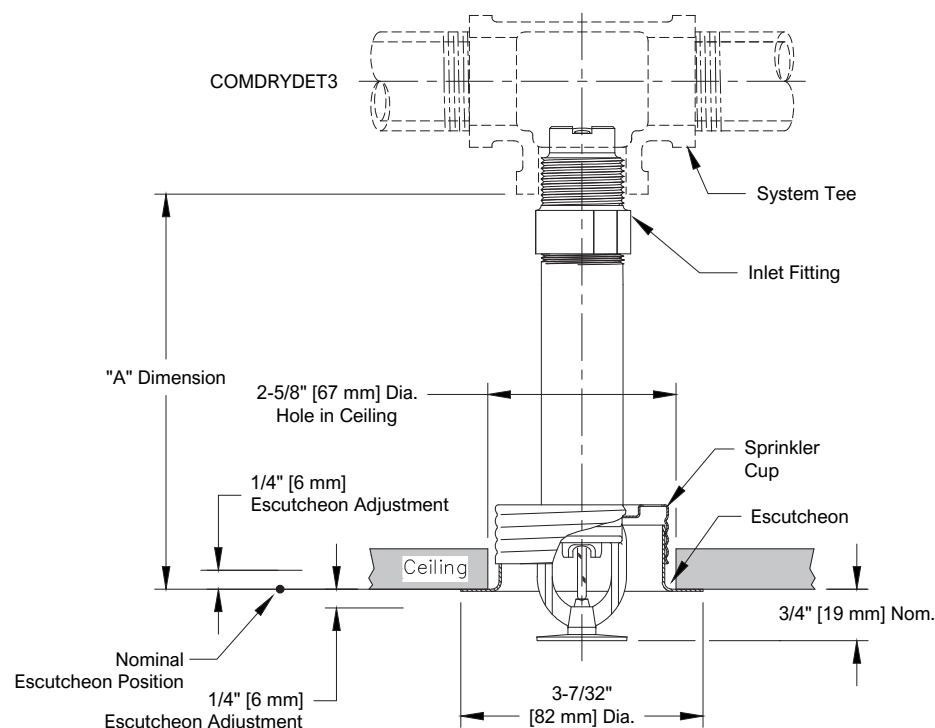
"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals	Sprinkler Guard
3½" to 48" (89mm to 1219mm) in 1¼" (6mm) increments for 1" connections or 3½" to 36" (89mm to 914mm) in 1¼" (6mm) increments for ¾" connections	Ordinary	155°F (68°C)	Red	cULus, FM	N/A
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus	

Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with ¾" NPT and ISO-R¾ threads for replacement of existing sprinklers (cULus Listed only).



Model F3QR56 Dry Pendent Sprinkler: FP Escutcheon

Figure 3



Note: Do not install the Model F3QR56 Dry Pendent sprinkler with the Model FP escutcheon in ceilings which have positive pressure in the space above.

Finish Combinations: FP Recessed	
Sprinkler ⁽¹⁾	Escutcheon ⁽³⁾⁽⁴⁾
Bronze	Brass
Chrome	Chrome
White Polyester ⁽²⁾	White Polyester
Black Polyester ⁽²⁾	Black Polyester
Custom Color Polyester ⁽²⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽²⁾⁽⁵⁾	Stainless Steel

Notes:

1. Cup for FP Recessed is unfinished galvanized steel except electroless nickel PTFE sprinklers which are provided with a stainless steel cup
2. UL Listed as Corrosion Resistant.
3. Escutcheons do not carry corrosion resistant listings.
4. Base material is cold rolled steel unless noted.
5. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Pendent: CCP Cover Plate - SIN R5714

Table E

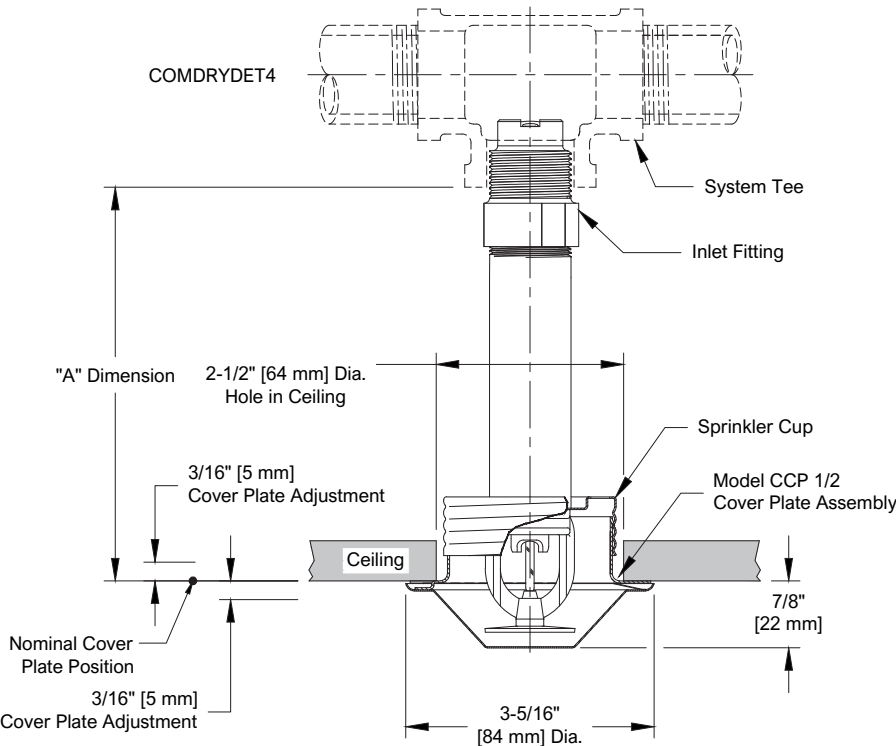
"A" Dimension in (mm)	Temperature Classification	Temperature Rating F (C)	Glass Bulb Color	Approvals	Sprinkler Guard
3 1/2" to 48" (89mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 3 1/2" to 36" (89mm to 914mm) in 1/4" (6mm) increments for 3/4" connections	Ordinary	155°F (68°C)	Red	cULus, FM	N/A
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High (See Caution)	286°F (141°C)	Blue	cULus	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Pendent Sprinkler: CCP Cover Plate

Figure 4



Finish Combinations: CCP Concealed	
Sprinkler ⁽¹⁾	Cover Plate ⁽²⁾
Bronze	White Polyester
	Chrome Bright
	Satin Chrome
	Bright Brass
	Unfinished Bronze
	Custom Color

- Notes:**
1. Cup for CCP Concealed is unfinished galvanized steel.
 2. Cover plates do not carry corrosion resistant listings.

Caution: High temperature CCP sprinklers are provided with a 165°F (74°C) rated cover plate that is suitable for use where the ceiling temperature will not exceed 150°F (66°C). Do not use CCP style sprinklers where the ceiling temperature exceeds 150°F (66°C).

Note: Do not install the Model F3QR56 Dry Pendent sprinkler with the Model CCP cover plate in ceilings which have positive pressure in the space above.

Model F3QR56 Dry Pendent: F1 Escutcheon - SIN R5714

Table F

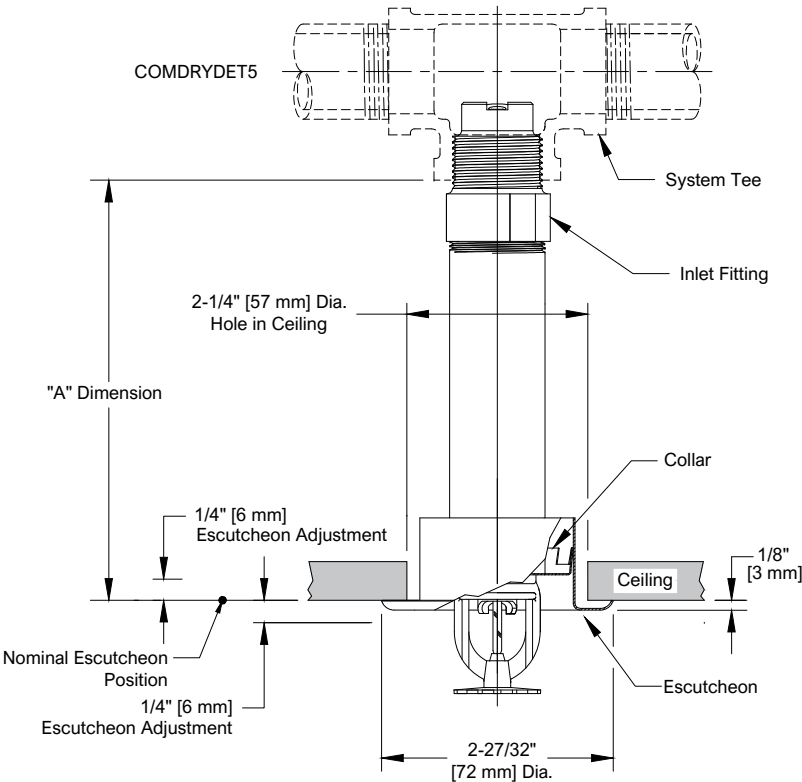
"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals	Sprinkler Guard
3½" to 48" (89mm to 1219mm) in 1¼" (6mm) increments for 1" connections or 3½" to 36" (89mm to 914mm) in 1¼" (6mm) increments for ¾" connections.	Ordinary	155°F (68°C)	Red	cULus, FM	N/A
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with ¾" NPT and ISO-R¾ threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Pendent Sprinkler: F1 Escutcheon

Figure 5



Finish Combinations: F1 Recessed	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Brass
Chrome	Chrome
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾⁽⁴⁾	Stainless Steel

- Notes:**
1. UL Listed as Corrosion Resistant.
 2. Escutcheons do not carry corrosion resistant listings.
 3. Base material is cold rolled steel unless noted.
 4. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Pendent: No Escutcheon - SIN R5714

Table G

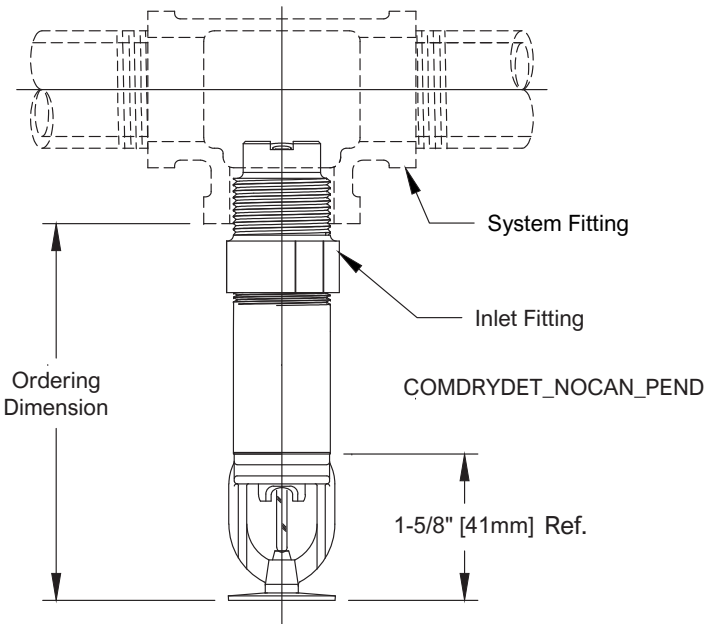
Order Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals	Sprinkler Guard
5" to 48" (127mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 5" to 36" (127mm to 914mm) in 1/4" (6mm) increments for 3/4" connections.	Ordinary	155°F (68°C)	Red	cULus, FM	C-2
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus, FM	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Pendent Sprinkler: No Escutcheon

Figure 6



Note: Customer is responsible for determining the correct deflector distance from the ceiling or structure above.

Available Finishes: No Escutcheon
Sprinkler
Bronze
Chrome
White Polyester ⁽¹⁾
Black Polyester ⁽¹⁾
Custom Color Polyester ⁽¹⁾
Electroless Nickel PTFE ⁽¹⁾⁽²⁾

- Notes:**
- 1. UL Listed as Corrosion Resistant.
 - 2. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Horizontal Sidewall: Standard Escutcheon - SIN R5734

Table H

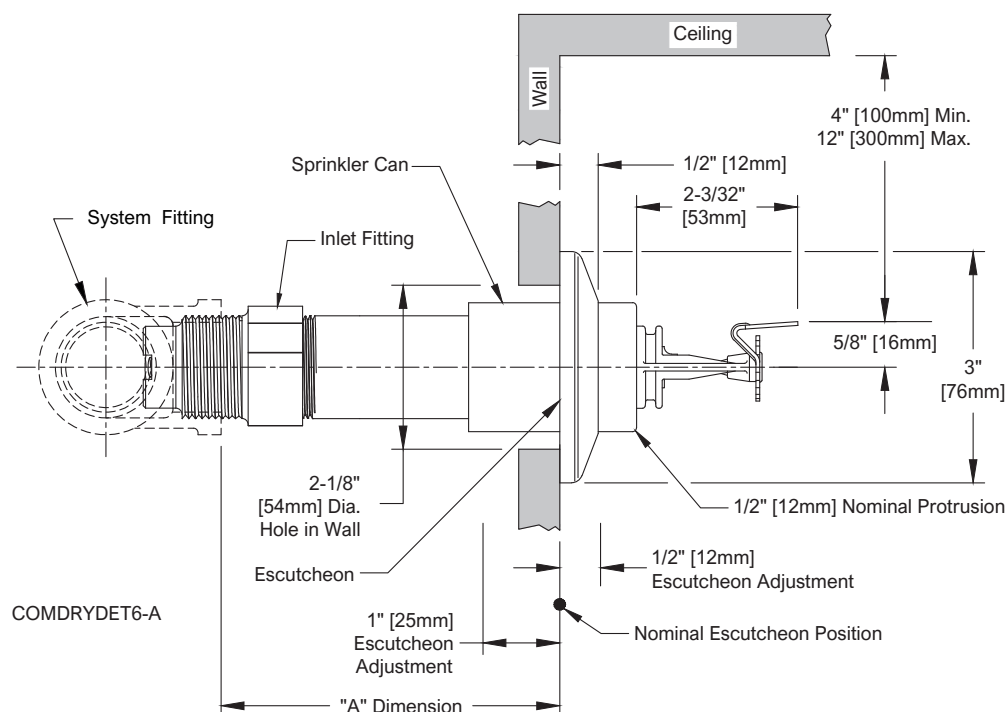
"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals (Light Hazard/HC-1 Only)	Sprinkler Guard
2" to 48" (51mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 2" to 36" (51mm to 914mm) in 1/4" (6mm) increments for 3/4" connections	Ordinary	155°F (68°C)	Red	cULus, FM	C-2 (FM Only)
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus, FM	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Horizontal Sidewall: Standard Escutcheon

Figure 7



Finish Combinations: Standard Escutcheon	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Polished Stainless
Bronze	Laquered Brass
Chrome	Polished Stainless
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾⁽⁴⁾	Polished Stainless

Notes:

1. UL Listed as Corrosion Resistant.
2. Escutcheons do not carry corrosion resistant listings.
3. Base material is 316 stainless steel unless noted.
4. FM Approved as Corrosion Resistant.

Note: The sprinkler can protrude 1/2" when escutcheon is in nominal position. Escutcheon adjustment provides -1/2" (-12mm) to +1" (25mm) "A" dimension adjustment range.

Model F3QR56 Dry Horizontal Sidewall: HB Escutcheon - SIN R5734

Table I

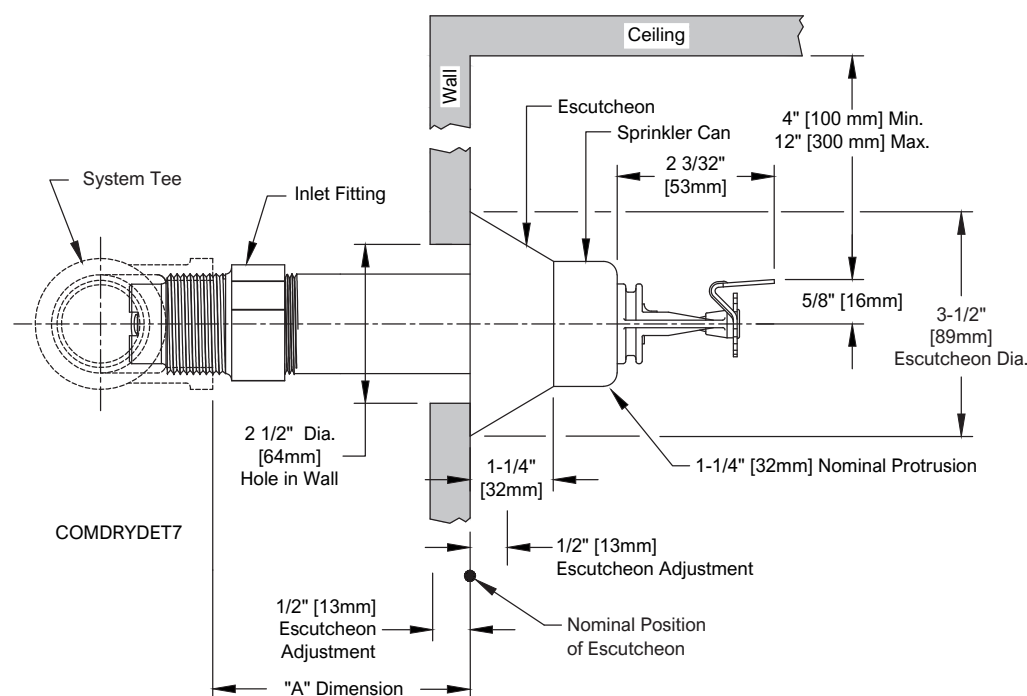
"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals (Light Hazard/HC-1 Only)	Sprinkler Guard
3½" to 48" (89mm to 1219mm) in 1¼" (6mm) increments for 1" connections or 3½" to 36" (89mm to 914mm) in 1¼" (6mm) increments for ¾" connections	Ordinary	155°F (68°C)	Red	cULus, FM	C-2 (FM Only)
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus, FM	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with ¾" NPT and ISO-R¾ threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Horizontal Sidewall: HB Escutcheon

Figure 8



Finish Combinations: HB Escutcheon	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Chrome
Chrome	Chrome
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾⁽⁴⁾	Stainless Steel

Notes:

1. UL Listed as Corrosion Resistant.
2. Escutcheons do not carry corrosion resistant listings.
3. Base material is cold rolled steel unless noted.
4. FM Approved as Corrosion Resistant.

Note: The sprinkler can protrudes 1¼" when escutcheon is in nominal position. Escutcheon adjustment provides -½" (-12.7mm) to +½" (+12.7mm) "A" dimension adjustment range.

Model F3QR56 Dry Horizontal Sidewall: FP Escutcheon - SIN R5734

Table J

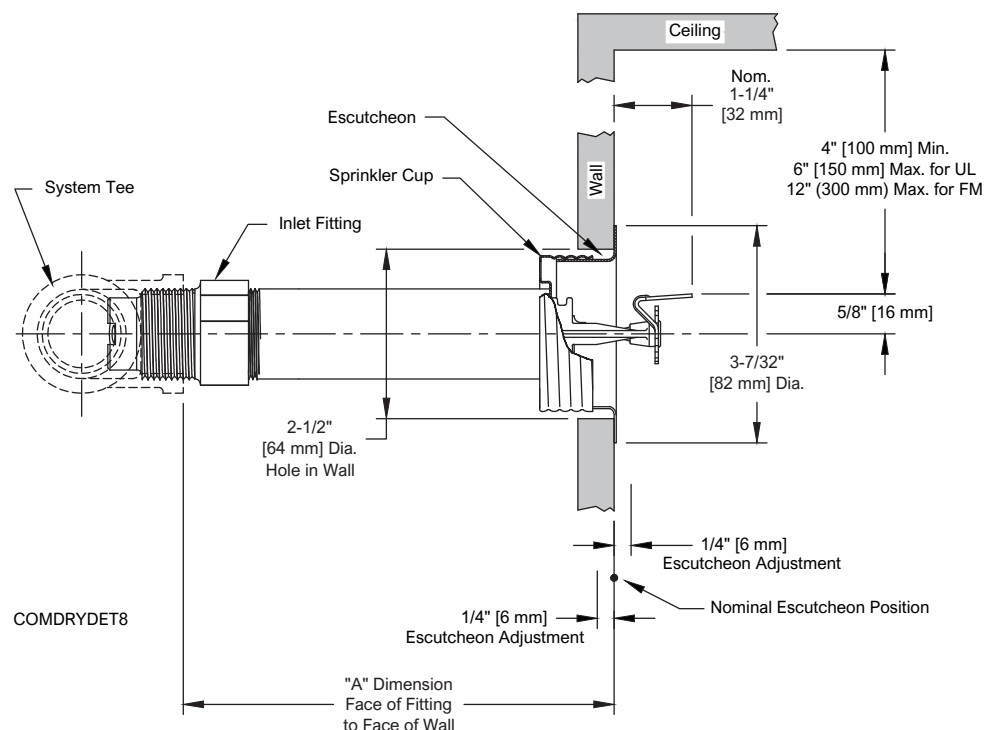
"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals (Light Hazard/HC-1 Only)	Sprinkler Guard
3½" to 48" (89mm to 1219mm) in 1¼" (6mm) increments for 1" connections or 3½" to 36" (89mm to 914mm) in 1¼" (6mm) increments for ¾" connections	Ordinary	155°F (68°C)	Red	cULus, FM	N/A
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with ¾" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Horizontal Sidewall: FP Escutcheon

Figure 9



Finish Combinations: FP Recessed	
Sprinkler ⁽¹⁾	Escutcheon ⁽³⁾⁽⁴⁾
Bronze	Brass
Chrome	Chrome
White Polyester ⁽²⁾	White Polyester
Black Polyester ⁽²⁾	Black Polyester
Custom Color Polyester ⁽²⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽²⁾⁽⁵⁾	Stainless Steel

Notes:

1. Cup for FP Recessed is unfinished galvanized steel except electroless nickel PTFE sprinklers which are provided with a stainless steel cup
2. UL Listed as Corrosion Resistant.
3. Escutcheons do not carry corrosion resistant listings.
4. Base material is cold rolled steel unless noted.
5. FM Approved as Corrosion Resistant.

Note: Do not install the Model F3QR56 Dry Horizontal Sidewall sprinkler with the Model FP escutcheon in walls which are positively pressurized with respect to the protected space.

Model F3QR56 Dry Horizontal Sidewall: F1 Escutcheon - SIN R5734

Table K

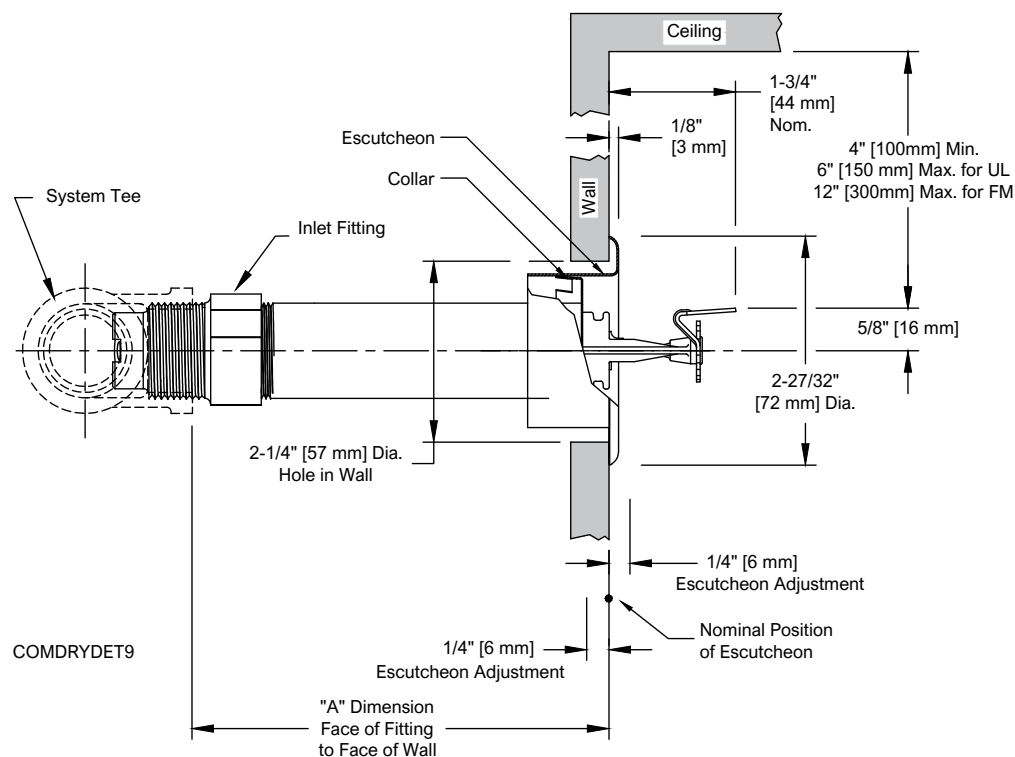
"A" Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals (Light Hazard/HC-1 Only)	Sprinkler Guard
3½" to 48" (89mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 3½" to 36" (89mm to 914mm) in 1/4" (6mm) increments for 3/4" connections	Ordinary	155°F (68°C)	Red	cULus, FM	N/A
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Horizontal Sidewall: F1 Escutcheon

Figure 10



Finish Combinations: F1 Recessed	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Brass
Chrome	Chrome
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾⁽⁴⁾	Stainless Steel

Notes:

1. UL Listed as Corrosion Resistant.
2. Escutcheons do not carry corrosion resistant listings.
3. Base material is cold rolled steel unless noted.
4. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Horizontal Sidewall: No Escutcheon - SIN R5734

Table L

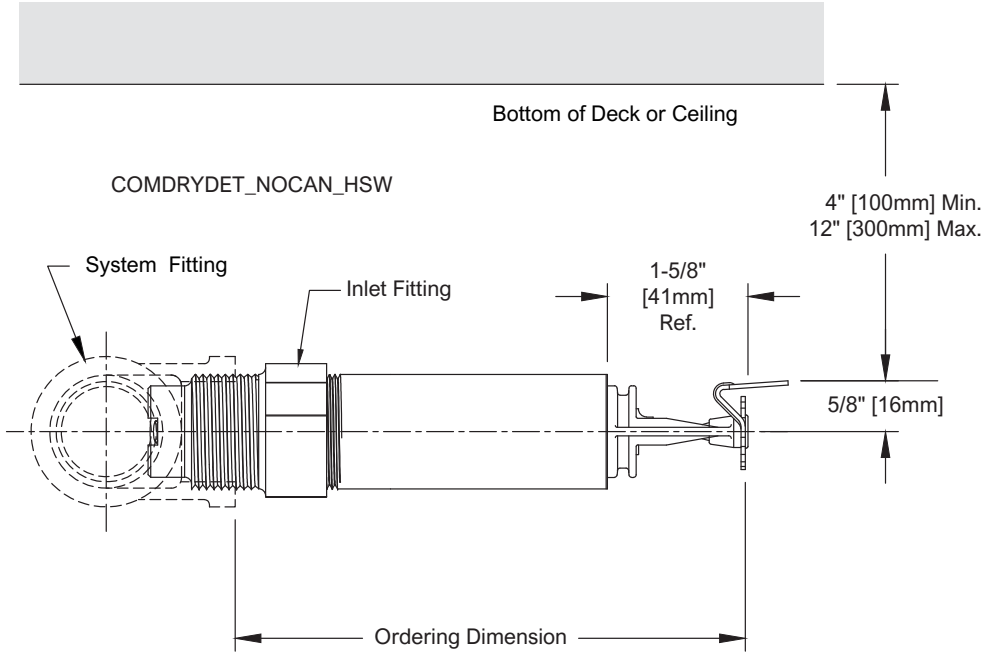
Order Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals (Light Hazard/HC-1 Only)	Sprinkler Guard
5" to 48" (127mm to 1219mm) in 1/4" (6mm) increments for 1" connections or 5" to 36" (127mm to 914mm) in 1/4" (6mm) increments for 3/4" connections	Ordinary	155°F (68°C)	Red	cULus, FM	C-2 (FM only)
	Intermediate	175°F (79°C)	Yellow	cULus	
		200°F (93°C)	Green	cULus, FM	
	High	286°F (141°C)	Blue	cULus, FM	



Note: Standard inlet fitting threads are 1" NPT or ISO7-R1. Inlet fitting is also available with 3/4" NPT and ISO-R3/4 threads for replacement of existing sprinklers (cULus Listed only).

Model F3QR56 Dry Horizontal Sidewall: No Escutcheon

Figure 11



Available Finishes: No Escutcheon	
Sprinkler	
Bronze	
Chrome	
White Polyester ⁽¹⁾	
Black Polyester ⁽¹⁾	
Custom Color Polyester ⁽¹⁾	
Electroless Nickel PTFE ⁽¹⁾⁽²⁾	

- Notes:**
- 1. UL Listed as Corrosion Resistant.
 - 2. FM Approved as Corrosion Resistant.

Note: Customer is responsible for determining the correct distance from the wall to the sprinkler deflector.

Model F3QR56 Dry Upright - SIN R5724

Table M

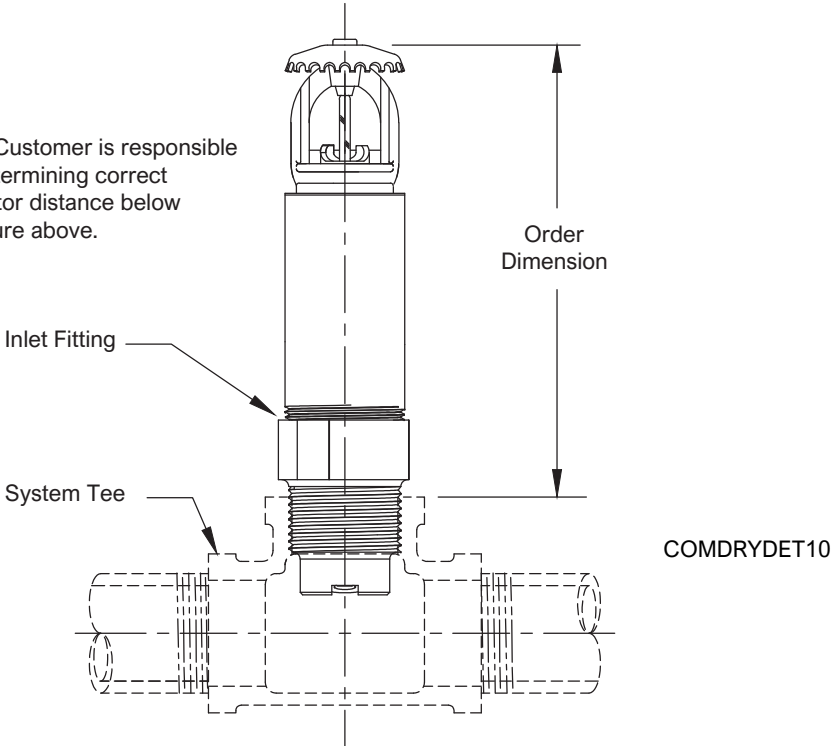
Order Dimension in (mm)	Temperature Classification	Temperature Rating °F (°C)	Glass Bulb Color	Approvals	Sprinkler Guard
5" to 48" (127 mm to 1219 mm)	Ordinary	155°F (68°C)	Red	cULus	N/A
	Intermediate	175°F (79°C)	Yellow		
		200°F (93°C)	Green		
	High	286°F (141°C)	Blue		



Model F3QR56 Dry Upright Sprinkler

Figure 12

Note: Customer is responsible for determining correct deflector distance below structure above.



Finish Combinations: Upright	
Sprinkler	Escutcheon
Bronze	NA
Electroless Nickel PTFE ⁽¹⁾	NA

- Notes:**
1. UL Listed as Corrosion Resistant.

Installation (General)

Dry sprinklers connected to wet pipe systems must be installed as indicated in Figure 14 and as required by NFPA 13 with the Exposed Minimum Barrel Length located in a heated area.

Reliable Model F3QR56 dry sidewall sprinklers may be installed in ductile or malleable cast iron threaded tees, or CPVC tees and adapters upon verification that the sprinkler inlet fitting does not interfere with the interior of the fitting (see Figure 15).

DO NOT install Reliable Model F3QR56 dry sidewall sprinklers into elbows or couplings, welded outlets, mechanical tees, or gasket sealed CPVC fittings.

See Figure 16 for acceptable and unacceptable installation practices.

F3QR56 with Standard Escutcheon

Cut a 2-1/8" (54mm) diameter hole in the wall as shown in Fig. 1. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model F3R installation wrench on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and sliding the escutcheon over the finished sleeve until tight to the finished surface.

F3QR56 with HB Escutcheon

Cut a 2-1/2" (64mm) diameter hole in the wall as shown in Fig. 2. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model F3R installation wrench on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and sliding the skirt over the finished sleeve until tight to the finished surface.

F3QR56 with FP Recessed Escutcheon

Cut a 2-5/8" (67mm) diameter hole in the wall as shown in Fig. 3. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model XLO2 installation wrench (see Fig. 13) on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and pushing (or threading) the FP escutcheon into the threaded cup. Final adjustment is made by turning the FP escutcheon clockwise until the flange makes full contact with the wall surface.

F3QR56 CCP Concealed Cover Plate

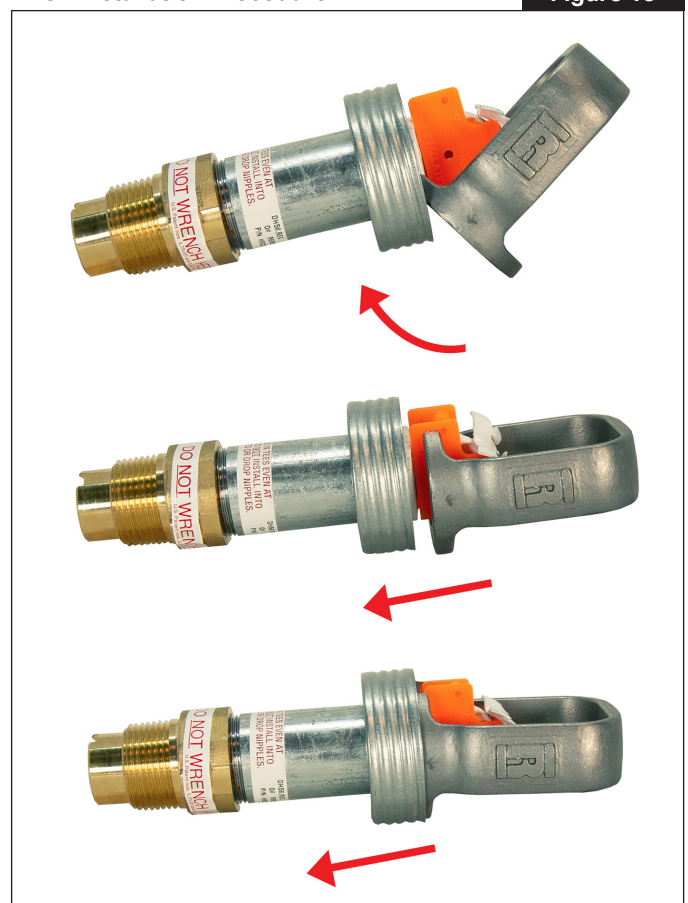
Cut a 2-5/8" (67mm) diameter hole in the wall as shown in Fig. 4. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model XLO2 installation wrench (see Fig. 13) on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and pushing (or threading) the SWC cover plate into the threaded cup. Final adjustment is made by turning the cover plate clockwise until the cover plate flange makes full contact with the finished surface.

Note:

1. The Model XLO2 installation wrench for recessed and concealed installations has a open side to accommodate the sprinkler deflector and can only be inserted in one way (see Figure 13). Care must be taken not to damage the deflector during installation.
2. Do not over-tighten sprinklers into fittings. It is recommended that Reliable dry sprinklers be installed using the wrench referenced in this bulletin. A pipe wrench may also be used to install dry sprinklers provided that it only engages the outer tube (steel pipe) of the assembly. Note that a pipe wrench will impart a large amount of torque into the final assembly. This torque will need to be matched or exceeded to remove the sprinkler at a later date. A leak free joint can normally be obtained by installing the sprinkler to a minimum torque of 22 ft-lb (30 N-m) after applying an appropriate thread sealant.
3. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling, and installation. Reliable installation wrenches are designed to install sprinklers while bulb protectors are in place. REMOVE THE PROTECTORS AT THE TIME THE SPRINKLER SYSTEM IS PLACED INTO SERVICE. Removal of the protectors before this time may leave the glass bulb vulnerable to damage. Remove protectors by undoing the clasp by hand. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.
4. Do not remove the wax fillet in the gap between the cup that supports the bulb and the wrenching boss.

XLO2 Installation Procedure

Figure 13



MINIMUM EXPOSED BARREL LENGTH WHEN CONNECTED TO WET PIPE SPRINKLER SYSTEM

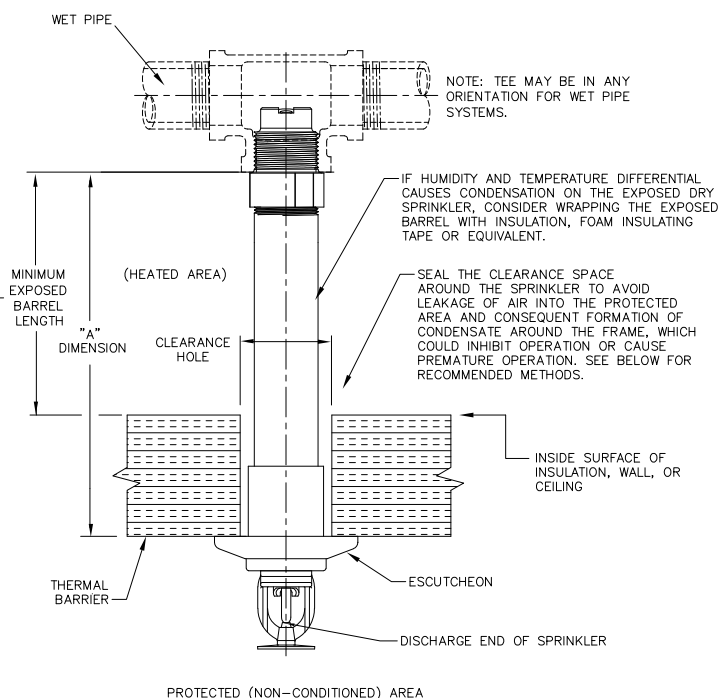
NOTE: STANDARD DRY PENDENT IS SHOWN, HOWEVER, MINIMUM EXPOSED BARREL LENGTH APPLIES TO ALL STYLES OF DRY SPRINKLERS CONNECTED TO A WET PIPE SYSTEM.

AMBIENT TEMPERATURE EXPOSED TO DISCHARGE END OF SPRINKLER*	EXPOSED BARREL AMBIENT TEMPERATURE		
	40°F/4°C	50°F/10°C	60°F/16°C
	EXPOSED MINIMUM BARREL LENGTH** (FACE OF FITTING TO TOP OF CEILING)***		
	IN. (MM)	IN. (MM)	IN. (MM)
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (300)	3 (75)	0
-10°F (-23°C)	14 (350)	4 (100)	1 (25)
-20°F (-29°C)	14 (350)	6 (150)	3 (75)
-30°F (-34°C)	16 (400)	8 (200)	4 (100)
-40°F (-40°C)	18 (450)	8 (200)	4 (100)
-50°F (-46°C)	20 (500)	10 (250)	6 (150)
-60°F (-51°C)	20 (500)	10 (250)	6 (150)

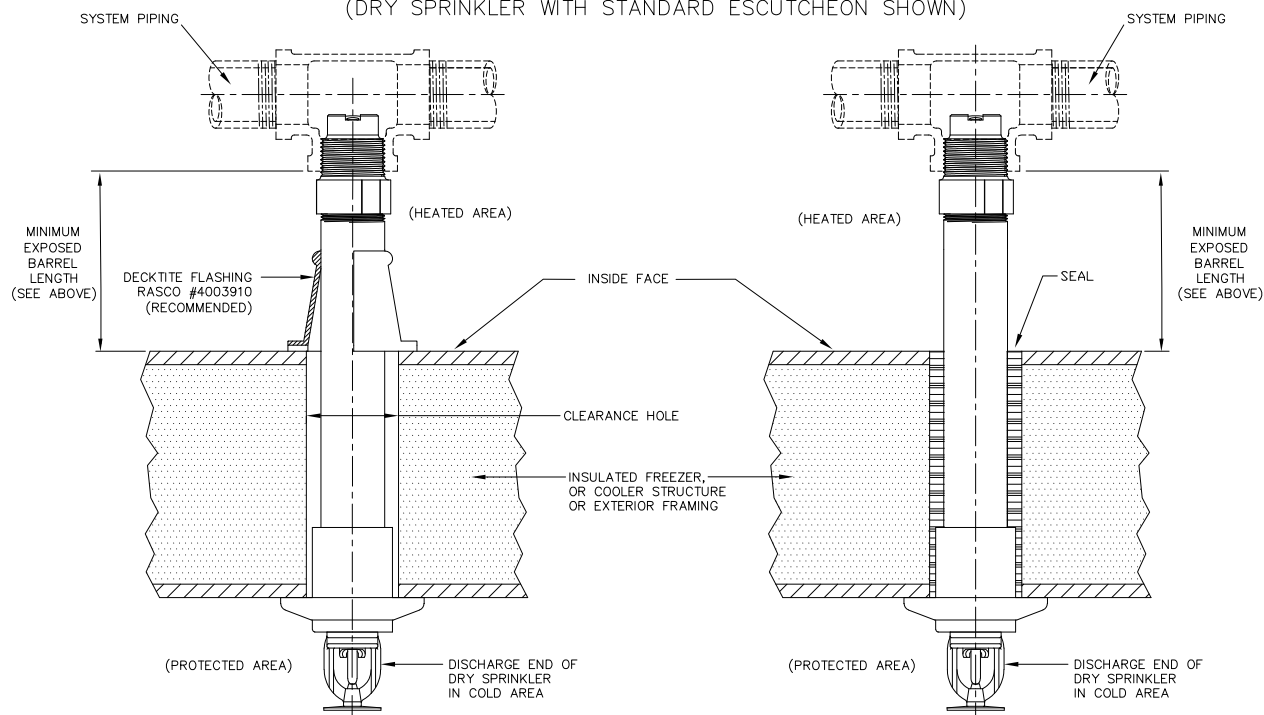
* FOR AMBIENT TEMPERATURES EXPOSED TO THE DISCHARGE END OF THE SPRINKLER THAT OCCUR BETWEEN THE VALUES LISTED, USE THE NEXT COOLER TEMPERATURE.

** THE MINIMUM EXPOSED BARREL LENGTH IS NOT THE SAME AS THE "A" DIMENSION. THE MINIMUM EXPOSED BARREL LENGTH IS BASED ON A PROPERLY SEALED PENETRATION WITH A MAXIMUM WIND VELOCITY ON THE EXPOSED SPRINKLER OF 30 MPH (48 KM/H). LONGER EXPOSED BARREL LENGTHS WILL HELP AVOID FREEZING OF THE WET PIPING WHERE HIGHER WIND VELOCITY IS EXPECTED.

*** THE MINIMUM EXPOSED BARREL LENGTH IS MEASURED FROM THE FACE OF THE FITTING TO THE INSIDE FACE OF THE INSULATION, WALL, OR CEILING LEADING TO THE COLD SPACE, WHICHEVER IS CLOSEST TO THE FITTING.



RECOMMENDED DRY SPRINKLER SEAL ARRANGEMENTS (DRY SPRINKLER WITH STANDARD ESCUTCHEON SHOWN)



COMDRYDET11

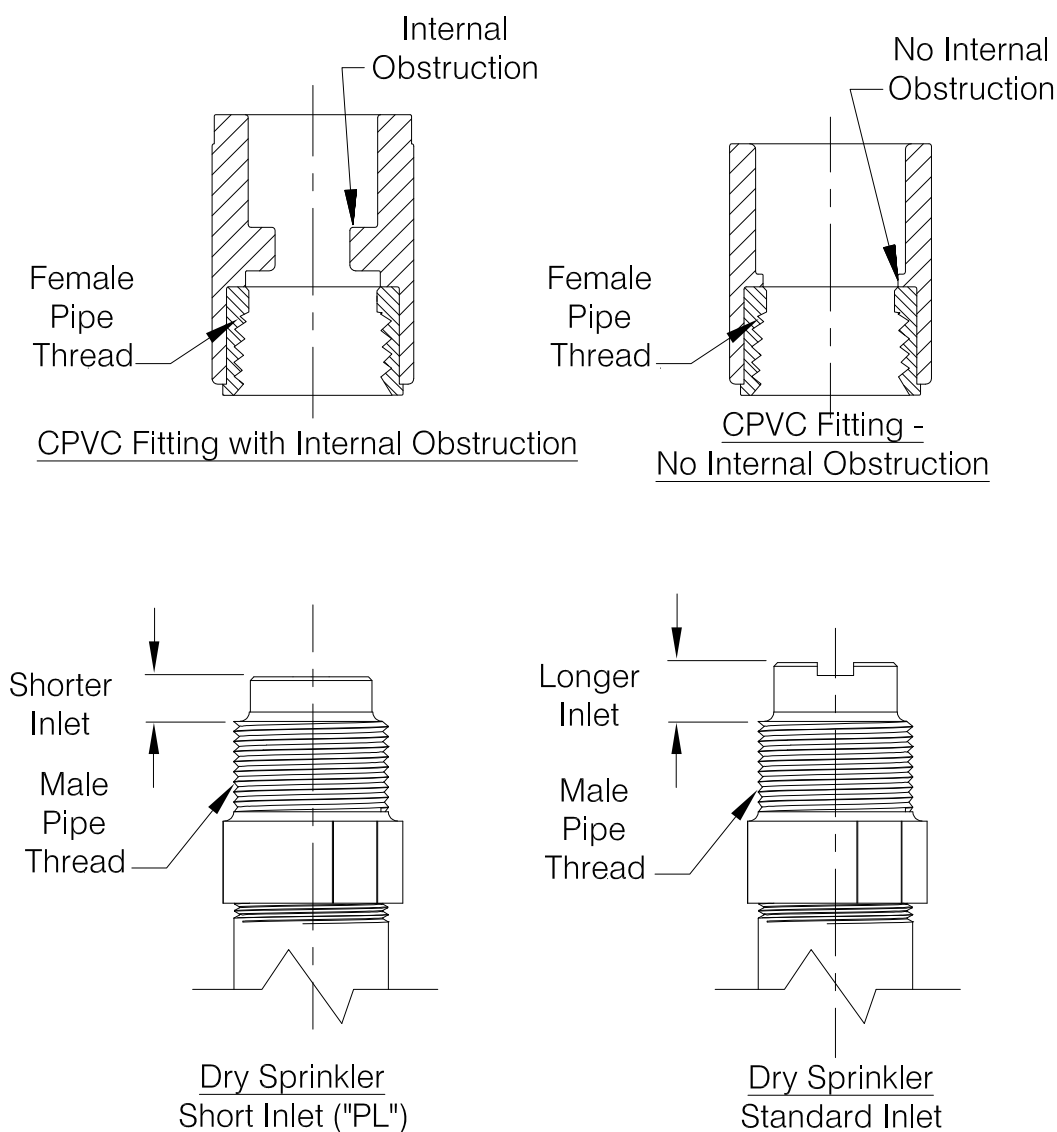
CAUTION

RELIABLE DRY SPRINKLERS MAY BE INSTALLED IN A LISTED CPVC SPRINKLER FITTING, ONLY UPON VERIFICATION THAT THE FITTING DOES NOT INTERFERE WITH THE SPRINKLER'S INLET.

Do not install dry sprinklers with standard inlets into CPVC fittings that have an internal obstruction; this will damage the sprinkler, the fitting, or both.

Short inlet ("PL") versions of Reliable dry sprinklers are available that may or may not be compatible with fittings having internal obstructions in existing installations. Sprinklers with the short inlet ("PL") should only be installed in CPVC fittings of wet-pipe systems.

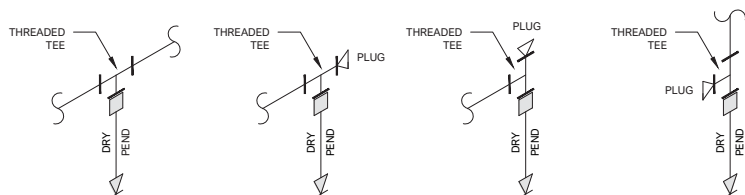
In all cases, verify sprinkler and fitting dimensions prior to installation to avoid interference.



BE SURE TO ORDER THE CORRECT SPRINKLERS FOR YOUR APPLICATION

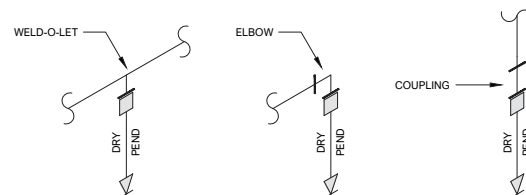
COMDRYDET2

ACCEPTABLE INSTALLATIONS FOR DRY PENDENT SPRINKLERS



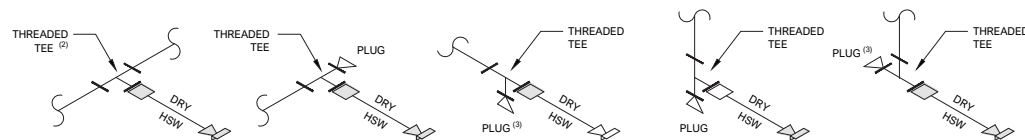
- NOTES:
1. EXPOSED LENGTH OF DRY BARREL INSIDE OF CONDITIONED SPACE TO BE IN ACCORDANCE WITH THIS BULLETIN AND NFPA 13.

UNACCEPTABLE INSTALLATIONS FOR DRY PENDENT SPRINKLERS



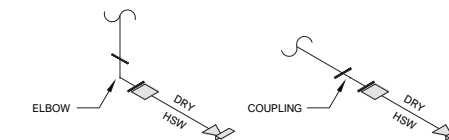
- NOTES:
1. IN ADDITION TO THE UNACCEPTABLE INSTALLATIONS ABOVE, DRY PENDENT SPRINKLERS SHALL NOT BE INSTALLED INTO MECHANICAL TEES (SADDLE OR U-BOLT STYLE), OR INTERNALLY GASKETED CPVC FITTINGS.

ACCEPTABLE INSTALLATIONS FOR DRY SIDEWALL SPRINKLERS



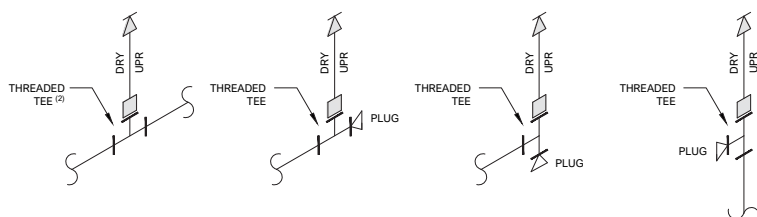
- NOTES:
1. EXPOSED LENGTH OF DRY BARREL INSIDE OF CONDITIONED SPACE TO BE IN ACCORDANCE WITH THIS BULLETIN AND NFPA 13.
 2. WELD-O-LETS IN COMPLIANCE WITH NFPA 13 REQUIREMENTS ALSO ACCEPTABLE FOR DRY SIDEWALL SPRINKLERS.
 3. PREFERRED ORIENTATION OF PLUG IS DOWN.

UNACCEPTABLE INSTALLATIONS FOR DRY SIDEWALL SPRINKLERS



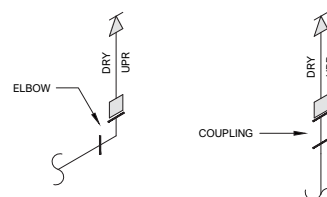
- NOTES:
1. IN ADDITION TO THE UNACCEPTABLE INSTALLATIONS ABOVE, DRY SIDEWALL SPRINKLERS SHALL NOT BE INSTALLED INTO MECHANICAL TEES (SADDLE OR U-BOLT STYLE), OR INTERNALLY GASKETED CPVC FITTINGS.

ACCEPTABLE INSTALLATIONS FOR DRY UPRIGHT SPRINKLERS

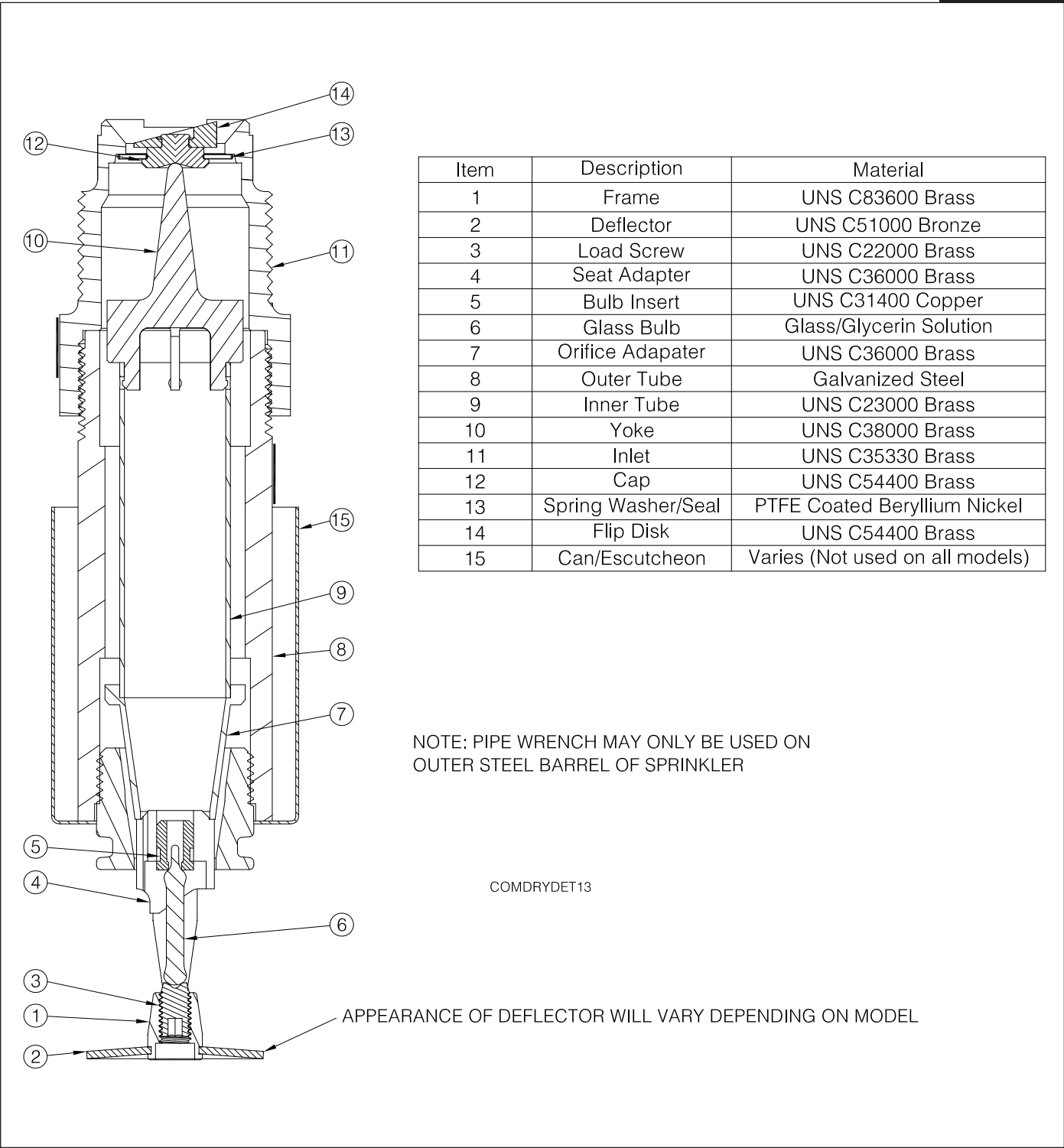


- NOTES:
1. EXPOSED LENGTH OF DRY BARREL INSIDE OF CONDITIONED SPACE TO BE IN ACCORDANCE WITH THIS BULLETIN AND NFPA 13.
 2. WELD-O-LETS IN COMPLIANCE WITH NFPA 13 REQUIREMENTS ALSO ACCEPTABLE FOR DRY UPRIGHT SPRINKLERS.

UNACCEPTABLE INSTALLATIONS FOR DRY UPRIGHT SPRINKLERS



- NOTES:
1. IN ADDITION TO THE UNACCEPTABLE INSTALLATIONS ABOVE, DRY UPRIGHT SPRINKLERS SHALL NOT BE INSTALLED INTO MECHANICAL TEES (SADDLE OR U-BOLT STYLE), OR INTERNALLY GASKETED CPVC FITTINGS.



Wrench Options



F3R Wrench
(Standard, HB, and No Escutcheon trims)



XLO2 Wrench
(FP Recessed, F1 Recessed, and CCP trims)

Maintenance

Reliable Model F3QR56 series sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25, as well as the requirements of any Authorities Having Jurisdiction. 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.

Do not clean sprinklers with soap and water, ammonia liquid or any other cleaning fluids. Remove dust by gentle vacuuming without touching the sprinkler.

Replace any sprinkler which has been painted (other than factory applied). A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Failure to properly maintain sprinklers may result in inadvertent operation or non-operation during a fire event.

Guarantee

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

Patents

US Patent No. 7,841,418

Ordering Information

Specify:

Model F3QR56 Dry Sprinkler

- Upright
- Pendent
- Horizontal Sidewall

Trim Style

- Standard Escutcheon
- HB Escutcheon
- FP Recessed Escutcheon
- F1 Recessed Escutcheon
- CCP Cover Plate (Pendent only)
- No Escutcheon

Temperature Rating

- See available temperatures (depending on trim style and approvals) on pages 2-13

Finish

- See available finish combinations (depending on trim style and approvals) on pages 2-13

Length

- For dry pendent and sidewall sprinklers with trim, "A" dimension is measured from face of fitting to face of finished ceiling or wall in 1/4" (6mm) increments.
- For dry upright sprinklers and sprinklers with no trim, order dimension is from face of fitting to deflector in 1/4" (6mm) increments.

Notes:

1. Lengths are based upon a normally gauged pipe thread "make-up" of .60 inch (15mm) per ANSI B2.1 (approximately 7-1/2 threads).

Installation Wrench

- Model F3R (Standard, HB, and No Escutcheon trims)
- Model XLO2 (FP Recessed, F1 Recessed & CCP trims)



Model F1Res Series Glass Bulb Residential Sprinklers

cULus Listed

Features

- cULus Listed Residential Sprinklers
- Available in pendent and horizontal sidewall orientations
- Decorative finishes available, including recessed escutcheons and conical concealed cover plates

Product Description

Model F1Res Series sprinklers are residential sprinklers with a 3 mm glass bulb operating element. A variety of K-Factors as well as recessed and conical concealed options are available as detailed in this Bulletin.

The F1Res Series sprinklers are specially engineered for fast thermal response to meet the requirements of UL 1626. They are intended for installation in accordance with NFPA 13, 13R, and 13D.

Model F1Res Series sprinklers are listed for use in wet systems only.

Application

Model F1Res Series sprinklers cULus Listed Residential sprinklers are intended for use in residential occupancies and residential portions of any occupancy in accordance with NFPA Standards 13, 13D, or 13R.

For NFPA 13R and NFPA 13D applications, the design flow and pressure shall not be less than the minimum flow and pressure specified in the Listed Design Criteria tables in this Bulletin.

Important! Reliable fire sprinklers must be handled, stored, and installed in accordance with the guidelines in Caution Sheet 310 and this bulletin. Failure to follow these instructions may result in unintended operation or nonoperation of the fire protection system.



For NFPA 13 applications, the design density shall be a minimum of 0.1 gpm/sf (4.1 mm/min) over the actual coverage area, but in no case shall the flow and pressure be less than the minimum flow and pressure specified in the Listed Design Criteria tables in this bulletin.

Residential Sprinkler Summary

Table A

Sprinkler Model	Sprinkler Identification Number (SIN)	Orientation	K-Factor gpm/psi ^{1/2} (lpm/bar ^{1/2})	Thread Size NPT or ISO7-1	Installation Options	Max. Coverage Area ft x ft (m x m)
F1Res30	R3511	Pendent	3.0 (43)	1/2	Pendent or Recessed	16 x 16 (4.9 x 4.9)
F1Res49	R3516	Pendent	4.9 (71)	1/2	Pendent or Recessed	20 x 20 (6.1 x 6.1)
F1Res58	R3513	Pendent	5.8 (84)	1/2	Pendent or Recessed	20 x 20 (6.1 x 6.1)
F1Res76	R7618	Pendent	7.6 (109)	3/4	Pendent or Recessed	20 x 20 (6.1 x 6.1)
F1Res30 CCP	R3511	Pendent	3.0 (43)	1/2	Conical Concealed	14 x 14 (4.3 x 4.3)
F1Res49 CCP	R3516	Pendent	4.9 (71)	1/2	Conical Concealed	20 x 20 (6.1 x 6.1)
F1Res58 CCP	R3513	Pendent	5.8 (84)	1/2	Conical Concealed	20 x 20 (6.1 x 6.1)
F1Res76 CCP	R7618	Pendent	7.6 (109)	3/4	Conical Concealed	20 x 20 (6.1 x 6.1)
F1Res44 HSW	R3531	Horizontal Sidewall	4.4 (63)	1/2	Recessed	16 x 20 (4.9 x 6.1)
F1Res44 SWC	R3531	Horizontal Sidewall	4.4 (63)	1/2	Conical Concealed	16 x 20 (4.9 x 6.1)
F1Res58 HSW	R3533	Horizontal Sidewall	5.8 (84)	1/2	Recessed	16 x 20 (4.9 x 6.1)
F1Res 58 HSWX	RA3533	Horizontal Sidewall	5.8 (84)	1/2	Recessed	14 x 26 (4.3 x 7.9)

Note: Please note SIN difference between F1Res58 HSW (R3533) and F1Res58 HSWX (RA3533).

Model F1Res30 Residential Pendant Sprinkler & Model F2 Escutcheon

SIN R3511

Technical Specifications

Style: Pendant and Recessed Pendant

Threads: 1/2" NPT or ISO7-1R1/2

Nominal K-Factor: 3.0 (43 metric)

Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb

Sprinkler Frame: Brass Alloy

Button: Copper Alloy

Sealing Assembly: Nickel Alloy with PTFE

Load Screw: Bronze Alloy

Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

Recessed Escutcheons

F2 Recessed

Sprinkler Wrenches

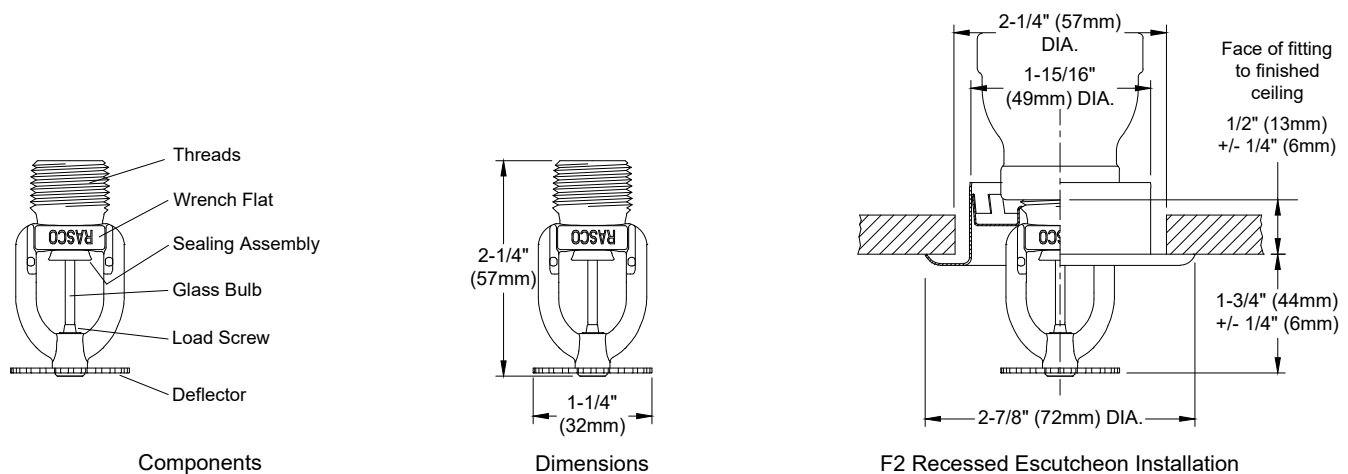
Model W2

Model W1 (Recessed)



Model F1Res30 Residential Pendant Sprinkler Components and Installation Dimensions

Figure 1



Model F1Res30 Residential Pendant Sprinkler Hydraulic Design Criteria

Table B

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft.(m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
12 x 12 (3.7 x 3.7)	8 (30)	7.0 (0.48)	1 to 4 inches (25 to 100 mm)
14 x 14 (4.3 x 4.3)	10 (38)	11.0 (0.76)	
15 x 15 (4.6 x 4.6)	12 (45)	16.0 (1.1)	
16 x 16 (4.9 x 4.9)	13 (49)	18.8 (1.3)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.

Technical Specifications

Style: Pendent and Recessed Pendent
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 4.9 (71 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass-bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

Recessed Escutcheons

F1 Recessed

F2 Recessed

Sprinkler Wrenches

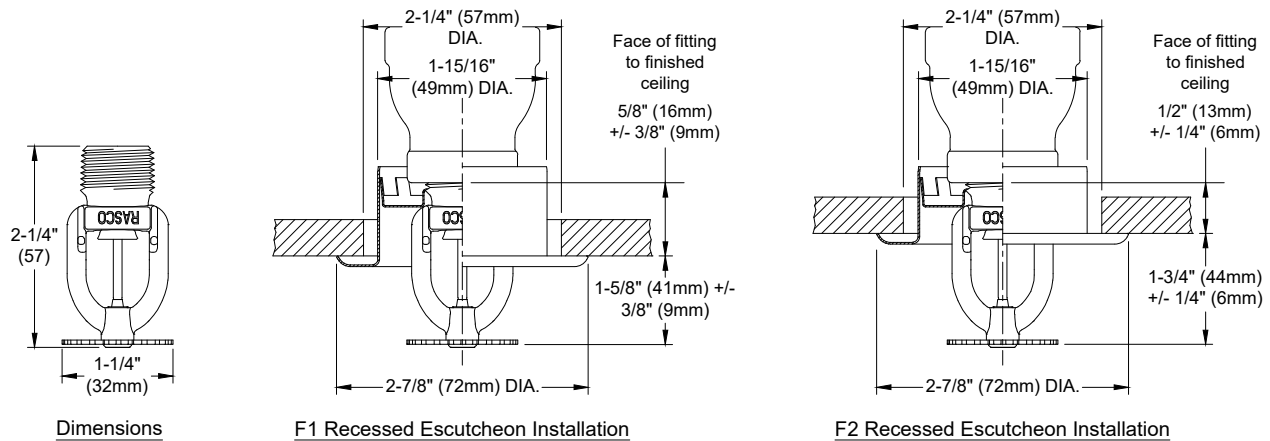
Model W2

Model W1 (Recessed)



Model F1Res49 Residential Pendent Sprinkler Components and Installation Dimensions

Figure 2



Model F1Res49 Residential Pendent Sprinkler Hydraulic Design Criteria

Table C

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
12 x 12 (3.7 x 3.7)	13 (49)	7.0 (0.48)	1 to 4 inches (25 to 100 mm)
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)	12.0 (0.83)	
20 x 20 (6.1 x 6.1)	20 (76)	16.7 (1.15)	
12 x 12 (3.7 x 3.7)	15 (57)	9.4 (0.65)	4 to 8 inches (100 to 200 mm)
14 x 14 (4.3 x 4.3)	16 (61)	10.7 (0.74)	
16 x 16 (4.9 x 4.9)	17 (64)	12.0 (0.83)	
18 x 18 (5.5 x 5.5)	19 (72)	15.0 (1.03)	
20 x 20 (6.1 x 6.1)	22 (83)	20.2 (1.39)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.

Technical Specifications

Style: Pendent and Recessed Pendent
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.8 (84 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

Recessed Escutcheons

F1 Recessed

F2 Recessed

Sprinkler Wrenches

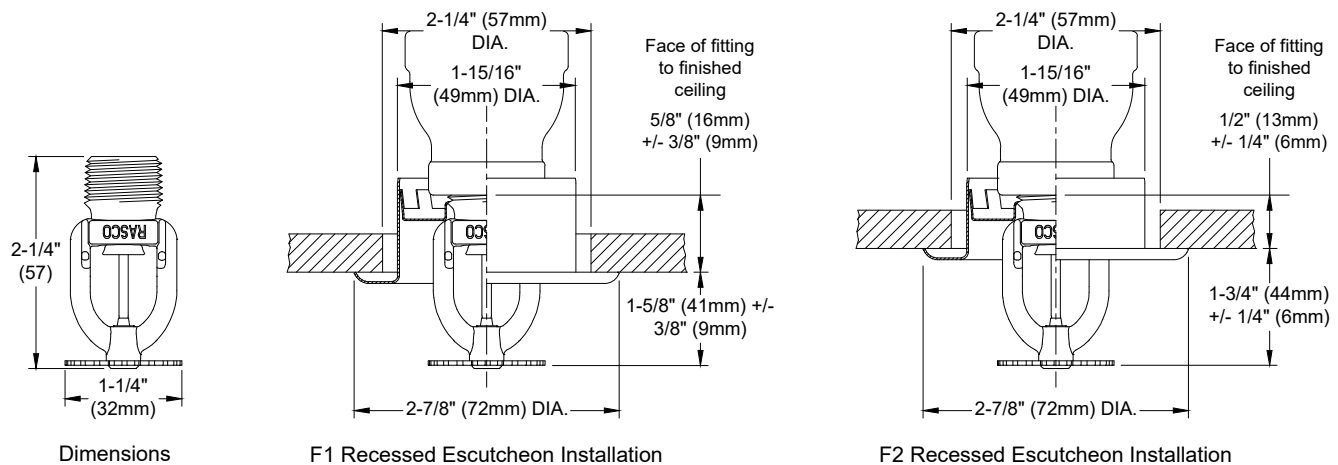
Model W2

Model W1 (Recessed)



Model F1Res58 Residential Pendent Sprinkler Components and Installation Dimensions

Figure 3



Model F1Res58 Residential Pendent Sprinkler Hydraulic Design Criteria

Table D

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
16 x 16 (4.9 x 4.9)	16 (61)	7.6 (0.52)	1 to 4 inches (25 to 100 mm)
18 x 18 (5.5 x 5.5)	19 (72)	10.8 (0.75)	
20 x 20 (6.1 x 6.1)	22 (83)	14.4 (1.0)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.

Technical Specifications

Style: Pendant and Recessed Pendant
Threads: 3/4" NPT or ISO7-1R3/4
Nominal K-Factor: 7.6 (109 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

Recessed Escutcheons

F1 Recessed

F2 Recessed

Sprinkler Wrenches

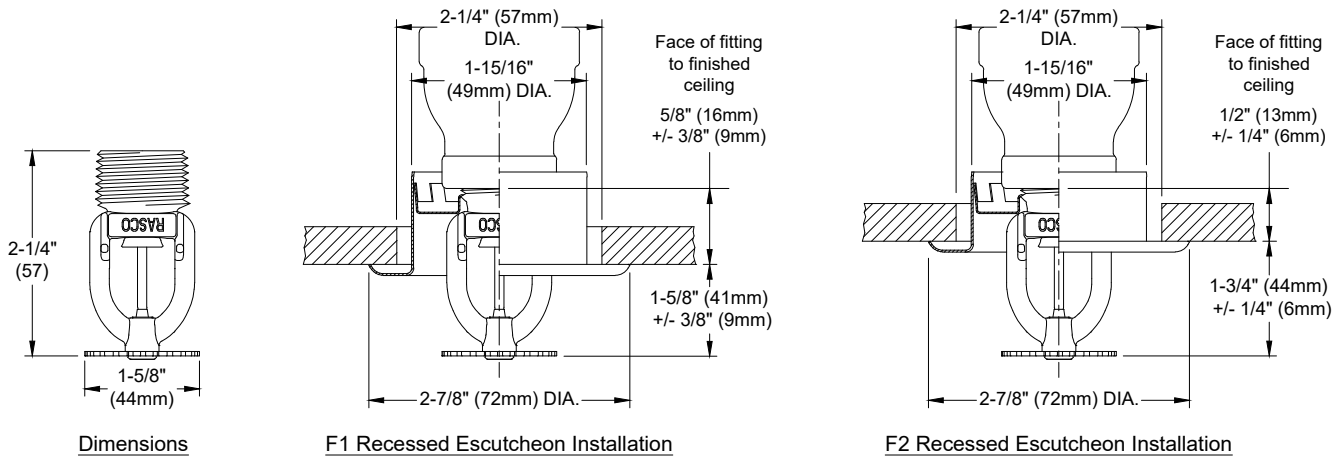
Model W2

Model W1 (Recessed)



Model F1Res76 Residential Pendant Sprinkler Components and Installation Dimensions

Figure 4



Model F1Res76 Residential Pendant Sprinkler Hydraulic Design Criteria

Table E

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
18 x 18 (5.5 x 5.5)	21 (80)	7.6 (0.52)	1 to 4 inches (25 to 100 mm)
20 x 20 (6.1 x 6.1)	23 (87)	9.2 (0.63)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.

Model F1Res30 CCP Conical Concealed Pendant & Model FP Recessed Escutcheon Pendant Sprinkler

SIN R3511

Technical Specifications

Style: Conical Concealed Pendant and Recessed Pendant
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 3.0 (43 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

Recessed Escutcheons/Cover Plates

CCP Conical Concealed Plate 135°F (57°C)*
FP Recessed*

Sprinkler Wrenches

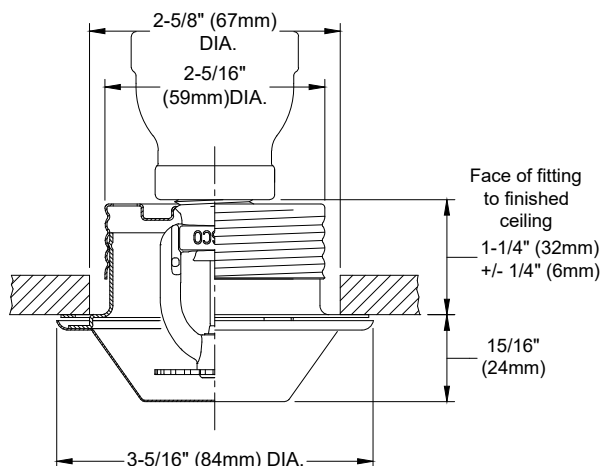
Model W1



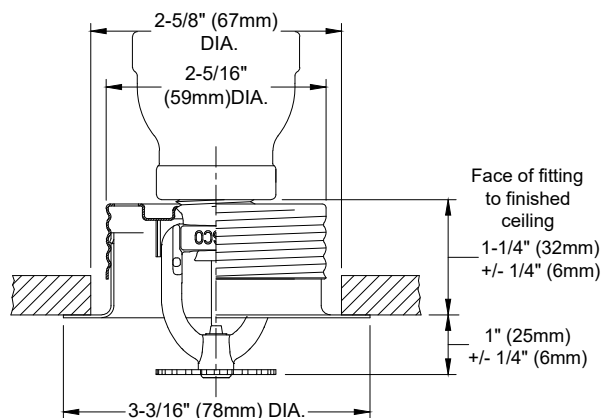
***Note:** Model F1Res sprinklers with Model FP recessed escutcheon or Model CCP cover plate may not be used where the pressure above the ceiling is positive with respect to the protected area. Ensure openings in the sprinkler cup are unobstructed following installation.

Model F1Res30 CCP and FP Recessed Pendant Sprinkler Installation Dimensions

Figure 5



CCP Recessed Escutcheon Installation



FP Recessed Escutcheon Installation

Model F1Res30 CCP Pendant & FP Recessed Pendant Sprinkler Hydraulic Design Criteria

Table F

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
12 x 12 (3.7 x 3.7)	8 (30)	7.0 (0.48)	1/2 to 1 inch (13 to 25 mm)
14 x 14 (4.3 x 4.3)	11 (38)	13.4 (0.92)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- The sprinkler must be installed into a ceiling with the listed cover plate installed.

Technical Specifications

Style: Conical Concealed Pendent and Recessed Pendent
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 4.9 (71 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

Recessed Escutcheons/Cover Plates

CCP Conical Concealed Plate 135°F (57°C)*
 FP Recessed*

Sprinkler Wrenches

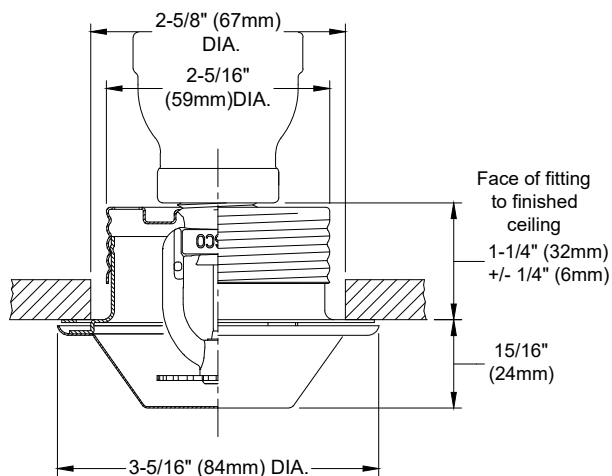
Model W1



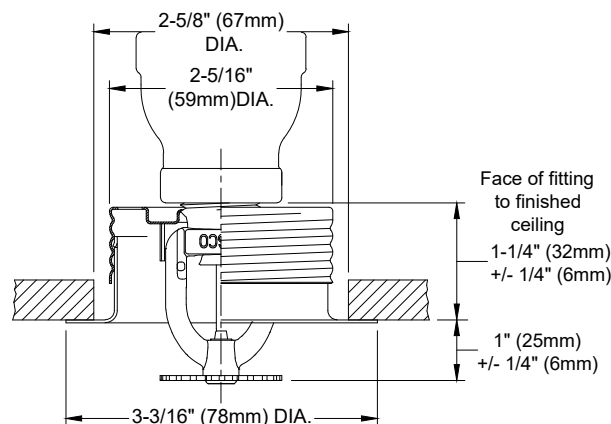
***Note:** Model F1Res sprinklers with Model FP recessed escutcheon or Model CCP cover plate may not be used where the pressure above the ceiling is positive with respect to the protected area. Ensure openings in the sprinkler cup are unobstructed following installation.

Model F1Res49 CCP & FP Recessed Pendent Sprinkler Installation Dimensions

Figure 6



CCP Recessed Escutcheon Installation



FP Recessed Escutcheon Installation

Model F1Res49 CCP Pendent and FP Recessed Pendent Hydraulic Design Criteria

Table G

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
14 x 14 (4.3 x 4.3)	13 (49)	7.0 (0.48)	1/2 to 1 inch (13 to 25 mm)
16 x 16 (4.9 x 4.9)	14 (53)	8.2 (0.57)	
18 x 18 (5.5 x 5.5)	18 (68)	13.5 (0.93)	
20 x 20 (6.1 x 6.1)	20 (76)	16.7 (1.15)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- The sprinkler must be installed into a ceiling with the listed cover plate installed.

Technical Specifications

Style: Conical Concealed Pendent and Recessed Pendent
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.8 (84 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

Recessed Escutcheons/Cover Plates

CCP Conical Concealed Plate 135°F (57°C)*
 FP Recessed*

Sprinkler Wrenches

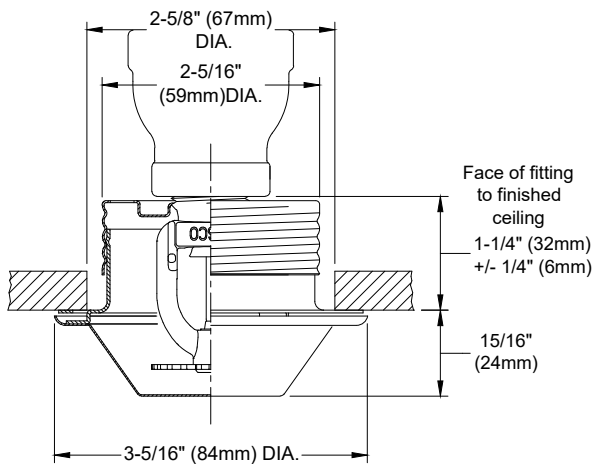
Model W1



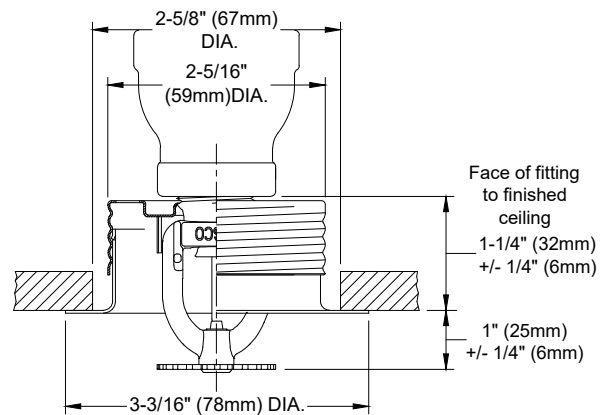
***Note:** Model F1Res sprinklers with Model FP recessed escutcheon or Model CCP cover plate may not be used where the pressure above the ceiling is positive with respect to the protected area. Ensure openings in the sprinkler cup are unobstructed following installation.

Model F1Res58 CCP and FP Recessed Pendent Sprinkler Installation Dimensions

Figure 7



CCP Recessed Escutcheon Installation



FP Recessed Escutcheon Installation

Model F1Res58 CCP Pendent & FP Recessed Pendent Hydraulic Design Criteria

Table H

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
16 x 16 (4.9 x 4.9)	16 (61)	7.6 (0.52)	1/2 to 1 inch (13 to 25 mm)
18 x 18 (5.5 x 5.5)	19 (72)	10.8 (0.75)	
20 x 20 (6.1 x 6.1)	22 (83)	14.4 (1.0)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- The sprinkler must be installed into a ceiling with the listed cover plate installed.

Technical Specifications

Style: Conical Concealed Pendent and Recessed Pendent
Threads: 3/4" NPT or ISO7-1R3/4
Nominal K-Factor: 7.6 (109 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

Recessed Escutcheons/Cover Plates

CCP Conical Concealed Plate 135°F (57°C)*
 FP Recessed*

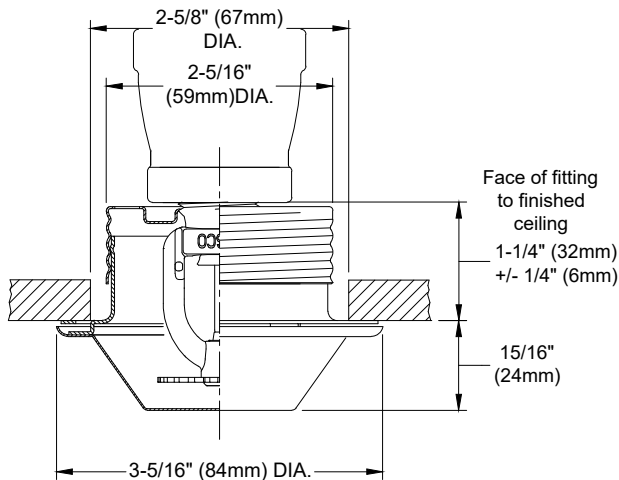
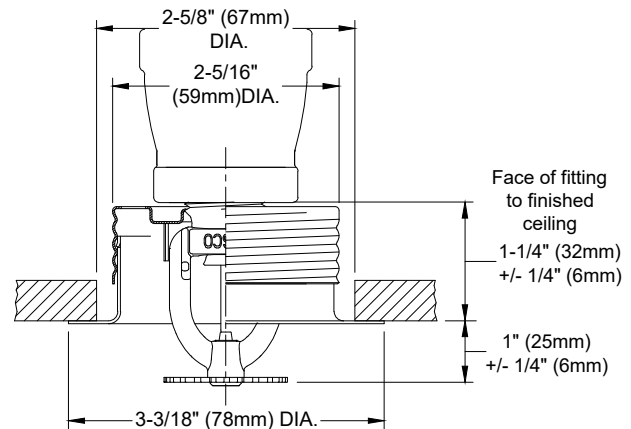
Sprinkler Wrenches

Model W1



***Note:** Model F1Res sprinklers with Model FP recessed escutcheon or Model CCP cover plate may not be used where the pressure above the ceiling is positive with respect to the protected area. Ensure openings in the sprinkler cup are unobstructed following installation.

Model F1Res76 CCP and FP Recessed Pendent Sprinkler Installation Dimensions

Figure 8

CCP Recessed Escutcheon Installation

FP Recessed Escutcheon Installation

Model F1Res76 CCP Pendent & FP Recessed Pendent Hydraulic Design Criteria

Table I

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
16 x 16 (4.9 x 4.9)	21 (80)	7.6 (0.52)	1/2 to 1 inch (13 to 25 mm)
18 x 18 (5.5 x 5.5)	22 (83)	8.4 (0.58)	
20 x 20 (6.1 x 6.1)	25 (95)	10.8 (0.75)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- The sprinkler must be installed into a ceiling with the listed cover plate installed.

Technical Specifications**Style:** Sidewall and Recessed Sidewall**Threads:** 1/2" NPT or ISO7-1R1/2**Nominal K-Factor:** 4.4 (63 metric)**Max. Working Pressure:** 175 psi (12 bar)**Material Specifications****Thermal Sensor:** 3 mm glass bulb**Sprinkler Frame:** Brass Alloy**Button:** Copper Alloy**Sealing Assembly:** Nickel Alloy with PTFE**Load Screw:** Bronze Alloy**Deflector:** Bronze Alloy**Finishes**

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

Recessed Escutcheons

F2 Recessed

Sprinkler Wrenches

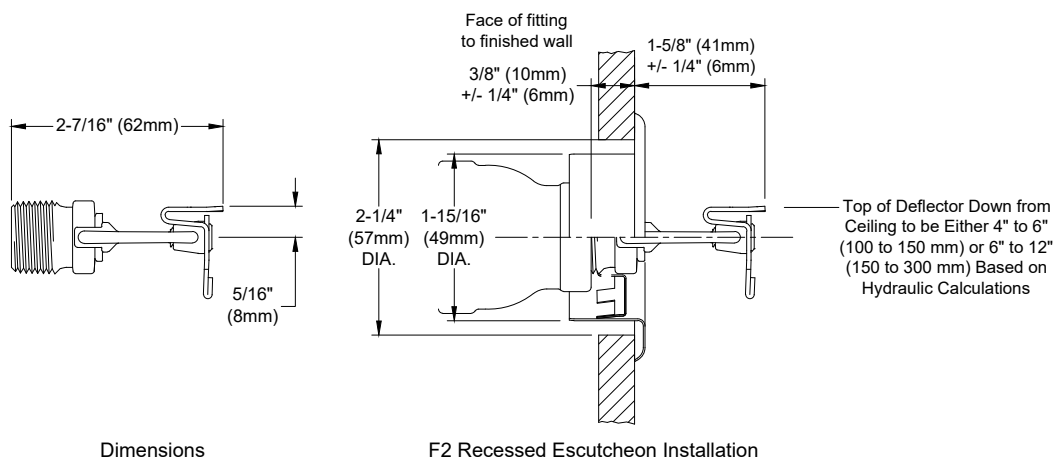
Model W2

Model W1 (Recessed)



Model F1Res44 Horizontal Sidewall Sprinkler Installation Dimensions

Figure 9



Model F1Res44 Horizontal Sidewall Sprinkler Hydraulic Design Criteria

Table J

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
12 x 12 (3.7 x 3.7)	12 (45)	7.5 (0.52)	4 to 6 inches (100 to 150 mm)
14 x 14 (4.3 x 4.3)	14 (53)	10.2 (0.70)	
15 x 15 (4.6 x 4.6)	15 (57)	11.6 (0.80)	
16 x 16 (4.9 x 4.9)	16 (61)	13.3 (0.92)	
16 x 18 (4.9 x 5.5) ⁽³⁾	21 (79)	22.8 (1.57)	
18 x 18 (5.5 x 5.5) ⁽³⁾	21 (79)	22.8 (1.57)	
16 x 20 (4.9 x 6.1)	23 (87)	27.4 (1.89)	
12 x 12 (3.7 x 3.7)	14 (53)	10.2 (0.7)	6 to 12 inches (150 to 300 mm)
14 x 14 (4.3 x 4.3)	16 (61)	13.2 (0.91)	
15 x 15 (4.6 x 4.6)	16 (61)	13.2 (0.91)	
16 x 16 (4.9 x 4.9)	17 (64)	15.0 (1.03)	
16 x 18 (4.9 x 5.5) ⁽³⁾	21 (79)	22.8 (1.57)	
16 x 20 (4.9 x 6.1)	23 (87)	27.4 (1.89)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- Previous versions of this bulletin specify different minimum flow rates for some spacings for the Model F1Res44 Horizontal Sidewall sprinkler. Please contact Reliable Technical Services for additional information.

Model F1Res44 SWC Conical Concealed Horizontal Sidewall Sprinkler

SIN R3531

Technical Specifications

Style: Conical Concealed Sidewall
Threads: 1/2" NPT or ISO 7-1 R1/2
Nominal K-Factor: 4.4 (63 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass-bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

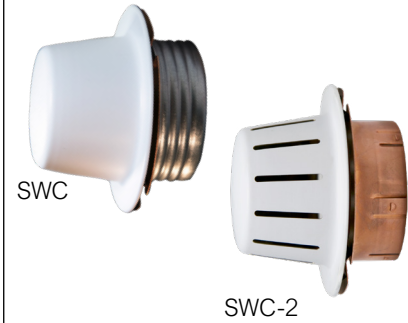
155°F (68°C)
175°F (79°C) ⁽¹⁾

Cover Plates

SWC Conical Concealed Plate⁽²⁾
SWC-2 (Slotted) Conical Concealed Plate⁽³⁾

Sprinkler Wrenches

Model W1



Note:

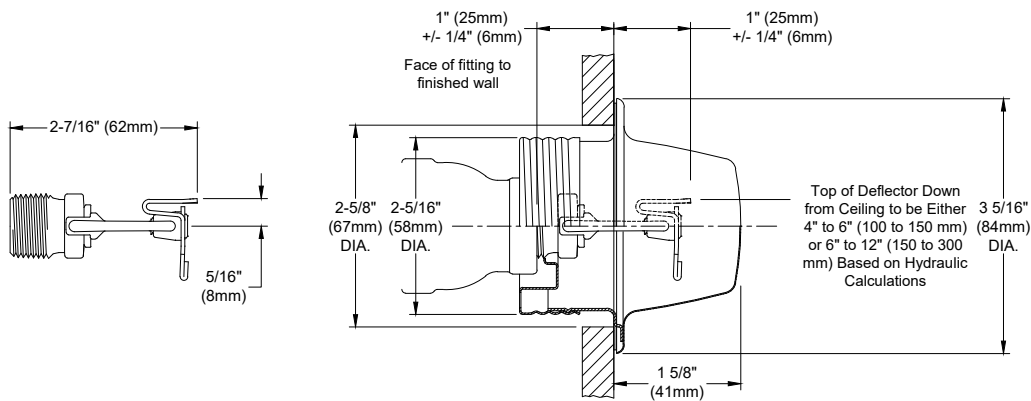
⁽¹⁾ Not for installation where the maximum ceiling temperature exceeds 100°F due to cover plate temperature rating.

⁽²⁾ 135°F SWC Conical Concealed Plate for 155°F (68°C) sprinklers

⁽³⁾ 135°F SWC-2 (Slotted) Conical Concealed Plate for 175°F (79°C) sprinklers

Model F1Res44 SWC Conical Concealed Horizontal Sidewall Sprinkler and Installation Dimensions

Figure 10



Dimensions

SWC & SWC-2 Concealed Cover Plate Installation

Note: Model F1Res44 sprinklers with SWC cover plate may not be used where the pressure behind the sprinkler is positive with respect to the pressure in the protected area. Ensure that openings in the sprinkler cup are unobstructed following installation.

Model F1Res44 SWC Conical Concealed Horizontal Sidewall Sprinkler Hydraulic Design Criteria

Table K

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾					
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Ordinary Temperature Rating 155°F (68°C)		Intermediate Temperature Rating 175°F (79°C)		Deflector to Ceiling Distance
	Flow gpm (l/min)	Pressure psi (bar)	Flow gpm (l/min)	Pressure psi (bar)	
12 x 12 (3.7 x 3.7)	13 (49)	8.7 (0.60)	14 (53)	10.2 (0.7)	4 to 6 inches (100 to 150 mm)
14 x 14 (4.3 x 4.3)	14 (53)	10.2 (0.7)	14 (53)	10.2 (0.7)	
15 x 15 (4.6 x 4.6)	16 (61)	13.2 (0.91)	--	--	
16 x 16 (4.9 x 4.9)	17 (64)	15.0 (1.03)	--	--	
16 x 18 (4.9 x 5.5) ⁽³⁾	21 (79)	22.8 (1.57)	--	--	
16 x 20 (4.9 x 6.1)	23 (87)	27.4 (1.89)	--	--	6 to 12 inches (150 to 300 mm)
12 x 12 (3.7 x 3.7)	14 (53)	10.2 (0.7)	--	--	
14 x 14 (4.3 x 4.3)	15 (57)	11.7 (0.81)	--	--	
15 x 15 (4.6 x 4.6)	17 (64)	15.0 (1.03)	--	--	
16 x 16 (4.9 x 4.9)	18 (68)	16.8 (1.16)	--	--	
16 x 18 (4.9 x 5.5) ⁽³⁾	21 (79)	22.8 (1.57)	--	--	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- Previous versions of this bulletin specify different minimum flow rates for some spacings for the Model F1Res44 Horizontal Sidewall sprinkler. Please contact Reliable Technical Services for additional information.

Technical Specifications

Style: Sidewall and Recessed Sidewall
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.8 (84 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

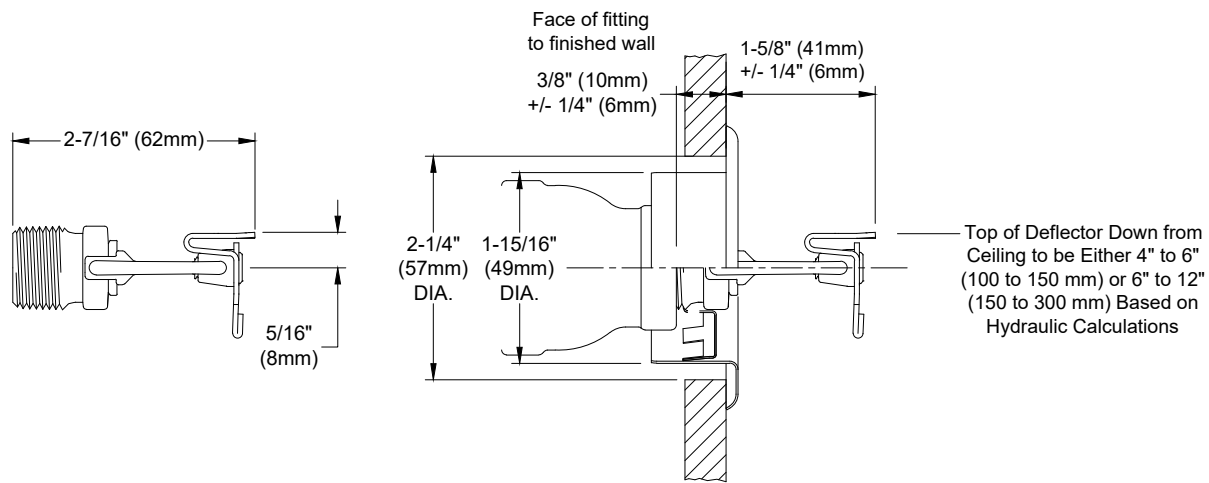
Recessed Escutcheons

F2 Recessed

Sprinkler Wrenches

Model W2

Model W1 (Recessed)

**Model F1Res58 Residential Horizontal Sidewall Sprinkler Installation Dimensions****Figure 11**DimensionsF2 Recessed Escutcheon Installation**Model F1Res58 Horizontal Sidewall Sprinkler Hydraulic Design Criteria****Table L**

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
12 x 12 (3.7 x 3.7)	16 (61)	7.6 (0.52)	4 to 6 inches (100 to 150 mm)
14 x 14 (4.3 x 4.3)	18 (68)	9.7 (0.66)	
15 x 15 (4.6 x 4.6)	19 (72)	10.7 (0.74)	
16 x 16 (4.9 x 4.9)	21 (80)	13.2 (0.91)	
16 x 18 (4.9 x 5.5)	25 (95)	18.6 (1.28)	
16 x 20 (4.9 x 6.1)	29 (110)	25.0 (1.72)	
12 x 12 (3.7 x 3.7)	22 (83)	14.4 (1.0)	6 to 12 inches (150 to 300 mm)
14 x 14 (4.3 x 4.3)	22 (83)	14.4 (1.0)	
15 x 15 (4.6 x 4.6)	24 (91)	17.1 (1.18)	
16 x 16 (4.9 x 4.9)	26 (98)	20.1 (1.39)	
16 x 18 (4.9 x 5.5)	31 (117)	28.6 (1.97)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- Please note SIN difference between F1Res58 HSW (R3533) and F1Res58 HSWX (RA3533).

Model F1Res58 HSWX Horizontal Sidewall Sprinkler & Model F2 Recessed Escutcheon

SIN RA3533

Technical Specifications

Style: Sidewall and Recessed Sidewall
Threads: 1/2" NPT or ISO7-1R1/2
Nominal K-Factor: 5.8 (84 metric)
Max. Working Pressure: 175 psi (12 bar)

Material Specifications

Thermal Sensor: 3 mm glass bulb
Sprinkler Frame: Brass Alloy
Button: Copper Alloy
Sealing Assembly: Nickel Alloy with PTFE
Load Screw: Bronze Alloy
Deflector: Bronze Alloy

Finishes

(See Table N)

Sensitivity

Fast-response

Temperature Ratings

155°F (68°C)

175°F (79°C)

Recessed Escutcheons

F2 Recessed

Sprinkler Wrenches

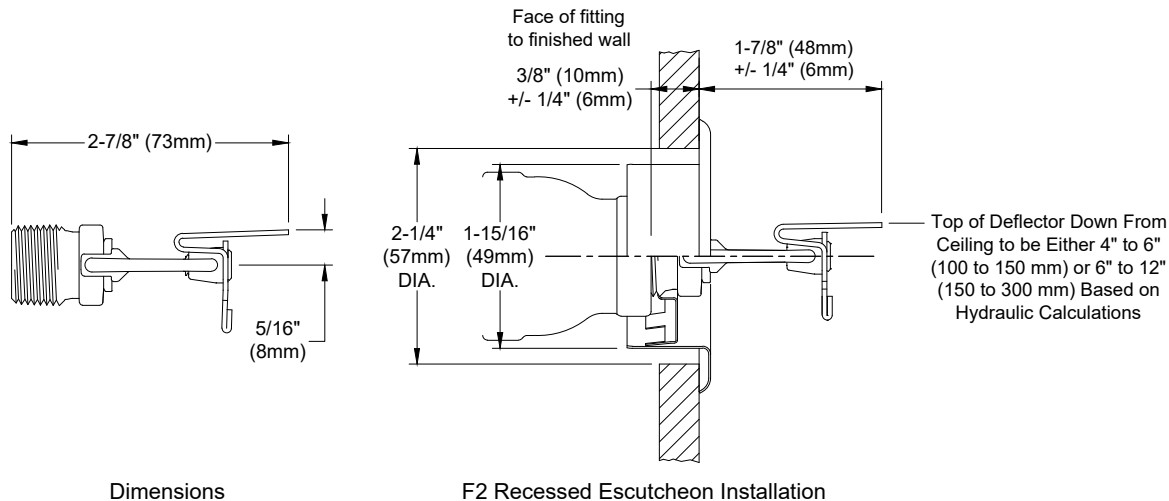
Model W2

Model W1 (Recessed)



Model F1Res58 HSWX Residential Horizontal Sidewall Sprinkler Installation Dimensions

Figure 12



Dimensions

F2 Recessed Escutcheon Installation

Model F1Res58 HSWX Horizontal Sidewall Sprinkler Hydraulic Design Criteria

Table M

Minimum Flow and Residual Pressure in Wet Pipe Systems ⁽¹⁾			
Maximum Coverage Area ⁽²⁾ ft. x ft. (m x m)	Flow gpm (l/min)	Pressure psi (bar)	Deflector to Ceiling Distance
18 x 20 (5.5 x 6.1)	30 (114)	26.8 (1.85)	4 to 6 inches (100 to 150 mm)
20 x 20 (6.1 x 6.1)	30 (114)	26.8 (1.85)	
16 x 22 (4.9 x 6.7)	33 (125)	32.4 (2.23)	
16 x 24 (4.9 x 7.3)	38 (144)	42.9 (2.96)	
14 x 26 (4.3 x 7.9)	42 (160)	52.4 (3.63)	6 to 12 inches (150 to 300 mm)
18 x 20 (5.5 x 6.1)	35 (133)	36.4 (2.51)	
16 x 22 (4.9 x 6.7)	38 (144)	42.9 (2.96)	
16 x 24 (4.9 x 7.3)	42 (160)	52.4 (3.61)	
14 x 26 (4.3 x 7.9)	46 (174)	62.9 (4.34)	

Notes:

- For NFPA 13 installations the flow per sprinkler must be the greater of: (1) the flow listed in the table above or (2) the flow required to achieve a minimum design density of 0.1 gpm/sq ft over the design area of the sprinkler.
- For coverage area dimensions less than those listed above, use the minimum required flow for the next larger maximum coverage area listed.
- Please note SIN difference between F1Res58 HSW (R3533) and F1Res58 HSWX (RA3533).

Finishes

Table N

Standard Finishes			Special Application Finishes		
Sprinkler ⁽¹⁾	F1, F2, & FP ⁽³⁾ , Escutcheons	CCP, SWC (Conical) Cover Plates ⁽¹⁾	Sprinkler ⁽¹⁾	F1, F2, & FP ⁽³⁾ Escutcheons	CCP, SWC (Conical) Cover Plates ⁽¹⁾
Bronze	Brass	--	Bright Brass	Bright Brass	Bright Brass
Chrome Plated	Chrome Plated	Chrome Plated	Satin Chrome	Satin Chrome	Satin Chrome
White Polyester ⁽²⁾	White Polyester	White Paint	Black Polyester ⁽²⁾	Black Polyester	Black Paint
--	--	--	Custom Color Polyester	Custom Color Polyester	Custom Color Paint
--	--	--	Electroless Nickel PTFE ⁽²⁾	--	--

Notes:

(1) Paint or any other coating applied over the factory finish will void all approvals and warranties.

(2) cULus Listed Corrosion Resistant.

(3) The Model FP escutcheon assembly consists of an unfinished galvanized cup with a finished escutcheon ring.

Installation

Models F1Res sprinklers are to be installed as shown in this bulletin. Model F1, F2, and FP recessed escutcheons are the only recessed escutcheons to be used with Model F1Res sprinklers. Not all F1Res sprinklers may be used with all recessed escutcheons offered. Confirm listing of escutcheon type for use with individual sprinklers. Use of any other recessed escutcheon will void all approvals and warranties.

For installing Model F1Res sprinklers, use only the Model W2 sprinkler Wrench; for installing Models F1Res Recessed Pendent, Sidewall, Conical Concealed Pendent (CCP), and Sidewall Concealed (SWC and SWC-2) sprinklers use only the Model W1 sprinkler wrench. Use of wrenches other than those specified may damage these sprinklers.

Installation of F1Res sprinklers in a wall or ceiling will require a hole diameter of 2-1/4" (57 mm) for F1 or F2 recessed escutcheons; or 2-5/8" (67 mm) for FP recessed escutcheons, CCP, SWC, and SWC-2 cover plates.

Install F1Res HSW sprinklers with a ceiling to deflector distance that complies with the hydraulic design criteria tables in this bulletin. The flow arrow on deflector must point away from near wall and "Top" marking must face the ceiling.

A "leak tight" sprinkler joint can be obtained with the following torque:

- 1/2" NPT and ISO7-1R1/2: 8-18 ft-lbs (11 – 24 N-m)
- 3/4" NPT and ISO7-1R3/4: 14-20 ft-lbs (19 – 27 N-m)

Do not tighten sprinklers over maximum recommended torque. This may cause leakage or impairment of the sprinklers. Do not install any glass bulb sprinklers where the bulb is cracked or there is a loss of liquid from the bulb.



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. Removal of the protectors before this time may leave the bulb vulnerable to damage. RASCO wrenches are designed to install sprinklers when protectors are in place. Remove protectors by undoing the clasp by hand. Do not use tools to remove the protectors.

Maintenance

Reliable Model F1Res Sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25, 13, 13D, and 13R, as well as the requirements of any Authorities Having Jurisdiction.

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.

Do not clean sprinklers with soap and water, ammonia liquid or any other cleaning fluids. Remove dust by gentle vacuuming without touching the sprinkler.

Replace any sprinkler which has been painted (other than factory applied). Properly installed CCP, SWC, and SWC-2 cover plates will have an air gap that is required for proper operation, do not seal the gap or paint the cover plates.

Replace any sprinkler which has been damaged, where cracks are observed in the glass bulb, or when liquid has been lost from the glass bulb.

A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Failure to properly maintain sprinklers may result in inadvertent operation or non-operation during a fire event.

Listings & Approvals

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

Guarantee

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

Patents

For patents applicable to products contained in this technical bulletin, please visit www.r-s.co

Ordering Information

Specify the following when ordering:

Sprinkler

- Model (See Table A)
- Temperature Rating
- Threads (NPT or ISO7-1)
- Finish (See Table N)

Escutcheon or Cover Plate

- Model
- Finish (See Table N)

Sprinkler Wrench

- Model W2 (Pendent and HSW)
- W1 (Recessed and Concealed)

Note: Please note SIN difference between F1Res58 HSW (R3533) and F1Res58 HSWX (RA3533).



Model DH56 Dry Extended Coverage
Horizontal Sidewall Sprinkler

cULus Listed

Features

- Coverage for long and narrow light hazard spaces such as hallways, decks, and rooms
- Coverage area up to 28 ft (8.5m) long and 10 ft (3m) deep
- Available in four trim styles and a variety of finish combinations.

Product Description

The Reliable Model DH56 Dry Extended Coverage Horizontal Sidewall Sprinkler is a quick-response sprinkler utilizing a sensitive 3mm glass bulb thermal element listed for use in light hazard applications.

Dry sprinklers are intended for use on wet, dry, and preaction systems to protect indoor and outdoor areas that are subject to freezing. When used on wet systems, it is important that a minimum exposed length of barrel inside the face of the wall or insulation is provided to offset conduction of potentially freezing temperatures from the unconditioned (sprinkler) end along the barrel. See Figure 6 for guidelines on using dry sprinklers on wet systems.

Environments where dry sprinklers are employed are often corrosive. For this reason, Model DH56 dry sprinklers have a special wax fillet placed in the gap between the cup that supports the bulb and the wrenching boss. This wax prevents contaminants from entering the internal portion of the drop nipple and must not be removed.

Important! Reliable fire sprinklers must be handled, stored, and installed in accordance with the guidelines in Caution Sheet 310 and this bulletin. Failure to follow these instructions may result in unintended operation or nonoperation of the fire protection system.



DH56 Dry EC HSW with standard escutcheon

Application

The Model DH56 is a horizontal sidewall dry sprinkler intended for installation in light hazard occupancies in accordance with NFPA 13. These sprinklers are designed to provide fire protection in long and narrow spaces such as hallways, corridors, decks and rooms up to 28 feet (8.5m) wide and 10 feet (3m) deep. Model DH56 sprinklers are rated for 250 psi (17.2 bar) and can be mounted between 4 and 12 inches (102 and 305mm) down from the ceiling.

Table A

Sprinkler Model	Max. Working Pressure psi (bar)	Maximum Coverage Area Width x Length ft x ft (m x m)	Flow Rate gpm (L/min)	Pressure psi (bar)	Sprinkler Identification Number (SIN)
DH56 Dry EC	250 (17.2)	28 x 8 (8.5 x 2.4)	23 (87.1)	16.9 (1.2)	RA1664
		28 x 10 (8.5 x 3)	28 (106)	25 (1.7)	

Technical Specifications**Style:**

Extended Coverage
Horizontal Sidewall

Threads: 1" NPT or ISO7-1R1**Nominal K-Factor:** 5.6 (80)**Max. Working Pressure:** 250 psi (17.2 bar)**Max. Spacing:** 28 ft (8.5m)**Min. Spacing:** 16 ft (4.9m)**Material Specifications****Inlet Fitting:** Brass Alloy**Flip Disk:** Brass Alloy**Seal:** PTFE Coated Belleville Spring**Outer Tube:** Galvanized Steel Pipe**Sprinkler Frame:** Brass Alloy**Bulb Insert:** Copper Alloy**Thermal Element:** Glass Bulb**Deflector:** Bronze Alloy**Load Screw:** Brass Alloy**Sprinkler Finishes**

See finish combination tables on
following pages

Sensitivity

Quick Response

Temperature Ratings

155°F (68°C)

175°F (79°C)

200°F (93°C)

Recessed Escutcheons/Cover Plates

Standard Escutcheon

HB Escutcheon

FP Escutcheon

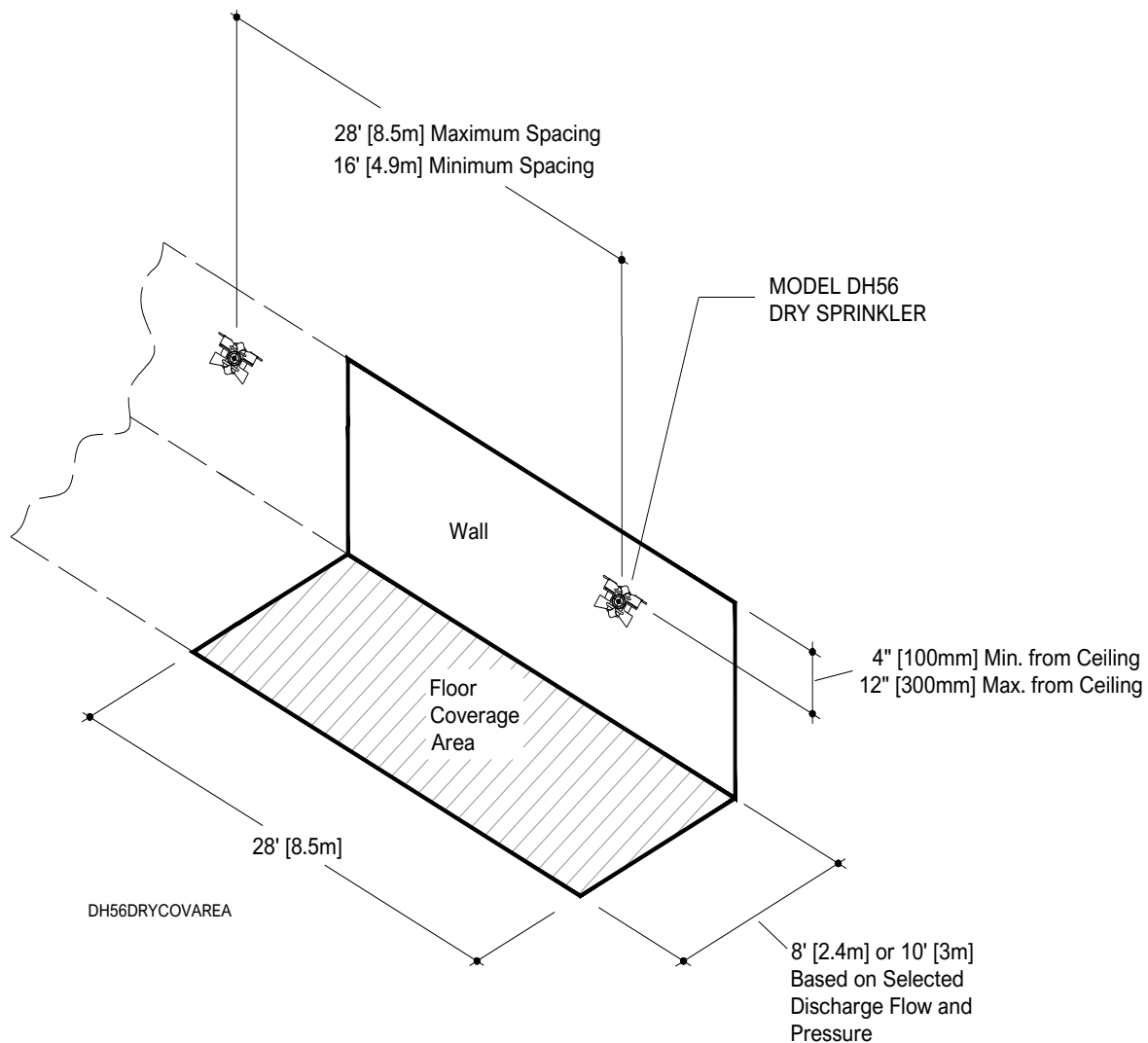
SWC Cover Plate

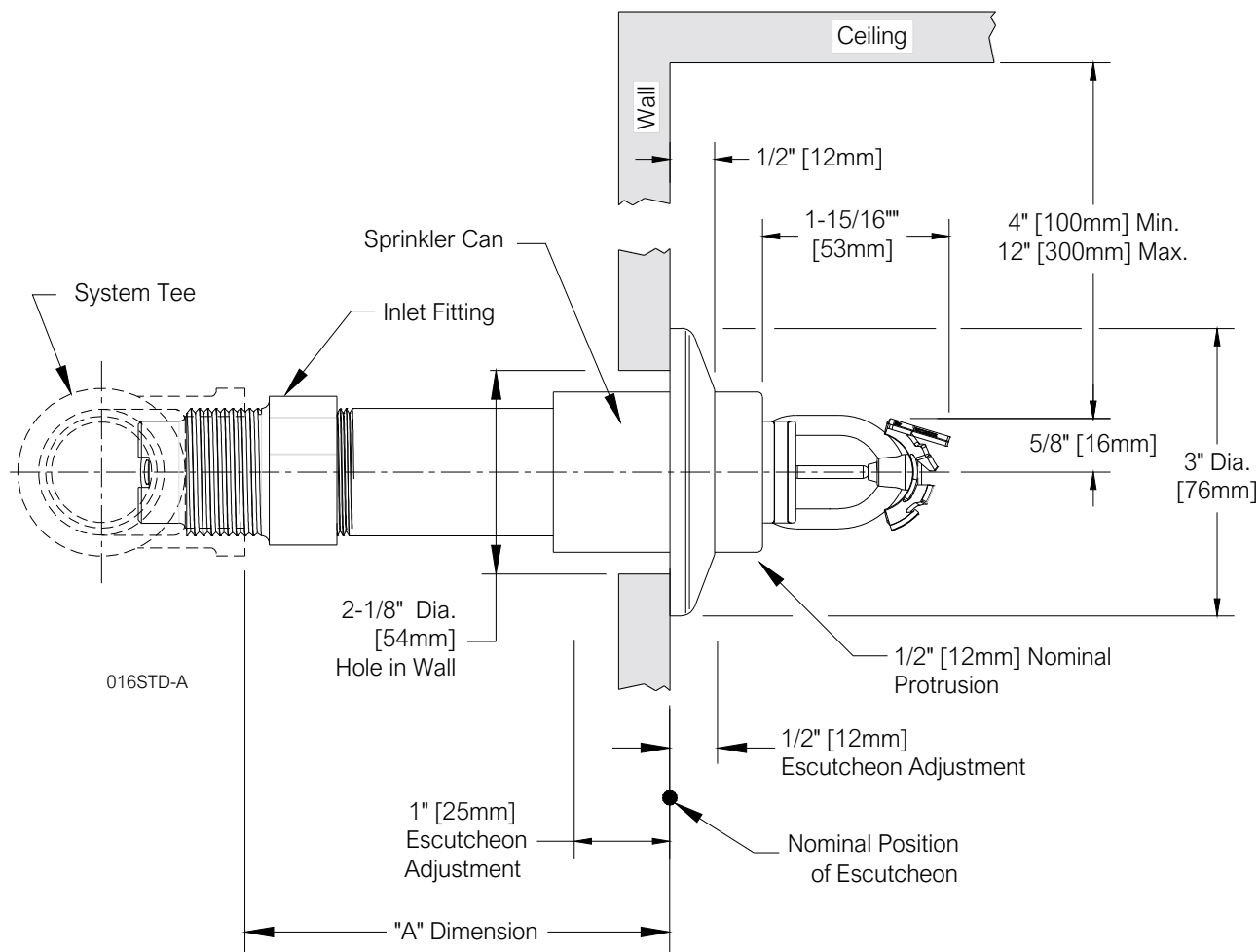
Listings and Approvals

cULus Listed for Light Hazard



Shown here with standard escutcheon.
See pages 3-6 for additional trim styles

Model DH56 EC HSW Coverage Area**Figure 1**

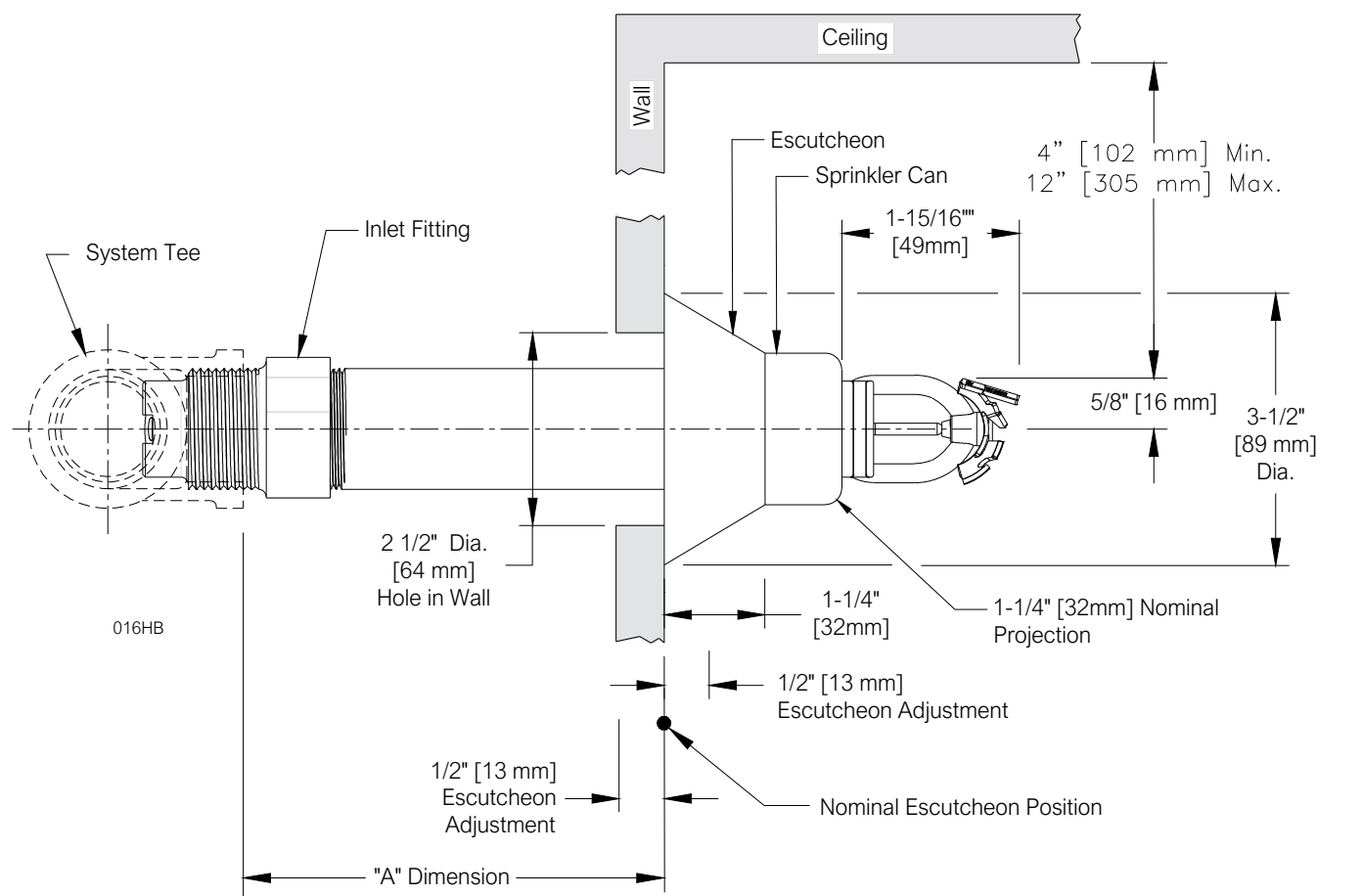


"A" Dimension: 2" to 48" (50mm to 1200mm) in 1/4" (6mm) increments

Finish Combinations: Standard Escutcheon	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Polished Stainless Steel
Bronze	Laquered Brass
Chrome	Polished Stainless Steel
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾	Polished Stainless Steel



- Notes:**
1. UL Listed as Corrosion Resistant.
 2. Escutcheons do not carry corrosion resistant listings.
 3. Base material is 316 stainless steel.

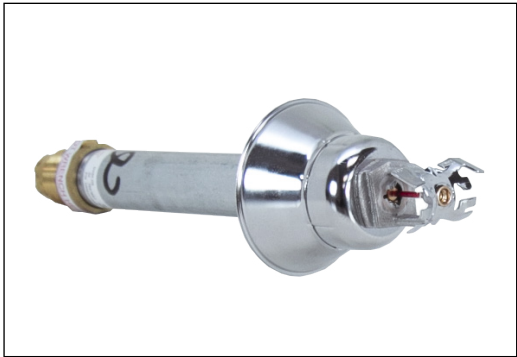


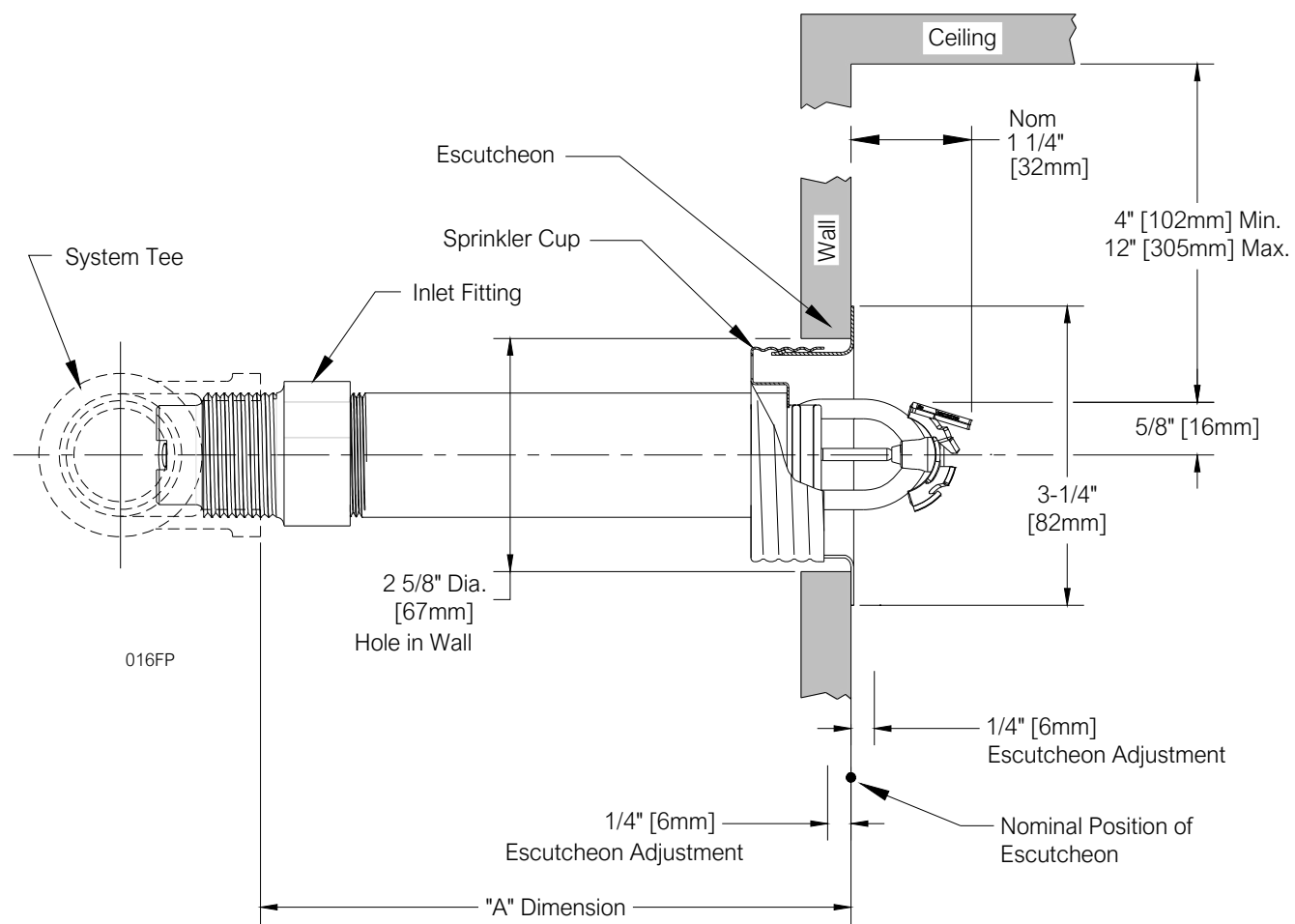
"A" Dimension: 3-1/2" to 48" (90mm to 1,200mm) in 1/4" (6mm) increments

Finish Combinations: HB Escutcheon	
Sprinkler	Escutcheon ⁽²⁾⁽³⁾
Bronze	Chrome
Chrome	Chrome
White Polyester ⁽¹⁾	White Polyester
Black Polyester ⁽¹⁾	Black Polyester
Custom Color Polyester ⁽¹⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽¹⁾	Stainless Steel

Notes:

1. UL Listed as Corrosion Resistant.
2. Escutcheons do not carry corrosion resistant listings.
3. Base material is cold rolled steel unless noted.





"A" Dimension: 3-1/2" to 48" (90mm to 1200mm) in 1/4" (6mm) increments

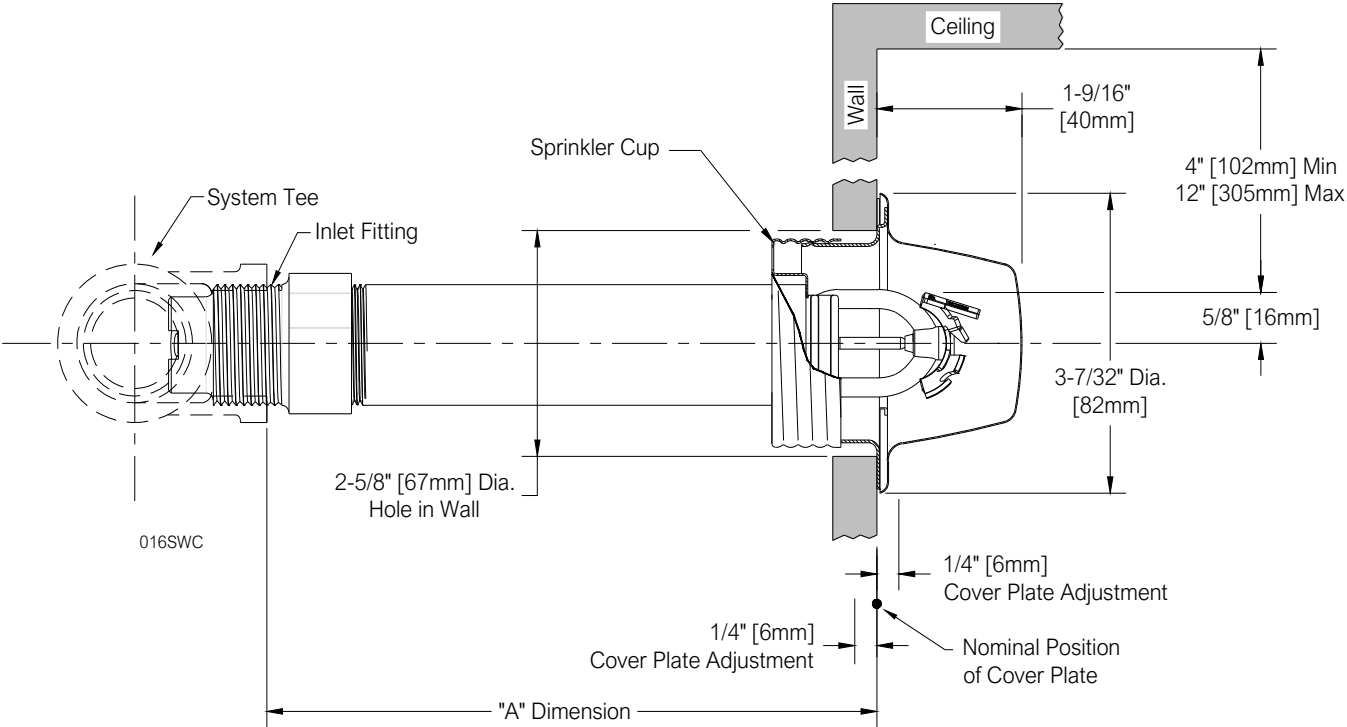
Note: Do not install the Model DH56 Dry Sprinkler with FP recessed escutcheon in locations where the pressure in the space behind the sprinkler is positive with respect to the pressure in the protected space. Ensure that openings in the sprinkler cup are unobstructed following installation.

Finish Combinations: FP Recessed Escutcheon	
Sprinkler ⁽¹⁾	Escutcheon ⁽³⁾⁽⁴⁾
Bronze	Brass
Chrome	Chrome
White Polyester ⁽²⁾	White Polyester
Black Polyester ⁽²⁾	Black Polyester
Custom Color Polyester ⁽²⁾	Custom Color Polyester
Electroless Nickel PTFE ⁽²⁾	Stainless Steel

Notes:

1. Cup for FP Recessed is unfinished galvanized steel except electroless nickel PTFE sprinkler uses a stainless steel cup.
2. UL Listed as Corrosion Resistant.
3. Escutcheons do not carry corrosion resistant listings.
4. Base material is cold rolled steel unless noted.





"A" Dimension: 3-1/2" to 48" (90mm to 1200mm) in 1/4" (6mm) increments

Note: Do not install the Model DH56 Dry Sprinkler with SWC cover plate in locations where the pressure in the space behind the sprinkler is positive with respect to the pressure in the protected space. Ensure that openings in the sprinkler cup are unobstructed following installation.

Finish Combinations: SWC Concealed Cover Plate	
Sprinkler ⁽¹⁾	Cover Plate ⁽²⁾
Bronze	White Polyester
	Chrome Bright
	Chrome Dull
	Bright Brass
	Unfinished Bronze
	Custom Color

- Notes:**
1. Cup for SWC Concealed is unfinished galvanized steel.
 2. Cover plates do not carry corrosion resistant listings.



MINIMUM EXPOSED BARREL LENGTH WHEN CONNECTED TO WET PIPE SPRINKLER SYSTEM

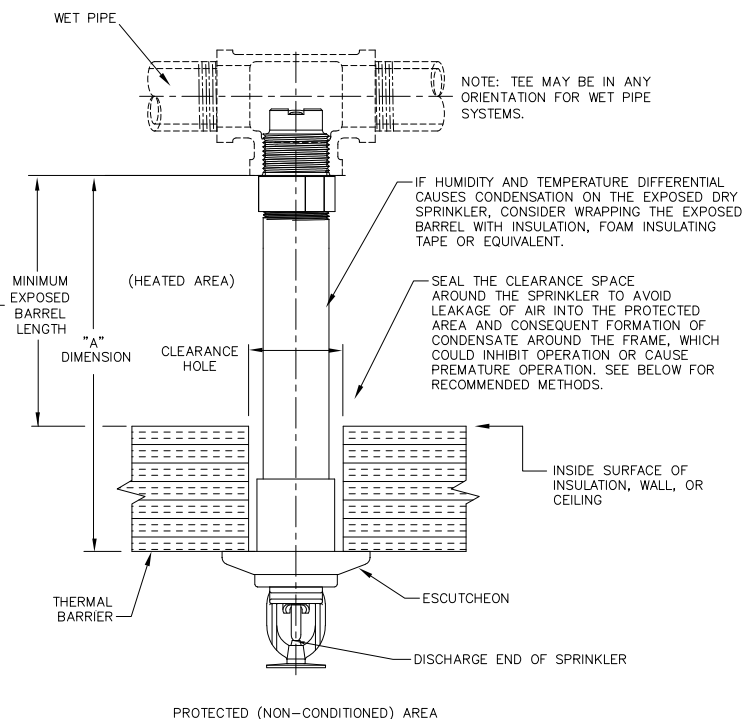
NOTE: STANDARD DRY PENDENT IS SHOWN, HOWEVER, MINIMUM EXPOSED BARREL LENGTH APPLIES TO ALL STYLES OF DRY SPRINKLERS CONNECTED TO A WET PIPE SYSTEM.

AMBIENT TEMPERATURE EXPOSED TO DISCHARGE END OF SPRINKLER*	EXPOSED BARREL AMBIENT TEMPERATURE		
	40°F/4°C	50°F/10°C	60°F/16°C
	EXPOSED MINIMUM BARREL LENGTH** (FACE OF FITTING TO TOP OF CEILING)***		
	IN. (MM)	IN. (MM)	IN. (MM)
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (300)	3 (75)	0
-10°F (-23°C)	14 (350)	4 (100)	1 (25)
-20°F (-29°C)	14 (350)	6 (150)	3 (75)
-30°F (-34°C)	16 (400)	8 (200)	4 (100)
-40°F (-40°C)	18 (450)	8 (200)	4 (100)
-50°F (-46°C)	20 (500)	10 (250)	6 (150)
-60°F (-51°C)	20 (500)	10 (250)	6 (150)

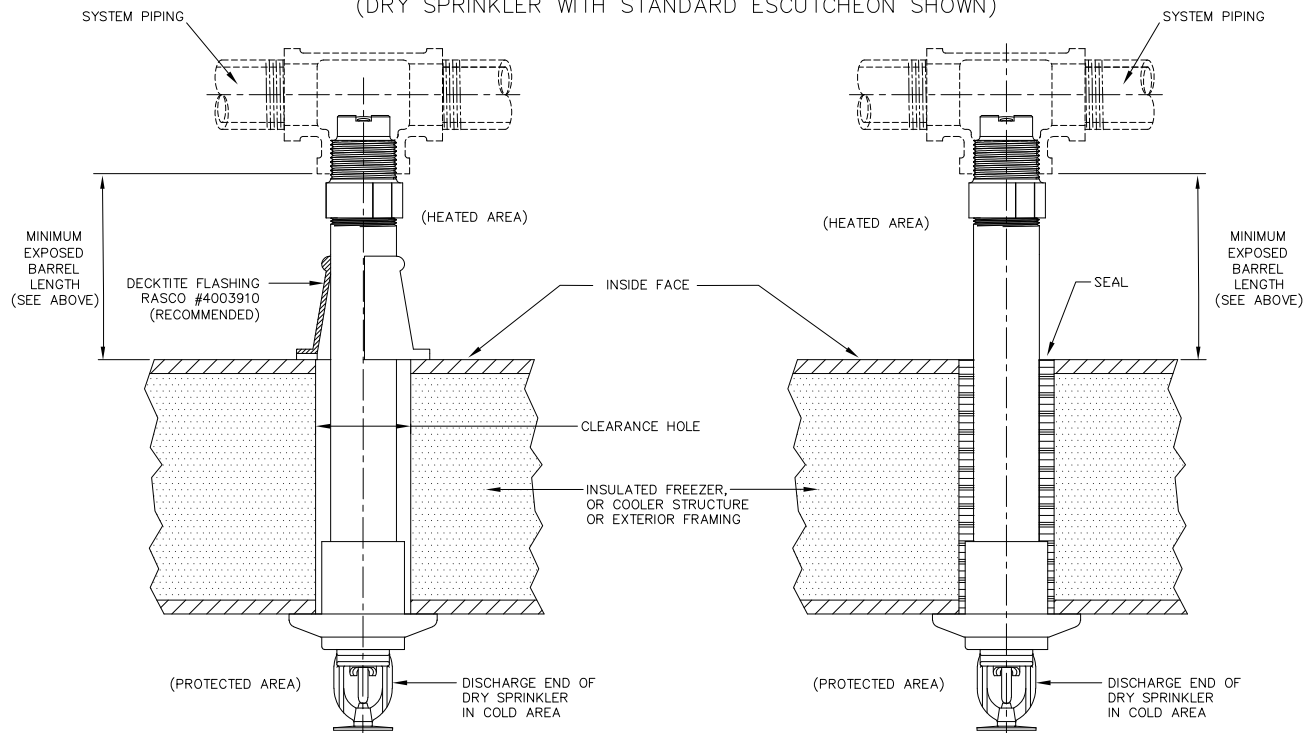
* FOR AMBIENT TEMPERATURES EXPOSED TO THE DISCHARGE END OF THE SPRINKLER THAT OCCUR BETWEEN THE VALUES LISTED, USE THE NEXT COOLER TEMPERATURE.

** THE MINIMUM EXPOSED BARREL LENGTH IS NOT THE SAME AS THE "A" DIMENSION. THE MINIMUM EXPOSED BARREL LENGTH IS BASED ON A PROPERLY SEALED PENETRATION WITH A MAXIMUM WIND VELOCITY ON THE EXPOSED SPRINKLER OF 30 MPH (48 KM/H). LONGER EXPOSED BARREL LENGTHS WILL HELP AVOID FREEZING OF THE WET PIPING WHERE HIGHER WIND VELOCITY IS EXPECTED.

*** THE MINIMUM EXPOSED BARREL LENGTH IS MEASURED FROM THE FACE OF THE FITTING TO THE INSIDE FACE OF THE INSULATION, WALL, OR CEILING LEADING TO THE COLD SPACE, WHICHEVER IS CLOSEST TO THE FITTING.



RECOMMENDED DRY SPRINKLER SEAL ARRANGEMENTS (DRY SPRINKLER WITH STANDARD ESCUTCHEON SHOWN)



COMDRYDET11

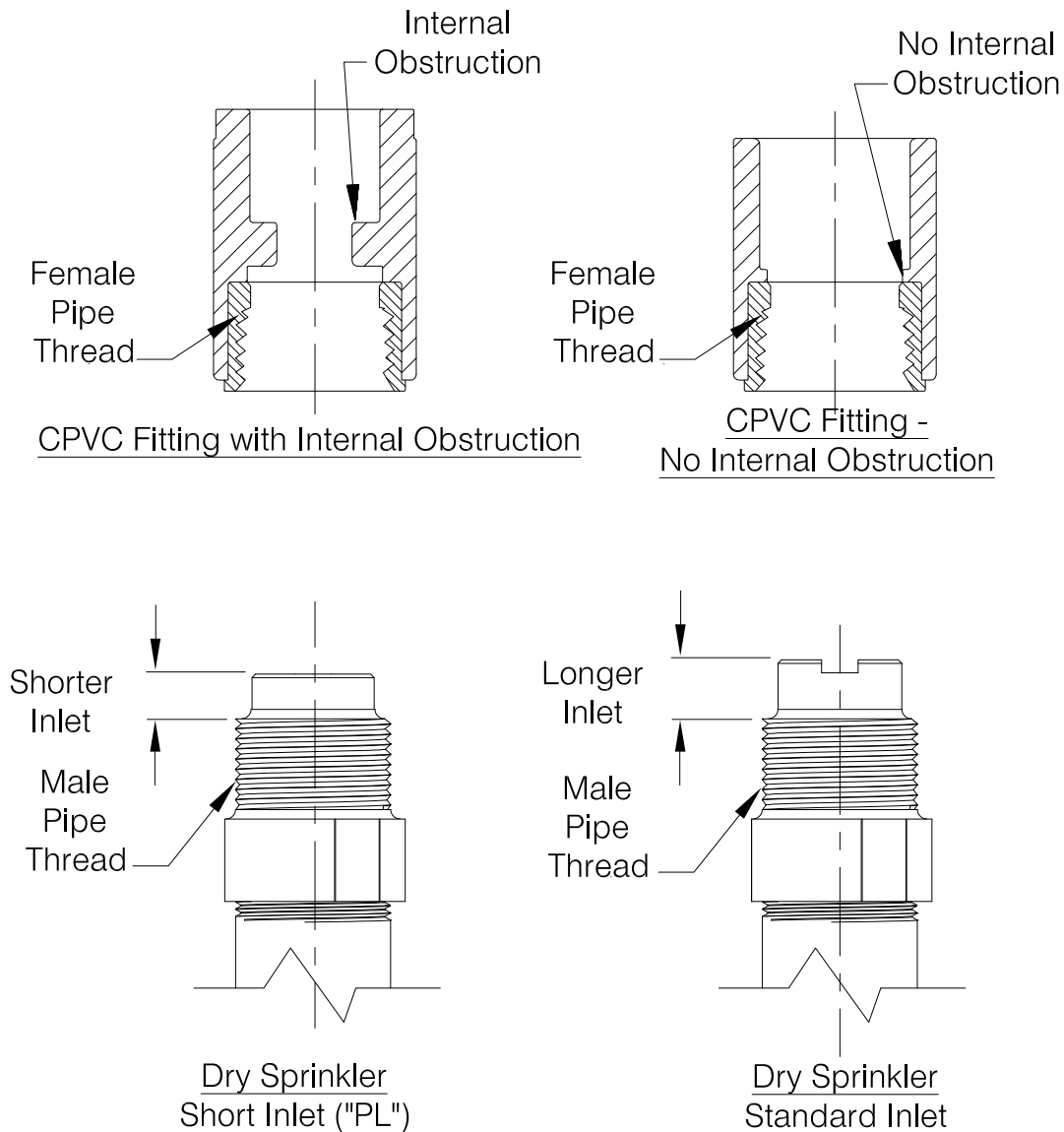
CAUTION

RELIABLE DRY SPRINKLERS MAY BE INSTALLED IN A LISTED CPVC SPRINKLER FITTING, ONLY UPON VERIFICATION THAT THE FITTING DOES NOT INTERFERE WITH THE SPRINKLER'S INLET.

Do not install dry sprinklers with standard inlets into CPVC fittings that have an internal obstruction; this will damage the sprinkler, the fitting, or both.

Short inlet ("PL") versions of Reliable dry sprinklers are available that may or may not be compatible with fittings having internal obstructions in existing installations. Sprinklers with the short inlet ("PL") should only be installed in CPVC fittings of wet-pipe systems.

In all cases, verify sprinkler and fitting dimensions prior to installation to avoid interference.



BE SURE TO ORDER THE CORRECT SPRINKLERS FOR YOUR APPLICATION

Installation (General)

Dry sprinklers connected to wet pipe systems must be installed as indicated in Figure 6 and as required by NFPA 13 with the Exposed Minimum Barrel Length located in a heated area.

Reliable Model DH56 dry sidewall sprinklers may be installed in ductile or malleable cast iron threaded tees, or CPVC tees and adapters upon verification that the sprinkler inlet fitting does not interfere with the interior of the fitting (see Figure 7).

DO NOT install Reliable Model DH56 dry sidewall sprinklers into elbows or couplings, welded outlets, mechanical tees, or gasket sealed CPVC fittings.

DH56 HSW with Standard Escutcheon

Cut a 2-1/8" (54mm) diameter hole in the wall as shown in Fig. 2. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model F3R installation wrench (see Fig. 8) on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and sliding the escutcheon over the finished sleeve until tight to the finished surface.

DH56 HSW with HB Escutcheon

Cut a 2-1/2" (64mm) diameter hole in the wall as shown in Fig. 3. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model F3R installation wrench (see Fig. 8) on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and sliding the skirt over the finished sleeve until tight to the finished surface.

DH56 HSW with FP Recessed Escutcheon

Cut a 2-5/8" (67mm) diameter hole in the wall as shown in Fig. 4. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model F3R installation wrench (see Fig. 8) on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and pushing (or threading) the FP escutcheon into the threaded cup. Final adjustment is made by turning the FP escutcheon clockwise until the flange makes full contact with the wall surface.

DH56 HSW SWC Concealed Cover Plate

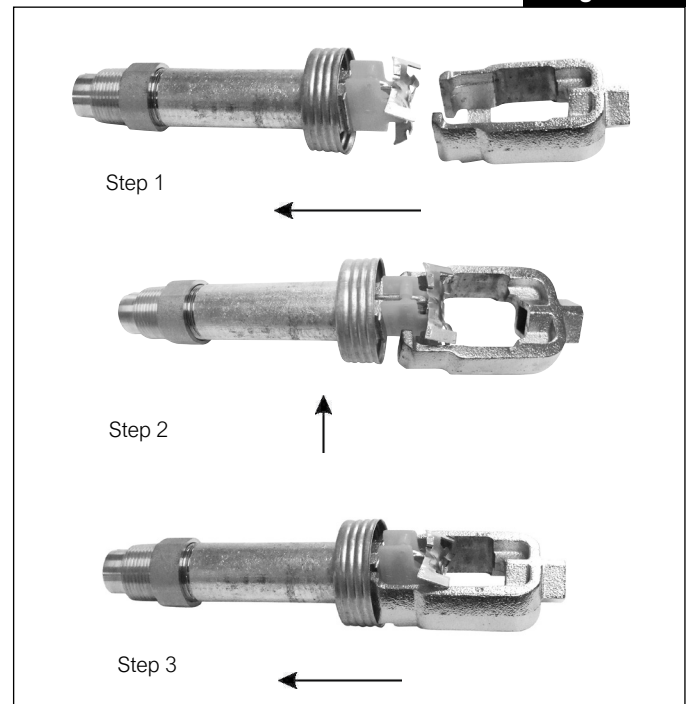
Cut a 2-5/8" (67mm) diameter hole in the wall as shown in Fig. 5. Apply a PTFE based sealant to the sprinkler threads before installing into the fitting. Use the Model F3R installation wrench (see Fig. 8) on the square boss to tighten the sprinkler until it is secured in the sprinkler fitting. Installation is completed by removing the orange glass bulb protector and pushing (or threading) the SWC cover plate into the threaded cup. Final adjustment is made by turning the cover plate clockwise until the cover plate flange makes full contact with the finished surface.

Note:

1. The Model XLO2 installation wrench for FP Recessed and SWC Concealed installations has a open side to accommodate the sprinkler deflector and can only be inserted in one way (see Figure 8). Care must be taken not to damage the deflector during installation.
2. Do not over-tighten sprinklers into fittings. It is recommended that Reliable dry sprinklers be installed using the wrench referenced in this bulletin. A pipe wrench may also be used to install dry sprinklers provided that it only engages the outer tube (steel pipe) of the assembly. Note that a pipe wrench will impart a large amount of torque into the final assembly. This torque will need to be matched or exceeded to remove the sprinkler at a later date. A leak free joint can normally be obtained by installing the sprinkler to a minimum torque of 22 ft-lb (30 N-m) after applying an appropriate thread sealant.
3. Glass bulb sprinklers have orange bulb protectors to minimize bulb damage during shipping, handling, and installation. Reliable installation wrenches are designed to install sprinklers while bulb protectors are in place. REMOVE THE PROTECTORS AT THE TIME THE SPRINKLER SYSTEM IS PLACED INTO SERVICE. Removal of the protectors before this time may leave the glass bulb vulnerable to damage. Remove protectors by undoing the clasp by hand. DO NOT USE TOOLS TO REMOVE THE PROTECTORS.
4. Do not remove the wax fillet in the gap between the cup that supports the bulb and the wrenching boss.

XLO2 Installation Procedure

Figure 8



Wrench Options



F3R Wrench (Standard & HB trims)



XLO2 Wrench (FP recessed and SWC trims)

Maintenance

Reliable Model DH56 series sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25, as well as the requirements of any Authorities Having Jurisdiction. 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.

Do not clean sprinklers with soap and water, ammonia liquid or any other cleaning fluids. Remove dust by gentle vacuuming without touching the sprinkler.

Replace any sprinkler which has been painted (other than factory applied). A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Failure to properly maintain sprinklers may result in inadvertent operation or non-operation during a fire event.

Guarantee

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

Patents

US Patent No. 7,841,418

Ordering Information

Specify:

Sprinkler Type

- Model DH56 Dry Extended Coverage Horizontal Sidewall Sprinkler

Trim Style

- Standard Escutcheon
- HB Escutcheon
- FP Recessed Escutcheon
- SWC Cover Plate⁽¹⁾

Temperature Rating

- 155°F (68°C)
- 175°F (79°C)
- 200°F (93°C)

Finish

- See available combinations (depending on trim style) on pages 3-6

Length

- "A" Dimension (face of fitting to finished wall surface, in 1/4" [6mm] increments)

Installation Wrench

- Model F3R (Standard & HB trims)
- Model XLO2 (FP Recessed & SWC trims)

Note:

1. 135°F (57°C) cover plate for 135°F (57°C) and 155°F (68°C) sprinklers; 165°F (74°C) cover plate for 175°F (79°C) and 200°F (93°C) sprinklers.

Series DS-1 Dry-Type Sprinklers 5.6K Horizontal Sidewall Standard and Quick Response, Extended Coverage

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

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

Scan the QR code or enter the URL in a web browser to access the most up-to-date electronic version of this document. Data rates may apply.



docs.jci.com/tycofire/tpf520

General Description

TYCO Series DS-1 Dry-Type Sprinklers, 5.6 K-factor Horizontal Sidewall, Standard (5 mm Bulb) and Quick Response (3 mm Bulb) and Extended Coverage, are decorative glass bulb automatic sprinklers typically used where the sprinklers and/or a portion of the connecting piping may be exposed to freezing temperatures; for example, horizontal piping extensions through a wall to protect an unheated area of a building. Series DS-1 Dry-Type Sprinklers are designed for extended coverage use in light hazard occupancies.

NOTICE

Series DS-1 Dry-Type Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

The owner is responsible for maintaining their fire protection system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions. Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.

Sprinkler Identification Numbers (SINs)

TY3358..... Standard Response
TY3338..... Quick Response

Technical Data

Approvals

UL and C-UL Listed

Note: For additional approvals information, see Table A.

Maximum Working Pressure

175 psi (12,1 bar)

Inlet Thread Connections

1 in. NPT or ISO 7-R 1

Discharge Coefficient

$K=5.6 \text{ gpm/psi}^{1/2}$ (80,6 Lpm/bar^{1/2})

Temperature Ratings

See Table A

Finishes

Sprinkler: Natural Brass, Chrome Plated, or Signal White

Escutcheon: Signal White, Chrome Plated, or Brass Plated



Physical Characteristics

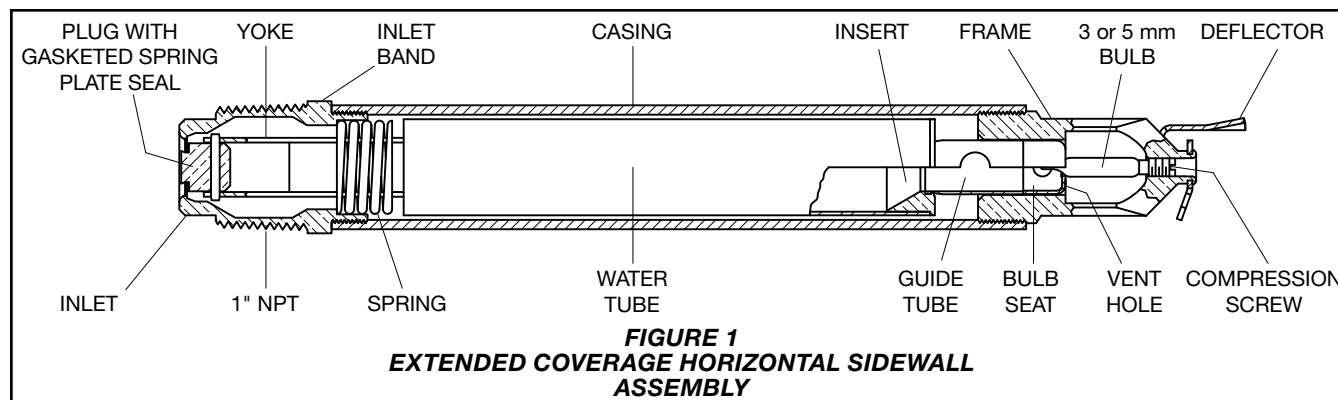
Inlet	Copper
Plug	Copper
Yoke	Stainless Steel
Casing	Galvanized Carbon Steel
Insert	Bronze
Bulb Seat	Stainless Steel
Bulb	Glass
Compression Screw	Bronze
Deflector	Bronze
Frame	Bronze
Guide Tube	Stainless Steel
Water Tube	Stainless Steel
Spring	Stainless Steel Gasketed Spring
Plate Seal	Beryllium Nickel w/TEFLON
Escutcheon	Carbon Steel or Stainless Steel

Operation

When TYCO Series DS-1 Dry-Type Sprinklers are in service, water is prevented from entering the assembly by the plug and gasketed spring plate seal (see Figure 1) in the inlet of the sprinkler.

The glass bulb contains a fluid that expands when exposed to heat. When the rated temperature is reached, the fluid expands sufficiently to shatter the glass bulb, and the bulb seat is released.

The compressed spring is then able to expand and push the water tube as well as the guide tube outward. This action simultaneously pulls inward on the yoke, withdrawing the plug and gasketed spring plate seal from the inlet allowing the sprinkler to activate and flow water.



Temperature Rating	Bulb Liquid Color	TY3338 Horizontal Sidewall with Standard Escutcheon (3 mm Bulb Type)		
		TY3358 Horizontal Sidewall with Standard Escutcheon (5 mm Bulb Type) (See Figure 2)		
		Sprinkler Finish		
		Natural Brass	Chrome Plated	Signal White
155°F (68°C)	Red	1, 2, 3		
NOTES 1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 in.) 2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 in.)				
TABLE A SERIES DS-1 EXTENDED COVERAGE HORIZONTAL SIDEWALL DRY-TYPE SPRINKLERS LABORATORY LISTINGS AND APPROVALS				

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area ¹		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length ² in. (mm)		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (305)	3 (75)	0
-10°F (-23°C)	14 (355)	4 (100)	1 (25)
-20°F (-29°C)	14 (355)	6 (150)	3 (75)
-30°F (-34°C)	16 (405)	8 (200)	4 (100)
-40°F (-40°C)	18 (455)	8 (200)	4 (100)
-50°F (-46°C)	20 (510)	10 (255)	6 (150)
-60°F (-51°C)	20 (510)	10 (255)	6 (150)
Notes: 1. For protected area temperatures that occur between values listed above, use the next cooler temperature. 2. These lengths are inclusive of wind velocities up to 30 mph (18,6 kph).			
TABLE C EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS MINIMUM RECOMMENDED LENGTHS			

Horizontal Sidewall Application	Coverage ¹ W. x L. ft x ft (m x m)	Minimum Flow gpm (Lpm)	Minimum Pressure psi (bar)	Temperature Rating	Top of Deflector-to Ceiling Distance ² in. (mm)		
TY3338 For Quick Response (3 mm Biulb), Light Hazard Extended Coverage per NFPA 13	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,49)	155°F (68°C)	4 to 12 (100 to 300)		
	16 x 18 (4,9 x 5,5)	29 (110)	26.8 (1,85)				
	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)				
	18 x 16 (5,5 x 4,9)	29 (110)	26.8 (1,85)				
TY3358 For Standard Response (5 mm Bulb), Light Hazard Extended Coverage per NFPA 13	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,49)				
	16 x 18 (4,9 x 5,5)	29 (110)	26.8 (1,85)				
	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)				
	18 x 16 (5,5 x 4,9)	29 (110)	26.8 (1,85)				
NOTES 1. The minimum allowable spacing between sprinklers to prevent cold soldering is 14 ft (4,3 m) 2. To meet the deflector-to-ceiling distance of 4 to 12 in. (100 to 300 mm), the centerline of the sprinkler waterway must be 4-7/16 to 12-7/16 in. below the ceiling							
TABLE B SERIES DS-1 EXTENDED COVERAGE HORIZONTAL SIDEWALL DRY-TYPE SPRINKLERS UL AND C-UL INSTALLATION CRITERIA							

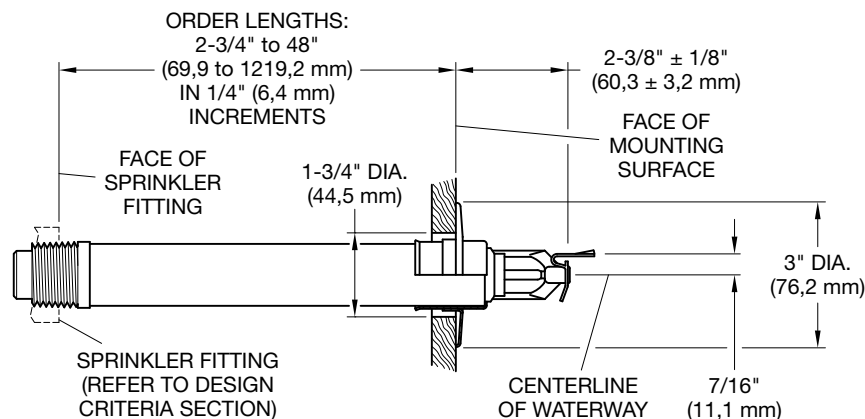


FIGURE 2
EXTENDED COVERAGE HORIZONTAL SIDEWALL WITH STANDARD ESCUTCHEON
TY3338 (3 MM BULB) AND TY3358 (5 MM BULB)

Design Criteria

TYCO Series DS-1 Dry-Type Sprinklers are intended for use in fire sprinkler systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency; for example, UL Listing is based on NFPA 13 requirements.

Sprinkler Fittings

Install 1 in. NPT Series DS-2 Dry-Type Sprinklers in the 1 in. NPT outlet or run of the following fittings:

- Malleable or ductile iron threaded tee fittings that meet the dimensional requirements of ANSI B16.3 (Class 150)
- Cast iron threaded tee fittings that meet the dimensional requirements of ANSI B16.4 (Class 125)

Do not install Series DS-2 Dry-Type Sprinklers into elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow.

The unused outlet of the threaded tee is plugged as shown in Figure 5.

You can also install Series DS-2 Dry-Type Sprinklers in the 1 in. NPT outlet of a GRINNELL Figure 730 Mechanical Tee. However, the use of the Figure 730 Tee for this arrangement is limited to wet pipe systems.

The configuration shown in Figure 6 is only applicable for wet pipe systems where the sprinkler fitting and water-filled pipe above the sprinkler fitting are not subject to freezing and where the length of the dry-type sprinkler has the minimum exposure length depicted in Figure 6. See the Exposure Length section.

For wet pipe system installations of 1 in. NPT Series DS-1 Dry-Type Sprinklers connected to CPVC piping, use the following CPVC fittings:

- 1 in. x 1 in. NPT Female Adapter
- 1 in. x 1 in. x 1 in. NPT Sprinkler Head Adapter Tee

Note: For more information on specific CPVC fitting design and installation criteria, refer to CPVC manufacturer.

For dry pipe system installations, use only the side outlet of maximum 2 1/2 in. reducing tee when locating Series DS-1 Dry-Type Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 4 to assure complete water drainage from above Series DS-1 Dry-Type Sprinklers and the branch line. Failure to do so may result in pipe freezing and water damage.

NOTICE

Do not install Series DS-1 Dry-Type Sprinklers into any other type fitting. Failure to use the appropriate fitting may result in one of the following:

- *failure of the sprinkler to operate properly due to formation of ice over the inlet plug or binding of the inlet plug*
- *Insufficient engagement of the Inlet pipe threads with consequent leakage*

Drainage

In accordance with the minimum requirements of the NATIONAL FIRE PROTECTION ASSOCIATION for dry pipe sprinkler systems, branch, cross, and feed-main piping connected to dry sprinklers and subject to freezing temperatures must be pitched for proper drainage.

Exposure Length

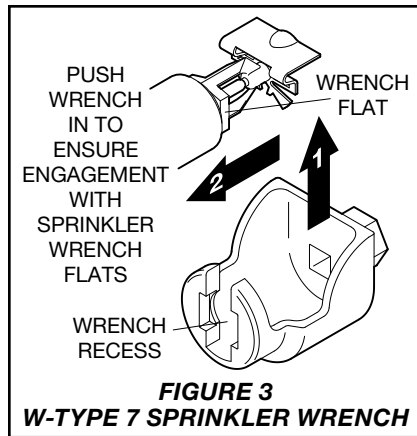
When using dry sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use Table C to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. See Figure 6 for an example.

For protected area temperatures between those given above, the minimum recommended length from the face of the fitting to the outside of the protected area may be determined by interpolating between the indicated values.

Clearance Space

In accordance with Section 8.4.9.2 of the 2010 edition of NFPA 13, when connecting an area subject to freezing and an area containing a wet pipe sprinkler system, the clearance space around the sprinkler barrel of dry-type sprinklers must be sealed. Due to temperature differences between two areas, the potential for the formation of condensation in the sprinkler and subsequent ice build-up is increased. If this condensation is not controlled, ice build-up can occur that might damage the dry-type sprinkler and/or prevent proper operation in a fire situation.

Use of the Model DSB-2 Dry Sprinkler Boot, described in Technical Data Sheet TFP591 and shown in Figure 7, can provide the recommended seal.



Installation

TYCO Series DS-1 Dry-Type Sprinklers must be installed in accordance with this section.

General Instructions

Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section. See the Design Criteria section for other important requirements regarding piping design and sealing of the clearance space around the Sprinkler Casing.

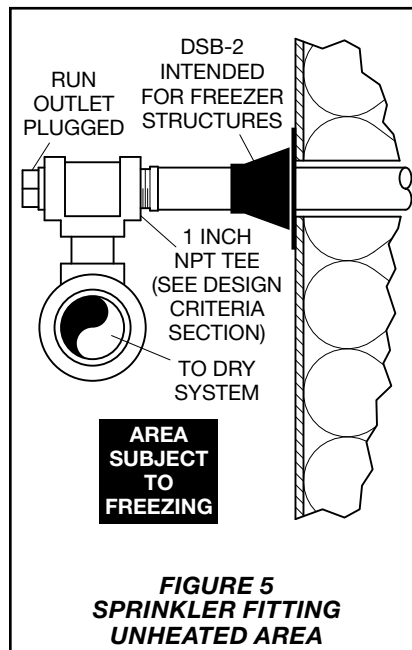
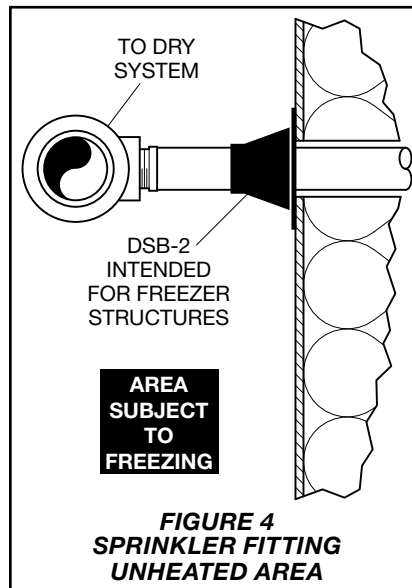
Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm).

A leak-tight 1 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 20 ft-lb to 30 (26,8 N-m to 40,2 N-m). Higher levels of torque may distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in an escutcheon plate by under or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Step 1. Install horizontal sidewall sprinklers in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. The word "TOP" on the deflector is to face towards the ceiling.

Step 2. With a non-hardening pipe-thread sealant such as TEFLON tape applied to the Inlet threads, hand-tighten the sprinkler into the sprinkler fitting.

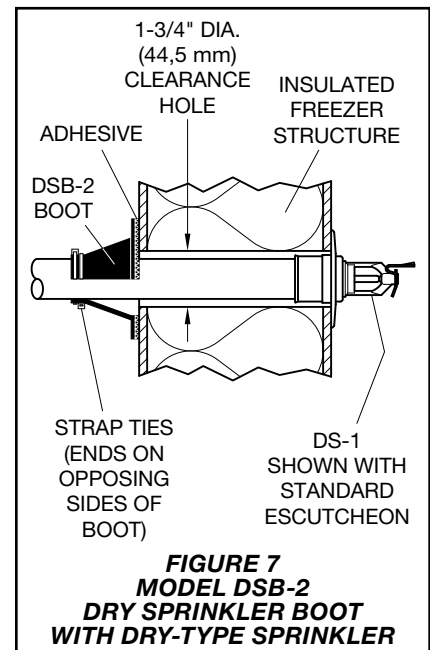
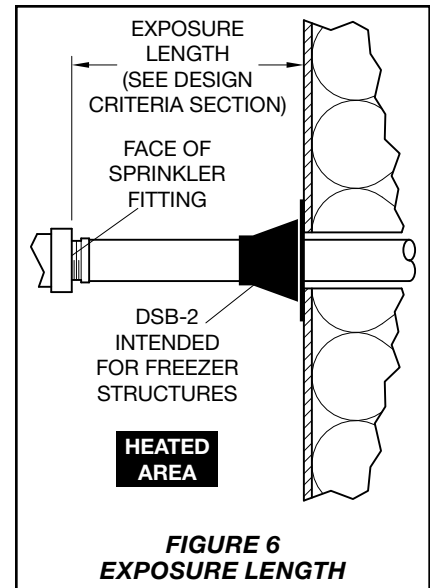


Step 3. Wrench-tighten the sprinkler using either of the following tools:

- Pipe wrench on the inlet band or the casing, see Figure 1
- W-Type 7 Sprinkler Wrench on the wrench flat, see Figure 3

Apply the wrench recess of the W-Type 7 Sprinkler Wrench to the wrench flat.

Note: If sprinkler removal becomes necessary, remove the sprinkler using the same wrenching method noted above. Sprinkler removal is easier when a non-hardening sealant was used and torque guidelines were followed. After removal, inspect the sprinkler for damage.



Step 4. After installing the ceiling or wall and applying a ceiling finish, slide on the outer piece of the escutcheon until it comes in contact with the ceiling or wall. Do not lift the ceiling panel out of its normal position.

Care and Maintenance

TYCO Series DS-1 Dry-Type Sprinklers must be maintained and serviced in accordance with this section.

Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection

P/N* 60 – XXX – X – XXX

Extended Coverage Sidewall Quick Response 3 mm Bulb		SIN
351	Temperature Rating 155°F (68°C)	TY3338

Extended Coverage Sidewall Standard Response 5 mm Bulb		SIN
951	Temperature Rating 155°F (68°C)	TY3358

NOTES

* Use Prefix "I" for ISO 7-R 1 Connection (for example, I-60-351-1-180).

** Dry-Type Sprinklers are furnished based upon "Order Length" as measured per Figure 2. After the measurement is taken, round it to the nearest 1/4 in. increment.

	Sprinkler Finish	Escutcheon Finish
0	Chrome Plated	Signal White (RAL9003)
1	Natural Brass	Signal White (RAL9003)
2	Natural Brass	Brass Plated
4	Signal White (RAL9003)	Signal White (RAL9003)
8	Chrome Plated	Stainless Steel
9	Chrome Plated	Chrome Plated

Order Length**	
055	5.50 in.
082	8.25 in.
180	18.00 in.
187	18.75 in.
372	37.25 in.
480	48.00 in.

TABLE D

SERIES DS-1 STANDARD AND QUICK RESPONSE, EXTENDED COVERAGE, DRY-TYPE SPRINKLERS PART NUMBER SELECTION

systems from the proper authorities and notify all personnel who may be affected by this action.

Absence of the outer piece of an escutcheon, which is used to cover a clearance hole, may delay the time to sprinkler operation in a fire situation.

A vent hole is provided in the bulb seat (see Figure 1) to indicate if the dry sprinkler is remaining dry. Evidence of leakage from the vent hole is an indication that there may be seepage past the inlet seal and that the sprinkler needs to be removed for determining the cause of leakage (for example, an improper installation or an ice plug). The fire protection system control valve must be closed and the system drained before removing the sprinkler.

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

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

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

If a sprinkler must be removed, do not reinstall it or a replacement without reinstalling the cover plate assembly.

If a cover plate assembly becomes dislodged during service, replace it immediately.

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

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

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

Dry Sprinklers

When ordering 5.6 K-factor Series DS-1 Horizontal Sidewall, Standard or Quick Response, Extended Coverage Dry-Type Sprinklers, see Table D and specify the following information:

- SIN
TY3338 – Quick Response
TY3358 – Standard Response

- Bulb size (3 or 5 mm)

- Order length
Dry-Type Sprinklers are furnished based upon Order Length as measured from the face of the wall to the face of the sprinkler fitting, see Figure 2. After the measurement is taken, round it to the nearest 1/4 in. increment.

- Inlet connection
1 in. NPT (Standard Order)
ISO 7-R 1

Note: For information on ISO Inlet Thread Connections, contact your Johnson Controls Sales Representative.

- Temperature rating
- Sprinkler finish
- Standard escutcheon and finish
- Part number

Replacement Escutcheons

Order replacement escutcheons separately.

Specify: (specify type), (specify) finish, P/N (specify):

Standard (Push-On)

White Color91-106-0-007
Brass Plated.91-106-2-007
Chrome Plated.91-106-9-007

Sprinkler Wrench

Specify W-Type 7 Sprinkler Wrench, P/N 56-850-4-001

Model DSB-2 Dry Sprinkler Boot

Model DSB-2 Dry Sprinkler Boot includes one boot, two strap ties, and 1/3 oz of adhesive, quantity of adhesive is sufficient for one boot installation.

Specify: Model DSB-2 Dry Sprinkler Boot, P/N 63-000-0-002



P.O. Box 3365 South El Monte, CA 91733 626.444.0541 Fax 626.444.3887 www.Afcon.org

551

REVOLVERTM THREADED BRACKET

SIZE - 3/8" rod.

MATERIAL - Carbon Steel.

FINISH - Plain, E.G. and S.S.

LISTING/APPROVAL -

cUL^{us} 203 - EX 2551

PATENT - No. 6,568,642

FUNCTION - Listed to support max. 4" Steel, CPVC or Copper pipe.

Listed hanger component per NFPA 13.

INSTALLATION - per NFPA 13. Space by pipe type.

Install on vertical mounting surface of wood, concrete or steel.

Center hole accepts 3/8" and 1/2" NFPA 13 fasteners.

**ADDITIONAL UL LISTED FASTENERS PER NFPA 13
FOR STEEL PIPE LOADS -SEE TABLES..**

FEATURES

* **Universal fastener array for enhanced mounting.**

* Double fastener installation allows:

Vertical - Hangs plumb from first fastener.

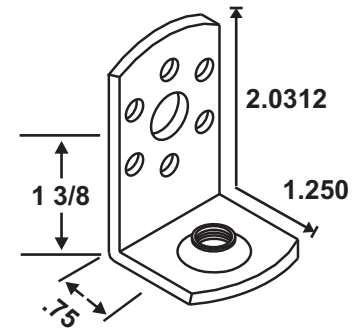
Stops wood splitting along the grain.

Horizontal - When vertical space is limited.

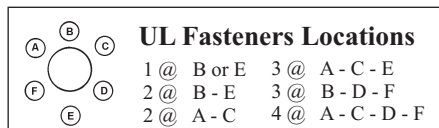
* **Radius -Tapped orifice:** Aligns rod for easy thread engagement and eliminates structural deficiencies associated with rod inserts.

* **No speed/pal nuts** required.

ORDERING - Part # and finish.



The purlin lip is not capable of supporting
NFPA 13 fire sprinkler pipe at 1(wt.) +250 lbs min.
When manufacturers **specify 200 lbs. max.**



Wood - No Pre Drill			Steel - 1/4 or #14 Tek			Steel - #10 SMS or #905		
Min. Fastener	Min. Qty.	Max. Pipe	Min. Thickness	Min. Qty.	Max. Pipe	Min. Thickness	Min. Qty.	Max. Pipe
1/4 x 1 1/2 Lag	1	2	14 GA.	1	3	18 GA.	1	2 1/2
	2	4		2	4		2	3
							3	4
#14 x 1 1/2 SMS	1	2	16 GA.	1	2 1/2	20 GA.	2	3
	2	4		2	4		4	4
#16 x 2 DS	2	2	18 GA.	1	2 1/2	22 GA.	3	3
	3	4		2	3			
				3	4			
Wood - Thru 5/8" Gyp.			20 GA.	* 1	2	DS= Drive Screw SMS = Sheet Metal Screw Lag= Lag Bolt Gyp= Gypsum Board		
1/4 x 2 Lag	1	2	* @ B ONLY	2	3			
	2	4		3	4			
#14 x 2 SMS	1	2						
	2	4	22 GA.	3	2 1/2			

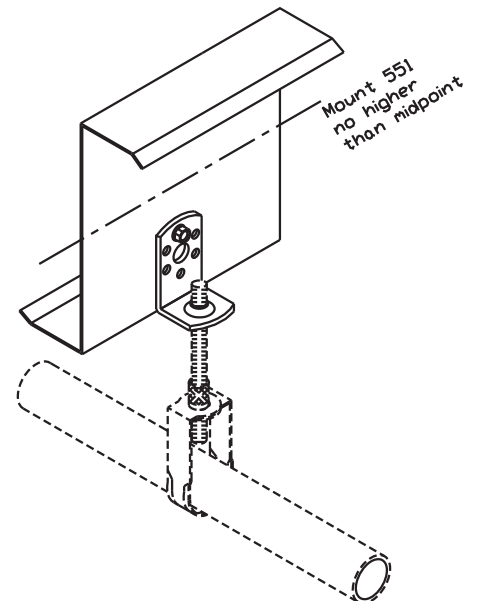


Fig. 28M - Offset Hanger & Restrainer for CPVC Plastic Pipe and IPS Steel Pipe **



Size Range: 3/4" (20mm) thru 2" (32mm)

Material: Steel, Pre-Galvanized

Function: Designed to be used as a hanger and restrainer for CPVC piping or steel piping where the "stand-off" design will ease installation by eliminating the need for wood blocking.

Features:

- Flared edge design protects CPVC pipe from any rough or abrasive surfaces
- Unique snap-on design holds pipe firmly in place and allows retrofit type of installation
- The "Stand-Off" design eliminates the need for wood block extension
- Can be installed on horizontal or vertical piping regardless of mounting surface orientation
- Attaches easily to wood structure with two hex head self-threading screws furnished with product
- Installs easily using rechargeable electrical driver with 5/16" (7.9mm) extension socket eliminating impact tool damage to pipe
- Attaches easily to steel, minimum 18 gauge (1.024mm) with (2) 1/4" x 1" tek type self drilling tapping screws
- **cULus** Listed as a hanger and a restrainer for fire sprinkler piping

Installation Note: When installed in wood structural members and threads from the #10 x 1" screws are exposed, use Fig. 27B speed nut to secure

Approvals: Underwriters Laboratory Listed in the USA (**UL**) and Canada (**cUL**) to support automatic fire sprinkler systems.

May be installed into wood using fasteners screws. Meets and exceeds the requirements of NFPA 13, 13R and 13D. Fig. 28M satisfies the UL vertical restraint requirements where needed.

Order By: Figure number and pipe size

Patent #7,744,042

** With reduced spacing, consult factory.

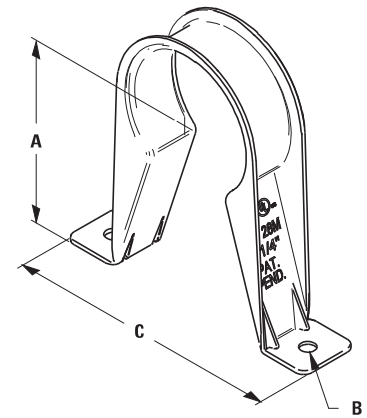
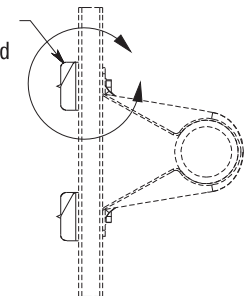
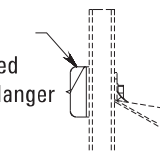


Fig. 27B
(2) Required

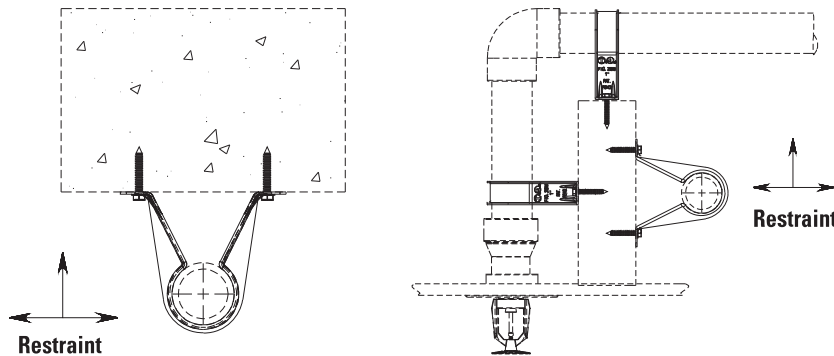


Hanger and Restraint Application

Fig. 27B
(1) Required
High Side of Hanger



**Detail A
Hanger Application**



Part No.	Pipe Size in. (mm)	A in. (mm)	Hole Dia. B in. (mm)	C in. (mm)	Max Spacing* in. (mm)	Approx. Wt./100 lbs. (kg)
28M-3/4	3/4" (20)	2" (50.8)	3/16" (4.8)	35/16" (84.1)	5'-6" (1676)	9 (4.1)
28M-1	1" (25)	2 1/8" (54.0)	3/16" (4.8)	3 1/2" (88.9)	6'-0" (1829)	12 (5.4)
28M-1 1/4	1 1/4" (32)	2 5/16" (58.7)	3/16" (4.8)	3 1/2" (88.9)	6'-6" (1981)	13 (5.9)
28M-1 1/2	1 1/2" (49)	2 7/16" (61.9)	3/16" (4.8)	3 7/8" (98.4)	7'-0" (2133)	14 (6.3)
28M-2	2" (50)	2 5/8" (66.7)	3/16" (4.8)	4 7/16" (112.7)	8'-0" (2438)	15 (6.8)

* Required per NFPA 13 for CPVC plastic pipe

All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

Fig. 200 - "Trimline" Adjustable Band Hanger

Size Range — 1/2" thru 8" pipe

Material — Carbon Steel, Mil. Galvanized to G90 specifications

Function — For fire sprinkler and other general piping purposes. Knurled swivel nut design permits hanger adjustment after installation.

Features —

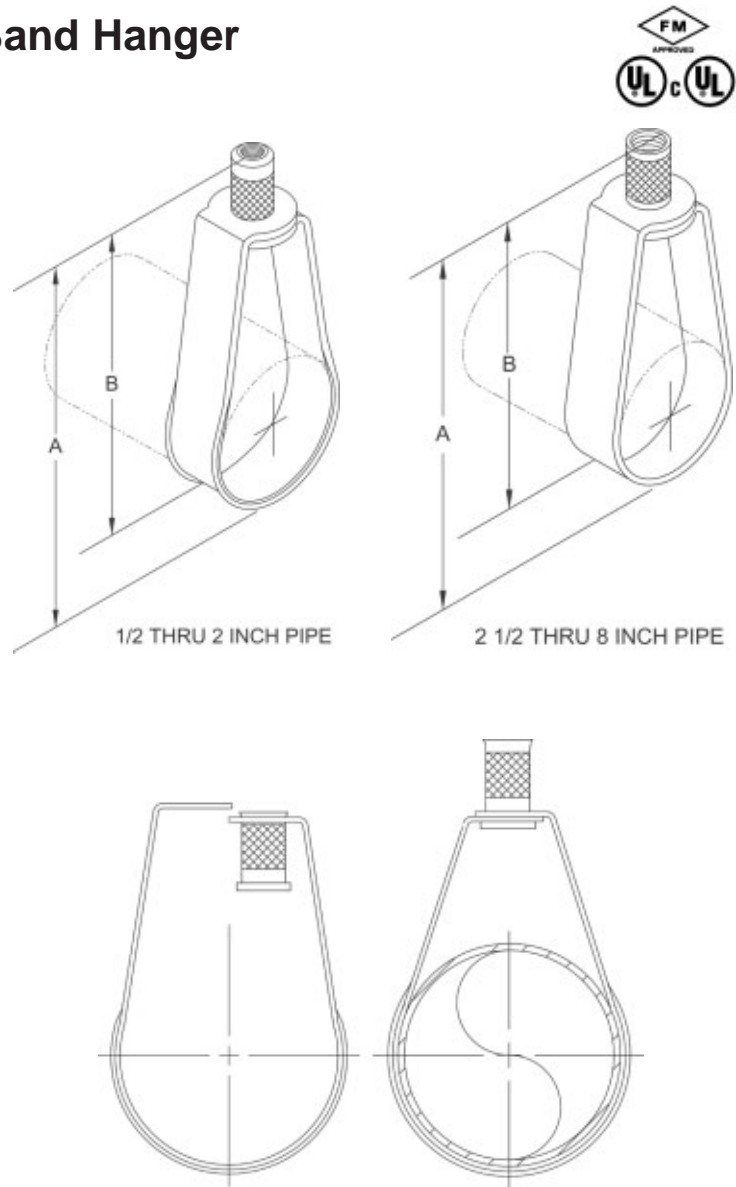
- (1/2" thru 2") Flared edges ease installation for all pipe types and protect CPVC plastic pipe from abrasion. Captured design keeps adjusting nut from separating with hanger. Hanger is easily installed around pipe.
- (2 1/2" thru 8" Spring tension on nut holds it securely in hanger before installation. Adjusting nut is easily removed.

Approvals — Underwriters' Laboratories listed (1/2" thru 8") in the USA (**UL**) and Canada (**cUL**) for steel and CPVC plastic pipe and Factory Mutual Engineering Approved (3/4" thru 8"). Conforms to Federal Specifications WW-H-171E, Type 10 and Manufacturers Standardization Society SP-69, Type 10.

Maximum Temperature — 650°F

Finish — Mil. Galvanized. For Stainless Steel materials, order TOLCO™ Fig. 200WON.

Order By — Figure number and pipe size



Dimensions • Weights

Pipe Size	Rod Size		A	B	Max. Rec. Load Lbs.	Approx. Length
	Inch	Metric				
1/2	3/8	8mm or 10mm	3 1/8	2 5/8	400	11
3/4	3/8	8mm or 10mm	3 1/8	2 1/2	400	11
1	3/8	8mm or 10mm	3 3/8	2 5/8	400	12
1 1/4	3/8	8mm or 10mm	3 3/4	2 7/8	400	13
1 1/2	3/8	8mm or 10mm	3 7/8	2 7/8	400	14
2	3/8	8mm or 10mm	4 1/2	3	400	15
2 1/2	3/8	10mm	5 5/8	4 1/8	600	27
3	3/8	10mm	5 7/8	4	600	29
3 1/2	3/8	10mm	7 3/8	5 1/4	600	34
4	3/8	10mm	7 3/8	5	1000	35
5	1/2	12mm	9 1/8	6 1/4	1250	66
6	1/2	12mm	10 1/8	6 3/4	1250	73
8	1/2	12mm	13 1/8	8 3/4	1250	136

G-FIRE Figure 577 Grooved Rigid Coupling 1 Inch to 12 Inch (DN25 to DN300)

IMPORTANT

Refer to Technical Data Sheet TFP2300 for warnings pertaining to regulatory and health information.

Scan the QR code or enter the URL in a web browser to access the most up-to-date electronic version of this document. Data rates may apply.



docs.jci.com/tycofire/tfp1854

General Description

The GRINNELL G-FIRE Figure 577 Grooved Rigid Couplings provide a rigid joint by firmly gripping along the full circumference of the pipe grooves. Figure 577 couplings are a proven dependable method of joining pipe and are an economical alternative to welding, threading, or using flanges.

Figure 577 couplings are rated at pressures up to 350 psi (24, 1 bar) depending on pipe size and wall thickness when used in fire protection service applications. For more information, see Table A.

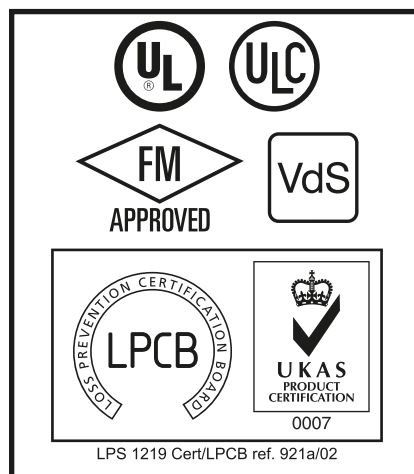
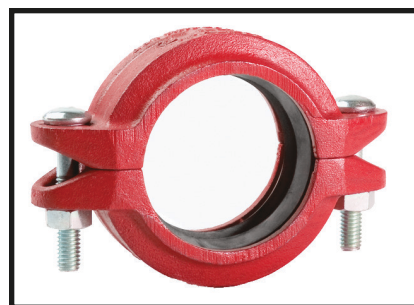
NOTICE

The GRINNELL G-FIRE Figure 577 Grooved Rigid Coupling described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the Approval agency, in addition to the standards of any other authorities having jurisdiction. Failure to do so may result in serious personal injury or impair the performance of these devices.

Never remove any piping component nor correct or modify any piping deficiencies without first de-pressurizing and draining the system. Failure to do so may result in serious personal injury, property damage, and/or impaired device performance.

It is the designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data are not exceeded. Material and gasket selection should be verified to be compatible for the specific application. Always read and understand the installation instructions.

The owner is responsible for maintaining their mechanical system and devices in proper operating condition. The installing contractor or device manufacturer should be contacted with any questions.



Technical Data

Approvals

UL and ULC Listed
FM Approved
VdS Approved
LPCB (Cert. Nos. 669a and 673a)

See Table A for details.

Sizes

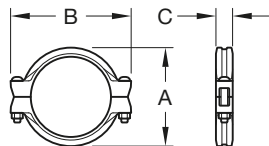
1 in. to 12 in. (DN25 to DN300)

Housing

Ductile iron conforming to ASTM A536, Grade 65-45-12

Finish

- Orange non-lead paint
- Red non-lead paint
- Hot-dipped, Galvanized conforming to ASTM A153



Pipe Size		Max. ^b Pressures psi (bar)	Max. ^b End Load Lbs. (kN)	Max. ^{a, d} End Gap Inches (mm)	Nominal Dimensions			Coupling Bolts		Approx. Weight Lbs. (kg)
Nominal ANSI Inches DN	O.D. Inches (mm)				A Inches (mm)	B Inches (mm)	C Inches (mm)	Qty.	Size ^c Inches (mm)	
1 DN25	1.315 (33,7)	350 (24,1)	475 (2,11)	0.06 (1,5)	1.63 (41)	3.92 (100)	1.65 (42)	2	3/8 x 2-1/4 M10 x 57	1.2 (0,55)
1-1/4 DN32	1.660 (42,4)	350 (24,1)	757 (3,37)	0.06 (1,5)	2.66 (68)	4.40 (112)	1.64 (42)	2	3/8 x 2-1/4 M10 x 57	1.3 (0,59)
1-1/2 DN40	1.900 (48,3)	350 (24,1)	992 (4,41)	0.06 (1,5)	2.90 (74)	4.66 (118)	1.66 (42)	2	3/8 x 2-1/4 M10 x 57	1.5 (0,68)
2 DN50	2.375 (60,3)	350 (24,1)	1,551 (6,90)	0.06 (1,5)	3.38 (86)	5.20 (132)	1.70 (43)	2	3/8 x 2-1/4 M10 x 57	1.8 (0,82)
2-1/2 DN65	2.875 (73,0)	350 (24,1)	2,272 (10,11)	0.06 (1,5)	3.88 (99)	5.64 (143)	1.75 (44)	2	3/8 x 2-1/4 M10 x 57	2.0 (0,91)
— DN65	3.000 (76,1)	350 (24,1)	2,474 (11,01)	0.06 (1,5)	4.00 (102)	5.78 (147)	1.75 (44)	2	— M10 x 57	2.0 (0,91)
3 DN80	3.500 (88,9)	350 (24,1)	3,367 (14,98)	0.06 (1,5)	4.50 (114)	6.33 (161)	1.75 (44)	2	3/8 x 2-1/4 M10 x 57	2.7 (1,22)
4 DN100	4.500 (114,3)	300 (20,7)	4,771 (21,22)	0.06 (1,5)	5.70 (145)	7.50 (191)	1.83 (46)	2	3/8 x 2-1/4 M10 x 57	3.3 (1,50)
— DN125	5.500 (139,7)	300 (20,7)	7,127 (31,71)	0.125 (3,2)	6.80 (173)	8.75 (222)	1.91 (49)	2	— M12 x 76	5.3 (2,41)
5 DN125	5.563 (141,3)	300 (20,7)	7,290 (32,43)	0.125 (3,2)	6.86 (174)	8.82 (224)	1.91 (49)	2	1/2 x 3 M12 x 76	5.3 (2,41)
— DN150	6.500 (165,1)	300 (20,7)	9,955 (44,28)	0.125 (3,2)	7.80 (198)	9.75 (248)	1.91 (49)	2	— M12 x 76	5.7 (2,59)
6 DN150	6.625 (168,3)	300 (20,7)	10,341 (46,00)	0.125 (3,2)	8.47 (215)	9.88 (251)	1.91 (49)	2	1/2 x 3 M12 x 76	5.9 (2,68)
— DN200	8.516 (216,3)	300 (20,7)	17,079 (76,0)	0.22 (5,6)	10.14 (257,5)	12.68 (322,1)	2.4 (61,0)	2	5/8 x 3-1/4 M16 x 83	11.4 (5,2)
8 DN200	8.625 (219,1)	300 (20,7)	17,528 (77,97)	0.125 (3,2)	10.25 (260)	12.78 (325)	2.40 (61)	2	5/8 x 3-1/4 M16 x 83	11.7 (5,32)
— DN250	10.528 (267,4)	300 (20,7)	26,102 (116,10)	0.22 (5,6)	12.52 (318,1)	15.81 (401,6)	2.4 (61,0)	2	3/4 x 4-3/4 M20 x 121	20.4 (9,3)
10 ^e DN250	10.750 (273,0)	300 (20,7)	27,229 (121,0)	0.25 (6,4)	12.50 (318)	16.50 (419)	2.56 (65)	2	3/4 x 4-3/4 M20 x 121	19.5 (8,86)
— DN300	12.539 (318,5)	300 (20,7)	37,033 (164,70)	0.22 (5,6)	14.60 (370,7)	18.06 (458,7)	2.4 (61,0)	2	3/4 x 4-3/4 M20 x 121	24.6 (11,2)
12 ^e DN300	12.750 (323,9)	300 (20,7)	38,303 (170,0)	0.25 (6,4)	14.50 (368)	18.50 (470)	2.56 (65)	2	3/4 x 4-3/4 M20 x 121	22.0 (10,00)

a. Maximum available gap between pipe ends. Minimum gap = 0.

b. Maximum Pressure and End Load are total from all loads based on standard weight steel pipe. Pressure ratings and end loads may differ for other pipe materials and/or wall thickness. Contact your TYCO Representative.

c. Gold color coded metric bolts and nuts are available upon request.

d. Max End Gap is for cut grooved standard weight pipe.

e. For 10 in. and 12 in. sizes where VdS Approval is required, refer to Figure 772, Technical Data Sheet G140.

FIGURE 1
G-FIRE FIGURE 577 GROOVED RIGID COUPLING, 1 TO 12 INCH (DN25 TO DN300)
NOMINAL DIMENSIONS

Pipe Sizes Nominal ANSI Inches (O.D. mm)	Pipe Schedule ^c	Pressure Rating psi (bar)		
		UL	ULC	FM
1 (33,7)	10	300 (20,7)	300 (20,7)	350 (24,1)
	40	350 (24,1)	350 (24,1)	350 (24,1)
1-1/4 (42,4); 1-1/2 (48,3); 2 (60,3); 2-1/2 (73,0)	10	350 (24,1)	350 (24,1)	350 (24,1)
	40	350 (24,1)	350 (24,1)	350 (24,1)
3 (88,9); 4 (114,3)	10	300 (20,7)	300 (20,7)	350 (24,1)
	40	300 (20,7)	300 (20,7)	350 (24,1)
5 (141,3); 6 (168,3); 8 (219,1) ^a ; 10 (273,0) ^a ; 12 (323,9) ^b	10	300 (20,7)	300 (20,7)	300 (20,7)
	40	300 (20,7)	300 (20,7)	300 (20,7)

Pipe O.D. mm	Pipe Specification ^c	Pressure Rating psi (bar)	
		UL	FM
76,1	ISO 4200 Type F	300 (20,7)	350 (24,1)
	ISO 4200 Type D and E	300 (20,7)	300 (20,7)
	EN 10255 Heavy	300 (20,7)	300 (20,7)
	EN 10255 Medium	300 (20,7)	300 (20,7)
139,7	ISO 4200 Type D, E, and F	300 (20,7)	300 (20,7)
	EN 10255 Heavy	300 (20,7)	300 (20,7)
	EN 10255 Medium	300 (20,7)	300 (20,7)
165,1	EN 10255 Heavy	300 (20,7)	300 (20,7)
	EN 10255 Medium	300 (20,7)	300 (20,7)
216,3; 267,4; 318,5	JIS G3452	300 (20,7)	300 (20,7)

Pipe Sizes Nominal ANSI Inches (O.D. mm)	Pipe Specification ^d	Pressure Rating psi (bar)	
		LPCB	VdS
1 (33,7); 1-1/4 (42,4); 1-1/2 (48,3); 2 (60,3); — (76,1); 3 (88,9); 4 (114,3); — (165,1)	ISO 65 Medium	290 (20)	—
6 (168,3); 8 (219,1); 10 (273,0); 12 (323,9)	ISO 4200 Wall Thickness 5,4 mm	290 (20)	—
1 (33,7); 1-1/4 (42,4); 1-1/2 (48,3); 2 (60,3); — (76,1); 3 (88,9); 4 (114,3); — (139,7); 6 (168,3); 8 (219,1)	DIN 2448 or 2458	—	232 (16)

a. For 8 in. and 10 in. sizes, minimum allowed pipe wall thickness is 0.188 in.

b. For 12 in., Schedule 30 is minimum allowed pipe wall thickness by UL and ULC. 0.250 inch wall thickness is the minimum allowed by FM

c. See Agency website for Listing/Approvals of other pipe specifications:

UL website - see Online Certificate Directory, www.ul.com

FM Global website - www.approvalguide.com

d. See Agency website for Listing/Approvals of other pipe specifications:

LPCB website - see Search Our Listings - Automatic Sprinklers, Water Spray and Deluge Systems, www.redbooklive.com

VdS website - see certifications, www.vds.de

TABLE A
LISTED/APPROVED PRESSURE RATINGS

Bolts/Nuts

- **ANSI:**

Carbon Steel oval neck track head bolts are heat-treated and conform to the physical properties of ASTM A183 Grade 2 and SAE J429 Grade 5 with a minimum tensile strength of 110,000 psi.

Carbon Steel heavy hex nuts conform to the physical properties of ASTM A183 Grade 2 and SAE J995 Grade 5. Bolts and nuts are zinc-electroplated conforming to ASTM B633.

Stainless Steel bolts and nuts are available upon request.

- **Metric:**

Carbon Steel oval neck track head bolts (Gold color coded) are heat-treated and conform to the physical properties of ASTM F568M with a minimum tensile strength of 760 MPa.

Carbon Steel heavy hex nuts conform to the physical properties of ASTM A563M Class 9. Bolts and nuts are zinc-electroplated conforming to ASTM B633.

Gaskets

- Pre-lubricated Grade “A” EPDM, Violet color code, -30°F to 150°F (-34°C to 66°C)

For dry and freezer systems, lubrication is required. Refer to Installation Manual IH-1000FP for details.

- Tri-Seal Grade “E” EPDM, Green color code, -30°F to 230°F (-34°C to 110°C)

For proper gasket selection, refer to Technical Data Sheet TFP1895.

Care and Maintenance

The GRINNELL G-FIRE Figure 577 Grooved Rigid Coupling must be maintained in accordance with this section.

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

After placing a fire protection system in service, notify the proper authorities and advise those responsible for monitoring proprietary and/or central station alarms.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION, such as NFPA 25, in addition to the standards of any authority having jurisdiction. Contact the installing contractor or product manufacturer with any questions. Any impairments must be immediately corrected.

Automatic sprinkler systems are recommended to be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

Limited Warranty

For warranty terms and conditions, visit www.tyco-fire.com.

Ordering Procedure

GRINNELL Products are available globally through a network of distribution centers. For the nearest distributor, visit www.tyco-fire.com. When placing an order, indicate the full product name.

Specify: G-FIRE Figure 577 Grooved Rigid Coupling, quantity, pipe size (Nominal ANSI or O.D.), finish (Orange, Red, or Galvanized), and type of gasket:

- Pre-lubricated Grade “A” EPDM
- Tri-Seal Grade “E” EPDM

High performance intumescent firestop sealant FS-ONE MAX

Product description

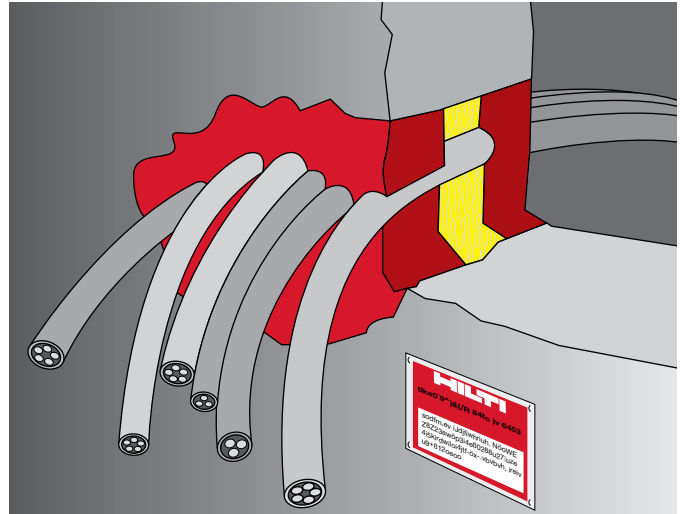
- Intumescent (expands when exposed to fire) firestop sealant that helps protect combustible and non-combustible penetrations for up to 4 hours fire rating

Applications

- Effectively seals most common through penetrations in a variety of base materials
- For use on concrete, masonry and drywall
- Mixed and multiple penetrations
- Metal pipe penetrations
- Insulated metal pipe penetrations
- Plastic pipe penetrations
- Cable bundles and trays
- HVAC penetrations

Advantages

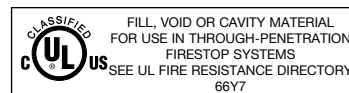
- One product for a variety of common through penetrations
- Cost-effective and easy-to-use solution
- Water-based and paintable
- W-rated systems available
- Ethylene glycol-free
- Industry leading VOC results
- Convenient multi application firestop solution for penetrations



Technical Data*	
Chemical basis	Water-based acrylic dispersion
Color	Red
Application temperature	41°F to 104°F
Storage and transportation range	41°F to 77°F
Approx. cure time *	4 mm / 3 days
Shelf life	18 months **
Temperature resistance range	-4°F to 212°F
Mold and mildew performance	Class 0 (ASTM G21-13)
Mold and mildew resistant	Yes
Surface burning characteristics (ASTM E 84-14)	Flame Spread: 0 Smoke Development: 10
Approvals	California State Fire Marshal - in progress
Tested in accordance with	ASTM G21 ASTM E 90 CAN/ULC-S115 UL 1479 ASTM E 814 ASTM E84

* At 75°F (24°C) and 50% relative humidity

** from date of manufacture



Hilti. Outperform. Outlast.

Hilti, Inc. (USA) 1-800-879-8000 | www.us.hilti.com | en español 1-800-879-5000 | Hilti (Canada) Corp. 1-800-363-4458 | www.hilti.ca





THIS INFORMATION PROVIDED IS BASED ON ASTM GUIDELINES FOR WELDED PIPE SPECIFICATIONS AND ASTM REQUIREMENTS. ACTUAL PIPE AND MATERIAL TEST REPORTS PROVIDED WOULD MEET OR EXCEED THESE GUIDELINES.

TEST REPORTS WOULD PROVIDE SPECIFIC AND ACTUAL DETAILS CONCERNING THE MECHANICAL AND CHEMICAL PROPERTIES OF THE ACTUAL PIPE, AS WELL AS ADDITIONAL TESTS RESULTS REQUIRED BY ASTM.

SCHEDULE 40 Black and Galvanized Steel ERW Pipe

Pipe Size Nominal	O.D.	I.D.	Weight / Foot	CRR Values	Test Pressure psi
				Threaded	
1"	1.315	1.049	1.680	1.0	700
1-1/4"	1.660	1.380	2.270	1.0	1200
1-1/2"	1.900	1.610	2.720	1.0	1200
2"	2.375	2.067	3.660	1.0	2300
2-1/2"	2.875	2.469	5.800	1.0	2500
3"	3.500	3.068	7.580	1.0	2220
4"	4.500	4.026	10.800	1.0	1900
5"	5.563	5.047	14.630	1.0	1670
6"	6.625	6.065	18.990	1.0	1520
8"	8.625	7.981	28.580	1.0	1340

COMPOSITION AND PROPERTIES

Chemical and mechanical properties requirements are as prescribed by applicable ASTM standards edition January 2006.

Chemical Requirements, Percent (Product)

Specification	Grade	C	Mn	P	S	Other
		max	max	max	max	
ASTM A53	A	0.250	0.950	0.05	0.045	-

1 Residual elements max: Cu-0.40, Ni-0.40, Cr-0.40, Mo-0.15 and V-.08. These live elements combined shall not exceed 1%.

Mechanical Properties-Tensile Requirements

Specification	Grade	Strength-psi.			
		Yield		Tensile	
		Min	Max	Min	Max
ASTM A53	A	30,000	-	48,000	-

NOTE: Elongation requirements vary with nominal area of test specimen and specified minimum tensile strength of the steel grade.



TECHNICAL MANUAL



C P V C F I R E S P R I N K L E R P R O D U C T

Installation Instructions
and Technical Handbook





© 2024 by IPEX Inc. All rights reserved. No part of this book may be used or reproduced in any manner whatsoever without prior written permission. For information contact: IPEX Management Inc. at 1383 North Service Road East, Oakville, Ontario, Canada, L6H 1A7.

The information contained here within is based on current information and product design at the time of publication and is subject to change without notification. IPEX does not guarantee or warranty the accuracy, suitability for particular applications, or results to be obtained therefrom.

INTRODUCTION	4
ADVANTAGES	5
TRAINING AND DEMONSTRATION	5
TRADEMARKS APPEARING IN THIS MANUAL	5
LISTINGS/APPROVALS (WHERE TO USE)	7
UNDERWRITERS LABORATORIES INC. (UL) AND UNDERWRITERS	
LABORATORIES INC. (C-UL) FOR USE IN CANADA	7
Concealed Installations (UL)	7
Concealed Installations (C-UL)	8
Installation in Concrete (UL & C-UL)	8
Exposed Installation – General (UL & C-UL)	10
Smooth, Flat, Horizontal, Fixed Ceilings –	
Exposed Installations (UL & C-UL)	10
UNFINISHED BASEMENTS	12
Exposed Installations	12
Unfinished Basements with Solid Wood Joists	
OR Composite Wood Joists	12
Open Web Joists	13
Residential Dry Pipe Systems (UL)	17
Low Pressure Dry Sprinkler Systems (UL)	18
Air Plenums (UL)	19
Garage Installations (UL)	19
System Risers in NFPA 13, 13R and 13D Applications	19
Underground Water Pressure Service (UL & C-UL)	21
Outdoor Installations	24
FACTORY MUTUAL (FM)	24
Concealed Installations (FM)	25
Exposed Installations – Smooth, Flat, Horizontal Ceilings (FM)	25
System Risers (FM)	26
The Loss Prevention Council (LPCB)	27
ADDITIONAL APPROVALS	28
NSF CERTIFIED	28
ORDINARY HAZARD INSTALLATIONS	28

TABLE OF CONTENTS

IPEX CPVC SPECIFICATIONS 31
 Pipe 31
 Fittings 32
 Solvent Cement 32

PRODUCT RATINGS AND CAPABILITIES 32
 Ambient Temperature and Heat Sources. 32
 Pressure Rating 32
 Friction Loss 33
 Thermal Expansion – U.S. Units 34
 Thermal Expansion – Metric Units. 36

PHYSICAL AND THERMAL PROPERTIES 47
 Permissible Bending Deflections. 47

SUPPORT AND HANGER REQUIREMENTS. 52
 Pipe Bracing with Standard Band Hanger. 53
 Hanger/Support Spacing 53
 Vertical Restraint 54
 Sway Bracing Guidance for CPVC 56

CHEMICAL COMPATIBILITY. 57

PAINT 57

INSTALLATION 59

HANDLING & STORAGE OF IPEX CPVC 59
 Handling – Pipe and Fittings. 59
 Storage – Pipe & Fittings 60
 Handling – Solvent Cements 60
 Storage – Solvent Cements 61
 Solvent – Cement Spills 61

JOINING CPVC PIPE AND FITTINGS

WITH ONE-STEP SOLVENT CEMENT. 61
 Apply Solvent Cement to Fitting 62
 Deburring and Beveling Pipe End 62
 Apply Solvent Cement to Pipe End. 62
 Assemble Pipe and Fitting. 62
 Estimating Cement Requirements 62
 De-burring and Beveling 63

TABLE OF CONTENTS

Solvent Cement Application. 63
Assembly 64
Set and Cure Times 65
System Acceptance Testing (Hydrostatic Pressure Test). 65
TFP-600 or BM-5 Solvent Cement Cure Times. 66
Limited Pressurized Air or Nitrogen Testing Allowance. 67

JOINING PIPE AND FITTINGS IN ADVERSE CONDITIONS 68
 In Cold Weather 68
 In Hot Weather 69

TRANSITION TO OTHER MATERIALS 69
 Brass Threaded Connections. 70
 Sprinkler Installation in Rapid Seal Adapter (RSA) Fittings 70
 Gasket Replacement in Rapid Seal Adapter (RSA) Fittings. 71
 Grooved Coupling Adapter Connections 72

PENETRATING FIRE RATED WALLS & PARTITIONS. 72

FREEZE PROTECTION 73
 Use of Dry Type Sprinklers 73
 Use and Cautions with LFP® Antifreeze
 or Glycerin Antifreeze 73
 Batt Insulation Requirements and Suggestions. 74
 Batt Insulation Installation Recommendations 75

CUT-IN PROCEDURE FOR SYSTEM MODIFICATION AND REPAIR. 75

APPENDIX A – PIPE FITTINGS 80

APPENDIX B – DO’S & DON’TS. 101

**IMPORTANT INFORMATION WITH REGARDS
TO YOUR IPEX CPVC FIRE SPRINKLER SYSTEM 103**

NOTIFICATION TO JOBSITE BUILDING TRADES 104

INTRODUCTION

This Installation Handbook refers to IPEX CPVC Pipe and Fittings produced by IPEX USA LLC. IPEX CPVC Pipe and Fittings are produced using BLAZEMASTER compound. When reference to NFPA Standards is made in this Installation Handbook, the current edition of the relevant code is used. This Installation Handbook contains the criteria for installation (including system design, handling, and storage) of BLAZEMASTER piping systems in accordance with the applicable Listing/Approval agencies. Additionally, this handbook contains general piping practices and other installation suggestions that may not be required to satisfy the applicable Listing/Approval agencies. To differentiate between a requirement and a suggestion, use the following definitions:

SHALL or MUST – The use of the words “shall” or “must” indicates a mandatory requirement of the Listings/Approvals.

SHOULD or MAY – The use of the words “should” or “may” indicates a recommendation that is strongly advised, but not required to meet the Listings/Approvals.

This handbook is intended as a supplement to basic, fundamental knowledge relating to the installation and/or repair of CPVC fire sprinkler systems. Before commencing installation, a user should understand this Installation Handbook and confirm applicable National Fire Protection Association (NFPA) standards, the National Building Code of Canada (as applicable), and local approval and installation requirements for CPVC fire sprinkler systems.

NOTICE

The IPEX CPVC Pipe and Fittings described herein must be installed and maintained in compliance with this Installation Handbook and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of the IPEX CPVC Pipe and Fittings.

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

It is the designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data are not exceeded. Material selection should be verified to be compatible for the specific application. Designers and Installers must read and understand the installation instructions in this handbook.

Never remove any piping component or modify any piping deficiencies without first depressurizing and draining the system.

⚠ WARNING

Never use compressed air or nitrogen in lieu of or to replace the required hydrostatic system acceptance testing. Any pre-testing performed with low pressure air or nitrogen should follow the recommendations on Page 65. System failure when using high-pressure compressed air or nitrogen may result in property damage, serious injury, or death.

ADVANTAGES

IPEX CPVC Pipe and Fittings are designed specifically for fire sprinkler systems and provide the following advantages over traditional sprinkler piping systems:

- Increased hydraulic capabilities (C-Factor =150)
- No pre-cutting and expensive fabrication required
- Pipe, Slip Style Fittings and Rapid Seal Adapter (RSA) threaded sprinkler connection fittings – NSF-pw listed for use in pressure rated potable water piping systems
- Can easily be connected to other sprinkler piping systems
- Flexibility in the piping for greater ease of installation
- Resistant to rust, scale, and foreign contaminant build up
- Inexpensive tools required for installation
- Easily repaired or modified on site
- Easily transported and handled
- Resists sweating and condensation

TRAINING AND DEMONSTRATION

IPEX strongly recommends that installers receive hands on demonstration in the proper procedure(s) for installation of BlazeMaster fire sprinkler systems. On-site demonstration in proper pipe preparation, solvent cementing, proper handling of CPVC and installation instruction are available from IPEX at no charge. Upon completion of the BlazeMaster demonstration program, IPEX will issue a completion card to the persons successfully finishing the required subject matter. This card is to be carried when working on BlazeMaster systems. For information about on-site demonstration, contact your local IPEX sales representative.

TRADEMARKS APPEARING IN THIS MANUAL

IPEX..... registered trademark of Aliaxis Group SA
 BLAZEMASTER..... registered trademark of The Lubrizol Corporation
 CAULK AND WALK..... registered trademark of The Lubrizol Corporation
 SOFFI-STEEL..... registered trademark of Grice Engineering
 TEFLON..... registered trademark of Dupont
 OATEY..... registered trademark of Oatey
 GREAT WHITE..... registered trademark of Oatey
 IPS..... registered trademark of IPS Corporation
 CRISCO..... registered trademark of J.M. Smucker Co.
 FBC SYSTEM COMPATIBLE PROGRAM..... registered trademark of The Lubrizol Corporation

IMPORTANT

Refer to Technical Data Sheet for warnings pertaining to regulatory and health information. TFP-600 and BM-5 One Step Solvent Cement are Listed for North America only.

LISTINGS/APPROVALS (WHERE TO USE)

For verification of Listings and Approvals, consult the current UL Fire Protection Equipment Directory, C-UL Products Certified for Canada Directory, Factory Mutual Research Approval Guide, or LPCB List of Approved Fire Security Products and Services Guide.

IPEX manufactures CPVC pipe and fittings using Lubrizol's BLAZEMASTER compound as a licensee of The Lubrizol Corporation.

UNDERWRITERS LABORATORIES INC. (UL) AND UNDERWRITERS LABORATORIES INC. (C-UL) FOR USE IN CANADA

IPEX CPVC Pipe and Fittings are UL and C-UL Listed for use in:

- Light Hazard and residential occupancies as defined in the Standard for Installation of Sprinkler Systems, NFPA 13
- Residential occupancies as defined in the Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies up to Four Stories in Height, NFPA 13R
- Residential occupancies as defined in the Standard for Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes, NFPA 13D
- Air plenums, as defined by the Installation of Air Conditioning and Ventilating Systems, NFPA 90A
- Underground Water Pressure Service, NFPA 24
- System risers in accordance with NFPA 13, 13R, and 13D
- See UL Fire Protection Equipment Directory, categories VIWT and HFYH.
- See C-UL Products Certified for Canada Directory, categories VIWT7 and HFYH7.

IPEX fire sprinkler systems shall be employed in wet-pipe systems only. (A wet pipe system contains water or water and glycerin (anti-freeze solution) and is connected to a water supply so that the water or water and glycerin (anti-freeze solution) will discharge immediately when a sprinkler is opened.)

National Fire Protection Association Standards 13, 13R, 13D and NFPA 24, in addition to the standards of any other authorities having jurisdiction, must be referenced and followed for design and installation requirements in conjunction with this installation handbook.

Concealed Installations (UL)

- In accordance with the UL Listing, protection shall be provided for IPEX CPVC Pipe and Fittings. The minimum protection shall consist of either one layer of 3/8 in. (9,5 mm) thick gypsum wallboard, 1/2 in. (12,7 mm) plywood soffits, or a suspended membrane ceiling with lay-in panels or tiles having a weight of 0.35 pounds per sq ft (1,7 kg per sq m) when installed with metallic grids. For residential occupancies defined in NFPA 13D and 13R, the minimum protection may consist of one layer of 1/2 in. (12,7 mm) plywood.

Listed Quick Response, standard or extended coverage, 225°F

(107°C) maximum temperature rated sprinkler located in accordance with its Listing may be used.

Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

Concealed Installations (C-UL)

- In accordance with the C-UL Listing, protection shall be provided for IPEX CPVC Pipe and Fittings. The minimum protection shall consist of either one layer of 9,5 mm thick gypsum wallboard, one layer of 13 mm plywood, or a suspended membrane ceiling with lay-in panels or tiles classified with respect to surface burning characteristics having a mass of not less than 1,7 kg/m² when installed with metallic grids. The effectiveness of this protection can be impaired if penetrated by large openings such as ventilation grills, exhaust fans connected to metal ducts serving washrooms excepted. Where such penetration is present, individual openings exceeding 0,03 m² but not exceeding 0,71 m² in area must be located such that the distance from the edge of the opening to the nearest sprinkler does not exceed 300 mm.

In these cases any Quick or Standard Response, 107°C maximum temperature rated sprinkler or Listed Residential 107°C maximum temperature rated sprinkler located in accordance with its Listing may be used. IPEX CPVC Pipe and Fittings shall not be used where such openings exceed 0.71 m² in area.

Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

Installation in Concrete (UL & C-UL)

IPEX CPVC Pipe and Fittings are acceptable for use embedded in concrete. Direct contact with concrete does not have any adverse chemical effect on BLAZEMASTER materials. The following installation practices shall be followed.

- As the IPEX CPVC pipe is laid out it shall not come into contact with sharp objects or edges, such as rocks, metal, or structural members. Any open pipe ends shall be protected from debris or concrete getting into the system.
- When laying out IPEX CPVC pipe it is best to use straight runs of pipe. However, CPVC pipe is inherently ductile and it is possible for CPVC pipe to be snaked when it is laid out. This can be useful in some installations when some offset from a straight run can be helpful in avoiding various construction obstacles. Straight runs of pipe will minimize any stress that is exerted on the pipe. When the pipe is embedded in concrete there is not opportunity to relieve any stress once the concrete is poured. Therefore, it is important to layout the piping such that the stress is minimized from the time of installation. (Refer to Pipe Deflection section for allowable deflection.)
- Avoid the contact of IPEX CPVC Pipe and Fittings with construction materials that are incompatible with CPVC. Verify the suitability of a product for use with CPVC with the manufacturer of the chemical additive to confirm chemical compatibility.

BLAZEMASTER pipe and fittings have been successfully installed encased in concrete for many years. Lubrizol is unaware of any problems that have been caused by chemical incompatibility between BLAZEMASTER pipe and fittings and concrete or any chemicals that have been added to concrete. Since new construction materials are regularly introduced to the market, however, questions may arise regarding the compatibility of the products you're using. To help ensure a successful installation, Lubrizol recommends contacting the manufacturer of the chemical to confirm chemical compatibility.

- Steps must be taken to prevent the wire mesh or reinforcing bars from causing any abrasion damage to the IPEX CPVC Pipe and Fittings (see Handling and Storage section). This is mostly of concern prior to pouring the concrete. IPEX CPVC Pipe and Fittings shall not be installed directly within concrete that is to be post tensioned. The post tensioning process can create excessive forces which can damage the IPEX CPVC piping system. IPEX CPVC Pipe and Fittings may be installed within a sleeve or protective enclosure that is installed in concrete that is to be post tensioned provided the following conditions are met:
 - IPEX CPVC piping cannot be exposed to any stresses associated with post-tensioning concrete process.
 - IPEX CPVC piping cannot be exposed to, or be in direct contact with, any chemically incompatible materials.
 - IPEX CPVC piping shall have sufficient clearance to prevent direct contact to the sleeve. The system piping may rest on the bottom of the protective sleeve, provided linear movement of the system piping is not restricted.
 - The material of the sleeve or protective enclosure must be of sufficient strength so it does not compress on the IPEX CPVC system piping during the concrete pouring/tensioning process.
- When there are pipe joints that will be covered in concrete, the installation shall be pressure tested prior to pouring the concrete. If there will not be any joints covered by concrete, there is no need to pressure test the system prior to pouring the concrete.
- Prior to the pouring of the concrete, the IPEX CPVC pipe shall be intermittently secured to prevent movement during this process. Nonabrasive, plastic fasteners are good choices for this application. When hangers are used, most metal hangers designed for metal pipe are suitable for IPEX CPVC pipe. Do not use undersized hangers. Hangers with sufficient load bearing surface shall be selected based on pipe size (e.g., 1 1/2 in. hangers for 1 1/2 in. pipe). The hanger shall not apply compressive load or have rough or sharp edges that come into contact with the pipe.
- Care shall be taken so that the IPEX CPVC Pipe and Fittings are not damaged by the tools and equipment used to pour and finish the concrete. All standard methods of pouring concrete onto the ceiling construction with concrete pumps or concrete containers followed by compaction with vibrators can be used in combination with IPEX CPVC sprinkler systems. IPEX CPVC Pipe and Fittings shall not come into contact with equipment such as tampers and agitators.

- As the concrete is poured, assure that the pipe has not moved from its intended positioning.
- Thermal expansion and contraction is not an issue for IPEX CPVC Pipe and Fittings that are embedded in concrete. Those forces are relieved in a manner that does not affect the pipe or fittings. However, expansion and contraction shall be incorporated in the design of those sections of pipe that are not embedded in concrete. Failure to adequately allow for stress at these points may result in damage to the pipe where it enters and exits the concrete.

NOTE: *It is recommended that when transitioning from embedded to not embedded in concrete that 6 in. of 1 in. compatible foam pipe insulation be installed around the embedded pipe.*

Exposed Installation – General (UL & C-UL)

In accordance with the UL and C-UL Listings, IPEX CPVC Pipe and Fittings may be installed without protection (exposed), subject to the following additional limitations:

Note: *NFPA standards permit the omission of automatic sprinklers in areas such as small closets and bathrooms. Where sprinklers are not required, and when approved by the authority having jurisdiction, it is acceptable to install BLAZEMASTER products exposed in these areas.*

Note: *Where piping is required to be mounted directly to the ceiling/wall, the use of listed hangers for thermoplastic sprinkler piping mounted directly to the ceiling/wall is permitted. The resulting clearance between the pipe and the ceiling/wall as a function of using the listed hanger is acceptable.*

Smooth, Flat, Horizontal, Fixed Ceilings – Exposed Installations (UL & C-UL)

• Standard Coverage Sprinklers

- Pendent Sprinklers shall be Listed, Quick Response, 170°F (77°C) maximum temperature rated, sprinklers having deflectors installed within 8 in. (203,2 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 15 ft (4,6 m). Piping shall be mounted directly to the ceiling.
- Upright Sprinklers shall be Listed, Quick Response, 155°F (68°C) maximum temperature rated, installed within 4 in. (101,6 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 15 ft (4,6 m). The maximum distance from the ceiling to the centerline of the main run of pipe shall not exceed 7 1/2 in. (190,5 mm). The distance from the centerline of the sprinkler to the closest hanger shall be 3 in. (76,2 mm).
- Horizontal Sidewall Sprinklers shall be Listed, Quick Response, 200°F (93°C) maximum temperature rated, having deflectors within 12 in. (305,0 mm) of the ceiling and within 6 in. (152,4 mm) of the side wall. The maximum distance between sprinklers shall not exceed 14 ft (4,3 m). Piping shall be mounted directly to the side wall.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

• Extended Coverage Sprinklers

- Pendent Sprinklers shall be Listed, Quick Response, 155°F (68°C) maximum temperature rated, having deflectors installed within 8 in. (203,2 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 20 ft (6,1 m) with an application density of at least 0.1 gpm/sq ft (4,1 mm/min). Piping shall be mounted directly to the ceiling.
- Horizontal Sidewall Sprinklers shall be Listed, Quick Response, 165°F (74°C) maximum temperature rated, having deflectors within 12 in. (305,0 mm) of the ceiling and within 6 in. (152,4 mm) of the side wall. The maximum lateral distance between sprinklers shall not exceed 18 ft (5,5 m) with an application density of at least 0.1 gpm/ft² (4,1 mm/min). Piping shall be mounted directly to the side wall.
- Horizontal Sidewall Sprinklers shall be Listed, Quick Response, 175°F (79°C) maximum temperature rated, having deflectors within 12 in. (305,0 mm) of the ceiling and within 6 in. (152,4 mm) of the side wall. The maximum lateral distance between sprinklers shall not exceed 16 ft (4,9 m) with an application density of at least 0.1 gpm/ft² (4,1 mm/min). Piping shall be mounted directly to the side wall.
- When using fittings 1 1/2 in. (DN40) and larger only Schedule 80 fittings may be used.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

• Residential Sprinklers

- Pendent Sprinklers when the maximum lateral distance between sprinklers is 15 ft (4,6 m) or less. Sprinklers shall be Listed 170°F (77°C) maximum temperature rated, having deflectors located in accordance with their Listing and not exceeding 8 in. (203,2 mm) from ceiling. The demand for the sprinklers shall be the minimum flow rates indicated in individual listing. Piping shall be mounted directly to the ceiling.
- Pendent Sprinklers when the maximum lateral distance between sprinklers exceeds 15 ft (4,6 m) but does not exceed 20 ft (6,1 m). Sprinklers shall be Listed 155°F (68°C) maximum temperature rated, having deflectors located in accordance with their Listing and not exceeding 8 in. (203,2 mm) from ceiling. The demand for the sprinklers shall be the greater of either the minimum flow rates indicated in individual listing or calculated based on delivering a minimum of 0.1 gpm/sq ft (4,1 mm/min) over the design area in accordance with the provisions of NFPA 13:(2007) Section 11.3.1.2. Piping shall be mounted directly to the ceiling.
- Horizontal Sidewall Sprinklers when the maximum lateral distance between sprinklers is 14 ft (4,3 m) or less. Sprinklers shall be Listed 200°F (93°C) maximum temperature rated having deflectors located in accordance with their Listing. The demand for the sprinklers shall be the minimum flow rates indicated in individual listing. Piping shall be mounted directly to the side wall.
- Horizontal Sidewall Sprinklers when the maximum lateral distance between sprinklers exceeds 14 ft (4,3 m) but does not exceed 18 ft (5,5 m). Sprinklers shall be Listed 165°F (74°C) maximum temperature rated having deflectors 12 in. (305,0 mm) from ceiling and within 6 in. (152,4 mm) of the wall. The demand for the sprinklers shall be the greater

of the minimum flow rates indicated in individual listing or calculated based on delivering a minimum of 0.1 gpm/sq ft (4,1 mm/min) over the design area in accordance with the provisions of NFPA 13:(2007) Section 11.3.1.2. The maximum sprinkler area of coverage shall not exceed 18 ft x 18 ft (5,5 m x 5,5 m). Piping shall be mounted directly to the side wall.

- When applying criteria having a minimum 0.1 gpm/sq ft (4,1 mm/min), Schedule 80 fittings must be used when sizes are 1 1/2 in. (DN40) and larger.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

UNFINISHED BASEMENTS

Exposed Installations

BLAZEMASTER CPVC pipe and fittings may be installed without protection (exposed) in unfinished basements in accordance with NFPA 13D when subject to the following additional limitations:

Unfinished Basements with Solid Wood Joists OR Composite Wood Joists

- The ceiling shall be horizontal and constructed utilizing solid wood joists or composite wood joists with a nominal depth of 16 in. (406,4 mm) or less on maximum 24 in. (609,6 mm) centers.
- The distance from the floor to the bottom of the joists shall be between 7 ft and 10 ft (2,1 m and 3,0 m).
- Listed residential pendent sprinklers with a maximum temperature rating of 155°F (68°C) and a minimum K-factor of 4.9 are to be used for this type of installation. The maximum sprinkler spacing shall not exceed 16 ft (4,9 m). Lesser areas are also permitted. The system is to be designed based upon the Listed flows for the sprinkler selected except that the flow for a single sprinkler or for multiple sprinklers flowing is to be not less than 13 gpm (49,2 lpm) per sprinkler. The sprinklers are to be installed with their deflectors a maximum of 1 3/4 in. below the bottom of the solid wood or composite wood joists in anticipation of future installation of a finished ceiling. (Refer to NFPA 13D, Section 8.2.4, 2016 Edition.)
- Schedule 80 fittings in the 1 1/2 in. and larger sizes shall be used.
- All solvent cement joints shall be made with One Step Solvent Cement (TFP-600 or BM-5).
- The maximum length along the joist shall not exceed 40 ft (12,2 m). When the length exceeds 40 ft (12,2 m), blocking shall be utilized. The blocking shall be constructed of minimum 1/2 in. (12,7 mm) plywood, minimum 3/8 in. (9,5 mm) gypsum wallboard or batt insulation with a minimum thickness of 3 1/2 in. (89 mm). These blocking materials shall be the full depth of the joists. When batt insulation is used as blocking, it must be a single piece of insulation. The insulation must be secured in place with metal wire netting which must encase the insulation on both of the exposed sides. The metal wire netting is required to hold the insulation in place and prevent it from being dislodged or repositioned over time. It is acceptable for items such as piping, wires, ducts, etc.

to penetrate the blocking. The gap between the item penetrating the blocking and the blocking should be minimized. For installations where the gap exceeds 1/4 in. (6.4 mm), the gap shall be filled with insulation, caulking, or other suitable material.

- When installing IPEX CPVC pipe and fittings perpendicular to the joists:
 - System mains installed below the joists shall use listed support devices for thermoplastic sprinkler piping or other listed support devices which mount the piping directly to the bottom of the joists.
 - System mains and branch lines installed through the joists using holes, for support, shall be at or below the center of the depth of the joist. The holes should be oversized to allow for movement and located to not impair the structural integrity of the joists.

⚠ CAUTION

When drilling holes in the joists, the structural integrity must be maintained. Consult the Authority Having Jurisdiction (AHJ) or building code for requirements.

- When installing IPEX CPVC pipe and fittings parallel to the joists:
 - System mains and branch lines shall be installed in the cavity below the bottom of the ceiling and above the bottom of the joist. The pipe and fittings shall be located at or below the center of the depth of the joist. The pipe shall be installed utilizing listed support devices for thermoplastic sprinkler piping or other listed support devices which mount the piping directly to nominal 2 in. wood blocking or listed support devices for thermoplastic sprinkler piping which offset the pipe a nominal distance of 1 1/2 in. from the joists.

NOTE: Use of IPEX CPVC Pipe and Fittings is limited to basements where the quantity and combustibility of contents is low and fires with relatively low rates of heat release are expected. For additional information regarding the assembly and installation of IPEX CPVC Pipe and Fittings refer to the manufacturer's installation instructions.

- The instructions shown here for Unfinished Basements with Exposed Solid Wood or Composite Wood Joists require the use of Schedule 80 fittings when sizes are 1 1/2 in. (DN40) and larger.

Use of IPEX CPVC Pipe and Fittings is limited to basements where the quantity and combustibility of contents is low and fires with relatively low rates of heat release are expected.

Open Web Joists

- The ceiling shall be horizontal and constructed utilizing open web wood or steel joists with a nominal depth of 16 in. (406 mm) or less, and a maximum spacing of 24 in. (610 mm) on center.
- The distance from the floor to the bottom of the joists shall be between 7 ft (2.13 m) and 10 ft (3.04 m).

NOTES:

[illegible]

Figure 1 – Unfinished Basement, Solid Wood Joists, Center Wall Riser with Center Room Main

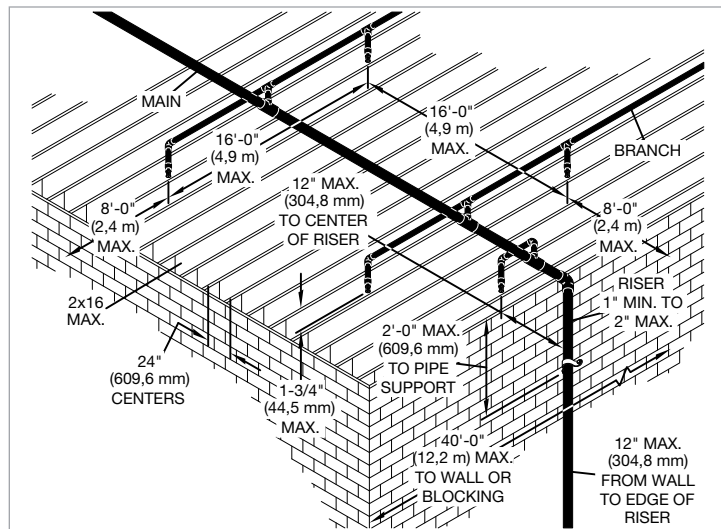


Figure 2 – Unfinished Basement, Solid Wood Joists, Center Wall Riser with Main at Wall

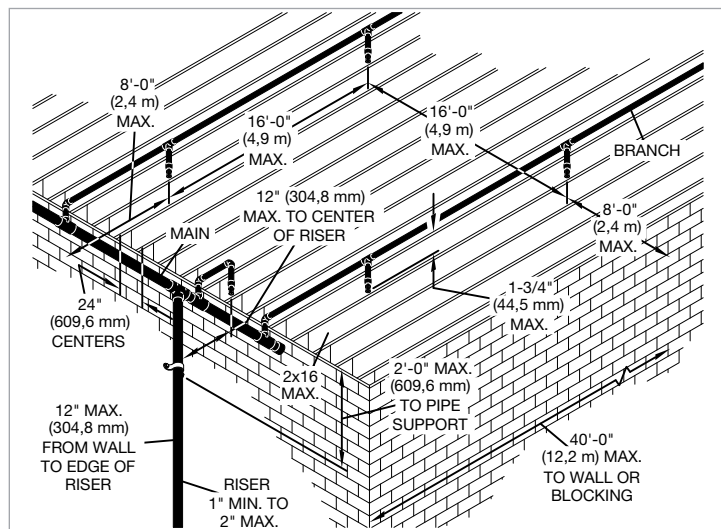


Figure 3 – Unfinished Basement, Solid Wood Joists, Riser in Corner

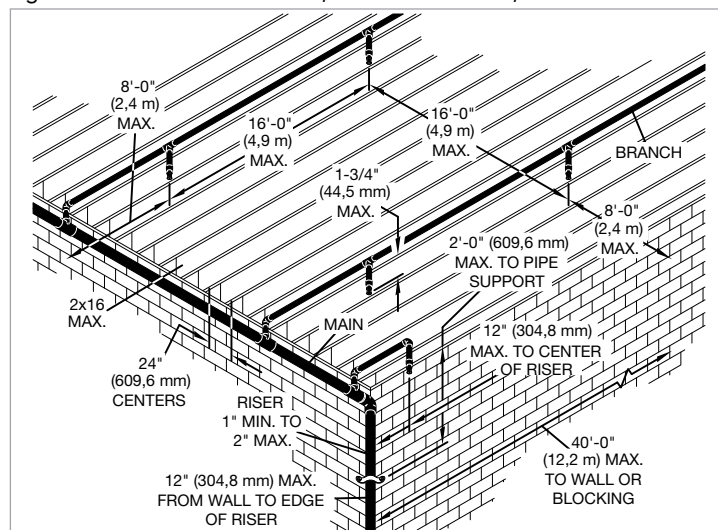


Figure 4 – Unfinished Basement, Solid Wood Joists, Blocking

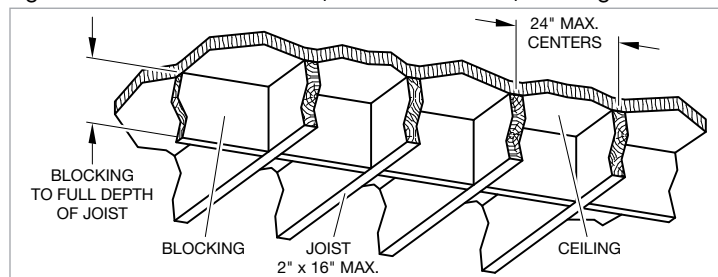
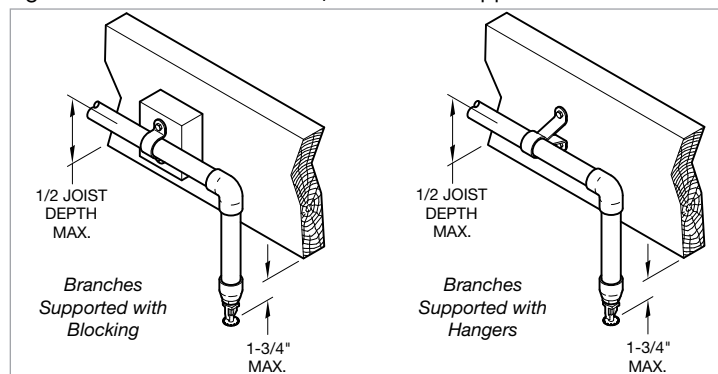


Figure 5 – Unfinished Basement, Branch Line Support



- Listed quick response horizontal sidewall sprinklers with a maximum temperature rating of 155°F (68°C) and a minimum K-factor of 4.2 installed below the joists. The sprinklers are to be installed with their deflectors a maximum of 4 1/2 in. (115 mm) below the bottom of the joists in anticipation of future installation of a finished ceiling (reference NFPA 13D). The residential horizontal sidewall sprinklers deflectors shall be located within the maximum distance from the wall as specified in their listing, but in no case more than 7 in. (178 mm) from the face of the wall or soffit on which they are mounted.

The maximum distance between sprinklers shall not exceed 14 ft (4,26 m). A sprinkler shall be located not more than 5 ft (1,5 m) from all corners. Lesser spacings are permitted based on limitations of the sprinklers. The system is to be designed based upon the Listed flows for the sprinkler selected except that the flow for a single sprinkler or for multiple sprinklers flowing is to be not less than 14 gpm (53 lpm) per sprinkler, and a discharge density not less than 0.07 gpm per ft² (0,12 lpm per m²).

- The system shall be installed as a loop in each space being protected. Schedule 80 fittings shall be used for sizes 1 1/2 in. and larger.
- All solvent cement joints shall be made with One Step Solvent Cement (TFP-600 or BM-5).
- The protected area of an individual space shall not be greater than 1,792 ft² (127.5 m²), with a maximum width of 32 ft (7,5 m) and a maximum length of 56 ft (17 m).
- The piping shall be mounted directly to the wall using listed support devices for thermoplastic sprinkler piping or other listed support devices either below the joist bay to a maximum of 4 1/2 in. (115 mm) below the bottom of the joist, or piping shall be run in the joist bay with drops to the sidewall sprinkler.

Combustible Concealed Spaces (UL)

IPEX CPVC Pipe and Fittings are not approved for installation in combustible concealed spaces requiring sprinklers, as referenced in NFPA 13 unless protected by sprinklers specifically Listed for this application. Although NFPA 13R and 13D permit the omission of sprinklers from combustible concealed spaces, IPEX CPVC Pipe and Fittings can be installed in these areas when protecting residential occupancies according to these standards.

For installations where sprinkler pipe runs through an attic space that requires sprinklers per NFPA, CPVC piping shall be protected in order to meet the requirements of its UL and C-UL Listings. Additionally, the authority having jurisdiction shall be consulted prior to any installation of CPVC in attic spaces requiring sprinklers. Protection methods and requirements may vary by jurisdiction and are subject to interpretation.

- Special Use Sprinklers – Specific Application Attic Sprinklers
 - Product Description – In accordance with the UL Listing, Specific Application Sprinklers for Protecting Attics are designed to provide protection of specific light hazard combustible, as well as noncombustible, attic spaces requiring sprinkler protection. The

Specific Application Sprinklers for Protecting Attics allow for the use of IPEX CPVC Pipe and Fittings within the attic space and to supply the wet system sprinklers below the ceiling provided the attic space is protected with Specific Application Sprinklers for Protecting Attics.

- Installation Requirements – When using the Specific Application Sprinklers for protecting attics, reference Sprinkler manufacturer technical data sheets..

• Special Use Sprinklers

- Product Description – In accordance with the UL Listing, the IPEX Specific Application Combustible Concealed Space Sprinklers are specific application sprinklers designed to provide protection of specific light hazard combustible, as well as noncombustible, concealed spaces requiring sprinkler protection. Sprinklers in some cases allow for the use of IPEX CPVC Pipe and Fittings within concealed spaces requiring automatic sprinkler protection.

Residential Dry Pipe Systems (UL)

In accordance with the Underwriters Laboratories Inc. (UL) Listing, IPEX CPVC Fire Sprinkler Pipe and Fittings made with BLAZEMASTER compound may be installed in Dry Pipe Systems for Residential Occupancies when subject to the additional limitations listed in this section.

• Acceptable Residential Occupancies are defined as follows:

- Concealed (protected) installations in residential sprinkler systems for one- and two- family dwellings and manufactured homes per NFPA 13D.
- Residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R.
- Residential portions of any occupancy per NFPA 13 where calculations for Dry Pipe System water delivery are based on the hazard shown in Table A using a calculation program listed by a nationally recognized laboratory or obtained where the system design specifies that water is delivered to the system test connection in not more than 15 seconds for Residential Occupancies, starting at normal air pressure on the system.

- Residential sprinklers used in conjunction with IPEX CPVC Fire Sprinkler Pipe and Fittings in Dry Pipe Systems shall be specifically listed for such use.
- The IPEX CPVC Sprinkler Head Adapter Tee (P/N 48159) is to be used with dry-type residential pendent sprinklers in dry pipe system installations.
- Dry Pipe Systems in areas subject to freezing shall be pitched at least 1/4 in. or 1/2 in. per 10 ft (2 mm/m) in accordance with the appropriate NFPA standard being utilized.
- Upon completion of the assembly and cure, the system shall be hydrostatically tested in accordance with the procedures described in the CPVC Installation Handbook.

- IPEX CPVC Fire Sprinkler pipe and fittings used in Dry Pipe Systems may not be used in combination with other thermoplastic piping systems unless specifically listed for use in Dry Pipe Systems. Combining with steel or copper piping systems is permitted, where applicable.
- The pipe and fittings shall be protected (concealed) in accordance with the specifications outlined in the CPVC Installation Handbook (IH-1900).
- Exposed pipe and fittings have not been evaluated.
- Minimum use temperature shall be -20°F (-29°C).
- 3/4 in. to 3 in. pipe and fittings are listed for these applications and are to be assembled with TFP-600 or BM-5 One Step Solvent Cement.
- In-service system Air Pressure shall be maintained at a maximum of 15 psi (1 bar).
- Pipe friction loss shall be calculated in accordance with the Hazen-Williams formula using a C value of 150.
- Air supply to the IPEX CPVC Pipe and Fittings shall be free of oil and oil vapor. Automatic air compressors shall be of an oil-less type or the air shall be treated to assure oil or oil vapor is not introduced into the piping

Table A
Residential Dry Pipe System Water Delivery

Hazard	Residential	Light
Number of Most Remote Sprinklers Initially Open	1	1
Maximum Time of Water Delivery	15 Seconds	60 seconds

Low Pressure Dry Sprinkler Systems (UL)

IPEX BLAZEMASTER pipe is Listed by UL for use in dry pipe sprinkler systems with the following characteristics:

- Pressure does not exceed 15 psi (1,03 bar)
- Ambient temperature is above -20°F (-28,9°C)

The dry system must be installed in Light Hazard and Residential occupancies in accordance with NFPA 13D, NFPA 13R, and/or NFPA 13.

When air is used in dry pipe sprinkler systems that utilize IPEX BLAZEMASTER CPVC pipe and fittings, there must be no residual oil in the compressed air. The types of oil used in this application may be incompatible with CPVC. If the oil is not removed from the compressed air, there is the risk that the oil may be incompatible with CPVC. Check the BLAZEMASTER website for chemical compatibility.

The dry pipe sprinkler system must be designed to provide pressure relief when the system pressure exceeds 15 psi (1,03 bar). As an alternative to this requirement, the system may be equipped with an alarm that sounds when the pressure exceeds 15 psi (1,03 bar).

Air Plenums (UL)

IPEX CPVC Pipe and Fittings are UL Listed for use in air plenums. IPEX CPVC Pipe and Fittings comply with UL1887 combustibility requirements for thermoplastic sprinkler pipe as described in the Standard for Installation of Air Conditioning and Ventilating Systems, NFPA 90A, and various model mechanical codes. IPEX CPVC Pipe and Fittings may be installed in the plenum adjacent to, but not over, an opening in the ceiling such as ventilation grills. Return Air Plenum installations may only be made with UL Listed IPEX CPVC Pipe and Fittings and require the use of Schedule 80 fittings when sizes are 1-1/2 in. (DN40) and larger.

Garage Installations (UL)

Garage Installation Specifications shall only apply for the installation of UL Listed IPEX CPVC Pipe and Fittings in garages requiring sprinkler protection per NFPA 13D and NFPA 13R. These Standards are defined in NFPA codes entitled "One and Two Family Dwellings and Mobile Homes" and in "Residential Occupancies up to Four Stories in Height". As referenced in NFPA 13D:(2007) Section 8.6.4, "Sprinklers are not required in garages, open attached porches, carports or similar structures." The installation of IPEX CPVC Pipe and Fittings for use in garages requiring sprinkler protection per NFPA 13R is only applicable to the UL Listing of this product.

Requirements for Pipe, Fittings, Solvent Cement Systems, System Design, Installation, Freeze Protection, and Penetrating Fire Related Walls and Partitions are covered in this Installation Handbook. Read these sections carefully prior to designing or installing IPEX CPVC Pipe and Fittings for garage installations.

- Installation Requirements
 - Protection: IPEX CPVC Pipe and Fittings shall be installed concealed behind protection consisting of a minimum of one layer of 3/8 in. (9,5 mm) thick gypsum wallboard or 1/2 in. (13 mm) thick plywood.
 - Sprinkler Requirements: UL Listed, pendent or sidewall sprinklers with a 225°F (107°C) maximum temperature rating shall be utilized. All sprinklers shall be installed per the manufacturer's published installation instructions.
 - Installation Standard: The Listing for Garage Installations shall pertain to those occupancies defined by NFPA 13R.

System Risers in NFPA 13, 13R and 13D Applications

BLAZEMASTER pipe and fittings may be used as system risers in accordance with NFPA 13, 13D and 13R when subject to the following limitations:

1. When installed protected (concealed), the minimum protection shall consist of either one layer of 3/8" (9.5 mm) thick gypsum wallboard or 1/2" (12.7 mm) thick plywood.
2. When installed without protection (exposed), the following limitations shall apply:

Note: Only NFPA 13R and 13D applications may be installed without protection exposed).

- a. The riser shall be installed below a smooth, flat, horizontal ceiling construction. A Listed residential pendent sprinkler is to be installed with its deflector at the distance from the ceiling specified in the sprinkler Listing.

OR

The riser shall be installed below a horizontal unfinished basement ceiling (in accordance with NFPA 13D) constructed utilizing solid wood joists, composite wood joists, open wood joists OR open steel joists with a nominal depth of 16" (406 mm) or less on maximum 24" (610 mm) centers.

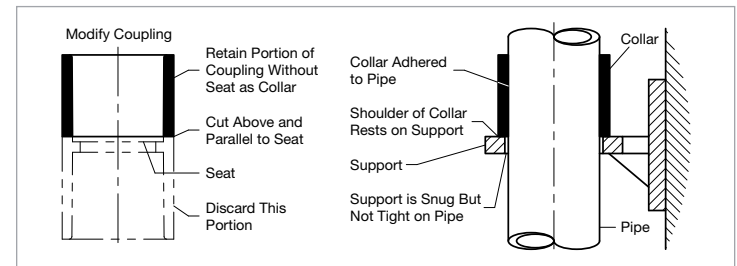
Listed residential pendent sprinkler is to be installed with its deflector a maximum of 1 3/4" (44.5 mm) below the bottom of the joist in anticipation of future installation of a finished ceiling.

- b. A Listed residential pendent sprinkler is to have a maximum temperature rating of 155°F and a minimum K-factor of 4.9 and is to be installed at a maximum horizontal distance of 12 inches from the centerline of the riser and a maximum horizontal distance of 15 inches from the wall. The system is to be designed based upon the Listed flows for the sprinkler selected except that the flow for a single sprinkler or for multiple sprinklers flowing is to be not less than 13 gpm per sprinkler.
- c. The riser shall be supported vertically within 2 feet of the ceiling or bottom of the joist.
- d. The minimum riser diameter shall be 1 in. and the maximum riser diameter shall be 2 in.
- e. The maximum distance between the wall and the outside surface of the riser pipe shall be 12 in.
- f. All solvent cement joints shall be made with One Step Solvent Cement (TFP-600 or BM-5).
- g. The instructions shown here for Exposed System Risers require the use of Schedule 80 fittings when riser sizes are 1 1/2" (38 mm) and larger.
3. The system shall be installed per the requirements of NFPA 13 Section 9.2.5(2016 Edition), Support of Risers.
4. IPEX CPVC Pipe and Fittings shall be installed per the manufacturer's Installation Instruction and Technical Handbook.
5. Risers shall be supported by pipe clamps or by hangers located on the horizontal connection closest to the riser. Only Listed hangers and clamps shall be used.
6. Vertical lines must be supported at intervals, described in Paragraphs 9 and 10 below to avoid placing excessive load on a fitting at the lower end. Do this by using riser clamps or double bolt pipe clamps Listed for this service. The clamps must not exert compressive stresses on the pipe. If possible, the clamps should be located just below a fitting so that the shoulder of the fitting rests against the clamp. If necessary, a coupling can be modified and adhered to the pipe as a bearing support (modified riser collar) such that the shoulder of the fitting rests on the clamp (Ref. Figure 6). Follow the cure times in Tables U, V, and W.

Note: A modified riser collar shall only be used to provide support to the riser and shall not be used to join two pieces of pipe.

7. Do not use riser clamps that squeeze the pipe and depend on compression of the pipe to support the weight.
8. Hangers and straps shall not compress, distort, cut or abrade the piping and shall allow for free movement of the pipe to permit thermal expansion and contraction. The pipe can be damaged, and compression increases the likelihood of stress cracking.
9. Maintain vertical piping in straight alignment with supports at each floor level, or at 10 ft (3,1 m) intervals, whichever is less.
10. IPEX CPVC risers in vertical shafts or in buildings with ceilings over 25 ft (7,6 m), shall be aligned straightly and supported at each floor level, or at 10 ft (3,1 m) intervals, whichever is less.

Figure 6 – Riser Collar



Underground Water Pressure Service (UL & C-UL)

- Pipe – IPEX CPVC Pipe complies with the requirements of ASTM F442 and standard dimension ratio (SDR) 13.5. IPEX pipe is UL Listed and C-UL Listed for a rated pressure of 175 psi (12,1 bar) for underground service.
- Fittings – IPEX CPVC Fittings comply with the requirements of ASTM F438 (Schedule 40 socket), ASTM F439 (Schedule 80 socket) and ASTM F1970 (Transition fittings).
- Solvent Cement – All socket type joints shall be made in accordance with IPEX's Installation Instructions using the TFP-600 or BM-5 One Step Solvent Cement.

Note: When using IPEX CPVC Pipe and Fittings, installation must be in accordance with ASTM D2774, the standard recommended practice for underground installation of thermoplastic pressure piping and ASTM F645, the standard guide for selection, design, and installation of thermoplastic water pressure piping systems, and all IPEX installation instructions contained within this Technical Manual.

- System Design – An IPEX CPVC underground system shall be hydraulically calculated using a Hazen-Williams C-Factor of 150, and designed and installed in accordance with the "Installation of Sprinkler Systems," NFPA 13, 2007 edition, and where appropriate the "Standard for Installation of Private Fire Service Mains and Their Appurtenances," NFPA 24.

- Installation Procedures – The installation procedures detailed within apply to IPEX CPVC Pipe that has solvent cemented joints in sizes ranging from 3/4 in. to 3 in. (DN20 to DN80).
- Inspection – Before installation, IPEX CPVC Pipe and Fittings should be thoroughly inspected for cuts, scratches, gouges, or split ends. Discard damaged pipe.
- Trenching – The trench should be of adequate width to allow convenient installation, while at the same time being as narrow as possible. Minimum trench widths may be utilized by joining pipe outside of the trench and lowering it into the trench after adequate joint strength has been achieved.

Note: Refer to IPEX's instructions for recommended set and cure times for solvent cemented joints as found in Tables U, V, and W. Where pipe is joined in the trench, or where thermal expansion and contraction are factors, trench widths may have to be widened. For additional details on expansion and contraction, see thermal expansion characteristics in Tables H1 and H2. Table B shows the trench width and minimum ground cover required for underground installation.

All IPEX CPVC Pipe that is water filled should be buried at least 12 in. (304,8 mm) below the maximum expected frost line. It is recommended that IPEX piping be run within a metal or concrete casing when it is installed beneath surfaces that are subject to heavy-weight or constant traffic such as roadways and railroad tracks.

The trench bottom should be continuous, relatively smooth and free of rocks. Where ledge rock, hardpan or boulders are encountered, it is necessary to pad the trench bottom using a minimum of 4 in. (102,0 mm) of tamped earth or sand beneath the pipe as a cushion and to protect the pipe from damage. Sufficient cover must be maintained to keep external stress levels below maximum design stress. Reliability and safety of service is of major importance in determining minimum cover. Local, state and national codes may also govern.

- Maintenance – Maintenance of IPEX CPVC Pipe and Fittings for underground water service shall be in accordance with the Standard for Inspection, Testing and Maintenance of Water Based Extinguishing Systems as defined by NFPA 25.
- Snaking of Pipe – After IPEX CPVC pipe has been solvent cemented, it is advisable to snake the pipe according to the following recommendations beside the trench during its required drying time. BE ESPECIALLY CAREFUL NOT TO APPLY ANY STRESS THAT WILL DISTURB THE UNDRIED JOINT. Snaking is necessary to allow for any anticipated thermal contraction that will take place in the newly joined pipe line. Snaking is particularly necessary on the lengths of pipe that have been solvent cemented during the afternoon hours of a hot summer day because the drying time will extend through the cool of the night when thermal contraction of the pipe could stress the joints to the point of pull out. This snaking is also especially necessary with pipe that is laid in its trench (necessitating wider trenches than recommended) and is back-filled with cool earth before the joints are thoroughly dry. Tables C1 and C2 show the Pipe Snaking and the Loop Offset dimensions to compensate for contraction.

Table B – Ground Cover

Nominal Pipe Size ANSI DN	Trench Width		Ground Cover Minimum			
			Light Traffic		Heavy Traffic	
in	in	mm	in	mm	in	mm
3 DN80 & Under	8	203,2	12 – 18	305,0 – 457,2	30 – 36	762,0 – 914,4

Table C1 – U.S. Units
Maximum Temperature Variation, °F
Between Time of Solvent Welding and Final Use

Loop Length Feet	Temperature Variation, °F									
	10°	20°	30°	40°	50°	60°	70°	80°	90°	100°
	Offset- Inches									
20	3	4	5	5	6	6	7	7	8	8
50	7	9	11	13	14	16	17	18	19	20
100	18	18	22	26	29	32	35	37	40	42

Table C2 – Metric Units
Maximum Temperature Variation, °C
Between Time of Solvent Welding and Final Use

Loop Length Meters	Temperature Variation, °C									
	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°
	Offset- Millimeters									
5	65	83	95	105	114	123	133	143	154	164
15	164	219	266	307	343	377	409	440	469	498
30	314	424	522	609	687	758	823	884	943	999

- Back-Filling – Ideally, back-filling should only be done early in the morning during hot weather when the line is fully contracted so that there is no chance of insufficiently dried joints being subject to contraction stresses.

The pipe should be uniformly and continuously supported over its entire length with firm, stable material. Blocking should not be used to change pipe grade or to intermittently support pipe across excavated sections. Pipe is installed in a wide range of sub soils. These soils should not only be stable, but applied in such a manner so as to physically shield the pipe from damage. Attention should be given to local pipe laying experience that may indicate particular bedding problems.

Back-filled material free of rocks with a size of 1/2 in. (12,7 mm) or less should be used to surround the pipe with 6 in. to 8 in. (152,4 mm to 203,2 mm) of cover. The back-filled material should be placed in layers. Each soil layer should be sufficiently compacted uniformly to develop laterally passive soil forces during the back-fill operation. It may be advisable to have the pipe under water pressure, 15-25 psi (1,0-1,7 bar) during the back-filling.

Vibratory methods are preferred when compacting sand or gravel. Best results are obtained when the soils are in a nearly saturated condition. Where water flooding is used, the initial back-fill should be sufficient to ensure complete coverage of the pipe. Additional material should not be added until the water flooded back-fill is firm enough to walk on. Care should be taken to avoid floating the pipe.

Sand and gravel containing a significant portion of fine-grained material such as silt and clay should be compacted by hand or preferably by a mechanical tamper. The remainder of the back-fill should be placed and spread in uniform layers in such a manner as to fill the trench completely so that there will be no unfilled spaces under or about rocks or lumps of earth in the back-fill. Large or sharp rocks, frozen clods and other debris greater than 3 in. (76,2 mm) in diameter should be removed. Rolling equipment or heavy tampers should only be used to consolidate the final back-fill.

Outdoor Installations

IPEX CPVC Pipe and Fittings are not listed for outdoor applications other than underground.

FACTORY MUTUAL (FM)

IPEX CPVC Pipe and Fittings are FM Approved for use in:

- Miscellaneous non-manufacturing occupancies as described in FM Loss Prevention Data Sheet 3-26, "Fire Protection Water Demand for Non-storage Sprinklered Properties", Table 2, Section L.
- Residential occupancies as described in FM Loss Prevention Data Sheet 3-26, "Installation of Sprinkler Systems".

IPEX Fire Sprinkler Systems shall be employed in wet pipe systems only. (A wet pipe system contains water or water and glycerin [anti-freeze solution] and is connected to a water supply so that the water or water and glycerin [anti-freeze solution] will discharge immediately when the sprinkler is opened.)

Concealed Installations (FM)

In accordance with the FM Approval, protection shall be provided for IPEX CPVC Pipe and Fittings as follows:

- The minimum protection shall consist of either a permanently installed noncombustible barrier from any area protected by the system.

Note: A permanently installed barrier is one that cannot be removed without substantial cosmetic damage. Drop ceiling tiles, as used in suspended ceilings are specifically considered not be permanently installed for the purposes of this definition. Noncombustible is defined as having a minimum finish fire rating of 15 minutes when tested per ASTM E119.

- As an alternative to the protection of a permanently installed noncombustible barrier, FM has approved the use of IPEX CPVC with the SOFFI-STEEL™ covering system manufactured by Grice Engineering.
- FM Approved quick response, standard or extended coverage, or FM Approved residential sprinklers installed in accordance with their approval limitations may be used.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

Exposed Installations – Smooth, Flat, Horizontal Ceilings (FM)

In accordance with the FM Approval, IPEX CPVC Pipe and Fittings may be installed without protection (exposed), subject to the following additional limitations:

Note: Where piping is installed above drop ceiling tiles, the piping shall be considered exposed.

Ceilings may be combustible, or non permanently installed.

• Standard Coverage Sprinklers

- Pendent sprinklers shall be FM Approved, quick response sprinklers having deflectors installed within 8 in. (203,2 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 15 ft (4,6 m). The maximum ceiling height shall not exceed 10 ft (3,0 m).
- Upright sprinklers shall be FM Approved, quick response sprinklers having deflectors installed within 4 in. (101,6 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 15 ft (4,6 m). The maximum distance from the ceiling to the centerline of the main run of pipe shall not exceed 7-1/2 in. (191 mm). The distance from the centerline of the sprinkler to the closest hanger shall be 3 in. (76,2 mm). The maximum ceiling height shall not exceed 10 ft (3,0 m).
- Horizontal Sidewall Sprinklers shall be FM Approved, quick response sprinklers having deflectors installed within 12 in. (304,8 mm) of the ceiling and within 6 in. (152,4 mm) of the side wall. The maximum distance between sprinklers shall not exceed 14 ft (4,3 m). The maximum ceiling height shall not exceed 10 ft (3,0 m).
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

• Extended Coverage Sprinklers

- Pendent sprinklers shall be FM Approved, quick response sprinklers having deflectors installed within 8 in. (203,2 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 20 ft (6,1 m). When the sprinklers are not on square spacings, the flow for a sprinkler should be based on the density applied over the square area calculated for the largest dimension of the sprinkler spacing. The maximum ceiling height shall not exceed 10 ft (3,0 m).
- Horizontal Sidewall Sprinklers shall be FM Approved, quick response sprinklers having deflectors installed within 12 in. (304,8 mm) of the ceiling and within 6 in. (152,4 mm) of the side wall. The maximum lateral distance between sprinklers shall not exceed 16 ft (4,9 m). The maximum ceiling height shall not exceed 10 ft (3,0 m).
- The minimum flow or pressure established for Extended Coverage Systems shall be per FM Loss Prevention Data Sheet 2-0 and 3-26.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

• Residential Sprinklers

- Pendent sprinklers shall be FM Approved, residential sprinklers having deflectors installed within 8 in. (203,2 mm) of the ceiling. The maximum distance between sprinklers shall not exceed 20 ft (6,1 m). The minimum required discharge from each sprinkler is to be the greater of either the approved flow rate applied over the square area calculated for the largest dimension of the sprinkler spacing or a minimum discharge of 0.1 gpm/sq ft (4,1 mm/min) over the actual area (S x L) covered by the sprinkler. The maximum ceiling height shall not exceed 10 ft (3,0 m).
- Horizontal Sidewall Sprinklers shall be FM Approved, quick response sprinklers having deflectors installed within 12 in. (304,8 mm) of the ceiling and within 6 in. (152,4 mm) of the side wall. The maximum lateral distance between sprinklers shall not exceed 16 ft (4,9 m). The minimum required discharge from each sprinkler is to be the greater of either the approved flow rate applied over the area calculated for the largest dimension of the sprinkler spacing or a minimum discharge of 0.1 gpm/sq ft (4,1 mm/min) over the actual area (S x L) covered by the sprinkler. The maximum ceiling height shall not exceed 10 ft (3,0 m).
- The minimum flow or pressure established for Residential Sprinkler Systems shall be per FM Loss Prevention Data Sheet 2-0 and 3-26.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

System Risers (FM)

In accordance with the FM Approval, IPEX CPVC Pipe and Fittings may be installed without protection (exposed) as a vertical riser when subject to the following additional limitations:

- An automatic sprinkler (of the same type as in the area being protected) shall be located adjacent to and no further than 1 ft (0,3 m) from the riser.

- The automatic sprinkler protecting the riser shall not be considered when determining protection criteria for the floor area. The design flow for the sprinkler protecting the riser must be the same as for the other sprinklers, and must be added to the hydraulic calculation.
- Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

The Loss Prevention Council (LPCB)

Use of IPEX CPVC Fire Sprinkler Systems in Accordance with The Loss Prevention Council (LPCB) "List of Approved Products and Services", Part 5, "Automatic Sprinkler, Water Spray, and Deluge Systems" Section 21.1 "Plastic Pipes and Fittings" and Section 5 of BS 5306: Part 2.

The Loss Prevention Certification Board Listing is as follows:

1. The 'scope of use' of plastic pipe should be agreed upon between the purchaser, authority having jurisdiction, and/or insurer.
2. Use of plastic pipe and fittings is subject to water authority agreement for the territory concerned.
3. LPCB Approved quick response sprinklers shall be used with exposed (e.g., fire exposure) plastic pipe and fittings.
4. Plastic pipe and fittings are suitable for use only with wet pipe systems.
5. Care should be exercised to ensure that joints are adequately cured, in accordance with the manufacturer's installation instruction, prior to pressurization.
6. Plastic pipe and fittings shall not be installed outdoors.
7. Where plastic pipe and fittings are exposed (for example, fire exposure), the system shall be installed close to a flat ceiling construction.
8. Sprinkler systems that employ plastic pipe and fittings shall be designed where possible to ensure no "no flow" sections of pipe work in the event of sprinkler operation.
9. LPCB maximum ambient temperature of 50°C.

The Loss Prevention Certification Board listing applies to Light Hazard Classifications BS 5306: Part 2, Section 5.2 fall within the scope of NFPA 13, 13R and 13D.

In addition, IPEX fire sprinkler systems can be installed in certain ordinary classification (BS 5306: Part 2, Section 5.3) such as offices, retail shops and department stores when installed in accordance with Section 22 of LPCB "List of Approved Products and Services".

IPEX CPVC Pipe and Fittings should not be used in high hazard applications (BS 5306: Part 2, Section 5.4) and ordinary hazard applications where the fuel load or rate of heat release is high, such as boiler rooms, kitchens, manufacturing areas, and certain warehouse applications.

Solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement.

NOTES:

[illegible]

IPEX CPVC SPECIFICATIONS

Pipe

IPEX CPVC sprinkler pipe conforms to the requirements of ASTM F442 and is produced to SDR 13.5. SDR (Standard Dimension Ratio) is the ratio of the outside pipe diameter to the wall thickness of the pipe. The pipe carries the NSF International (NSF-pw) mark for use in potable water systems. See Tables D1 and D2 for dimensions of pipe.

Table D1 – U.S. Units
Dimensions for IPEX CPVC Pipe

Nominal Pipe Size ANSI Inches	Nominal O.D. Inches	Nominal I.D. Inches	Empty Weight	Water Filled Weight	Volume Gallons / Foot
			Pounds / Foot	Pounds / Foot	
3/4	1.050	0.874	0.168	0.428	0.031
1	1.315	1.101	0.262	0.675	0.049
1 1/4	1.660	1.394	0.418	1.079	0.079
1 1/2	1.900	1.598	0.548	1.417	0.104
2	2.375	2.003	0.859	2.224	0.164
2 1/2	2.875	2.423	1.257	3.255	0.239
3	3.500	2.950	1.867	4.829	0.355

Table D2 - Metric Units
Dimensions for IPEX CPVC Pipe

Nominal Pipe Size DN	Nominal O.D. Millimeters	Nominal I.D. Millimeters	Empty Weight	Water Filled Weight	Volume Liters / Meter
			Kilograms/ Meter	Kilograms/ Meter	
DN20	26,7	22,0	0,250	0,637	0,102
DN25	33,4	28,0	0,390	1,000	0,161
DN32	42,4	35,4	0,622	1,606	0,260
DN40	48,3	40,6	0,816	2,109	0,342
DN50	60,3	50,9	1,278	3,310	0,538
DN65	73,0	61,5	1,871	4,844	0,786
DN80	88,9	75,0	2,778	7,186	1,166

Fittings

IPEX CPVC sprinkler fittings conform to the requirements of ASTM F438 (Schedule 40 dimensions from 3/4 in. to 1 1/2 in. (DN20 to DN32), ASTM F439 (Schedule 80 dimensions for 1 1/2 in. to 3 in. (DN40 to DN80) and ASTM F1970 (Transition Fittings). Rapid Seal Adapter (RSA) threaded sprinkler connection fittings and slip style fittings carry the NSF International (NSF-pw) mark for use in potable water systems. All other threaded sprinkler adapter fittings feature brass inserts and are not NSF-pw rated. See Appendix A for sprinkler fittings types, sizes, socket and take-out dimensions.

Solvent Cement

IPEX CPVC socket connections shall be joined using TFP-600 or BM-5 One Step Solvent Cement as indicated in the "Listing and Approvals" section. TFP-600 or BM-5 One Step Solvent Cement meets ASTM F493, NSF, FM, UL and LPCB requirements. Review solvent cementing instructions within this handbook prior to installation.

PRODUCT RATINGS AND CAPABILITIES

Ambient Temperature and Heat Sources

IPEX CPVC Pipe and Fittings shall be installed in areas where the ambient temperature does not exceed 150°F (65°C). (LPCB maximum ambient temperature of 50°C)

Before penetrating fire rated walls and partitions, consult building codes and authorities having jurisdiction in your area. IPEX CPVC systems should be designed and installed so that the piping is not closely exposed to high heat producing sources, such as incandescent light, ballasts, and steam lines.

Pressure Rating

IPEX CPVC Pipe and Fittings are Listed/Approved for a rated pressure of 175 psi (12,1 bar) and a maximum ambient temperature of 150°F (65°C). (LPCB maximum ambient temperature of 50°C)

Friction Loss

IPEX CPVC Pipe has a Hazen-Williams C-Value of 150. Pipe friction loss calculations shall be made according to NFPA Standards. Tables F1 and F2 show the allowance of friction loss for fittings, expressed in equivalent feet of pipe.

Table F1
Allowance for Friction Loss in Fittings³

Fitting Size ANSI Inches	3/4	1	1 1/4	1 1/2	2	2 1/2	3
Tee Branch- ft	3	5	6	8	10	12	15
Elbow 90° ¹ - ft	4	5	6	7	9	12	13
Elbow 45°- ft	1	1	2	2	2	3	4
Coupling- ft	1	1	1	1	1	2	2
Tee Run ² - ft	1	1	1	1	1	2	2

Table F2
Allowance for Friction Loss in Fittings³

Fitting Size DN	DN20	DN25	DN32	DN40	DN50	DN65	DN80
Tee Branch- m	0,9	1,5	1,8	2,4	3,1	3,7	4,6
Elbow 90° ¹ - m	1,2	1,5	1,8	2,1	2,7	3,7	4,0
Elbow 45°- m	0,3	0,3	0,6	0,6	0,6	0,9	1,2
Coupling- m	0,3	0,3	0,3	0,3	0,3	0,6	0,6
Tee Run ² - m	0,3	0,3	0,3	0,3	0,3	0,6	0,6

1. The above stated friction loss values are for IPEX fittings only. When using other Listed IPEX CPVC 90° elbows with BLAZEMASTER products, consult the fitting manufacturer's installation and design manuals.
2. Per manufacturer's test.

Thermal Expansion – U.S. Units

IPEX CPVC Pipe, like all piping materials, expands and contracts with changes in temperature. The coefficient of linear expansion for IPEX CPVC Pipe is: 0.000034 in/in/°F. The coefficient of linear expansion IPEX CPVC Pipe is the same for all pipe sizes.

To determine the linear expansion of the pipe due to thermal changes use the following formula:

$$\Delta L = 12eL (\Delta T)$$

Where:

e = 0.000034 in/in/°F (coefficient of linear expansion)

L = Length of run in feet

ΔT = Temperature change in °F

ΔL = Inches

Example: How much will a 40 foot run of 3/4 inch IPEX CPVC Pipe increase in length (or expand) if the expected ambient temperature ranges from 35°F to 85°F? Changes in length due to fittings are insignificant relative to the pipe.

$$\Delta L = 12eL (\Delta T)$$

$$\Delta L = 12 (0.000034) \times 40 \times 50$$

$$\Delta L = 0.82 \text{ inch or approximately } 13/16 \text{ inch}$$

IPEX CPVC exhibits a relatively high coefficient of thermal expansion. When designing CPVC fire sprinkler systems, expansion of long runs must be considered if temperature variations will be encountered (i.e., summer to winter extremes). Methods of compensating for thermal expansion are expansion loops, offsets and change of direction of the pipe run shown in Figure 7.

Loop Lengths "L" for use in Figure 7 are shown in Tables H1, J1, and K1. If the change in temperature and the maximum working temperature are lower than those used to derive the tables, the numbers will be conservative in nature. For example, for a temperature change from 60°F to 125°F use Table J1 because the maximum temperature is greater than those shown in Tables G1 and H1.

For conditions that are not covered in the Loop Length Tables, use the following formula:

$$L = \sqrt{\frac{3ED(\Delta L)}{2S}}$$

Where:

L = Length of loop, offset, or change of direction in inches

E = Modulus of elasticity at the maximum temperature (Table L1) in psi

D = Nominal outside diameter of pipe (Table D1) in inches

ΔL = Change in length of pipe due to change in temperature in inches

S = Working stress at the maximum temperature (Table L1) in psi

Example: How much expansion can be expected in a 240 foot run of 2 inch IPEX CPVC Pipe installed in 40°F given a maximum temperature change to 100°F? Additionally, how long should the expansion loop be to compensate for this expansion?

Step 1. Find the temperature change expressed as ΔT.

$$\Delta T = 100^{\circ}\text{F} - 40^{\circ}\text{F}$$

$$\Delta T = 60^{\circ}\text{F}$$

Step 2. Calculate the change in length expressed as ΔL.

$$\Delta L = 12 e L (\Delta T)$$

$$\Delta L = 12 (0.000034) \times 240 \times 60$$

$$\Delta L = 5.88 \text{ inches}$$

Step 3. Find the length of the expansion loop or offset in inches

$$L = \sqrt{\frac{3ED(\Delta L)}{2S}}$$

L = Length of loop, offset, or change of direction in inches

E = Modulus of elasticity at maximum temperature (Table L1)

in psi

D = Nominal outside diameter of pipe (Table D1) in inches

S = Working stress at maximum temperature (Table L1) psi

ΔL = Change in length of pipe due to a change in temperature from Step 2 in inches

$$L = \sqrt{\frac{3 \times (3.85 \times 10^5) (2.375) (5.88)}{2 \times 1560}}$$

$$L = 71.90 \text{ inches}$$

Step 4. Refer to Figure 7.

$$\begin{aligned} \text{a- For loop length: } 1/5 L &= 1/5 \times 71.90 = 14.38 \text{ inches} \\ 2/5 L &= 2/5 \times 71.90 = 28.76 \text{ inches} \end{aligned}$$

$$\begin{aligned} \text{b- For offset length: } 1/4 L &= 1/4 \times 71.90 = 17.98 \text{ inches} \\ 1/2 L &= 1/2 \times 71.90 = 35.95 \text{ inches} \end{aligned}$$

$$\text{c- For change of direction length: } L = 71.90 \text{ inches}$$

Thermal Expansion – Metric Units

IPEX CPVC Pipe, like all piping materials, expands and contracts with changes in temperature. The coefficient of linear expansions IPEX CPVC Pipe is: 0,062 mm/m/°C. The coefficient of linear expansion IPEX CPVC Pipe is the same for all pipe sizes.

To determine the linear expansion of the pipe due to thermal changes use the following formula:

$$\Delta L = eL (\Delta T)$$

Where:

e = 0,061 mm/m/°C (coefficient of linear expansion)

L = Length of run in meters

ΔT = Temperature change in °C

Example: How much will a 12 m run of DN20 IPEX CPVC Pipe increase in length (or expand) if the expected ambient temperature ranges from 2°C to 32°C? Changes in length due to fittings are insignificant relative to the pipe.

$$\Delta L = eL (\Delta T)$$

$$\Delta L = (0,061) \times 12 \times 30$$

$$\Delta L = 22,0 \text{ mm}$$

IPEX CPVC exhibits a relatively high coefficient of thermal expansion (see Table H2). When designing IPEX sprinkler systems, expansion of long runs must be considered if temperature variations will be encountered (i.e., summer to winter extremes). Methods of compensating for thermal expansion are expansion loops, offsets and change of direction of the pipe run shown in Figure 7.

Loop Lengths "L" for use in Figure 7 are shown in Tables H2, J2, and K2. If the change in temperature and the maximum working temperature are lower than those used to derive the tables, the numbers will be conservative in nature. For example, for a temperature change from 16°C to 52°C use Table J2 because the maximum temperature is greater than those shown in Tables G2 and H2.

For conditions that are not covered in the Loop Length Tables, use the following formula:

$$L = \sqrt{\frac{3ED(\Delta L)}{2S}}$$

Where:

L = Length of loop, offset, or change of direction in millimeters

E = Modulus of elasticity at the maximum temperature (Table L2) in bar

D = Nominal outside diameter of pipe (Table D2) in millimeters

ΔL = Change in length of pipe due to change in temperature in millimeters

S = Working stress at the maximum temperature (Table L2) in bar

Example: How much expansion can be expected in a 73 m run of DN50 IPEX CPVC Pipe installed in 4°C given a maximum temperature change to 38°C? Additionally, how long should the expansion loop be to compensate for this expansion?

Step 1. Find the temperature change expressed as ΔT.

$$\Delta T = 38^{\circ}\text{C} - 4^{\circ}\text{C}$$

$$\Delta T = 34^{\circ}\text{C}$$

Step 2. Calculate the change in length expressed as ΔL.

$$\Delta L = eL (\Delta T)$$

$$\Delta L = 0,061 \times 73 \times 34$$

$$\Delta L = 151,4 \text{ mm}$$

Step 3. Find the length of the expansion loop or offset in millimeters

$$L = \sqrt{\frac{3ED(\Delta L)}{2S}}$$

L = Length of loop, offset, or change of direction in millimeters

E = Modulus of elasticity at the maximum temperature (Table L2) in bar

D = Average outside diameter of pipe (Table D2) in millimeters

S = Working stress at the maximum temperature (Table L2) in bar

ΔL = Change in length of pipe due to a change in temperature from Step 2 in millimeters

$$L = \sqrt{\frac{3 \times 26546 \times 60,3 \times 151,4}{2 \times 107,6}}$$

$$L = 1838 \text{ mm}$$

Step 4. Refer to Figure 7.

$$\text{a- For loop length: } 1/5 L = 1/5 \times 1838 \text{ mm} = 368 \text{ mm}$$

$$2/5 L = 2/5 \times 1838 \text{ mm} = 735 \text{ mm}$$

$$\text{b- For offset length: } 1/4 L = 1/4 \times 1838 \text{ mm} = 460 \text{ mm}$$

$$1/2 L = 1/2 \times 1838 \text{ mm} = 919 \text{ mm}$$

$$\text{c- For change of direction length: } L = 1838 \text{ mm}$$

Table G1 – Thermal Expansion U.S. Units

Length of Run Feet	Temperature Change ΔT °F								
	20	30	40	50	60	70	80	90	100
	Thermal Expansion, ΔL Inches								
5	0.04	0.06	0.08	0.10	0.12	0.14	0.16	0.18	0.20
10	0.08	0.12	0.16	0.20	0.24	0.29	0.33	0.37	0.41
15	0.12	0.18	0.24	0.31	0.37	0.43	0.49	0.55	0.61
20	0.16	0.24	0.33	0.41	0.49	0.57	0.65	0.73	0.82
25	0.20	0.31	0.41	0.51	0.61	0.71	0.82	0.92	1.02
30	0.24	0.37	0.49	0.61	0.73	0.86	0.98	1.10	1.22
35	0.29	0.43	0.57	0.71	0.86	1.00	1.14	1.29	1.43
40	0.33	0.49	0.65	0.82	0.98	1.14	1.31	1.47	1.63
45	0.37	0.55	0.73	0.92	1.10	1.29	1.47	1.65	1.84
50	0.41	0.61	0.82	1.02	1.22	1.43	1.63	1.84	2.04
70	0.57	0.86	1.14	1.43	1.71	2.00	2.28	2.57	2.86
90	0.73	1.10	1.47	1.84	2.20	2.57	2.94	3.30	3.67
120	0.98	1.47	1.96	2.45	2.94	3.43	3.92	4.41	4.90
160	1.31	1.96	2.61	3.26	3.92	4.57	5.22	5.88	6.53

Table G2 – Thermal Expansion Metric Units

Length of Run Meters	Temperature Change ΔT °C								
	10	15	20	25	30	35	40	50	55
	Thermal Expansion, ΔL Millimeters								
1	0,6	0,9	1,2	1,5	1,8	2,1	2,4	3,1	3,4
2	1,2	1,8	2,4	3,1	3,7	4,3	4,9	6,1	6,7
3	1,8	2,7	3,7	4,6	5,5	6,4	7,3	9,2	10,1
4	2,4	3,7	4,9	6,1	7,3	8,5	9,8	12,2	13,4
5	3,1	4,6	6,1	7,6	9,2	10,7	12,2	15,3	16,8
7	4,3	6,4	8,5	10,7	12,8	14,9	17,1	21,4	23,5
9	5,5	8,2	11,0	13,7	16,5	19,2	22,0	27,5	30,2
12	7,3	11,0	14,6	18,3	22,0	25,6	29,3	36,6	40,3
15	9,2	13,7	18,3	22,9	27,5	32,0	36,6	45,8	50,3
20	12,2	18,3	24,4	30,5	36,6	42,7	48,8	61,0	67,1
25	15,3	22,9	30,5	38,1	45,8	53,4	61,0	76,3	83,9
30	18,3	27,5	36,6	45,8	54,9	64,1	73,2	91,5	100,7
40	24,4	36,6	48,8	61,0	73,2	85,4	97,6	122,0	134,2
50	30,5	45,8	61,0	76,3	91,5	106,8	122,0	152,5	167,8

Table H1 - U.S. Units
Loop Length (30°F to 100°F) ΔT = 70°F

Length of Run Feet	Nominal Pipe Size – O.D. & ANSI Inches						
	3/4 1.050	1 1.315	1 1/4 1.660	1 1/2 1.900	2 2.375	2 1/2 2.875	3 3.500
	Length of Loop – Inches						
10	11	12	13	14	16	18	19
20	15	17	19	20	22	25	27
30	18	20	23	25	27	30	33
40	21	24	26	28	32	35	38
50	24	26	30	32	35	39	43
60	26	29	32	35	39	43	47
70	28	31	35	38	42	46	51
80	30	33	37	40	45	49	54
90	32	35	40	43	48	52	58
100	33	37	42	45	50	55	61
120	37	41	46	49	55	60	67
140	39	44	50	53	59	65	72
160	42	47	53	57	63	70	77

Note: Table based on Stress and Modulus of Elasticity at 100°F.
Refer to Table K1.
ΔT = 70°F, S = 1560 psi, E = 3.85 x 10⁵ psi

Table H2 - Metric Units
Loop Length (0°C to 40°C) ΔT = 40°C

Length of Run Meters	Nominal Pipe Size – O.D. & DN, mm						
	DN20 26,7	DN25 33,4	DN32 42,2	DN40 48,3	DN50 60,3	DN65 73,0	DN80 88,9
	Length of Loop – Meters						
3	0,3	0,3	0,3	0,4	0,4	0,4	0,5
5	0,3	0,4	0,4	0,5	0,5	0,6	0,6
10	0,5	0,5	0,6	0,7	0,7	0,8	0,9
15	0,6	0,7	0,8	0,8	0,9	1,0	1,1
20	0,7	0,8	0,9	0,9	1,0	1,1	1,3
25	0,8	0,9	1,0	1,0	1,2	1,3	1,4
30	0,9	1,0	1,1	1,1	1,3	1,4	1,6
35	0,9	1,0	1,2	1,2	1,4	1,5	1,7
40	1,0	1,1	1,2	1,3	1,5	1,6	1,8
45	1,0	1,2	1,3	1,4	1,6	1,7	1,9
50	1,1	1,2	1,4	1,5	1,6	1,8	2,0
55	1,2	1,3	1,5	1,5	1,7	1,9	2,1
60	1,2	1,3	1,5	1,6	1,8	2,0	2,2

Note: Table based on Stress and Modulus of Elasticity at 40°C.
Refer to Table K2.
ΔT = 38,9°C, S = 107,6 bar, E = 26546 bar

Table J1 – U.S. Units
Loop Length (60°F to 120°F) ΔT = 60°F

Length of Run Feet	Nominal Pipe Size – O.D. & ANSI Inches						
	3/4 1.050	1 1.315	1 1/4 1.660	1 1/2 1.900	2 2.375	2 1/2 2.875	3 3.500
	Length of Loop – Inches						
10	10	12	13	14	16	17	19
20	15	16	18	20	22	24	27
30	18	20	22	25	27	30	33
40	21	23	26	28	31	34	38
50	23	26	29	31	35	38	42
60	25	28	32	34	38	42	46
70	27	31	34	37	41	45	50
80	29	33	37	39	44	48	54
90	31	35	39	42	47	51	57
100	33	37	41	44	49	54	60
120	36	40	45	48	54	59	66
140	39	43	49	52	58	64	71
160	41	46	52	56	62	69	76

Note: Table based on Stress and Modulus of Elasticity at 120°F.
Refer to Table K1.
ΔT = 60°F, S = 1275 psi, E = 3.55 x 10⁵ psi

Table J2 – Metric Units
Loop Length (15°C to 50°C) ΔT = 35°C

Length of Run Meters	Nominal Pipe Size – O.D. & DN, mm						
	DN20 26,7	DN25 33,4	DN32 42,2	DN40 48,3	DN50 60,3	DN65 73,0	DN80 88,9
	Length of Loop – Meters						
3	0,3	0,3	0,3	0,4	0,4	0,4	0,5
5	0,3	0,4	0,4	0,5	0,5	0,6	0,6
10	0,5	0,5	0,6	0,7	0,7	0,8	0,9
15	0,6	0,7	0,8	0,8	0,9	1,0	1,1
20	0,7	0,8	0,9	0,9	1,0	1,1	1,3
25	0,8	0,9	1,0	1,0	1,2	1,3	1,4
30	0,8	0,9	1,1	1,1	1,3	1,4	1,5
35	0,9	1,0	1,2	1,2	1,4	1,5	1,7
40	1,0	1,1	1,2	1,3	1,5	1,6	1,8
45	1,0	1,2	1,3	1,4	1,6	1,7	1,9
50	1,1	1,2	1,4	1,5	1,6	1,8	2,0
55	1,1	1,3	1,4	1,5	1,7	1,9	2,1
60	1,2	1,3	1,5	1,6	1,8	2,0	2,2

Note: Table based on Stress and Modulus of Elasticity at 50°C.
Refer to Table K2.
ΔT = 33,4°C, S = 87,9 bar, E = 24477 bar

Table K1 - U.S. Units
Loop Length (70°F to 150°F) ΔT = 80°F

Length of Run Feet	Nominal Pipe Size – O.D. & ANSI Inches						
	3/4 1.050	1 1.315	1 1/4 1.660	1 1/2 1.900	2 2.375	2 1/2 2.875	3 3.500
	Length of Loop – Inches						
10	14	15	17	18	20	22	25
20	19	21	24	26	29	31	35
30	23	26	29	31	35	39	43
40	27	30	34	36	41	45	49
50	30	34	38	40	45	50	55
60	33	37	41	44	50	55	60
70	36	40	45	48	53	59	65
80	38	43	48	51	57	63	69
90	40	45	51	54	61	67	74
100	43	48	53	57	64	70	78
120	47	52	59	63	70	77	85
140	50	56	63	68	76	83	92
160	54	60	68	72	81	89	98

Note: Table based on Stress and Modulus of Elasticity at 150°F.
Refer to Table K1.
ΔT = 80°F, S = 875 psi, E = 3.08 x 10⁵ psi

Table K2 - Metric Units
Loop Length (20°C to 65°C) ΔT = 45°C

Length of Run Meters	Nominal Pipe Size – O.D. & DN, mm						
	DN20 26,7	DN25 33,4	DN32 42,2	DN40 48,3	DN50 60,3	DN65 73,0	DN80 88,9
	Length of Loop – Meters						
3	0,3	0,4	0,4	0,5	0,5	0,6	0,6
5	0,4	0,5	0,6	0,6	0,7	0,7	0,8
10	0,6	0,7	0,8	0,8	0,9	1,0	1,1
15	0,8	0,9	1,0	1,0	1,1	1,3	1,4
20	0,9	1,0	1,1	1,2	1,3	1,5	1,6
25	1,0	1,1	1,2	1,3	1,5	1,6	1,8
30	1,1	1,2	1,4	1,4	1,6	1,8	2,0
35	1,2	1,3	1,5	1,6	1,7	1,9	2,1
40	1,2	1,4	1,6	1,7	1,9	2,1	2,3
45	1,3	1,5	1,7	1,8	2,0	2,2	2,4
50	1,4	1,6	1,8	1,9	2,1	2,3	2,5
55	1,5	1,6	1,8	2,0	2,2	2,4	2,7
60	1,5	1,7	1,9	2,1	2,3	2,5	2,8

Note: Table based on Stress and Modulus of Elasticity at 65°C.
Refer to Table K2.
ΔT = 44,5°C, S = 60,3 bar, E = 21237 bar

Table L1

Modulus of Elasticity & Stress vs Temperature – U.S. Units

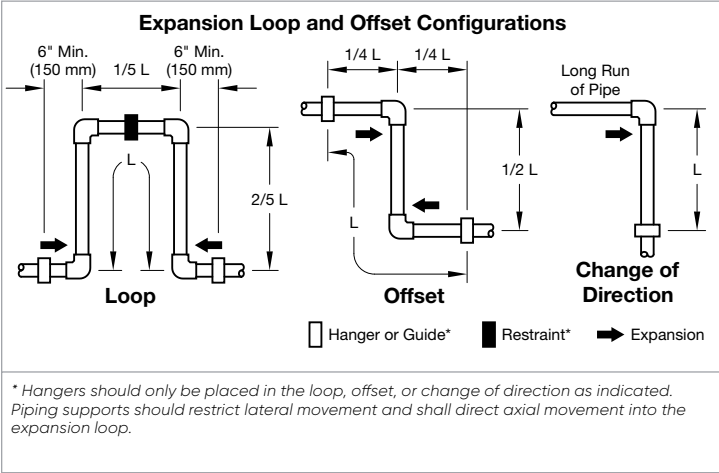
Temperature °F	73°	80°	90°	100°	110°	120°	140°	150°
Modulus of Elasticity "E " x 10 ⁵ (psi)	4.23	4.14	3.99	3.85	3.70	3.55	3.23	3.08
Working Stress "S " (psi)	2,000	1,875	1,715	1,560	1,415	1,275	1,000	875

Table L2

Modulus of Elasticity & Stress vs Temperature – Metric Units

Temperature °C	25°	30°	35°	40°	45°	50°	60°	65°
Modulus of Elasticity (bar)	29166	28545	27511	26546	25512	24477	22271	21237
Working Stress "S" (bar)	137,9	129,3	118,2	107,6	97,6	87,9	69,0	60,3

Figure 7



PHYSICAL AND THERMAL PROPERTIES

Table M – Physical and Thermal Properties

Property		CPVC	ASTM
Specific Gravity	"Sp.Gr."	1.53	D792
IZOD Impact Strength (ft-lbs/in., notched)		3.0	D256A
Modulus of Elasticity, @73°F, psi	"E"	4.23 x 10 ⁵	D638
Ultimate Tensile Strength, psi		8,000	D638
Compressive Strength, psi	"o"	9,600	D695
Poisson's Ratio	"n"	.35 -.38	—
Working Stress @ 73°F, psi	"S"	2,000	D1598
Hazen Williams "C" Factor	"C"	150	—
Coefficient of Linear Expansion in/(in °F)	"e"	3.4 x 10 ⁻⁵	D696
Thermal Conductivity BTU/hr/ft ² /°F/in	"k"	0.95	C177
Flash Ignition Temperature	°F	900	D1929
Limiting Oxygen Index	"LOI"	60%	D2863
Electrical Conductivity	Non Conductor		

Permissible Bending Deflections

IPEX CPVC fire sprinkler piping while classified as a rigid piping material is inherently flexible. This flexibility allows piping to be deflected within permissible limits around or away from objects during installation.

The maximum allowable deflections for IPEX CPVC piping can be found in Tables N1 and N2 and Table P1 and P2.

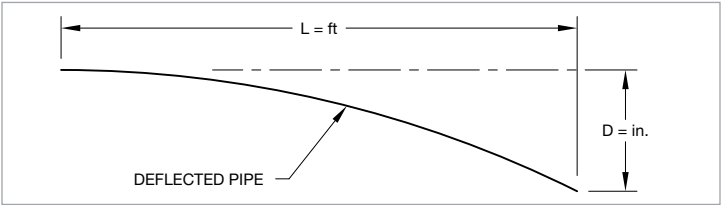


Table N1 – U.S. Units (1 of 2)
Permissible Bending Deflections SDR 13.5 at 73°F
"Bending " (One End Restrained)

(L) Length of Run Feet	Nominal Pipe Size – ANSI Inches						
	3/4	1	1 1/4	1 1/2	2	2 1/2	3
	(D) Deflection – Inches						
2	1.3	1.0	0.8	0.7	0.6	0.5	0.4
5	7.8	6.3	5.0	4.3	3.5	2.9	2.4
7	15.4	12.3	9.7	8.5	6.8	5.6	4.6
10	31.3	25.0	19.8	17.3	13.9	11.4	9.4
12	45.1	36.0	28.5	24.9	20.0	16.5	13.5
15	70.5	56.3	44.6	39.0	31.2	25.8	21.2
17	90.6	72.3	57.3	50.1	40.0	33.1	27.2
20	125.4	100.1	79.3	69.3	55.4	45.8	37.6
25	195.9	156.4	123.9	108.2	86.6	71.5	58.8
30	282.1	225.2	178.4	155.9	124.7	103.0	84.6
35	383.9	306.6	242.8	212.2	169.7	140.2	115.2
40	–	400.4	317.2	277.1	221.7	183.1	150.4
45	–	–	401.4	350.7	280.6	231.8	190.4
50	–	–	–	433.0	346.4	286.2	235.1

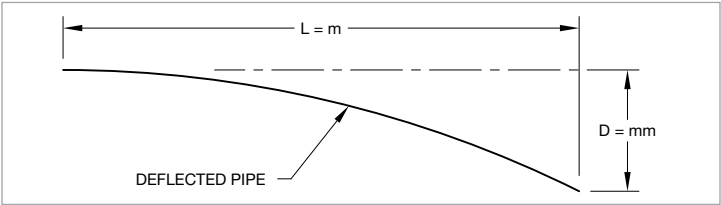


Table N2 – Metric Units
Permissible Bending Deflections SDR 13.5 at 23°C
"Bending " (One End Restrained)

(L) Length of Run Meters	Nominal Pipe Size – DN						
	DN20	DN25	DN32	DN40	DN50	DN65	DN80
	(D) Deflection – Meters						
0.5	0,02	0,02	0,01	0,01	0,01	0,01	0,01
1	0,09	0,07	0,05	0,05	0,04	0,03	0,03
2	0,34	0,27	0,22	0,19	0,15	0,13	0,10
3	0,77	0,62	0,49	0,43	0,34	0,28	0,23
4	1,37	1,10	0,87	0,76	0,61	0,50	0,41
5	2,15	1,71	1,36	1,19	0,95	0,78	0,64
6	3,09	2,47	1,96	1,71	1,37	1,13	0,93
7	4,21	3,36	2,66	2,33	1,86	1,54	1,26
8	5,50	4,39	3,48	3,04	2,43	2,01	1,65
9	6,96	5,55	4,40	3,84	3,08	2,54	2,09
10	8,59	6,86	5,43	4,75	3,80	3,14	2,58
11	–	8,30	6,57	5,74	4,59	3,80	3,12
13	–	–	9,18	8,02	6,42	5,30	4,35
15	–	–	–	10,68	8,54	7,06	5,80

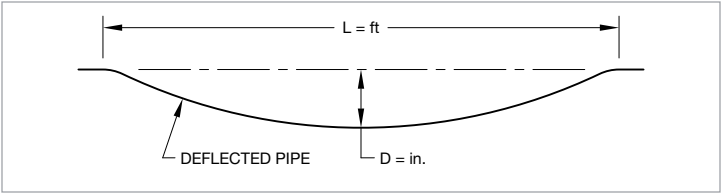


Table P1 – U.S. Units (1 of 2)
Permissible Bending Deflections SDR 13.5 at 73°F
“Snaking” (Both Ends Restrained)

(L) Length of Run Feet	Nominal Pipe Size – ANSI Inches						
	3/4	1	1 1/4	1 1/2	2	2 1/2	3
	(D) Deflection – Inches						
2	0.3	0.3	0.2	0.2	0.1	0.1	0.1
5	2.0	1.6	1.2	1.1	0.9	0.7	0.6
7	3.8	3.1	2.4	2.1	1.7	1.4	1.2
10	7.8	6.3	5.0	4.3	3.5	2.9	2.4
12	11.3	9.0	7.1	6.2	5.0	4.1	3.4
15	17.6	14.1	11.2	9.7	7.8	6.4	5.3
17	22.6	18.1	14.3	12.5	10.0	8.3	6.8
20	31.3	25.0	19.8	17.3	13.9	11.4	9.4
25	49.0	39.1	31.0	27.1	21.6	17.9	14.7
30	70.5	56.3	44.6	39.0	31.2	25.8	21.2
35	96.0	76.6	60.7	53.0	42.4	35.1	28.2
40	125.4	100.1	79.3	69.3	55.4	45.8	37.6
45	158.7	126.7	100.4	87.7	70.1	57.9	47.6
50	195.9	156.4	123.9	108.2	86.6	71.5	58.8

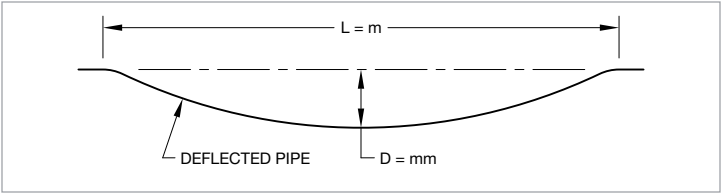


Table P2 – Metric Units
Permissible Bending Deflections SDR 13.5 at 23°C
“Snaking” (Both Ends Restrained)

(L) Length of Run Meters	Nominal Pipe Size – DN						
	DN20	DN25	DN32	DN40	DN50	DN65	DN80
	(D) Deflection – Meters						
0.61	0,008	0,006	0,005	0,004	0,004	0,003	0,002
1	0,022	0,017	0,014	0,012	0,010	0,008	0,006
2	0,086	0,069	0,054	0,048	0,038	0,031	0,026
3	0,194	0,155	0,122	0,107	0,086	0,071	0,058
4	0,344	0,275	0,218	0,190	0,152	0,126	0,103
5	0,538	0,429	0,340	0,297	0,238	0,196	0,161
6	0,774	0,618	0,490	0,428	0,342	0,283	0,232
7	1,054	0,842	0,667	0,582	0,466	0,385	0,316
8	1,377	1,099	0,871	0,761	0,609	0,503	0,413
9	1,742	1,391	1,102	0,963	0,770	0,636	0,523
10	2,151	1,718	1,361	1,189	0,951	0,786	0,645
11	–	2,078	1,646	1,438	1,151	0,951	0,781
13	–	–	2,299	2,009	1,607	1,328	1,091
15	–	–	–	2,675	2,140	1,768	1,452

SUPPORT AND HANGER REQUIREMENTS

Special care must be exercised when selecting the appropriate hanger or support method for IPEX CPVC Fire Sprinkler Systems.

IPEX CPVC Fire Sprinkler Systems may be supported as follows:

- Using the same hangers as metal piping systems that meet the requirements of this section
- Using hangers specifically listed for thermoplastic sprinkler piping
- Using any other support method acceptable to the local authority having jurisdiction

When using hangers/restraining devices, ensure that the hangers are clean, free of burrs, and free of all surface oils. Any foreign substance must be removed from the hanger.

When plumbers tape or J hooks are permitted by the authority having jurisdiction, for example NFPA 13D applications, rough edges are to be shielded.

Avoid using hangers of the incorrect size for the pipe being fastened/hung as the hanger can pinch, crush, and damage the piping system causing it to leak or crack under pressure. Leaks may not appear until after the pipe is in service.

The pipe size of the hanger shall be the same size as the supported pipe, and the hanger shall be applied to the pipe (i.e., not the fittings). Horizontal runs of piping must be braced so that stress loads (caused by bending or snaking the pipe) will not be placed on a fitting or joint. In jurisdictions that do not allow plastic to metal contact, rigid plastic sleeves should be used to isolate the materials. Strapping pipe overly tight to a structural member may cause damage to the pipe when pressurized. The pipe should be held snugly by the hanger, but cannot be pinched or crushed in any way. Pipe hangers must comply NFPA 13, NFPA 13D, NFPA 13R, or the standard recognized by the applicable Approval Agency, as appropriate.

Exception: In installations where IPEX CPVC Pipe is attached tight to a continuous ceiling with a "strap" style hanger, undue stress may be placed on the pipe. The outside dimension of the fitting is greater than that of the pipe and this size difference can create an unacceptable deflection of the pipe when the strap is located directly adjacent to the fitting. In this case only, and when the fitting is tight to the ceiling, it would be acceptable to use a hanger that is one size larger than the pipe. The use of such an oversized hanger would avoid the stress on the pipe.

Some hangers designed for metal pipe are suitable for use with IPEX CPVC Fire Sprinklers Systems. Hangers must not have rough or sharp edges that can come in contact with the pipe. Pipe hangers must have a load bearing surface at least 1/2 in. (12,7 mm) wide.



SHB1 Head Set

There are several types of hangers, that have been specifically listed as "Support Devices For Thermoplastic Piping," such as Tolco (Model 22, 23, 24), Afcon (# 510, 511, 512) and Erico (No. 107, 108, 109). Consult the specific manufacturer for information on the

appropriateness of these devices as hangers and/or vertical restraining devices for use with IPEX CPVC Pipe and Fittings.

Pipe Bracing with Standard Band Hanger

A One Hole Strap, shown below, can function as a hanger and as a restraining device. As a restraining device, invert the hanger so that the fastener is downward. Installation in this manner will prevent upward movement of the sprinkler during activation.

A Two Hole Strap, shown below, can function as a hanger and as a restraining strap. UL Listed CPVC hangers incorporate features that protect the pipe from sharp edges and ease installation. The hex head self-threading screw (furnished with most UL Listed CPVC hangers) is easily installed using a rechargeable electric drill and a 5/16 in. (8,0 mm) socket attachment. No pre-drilling of a pilot hole is required.

Local codes have final authority on which types of hangers may be used.

Hanger/Support Spacing



One Hole Strap



Two Hole Strap

Because IPEX pipe is more rigid than other types of plastic pipe systems, the support spacing shown in Table Q shall be adhered to when installing the system. For exposed installations, Listed support devices shall be used that mount piping directly to the ceiling or side wall, except when using upright sprinklers per the installation information in the Listings & Approvals Section of this handbook.

When the piping is supported by wood joists or trusses by laying the pipe directly on top of the structural members, the structure provides the support, assuming that the center spacing of the structural member does not exceed the requirements of Table Q.

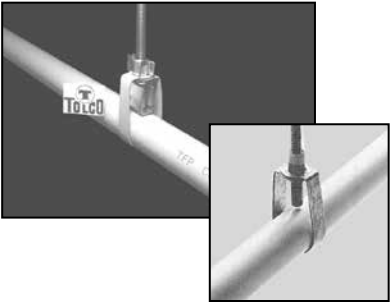
Table Q
Maximum Support Spacing "L " (Feet) CPVC SDR 13.5

Nominal Pipe Size ANSI Inches (DN)	3/4 DN20	1 DN25	1 1/4 DN32	1 1/2 DN40	2 DN50	2 1/2 DN65	3 DN80
Support Spacing in Feet (m)	5-1/2 (1,7)	6 (1,8)	6-1/2 (2,0)	7 (2,1)	8 (2,4)	9 (2,7)	10 (3,0)

Vertical Restraint

When a sprinkler activates, a significant reactive force is exerted on the pipe, especially at system static pressures greater than 100 psi (6,9 bar). The reactive force will cause the pipe to lift vertically if it is not properly secured, especially if the sprinkler drop is from a small diameter pipe.

When a sprinkler drop is 3/4 in. (DN19) to 1 1/4 in. (DN32) pipe, the closest hanger should brace the pipe against vertical lift. A number of techniques can be used to brace the pipe such as a standard band hanger positioning the threaded support rod to 1/16 in. (1,6 mm) above the pipe or using a split ring or a wrap-around hanger for restraint.



Note: Threaded rod shall not come in contact with CPVC when installed. It is advisable to use lift restraint devices such as those produced by Tolco and Afcron that prevent the threaded rod from coming in contact with the CPVC pipe (as shown above).

Branch lines shall be braced at a distance from a tee or elbow to prevent lift of sprinklers as shown in Tables R or S.

The hangers used for vertical restraint can also serve as the hangers for "Hanger/Support Spacing."

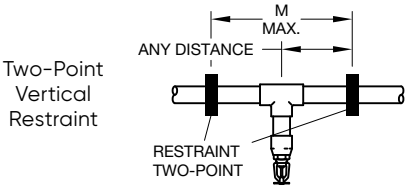
Table R - One Point of Restraint

Nominal Pipe Size ANSI Inches DN	"N" Less than 100 psi (6,9 bar)	"N" Greater than 100 psi (6,9 bar)
3/4 DN20	0'-9" (0,23 m)	0'-6" (0,15 m)
1 DN25	1'-0" (0,30 m)	0'-9" (0,23 m)
1 1/4 DN32	1'-4" (0,41 m)	1'-0" (0,30 m)
1 1/2 - 3 DN40 - DN80	2'-0" (0,61 m)	1'-0" (0,30 m)



Table S - Two Points of Restraint

Nominal Pipe Size ANSI Inches DN	"M" Less than 100 psi (6,9 bar)	"M" Greater than 100 psi (6,9 bar)
3/4 DN20	4'-0" (1,22 m)	3'-0" (0,91 m)
1 DN25	5'-0" (1,52 m)	4'-0" (1,22 m)
1 1/4 DN32	6'-0" (1,83 m)	5'-0" (1,52 m)
1 1/2 - 3 DN40 - DN80	7'-0" (2,13 m)	7'-0" (2,13 m)



Sway Bracing Guidance for CPVC

Sway bracing for BLAZEMASTER shall be designed and installed per NFPA 13. Compressive load shall not be placed on CPVC pipe. Many common longitudinal sway braces exert compressive load on the pipe through a clamp and shall not be used with CPVC products. In order to avoid this, the installer should use lateral sway braces designed for use with CPVC pipe in one of the following manners. In accordance with NFPA 13, a lateral sway brace may be used as a longitudinal brace if they are within 24 in. of the centerline of the piping to be braced longitudinally and the lateral brace is on a pipe of equal or greater size than the pipe being braced longitudinally. If a line of equal or greater size is not available in the location of longitudinal bracing, a dead leg may be installed. This dead leg may be used to longitudinally brace a line with a lateral brace. Follow the procedure below to install and brace a dead leg.

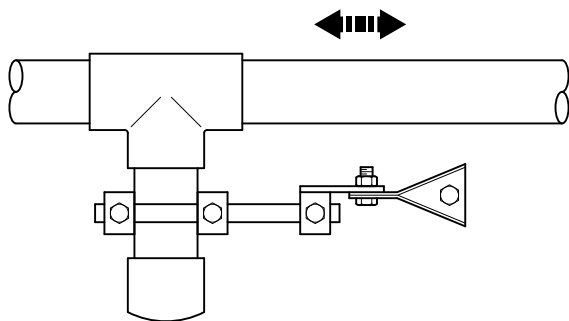
Step 1. Install a tee in the main or cross main at the point where longitudinal bracing is required.

Step 2. Cut a length of pipe with a diameter equal to or greater than the diameter of the main being longitudinally braced.

Step 3. Cap one end of the pipe using proper solvent welding technique. (See section on "Joining CPVC Pipe and Fittings with One-Step Solvent Cement.")

Step 4. Solvent weld the pipe to the tee perpendicular to the main being longitudinally braced.

Step 5. Attach a lateral sway brace designed for use with CPVC pipe to the dead leg. The sway brace must be no greater than 24 in. from the center line of the main.



CHEMICAL COMPATIBILITY

NOTICE

Products coming in contact with CPVC systems must be chemically compatible. Products commonly used in construction, including materials ancillary to the assembly of fire sprinkler systems, may contain chemicals that are incompatible with CPVC, including but not limited to: hydrocarbons (for example, non-CPVC compatible cutting oils), termiticides and insecticides, surfactants, cooking oils, plasticizers (for example, flexible wire or hose), building caulks, and certain paints. This list is not meant to be exhaustive. Contact between CPVC and incompatible chemicals should be avoided; failure to avoid contact with incompatible chemicals may cause damage to/failure of the system. Consult The Lubrizol Corporation's FBC SYSTEM COMPATIBLE PROGRAM at www.fbcssystemcompatible.com. If the product in question is not identified in the FBC SYSTEM COMPATIBLE PROGRAM, Lubrizol recommends, as does IPEX, that the chemical compatibility be confirmed with the manufacturer of the product in question. IPEX does not provide a warranty for products or components which have been subject to deterioration from exposure to incompatible chemicals/materials.

NOTICE

PAINT

The Listings and Approvals do not cover any (to be installed or existing) painted CPVC fire sprinkler products.

Water-based acrylic latex paint is the preferred and recommended paint to be used on IPEX CPVC Pipe and Fittings. OIL OR SOLVENT-BASED PAINTS MAY BE CHEMICALLY INCOMPATIBLE WITH IPEX CPVC.

The installation contractor must take responsibility for obtaining approval from the authority having jurisdiction to cover the markings on the product (for example, product identification, listing marks) and to change color of the pipe and fittings from its identifiable orange. Application of oil or solvent-based paints must be individually reviewed, as there are certain types of paints and stains that contain drying oils and should not be used at all on CPVC. Contact the manufacturer of the paint for verification of compatibility of paints other than water-based acrylic latex.

NOTES:

[illegible]

INSTALLATION

NOTICE

The "Notification to Jobsite Building Trades" placard (Page 104) is to be posted from start to finish of a IPEX CPVC Fire Sprinkler System installation in a location where building trades can take notice. Upon completion of a IPEX CPVC fire sprinkler installation, the placard is to be posted in a conspicuous space adjacent to the water supply to the sprinkler system.

Sprinklers shall be installed only after all the CPVC pipe and fittings, including the sprinkler adapters, are solvent welded to the piping and allowed to cure for a minimum of 30 minutes. Sprinkler fittings should be visually inspected and probed with a wooden dowel to ensure that the water way and threads are clear of any excess cement that may restrict the flow of water before installing the sprinkler. Once installation is complete and cured per Tables U, V and W, the system shall be hydrostatically tested. It is an unacceptable practice to install sprinklers into the sprinkler adapter fittings and then solvent cement to the drop. Failure to allow sprinkler fitting joint to cure before installing sprinklers may result in cement in sprinkler waterway.

Assembly or disassembly of a threaded connection requires extreme care to avoid twisting of the CPVC pipe (for example, removal of a sprinkler from a CPVC pipe drop). A hold back device, approved for use with CPVC pipe and fittings, must be used on the threaded adapter to prevent damage to the CPVC piping.

HANDLING & STORAGE OF IPEX CPVC

Handling - Pipe and Fittings

IPEX CPVC Pipe is protectively wrapped and fittings are packaged for ease of handling and storage, minimizing the potential damage of pipe and fittings due to transit handling and storage.

NOTICE

CPVC piping products have a lower impact strength as compared to metal piping products. Pipe fittings, packaged or loose, should never be tossed or thrown to the ground. Pipe should never be dropped or dragged on the ground (for example, when unloaded from a truck) and should remain boxed until ready for use. Impact cracks, splits or scratches can weaken or damage the pipe and fittings. Heavy or sharp objects should not be thrown into or against CPVC pipe or fittings. When handling CPVC pipe, ensure that the pipe is well supported and sagging is minimized. Failure to comply could result in damage of the CPVC pipe and in property damage due to leaks.

Very cold weather will make plastic pipe and fittings brittle. Extra care during handling should be taken to prevent damage.

IPEX CPVC Pipe and Fittings should always be inspected for damage before actual installation. Pipe or fittings with cuts, gouges, scratches, splits or other signs of damage from improper handling or storage should not be used. Damaged sections on lengths of pipe can easily be cut out using proper techniques for cutting IPEX CPVC Pipe.

Storage - Pipe & Fittings

IPEX CPVC Pipe and Fittings can be stored in their original packaging to keep them free from dirt and reduce the possibility of damage. IPEX pipe (un-packaged) must be covered with a non-transparent material when stored outdoors for extended periods of time. Brief exposure to direct sunlight on the job site may result in color fade, but will not affect physical properties. Long term exposure to direct sunlight will increase color fading and can make the pipe and fittings more brittle. Avoid long term exposure to ultra-violet light and/or direct sun exposure.

When storing inside, IPEX CPVC Pipe and Fittings should be kept in a well ventilated area, away from steam lines or other types of heat sources. IPEX CPVC Pipe and Fittings should always be stored in the original packaging until needed for use to keep them free from dirt and other contaminants, eliminate color fading, and reduce the possibility of damage.

Pipe should be stored on a clean, flat surface that provides an even support for the entire length of the pipe. When palletized pipe is stored, ensure that the wooden pallet bracings are in full contact with each other. Loose pipe should be stored in original packaging. When storing pipe on racks, the racks should have continuous or close support arms to prevent the pipe from sagging. Pipe racks should be free of oil/dirt and sharp edges that can damage the pipe when stored.

Plastic pipe fittings should be stored on pallets in their original cartons. The cartons should then be wrapped with thin plastic sheeting to prevent moisture from causing the packaging to collapse. To avoid hydrocarbon contamination and failure of the CPVC fittings under pressure, IPEX CPVC Fittings should never be stored with metal fittings.

Special care shall be taken to avoid contamination of IPEX CPVC Pipe and Fittings. (See Notice located on Page 57, Chemical Compatibility section)

Handling - Solvent Cements

⚠ CAUTION

Prior to using CPVC solvent cements, review and follow all precautions found on the container labels, material safety data sheet, and Standard Practice for Safe Handling ASTM F 402. Failure to follow precautions may result in injury.

Cements contain volatile solvents that evaporate rapidly. Avoid breathing the vapors and provide ventilation. If necessary, use a fan to keep the work area clear of fumes. Avoid skin contact. Keep the cement can closed when not in use. If the cement thickens beyond its original consistency, discard it. Do not attempt to dilute it with primer or thinner, as this may change the character of the cement and make it ineffective. Primers and thinners may also not be compatible with the IPEX CPVC and could cause failures. (See Notice located on Page 57, Chemical Compatibility section)

Before applying solvent cement, appropriate safety precautions should be taken. Cement must be stored between 40°F (4,4°C) and 90°F (32,2°C) and should be kept in the shade. Eliminate all ignition sources and do not smoke when using. Explosion proof general mechanical ventilation or local exhaust is recommended to maintain vapor concentrations below recommended exposure limits. In confined or partially enclosed areas, a NIOSH approved organic vapor cartridge respirator with full face piece is recommended. Containers of solvent cement should be closed when not

in use. Wearing PVA coated protection gloves and an impervious apron are recommended. Splash proof chemical goggles are recommended. For further information refer to Technical Data Sheet IFP-2010 SDS (Safety Data Sheet) for TFP-600 or BM-5 One Step Solvent Cement.

Note: *IPEX Blazemaster solvent cement has an expiration date of two years after the date of manufacture which is printed on the container.*

Storage - Solvent Cements

Cement must be stored between 40°F (4,4°C) and 90°F (32,2°C) and should be kept in the shade. Eliminate all ignition sources.

Solvent - Cement Spills

The best protection from accidental spills of cement is to protect the work area with drop cloths. If cement comes in contact with fiberglass tub/shower enclosures, carpet or furniture, the excess cement must be wiped up immediately. Once the cement is dry, it is almost impossible to remove.

The use of solvents such as alcohol, M.E.K. or acetone will usually work on tile sinks or floors but can do more damage than good on some synthetic materials. Care should be used when trying any solvent to remove cement from any surface. Always protect the work area before starting, both under and around where cement spills can cause irreparable damage.

Whatever method is used, it should first be tested on a small hidden area, if it removes the shine or color or softens the surface, do not use.

JOINING CPVC PIPE AND FITTINGS WITH ONE-STEP SOLVENT CEMENT

NOTICE

Read and understand all instructions prior to assembly. Follow all instructions. Failure to follow instructions during joining and testing may result in pipe failure, clogged waterways, or leakage.

Solvent cementing is the only method of joining rigid CPVC pipe and fittings that provides a chemically fused joint. Solvent cementing procedures must be carefully followed. Field experience has shown that problems can occur with improperly solvent cemented joints. Follow the instructions presented below carefully. Do not omit any steps and ensure that all facets of installation are fully understood prior to commencing work. Note the specific instructions and cure times for the TFP-600 or BM-5 One Step Solvent Cement provided within this handbook. These instructions and cure times must be carefully followed. TFP offers a demonstration program for installers that is described on Page 5 of this handbook.

NOTICE

Use of solvent cement products other than TFP-600 or BM-5 One Step Solvent Cement will void IPEX's warranty on IPEX CPVC Pipe and Fittings.

Avoid applying too much cement. Do not allow the cement to drip beyond the bottom of fitting socket. Do not allow the cement to puddle in the pipe and fitting assembly. Excessive cement on the pipe and/or fitting can weaken the wall of the pipe and/or fitting and may cause cracks

when pressure is applied. Failure to comply could result in property damage due to leaks. Leaks may not appear until after the pipe and/or fitting is in service.

Estimating Cement Requirements

Guidelines to allow estimation of IPEX CPVC Cement quantities needed are provided in Table T.

Table T – Estimated Cement Requirements

Fitting Size ANSI Inch DN	3/4 DN20	1 DN25	1 1/4 DN32	1 1/2 DN40	2 DN50	2 1/2 DN65	3 DN80
One Step Solvent Cemented Joints per Quart	260	170	125	95	65	40	30



Cutting Pipe



De-burring and
Beveling Pipe End



Clean & Fit Pipe & Fitting



Apply Solvent Cement
to Pipe End



Apply Solvent Cement
to Fitting



Assemble Pipe and
Fitting

Cutting

CPVC can easily be cut with a ratchet cutter, a wheel-type plastic tubing cutter, a power saw or a fine toothed saw. Tools used to cut CPVC must be designed for plastic use and must be in good condition in accordance with the tool manufacturer's recommendations. It is important to cut the pipe square. A square cut provides the surface of the pipe with maximum bonding area.

NOTICE

Avoid splitting the pipe when using ratchet cutters. Failure to do so may result in pipe failure or leakage.

- Only use ratchet cutters that contain a sharp blade (blades dull quickly).
- Only use ratchet cutters at temperatures of 50°F (10°C) or warmer.
- Only use well-maintained, good quality ratchet cutters capable of consistently cutting the pipe squarely.

If any indication of damage or cracking is evident at the pipe end, cut off at least 2 in. (50 mm) beyond any visible crack.

De-burring and Beveling

Burrs and filings can prevent proper contact between pipe and fitting during assembly, and must be removed from the outside and the inside of the pipe. A chamfering/reaming tool or a file is suitable for this purpose. A slight bevel (approximately 10° to 15° by 1/8 in. to 3/32 in.) shall be made at the end of the pipe along the outer diameter to ease entry of the pipe into the socket. This will also minimize the chance that the edges of the pipe will wipe solvent cement from the fitting socket during the insertion of the pipe.

Solvent Cement Application

CAUTION

Prior to using TFP-600 or BM-5 One Step Solvent Cement, review and follow all precautions found on the container labels, Safety Data Sheet, and Standard Practice for Safe Handling ASTM F 402. Failure to follow precautions may result in injury.

Using a clean, dry rag, wipe loose dirt and moisture from the fitting socket and pipe end. Moisture can slow the cure time and at this stage of assembly, and excessive water can reduce joint strength.

The pipe should easily enter the fitting socket one-third to two-thirds of the way. Contact between the pipe and fitting is essential in making a good joint. This contact allows the solvent cement (which is applied in the next step) to effectively join the pipe and fitting.

Use a dauber that is properly sized for the pipe. For 3/4 in. (DN20) and 1 in. (DN25) pipe, use a dauber that is 3/4 in. (19,1 mm) in size. For 1 1/4 in. (DN32) through 3 in. (DN80) pipe, use a dauber that is 1 1/2 in. (38,1 mm) in size.

Pint cans are furnished with 3/4 in. (DN20) daubers. Quart cans are furnished with 1 1/2 in. (38,1 mm) daubers. Additional daubers can be obtained through Customer Service.

All solvent cement joints shall be made with TFP-600 or BM-5 One Step Solvent Cement, as applicable (see LISTINGS/APPROVALS).

Apply a heavy, even coat of cement to the outer wall of the pipe end. Apply a medium coat to the inside of the fitting socket. Pipe sizes 1 1/4 in. (DN32) and above shall always receive a second cement application. **FIRST APPLY CEMENT ON THE PIPE END, THEN IN THE FITTING SOCKET, AND, FINALLY, ON THE PIPE END AGAIN.**

NOTICE

Too much solvent cement can cause clogged waterways or weaken the wall of the pipe or fitting and result in pipe failure or leakage, which may not appear until after the pipe and/or fitting is in service.

- *Do not allow excess cement to puddle in the pipe and fitting assembly. To prevent this puddling, apply a lighter coating of solvent cement to the inside of the fitting socket than the outside of the pipe.*
- *Wipe off excess cement on the outside of the joint. The solvents will evaporate, but the solvent cement inside the fitting will stay there.*

Special care shall be exercised when assembling CPVC fire sprinkler systems in temperatures below 40°F (4°C). In colder temperatures extra time must be allowed for the solvent cement to set and cure. Extra care should be taken to prevent damaging the pipe during handling. (See Notice located on Page 59, Handling – Pipe and Fittings section.) When solvent cementing pipe and fittings in colder temperatures, make certain that the cement has not become lumpy or has not “gelled”. Gelled cement must be discarded.

At temperatures above 80°F (27°C) make sure both surfaces to be joined are still wet with cement during assembly. Higher temperatures and/or wind accelerate the evaporation of the volatile solvents in the cement. Pipe stored in direct sunlight may have surface temperatures 20°F to 30°F (-7°C to -1°C) above the air temperature. If possible, store the pipe and fittings, or, at least the ends to be solvent welded, out of the direct sunlight prior to cementing. The solvents will penetrate hot surfaces more deeply. In such conditions, it is very important to avoid puddling the solvent cement inside the fitting socket.

Assembly

After applying cement, immediately insert the pipe into the fitting socket, while rotating the pipe one-quarter turn until the pipe bottoms out at the fitting stop. Rotate the pipe as it is inserted into the fitting, not after it has bottomed out in the fitting. Properly align the fitting for the installation at this time. Pipe must bottom to the stop. Hold the assembly for 30 seconds to ensure initial bonding. **A bead of solvent cement should be evident around the pipe and fitting juncture. If this bead is not continuous around the socket shoulder, it may indicate that insufficient cement was applied.** If insufficient cement is applied, the fitting must be cut out and discarded. Cement in excess of the bead should be wiped off with a clean, dry rag.

NOTICE

Failure to allow sprinkler fitting joints to cure before installing sprinklers may result in cement in the sprinkler waterway.

- *Install sprinklers only after all the CPVC pipe and fittings, including the sprinkler adapters, are solvent cemented and allowed to cure for a minimum of 30 minutes.*
- *Do not install sprinklers in the fittings prior to the fittings being cemented in place.*

Exercise care when installing sprinklers. Allow sprinkler head fittings and previously joined fittings to cure for a minimum of 30 minutes prior to installing the sprinkler. When installing sprinklers, be sure to anchor or hold the pipe drop securely to avoid rotating the pipe in previously cemented connections.

NOTICE

Too much solvent cement can cause clogged waterways.

- *Visually inspect sprinkler fittings to ensure that the waterway and threads are clear of any excess cement.*
- *Once the installation is complete and cured per Table U, V or W, hydrostatically test the system.*

Set and Cure Times

NOTICE

Inadequate curing of solvent cement joints may cause pipe failure or leakage. Solvent cement set and cure times are a function of pipe size, temperature, relative humidity, and tightness of fit.

Cure times should be increased when moisture is present, such as during cut-ins to live sprinkler lines. (NOTE: A specific procedure for modifications or repairs to existing CPVC fire sprinkler lines is included in this manual.) The assembly must be allowed to set, without any stress on the joint, for 1 to 5 minutes, depending on pipe size and temperature. Following the initial set period, the assembly can be handled carefully, **avoiding significant stresses to the joint.**

See Tables U, V, and W for minimum cure times prior to pressure testing.

System Acceptance Testing (Hydrostatic Pressure Test)

⚠ WARNING

Never use compressed air or nitrogen in lieu of or to replace the required hydrostatic system acceptance testing. Any pre-testing performed with low pressure air or nitrogen should follow the recommendations on Page 67. System failure when using high-pressure compressed air or nitrogen may result in property damage, serious injury, or death.

Once an installation is completed and joints are properly cured per the above instructions, the system shall be pressure tested with water at 200 psi (13,8 bar) for 2 hours. See Table V for curing conditions at 200 psi (13,8 bar).

TFP-600 or BM-5 Solvent Cement Cure Times

Table U

Nominal Pipe Size ANSI Inches DN	Ambient Temperature Ranges During Cure Period		
	60°F to 120°F (16°C to 49°C)	40°F to 59°F (4°C to 15°C)	0°F to 39°F (-18°C to 3°C)
	Minimum Cure Times for Systems Requiring Pressure Testing up to 100 psi (6,9 bar)		
3/4 / DN20	15 minutes	15 minutes	30 minutes
1 / DN25	15 minutes	30 minutes	30 minutes
1 1/4 / DN32	15 minutes	30 minutes	2 hours

Table V

Nominal Pipe Size ANSI Inches DN	Ambient Temperature Ranges During Cure Period		
	60°F to 120°F (16°C to 49°C)	40°F to 59°F (4°C to 15°C)	0°F to 39°F (-18°C to 3°C)
	Minimum Cure Times for Systems Requiring Pressure Testing up to 200 psi (13,8 bar)		
3/4 / DN20	45 minutes	1-1/2 hours	24 hours
1 / DN25	45 minutes	1-1/2 hours	24 hours
1 1/4 / DN32	1-1/2 hours	16 hours	120 hours
1 1/2 / DN40	1-1/2 hours	16 hours	120 hours
2 / DN50	6 hours	36 hours	*
2 1/2 / DN65	8 hours	72 hours	*
3 / DN80	8 hours	72 hours	*

Table W

Nominal Pipe Size ANSI Inches DN	Ambient Temperature Ranges During Cure Period		
	60°F to 120°F (16°C to 49°C)	40°F to 59°F (4°C to 15°C)	0°F to 39°F (-18°C to 3°C)
	Minimum Cure Times for Systems Requiring Pressure Testing up to 225 psi (15,5 bar)		
3/4 / DN20	1 hour	4 hours	72 hours
1 / DN25	1-1/2 hours	4 hours	72 hours
1 1/4 / DN32	3 hours	32 hours	10 days
1 1/2 / DN40	3 hours	32 hours	10 days
2 / DN50	8 hours	48 hours	*
2 1/2 / DN65	24 hours	96 hours	*
3 / DN80	24 hours	96 hours	*

* For this size pipe and fitting, the solvent cement can be applied at temperatures below 40°F (4,4°C), however, the sprinkler system temperature must be raised to a temperature of 40°F (4,4°C) or above and allowed to cure per the requirements listed above prior to pressure testing.

The system shall be pressure tested with water at 50 psi (3,4 bar) in excess of maximum pressure when the maximum system pressure is to be maintained in excess of 150 psi (10,3 bar). See Table W for curing conditions at 225 psi (15,5 bar). This requirement is in accordance with the requirements established by NFPA Standard 13, Section 24.2.1 (2013 Edition).

Sprinkler systems in one- and two-family dwellings and mobile homes may be pressure tested with water at line pressure, after following Table U curing conditions, in accordance with the requirements established by NFPA 13D, Section 4.3 (2013 Edition).

In systems featuring RSA adapter fittings and where hydrostatic testing is required by the Authority Having Jurisdiction prior to sprinkler installation, sprinkler adapter outlets may be plugged with RSA system test plugs during testing. Remove the plugs and replace with sprinklers after successful testing.

When pressure testing, the sprinkler system shall be slowly filled with water and the air bled from the highest and farthest sprinklers before pressure testing begins. Air must be removed from piping systems (plastic or metal) to prevent it from being locked in the system when pressure is applied. Entrapped air can generate excessive surge pressures that can result in bodily injury and/or property damage, regardless of the piping materials used.

If a leak is found, the leaking pipe and/or fitting must be cut out and discarded. A new section of piping can be installed using couplings or a union. Unions should be used in accessible areas only.

Limited Pressurized Air or Nitrogen Testing Allowance

⚠ WARNING

Extreme caution must be exercised when applying pressurized air or nitrogen to BLAZEMASTER CPVC systems. System failure caused by high-pressure compressed air or nitrogen can cause property damage, severe personal injury, or death.

If it is necessary to pre-test a BLAZEMASTER CPVC piping system with air or nitrogen prior to the required hydrostatic test, the following recommendations must be followed:

1. Maximum pressure (air or nitrogen) must never exceed 5 psig (35 kPa) and must be regulated using the appropriate air maintenance device.
2. Air or nitrogen introduced into the system must not contain oils, lubricants, or other chemicals. Use an oil-less compressor. (Information regarding chemical and substance compatibility with BLAZEMASTER CPVC can be found at www.fbcssystemcompatible.com.)
3. Proper use of Personal Protective Equipment (PPE), including but not limited to safety glasses, hard hats, and protective gloves, must be worn while performing any air test. Prior to pressurization and for the duration of the test, all personnel must be evacuated from the test area.

Note: This recommendation applies only when the pre-testing of a system has been deemed necessary. Pre-testing with low pressure air or nitrogen is not a substitute for hydrostatic testing, which is required by the installation standard (i.e., NFPA).

JOINING PIPE AND FITTINGS IN ADVERSE CONDITIONS

In Cold Weather

TFP-600 or BM-5 One Step Solvent Cement is suitable for joining IPEX CPVC Pipe and Fittings during cold weather temperatures as low as 0°F (-18°C) minimum (assembly in temperatures below 0°F (-18°C) are not permitted). The time period for bonding CPVC pipe and fittings is affected by temperature; therefore, very cold weather requires extra time to cure cemented joints.

When assembling a CPVC pipe and fitting system requiring pressure testing at 225 psi (15.5 bar) (See Table W) and the Ambient Temperature is less than 0°F (-18°C), the CPVC pipe and fittings must be conditioned in a freezer at 0°F (-18°C) for 24 hours prior to assembly. Immediately after the 24 hour conditioning period, join the pipe and fittings with TFP-600 or BM-5 One Step Solvent Cement in the 0°F (-18°C) environment and allow to cure per Table W before pressure testing.

Very cold weather will make IPEX CPVC Pipe and Fittings brittle. Extra care should be taken during such conditions to prevent damage while handling, cutting, de-burring, beveling, and assembly.

NOTICE

Extra care must be exercised if using ratchet cutters as they may split the pipe if not properly used and maintained. See Cutting section on Page 63.

When working in cold weather, be aware that solvents formulated into TFP-600 or BM-5 cement penetrate and soften the CPVC surfaces more slowly than in warm weather. Colder temperatures require greater cure times due to the slower evaporation of primer in solvent cements. See Tables U, V and W for cure times at various temperature ranges.

Other considerations are required when preparing for and joining CPVC pipe and fittings in cold weather conditions:

1. Carefully read and follow all instructions before installation.
2. Prefabricate as much of the system as possible in a heated working area.
3. Store cements in a warm area when not in use and make sure they remain fluid. Do not allow the cement to freeze or become "jelly-like." Gelled cement shall be discarded.
4. Take special care to remove moisture, including ice and snow.
5. When using TFP-600 or BM-5 One Step Solvent Cement, primer shall never be used.
6. Allow a longer cure period before the system is used.

In Hot Weather

CPVC solvent cements contain volatile solvents. Higher temperatures and/or wind accelerate evaporation. Pipe stored in direct sunlight may have surface temperatures of 20°F to 30°F (-7°C to -1°C) above air temperatures. Solvents attack these hot surfaces deeper; therefore, it is very important to avoid puddling the cement inside the fitting socket. Always ensure that the excess cement is wiped from the outside of the joint.

Follow the standard installation instructions and take special note of the tips and cautions below:

1. See Tables G1 & G2 for the appropriate temperature related expansion and contraction information.
2. Store solvent/cements and primers in a cool or shaded area prior to use.
3. If possible, store pipe and fittings, or at least the ends to be solvent welded, in a shady area before cementing.
4. Make sure both surfaces to be joined are still wet with cement when putting them together. With larger size pipe more people may be required to complete the application successfully.
5. Carefully read and follow all instructions before installation.

TRANSITION TO OTHER MATERIALS

Male and female brass insert thread adapters, grooved pipe adapters, or flanges shall be used when connecting a IPEX system to other piping materials. Special brass insert threaded fittings or the Rapid Seal Adapter (RSA) series are used for connection to sprinklers.

When IPEX CPVC Pipe and Fittings are used in combination systems with steel pipe, compliance with 2013 NFPA 13 sections 6.3.7 and 6.4.3, and 2013 NFPA 13R sections 5.2.3 and 5.2.12.2 is required.

The instructions for transitioning to other materials are specifically for IPEX CPVC Fittings. Should other Listed BLAZEMASTER CPVC Fittings be used in conjunction with IPEX CPVC products, consult the fitting manufacturer's installation and design manuals.

NOTICE

Care must be taken when transition is made to dissimilar materials. Brass inserts used in male and female threaded and grooved CPVC adapters may create galvanic reaction with steel and iron drop nipples, pipe, and cast fittings in certain water conditions. If you are unsure of the potential for galvanic reaction to occur, verify the water condition and conductivity of the water being used in the sprinkler system piping prior to installation. Brass threaded nipples are recommended when using brass inserted threaded IPEX CPVC Fittings to reduce the potential of galvanic reaction caused by dissimilar metals.

Care must be taken when transition is made from metallic pipe, fittings and flanges. When transitioning from metallic pipe system to a IPEX CPVC piping system via grooved adapter, male or female thread adapter or flanges, caution must be taken to ensure that all hydrocarbons and/or cutting oils are thoroughly removed from both inside and outside of the metallic pipe, fittings and flanges prior to assembly with IPEX CPVC Pipe and Fittings. (See Notice located on Page 57, Chemical Compatibility section.)

Brass Threaded Connections

A thread sealant shall be used in making wrench-tightened NPT threaded connections. TEFLON thread tape is the recommended sealant. Some thread sealants other than TEFLON thread tape contain solvents or other materials that may be damaging to CPVC. For other types of thread sealants, which have been specifically investigated and confirmed to be "System Compatible," refer to the FBC System Compatible Program at www.fbcssystemcompatible.com, Underwriters Laboratory and FM Global Approvals.

Note: The use of any other thread sealant may result in damage to the IPEX CPVC and/or the brass insert. DO NOT use a combination of tape and thread sealant on the same joint.

When using TEFLON thread tape, IPEX recommends a thickness of 0.003 in. (3 mils) ± 0.0005 in. and the tape must meet or exceed military specification MIL-T-27730A. The tape should be wrapped in the direction of the threads. Generally 2 to 3 wraps are sufficient to obtain a leak free seal.

When using OATEY GREAT WHITE Thread Sealant, it should be applied to the male threads only. Make sure all the threads are covered and DO NOT clog the waterway with excess sealant.

Care must be taken to avoid over-torquing. Usually 1 to 2 turns beyond finger tight is all that is required to make up a threaded connection. For sprinkler torque requirements refer to the appropriate sprinkler technical data sheets.

NOTICE

A hold back device, approved for use with CPVC pipe and fittings, must be used when torquing the body of the sprinkler adapter. Failure to so may result in damage to the brass threaded connector and void the TFPP warranty. Additionally, the CPVC system may also fail or leak, resulting in property damage.

Sprinkler Installation in Rapid Seal Adapter (RSA) Fittings

Install sprinklers in RSA Fittings in accordance with the following procedure.

Refer to individual sprinkler data sheets for additional information including required sprinkler wrenches.

NOTICE

For assembly of CPVC piping and fittings, see Tables on Page 66 and Joining Pipe and Fittings in Adverse Conditions section on Page 68 for Curing Time.

⚠ CAUTION

DO NOT apply thread sealant or TEFLON thread tape on sprinklers intended to be installed in RSA Fittings. Thread Sealant or TEFLON tape may not allow the sprinkler to seat properly and cause leakage and/or equipment failure.

Step 1. Ensure the sprinkler threads are clean and do not have thread sealant such as tape or paste applied. Avoiding cross-threading, gently thread the sprinkler into the fitting and hand-tighten until the sprinkler makes contact with the gasket.

⚠ CAUTION

Do not over-torque sprinklers when wrench-tightening with the manufacturer required sprinkler wrench. Over-torquing may result in equipment damage.

For recessed applications do not attempt to compensate for insufficient sprinkler depth within the Escutcheon Plate by under- or over-tightening the sprinkler. Re-adjust the sprinkler fitting position to suit.

Step 2. Adjust orientation of the sprinkler by applying the manufacturer specified sprinkler wrench to the sprinkler wrench flats and wrench-tighten an additional 1/2 to 1 full turn, or by applying a minimum-to-maximum torque of 5 to 7 ft lb (6,8 to 9,5 N·m).

Gasket Replacement in Rapid Seal Adapter (RSA) Fittings

NOTICE

Gasket Replacement and its associated tools were not evaluated as part of the UL Listing program.

In the event that a sprinkler, installed in an RSA fitting longer than six months, is removed due to damage or activation, the RSA fitting or the RSA fitting gasket must be replaced.

See Appendix A for separately ordered replacement gaskets and tools.

Step 1. Remove the sprinkler from the RSA fitting.

⚠ CAUTION

Use caution when removing the gasket to avoid damaging the adapter threads. Failure to do so may result in equipment damage or failure.

Step 2. Using the Rapid Seal Gasket Removal Pick, (see Figure 2) carefully remove the gasket from the RSA fitting. Discard the old gasket.

Step 3. Verify that the RSA fitting port is clean - free of all debris, chips, or burrs. Failure to do so may result in equipment damage or failure.

Step 4. Ensure the tool Base Socket is the correct size, 1 1/4 in. socket or 1 1/2 in. socket, for the RSA fitting.

Note: To change the Base Socket, remove two socket head cap screws using a 3/16 in. hex head wrench.

Step 5. Rotate the Rapid Seal Gasket Replacement Tool insertion shaft (see Figure 3) counter-clockwise until fully retracted. Place the Rapid Seal Replacement Gasket (see Figure 4) onto the shaft end boss and rotate the shaft clockwise until the gasket is flush with the surface of the base recess.

Step 6. Holding the Rapid Seal Gasket Replacement Tool (see Figure 3) base recess firmly against the face of the RSA fitting, rotate the insertion shaft until fully engaged. Remove the Rapid Seal Gasket Replacement Tool from the RSA and verify that the gasket is evenly seated and fully installed in the RSA fitting port.

Step 7. Install the replacement sprinkler in accordance with the Sprinkler Installation section in this handbook.

Grooved Coupling Adapter Connections

The following procedures are recommended for proper assembly of the Grooved Coupling Adapter:

Inspect the fittings and pipe to ensure that they are sufficiently free of indentations, projections or roll-marks on the gasket seating areas of the fitting and pipe. The pipe should be squarely cut. Any loose scale, paint and/or dirt must be removed from the groove and seating surfaces prior to assembly.

Flexible couplings shall be used with grooved coupling adapters in wet pipe systems. Refer to flexible coupling manufacturer's technical data sheets for additional information. Use a standard grade EPDM-A gasket that is suitable for wet pipe fire sprinkler service, see manufacturer's temperature ratings.

Flexible couplings shall be used with grooved coupling adapters in dry pipe systems. Refer to flexible coupling manufacturer's Technical Data Sheets for additional information. Use a standard grade EPDM-A or EPDM-E gasket that is suitable for dry pipe fire sprinkler service. Dry pipe systems require an external lubricant, see Notice below.

NOTICE

For dry pipe and freezer applications, the addition of a petroleum free silicone lubricant is required.

Products coming in contact with CPVC systems (for example, coupling gaskets, coupling lubricants) must be chemically compatible. (See Notice located on Page 57, Chemical Compatibility section.) Use of rigid style couplings may damage the grooved coupling adapter. Consult the grooved coupling manufacturer for proper selection and installation instructions.

Use of petroleum based lubricants will damage the gasket and may damage the adapter, resulting in stress failure of the CPVC housing that could cause property damage.

PENETRATING FIRE RATED WALLS & PARTITIONS

Consult the authority having jurisdiction and building codes prior to penetrating fire rated walls and partitions. Several through-penetration firestop systems are UL listed for use with CPVC pipe. IPEX recommends BLAZEMASTER Caulk and Walk for use with IPEX CPVC Pipe and Fittings, as this caulking product contains a water based intumescent that will not harm the CPVC compound as verified by The Lubrizol Corporation. The use of fire-stopping materials incompatible with IPEX CPVC Pipe and Fittings may cause damage to and/or failure of the CPVC system. (See Notice located on Page 57, Chemical Compatibility section.)

IPEX CPVC piping systems shall be designed and installed so that the piping is not closely located to heat producing sources, such as light fixtures, ballasts and steam lines. Pipe must not be positioned directly over open ventilation grills. Finally, during periods of remodeling or ceiling repair, appropriate steps must be taken to shield the piping from the protected occupancy.

Because IPEX CPVC Pipe is more flexible than metallic sprinkler pipe, it has greater capacity to withstand earthquake damage. In areas subject to earthquakes, IPEX CPVC piping systems should be designed and braced in accordance with local codes and NFPA Standard 13. For information regarding Bending Deflections and Snaking Deflections for given lengths of CPVC SDR 13.5 pipe, See Tables N1, N2, P1, and P2.

Use extreme care when passing IPEX CPVC Pipe and Fittings through metal studs, as the sharp cut edges of these studs can scar or puncture thermoplastic pipe. IPEX recommends the use of chemically compatible rubber or plastic grommets such as those commonly used in the plumbing industry for protection of the pipe when passing through such spaces. Consult your local authority having jurisdiction for additional information regarding the protection of thermoplastic pipe when passed through metal studs. (See Notice located on Page 57, Chemical Compatibility section.)

FREEZE PROTECTION

Use of Dry Type Sprinklers

When dry type sprinklers are connected to a water filled IPEX CPVC piping system protecting areas subject to freezing temperature, consideration must be given to the appropriate length of the sprinkler that will prevent freezing of the water in the connecting pipes due to conduction, as well as the compatibility of the fitting to which the dry type sprinkler will be attached. Refer to the sprinkler manufacturers' installation instructions for specific guidance on the minimum recommended lengths between the face of the sprinkler fitting and the outside surface of the protected area, as well as the appropriate fitting types for use with dry type sprinklers.

Use and Cautions with UL Listed Antifreeze or Glycerin Antifreeze

IPEX CPVC Pipe and other Listed IPEX CPVC Fittings can be protected with UL Listed Antifreeze only as outlined by NFPA 13 in areas that are subject to freezing. The guidelines provided in this manual must be followed when providing freeze protection for IPEX CPVC Pipe and Fittings. UL Listed Antifreeze is the first UL Certified (Listed) antifreeze for use in CPVC systems.

When adequate freeze protection cannot be attained with antifreeze, IPEX CPVC systems are recommended to be protected by using batt insulation and building construction techniques that ensure adequate freeze protection and wind blocking. Batt insulation guidelines are provided by most local authorities having jurisdiction with recommendations for NFPA 13D installations provided in the Appendix of that Standard. Local building code and authorities having jurisdiction requirements must be followed carefully, as misplaced or inadequate insulation and wind blocking can create localized freeze of the system piping that can result in damage to the structure and piping system. When adequate insulation and wind blocking are not available, IPEX CPVC Pipe and other Listed IPEX CPVC Fittings can be protected with LFP® Antifreeze or Glycerin antifreeze solutions only as outlined by NFPA 13 in areas that are subject to freezing. The guidelines provided below must be followed when providing freeze protection for IPEX CPVC Pipe and Fittings.

NOTICE

Products coming in contact with CPVC systems (for example, anti-freeze, alcohol based cleaners) must be chemically compatible. (See Notice located on Page 57, Chemical Compatibility section.)

- The use of glycol based antifreeze solutions is specifically prohibited for use with IPEX CPVC systems.
- Prior to using Glycerin Antifreeze, consult the local authority having jurisdiction on the use of antifreeze solutions in fire sprinkler applications.
- Prior to using Glycerin antifreeze solutions, consult the NFPA 13 standard for rules and guidelines.
- If hydro testing the sprinkler system, ensure that the system is completely drained of water prior to introducing LFP® Antifreeze or Glycerin antifreeze. The antifreeze solution will not fully mix with trapped water in sprinkler drops and sprinkler system low points, potentially allowing freezing in these areas of the system.
- A Glycerin antifreeze sprinkler system is more prone to leakage than a water only sprinkler system. Glycerin characteristics increase the capacity for leakage and can be successfully addressed by using care when making threaded connections by ensuring sufficient torque is applied to the male and female threads being mated.

A thread sealant shall be used in making threaded connections. TEFLON thread tape is the recommended sealant. Some thread sealants other than TEFLON thread tape contain solvents or other materials that maybe damaging to CPVC. For other types of thread sealants, which have been specifically investigated and confirmed to be "System Compatible," refer to the FBC System Compatible Program at www.fbcssystemcompatible.com.

IPEX recommends between 14 to 21 lb-ft (19,0 to 28,5 N-m) of torque to achieve a leak free 1/2 in. (DN15) NPT seal. Do not use fittings or sprinklers with damaged threads in glycerin systems, as the damaged threads create increased leakage potential. Rapid Seal Adapter fittings are not to be used with a thread sealant. The manufacturer instructions should be followed to obtain a good seal to prevent leaking in Rapid Seal Adapter fittings.

- Glycerin antifreeze can be cleaned with alcohol based cleaners. Prior to using any cleaner on a surface, ensure compatibility with the surface material to be cleaned. If compatibility with the surface to be cleaned is questionable, a small section of the surface should be spot cleaned prior to wide spread application of the cleaner.

Batt Insulation Requirements and Suggestions

Many jurisdictions recommend the use of batt insulation for freeze protection in place of antifreeze solutions. These jurisdictions typically publish recommended batt insulation guidelines that provide the minimum thickness of insulation to be utilized. These minimum insulation recommendations should be followed. Insulation requirements may vary by geographic area given climate conditions. Batt insulation is used to maintain a minimum water temperature in the sprinkler piping of 40°F (4,4°C). The minimum insulation recommendations pictured in the Appendix of NFPA 13D are shown primarily for piping wood frame ceilings with an unheated attic or an un-insulated roof above. Many jurisdictions do not allow the installation of water filled sprinkler piping in unheated outside walls. Consult the local authority having jurisdiction prior to installing batt insulation for freeze protection with BLAZEMASTER CPVC products.

NOTICE

Products coming in contact with CPVC systems (for example, insulation) must be chemically compatible. (See Notice located on Page 57, Chemical Compatibility section.)

Batt Insulation Installation Recommendations

The 2007 edition of NFPA 13D, The Standard for the Installation of Sprinkler Systems in One and Two-Family Dwellings and Manufactured Homes, Appendix A.8.3.1 recommends the following guidelines for use of batt insulation:

In areas subject to freezing, care should be taken to cover sprinkler piping completely in unheated attic spaces with insulation. Installation should follow the guidelines of the insulation manufacturer. (Figures A.8.3.1 (a) through (e) show several installation methods that can be considered.)

- A.8.3.1 (a) "It is important that the insulation be installed tight against the joists. In unheated areas, any spaces or voids between the insulation and the joists causes the water in the fire sprinkler piping to freeze."
- A.8.3.1 (b) "For areas having temperatures of 0°F (-18°C) or lower, an additional batt of insulation covering the joist and the fire sprinkler piping should be used. If this is not done, localized freeze-ups can occur in the sprinkler piping."
- A.8.3.1 (c) "Boring holes in the joist is one of the methods for locating the fire sprinkler piping in the ceiling. As an alternative, when temperatures are expected to be 0°F (-18°C) or lower, loose pieces of insulation should be stuffed in the bored holes around the piping."
- A.8.3.1 (d) (e) "Care should be taken to avoid compressing the insulation. This reduces its R value. To prevent potential freeze-ups of the sprinkler piping, the insulation should be tight against the joists."

Minimum insulation R value requirements are typically between R19 and R30; however, the minimum requirements must be verified with the authority having jurisdiction.

CUT-IN PROCEDURE FOR SYSTEM MODIFICATION AND REPAIR

At times it may become necessary to make modifications to existing CPVC fire sprinkler systems. Cut-ins can be done safely when the proper procedures are followed. The following procedure has been developed to assure that the modifications are done successfully.

Prior to making cut-ins to existing systems, care should be used to review proper joining procedures and to follow cut-in cure schedules (Tables U, V and W) to ensure system integrity. Several methods can be utilized to tie into an existing system using a socket style tee fitting in combination with the use of socket unions, grooved coupling adapters, and flanges. Regardless of the method used, the following points must be followed to ensure system integrity:

- Using proper tools, the cut-in should be made on the smallest diameter pipe section (that is capable of adequately supplying the system changes) in close proximity to the modification being made. This approach will expedite cure times prior to pressure testing.
- The cut-in connection to the existing system should be made first, prior to proceeding with additional work.

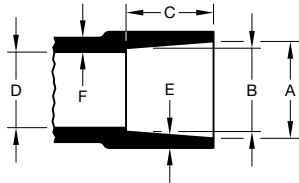
- Existing lines must be drained adequately prior to solvent cementing. Use a Drain Vac unit to be sure all water is removed from the system. Moisture can slow the cure time and will reduce joint strength.
- Carefully review and follow the solvent cementing procedures for proper joining techniques prior to commencing the cut-in (pipe must be cut square to proper length, de-burred, beveled and dry to ensure proper insertion depth and system integrity).
- Carefully measure and cut pipe to proper length to ensure complete insertion during assembly (first check the interference fit of the components being joined).

Note: During assembly of the cut-in tee (and other components), it is important to make a one-quarter turn when inserting the pipe into the fitting per the installation instructions. This may require the use of several components assembled in combination with the cut-in tee to create a short spool piece assembly. This can be accomplished by using socket unions, flanges, or grooved coupling adapters that will ensure that a one-quarter turn can be obtained on all pipe connections being joined.

- Prior to applying the solvent cement, use a clean dry rag to wipe moisture and dirt from the fitting socket and the pipe end (the presence of moisture on the joining surfaces will reduce joint integrity).
- Use a new can of solvent cement when making cut-in connections (verify expiration dates stamped on can prior to use).
- After all work is completed, the cut-in joints must be allowed to cure properly prior to pressure testing as shown in the Tables U, V, and W.
- After work is completed and the cut-in cure times are met, inspect work for proper alignment and hanger placement prior to pressure testing.
- After cut-in cure times are met, the system must be slowly filled with water and the air bled from the farthest and highest sprinklers before test pressure is applied. (See instructions regarding pressure testing the system.)
- After cut-in cure times are met and the air is bled from the system, pressure testing of the portion of the sprinkler system containing the cut-in tee is recommended. Prior to pressure testing, the system must be isolated off to its smallest area using floor valves, etc., to isolate the cut-in area. Additionally, the recommended test pressure to be applied is a maximum of 50 psi (3,4 bar) over the system operating pressure. Should a leak occur, this approach will minimize the potential for water damage.

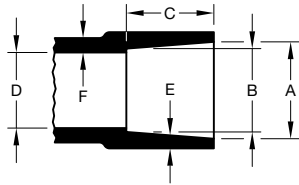
- When tying into a IPEX CPVC piping system that has been painted with water based latex paint, the paint on the end of the piping should be removed with a fine grain sand paper approximately 1/4 in. to 1/2 in. (6,4 mm to 12,7 mm) beyond the make-in of the fitting being added. Care should be exercised to assure that material is evenly removed from the entire circumference of the piping. The outside diameter of the piping should be measured and compared to Tables D1 and D2. If too much material is removed at one location along the circumference, it could result in a leak point once the fitting is solvent welded to the piping. Special care should be made when selecting the fitting that will be attached to the recently cleaned piping. Check the dry fit of the pipe and fitting. The pipe should enter the fitting socket easily 1/4 to 3/4 of the way. If the pipe bottoms in the fittings with little interference, select a different fitting. All other criteria outlined in "Installation- Cut-In Procedure for System Modification and Repair" should be followed to assure system integrity.

ASTM CPVC FITTING SOCKET DIMENSIONS U.S. UNITS



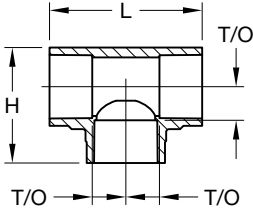
Nominal Pipe Size ANSI Inches	Nominal Inches					
	A Socket Entrance Diameter	B Socket Bottom Diameter	C Minimum Socket Depth	D Minimum Inside Diameter	Minimum Wall Thicknesses	
					E	F
3/4	1.058	1.046	0.719	0.740	0.113	0.141
1	1.325	1.310	0.875	0.990	0.133	0.166
1 1/4	1.670	1.655	0.938	1.335	0.140	0.175
1 1/2	1.912	1.894	1.375	1.446	0.220	0.250
2	2.387	2.369	1.500	1.881	0.218	0.275
2 1/2	2.889	2.868	1.750	2.250	0.276	0.345
3	3.516	3.492	1.875	2.820	0.300	0.375

ASTM CPVC FITTING SOCKET DIMENSIONS METRIC UNITS



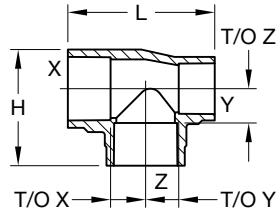
Nominal Pipe Size DN	Nominal Millimeters					
	A Socket Entrance Diameter	B Socket Bottom Diameter	C Minimum Socket Depth	D Minimum Inside Diameter	Minimum Wall Thicknesses	
					E	F
DN20	26,88	26,60	18,30	18,80	2,90	3,60
DN25	33,70	33,30	22,23	25,15	3,40	4,22
DN32	42,42	42,04	23,82	33,91	3,60	4,50
DN40	48,60	48,11	34,93	36,73	5,60	6,40
DN50	60,63	60,20	38,10	47,80	5,54	7,00
DN65	73,40	72,90	44,45	57,20	7,00	8,80
DN80	89,31	88,70	47,63	71,63	7,62	9,53

TEE



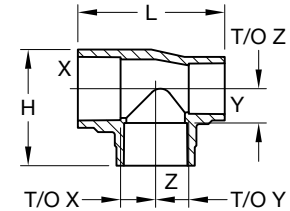
Nominal Pipe Size ANSI Inches DN	Nominal Take-Out Inches (mm)	Nominal outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		L	H			
3/4 DN20	0.625 (15,9)	2.820 (71,6)	2.050 (52,1)	40	0.11 (0,05)	048080
1 DN25	0.687 (17,4)	3.180 (80,8)	2.405 (61,1)	40	0.19 (0,09)	048081
1 1/4 DN32	0.875 (22,2)	3.750 (95,3)	2.875 (73,0)	40	0.26 (0,11)	048082
1 1/2 DN40	1.062 (27,0)	4.900 (124,5)	3.625 (92,1)	80	0.51 (0,23)	048083
2 DN50	1.375 (34,9)	5.900 (149,9)	4.380 (111,3)	80	0.90 (0,41)	048084
2 1/2 DN65	1.562 (39,7)	6.730 (170,9)	5.110 (129,8)	80	1.59 (0,72)	048085
3 DN80	1.812 (46,0)	7.500 (190,5)	5.830 (148,1)	80	2.41 (1,09)	048086

REDUCING TEE – 1 of 2



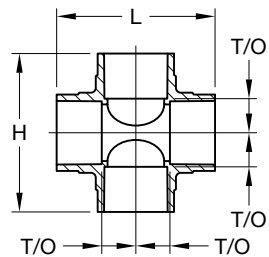
Nominal Pipe Size ANSI Inches DN			Nominal Take-Out Inches (mm)			Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	X	Y	Z	L	H			
3/4 DN20	3/4 DN20	1 DN25	0.750 (19,0)	0.750 (19,0)	0.625 (15,9)	2.890 (73,4)	2.140 (54,4)	40	0.14 (0,06)	048121
1 DN25	3/4 DN20	3/4 DN20	0.562 (14,3)	0.562 (14,3)	0.750 (19,0)	2.790 (70,9)	2.295 (58,3)	40	0.14 (0,06)	048122
1 DN25	3/4 DN20	1 DN25	0.750 (19,0)	0.687 (17,4)	0.750 (19,0)	3.060 (77,7)	2.415 (61,3)	40	0.17 (0,07)	048123
1 DN25	1 DN25	3/4 DN20	0.625 (15,9)	0.625 (15,9)	0.812 (20,6)	3.120 (79,2)	2.375 (60,3)	40	0.16 (0,07)	048160
1 1/4 DN32	1 DN25	3/4 DN20	0.625 (15,9)	0.625 (15,9)	0.937 (23,8)	3.330 (84,6)	2.705 (68,7)	40	0.21 (0,09)	048124
1 1/4 DN32	1 DN25	1 DN25	0.750 (19,0)	0.750 (19,0)	0.937 (23,8)	3.300 (83,8)	2.785 (70,7)	40	0.22 (0,09)	048125
1 1/4 DN32	1 DN25	1-1/4 DN32	0.937 (23,8)	0.937 (23,8)	0.875 (22,2)	3.640 (92,5)	2.795 (71,0)	40	0.26 (0,11)	048126
1 1/4 DN32	1-1/4 DN32	3/4 DN20	0.625 (15,9)	0.625 (15,9)	0.875 (22,2)	3.240 (82,3)	2.685 (68,2)	40	0.23 (0,10)	048161
1 1/4 DN32	1-1/4 DN32	1 DN25	0.750 (19,0)	0.750 (19,0)	0.875 (22,2)	3.500 (88,9)	2.825 (71,8)	40	0.26 (0,11)	048162
1 1/4 DN32	1-1/4 DN32	1-1/2 DN40	1.000 (25,4)	1.000 (25,4)	1.000 (25,4)	4.700 (119,4)	3.515 (89,3)	80	0.43 (0,19)	048127
1 1/2 DN40	1-1/4 DN32	3/4 DN20	0.562 (14,3)	0.562 (14,3)	1.000 (25,4)	3.920 (99,6)	3.255 (82,7)	80	0.36 (0,16)	048128
1 1/2 DN40	1-1/4 DN32	1 DN25	0.562 (14,3)	0.562 (14,3)	1.062 (27,0)	3.920 (99,6)	3.435 (87,2)	80	0.38 (0,17)	048129
1 1/2 DN40	1-1/2 DN40	3/4 DN20	0.562 (14,3)	0.562 (14,3)	1.000 (25,4)	4.040 (102,6)	3.255 (82,7)	80	0.36 (0,16)	048163

REDUCING TEE – 2 of 2



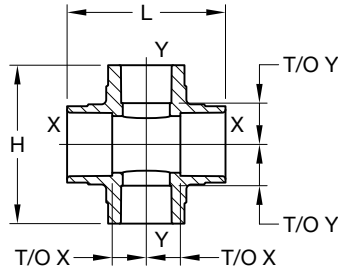
Nominal Pipe Size ANSI Inches DN			Nominal Take-Out Inches (mm)			Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	X	Y	Z	L	H			
1 1/2 DN40	1-1/2 DN40	1 DN25	0.562 (14,3)	0.562 (14,3)	1.062 (27,0)	4.040 (102,6)	3.445 (87,5)	80	0.38 (0,17)	048164
1 1/2 DN40	1-1/2 DN40	1-1/4 DN32	0.875 (22,2)	0.875 (22,2)	1.000 (25,4)	4.640 (117,9)	3.505 (89,0)	80	0.45 (0,20)	048175
2 DN50	2 DN50	3/4 DN2	0.750 (19,0)	0.750 (19,0)	1.375 (34,9)	4.580 (116,3)	3.880 (98,6)	80	0.61 (0,28)	048165
2 DN50	2 DN50	1 DN25	0.875 (22,2)	0.875 (22,2)	1.375 (34,9)	4.830 (122,7)	4.010 (101,9)	80	0.66 (0,30)	048166
2 DN50	2 DN50	1-1/4 DN32	1.125 (28,6)	1.125 (28,6)	1.375 (34,9)	5.190 (131,8)	4.150 (105,4)	80	0.74 (0,33)	048174
2 DN50	2 DN50	1-1/2 DN40	0.750 (19,0)	0.687 (17,4)	0.750 (19,0)	5.400 (137,2)	4.240 (107,7)	80	0.78 (0,35)	048167
2 1/2 DN65	2-1/2 DN65	1 DN25	1.562 (39,7)	1.562 (39,7)	1.562 (39,7)	6.730 (170,9)	4.480 (113,8)	80	1.43 (0,65)	048171
2 1/2 DN65	2-1/2 DN65	1-1/4 DN32	1.562 (39,7)	1.562 (39,7)	1.562 (39,7)	6.730 (170,9)	4.680 (118,9)	80	1.46 (0,66)	048172
2 1/2 DN65	2-1/2 DN65	1-1/2 DN40	1.562 (39,7)	1.562 (39,7)	1.562 (39,7)	6.730 (170,9)	4.710 (119,6)	80	1.48 (0,67)	048173
2 1/2 DN65	2-1/2 DN65	2 DN50	1.562 (39,7)	1.562 (39,7)	1.562 (39,7)	6.730 (170,9)	4.870 (123,7)	80	1.50 (0,68)	048176
3 DN80	3 DN80	1-1/2 DN40	1.812 (46,0)	1.812 (46,0)	1.812 (46,0)	7.520 (191,0)	5.330 (135,4)	80	2.28 (1,03)	048170
3 DN80	3 DN80	2 DN50	1.812 (46,0)	1.812 (46,0)	1.750 (44,4)	7.500 (190,5)	5.440 (138,2)	80	2.25 (1,02)	048168
3 DN80	3 DN80	2-1/2 DN65	1.812 (46,0)	1.812 (46,0)	1.812 (46,0)	7.520 (191,0)	5.710 (145,0)	80	2.44 (1,11)	048169

CROSS



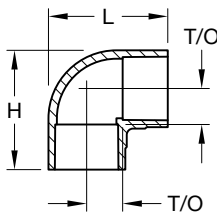
Nominal Pipe Size ANSI Inches DN	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		L	H			
3/4 DN20	0.562 (14,3)	2.750 (69,9)	2.750 (69,9)	40	0.13 (0,06)	048087
1 DN25	0.687 (17,4)	3.300 (83,2)	3.300 (83,2)	40	0.23 (0,10)	048088
1 1/4 DN32	0.937 (23,8)	3.750 (95,3)	3.750 (95,3)	40	0.34 (0,15)	048089
1 1/2 DN40	1.062 (27,0)	4.900 (124,5)	4.900 (124,5)	80	0.67 (0,30)	048090
2 DN50	1.312 (33,3)	5.720 (145,3)	5.720 (145,3)	80	1.00 (0,45)	048091
2 1/2 DN65	1.562 (39,7)	6.750 (171,5)	6.750 (171,5)	80	1.91 (0,87)	048092

REDUCING CROSS



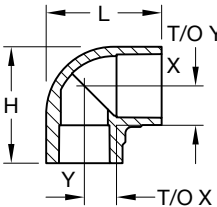
Nominal Pipe Size ANSI Inches DN		Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	X	Y	L	H			
1 DN25	3/4 DN20	0.875 (22,2)	0.875 (22,2)	3.300 (83,8)	3.300 (83,8)	40	0.28 (0,13)	048093

90° ELBOW



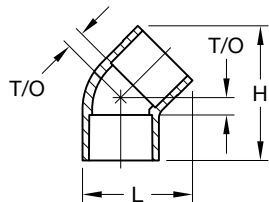
Nominal Pipe Size ANSI Inches DN	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		L	H			
3/4 DN20	0.625 (15,9)	2.090 (53,1)	2.090 (53,1)	40	0.09 (0,04)	049094
1 DN25	0.750 (19,0)	2.495 (63,4)	2.495 (63,4)	40	0.14 (0,06)	048095
1 1/4 DN32	1.000 (25,4)	2.945 (74,8)	2.945 (74,8)	40	0.21 (0,09)	048096
1 1/2 DN40	1.062 (27,0)	3.625 (92,1)	3.625 (92,1)	80	0.40 (0,18)	048097
2 DN50	1.312 (33,3)	4.325 (109,9)	4.325 (109,9)	80	0.79 (0,36)	048098
2 1/2 DN65	1.562 (39,7)	5.080 (129,0)	5.080 (129,0)	80	1.14 (0,52)	048099
3 DN80	1.812 (46,0)	5.825 (148,0)	5.825 (148,0)	80	1.82 (0,82)	048100

90° REDUCING ELBOW



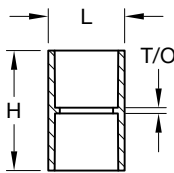
Nominal Pipe Size ANSI Inches DN		Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	X	Y	L	H			
1 DN25	3/4 DN20	0.687 (17,4)	1.812 (46,0)	2.435 (61,8)	2.435 (61,8)	40	0.16 (0,07)	048101

45° ELBOW



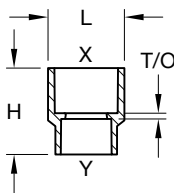
Nominal Pipe Size ANSI Inches DN	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		L	H			
3/4 DN20	0.375 (9,5)	1.926 (48,9)	2.434 (61,8)	40	0.08 (0,04)	048102
1 DN25	0.375 (9,5)	2.284 (58,0)	2.799 (71,1)	40	0.11 (0,05)	048103
1 1/4 DN32	0.750 (19,0)	2.971 (75,5)	3.831 (97,3)	40	0.20 (0,09)	048104
1 1/2 DN40	0.500 (12,7)	3.318 (84,3)	4.047 (102,8)	80	0.31 (0,14)	048105
2 DN50	0.750 (19,0)	4.041 (102,6)	4.959 (126,0)	80	0.56 (0,25)	048106
2 1/2 DN65	1.812 (46,0)	4.846 (123,1)	5.713 (145,1)	80	0.89 (0,40)	048207
3 DN80	1.000 (25,4)	5.648 (143,5)	6.505 (165,2)	80	1.19 (0,54)	048208

COUPLING



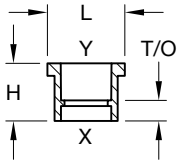
Nominal Pipe Size ANSI Inches DN	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		L	H			
3/4 DN20	0.125 (3,2)	1.280 (32,5)	2.120 (53,8)	40	0.08 (0,04)	048107
1 DN25	0.125 (3,2)	1.590 (40,4)	2.500 (63,5)	40	0.11 (0,05)	048108
1 1/4 DN32	0.187 (4,7)	1.950 (49,5)	2.190 (55,6)	40	0.20 (0,09)	048109
1 1/2 DN40	0.500 (12,7)	2.310 (58,7)	3.080 (78,2)	80	0.31 (0,14)	048110
2 DN50	0.750 (19,0)	2.820 (71,6)	3.310 (84,1)	80	0.56 (0,25)	048111
2 1/2 DN65	0.812 (20,6)	3.440 (87,4)	3.850 (97,8)	80	0.89 (0,40)	048112
3 DN80	1.000 (25,4)	4.120 (104,6)	4.250 (108,0)	80	1.19 (0,54)	048113

REDUCING COUPLING



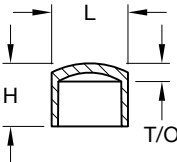
Nominal Pipe Size ANSI Inches DN		Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y		L	H			
1 DN25	3/4 DN20	0.125 (3,2)	1.590 (40,4)	1.800 (45,7)	40	0.08 (0,04)	048149

REDUCING BUSHING



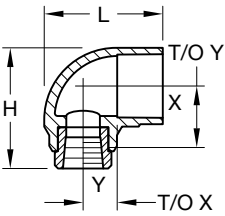
Nominal Pipe Size ANSI Inches DN		Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y		L	H			
1 DN25	3/4 DN20	0.437 (11,1)	1.490 (37,8)	1.200 (30,5)	40	0.04 (0,06)	048182
1 1/4 DN32	3/4 DN20	0.500 (12,7)	1.840 (46,7)	1.260 (32,0)	40	0.11 (0,05)	048183
1 1/4 DN32	1 DN25	0.312 (7,9)	1.840 (46,7)	1.260 (32,0)	40	0.12 (0,05)	048184
1 1/2 DN40	3/4 DN20	0.625 (15,9)	2.090 (53,1)	1.670 (42,4)	80	0.16 (0,07)	048185
1 1/2 DN40	1 DN25	0.500 (12,7)	2.090 (53,1)	1.670 (42,4)	80	0.14 (0,06)	048186
1 1/2 DN40	1-1/4 DN32	0.375 (9,5)	2.090 (53,1)	1.670 (42,4)	80	0.17 (0,08)	048187
2 DN50	3/4 DN20	0.812 (20,6)	2.600 (66,0)	1.870 (47,5)	80	0.27 (0,12)	048188
2 DN50	1 DN25	0.687 (17,4)	2.600 (66,0)	1.870 (47,5)	80	0.26 (0,12)	048189
2 DN50	1-1/4 DN32	0.562 (14,3)	2.600 (66,0)	1.870 (47,5)	80	0.24 (0,11)	048190
2 DN50	1-1/2 DN40	0.437 (11,1)	2.600 (66,0)	1.870 (47,5)	80	0.19 (0,11)	048191
2 1/2 DN65	1 DN25	0.937 (23,8)	3.110 (79,0)	2.130 (54,1)	80	0.42 (0,19)	048197
2 1/2 DN65	1-1/4 DN32	0.812 (20,6)	3.110 (79,0)	2.140 (54,4)	80	0.45 (0,20)	048196
2 1/2 DN65	1-1/2 DN40	0.687 (17,4)	3.110 (79,0)	2.140 (54,4)	80	0.46 (0,21)	048195
2 1/2 DN65	2 DN50	0.625 (15,9)	3.110 (79,0)	2.140 (54,4)	80	0.29 (0,13)	048193
3 DN80	2 DN50	0.750 (19,0)	3.760 (95,5)	2.330 (59,2)	80	0.72 (0,33)	048192
3 DN80	2-1/2 DN65	0.500 (12,7)	3.760 (95,5)	2.330 (59,2)	80	0.47 (0,21)	048194

CAP



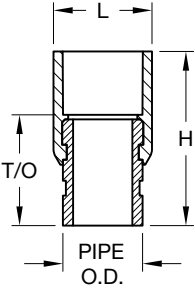
Nominal Pipe Size ANSI Inches DN	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		L	H			
3/4 DN20	0.312 (7,9)	1.280 (32,5)	1.100 (27,9)	40	0.04 (0,02)	048114
1 DN25	0.375 (9,5)	1.590 (40,4)	1.314 (33,4)	40	0.06 (0,03)	048115
1 1/4 DN32	0.437 (11,1)	1.950 (49,5)	1.760 (44,7)	40	0.10 (0,04)	048116
1 1/2 DN40	0.687 (17,4)	2.310 (58,7)	2.192 (55,7)	80	0.20 (0,09)	048117
2 DN50	0.687 (17,4)	2.820 (71,6)	2.230 (56,6)	80	0.31 (0,14)	048118
2 1/2 DN65	0.875 (22,2)	3.440 (87,4)	2.770 (70,4)	80	0.58 (0,26)	048119
3 DN80	1.000 (25,4)	4.120 (104,6)	3.000 (76,2)	80	0.88 (0,40)	048120

SPRINKLER ADAPTER 90° ELBOW



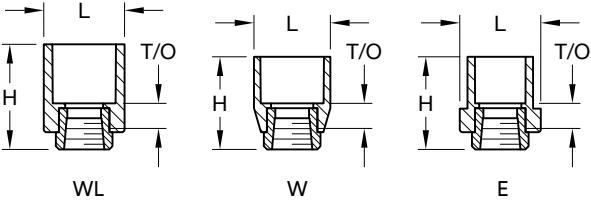
Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPT	Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		X	Y	L	H			
3/4 DN20	1/2	0.562 (14,3)	1.000 (25,4)	2.040 (51,8)	2.160 (54,9)	40	0.20 (0,09)	048148
1 DN25	1/2	0.750 (19,0)	1.250 (31,7)	2.470 (62,7)	2.515 (63,9)	40	0.26 (0,12)	048147
1 DN25	3/4	1.062 (27,0)	1.437 (36,5)	2.875 (73,0)	2.835 (72,0)	40	0.26 (0,12)	048146

GROOVED COUPLING ADAPTER



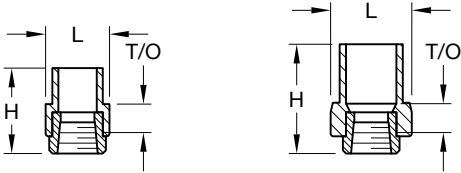
Nominal Pipe Size ANSI Inches DN		Nominal Take-Out & Pipe O.D. Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		T/O	Pipe O.D.	L	H			
1 1/4 DN32	1-1/4 Groove	0.875 (22,2)	1.660 (42,4)	2.050 (52,1)	3.630 (92,2)	40	0.78 (0,35)	048137
1 1/2 DN40	1-1/2 Groove	1.125 (28,6)	1.900 (48,3)	2.310 (58,7)	3.740 (95,0)	80	0.95 (0,43)	048138
2 DN50	2 Groove	0.750 (19,0)	2.375 (60,3)	2.820 (71,6)	3.870 (98,3)	80	1.42 (0,64)	048139
2 1/2 DN65	2-1/2 Groove	1.562 (39,7)	2.875 (73,0)	3.440 (87,4)	4.220 (107,2)	80	2.28 (1,03)	048140
2 1/2 DN65	76,1mm Groove	1.562 (39,7)	76,1mm 3.000	3.600 (91,4)	4.220 (107,2)	80	2.28 (1,03)	048142
3 DN80	3 Groove	1.562 (39,7)	3.500 (88,9)	4.120 (104,6)	4.320 (109,7)	80	3.00 (1,36)	048141

SPRINKLER ADAPTER



Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPT	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
			L	H			
3/4 DN20	1/2	0.437 (11,1)	1.710 (43,4)	2.060 (52,3)	80	0.20 (0,09)	048178
1 DN25	1/2	0.437 (11,1)	1.710 (43,4)	2.190 (55,6)	80	0.22 (0,10)	048179
3/4 DN20	1/2	0.437 (11,1)	1.280 (32,5)	1.740 (44,2)	40	0.16 (0,07)	048223
1 DN25	3/4	0.812 (20,6)	1.590 (40,4)	2.500 (63,5)	40	0.43 (0,19)	048144
3/4 DN20	1/2	0.500 (12,7)	1.600 (40,6)	1.720 (43,7)	40	0.19 (0,09)	048222
1 DN25	1/2	0.500 (12,7)	1.590 (40,4)	1.930 (49,0)	40	0.18 (0,08)	048180

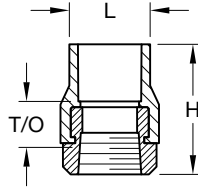
SPRINKLER ADAPTER (SPIGOT)



X (Not LPCB Approved)

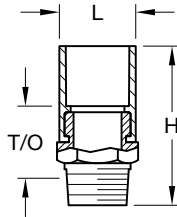
Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPT	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
			L	H			
3/4 DN20	1/2	0.500 (12,7)	1.330 (33,8)	1.780 (45,2)	40	0.16 (0,07)	048177
1 DN25	1/2	0.562 (14,3)	1.720 (43,7)	1.920 (48,8)	40	0.20 (0,09)	048143
1 DN25	3/4	0.875 (22,2)	1.750 (44,5)	2.240 (56,9)	40	0.40 (0,18)	048145
1 DN25	1/2	0.625 (15,9)	1.720 (43,7)	2.268 (57,6)	40	0.20 (0,09)	048181

FEMALE ADAPTER



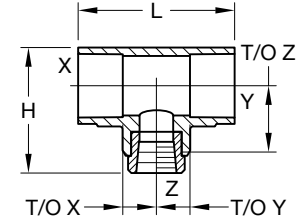
Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPT	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
			L	H			
3/4 DN20	3/4	0.812 (20,6)	1.710 (43,4)	2.390 (60,7)	80	0.41 (0,19)	048130
1 DN25	1	0.875 (22,2)	2.050 (52,1)	2.710 (68,8)	80	0.63 (0,28)	048131
1 1/4 DN32	1-1/4	1.125 (28,6)	2.390 (60,7)	3.100 (78,7)	40	1.03 (0,47)	048132
1 1/2 DN40	1-1/2	1.375 (34,9)	2.650 (67,3)	3.440 (87,4)	80	1.42 (0,64)	048133
2 DN50	2	1.687 (42,8)	3.480 (88,4)	3.950 (100,3)	80	2.66 (1,18)	048134

MALE ADAPTER



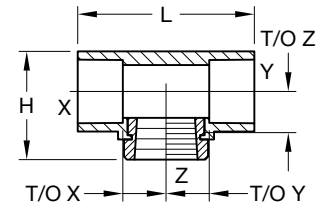
Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPT	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
			L	H			
3/4 DN20	3/4 NPT	1.312 (33,3)	1.375 (34,9)	2.850 (72,4)	40	0.33 (0,15)	048135
1 DN25	1 NPT	1.375 (34,9)	1.690 (42,9)	3.320 (84,3)	40	0.56 (0,25)	048136

SPRINKLER ADAPTER TEE



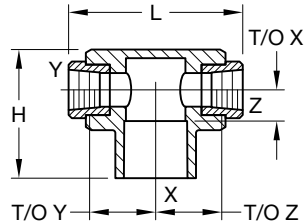
Nominal Pipe Size ANSI Inches DN		Thread Size Inch NPT	Nominal Take-Out Inches (mm)			Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	X	Y	Z	L	H			
3/4 DN20	3/4 DN20	1/2	0.562 (14,3)	0.562 (14,3)	1.000 (25,4)	2.700 (68,6)	2.139 (54,3)	40	0.22 (0,10)	048151
1 DN25	1 DN25	1/2	0.687 (17,4)	0.687 (17,4)	1.187 (30,1)	3.260 (82,8)	2.634 (66,9)	40	0.29 (0,13)	048152
1 DN25	1 DN25	1	0.937 (23,8)	0.937 (23,8)	1.562 (39,7)	3.680 (93,5)	3.005 (76,3)	40	0.73 (0,33)	048150
1 1/4 DN32	1 DN25	1/2	0.437 (11,1)	0.562 (14,3)	1.312 (33,3)	2.980 (75,7)	2.794 (71,0)	40	0.30 (0,14)	048156
1 1/4 DN32	1-1/4 DN32	1/2	0.437 (11,1)	0.437 (11,1)	1.312 (33,3)	3.000 (76,2)	2.794 (71,0)	40	0.31 (0,14)	048153
1 1/2 DN40	1-1/4 DN32	1/2	0.500 (12,7)	0.687 (17,4)	1.437 (36,5)	3.860 (98,0)	3.104 (78,8)	40	0.43 (0,19)	048157
1 1/2 DN40	1-1/2 DN40	1/2	0.500 (12,7)	0.500 (12,7)	1.437 (36,5)	3.860 (98,0)	3.104 (78,8)	80	0.46 (0,21)	048155
2 DN50	1-1/2 DN40	1/2	0.500 (12,7)	0.625 (15,9)	1.687 (42,8)	4.110 (104,4)	3.609 (91,7)	80	0.56 (0,25)	048158
2 DN50	2 DN50	1/2	0.500 (12,7)	0.500 (12,7)	1.687 (42,8)	4.100 (104,1)	3.599 (91,4)	80	0.62 (0,28)	048154

DRY SPRINKLER ADAPTER TEE



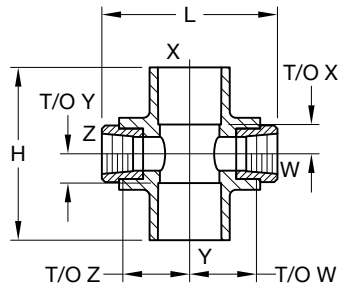
Nominal Pipe Size ANSI Inches DN		Thread Size Inch NPT	Nominal Take-Out Inches (mm)			Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	X	Y	Z	L	H			
1 DN25	1 DN25	1	0.90 (22,9)	0.90 (22,9)	0.86 (21,8)	3.680 (93,5)	2.255 (57,3)	40	0.71 (0,32)	048159

BACK TO BACK TEE



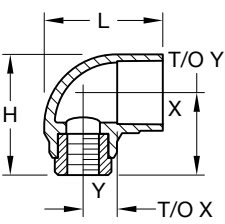
Nominal Pipe Size ANSI Inches DN		Thread Size Inch NPT		Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	X	Y	Z	L	H			
1 DN25	1/2	1/2	0.562 (14,3)	1.312 (33,3)	3.628 (92,2)	2.700 (68,6)		40	0.48 (0,22)	048198
1 DN25	1/2	1/2	0.687 (17,4)	1.187 (30,1)	3.358 (85,3)	2.700 (68,6)		40	0.46 (0,21)	048199

BACK TO BACK CROSS



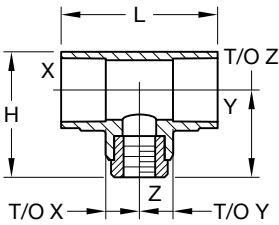
Nominal Pipe Size ANSI Inches DN		Thread Size Inch NPT		Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	W	X	Y	Z	H			
1 DN25	1 DN25	1/2	1/2	0.625 (15,9)	1.187 (30,1)	3.398 (86,3)	3.600 (91,4)	40	0.46 (0,21)	048200
1 DN25	1 DN25	1/2	1/2	0.625 (15,9)	1.312 (33,3)	3.658 (92,9)	3.600 (91,4)	40	0.47 (0,21)	048201

RAVEN STUDIO SPRINKLER ADAPTER 90° ELBOW



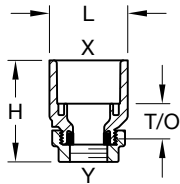
Nominal Pipe Size ANSI Inches DN		Thread Size ISO 228		Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	X	Y	L	H					
1 DN25	G3/8	0.750 (19,0)	1.750 (44,5)	2.470 (62,7)	2.535 (64,4)			40	0.26 (0,12)	048209

RAVEN STUDIO SPRINKLER ADAPTER TEE



Nominal Pipe Size ANSI Inches DN		Thread Size ISO 228		Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
X	Y	Z	W	X	Y	Z	H			
1 DN25	1 DN25	G3/8		0.687 (17,4)	0.687 (17,4)	1.625 (41,3)	3.260 (82,8)	40	0.29 (0,13)	048210

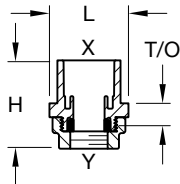
RAPID SEAL ADAPTER



Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPS	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
			L	H			
X	Y						
3/4 DN20	1/2	0.66 (16,8)	1.646 (41,8)	1.850 (47,0)	40	0.090 (0,041)	048211
1 DN25	1/2	0.78 (19,8)	1.630 (41,4)	2.140 (54,4)	40	0.107 (0,049)	048226

NOTE:
1. Part Number 048211 is used for both the Rapid Seal Adapter and the Rapid Seal Adapter Spigot as it is a dual purpose fitting and can be used in two different applications.

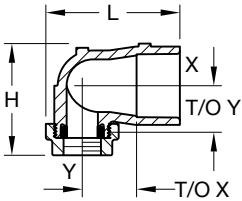
RAPID SEAL ADAPTER
SPIGOT



Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPS	Nominal Take-Out Inches (mm)	Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
			L	H			
X	Y						
3/4 DN20	1/2	0.36 (9,1)	1.520 (38,6)	1.539 (39,1)	40	0.061 (0,028)	048227
1 DN25	1/2	0.51 (13,0)	1.646 (41,8)	1.850 (47,0)	40	0.090 (0,041)	048211

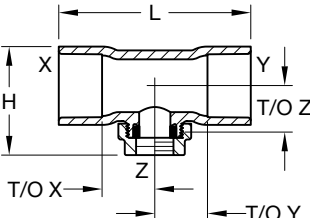
NOTE:
1. Part Number 048211 is used for both the Rapid Seal Adapter and the Rapid Seal Adapter Spigot as it is a dual purpose fitting and can be used in two different applications.

RAPID SEAL ADAPTER 90° ELBOW



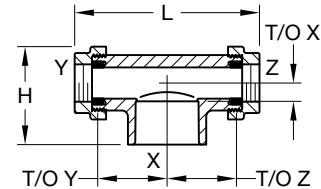
Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPS	Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		X	Y	L	H			
X	Y							
3/4 DN20	1/2	0.58 (14,8)	0.92 (23,4)	2.087 (53,0)	2.086 (53,0)	40	0.099 (0,045)	048215
1 DN25	1/2	1.13 (28,7)	1.01 (25,7)	2.789 (70,8)	2.327 (59,1)	40	0.148 (0,067)	048228

RAPID SEAL ADAPTER TEE

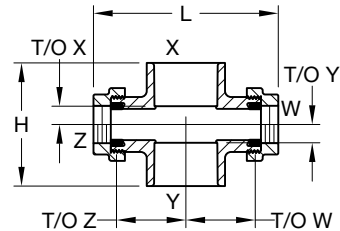


Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPS	Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		X Y	Z	L	H			
X Y	Z							
3/4 DN20	1/2	0.38 (9,7)	0.92 (23,4)	2.254 (57,3)	2.017 (51,2)	40	0.107 (0,049)	048230
1 DN25	1/2	1.10 (27,9)	1.01 (25,7)	4.000 (101,6)	2.261 (57,4)	40	0.205 (0,093)	048231

RAPID SEAL ADAPTER BACK TO BACK TEE

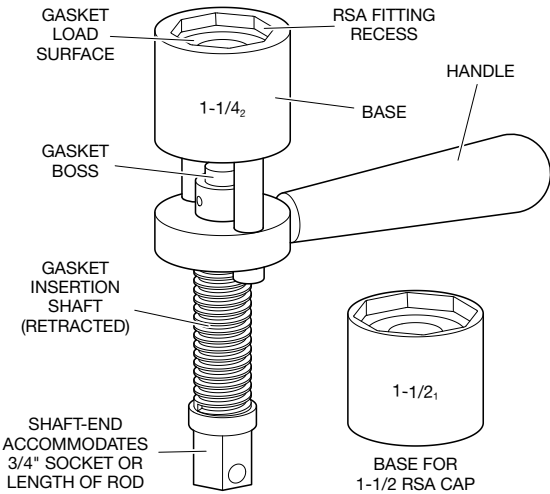


Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPS	Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		X	Y Z	L	H			
1 DN25	1/2	0.38 (9,7)	1.37 (34,7)	3.645 (92,6)	2.042 (51,9)	40	0.190 (0,086)	048219
1 DN25	1/2	0.38 (9,7)	1.49 (37,9)	3.900 (99,1)	2.042 (51,9)	40	0.200 (0,091)	048218



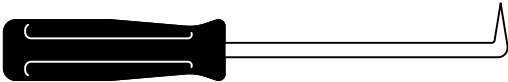
Nominal Pipe Size ANSI Inches DN	Thread Size Inch NPS	Nominal Take-Out Inches (mm)		Nominal Outside Inches (mm)		Pipe Sch.	Approx. Wt. Lbs. (kg.)	P/N
		X Y	W Z	L	H			
1 DN25	1/2	0.38 (9,7)	1.37 (34,7)	3.600 (91,4)	2.566 (65,2)	40	0.207 (0,094)	048220
1 DN25	1/2	0.38 (9,7)	1.49 (37,9)	3.850 (97,8)	2.566 (65,2)	40	0.217 (0,098)	048235

RAPID SEAL GASKET REPLACEMENT TOOL, P/N 074297

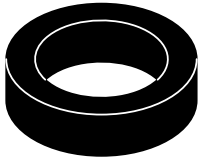


- Notes:
- 1. 1-1/2 in. base used to replace gaskets in Version 1 adapters
 - 2. 1-1/4 in. base used to replace gaskets in Version 2 adapters

RAPID SEAL
GASKET REMOVAL PICK, P/N 074294



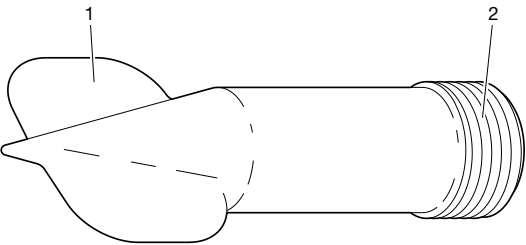
RAPID SEAL
REPLACEMENT GASKET (QTY 10), P/N 074295



NOTICE

Gasket Replacement and its associated tools were not evaluated as part of the UL Listing program.

RAPID SEAL ADAPTER SYSTEM TEST PLUG, P/N 048224



ITEM	DESCRIPTION
1	Thumb Tabs
2	Threads, 1/2 in. NPS

DO'S

- Install IPEX CPVC Pipe and Fittings according to this Installation Handbook.
- Follow recommended safe work practices.
- Make certain that any materials coming in contact with IPEX CPVC Pipe and Fittings are chemically compatible with BLAZEMASTER. (See Notice located on Page 57, Chemical Compatibility section.)
- If painting is required, use only latex based paints.
- Keep pipe and fittings in original packaging until needed and away from sources of heat.
- If stored outdoors, cover the pipe and fittings with an opaque tarp.
- Follow proper handling procedures.
- Inspect IPEX CPVC Pipe and Fittings for damage before installation.
- Use tools specifically designed for use with CPVC pipe and fittings.
- Use only TFP-600 or BM-5 One Step Solvent Cement and follow application instructions.
- Use a drop cloth to protect interior finishes.
- Cut the pipe ends square.
- Before solvent cementing, de-burr and bevel the pipe end.
- When solvent cementing, rotate the pipe 1/4 turn when bottoming pipe in fitting socket.
- Carefully follow instructions for applying solvent cement. Do not apply too much cement.
- Avoid puddling of solvent cement in pipe and fittings. Do not allow cement to plug the sprinkler adapter or sprinkler orifice.
- Follow the recommended cure times prior to pressure testing.
- Fill lines slowly and bleed the air from the system at the farthest sprinklers prior to pressure testing.
- Use water to pressure test the CPVC system. If low-pressure air or nitrogen pre-testing is deemed necessary, guidelines can be found on Page 67 of this installation manual and must be followed.
- Support sprinkler properly to prevent excessive movement of the sprinkler when activated.
- Install IPEX CPVC Pipe and Fittings in wet systems only or specially listed dry systems.
- Use only chemically compatible insulation and/or glycerin & water solutions for freeze protection.
- When glycerine solutions are used, provide an expansion chamber or allow for thermal expansion of the solution.
- Allow for movement due to expansion and contraction.
- Renew your IPEX CPVC Pipe and Fittings installation training every two years.

DON'TS

- Do not use cutting oils other than those represented by the cutting oil manufacturer as safe for use in conjunction with CPVC. (See Notice located on Page 57, Chemical Compatibility section.)
- Do not use edible oils such as CRISCO as a gasket lubricant.
- Do not use petroleum or solvent-based paints, sealants, lubricants or fire stop materials that are chemically incompatible with IPEX CPVC Pipe and Fittings.
- Do not use any glycol-based solutions as an antifreeze.
- Do not use glycerin-based antifreeze solutions without consulting the rules and guidelines outlined in the NFPA 13 Standard.
- Do not use both TEFLON tape and thread sealants simultaneously.
- Do not use TEFLON tape or thread sealants for Rapid Seal Adapter (RSA) sprinkler connection fittings.
- Do not use solvent cement that exceeds its shelf life or has become discolored or gelled.
- Do not allow threaded rod within 1/16 in. of the pipe.
- Do not allow solvent cement to plug the sprinkler orifice.
- Do not connect rigid metal couplers to IPEX CPVC grooved adapters.
- Do not thread or groove IPEX CPVC Pipe.
- Do not use solvent cement near sources of heat, open flame, or when smoking.
- Do not pressure test until recommended cure times are met.
- Do not use dull or broken cutting tool blades when cutting pipe.
- Do not use IPEX CPVC Pipe that has been stored outdoors, unprotected and is faded in color.
- Do not install IPEX CPVC Pipe in cold weather without allowing for expansion.
- Do not install IPEX CPVC Pipe and Fittings in dry systems, unless specifically listed for such use.

IMPORTANT INFORMATION WITH REGARDS TO BLAZEMASTER FIRE SPRINKLER SYSTEM

CONGRATULATIONS, your building structure contains a state-of-the-art life safety system. Your IPEX CPVC fire sprinkler system will enhance the safety and security of your building when properly maintained. IPEX CPVC Fire Sprinkler Products resist attack from a wide range of chemicals that are corrosive to metallic piping. As with any piping material, there are, however, certain chemicals that can be detrimental to CPVC. Occasionally some of these chemicals may be found in some construction products, site preparations and building maintenance. There are certain things that you need to be mindful of in caring for or working around your IPEX CPVC fire sprinkler system.

Keep your system clear from contact with the following products and chemicals unless product labels state materials are compatible with CPVC:

NOTICE	
Ordinary considerations	Property maintenance services
Cleaning Products Detergents, Oils/ Lubricants/Greases, Rubbery Materials	Fungicides, Mold Remediation Chemicals, Termiticides/Insecticides
For hired contractors & do-it-yourselfers	
Corrosion Inhibitors, Glycol-based antifreezes, Solder Flux, Thread Sealants Flexible Cable/Wiring (especially communications cabling) Caulks/Mastics, Adhesive, Vinyl/Electrical Tape Non-Approved Spray Foam Insulation Non-Water Based Paint, Paint Thinners Wood Finishes / Varnishes	

The following jobsite activities or conditions should be avoided:

- Sitting, standing, hanging, leaning, or resting anything on the pipe, fittings, and sprinklers
- Grounding electrical wiring to the pipe or fittings
- Ambient temperatures below 40°F (4,4°C) where your fire sprinkler system is located. (Unless an approved compatible antifreeze or insulation method is installed.)
- Hot work around the pipe, for example, blow torches, soldering, etc.

Be certain that this document is reviewed and understood by anyone working on or around your CPVC life safety system. If you have any questions or need assistance on chemical compatibility with your IPEX CPVC fire sprinkler system, contact the manufacturer of the chemical or non-CPVC product in question.

Proper care will help your IPEX CPVC fire sprinkler system provide protection for years to come.

NOTICE

THIS BUILDING CONTAINS A CPVC FIRE SPRINKLER SYSTEM. THIS CPVC FIRE SPRINKLER SYSTEM IS A LIFE SAFETY ASSEMBLY AND MUST BE TREATED CAREFULLY. READ THE FOLLOWING BEFORE ANY ACTIVITY WHICH COULD CONTACT THIS SYSTEM:

CPVC piping components may be damaged by certain substances and construction practices.

- DO NOT stack, support, hang equipment, or hang flexible wire/cable, especially communications cable, or other material on the fire sprinkler system.
- ONLY system compatible materials should be used in contact with this system. For a list of products that have been tested and verified as compatible, consult the *FBC™ System Compatible Program information at www.fbcssystemcompatible.com*. *If the product in question is not identified in the System Compatibility Program, Lubrizol recommends, as does IPEX, that the chemical compatibility be verified with the manufacturer of the product in question.*
- DO NOT expose CPVC products to incompatible substances, such as cutting oils, non-water based paints, packing oils, threaded pipe thread paste and dope, fungicides, termiticides, insecticides, detergents, building caulks, adhesive tape, solder flux, flexible wire/cable (with special consideration for communications cabling), and non-approved spray foam insulation materials.
- DO NOT expose CPVC products to edible oils, solvents, or glycol-based anti-freeze fluids.
- DO NOT expose CPVC products to open flame, solder, and soldering flux.
- DO NOT drop, distort, or impact CPVC products or allow objects to be dropped on them.
- DO NOT handle CPVC products with gloves contaminated with oils (hydrocarbons) or other incompatible materials.

Failure to follow this notice may cause cracks or fractures to develop in CPVC products resulting in property damage due to leaks or flooding. The presence of any visible cracks may require partial or full system replacement. For additional information contact the general contractor or the fire sprinkler system installer.

FOR ADDITIONAL INFORMATION CONTACT TECHNICAL SERVICES AT 1-(800) 463-9572

NOTES:

SALES AND CUSTOMER SERVICE

Customers call IPEX USA LLC.

Toll free: (800) 463-9572

www.ipexna.com

About IPEX by Aliaxis

As leading suppliers of thermoplastic piping systems, IPEX by Aliaxis provides our customers with some of the world's largest and most comprehensive product lines. All IPEX by Aliaxis products are backed by more than 50 years of experience. With state-of-the-art manufacturing facilities and distribution centers across North America, we have earned a reputation for product innovation, quality, end-user focus and performance.

Markets served by IPEX by Aliaxis products are :

- Electrical systems
- Telecommunications and utility piping systems
- PVC, CPVC, PP, PVDF, PE, ABS, and PEX pipe and fittings
- Industrial process piping systems
- Municipal pressure and gravity piping systems
- Plumbing and mechanical piping systems
- Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
- Irrigation systems

BlazeMaster® is manufactured by IPEX USA LLC. and distributed in Canada by IPEX Inc.

BlazeMaster® is a registered trademark of the Lubrizol Corporation.

www.ipexna.com

This literature is published in good faith and is believed to be reliable. However, it does not represent and/or warrant in any manner the information and suggestions contained in this brochure. Data presented is the result of laboratory tests and field experience. A policy of ongoing product improvement is maintained. This may result in modifications of features and/or specifications without notice



Model RHB1 Spare Sprinkler Storage Cabinet

Product Description

Reliable spare sprinkler storage cabinets are designed to allow for storage of spare sprinklers as required by NFPA guidelines. The cabinets are available in six sizes:

All styles of spare sprinkler storage cabinets are manufactured with knockouts to facilitate storage of the most common size sprinklers. Shelves within each storage cabinet are positioned to enable storage of a sprinkler wrench. Each sprinkler storage cabinet is manufactured from 22-gauge steel and finished with red enamel paint. Each sprinkler storage cabinet features holes on the back panel to facilitate easy installation to existing structure of the building. Reliable spare sprinkler storage cabinets are not intended for harsh environments and are not recommended for outdoor exposure.

Ordering Information

Specify the following when ordering:

Model

- RHB1 Sprinkler Cabinet

Size

- 3 Sprinkler
- 6 Sprinkler
- 6 ESFR Sprinkler
- 12 Sprinkler
- 24 Sprinkler
- 36 Sprinkler

Guarantee

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

Spare Sprinkler Storage Cabinet

Technical Specifications

Material: Steel

Finish: Red High Gloss Epoxy



3 Sprinkler Cabinet



6 Sprinkler Cabinet



12 Sprinkler Cabinet



24 Sprinkler Cabinet



36 Sprinkler Cabinet

Dimensions with door closed in. (mm)

Table A

Cabinet Size	Width	Depth	Height
3 Sprinkler	7-3/8 (187)	2-3/8 (60)	5-1/4 (133)
6 Sprinkler	14-1/4 (362)	2-3/8 (60)	5-1/4 (133)
6 ESFR Sprinkler	14-1/4 (362)	3-1/8 (79)	6-1/2 (165)
12 Sprinkler	14 (356)	4 (100)	5-1/4 (133)
24 Sprinkler	14-1/4 (362)	4 (100)	8-3/8 (213)
36 Sprinkler	14-1/4 (362)	4 (100)	11-5/8 (295)

Installation

Installation is performed by using appropriate fasteners to securely mount the sprinkler storage cabinet to the wall using the holes in the back surface of the cabinet, ensuring that the door can freely open and close and that there are no obstructions that reasonably prevent access to the sprinkler storage cabinet or its contents. After installation of the sprinkler storage cabinet, the appropriate number and type of sprinklers shall be inserted into the cabinet in accordance with applicable requirements. Close the door to the sprinkler storage cabinet.

P/N 9999970705